

# The National Energy Guarantee and new forms of generation

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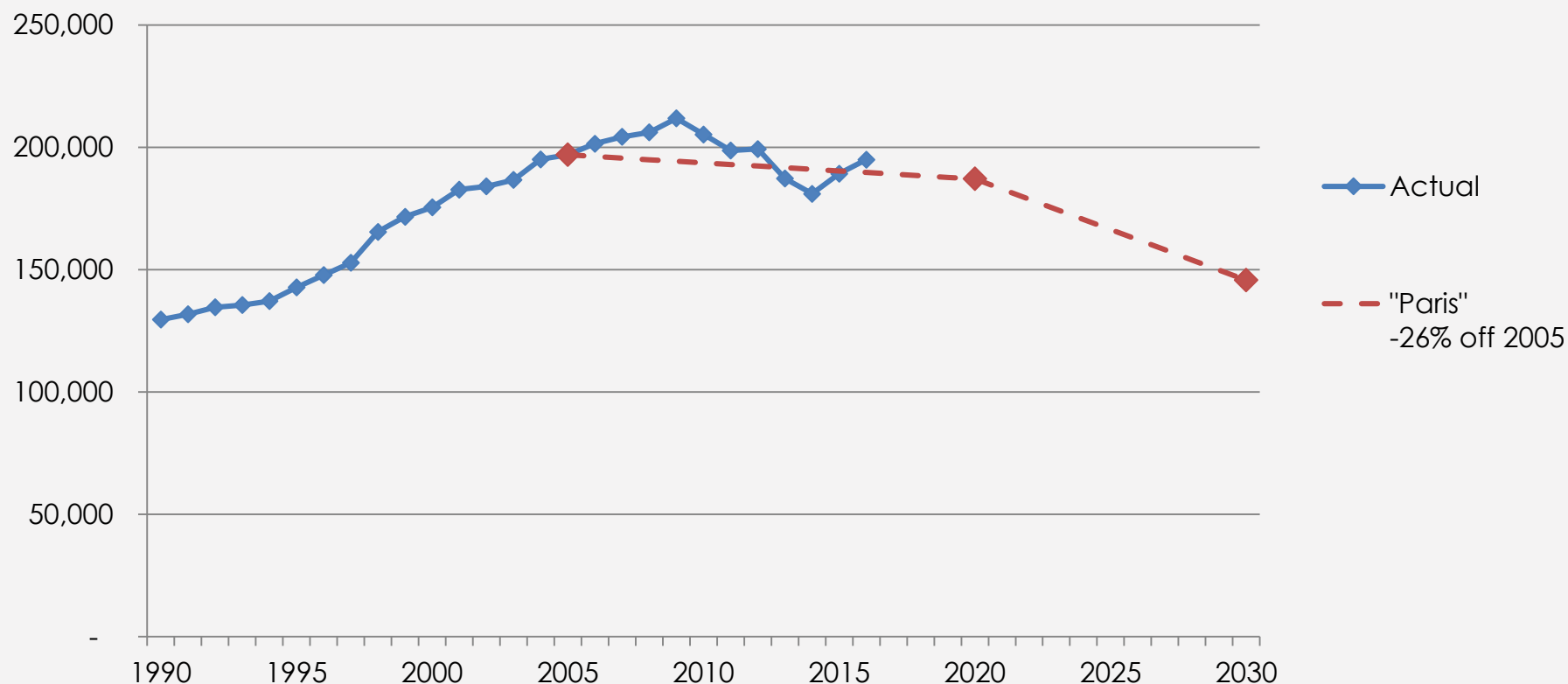
# Energy law reform

- The proposed National Energy Guarantee
  - The emissions obligation
- Regulation of new forms of generation
  - Battery storage
  - Pumped hydro
  - Behind the meter solar

