CONGESTION MANAGEMENT

PROPOSED CONNECTION FEE AND ASSOCIATED MEASURES TO MANAGE CONGESTION COSTS

Initial thinking for discussion with Technical Working Group
23 June 2022

THE CHALLENGE

- A key option for analysis is the use of connection fees to provide incentives for the efficient use of the grid; ie incentivise connection of projects of the right design and scale at the right locations on the grid through lower, or no, connection fees to those projects and higher fees to others.
- A clear, transparent process is required
- The process also needs to:
  - be repeatable and transparent to support investors to make informed decisions
  - be consistent with the other post 2025 design measures
  - provide for jurisdictional policies especially in regard to REZs
- The process has to deliver on this core objective but also operate to minimise congestion where it is efficient to do so:
  - opportunities should be provided for connecting parties to optimise projects
  - incentives to TNSPs, and
  - potentially opportunities for a broader range of parties to be rewarded for reducing congestion

BACKGROUND

- A level of congestion will be characteristic of the future, high renewables grid – the target has to be an ‘efficient’ level of congestion, not no congestion
- Parties need early information and understanding of the likely connection costs to pursue the right projects
- It is challenging to capture all the complexity of connecting different projects at different locations across the grid into one number
- Sequencing of projects will be key to outcomes
- To encourage innovation in the development of projects and minimise risks of perverse outcomes, the fee needs to reflect actual impacts on the grid as well as possible:
    - at the macro level, the choice of technology or mix of technologies to connect
    - at the micro level, the detailed design of the connecting plant

OVERALL APPROACH

- Efficient development and operation of the future power system:
  - Planning driven approach to the design and development of the future grid – the *optimal development path*
  - A connection fee (or other measure?) to drive investment in generation and storage of the most efficient mix and location to ensure efficient utilisation of the grid
  - Real time measures to ensure efficient utilisation and operation of the power system
- Supported by:
  - Hosting capacity information for guidance to future investors
  - Ongoing review of congestion costs and measures to refine grid operation and invest in grid enhancements where it is efficient
  - Enhanced opportunities for other parties to invest in congestion reduction measures

CONNECTION FEE DESIGN

DRAFT MODEL - FOR DISCUSSION

WHAT COST ARE WE TRYING TO REFLECT IN THE CONNECTION FEE?

- The fee could be designed to reflect the long run incremental cost on the network of hosting a particular generator at a particular location. Such an approach would normally incorporate a generator access standard. The long run incremental cost of connecting the generator would then reflect the NPV of the increased network expenditure required to ensure that the generator access standard was maintained with the additional generator connected.
  - The NEM has a planned approach to the efficient expansion of the network on a holistic basis. Accurately assigning the cost to a specific generator would be difficult.
  - Such an approach then requires detailed future planning with and without each connecting generator, to identifying the increased network expenditure
  - Conceptually targets with the cost of expanding the network rather than driving the efficient use of the network in place and under development
- Alternately the fee could be designed to reflect the incremental change in congestion across the grid driven by the connection and operation of a new generator.
  - Reflecting the incremental cost of congestion would appear to better reflect the economic cost and reduce the administrative overhead
  - Reflecting the incremental cost of congestion would appear to better reflect the economic impacts on the market and value to customers, and reduce the administrative overhead

Idea for discussion

- The connection fee should aim to reflect the impact the connecting generator has in increasing congestion on the grid.

SHOULD WE DEFINE CONGESTION BASED ON PHYSICAL OR FINANCIAL IMPACTS?

- The impact of a new generator on congestion in the NEM could be quantified in terms of MWhs, hours of congestion or the percentage of energy constrained. Such physical measures could be simpler than modelling price.
- However congestion for renewable generators may often occur at times where the value of energy is low
- Price modelling would still be necessary to determine which generators reduce output as the new generator enters the market
- Need to focus on maximising value rather than physical access to be consistent with the NEO and optimise the use of the transmission system.
- Approach should also incentivise efficient projects - including choice of technology and detailed design choices which maximise the value to customers of projects

Idea for discussion

- Congestion should be measured in terms of its financial impact.

