Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

Meeting Agenda

Meeting Title:	Wholesale Electricity Market (WEM) Investment Certainty Review Working Group (WICRWG)
Date:	Thursday 14 August 2025
Time:	9:30 AM –11:30 PM
Location:	Online, via TEAMS

Item	Item	Responsibility	Type	Duration
1	Welcome and introductions • Apologies • Conflicts of interest • Competition Law	Chair	Noting	5 min
2	Scope and approach	RBP/Jacobs	Discussion	10 min
3	Technology long list	RBP/Jacobs	Discussion	10 min
4	Capacity service requirements	RBP/Jacobs	Discussion	20 min
5	Evaluation	RBP/Jacobs	Discussion	30 min
6	Gross/net CONE modelling	RBP	Discussion	10 min
7	Next steps	Chair	Noting	5 min

Please note, this meeting will be recorded.

Competition and Consumer Law Obligations

Members of the MAC's Wholesale Electricity Market (WEM) Investment Certainty Working Group (**Members**) note their obligations under the *Competition and Consumer Act 2010* (**CCA**).

If a Member has a concern regarding the competition law implications of any issue being discussed at any meeting, please bring the matter to the immediate attention of the Chairperson.

Part IV of the CCA (titled "Restrictive Trade Practices") contains several prohibitions (rules) targeting anti-competitive conduct. These include:

(a) **cartel conduct**: cartel conduct is an arrangement or understanding between competitors to fix prices; restrict the supply or acquisition of goods or services by parties to the arrangement; allocate customers or territories; and or rig bids.

(b) **concerted practices**: a concerted practice can be conceived of as involving cooperation between competitors which has the purpose, effect or likely effect of substantially lessening competition, in particular, sharing Competitively Sensitive Information with competitors such as future pricing intentions and this end:

- a concerted practice, according to the ACCC, involves a lower threshold between parties than a contract arrangement or understanding; and accordingly; and
- a forum like this Working Group is capable being a place where such cooperation could occur.

(c) **anti-competitive contracts, arrangements understandings**: any contract, arrangement or understanding which has the purpose, effect or likely effect of substantially lessening competition.

(d) **anti-competitive conduct (market power)**: any conduct by a company with market power which has the purpose, effect or likely effect of substantially lessening competition.

(e) **collective boycotts**: where a group of competitors agree not to acquire goods or services from, or not to supply goods or services to, a business with whom the group is negotiating, unless the business accepts the terms and conditions offered by the group.

A contravention of the CCA could result in a significant fine (up to $500,000 for individuals and more than $10 million for companies). Cartel conduct may also result in criminal sanctions, including gaol terms for individuals.

Sensitive Information means and includes:

(a) commercially sensitive information belonging to a Member's organisation or business (in this document such bodies are referred to as an Industry Stakeholder); and

(b) information which, if disclosed, would breach an Industry Stakeholder's obligations of confidence to third parties, be against laws or regulations (including competition laws), would waive legal professional privilege, or cause unreasonable prejudice to the Coordinator of Energy or the State of Western Australia).

Guiding Principle – what not to discuss

In any circumstance in which Industry Stakeholders are or are likely to be in competition with one another a Member must not discuss or exchange with any of the other Members information that is not otherwise in the public domain about commercially sensitive matters, including without limitation the following:

(a) the rates or prices (including any discounts or rebates) for the goods produced or the services produced by the Industry Stakeholders that are paid by or offered to third parties;

(b) the confidential details regarding a customer or supplier of an Industry Stakeholder;

(c) any strategies employed by an Industry Stakeholder to further any business that is or is likely to be in competition with a business of another Industry Stakeholder, (including, without limitation, any strategy related to an Industry Stakeholder's approach to bilateral contracting or bidding in the energy or ancillary/essential system services markets);

(d) the prices paid or offered to be paid (including any aspects of a transaction) by an Industry Stakeholder to acquire goods or services from third parties; and

(e) the confidential particulars of a third party supplier of goods or services to an Industry Stakeholder, including any circumstances in which an Industry Stakeholder has refused to or would refuse to acquire goods or services from a third party supplier or class of third party supplier.

Compliance Procedures for Meetings

If any of the matters listed above is raised for discussion, or information is sought to be exchanged in relation to the matter, the relevant Member must object to the matter being discussed. If, despite the objection, discussion of the relevant matter continues, then the relevant Member should advise the Chairperson and cease participation in the meeting/discussion and the relevant events must be recorded in the minutes for the meeting, including the time at which the relevant Member ceased to participate.

