Gate 3 constraint modelling

EirGrid Customer Connection Forum

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Generation Analysis

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Overview

- Constraint reports status
- Explanation of terms
    - What are constraints and curtailment?
    - Groups and categories
- Build-out scenario
- Timelines

Constraint report

- The Gate 3 CER direction in relation to constraint modelling (CER-08-260):

  "*the TSO will issue, generally with the offers, estimates of the likely incidence of constraining off of the recipient's generation output from the date of commissioning until all necessary transmission reinforcement works are expected to be completed*".

Wind Integration Studies

Policy
Wind generators allowed to connect on 'non-firm' basis before 'deep' reinforcements are complete

EirGrid's Obligation
As part of Gate 3, EirGrid provides generators with forecasts of possible output reductions

Investment Decision
Helps windfarm developers to make investment decision

Constraint reports status

- Constraint reports are provided as part of the Gate 3 offer process. Customers have 50 business days after the reports are issued to decide on a connection offer.
- Interim constraint reports, the PGORs, have already been provided to customers.
- These PGOR reports were based on a draft dispatch rule-set that CER provided.
- The current SEMC proposals on Tie-break are different to the draft rule-set and, depending on the final Tie-Break decision, a re-run of the constraint studies may be required.

Explanation of terms

- There can be differing interpretations, sometimes subtle, on the definitions of certain terms. Below are some of the common ones encountered:
    - Constraint
    - Curtailment
    - Binding Constraints
    - Tie Break
    - Constraint Groups
    - Constraint Categories

Constraints

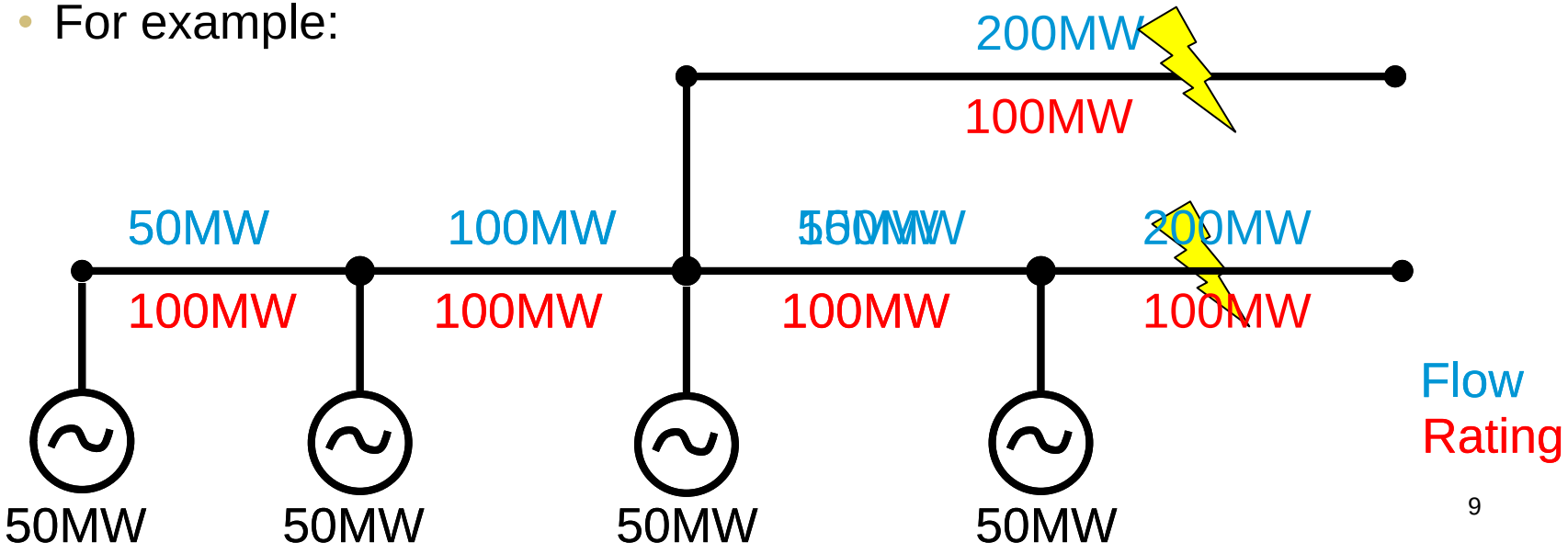
- Constraints are applied to generation to relieve transmission limitations or localised security issues on the transmission system.
- Examples of reasons for constraint:
    - Line rating overloads in the case where a line in the area trips
    - Line rating overloads for an intact network
    - Violation of voltage limits
- Constraints are typically applied pre-contingency to ensure the safe and secure operation of the power system.

