



Connections Reform

Appendix 3 – International Case Studies

June 2023

International Case Studies

USA

We engaged with the Energy Systems Integration Group (ESIG) to understand the connections process in the USA and learn more about the changes proposed by the Federal Energy Regulatory Commission (FERC) in relation to expediting the current process for connecting new electricity generation facilities.

ESIG shared some of the process for applying and also outlined some of the issues that generators face when trying to connect in the USA under the current process:

Application Process

- Most of the process is controlled at a federal level under specific requirements.
- Very little information on connection costs and lengthy interconnection process, resulting in speculative applications.
- Many applications submitted because developers do not know where to apply.
- There is c.2000 GW stuck in queue because it requires so much studying.

Offers

- Most transmission is built through the interconnection process and there is no country-wide transmission planning. Historically, planning was specific for each region e.g., New York has its own system operator, and they will plan for their state only. However, as renewable generation comes in, the flows between regions are becoming more important and currently inter-regional planning is almost non-existent.
- New generator impact studies are siloed so many facets are not accounted for e.g., connection of large industrial loads, connection of other generators, energy policy impacts, etc.

- There can often be large costs for projects and generators can sometimes be responsible for reinforcements hundreds of miles away due to the models' study process and criteria used to identify transmission upgrade needs.
- In some regions, the Transmission Operators will carry out cluster studies, which can help to identify transmission needs for the entire cluster but problematic if a customer withdraws their application (triggering restudies and further delays). Other Transmission Operators will study one generator at a time.
- As the process takes a long-time studies are based on fictitious equipment, rather than the equipment that the customer will actually use. There is no incentive for developers to advise Transmission Operators that their equipment has changed as it will result in restudies and additional delays. This can result in reliability issues.
- In some areas developers are not given a choice around curtailment and interconnection studies do not yield any information about prospective curtailment frequency/duration.
- There are two types of connection option: energy only or network connection services. The difference being in the study assumptions and criteria to identify transmission upgrade requirements that apply:
 - Energy only – having this connection does not guarantee that the generator will be able to transfer all the time.
 - Network connection services – if this connection is allowed then theoretically it should allow guaranteed transfer all the time and allows participation in capacity markets.
- Generators only get a full interconnector agreement towards the end of the process.
- There is no US-wide Grid Code equivalent but there are some requirements provided from the North American Reliability Council and FERC. Some regions have their own interconnection requirements.