Department of Energy and Economic Diversification

GOVERNMENT OF WESTERN AUSTRALIA

Energy Policy WA

WEM Investment Certainty Working Group

Benchmark Capacity Providers Review

14 August 2025

Working together for a **brighter** energy future.

Agenda

	Item		Presented by
1	Welcome and introductions	5 min	Chair
2	Scope and approach	10 min	RBP/Jacobs
3	Technology longlist	10 min	RBP/Jacobs
4	Capacity service requirements	20 min	RBP/Jacobs
5	Evaluation	30 min	RBP/Jacobs
6	Gross/net CONE modelling	10 min	RBP
7	Next steps	5 min	Chair

2. Scope and approach

Scope of the Review

- Under ESM Rule 4.16.11, the Coordinator must review the Benchmark Capacity Providers within six months of a changed ESR Duration Requirement being published in the ESOO.
- In the 2025 ESOO, the ESR Duration Requirement changed from 4 hours to 6 hours, so the Coordinator is reviewing the Benchmark Capacity Providers.
- The Coordinator must determine the reference technologies for:
  1. Peak Capacity; and
  2. Flexible Capacity.
- The selected reference technologies should:
  - provide efficient investment signals to ensure system security and reliability; and
  - ensure that customers don't overpay for the desired system security and reliability.

Approach

1. Establish a long list of technologies
2. Filter long list based on expected capital costs
3. Create potential configurations of remaining technologies for assessment
4. Identify cost data (based on the existing BRCP determination approach) for each configuration to deliver each capacity service
5. Identify the requirements that must be met to provide each capacity service
6. Filter configurations based on service requirements
7. Identify additional data for determination of net Cost of New Entrant assessment
8. Conduct market modelling to inform proposals on reference technologies and Gross/Net CONE
9. Develop Reference Technology and Gross/Net CONE proposals.

EPWA has completed steps 1-8 and is currently undertaking step 9.

3. Technology Long List

Reference Technology Long List (2025)

Generation Technologies	
Industrial SCGT	Lithium Based BESS
Aeroderivative SCGT	Vanadium Based BESS
CCGT once through steam generator	Pump storage hydro
CCGT drum steam generator	Solar thermal
Reciprocating engine	Solar PV
Fuel cell	Wind

Fuels
Liquid
Natural Gas
Solar
Wind
Hydrogen

Note: Nuclear excluded

Reference Technology Long List (2025)

Generation Technologies	
Industrial SCGT	Lithium Based BESS
Aeroderivative SCGT	Vanadium Based BESS
CCGT once through steam generator	Pump storage
CCGT drum steam generator	Solar thermal
Reciprocating engine	Solar PV
Fuel cell	Wind

Fuels
Liquid
Natural Gas
Solar
Wind
Hydrogen

Note: Nuclear excluded

- Pump storage excluded due to sizing and cost.
- Fuel cell, Vanadium BESS, Solar thermal excluded as unlikely to be competitive in the study horizon.
- Solar PV, wind excluded based on cost required for MW of capacity compared to MW of nameplate

4. Capacity service requirements

Capacity service requirements

Service requirements are updated from the 2023 review to reflect subsequent AEMO and ERA activity.

Peak Service – Non-Storage

Parameter	Setting	Comments	Implications for benchmark provider
Operational Duration	14 hours with 3-day recharge		Requirement for gas transport contract / line pack
Operating Temperature	41° Celsius		Site capacity
NOx emissions	150 mg/ m3	DWER approval at Kwinana	Requirement for Dry Low NOx or water NOx control
Carbon emissions intensity	0.55 tCO2e/MWh	Based on latest proposal for emissions thresholds	Will exclude diesel fuels and likely heavy duty gas turbines.
Capacity factor	2%	Based on DSM meeting last tranche of peak demand, and this facility meeting the next portion of the LDC.	Operational life considerations

Capacity service requirements

Peak Service – Storage

Parameter	Setting	Comments	Implications for benchmark provider
Operational Duration	6 Hours	New ESR duration requirement in 2025 ESOO	Battery storage configuration
Operating Temperature	41° Celsius		Site capacity
NOx emissions	None	Not required	Emissions accounted for at generation, not at charge
Carbon emissions intensity	None	Not required	Emissions accounted for at generation, not at charge
Capacity factor	2%	Based on DSM meeting last tranche of peak demand, and this facility meeting the next portion of the LDC.	Operational life considerations