Curtailment

- Curtailment is applied to generation to relieve overall system security issues.
- Examples of reasons for curtailment include:
  - Frequency control
  - Maintain reserve margins
  - Maintain a minimum number of conventional units for inertia and other system stability reasons.
  - Asynchronous generation limit – Facilitation of Renewables.
- Curtailment can be applied to any and all wind generation since it is the collective impact of the wind and not individual wind farms that is leading to system security limits being reached.

Binding Constraint

- A binding constraint is the most severe constraint that can affect a groups of nodes.
- Even though there is a binding constraint, there may be other underlying constraints that are masked by the binding one. These sometimes become apparent when the binding constraint is relieved.
- For example:



Tie Break

- A tie break situation occurs only where windfarms have an equal contribution to relieving a binding constraint.

Groups and categories

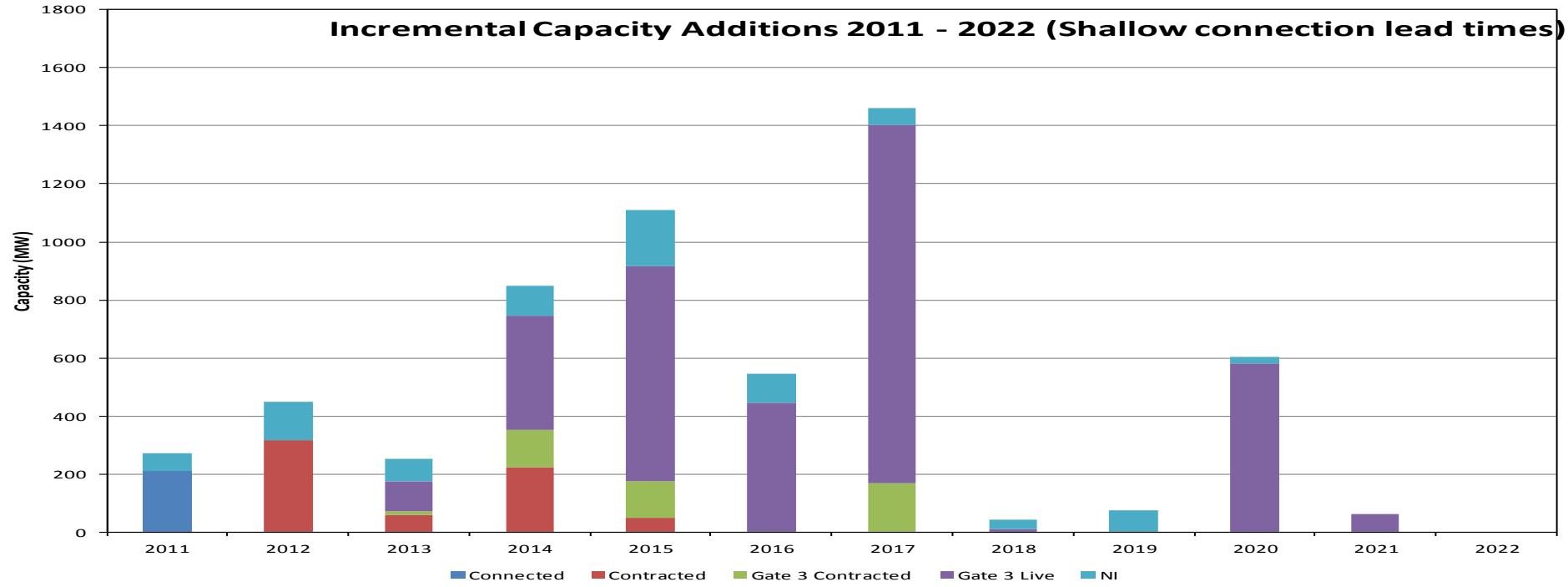
- A **Constraint Group** is a set of nodes with a set of associated windfarms connected to them where the windfarms have equal contribution to relieving a binding constraint. For the purposes of the tie-break consultation, different dispatch rules may apply within a constraint group.
- **Constraint Categories** are a way of differentiating in dispatch between windfarms in a constraint group e.g. by proportion of FAQ.

