TRANSMISSION ACCESS

PUBLIC SEMINAR ON ALTERNATE MODELS

24 February 2021

AGENDA

Item	Time
Welcome & Introductions	9:00
Model Presentation # 1 – Fixed-shape time-of-day MLF (CS Energy) Model Presentation # 2 – Locational connection fee model (Shell)	9:15
Break-Out sessions	9:35
Plenary – key messages + discussion of models	10:05
Break	10:25
Model Presentation # 3 – Congestion Relief Market (Edify Energy) Model Presentation # 4 – Grid access reform (CEIG)	10:35
Break-Out sessions	10:55
Plenary – key messages + discussion of models	11:20
Q&A	11:40
Thanks and Next Steps	11:55
Close	12:00

CONTEXT AND OBJECTIVE OF TODAY'S MEETING

- ESB asked stakeholders to put forward alternative congestion solutions, noting the access reform objectives.
- We have received a strong response.
- Purpose of today's session is to:
  - Explore four alternative models for transmission access reform
  - Provide commentary and perspectives for both the Congestion Management Technical Working Group and the ESB to consider further as we progress the detailed design process.

We are seeking your initial views on:

- What are the strengths of the models?
- Are there any apparent gaps?
- What questions do you have regarding the models?

PRESENTATION OF MODELS

Fixed-shape time-of-day MLF

Evan Jones

Alternative approaches to congestion management

24 February 2022

Context

- Energy Security Board's objectives and assessment criteria
- Recent and in-train reforms and initiatives
  - Five Minute Settlement
  - Wholesale Demand Response Mechanism
  - System Strength
  - Essential Systems Services
  - State REZ schemes
- Targets versus levers; "big bang" versus hybrid solution

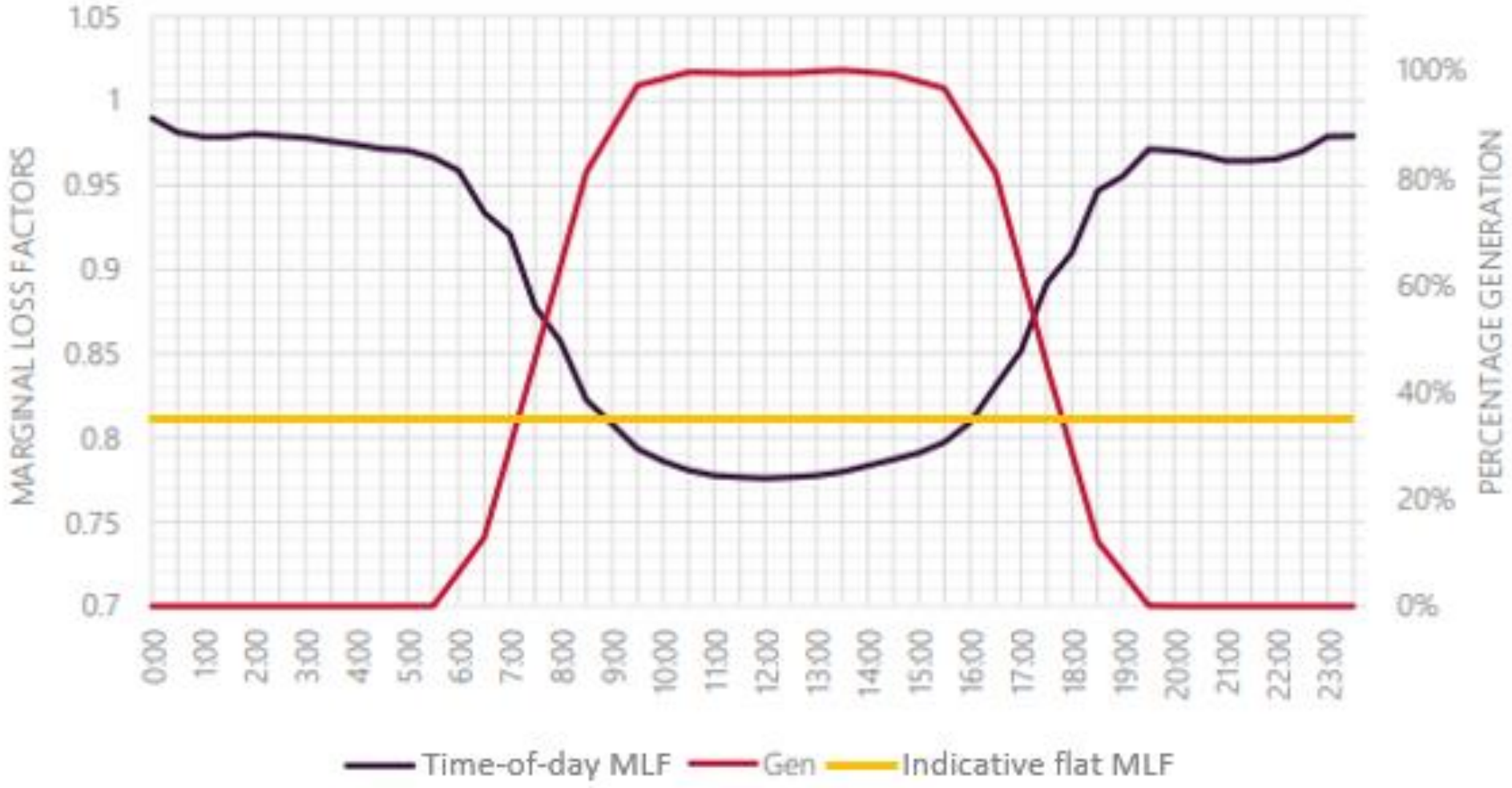
AEMC assessment of Marginal Loss Factors