International Case Studies

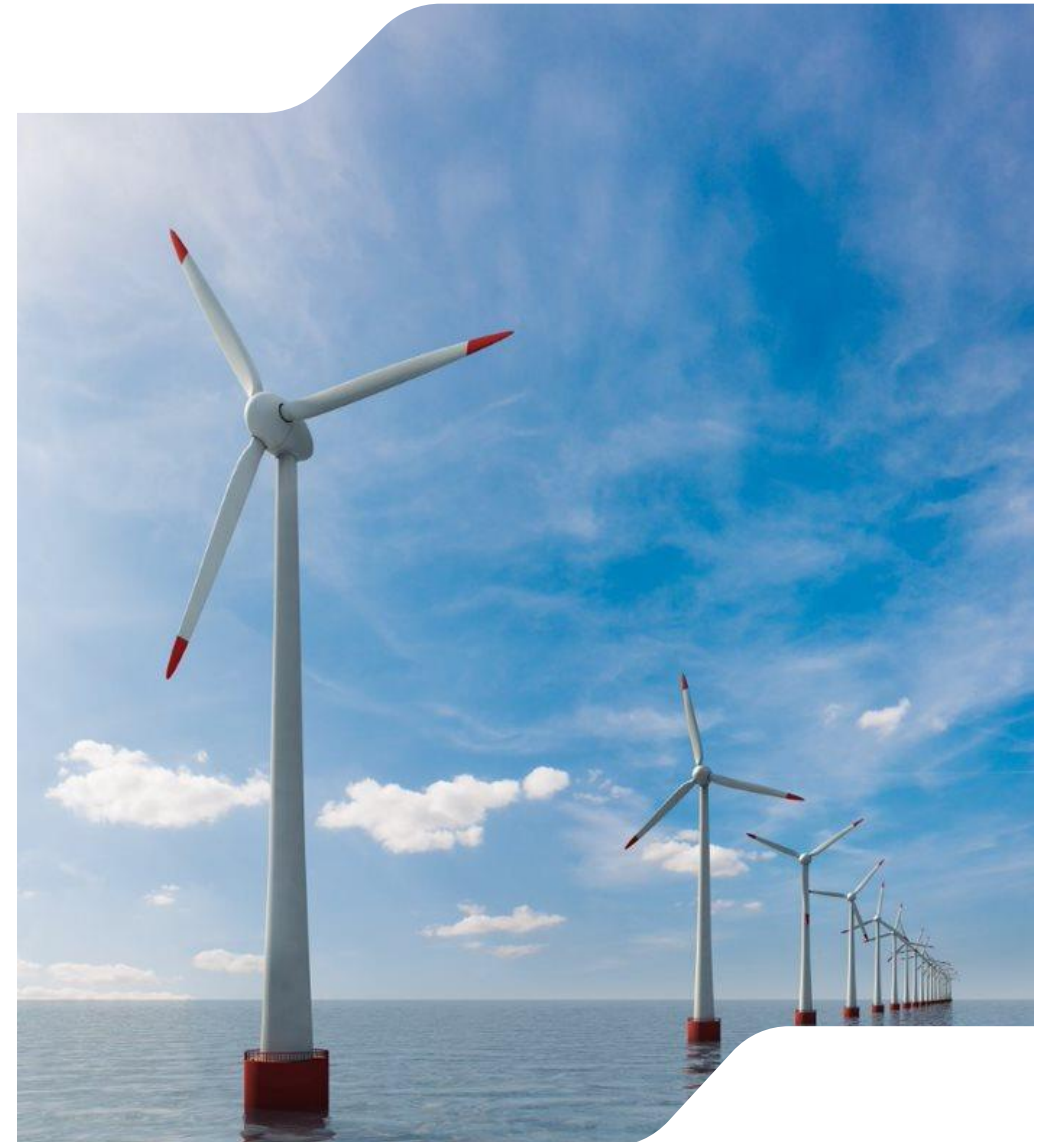
USA

Offers (continued)

- There are notable differences between ERCOT that serves most of Texas state and the rest of the USA, as the ERCOT system is not synchronously connected to the rest of the USA. The key difference relates to quicker connection times and no connection costs paid by generators (the costs are socialized to load customers), but this may lead to significant curtailments which are not compensated. ERCOT, through a periodic transmission planning process may identify economic transmission upgrades where the cost of transmission upgrade is covered by production cost savings provided by that additional transmission.

Future Proposals

- FERC have launched their proposals on interconnection process changes. This involves multiple consultation rounds and also includes a notice of proposed rulemaking which is issued first. Once all comments are received then the law will be produced.
- It is proposed that there will be a move to cluster studies for all and potentially include annual windows for these cluster studies.
- The proposals also include different readiness requests for each step, and this may include the requirement for land consents or site control to remove the more speculative bids. Alternatively, FERC may consider increasing charges at each step of the interconnection process.
- The proposals are also looking at heat maps including available capacity in MW as a way to show more information on where it is best to connect.
- FERC are potentially also considering placing higher penalties for the withdrawal process as another measure to deter speculative applications.
- More rigorous generator model and interconnection requirements are also proposed.



International Case Studies

Ireland

We engaged with EirGrid in Ireland around their connection process as they had previously gone through a connections reform process and were now looking to the future and further changes that they make to the process to ensure that it is fit for purpose for the future.

Application and Batching Process:

- Traditionally had a portfolio of a small number of connecting customers with multiple connections.
- EirGrid use annual batches with an annual window for applications which allows planners the opportunity to holistically plan. This is useful in trying to get the right technology types as there are rule sets used for the batches to help design.
- The Regulator in Ireland sets the regulatory framework for connections in Ireland which is followed by EirGrid as transmission system operator and ESBN as distribution system operator. Both System Operators work together utilising the annual application window and batches.
- The batch approach allows the System Operators to effectively manage the pipeline of grid connection applicants and to plan the system accordingly.
- EirGrid follow a set of rules to manage the batches and over time this has become more defined and has evolved in line with requirements.
- The System Operators process around 80 - 90 applications per batch. The top 25 renewable projects are chosen and then around 60 other applications are chosen by earliest planning date.
- Developers must have planning permission as a prerequisite to apply for any of the batches. This rule was established in 2018. However, planning permission is valid in Ireland for 10 years with an ability to extend if required.
- Under regulatory direction in Ireland, longstop dates have been significantly reduced within the contracts. This is to discourage the undue reservation of capacity. Projects that are not progressing in a timely manner are removed from the process.
- Under regulatory direction, the commitment model for grid connection in Ireland includes a first stage payment to be paid by the customer on offer acceptance. This payment is non-refundable should the project fail to progress. This is part of the commitment model utilised by EirGrid and is designed to discourage the undue reservation of capacity which is a scarce resource.