Capacity service requirements

Flex Service - All

Parameter	Setting	Comments	Implications for benchmark provider
Must meet all Peak Service Requirements			
Start time	30 minutes	Per minimum eligibility requirements for the 2025 Reserve Capacity Cycle	Excludes some CCGT
Ramp rate	3% of nameplate per minute		Excludes some CCGT
Minimum online generation	46%		
Capacity factor	Daily operation	Flex service required daily	Increases variable costs

Discussion – connection location and facility size

- Connection costs are ultimately a matter for the ERA BRCP process, but this project needs assumptions to determine the appropriate technology.
- Some proposed projects do not involve a new connection, but rather installing new equipment at an existing HV connected site to make better use of existing DSOC. Capacity connected in this way would have lower connection costs than a new standalone facility but relies upon development at an existing site.
- >80% of gas turbine power stations in Australia are multi-unit configurations, as this is more efficient investment. This would mean larger industrial SCGT installations than has historically been evaluated in BRCP processes.
- Increasing the size of the largest contingency on the power system is likely to lead to significant costs. The largest facility contingency is currently around 330 MW. New facilities with larger contingency would face significant impact of ESS.

Assumption: Standalone facility with a 330kV connection. Multi-unit gas facilities have network configurations that avoid contingencies above 330 MW (not possible for all CCGT).

Discussion – economic life

- While assumed economic life is a matter for the ERA component of the BRCP review, this project needs assumptions to support the economic modelling.
- Current BESS warranties could allow up to 20 years with daily cycling. Current WEM performance shows more frequent cycling, which is consistent with the current 15-year life in the ERA's BRCP procedure.
- Technical life for new gas-fired generation is around 35 years. WA's 2050 net zero target implies that they will only be operating for around 25 years.
- It may be possible to extend life beyond 2050 by using green fuels (hydrogen/biogas), but the availability and cost of doing so is far from certain.

Assumption: Economic life 15 years for ESR, 25 years for gas-fired generation.

5. Evaluation

Reference Technology – evaluation configurations

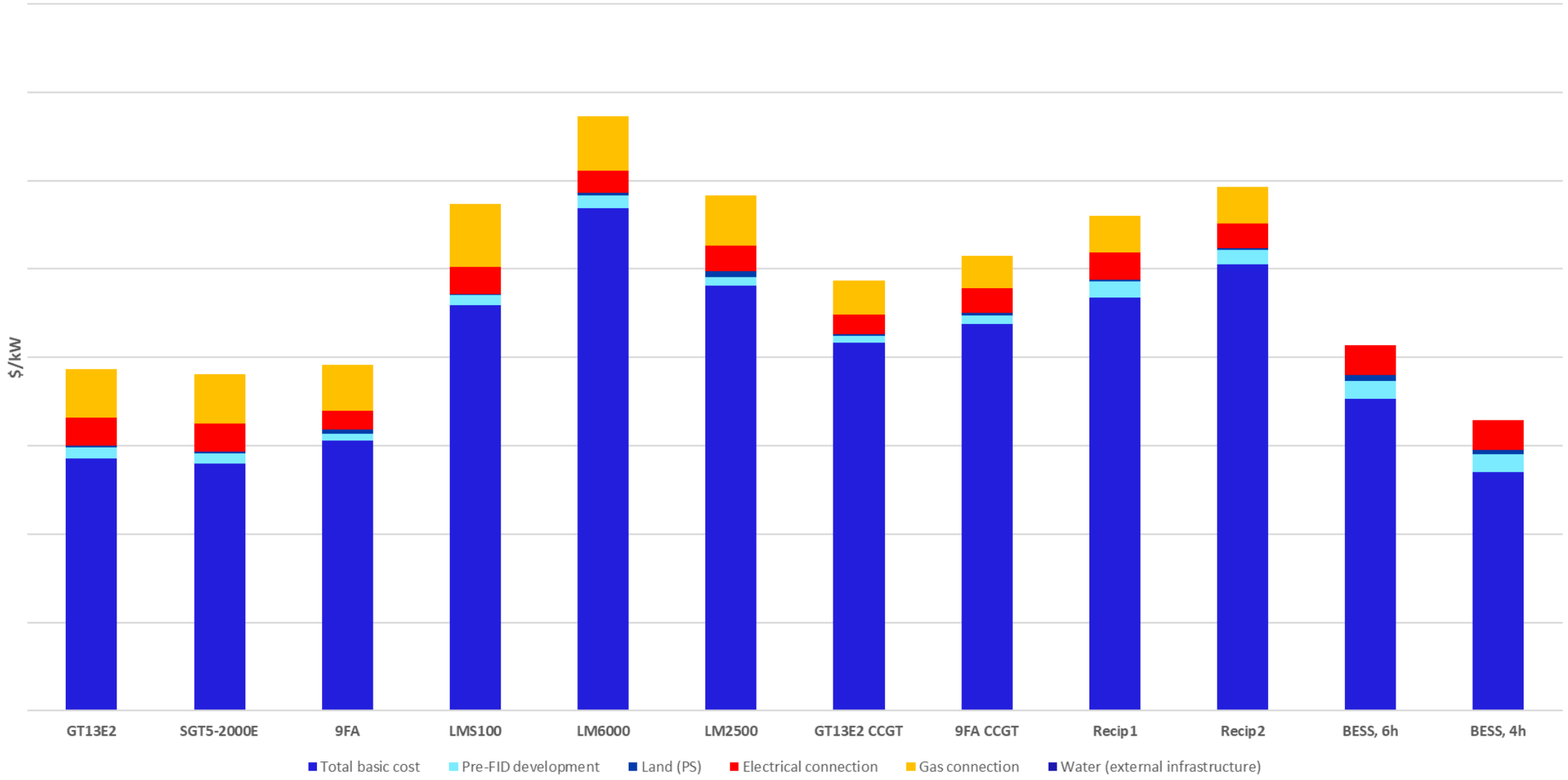
From the long-list, we have identified specific configurations to be costed and compared against the service requirements.