The Commission conducted concluded through its additional quantitative analysis which further evaluated the effects of moving from a marginal loss factor methodology to an average loss factor methodology. The results from this additional quantitative analysis found that:

- MLFs provide and maintain the most efficient locational and dispatch signals to the market

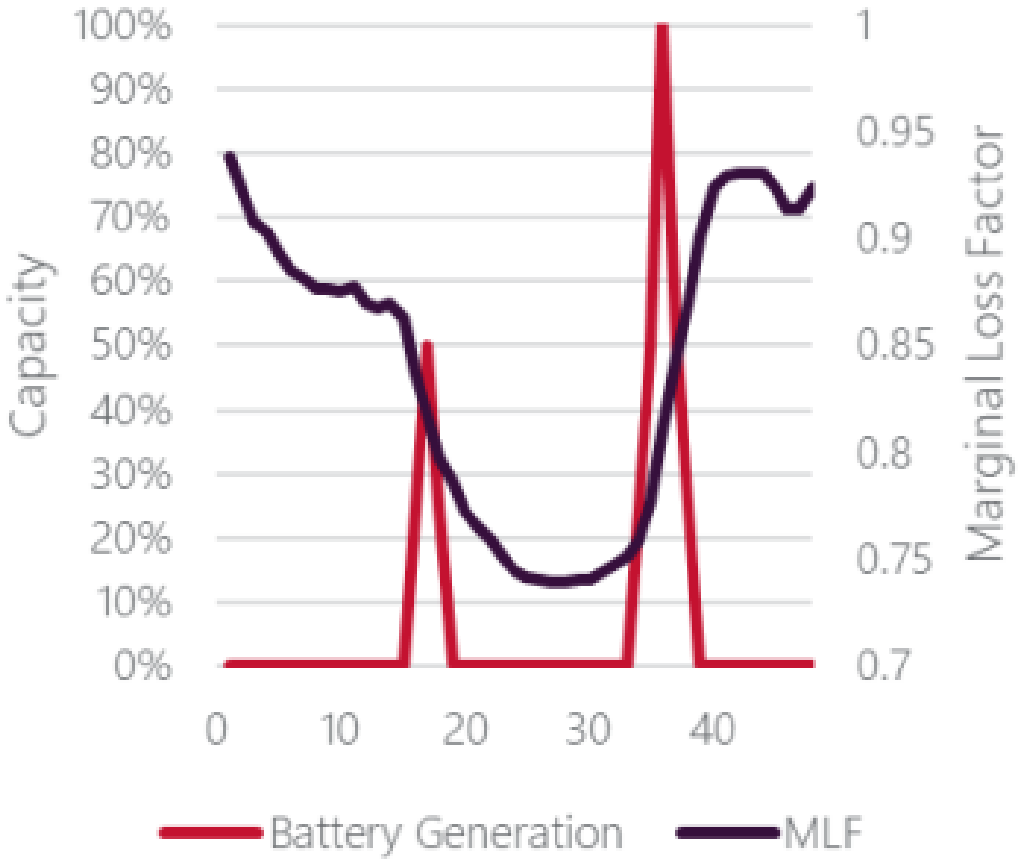
Source: www.aemc.gov.au/sites/default/files/2020-02/Final%20rule%20determination%20Transmission%20loss%20factors.pdf