International Case Studies

Ireland

Challenges with batching

- EirGrid advised that there have been challenges, particularly with planning due to the number of live offers available.
- EirGrid advised that it is important to adequately time the batches and ensure that there is sufficient gap between the batches to ensure that all offers either are signed or lapse to ensure the true capacity is known.
- EirGrid also advised that it is important to set out the criteria of the batches which is done by the regulator.



Overall views on their current process

- EirGrid acknowledged that there have been some issues with the batching process. However, EirGrid noted that it has fundamentally been good for the Irish System Operators and has enabled EirGrid to remove interactivity from the connections process.
- Another finding is that EirGrid believes that the batching approach provides certainty for developers.
- EirGrid has developed a plan called Shaping Our Electricity Future which sets out EirGrid's view of the optimal development of the power system in Ireland to meet targets including those for renewables. This plan helps to inform government policy and regulatory direction.
- EirGrid advised that it fully supports the provision of clear and robust criteria in the batching process which brings in certainty for potential batch applicants.
- Finally, EirGrid advised that overall they perceive that there are more positives than negatives in the batching process.

International Case Studies

Ireland

Next Steps for Ireland - Shaping the electricity future

- EirGrid previously used a 10-year approach to reform. During this period, EirGrid overhauled the system services market, offering new services such as FFR, voltage and inertia. EirGrid have also overhauled the power system policies so that system non-synchronous penetration is now at 75%.
 - EirGrid have now launched Shaping Our Electricity Future 2030. This seeks to develop an integrated vision of the electricity system and market in 2030 and will continue to focus on the system becoming carbon free quicker.
 - To facilitate their ambitious plans, EirGrid hold Energy Citizens roadshows to meet with communities that are being impacted and there is a big drive within EirGrid to continually engage with all stakeholders.
 - The launch of Shaping Our Electricity Future 2030 comes off the back of substantial growth of large energy users within Ireland due to an increase in technology companies. EirGrid need to ensure that they can support this demand.
 - To try and address this EirGrid are looking for a blended approach to the Grid. This will involve also looking at smart grid technology to reduce the amount of new infrastructure.
 - EirGrid intend to provide further updates to industry on their Shaping Our Electricity Future 2030.
- EirGrid also published their Operation Policy Roadmap in December 2022 which they view as a pathway to 2030.
 - EirGrid indicated that ideally, they would move away from the developer led approach to network design, however, they advised that they understand that developers have invested heavily so EirGrid cannot simply disregard those developments.
 - As part of the 'Next Steps' project launched by EirGrid, the shaping team have been looking into the pipelines for renewable generation developments that have permissions in place, and Eirgrid are building these into their models.
 - In addition, EirGrid have also started to implement a regional approach with their Shaping Team to try and guide development for quicker connections.
 - EirGrid advised that they are keen to work on solutions with developers to ensure the correct connections are in the correct locations.
 - Further to this, EirGrid are considering whether the future batch process will be changed, however, any decision will be made in conjunction with their Shaping Team.
 - Finally, EirGrid stated that they wish to bring the developers on the journey and are focused on influencing policy to try and inform the regulator.