Generation Technologies
Industrial SCGT - GT13E2
Industrial SCGT - SGT5-2000E
Industrial SCGT - GE 9FA.04
Aero SCGT - LMS100PB
Aero SCGT - LM6000PF-SPRINT
Aero SCGT - LM2500 G4 DLE
CCGT - GT13E2 (2+1 with bypass stacks)
CCGT - GE 9FA.04 (1+1)
Reciprocating engine - Wartsila medium speed
Reciprocating engine - Jenbach medium speed
Storage – 6h lithium battery electric storage system

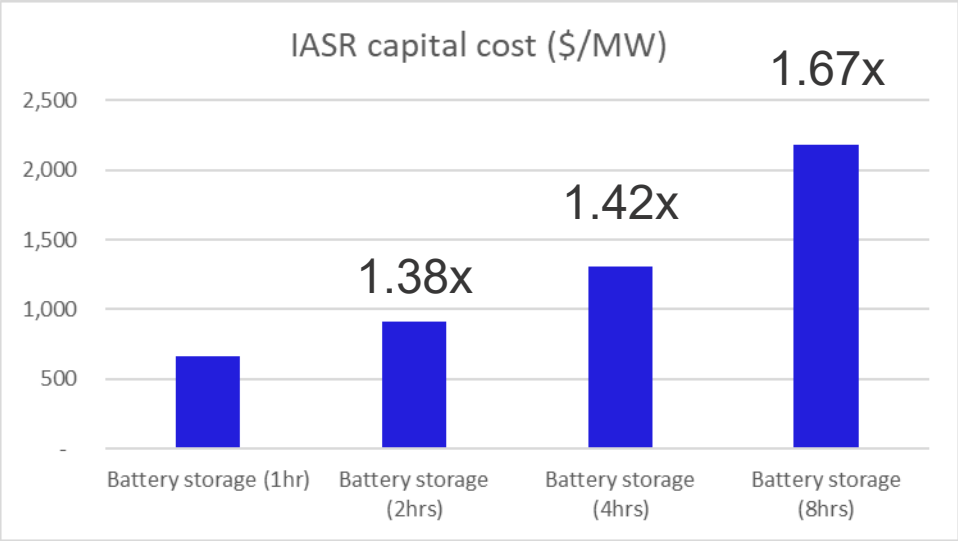
Candidate configurations

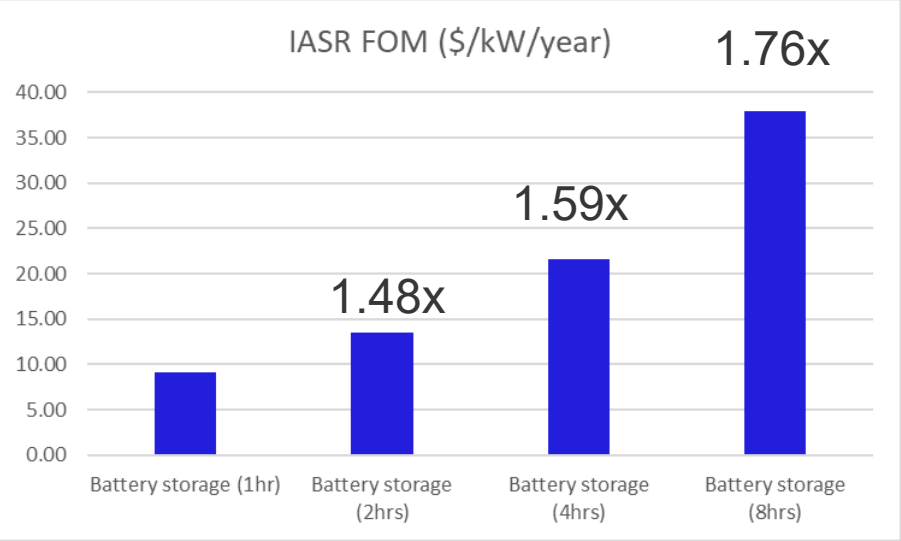
	Industrial SCGT			Aero SCGT			CCGT		Reciprocating Engines		Storage
	2x GT13E2	2x SGT5-2000E	2x GE 9FA.04	4x LMS100PB	6x LM6000PF-SPRINT	12x LM2500 G4 DLE	2x GT13E2 2+1 with bypass stacks	1x GE 9FA.04 1+1 ss	12x Wartsila medium speed	24x Jenbach medium speed	6h BESS
Gross MW	346.2	353.0	523.9	367.4	268.4	386.3	500.6	399.2	220.5	249.3	
Net MW	341.2	347.8	516.5	356.2	264.1	380.2	489.3	389.5	217.4	244.3	200
# network connections	2	2	2	2	1	2	2	1	1	1	1
Single contingency loss, MW	170	174	260	178	264	190	326	390	217	244	200
HR, net, LHV kJ/kWh	9,771	10,057	9,609	8,720	8,979	9,392	6,818	6,319	7,868	7,882	
GHG clean-as-new t/MWh	0.557	0.574	0.548	0.497	0.512	0.536	0.389	0.360	0.449	0.450	0
GHG, incl. degradation	0.57	0.59	0.56	0.51	0.52	0.55	0.40	0.37	0.45	0.45	0
Land Ha (excl switchyard)	3.4	3.4	10	2.0	3.0	12	4.0	4.0	2.0	2.5	6.4
Technical life	35	35	35	35	35	35	35	35	35	35	20
Economic life	25	25	25	25	25	25	25	25	25	25	15
Build time	1.5	1.5	1.5	1.5	1.5	1.5	2	2	1.1	1.1	1.3