SHOULD FEES BE PRE-SET OR CALCULATED FOR INDIVIDUAL PROJECTS?

Should we pre-define connection fees or provide a process which can be applied at the time connection is finalised?

- Prior planning information will be important to direct parties to the right opportunities
- However the impacts of congestion from a new connection will be directly related to:
  - the scale and profile of the use of the network by the project, and
  - the connection of other projects to the grid

  Making them bespoke to the specific project
- Proposed projects can often be large compared to the locational hosting capacity leading to significant impacts as other projects finalise their connection

Ideas for discussion

- The forecast cost of congestion cost for a ‘standard project’ at each connection point on the grid could be published for information as part of the ISP
- The actual connection fee applying to any project be specifically calculated for that project immediately prior to finalising a connection agreement.

HOW SHOULD JURISDICTIONAL SCHEMES BE ACCOMMODATED?

- The ISP proposes various renewable energy zones (REZ) for development over time to provide for more efficient and effective connection of renewables to the grid
- Jurisdictions have, or are considering, schemes to proved for the development of REZs
- Congestion within a REZ will be dealt with by the REZ developer, but the overall value of a REZ is subject to the broader access they provide to load. This will be affected by other parties connecting outside the REZ
- The extent to which the connection fee arrangements provide for future designated REZs needs to be considered
- REZs also are expected to implicitly or explicitly include a connection fee through the use of competitive auctions to fill a REZ.

Ideas for discussion

- Where a REZ has been identified in the ISP and declared under a jurisdictional scheme, it should be accommodated within the connection fee calculation process
- Parties connecting in a REZ should be subject to the arrangements within that REZ and be exempt from the general connection fee regime

HOW WOULD THE FEE BE CALCULATED?

- In seeking to reflect the change in the NPV cost of congestion as a result of a connection, it is proposed to use market modelling
  - Modelling approach would be constrained to a limited base case and number of years to improve repeatability and reduce the resources needed to calculate
  - Modelling could be undertaken by AEMO or another body, but would need to be nationally focussed as congestion impacts of projects would be national
- A baseline market model would be required which reflects a most likely, or central case, in the ISP. The baseline case would need to:
  - cover a sample of several years within the next twelve years – aiming to cover the first 10 years of a typical project
  - include existing and committed plant and any designated REZ generation for each sampled year
  - include existing and committed network investment along with projects defined in the ISP for each sampled year
  - model outcomes in terms of dispatch and pricing, assuming participants bid their short run marginal cost
- A second case would then be run for the same sample years but including the generation of the participant seeking connection. This case would need to reflect the:
  - the generation level and profile of the proposed connection
  - be effectively forced to dispatch at these levels

HOW WOULD THE FEE BE CALCULATED (Contd)?

- A second case would then be run for the same sample years but including the generation of the participant seeking connection. This case would need to reflect the:
  - the generation level and profile of the proposed connection
  - be effectively forced to dispatch at these levels
- The additional generation would be offset by a reduction in other generation, based on their SRMC. The NPV of total congestion estimated by the sample years would be calculated, directly measuring the impact of the project on the total congestion cost in the NEM.
- The connection fee would reflect the NPV of the difference in total congestion costs between the two models
- The connection fee is expected to be high in some locations and low in others. It may be negative if the applicant is seeking to connect at a favourable location and displace other generation, reducing total congestion.

Idea for discussion

- Work is required to develop a process and modelling should be undertaken to test and refine the methodology.

