Government of **Western Australia**
Energy Policy WA

Reserve Capacity Mechanism Review Working Group

Meeting 2022_01_20

20 January 2022

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

Meeting Protocols

- Please place your microphone on mute, unless you are asking a question or making a comment
- Please keep questions relevant to the agenda item being discussed
- If there is not a break in discussion and you would like to say something, you can ‘raise your hand’ by typing ‘question’ or ‘comment’ in the meeting chat
- Questions and comments can also be emailed to energymarkets@energy.wa.gov.au after the meeting
- The meeting will be recorded and minutes will be taken (actions and recommendations only)
- Please state your name and organisation when you ask a question
- If you are having connection/bandwidth issues, you may want to disable the incoming and/or outgoing video

Agenda

Item	Item	Responsibility	Type	Duration
1	Welcome and Agenda	Chair	Noting	3 min
2	Meeting Apologies/Attendance	Chair	Noting	2 min
3	Introduction • Ways of working • Roles and responsibilities	Chair	Discussion	20 min
4	Project Timeline	RBP	Discussion	20 min
5	Initial Discussion • System stress modes • Reliability targets/indices • Quantifying capacity contribution	RBP	Discussion	20 min
6	Introduction to the Modelling Tool	RBP	Discussion	15 min
7	Next Steps	Chair	Discussion	5 min
8	General Business	Chair	Discussion	5 min
	Next meeting: To be determined			

3. Introduction

4. Project Timeline

Structure of the RCM Review

- **Stage 1 – Assess and update:**
  - Reliability needs
  - Planning Criterion
  - CRC assignment
  - Benchmark Reserve Capacity Price
- **Stage 2 – Assess and update (in context of stage 1 outputs):**
  - Outage scheduling
  - Capacity refunds
  - IRCR determination
- **Stage 3 – Detailed design and transition**

We are now kicking off Stage 1

Stage 1 Activities

The project scope sets out five steps within stage 1:

Step 1: Assess requirements for capacity needed to achieve the purpose of the RCM by defining types of system stress, capacity requirements to achieve desired system reliability, and which system stress situations can/should be addressed through the RCM

Step 2: Review the Planning Criterion to ensure that it reflects the purpose of the RCM and addresses the reliability target from Step 1

Step 3: Develop methods for assigning CRC to meet the Planning Criterion, including how to determine the ability of different technology types to contribute to the target, obligations for different technology types, and achieving zero emissions by 2050

Step 4: Review the method for setting the Benchmark Reserve Capacity Price considering the revised Planning Criterion

Step 5: Assess the methods for assigning CRC under different scenarios

- Lots of interrelationships, steps will be carried out in parallel to some degree
- Step 4 to be carried out after step 5

Stage 1 Outputs

Two main modelling exercises, each with an accompanying report:

- Reliability and requirements analysis, covering step 1 and part of step 2
- CRC allocation and reliability impact analysis, covering the rest of step 2, as well as steps 3 & 5

Outputs:

- Detailed modelling assumptions and methodology (March)
- Draft international review report (March)
- Draft reliability and requirements analysis report (June)
- Draft CRC allocation, reliability impact analysis and BRCP review report (July)
- Final reports (August)

Stage 1 Working Group Meetings – Indicative

- **April**
  - International review findings
  - Modelling update – assumptions and methodology
- **May**
  - System stress draft modelling findings
  - Discussion – required capacity services and planning criterion
- **June**
  - Required capacity services and planning criterion draft modelling findings
  - Analysis update – required capacity services, planning criterion
  - Discussion – CRC allocation approach
- **July**
  - CRC allocation and scenario analysis draft modelling findings
  - Analysis update – CRC allocation
  - Discussion – Benchmark Reserve Capacity Price
- **August**
  - Final findings and proposed high level design

5. Initial Discussion

Key Topic – System Stress

- **The first piece of modelling will be about system stress**
- **The modelling will seek to provide insight on the type, frequency and size of stress situations**
- **Times of system stress:**
  - Maximum demand
  - Minimum demand
  - Demand volatility (magnitude and speed)
  - Generation volatility (magnitude and speed)
  - Planning for and response to outages
  - Others?