Capital and up-front costs



Storage cost scaling with duration

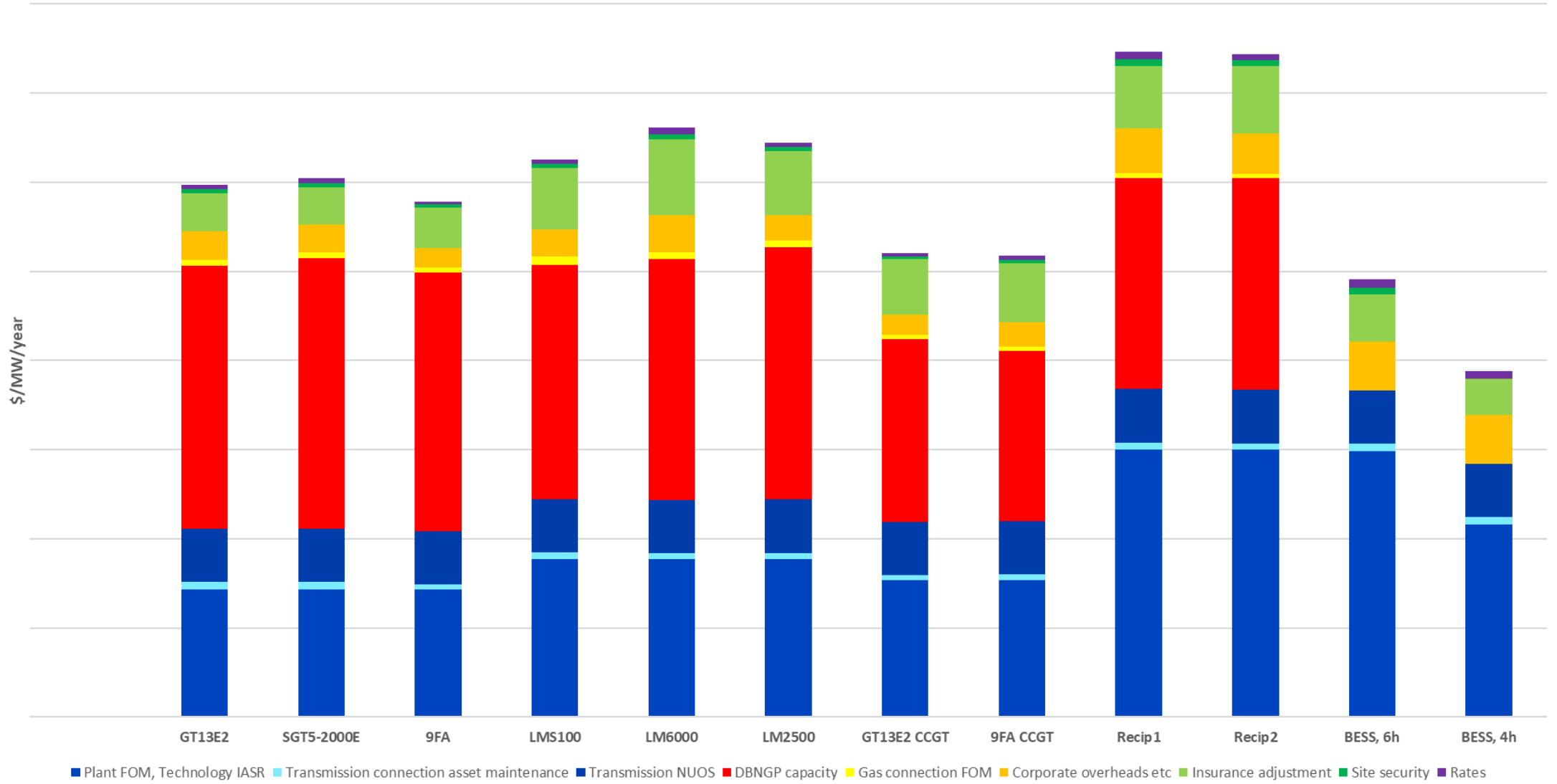




Assumptions:

- We have interpolated 6h storage costs from 4h and 8h figures (see charts)
- Per CSIRO, base costs (capital and FOM) increase with storage duration, but 2x duration comes at less than 2x cost.
- Land costs increase with storage duration, 2x duration = 2x land cost
- Most other cost assumptions (electrical connection, corporate overhead, transmission maintenance, etc) do not vary by storage duration.