# How did we get to where we are?

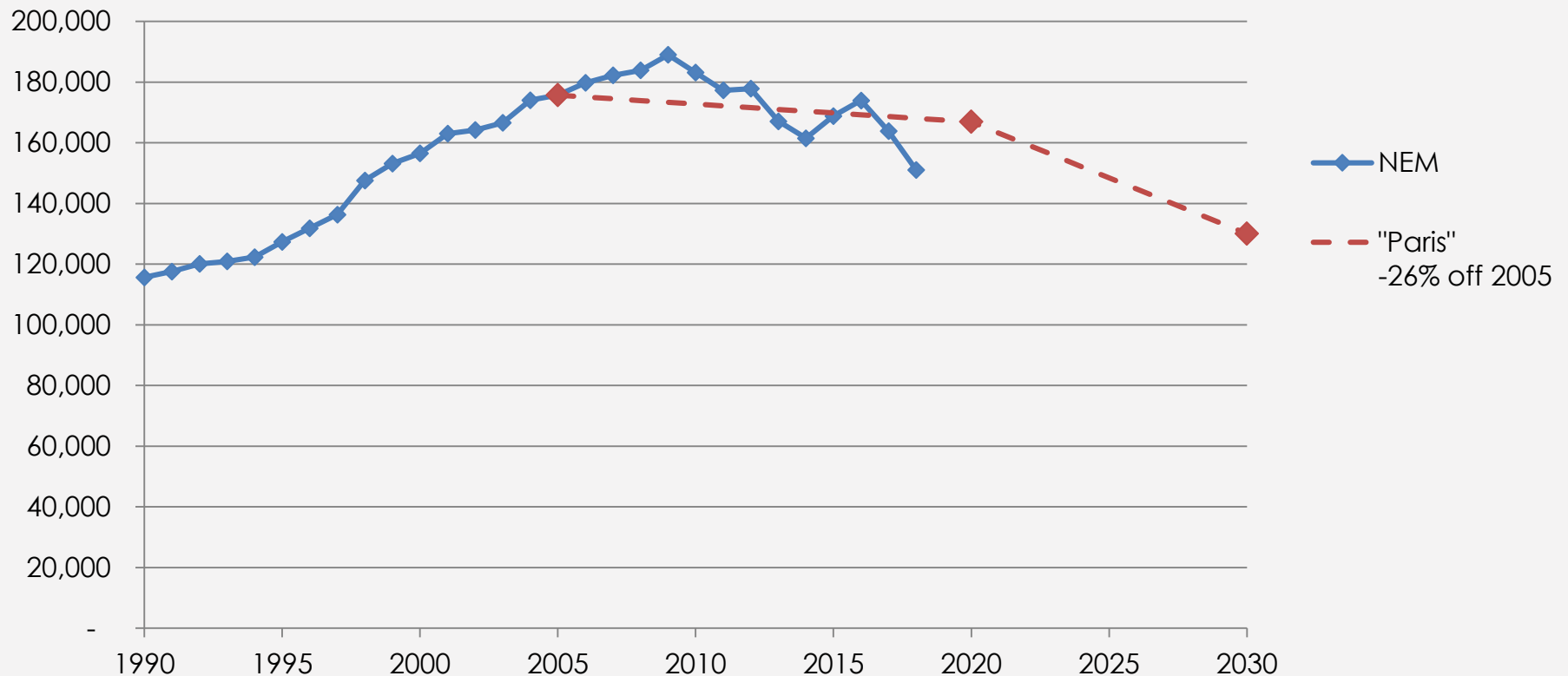
And where are we going?

