Response to the AEMO Transmission Expansion Options Report

31 May 2023

Smart Wires Response

Introduction

Smart Wires are pleased to provide a response to the AEMO 2023 Transmission Expansion Options Report (TEOR). We would like to acknowledge that the document represents the culmination of a significant body of work, resulting in a comprehensive and invaluable guiding resource. As such, we welcome the opportunity to contribute towards the development of a robust, flexible, and efficient investment plan to meet the future electricity supply needs of the National Electricity Market (NEM).

As the leading provider of Modular Power Flow Control (MPFC) solutions, we continue to see the benefits that can be realised from the prudent application of MPFC on both new and existing transmission assets, increasing the capability of the power system by balancing power flows to improve the utilisation of existing networks, as well as for optimising and maximising the capability of new network augmentations.

MPFC installations are able to provide value in a number of different ways, notably:

- Providing an alternative to traditional solutions, (such as PSTs), often at a greatly reduced cost and lead time
- Enhancing project benefits, increasing the network capacity provided by an augmentation
- Enabling projects that would otherwise not be technically feasible without the inclusion of power flow control.

The modular nature of MPFC solutions, being readily staged and flexible in deployment, allow them to inherently mitigate the risks of over or under-investment that arise when trying to address the increasingly uncertain needs of the evolving power system. They allow for a high degree of flexibility in operation and deployment and can therefore support the grid's needs today while being adaptive enough to continue to do so tomorrow and into the future.

With the ongoing need to develop the transmission network to facilitate the energy transition, the imperative to leverage the advantages of integrating modular power flow control into the grid to provide cost-effective increases in network capacity is more timely than ever before.

Opportunities to realise the benefits of MPFC

We welcome the inclusion of MPFC as a part of the ISP methodology, published August 2021, and are pleased that AEMO has considered the potential benefits that the technology can provide, noting that MPFC has been included as a part of the preferred option for VNI West. We appreciate the enormous task that the TEOR presents and understand that in the development of the optimal set of network investments, it is not possible to investigate every possible permutation of potential solutions.

With that in mind, we would like to take the opportunity to highlight a number of opportunities where we believe MPFC could assist in the efficient delivery of a transmission network with greater renewable energy dispatch capacity for a relatively low incremental cost.

VNI West – Bulgana to Ballarat

We acknowledge the recently published VNI West PACR that describes the increased transfer capacity that is made available on the proposed 500 kV line development by implementing MPFC to prevent overloading on the 330 kV lines between the Snowy Area and South Morang as well as 220 kV lines approaching the Melbourne area.

In addition, we would like to present the concept of employing MPFC to also manage the loading of the existing low-rated 220 kV network between Bulgana and Ballarat to prevent constraints that could limit the dispatch of renewable generation in north-western Victoria once the new 500 kV lines have been constructed between Bulgana and Ballarat. Depending on the ultimate line development configuration, an increase in dispatch capacity of hundreds of MW is potentially possible for a modest investment.

HumeLink

The initial HumeLink RIT-T project options included the installation of a phase-shifting transformer to manage the loading on the Bannaby to Sydney West 330 kV line. This was found to be uneconomic and was excluded from the preferred option in the PADR. An initial assessment of using MPFC in place of the phase-shifting transformer in conjunction with the HumeLink project showed that the incremental increase in network MW capability came at a $/M cost that was considerably lower than that provided by the line build itself, however, the additional network transfer capacity that would be provided by the installation of MPFC wasn't forecast to be needed at the time of analysis.

Since that time, a substantial increase in the number of renewable generators that have connected in south-western New South Wales, combined with the ongoing and accelerated retirement of coal-fired generation in New South Wales means that it is likely an MPFC installation on the Bannaby to Sydney West line would provide real economic benefits and increased supply reliability by allowing up to 200 MW of additional renewable energy to be dispatched in south-western New South Wales for a $/MW cost that is an order of magnitude lower than the benefits provided by the line augmentations.

QEJP – Woolooga to South Pine

The proposed initial development of the 500 kV SuperGrid between Woolooga and Halys, via the proposed Borumba PHES, is expected to produce a constraint on the eastern Woolooga to South Pine 275 kV corridor. Phase-shifting transformers are proposed to be installed at Woolooga 275 kV substation to manage this constraint.

The implementation of MPFC on the eastern 275 kV corridor at Woolooga could eliminate, or at least defer, the need for installation of PSTs at Woolooga for a substantially lower cost and greatly reduced lead time, providing an economical way to effectively manage the uncertainty surrounding the timing, technical and financial risks associated with delivering the PST solution.

Southern Queensland to Northern and Central New South Wales

We would suggest that consideration of MPFC as an alternative to the installation of PSTs for both the SQ-NNSW and NNSW-CNSW projects is worthwhile. Similarly to the QEJP Woolooga case, the potential benefits of reduced cost, shorter equipment lead, along with the future flexibility of a modular solution make this an alternative option that should be evaluated.

Renewable Energy Zones

More generally, MPFC can be used to improve the benefits provided by other projects that could otherwise be reduced by operational constraints. This is expected to include the development of renewable energy zones (REZs) where new 330 kV line builds would occur in parallel with low-capacity 132 kV subtransmission networks. Controlling the flow of power on the lower capacity network could not only allow the capacity of the new lines to be better utilised but if power flow control is considered in the planning of the new 330 kV lines, higher-capacity lines can potentially be installed.

For this reason, we feel it would be useful for REZ design reports to be published that outline the proposed topology of the REZ networks to be made available as the preferred options are being refined and firmed. This would allow market participants to provide more relevant comments on solution options and enhancements that would maximise the dispatchable connection capacity provided by the REZs.

Lastly, we would once again like to thank AEMO for its highly transparent and consultative process, recognising the immense amount of effort that has contributed to the substantial scope of the Draft Transmission Expansion Options Report. AEMO has demonstrated an openness to investigating traditional and non-traditional solutions to maximise the benefit for the NEM and ultimately for all consumers. We continue to view the AEMO ISP and consultation process as the benchmark amongst the market segments within which we work around the world.

Regards,

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