Key Topic – Reliability Target/Indices

- **Following the system stress analysis, we look at the Planning Criterion**
- ***"The purpose of the RCM is to ensure acceptable reliability of electricity supply at the most efficient cost"***
  - The planning criterion defines the "acceptable reliability" part of this purpose
- ***"Any changes to the RCM should not erode the level of system reliability provided for by the WEM Rules at the time of the last review of the Planning Criterion"***
- **Potential reliability targets/indices:**
  - Avoiding unserved energy at peak (current)
  - Avoiding unserved energy in general (current)
  - Avoiding directed (non-economic) curtailment? (low load)
  - Allowing all desired/un-schedulable small-scale injection? (low load)
  - Others?

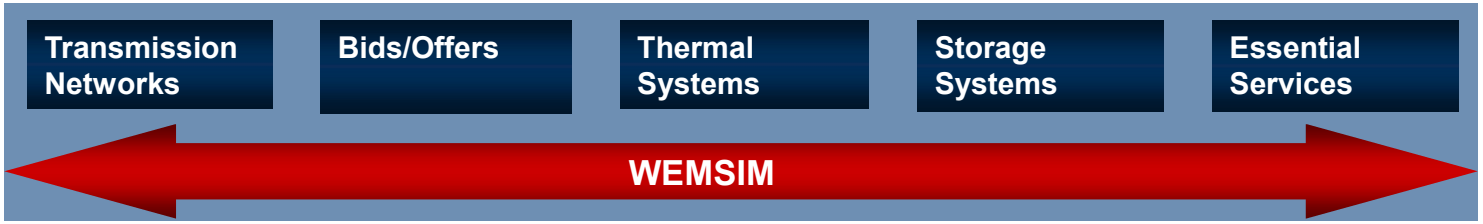
Key Topic – Quantifying Capacity Contribution

- **In assessing the Planning Criterion, we will need to consider how the metrics account for the varied capability of a MW, and extend this consideration in considering the methods for allocating Certified Reserve Capacity**
- **Current RCM:**
  - sets the capacity target in terms of installed capacity (ICAP)
  - Allocates CRC to:
    - Non-intermittent components based on nameplate capacity
    - Intermittent components based on historic contribution in high generation intervals
    - Storage components based on nameplate capacity and storage volume
- **We need to consider:**
  - Setting RC target based on unforced capacity (UCAP) to include consideration of outage rates
  - Whether the value of or contribution to reliability differs by location
  - How different technology types contribute to meeting the reliability target

6. Introduction to the Modelling Tool

Overview

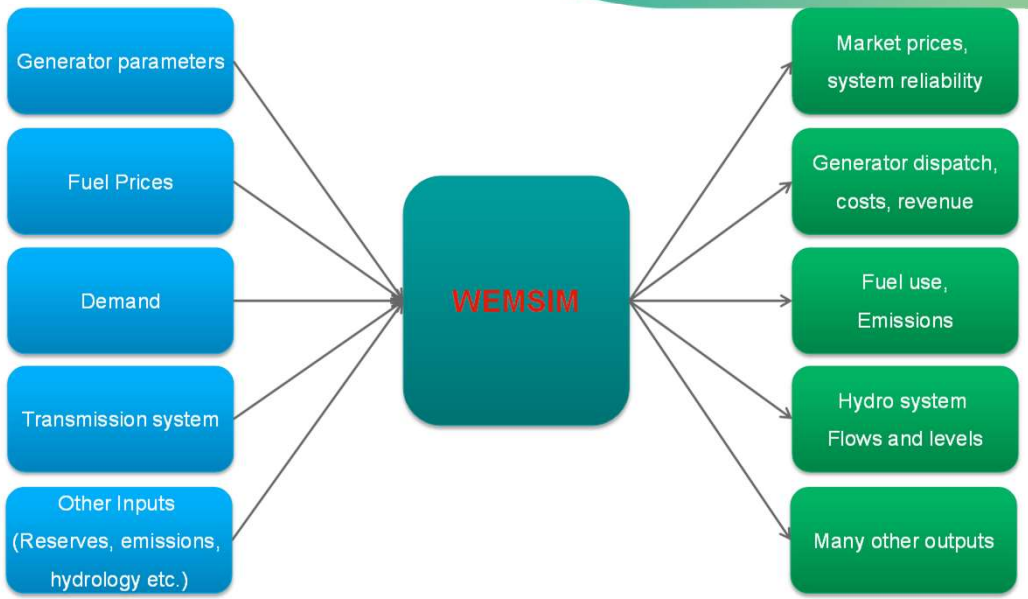
Wholesale Electricity Market Simulation (WEMSIM) is a linear programming modelling tool used to simulate cost- and bid-based electricity markets