Flat MLF vs. Time-of-day MLF

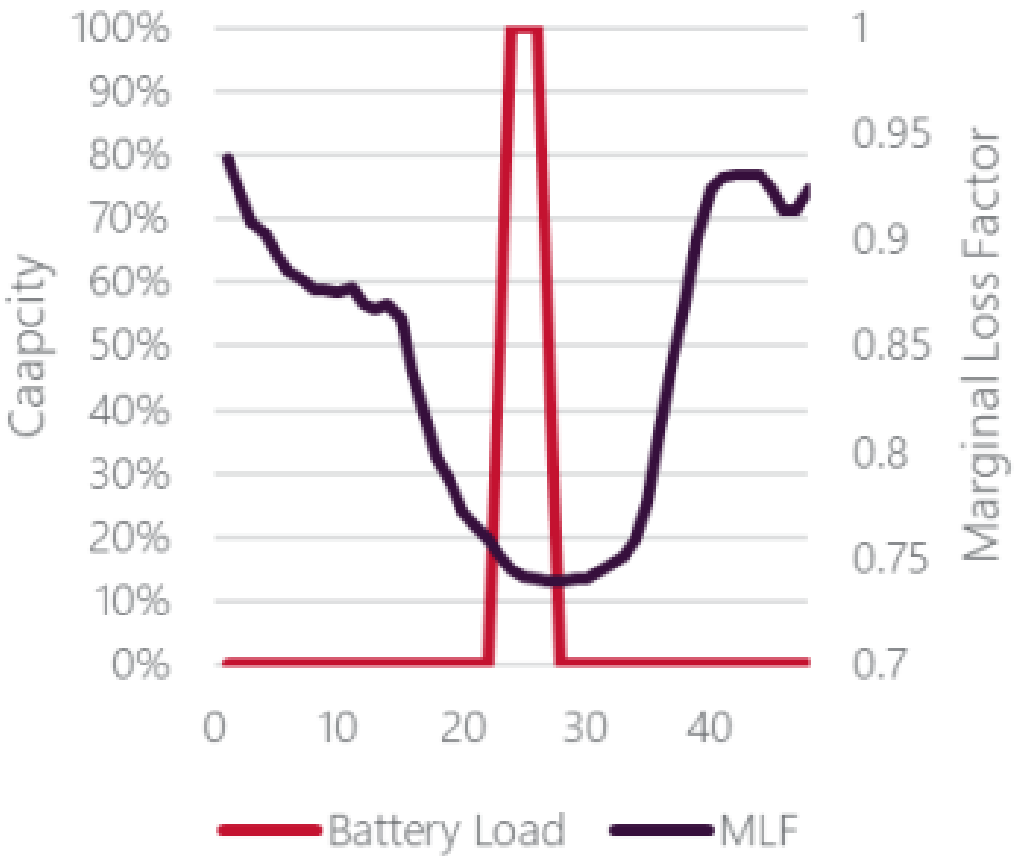


Source: Adapted from Australian Energy Market Operator, Regions and Marginal Loss Factors: FY 2020-21, page 65

Time-of-day impact of technology on MLF



Battery generation MLF = 0.8130



Battery load MLF = 0.7431

Source: Australian Energy Market Operator, Regional and Marginal Loss Factors: FY 2021-22, page 76

Addressing new investment displacing incumbents

- The ESB has expressed concerns that "*some generators are connecting in locations where… they are displacing the renewable generators that were already there*".
- Address this calculating the MLFs of new projects as the *true marginal* loss factor to reflect the marginal contribution of energy provided by the project beyond that of incumbent generation in that location on the network.
  - A low true marginal loss factor would dissuade new projects from connecting in heavily populated parts of the network.
  - The time-of-day profile would reinforce what technologies may be better suited to a particular location.
- Akin to the current approach to system strength, where new entrants are responsible for meeting the costs of addressing the impact of their locational decisions on system strength.

Performance against ESB assessment criteria

ESB's assessment criteria	Performance
Efficient market outcomes – investment	Time-of-day MLFs across the network visible to the market and potential investors. Ex-ante signal.
Efficient market outcomes – dispatch	Reduces ability to increase generation during typical periods of high concurrent generation.
Appropriate allocation of risk [due to congestion]	True marginal loss factor of new entrants means they bear 100% of their impact on losses.
Appropriate allocation of the cost of transmission investment	Further work to determine if augmentation funded by participants can be reflected in their MLF.
Implementation considerations	Utilises existing market mechanisms. Need to consult AEMO to determine implementation costs.
Flexibility to enable consideration of jurisdictional differences	No impediment to jurisdictions choosing MLFs that don't reflect network losses.