Fixed operating costs



Candidate configurations and peak service requirements

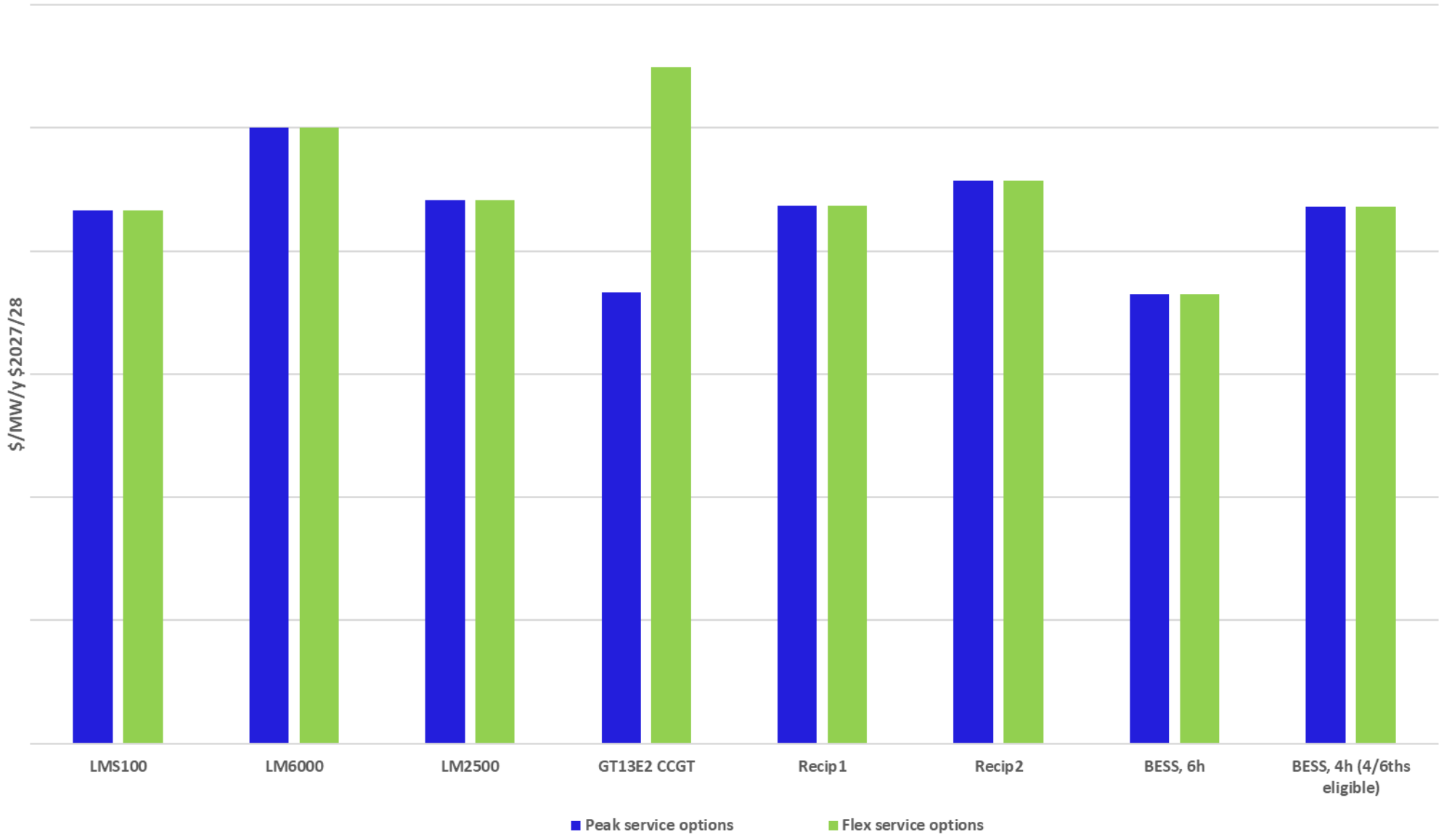
	Industrial SCGT			Aero SCGT			CCGT		Reciprocating Engines		Storage	
	2x GT13E2	2x SGT5-2000E	2x GE 9FA.04	4x LMS100PB	6x LM6000PF-SPRINT	12x LM2500 G4 DLE	2x GT13E2 2+1 with bypass stacks	1x GE 9FA.04 1+1 ss	12x Wartsila medium speed	24x Jenbach medium speed	6h BESS	4h BESS
Single contingency < 330 MW	☑	☑	☑	☑	☑	☑	☑	X	☑	☑	☑	☑
0.55t/MWh-net, 41°C, with degradation	X	X	X	☑	☑	☑	☑	☑	☑	☑	N/A	N/A
6 hour rating (storage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	☑	$^{2}/_{3}$cap only

- Industrial gas turbines operating in simple-cycle on natural gas are unlikely to meet the 0.55 t/MWh GHG intensity threshold after their first year in operation.
- 1+1 CCGT cannot be configured to lower contingency.

Candidate configurations and flex service requirements

	Industrial SCGT			Aero SCGT			CCGT		Reciprocating Engines		Storage	
