SIGA-HYDRO

SIGA Hydro response to Capacity Requirement and De-Rating Factor Methodology Detailed Design Consultation Paper SEM-16-051

Introduction

SIGA Hydro is developing a 360MW pumped storage plant at Silvermines, County Tipperary to serve the Irish electricity market.

Pumped storage is widely acknowledged as being a highly effective means of integrating large volumes of variable wind power into relatively small and isolated power systems[1]. Pumped storage is more efficient than other synchronous storage technologies and can be developed cost competitively to the benefit of consumers. In order to achieve these consumer and operational benefits, Silvermines pumped storage plant must be able to bid and to earn a fair return on investment. A well designed CRM forms an important component of this fair return as well as delivering additional consumer benefits such as security of supply, reduced energy price volatility and lower long run costs.

In order to achieve the benefits of additional pumped storage capacity in the Irish market, the new plant must be able to bid effectively and to earn an adequate return on investment should it be successful in the capacity auction.

Secure capacity income will be a vital component in securing investment. It is important that the capacity procurement process should not inappropriately discriminate against pumped storage.

De-rating Methodology

Source data for de-rating factor determination

The TSOs describe the proposed de-rating methodology for various generation technologies in their paper of August 22nd 2016 (SEM-16-051a)

In arriving at de-rating factors for generation technologies (apart from wind), the TSOs have decided to use outage data from Electronic Dispatch Instruction Logger records from January 2011 – December 2015 (and as at 31 January 2016).

In February 2010 Turlough Hill Unit 2 started a scheduled outage for a major overhaul. A type fault was discovered which led to forced outages of all four units by July 2010. The redesign and modification work arising from this fault resulted in outage of these units until mid-2012. The outage data set which the TSOs propose to use for determining de-rating includes these outages, which occurred after almost 40 years of high-availability service.

As a result of including the outage data for 2011-12 for pumped storage, the proposed derating factor for this technology is 86% for units below 100MW in size. For larger unit sizes, the derating factors are lower.

We believe that the derating factors projected for pumped storage are too low because they are based on untypical outage date. Please note that the derating factor determined for pumped storage in the Great Britain capacity auctions was 96.63% - higher than for any other technology and reflecting actual average pumped storage performance. Furthermore, please note that the average Great Britain pumped storage unit size is over 180MW.

Having low and inappropriate derating factor for pumped storage leads to a higher-than-necessary total capacity requirement, adding cost to customers for no benefit.

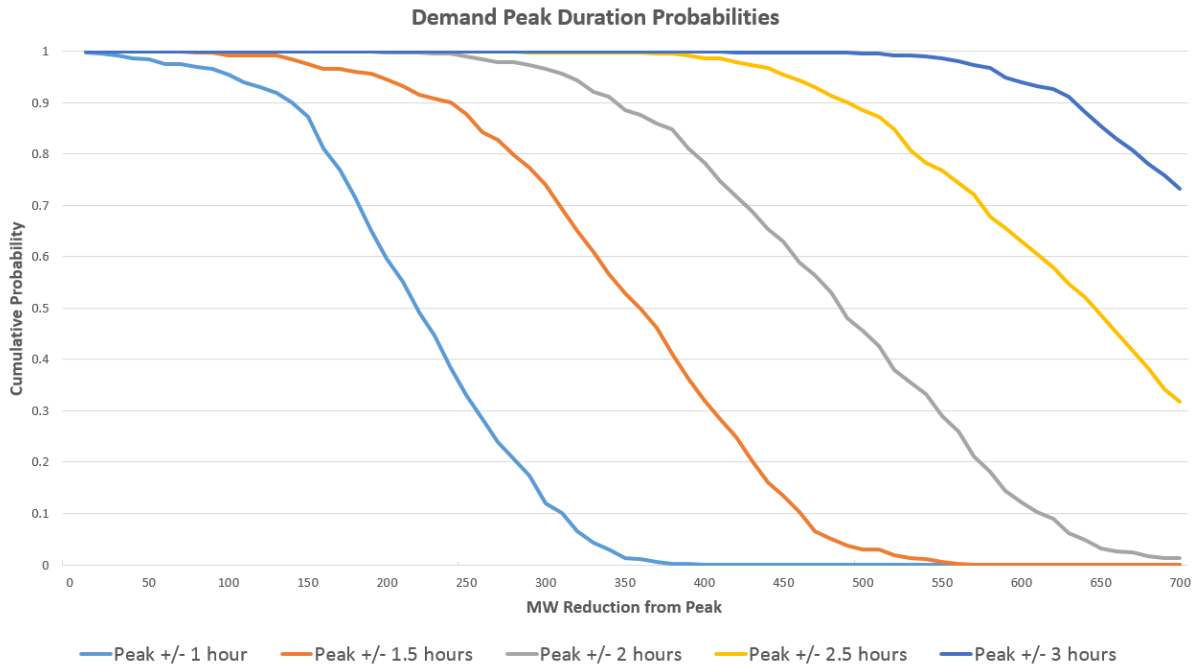
[1] See for example http://sse.com/newsandviews/allarticles/2016/10/future-of-pumped-storage-hydro-analysed-in-new-report/

Furthermore, a low derating factor will reduce potential capacity income for new pumped storage plants. Secure income is required to finance these capital-intensive projects.