TRANSMISSION ACCESS REFORM

Locational connection fee model

Ben Pryor

Regulatory Affairs Policy Adviser

Shell ENERGY

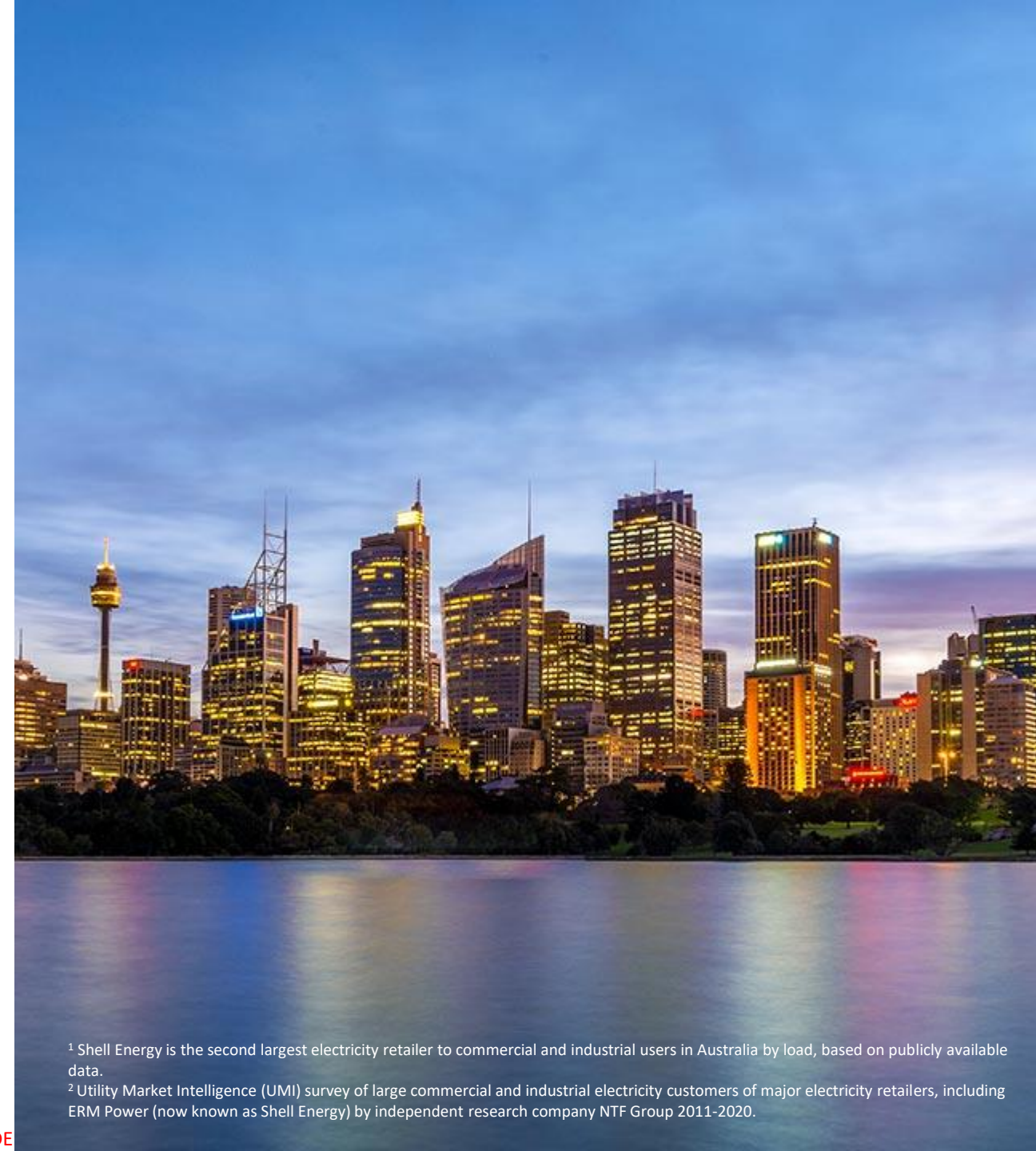
WHO WE ARE

Shell Energy is Shell's renewables and energy solutions business in Australia, helping its customers to decarbonise and reduce their environmental footprint.

Shell Energy delivers business energy solutions and innovation across a portfolio of electricity, gas, environmental products and energy productivity for commercial and industrial customers, while our residential energy retailing business Powershop, acquired in 2022, serves more than 185,000 households and small business customers in Australia.

As the second largest electricity provider to commercial and industrial businesses in Australia[1], Shell Energy offers integrated solutions and market-leading[2] customer satisfaction, built on industry expertise and personalised relationships. The company's generation assets include 662 megawatts of gas-fired peaking power stations in Western Australia and Queensland, supporting the transition to renewables, and the 120 megawatt Gangarri solar energy development in Queensland.

Together, we can build a better energy future.



[1] Shell Energy is the second largest electricity retailer to commercial and industrial users in Australia by load, based on publicly available data.
[2] Utility Market Intelligence (UMI) survey of large commercial and industrial electricity customers of major electricity retailers, including ERM Power (now known as Shell Energy) by independent research company NTF Group 2011-2020.

WHY AN ALTERNATIVE?

- Don’t agree there is a need for reform but accept that there’s a driver for reform
- Provide a strong and efficient locational signal
- Focus on delivering coordinated generation and transmission investment at lowest system cost
- Ensure no material harm to existing investments

LOCATIONAL CONNECTION FEE

[1] Process aligns with Dedicated Connection Assets rule change

WORKED EXAMPLE

	Status quo	Generator pays to augment network	Constrained off via runback scheme	Chooses new location
Generation capital cost ($M)	640	640	640	640
Locational connection fee ($M)	0	100	5	0
Capacity factor (%)	32	35	26	32
Assumed energy price ($/MWh)	55	55	55	55
Total system cost of congestion ($M)[1]	54.2	13.2	30.5	0

[1] e.g. includes impacts of constraints, loss of LGCs, changes to MLFs etc.

[1] e.g. impacts of constraints, loss of LGCs, changes to MLFs etc on both existing and new generation.

BENEFITS

01

Efficiently coordinates generation and transmission investment via clear incentives