	2x GT13E2	2x SGT5-2000E	2x GE 9FA.04	4x LMS100PB	6x LM6000PF-SPRINT	12x LM2500 G4 DLE	2x GT13E2 2+1 with bypass stacks	1x GE 9FA.04 1+1 ss	12x Wartsila medium speed	24x Jenbach medium speed	6h BESS	4h BESS
Peak service compliance	X	X	X	☑	☑	☑	☑	X	☑	☑	☑	2/3 cap only
Min stable load 46% for Non-intermittent	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	N/A	N/A
Ramp rate 3%/min up & down	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Dispatch time <30 mins	☑	☑	☑	☑	☑	☑	2/3 cap only	X	☑	☑	N/A	N/A

Estimated BRCP comparison (excl. industrial SCGT)



Likely BRCP Technology Outcomes

Of the candidate configurations which meet service requirements, the cheapest new entrant technologies are:

Peak Service	Flex Service
• Lithium BESS • 200MW / 1200MWh • Connected at 330kV	• Lithium BESS • 200MW / 1200MWh • Connected at 330kV

6. Gross/Net CONE

Net/Gross CONE : Criteria

For Peak BRCP:

- If the reference technology would be the marginal energy supplier: gross CONE should be applied
- If not: further assess whether applying net CONE would be more appropriate.