Application of marginal contribution approach to de-rating factor determination

SIGA Hydro considers that the marginal de-rating approach penalises pumped storage units unreasonably and unfairly. The suggested de-rating factors of as low as 54% appear flawed when compared with the e-rating factor of 96.63%[2] for pumped storage in our neighbouring GB market. Pumped storage is one of the most reliable technologies available as evidenced by the availability based methodology used in GB for the calculation of de-rating factors[3]. While we accept that the pure availability based methodology does not take the energy limited nature of pumped storage into account, we assert that the marginal derating approach overemphasises this energy limit.

To demonstrate the performance of such energy limited storage units, SIGA-Hydro have analysed the all island demand data for the years 2010 to 2014 inclusive. This analysis was carried out for all demand peaks greater than 5,500MW and shows that demand peaks reduce by over 400MW within 2.5 hours with a probability of 1 (within the data set studied)



This clearly demonstrates that storage with the capability to deliver energy over 2 to 5 hour timeframes makes a real and full contribution to generation adequacy.

[2] See https://www.emrdeliverybody.com/Capacity%20Markets%20Document%20Library/Auction%20Guidelines%20June%2029%202015_TA.pdf
file:///C:/Users/Ken/Downloads/DRAFT%20AUCTION%20GUIDELINES%20June%2027th.pdf

[3] See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/325074/Capacity_Market_Rules.pdf

This unfair treatment of storage units appears to arise from the marginal de-rating methodology used to calculate de-rating factors. SEM-16-051a[4] acknowledges the difficulty in calculating the marginal de-rating of storage units and describes the process used as;

"For the indicative results presented in this document the marginal de-rating approach to storage is specific to the existing pumped storage unit in the SEM. The generation component is treated as a load modifier (i.e. it reduces the peak demand until the associated reservoir is depleted)"

This approach appears unsatisfactory in a number of areas including;

- The analysis is based on a fixed storage capacity of 1540MWh but examines maximum export capacities up to 500MW equating to just 3 hours of storage. Pumped storage systems are more typically designed to provide 5 to 8 hours of storage, more than sufficient to cover scarcity events.
- The performance statistics (FOR 7.1% and SOR 4.9%) used for the analysis were inappropriate as discussed above
- The particular Set of Capacity Adequate Portfolios (CAPS) for the various demand scenarios is unknown and unclear. The variance of the de-rating factor when calculated for different portfolios should be specified
- The distribution of the load modifying function of the storage unit is unclear. Was the load simply reduced by a 1540MWh block centred on the peak for example?
- The LOLE calculation methodology is unclear. Was the methodology outlined in the All-Island Generation Capacity Statement 2016-2025[5] used for example?

SEM-16-051a[6] also acknowledges that additional analysis is required for pumped storage. SIGA-Hydro requests that the methodology for this further analysis be clearly defined and agreed with stakeholders prior to the analysis being carried out.

Responses to specific questions

Section 2 – Capaacity Requirement and De-rating Factor Methodology

2.2.1 The SEM Committee welcomes views on all aspects of the methodology proposed and the historic and forecasts inputs used including:

A. The determination of Capacity Requirement;

As stated, we consider that the methodology applied to determination of de-rating factors for pumped storage gives inappropriately low factors resulting in a higher than necessary capacity requirement.

B. The treatment of operational reserves in the determination of Capacity Requirement;

[4] Available at https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-16-051a%20Appendix%201%20TSOs%20Capacity%20Requirement%20and%20De-rating%20Factors%20Methodology.pdf

[5] Available at http://www.eirgridgroup.com/site-files/library/EirGrid/Generation_Capacity_Statement_20162025_FINAL.pdf

[6] Available at https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-16-051a%20Appendix%201%20TSOs%20Capacity%20Requirement%20and%20De-rating%20Factors%20Methodology.pdf

We welcome the change to include reserves in the determination of Capacity Requirement. This change aligns with the approach in the GB market and appears prudent in the context of the I-SEM.

C. The technology groupings;

No comment

D. Determination of the marginal de-rating curves;

As stated, we consider that the marginal de-rating approach has been inappropriately applied to pumped storage, resulting in de-rating factors that are too high. SEM-16-051a acknowledges that additional analysis is required for pumped storage. SIGA-Hydro requests that the methodology for this further analysis be clearly defined and agreed with stakeholders prior to the analysis being carried out.

E. The determination of Effective Interconnector Capacity;

No comment

F. The use of the TSO De-Rating Model in conjunction with the RA-determined values of Effective Interconnector Capacity and the outage rates for the interconnector Technology Class to determine the marginal de-rating factors to be applied to the interconnectors.

No comment

2.2.2 The Committee would particularly want to receive evidence supporting any alternative to the methodology proposed, where possible supported by quantitative analysis.

We have stated our concerns relating to the proposed de-rating factors for pumped storage and we have stated the basis for those concerns. The TSOs acknowledge that additional analysis is required for pumped storage. We request that further analysis be carried out and that SIGA Hydro and other stakeholders be consulted prior to this analysis being undertaken to agree and appropriate approach.

Conclusions

SIGA Hydro urges review of the methodology for determining derating factors, in particular for pumped storage, where use of untypical data and the marginal contribution approach taken is giving rise to inappropriately low derating factors.

By using more typical data and by modifying the approach taken to marginal contribution in the case of pumped storage, we believe that higher derating factors will be arrived at – similar to those used in the Great Britain capacity auction – and that this will lead to a lower capacity requirement and lower electricity customer costs.