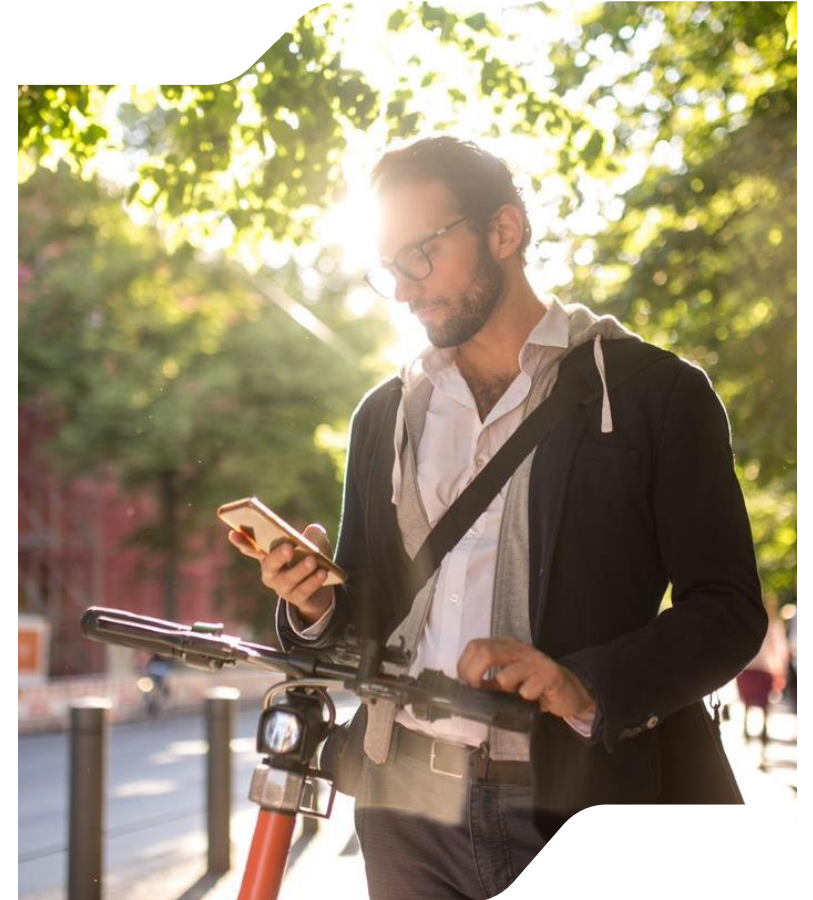
International Case Studies

Australia

Whilst we did not engage with the Australian System Operator i.e. the Australian Energy Market Operator (AEMO), we researched their current reform process to understand the proposed changes and the methodologies behind the process.

Background

- Initiated in Q2 2021, the Connections Reform Initiative (CRI) is a unique construct sponsored by the Clean Energy Council and AEMO working collaboratively with approximately 100 industry participants across a broad range of stakeholders.
- The reforms were launched to address concerns with delays and increasing complexity in connections to the National Electricity Market (NEM) and to facilitate the fastest clean energy system transition in the world. These complexities were arising as the NEM was transforming with a greater penetration of inverter-based resources, a more diverse generation mix, and a more decentralised system.
- The launch of the CRI was due to significant numbers of connections being requested in an increasingly constrained network. It is expected that there will c.122GW of additional variable renewable energy capacity by 2050 under AEMO's updated Step Change scenario.
- The vision is a connections process that is consistent, predictable, efficient, collaborative and “the best place in the world to connect new generators”.
- Connecting parties have been raising concerns about the connections process for some time – such as lengthy connections process timeframes, and complex and time-consuming technical and system strength assessments – which can have significant implications for renewable energy investment and project development. The Clean Energy Investor Group Investor Principles, published in August 2021, identified that network connection risks create uncertainty that is extremely difficult for investors to quantify and is the source of a material risk premium on their cost of capital.
- These risks and complexities have been exacerbated in areas where multiple parties seek to connect at the same time in areas of the NEM with low system strength, such as the West Murray Zone in Victoria. In this case, assessment timeframes required by the rules were not always able to be met, and AEMO was required to develop an alternative sequencing approach to progress uncommitted projects through the connections process.



International Case Studies

Australia



The Connections Reform Initiative

- The CRI has three objectives:
 - 1) a consistent and predictable connections process that delivers repeatable outcomes;
 - 2) reduced re-work and improved efficiency and quality of information to address information asymmetry; and
 - 3) to create a collaborative working model between industry, AEMO and the Network Service Providers (NSPs).
- A 'Connections Reform Roadmap' provides 11 recommendations to improve the connection process, including across access standards, information and modelling, batching, and investment certainty. All of these will help to speed up the connection process, lower the cost of connection, improve hosting capacity and system strength, and allow for firmer connection process timeframes.
- A 'Leadership Group' endorsed all 11 recommendations for implementation, subject to finalisation of a funding mechanism. There was unanimous support for a compulsory fee on developers (on a fixed \$/MW basis, over 3 years), and detailed planning and scheduling to ensure that the programme is achievable alongside business-as-usual and other demands.
- The 11 recommendations (and an update on each) can be found as part of the revised Connections Reform Roadmap here: [Connections Reform Initiative | Clean Energy Council.](#)