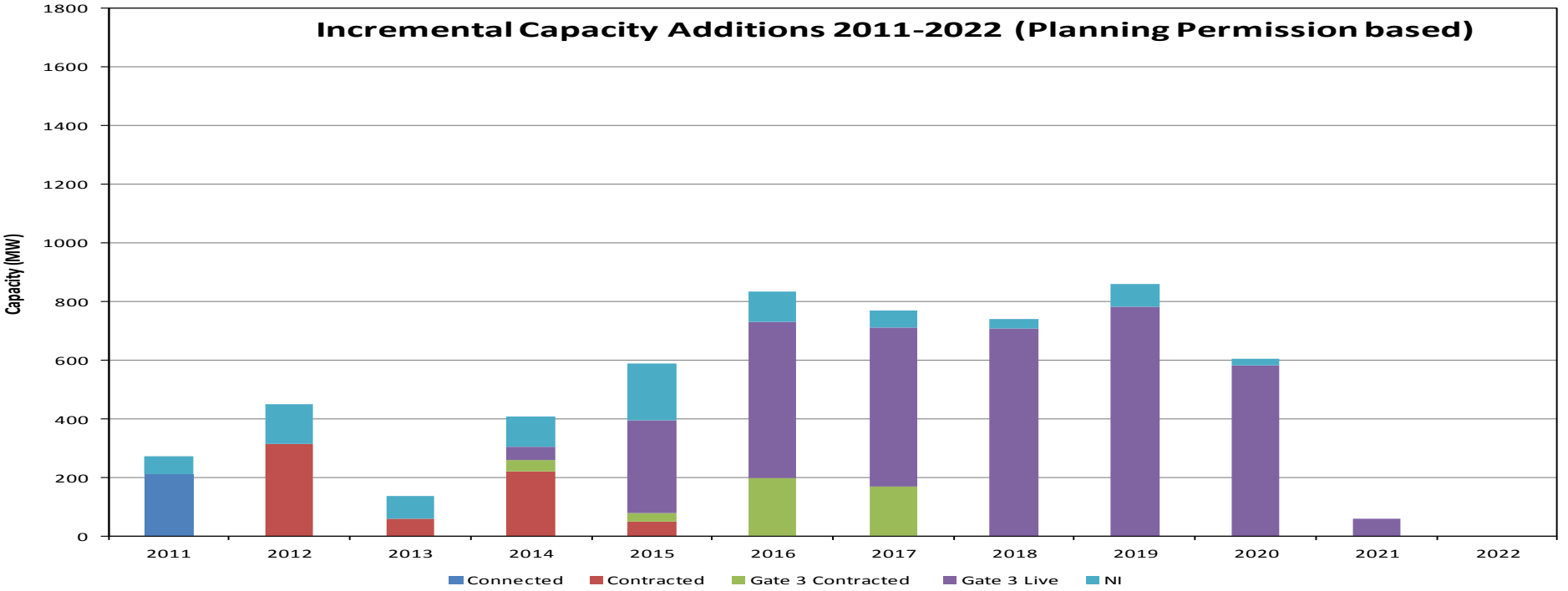
Build out scenarios

- The PGORs assumed that windfarms would connect based on shallow connection lead-times. We are proposing to do the same if constraint reports need to be re-done.
- We are also considering an alternative scenario which takes into account the time it takes to construct a windfarm as well as the shallow lead-time. This should take into account factors such as planning permission status, project size and location with respect to Natura 2000 sites.

Build out scenarios

- We have been discussing this alternative scenario with industry over the past few months.
- We have obtained a set of data describing the planning status of windfarms from IWEA. This is based on the grid co-ordinates in the project's connection application.
- We are shortly going to write to all windfarm asking them to check and correct any factual information if necessary.
- We plan to make this information publically available in the constraint reports at the very least.
- In the following slides we can show some draft information based on the information that we currently have.