- Flexible in its level of aggregation:
  - Time steps
  - Time horizons
  - Plant operational details
  - Transmission details
- Has been used to simulate power market outcomes in Australasia, Asia, Middle East, Europe and Central America
- Projects have included pool pricing analysis, revenue estimation and asset valuation, transmission constraint analysis, fuel contract structure comparison, market sensitivity, storage resource management, and policy analysis

The Dispatch Simulation Model

- **WEMSIM (Wholesale Electricity Market Simulation):**
  - Simulates the dispatch of thermal and hydro generation resources in a multi-regional transmission framework
  - is an analytical dispatch planning and analysis tool with an optimization engine based on linear and mixed integer programming
  - Simultaneously optimizes generation dispatch, reserve provision (and, in MIP mode, unit commitment)
- **Topic for discussion – where should fuel price data be sourced?**

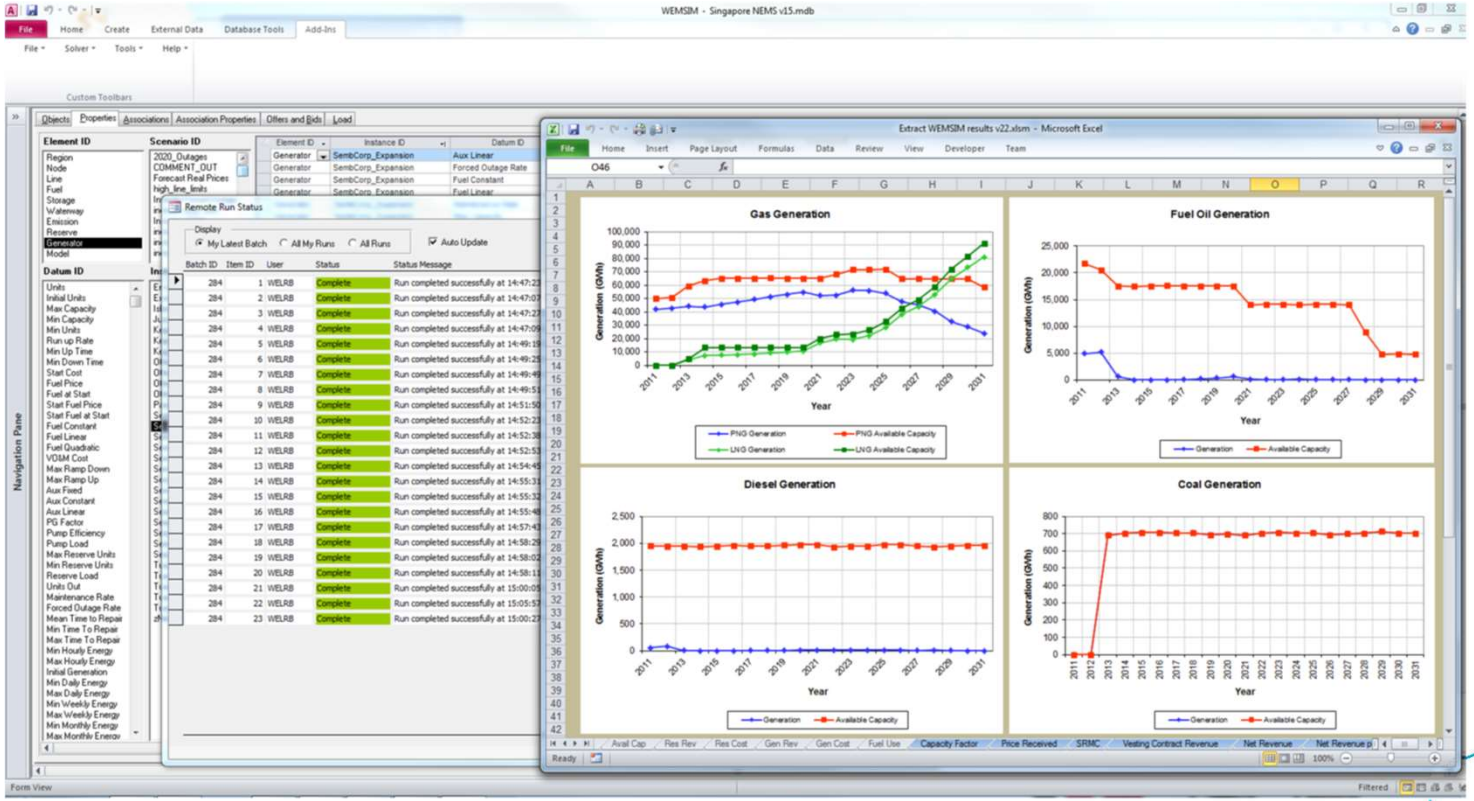


Detailed Modelling Capabilities

- Load representation: time-based load (detailed plant operations, rich outputs, longer solve time) or load duration curve (aggregated data, fast solution, broad-brush analysis)
- Thermal generation: fixed and variable heat rates; multiple fuels; fuel constraints; emissions rates and constraints; unit commitment with start-up costs, minimum uptimes, and downtimes; take-or-pay fuel contracts; scheduled and stochastic outages
- Hydro generation: Detailed modelling of storage, waterways, and inflows, including pumped storage
- Intermittent renewables: Daily and seasonal generation profiles
- Battery and other energy storage technologies: Round trip efficiency, energy and capacity limits