02

All generators confident their transmission access won't be materially harmed

03

Increased certainty for new investors and clarity over connection costs

04

Incentivises investments in unconstrained parts of the network

05

Does not interfere with financial markets

06

Complements Dedicated Connection Assets rule change

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BREAKOUT ROOMS

Session 1

PLENARY DISCUSSION

Session 1

Edify™

Medium term access reform

Introducing the Congestion Relief Market

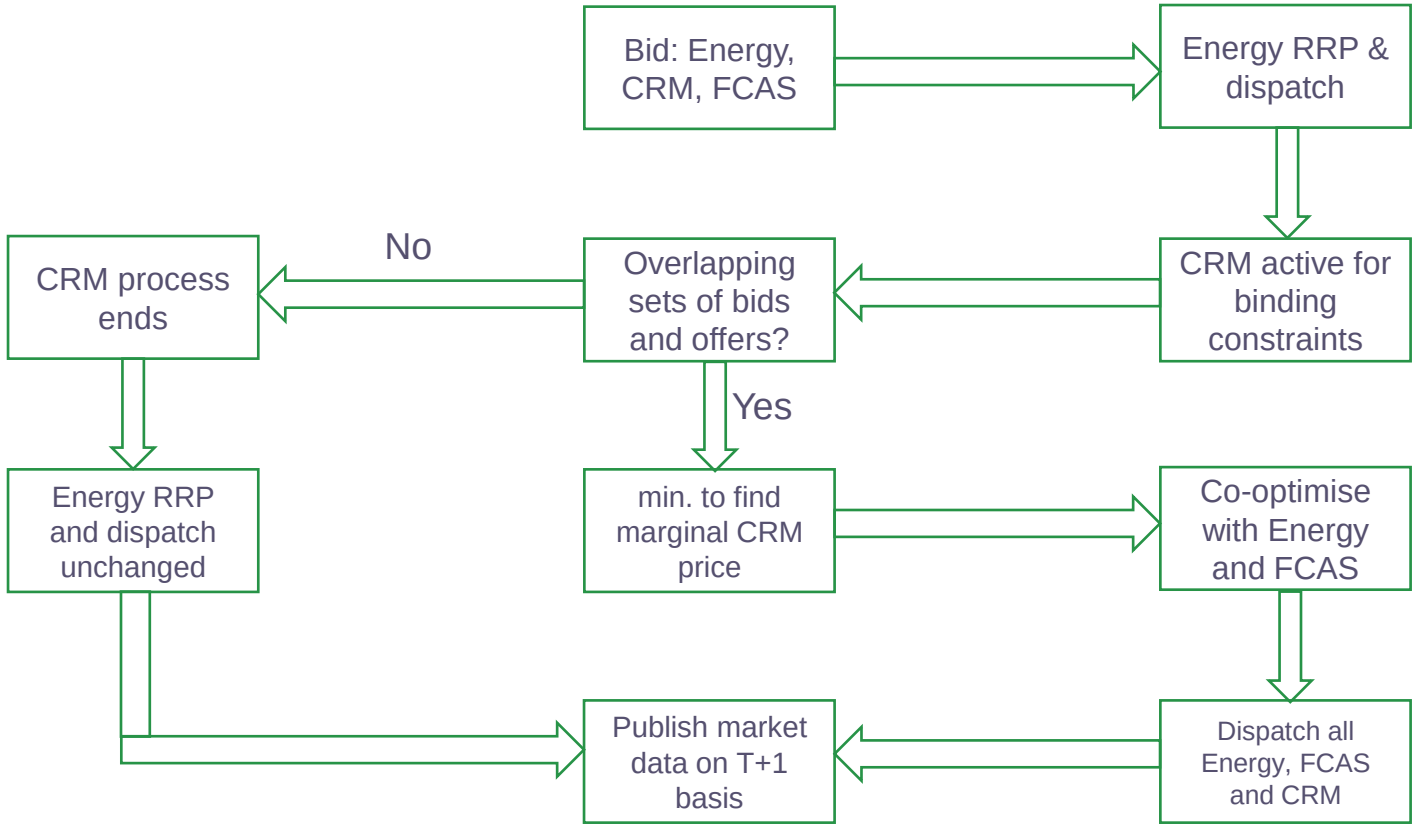
Congestion relief market

An alternate approach – Introduction

- Market participants have limited options during a constraint
- Constraint can be relieved, by adjusting the generator or load outputs, or by improving power system stability
- There is no incentive to relieve constraints as all participants are exposed to the RRP, and the benefit of doing so is shared amongst all participants behind a constraint
- Nodal pricing introduces too much change, CMM doesn't promote price discovery of congestion, and access rights over-simplify the causes of congestion at the expense of efficiency
- So, consider – an ancillary service that:
  - Facilitates a financial transaction between those who provide constraint relief and those who receive constraint relief;
  - Dispatches the outcomes to physically relieve congestion; and
  - Excludes non-participants from the transaction