Incremental Capacity Additions 2011 - 2022 (Shallow connection lead times)
Capacity (MW)
1800
1600
1400
1200
1000
800
600
400
200
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Connected
Contracted
Gate 3 Contracted
Gate 3 Live
NI


Incremental Capacity Additions 2011-2022 (Planning Permission based)
Capacity (MW)
1800
1600
1400
1200
1000
800
600
400
200
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
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Gate 3 Contracted
Gate 3 Live
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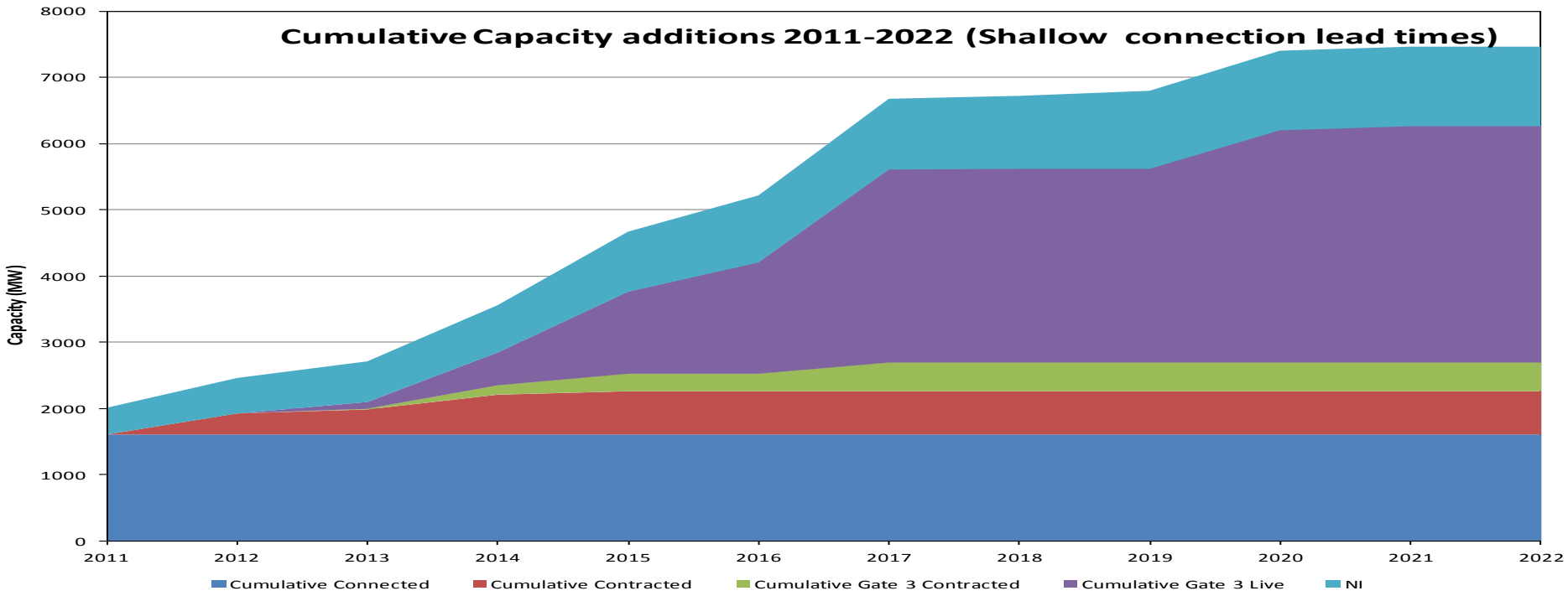
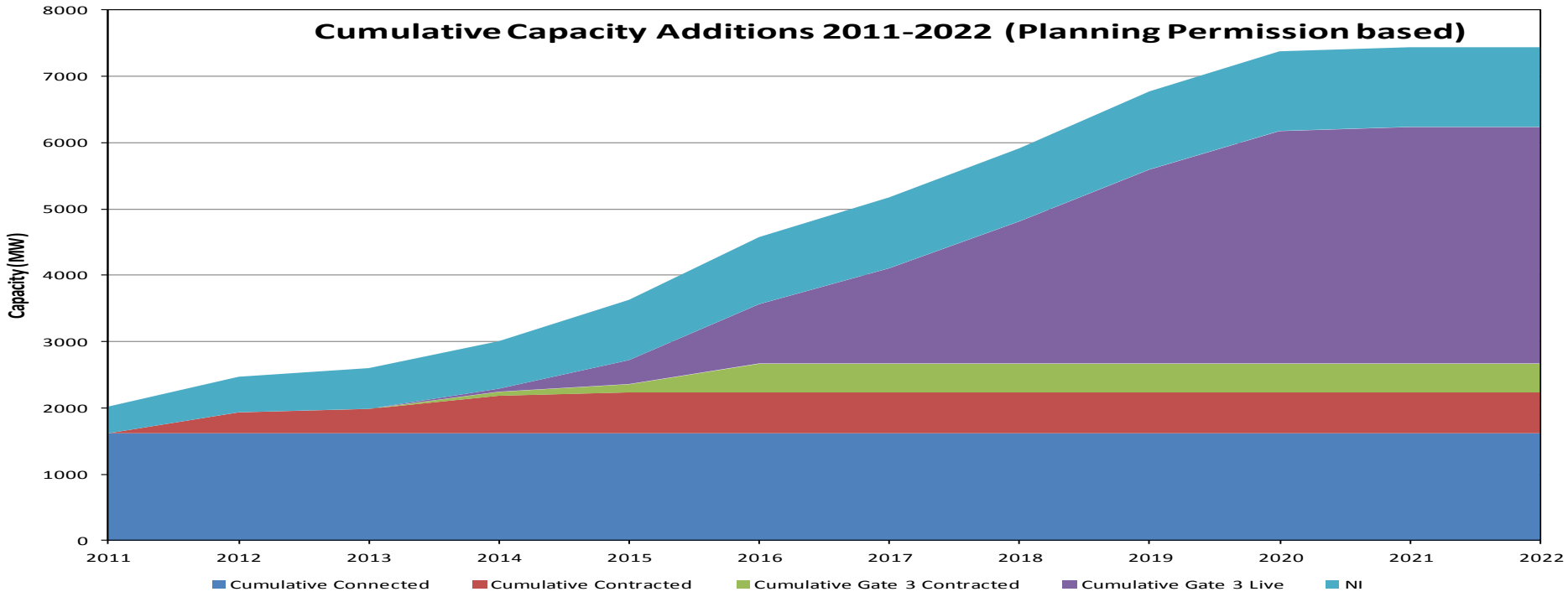