- Transmission: DC load flow and transmission OR NEMDE/WEMDE style constraint equations
- Full nodal pricing, or regional markets with transmission constraint equations (nomograms), or system-wide pricing
- Demand-side participation
- Essential system service requirements, provision, cost, and revenue
- Monthly, daily, and hourly profiles available on all parameters
- Facility forced outage and maintenance simulation

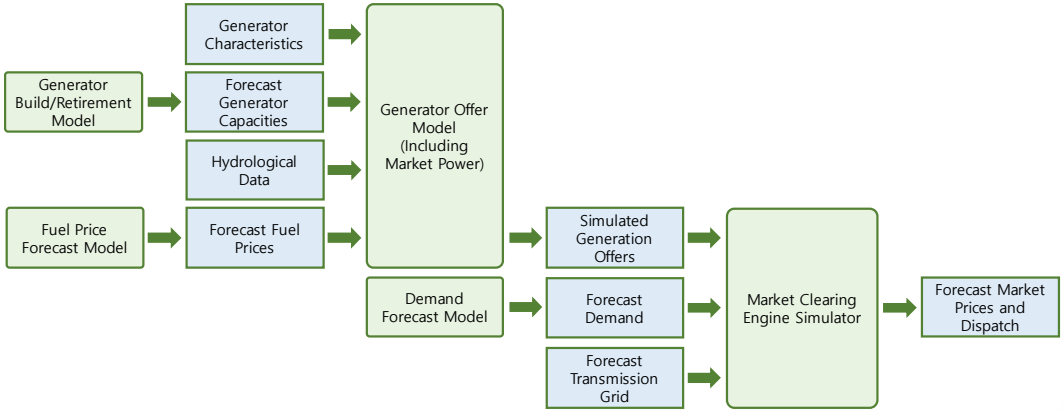
Rich Outputs

Outputs available include: period-by-period energy and ESS prices, dispatch, fuel use, emissions, revenue, capacity factors, unserved energy, storage volumes, network flows, and transmission constraints



Supporting Modules

- The Market Clearing Engine Simulator is the core of the platform, performing security constrained economic dispatch with ESS co-optimization
- The Demand Forecast Model transforms a given demand shape and long-term peak and energy forecasts into realistic demand data that captures both long-term trends and short-term volatility
- The Generator Build/Retirement Model can take manual entries where known or expected, and supplement with economic build/retirement decisions
- The Generator Offer Model can provide for offers based on cost, market power (Bertrand gaming), water values/stored energy values for hydro/storage systems, or derived from historic data



7. Next Steps

Next steps

- **You may wish to provide further input on:**
  - Analysis or data relevant to the deliverables (please specify confidentiality)
  - International references, experience and research relevant to the WA Reserve Capacity Mechanism
- **Questions or feedback can be emailed to energymarkets@energy.wa.gov.au**

8. General Business


We're working for
Western Australia.