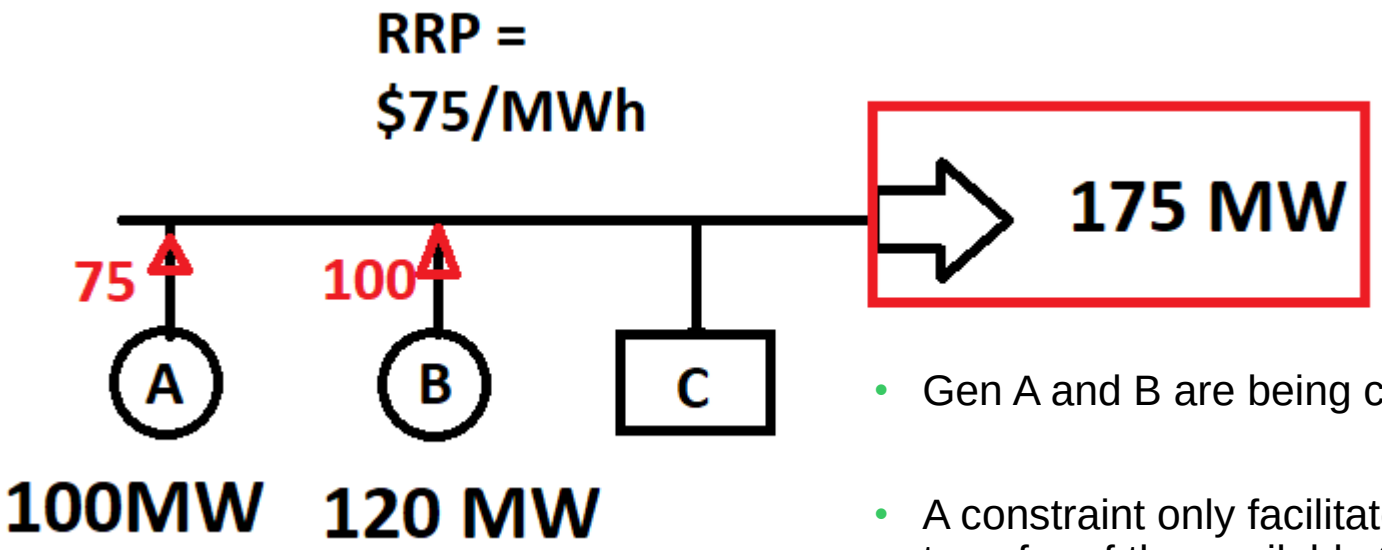
Congestion relief market

Process overview



Congestion relief market

Simplified example – action on constraint LHS

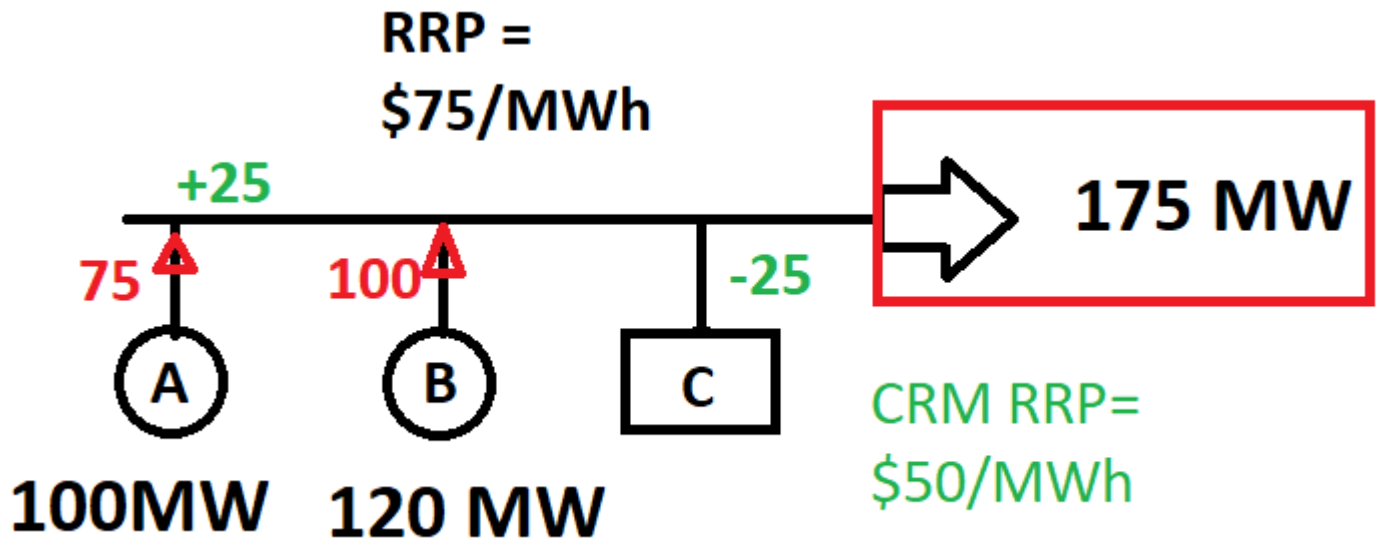


- Gen A has bid 100MW of generation below the RRP
- Gen B has bid 120MW of generation below the RRP

- Gen A and B are being constrained off
- A constraint only facilitates 175MW of power transfer of the available 220MW
- Gen A is being constrained down to 75MW
- Gen B is being constrained down to 100MW
- Gen C is capable of placing a load on the system

Congestion relief market

Simplified example – action on constraint LHS



- Gen A has submitted a bid for 25MW of congestion relief
- Gen B has also submitted a bit for congestion relief however it is priced lower than Gen C's lowest offer
- Market clears 25MW of congestion relief at $50/MWh to Gen A and C
- Gen C pays a net energy cost of $25 / MWh [RRP-CRM]

Congestion relief market

An alternate approach – Benefits

- Facilitates more efficient use of existing transmission infrastructure
- Rewards providers of congestion relief services and minimises impact on all other market participants
- Incentivises innovative technologies and solutions as the lowest marginal cost of supply of congestion relief has the competitive advantage
  - Storage technologies such as BESS, pumped hydro or industrial loads are natural suppliers, however an efficient spot market facilitates wide array of solutions in a technology neutral fashion
- A formal spot market for congestion relief also facilitates the development of derivative contracting solutions, allowing participants to manage financial risks, which in turn attracts additional investment into the NEM

Congestion relief market

Further developments – Investment time horizon

- Since submission in Post 2025 we have received feedback regarding the need to do more in the investment time horizon
- Edify has a preference for softer, less disruptive policy which seeks to improve market access to data that empowers participants to better understand and analyse risk
- Our suggestions for consideration:
  - AEMO publish loss factor data against each TNCP (and DNCP where possible) at a 5min/30min period via MMS to improve risk analysis of locational and profile impacts on MLFs
  - Iberdrola's suggestion of published Network Statement of Opportunities complimenting transmission annual planning report focussed on identifying efficient network locations for generation
  - Introducing requirements to complete congestion risk analysis for each project during or as a pre-requisite to receiving 5.3.4A / B letters.

Congestion relief market

Q&A

- Questions / Feedback / Suggestions?
- Next steps

Grid access reform proposal

Presentation to ESB – CEIG's alternative approach to congestion management

24 February 2022

Clean Energy Investor Group

About CEIG

CEIG is the voice for domestic and global renewable energy developers and investors in Australia

Combined, CEIG members own:

- More than 11GW of installed VRE
  - 20% total NEM
  - 50% total clean energy in NEM
- More than 70 power stations
- Portfolio value of around $24B
- Pipeline of more than 18GW

ESB P2025 reform

Main CEIG focus

ESB has set out 4 objectives* for access reform

- **Efficient locational signals for generators** - better signals for generators to locate in areas where there is available transmission capacity incl in REZs.
- **Efficient locational signals for storage and demand side management** - establishing a framework that rewards storage and demand side resources for locating where they are needed most and operating in ways that benefit the broader system.
- **Measures to give investors confidence** that their investments will not be undermined by inefficient subsequent connections.
- **Efficient dispatch** - achieving efficient dispatch by eliminating disorderly bidding.