Cumulative Capacity additions 2011-2022 (Shallow connection lead times)
Capacity (MW)
8000
7000
6000
5000
4000
3000
2000
1000
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Cumulative Connected
Cumulative Contracted
Cumulative Gate 3 Contracted
Cumulative Gate 3 Live
NI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Cumulative Connected
Cumulative Contracted
Cumulative Gate 3 Contracted
Cumulative Gate 3 Live
NI

Timelines

- Timelines are very dependant on the timing of the SEMC decision and what the decision is.
- While we have indicated that it will take approximately 9 months at best to produce constraint reports following a decision, this is dependent on the detailed content of the decision.


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Shallow connection lead-times

- Typical transmission shallow connection works:
  - RTU only (9 months)
  - Substation work requiring planning permission (19-41 months)
  - Uprating substation components (10-96 months)
  - New multi-bay station w/ significant OHL/UGC (26-96 months)
  - 220kV or 110kV loop in >1km (21-59 months)
  - Transmission works in a GIS station (19-41 months)

- The DSO have also supplied shallow grid connection timelines for their projects

Build out scenario #2

- Planning:
  - Assume planning process starts one year in advance of the timeline for offer acceptance.
  - Assume if it is subject to a planning application amendment (reapplication) to planning site is outside any designated area 18 months.
  - Planning process (project is outside of any designated area) will take 36 months
  - If planning application is submitted assume timeline remains is 12 months
  - If you do have planning and the development is in Hen Harrier SPA's sites but requiring amendment or extension will take 36 months
  - If you don't have planning and the development is in Hen Harrier SPA's sites will take 48 months to get planning
  - If you don't have planning and the development is any other Natura site it will take 48 months to get planning

Build out scenario #2

- Construction:
  - Projects less than 40MW will take 12 months for construction /energisation
  - Projects greater than 40MW will take 18 months for construction /energisation
- Grid:
  - Possible delays to 110kV and 400kV shallow connections also considered.

Build out scenario #2

- Finance:
  - Subgroups where bilateral agreements between more than one party add on 6 months based on complexity factor involved
  - Financial Close to add 6 months for <20MW
  - Financial Close to add 9 months for >20MW