For Flexible BRCP:

- If the reference technology would be the marginal energy supplier in the intervals Flexible Capacity would be required: gross CONE should be applied
- If not: further assess whether applying net CONE would be more appropriate.

Marginal Energy Supplier – Methodology

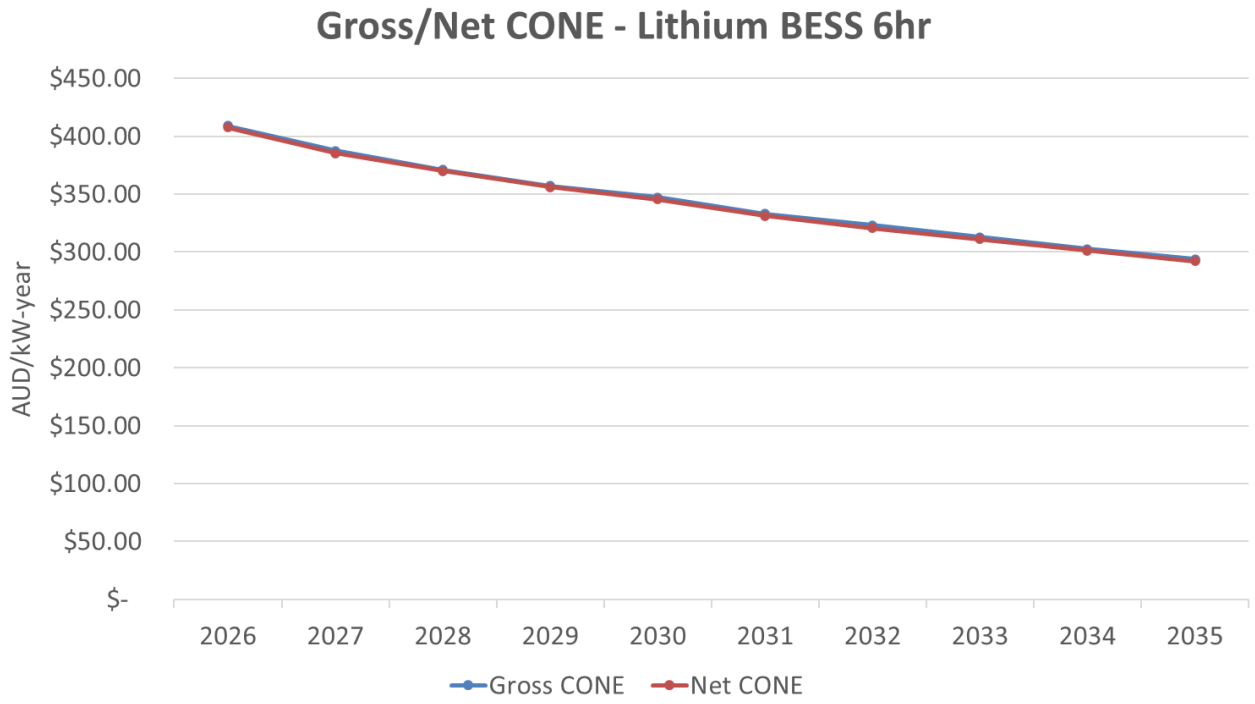
- Perform market modelling of the WEM under new Market Rules using RBP's WEMSIM model
- Include a facility representing a unit of the recommended BRCP reference technology – i.e. 200MW/1200MWh Lithium BESS
- The model forecasts:
  - Energy market prices
  - Marginal cost of generation for the BESS facility, including captured prices at time of charging
  - Net market revenue for the BESS facility, including captured prices at time of discharging, and ESS revenues
  - CONE and Net CONE
- Note that the following results are indicative only

Marginal Energy Supplier – Base Results

In the 2023 modelling, we noted that the gap between SRMC and captured price would narrow as more renewable and ESR facilities are built.

The volume of ESR currently in the market is now sufficient to eliminate the difference between gross and net CONE for electric storage resources.

Conclusion: The BRCP should continue to be set using gross CONE.



7. Next steps

Next Steps

1. Finalise Reference Technology and Gross/Net CONE proposals.
2. Consult with the MAC on draft Consultation Paper (Out of session).
3. Publish Consultation Paper.
4. Hold TDOWG meeting during consultation period.

Thank you