* ESB, *Transmission access reform – Project initiation paper*, p.12 (Nov-21)

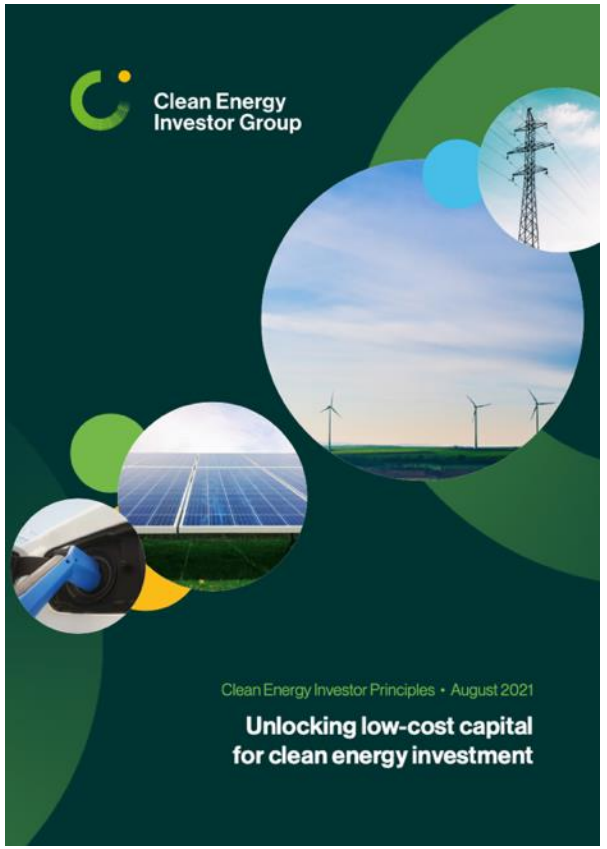
CEIG's alternative proposal to CMM-REZ

Grid access reform proposal

- This is a concept design: we are open to feedback & amendments.
- Alternative to ESB's CMM-REZ that seeks to be consistent with approach adopted in CEIG's Investor Principles

Risk premium in Australian market

- Survey of CEIG Members: 100-250 bps risk premium on cost of equity
- Caused by lack of revenue certainty and excessive risk



Operation of the current NEM

Open access designed to encourage lower marginal cost generation

- Steady thermal load, steady thermal generation
- Need to generate competition
- No guarantee of dispatch

Solving for short-term dispatch problem

Problem

- Open access ➔ uncertainty around future congestion + volatile MLFs
- No mechanism to allocate spare transmission (Tx) capacity
- Tx investment framework: uncertain timetable for future Tx investment
- Lack of coordination between transmission and generation

Consequence

- High risk premium due to revenue uncertainty & difficulty to predict future revenues
- Inadequate level of committed projects to achieve ISP scenarios

What will the future NEM look like?

NEM quickly transitioning to 100% Renewable Energy

Solving for long-term investment problem

- Energy transition will require large capital deployment (see 2022 draft ISP)
- Renewable generators characteristics:
  - High upfront capital cost: infrastructure cost (through cost capital) becomes more important, energy price less;
  - Near zero marginal cost: if all bidders have near zero marginal cost, no social benefit to dispatching any particular plant ahead of another

Objective: Achieve NEO by avoiding inefficient generation and Tx investment

- Need to minimise total infrastructure costs to achieve least-cost transition for consumers
  - Price lever (lower cost capital): need greater revenue certainty at time of financial investment decision about future ability to dispatch
  - Volume lever (minimise volume of infra built): optimise location of generation and Tx
- Efficient locational signal must be predictable and based on future generation and Tx conditions

Key elements of our proposal

Clean Energy Investor Group

CEIG's Grid Access Reform – Overview

CEIG is proposing a physical access regime which is designed to apply across the NEM, and within the REZ framework, leading to the following benefits:

- Locally firm, stable, more predictable access rights to Tx network
- Efficient utilisation of Tx network
- Minimise cost of infrastructure investment (generation, storage, Tx)
- Lower cost of capital
- Improved investor confidence

Grid access reform – Key elements

Queueing for curtailment order

- Applies to existing / future ISP Tx
- Allocate access to spare Tx capacity based on a queue
  - If need to decide who to curtail: “last in, first curtailed”
  - Includes protection for existing plants
- Provides access protection for existing plants

Transmission Charges as safety valve

- Applies if no existing or planned Tx capacity
- Generator can fund Tx inv to improve position in queue
- Incentive for storage as substitute to Tx inv

Grid access reform – Key elements

Use Average Loss Factor for settlement purposes

- Improve revenue certainty and predictability to lower cost of capital

Eliminate ‘race to floor’ bidding

- Amend tie-break rule to curtail thermal plants before renewables
  - Retain “physical” dispatch system requirements (e.g. coal plant ramp rates).

Queueing for curtailment order

Why a queue?