POTENTIAL ISSUES WITH THE PROCESS

- The process is plan driven and determines a price based on projected outcomes which are inherently uncertain
- The price calculated on this basis would include all changes in congestion, intra and inter-regional, driven by the new participants generation
  - new generation operating in the NEM will displace other existing generation
- The calculated price needs to identify the impact on network congestion costs as a result of the new connection. It should not reflect:
  - the increase in curtailment of generators as a result of the additional generation, or
  - cost shifts associated with the change in plant mix
- The cost calculated would be very dependent on the projected generation profile of the connection applicant
  - need to assess the new plant based on its expected output profile, not on its modelled output in the market which would reflect a range of other factors
  - raises the question as to whether applicants can offer a modified output profile for the modelling to set their connection cost – especially where they might include an automated runback scheme in their connection

POTENTIAL ISSUES WITH THE PROCESS

- Should apply broadly to all generators, although application to smaller generators needs further consideration. Risks perverse outcomes if a 30 MW generator faces a connection fee and a 29 MW one does not.
- Application to storage needs to be considered. The process could determine a payment (negative fee) to proponents of storage based on their overall impact in reducing congestion.
- Ideally take into account the npv of costs over a longer time period. However forecasts, network investment, constraint formulation and the like become quite uncertain beyond 10 years. Propose 12 years to provide cost relevant to (approximately) the first 10 years of commercial operation.
- Costs would be scale dependent and non-linear. They will lead to a queueing issue – need to consider auctions where there is strong interest in connection

DESIGN OF SUPPORTING MEASURES

PLANNING INFORMATION FOR POTENTIAL INVESTORS

- The process to develop the optimal development path in the ISP inherently addresses future congestion on the grid, balancing the cost of expanding the grid with the benefits delivered.
- While the future grid builds in opportunities to efficiently connect the generation and storage needed, it accepts efficient levels of congestion. The hosting opportunities and congestion levels associated with connection at different points in the grid could be defined and published to guide investors.
- If the incentive to efficient locational investment is the connection fee, the most targeted information would be to publish information relevant to that – albeit not the actual fee that would apply to a specific project.
- Propose that a ‘standard project’ be defined and the incremental cost of congestion imposed on the system from locating such a project at connection points across the national grid be calculated and published. This could be undertaken, with or immediately after the publication of the ISP.
- The cost calculated for the connection of a standard project (for example, a 100 MW solar plant) would be useful to show the comparative costs for connection at different locations even though actual connection costs would be different.

MONITORING AND ENHANCEMENT OF THE GRID

- The development of the ISP is most appropriate to direct major grid development by taking a national and whole of power system approach.
- However implantation of the optimal development plan and actual investment in the power system could be further refined based on experience.
- TNSPs are required to publish an Annual Planning Review which should address actual and forecast congestion on their grid. This could be enhanced by requiring linking of:
    - information from the Congestion Information Resource to planned grid enhancements or refinements to operating arrangements
    - information on the incremental cost of connection to the grid and consideration of targeted investment or changes in operating arrangements which can be delivered at less than the cost of congestion.

INCENTIVES ON TNSPS

- The current regulatory environment contains a range of incentive mechanisms. These include the:
  - the service target performance incentive scheme (STPIS) and
  - the capital expenditure sharing scheme (CESS)
- The current version of the STPIS requires the parameters for each service component to be defined and the maximum revenue increment/decrement that a TNSP can receive for a given level of performance to be prescribed.
- The scheme includes:
  - a market impact component (MIC), and
  - network capability component (NCC) which includes the opportunity for TNSPs to earn beneficial funding for projects approved under their network capability incentive parameter action plan (NCIPAP).

TAILORING OF INCENTIVES

- The network regulation incentive mechanisms are regularly reviewed by the AER with the CESS currently under review.
- The intent of these incentive schemes is consistent with future needs but there are opportunities to tailor these schemes to better work with the new congestion management and network planning arrangements to ensure there are strong incentives to:
  - efficiently deliver the projects identified in the ISP, and
  - make incremental investments in the network to maximise the benefits it delivers for customers

WIDER OPPORTUNITIES FOR INVESTMENT

- Consideration should be given to ways in which other parties could be rewarded for efficient investment and operation which reduces congestion
- This may be delivered through:
  - the arrangements for setting connection fees which could be lower for generators connecting at the right location with the right plant and potentially some related investment.
  - connection fees for storage and plant which reduces overall congestion could be negative
  - A congestion relief market could provide a revenue stream for resources which reduce congestion. Similar rewards could be delivered through a CMM
- There should be further consideration of widening opportunities for innovation and opening opportunities for a wider group of participants to reduce congestion.