- Locational signal to generators about curtailment order if curtailment becomes necessary (*"last in, first curtailed")*
- Applies to spare existing or future centrally-planned (i.e. ISP) Tx capacity

How places are allocated in queue

- Recognition of incumbent access: existing plants receive position '0' in queue;
- First-come first-serve/ auction for new entrants connecting to spare Tx capacity (position '0');
- Once spare Tx exhausted, queue does not prohibit connections
  - Instead, generators receive a high number in the queue
  - Queue order delivers increased predictability of future curtailed risk
- Place in queue cannot deteriorate

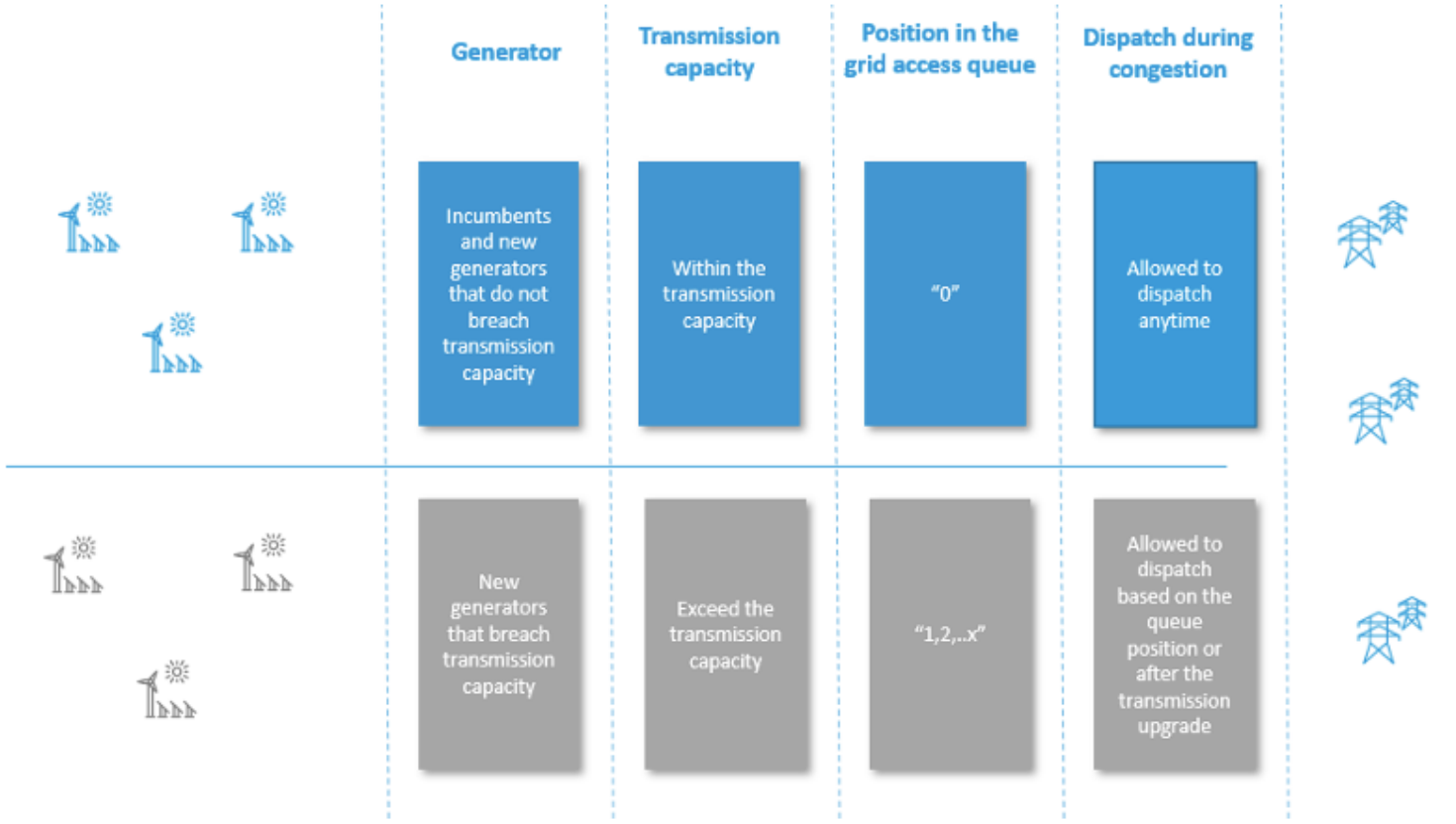
Incorporate queue order into dispatch algorithm

Figure 3.3: Order of Decision Making in Dispatch Order

Source: Castalia

Operation of Tx queue

Figure 3.2: Overview of the Transmission Queue



Source: Castalia

Transmission Charges as safety valve

Why Transmission Charges (TCs)

- New entrant generator can fund Tx investment to improve position in queue
- Efficient locational signal when limited Tx capacity:

  Requires investors to evaluate:
  - Benefits of location with abundant resources but also high position in queue (e.g. ‘5’);
  - TC: cost of transmission network enhancement to gain position ‘0’ in queue

TC features

- No need for RIT-T approval
- Regulated TC price and SLAs to balance negotiating power (generator/ TNSP)
- Incentive for storage as substitute to TC

Thank you

For the latest version of our grid access reform report please contact us or find more information on our website.

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www.ceig.org.au

Clean Energy Investor Group

BREAKOUT ROOMS

Session 2

PLENARY DISCUSSION

Session 2

NEXT STEPS AND CLOSE

- Thank you for your engagement, open minds and thoughts today
- ESB will reflect on this feedback and consider which models are viable to be progressed, including the congestion management model
- As part of this, we will continue to consult with the industry, including with our post-2025 advisory group, our technical working group and our jurisdictional advisory group
- We intend to publish a detailed consultation paper in Q2 to continue the detailed design process of these transmission access reform models