# Australian Electricity sector greenhouse emissions



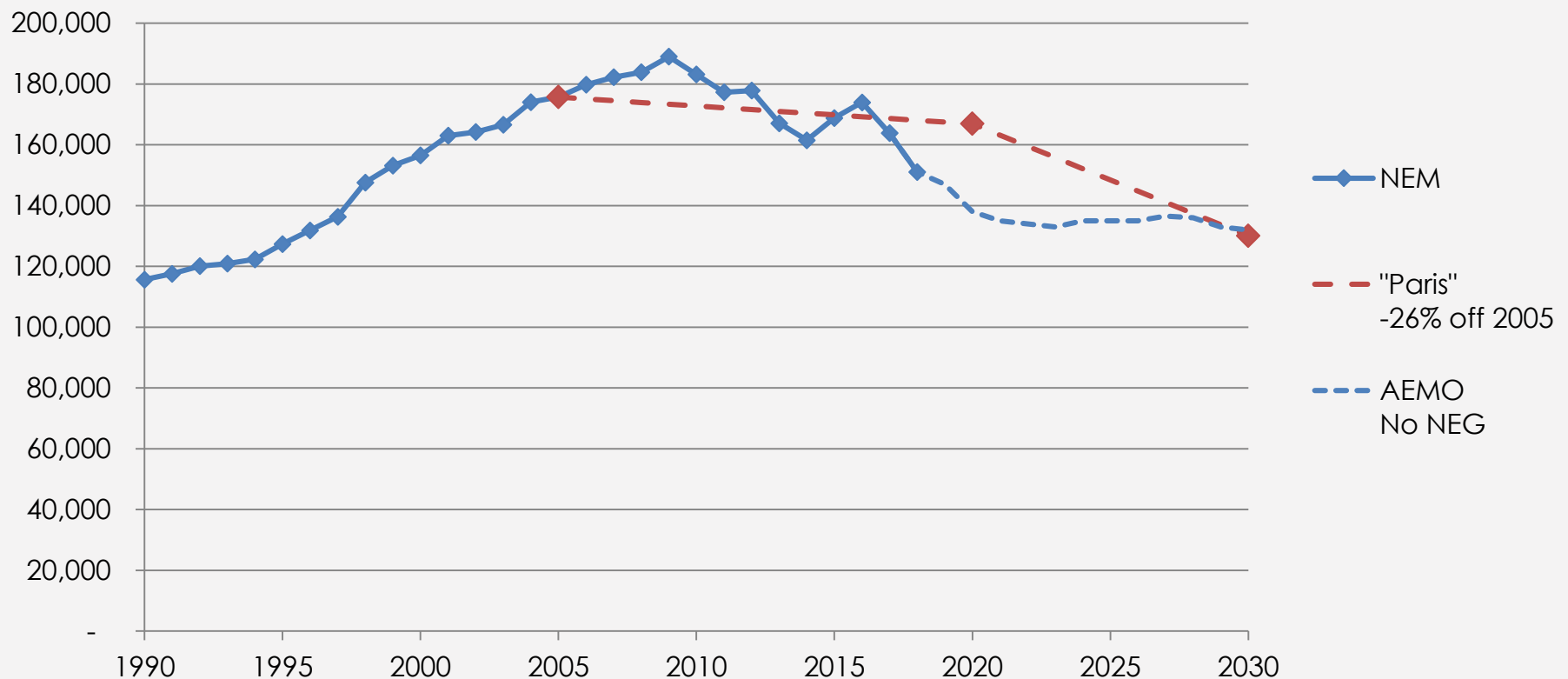
Source: Australian Greenhouse Emissions Information System – Sector 26 – electricity supply

# National Electricity Market Generation Emissions





# National Electricity Market Generation Emissions



Source: ESB National Energy Guarantee Final Design August 2018 p18

# National Energy Guarantee (“N.E.G.”)

- 2 components:
  - Emissions obligation
  - Reliability obligation
- Applies only to the National Electricity Market (not WA or NT).
- Imposes obligations on “market customers” of the NEM (not the actual generators / emitters).
- “Market customers” are typically energy retailers, and some large direct consumers of electric power.

# NEG Emissions obligation

## – how it works (1)

- Operates on a financial year (July to June) basis.
- The prescribed intensity for a year will be set in Commonwealth legislation, reducing each year so that total NEM emissions in 2030 meets the target reduction, having regard to current forecasts of annual load.
- Each power station in the NEM has an “emissions intensity” set for a compliance year (based on historic measurement, or an estimate for new plants).
- Generation by the generator in the compliance year is recorded in a registry operated by AEMO.
- Load consumption by the market customer is also recorded in a registry operated by AEMO.
- The market customer is under a legal obligation to ensure that the emissions intensity of its market load is below the prescribed intensity (tCO<sub>2</sub>-e/MWh).



# NEG Emissions obligation

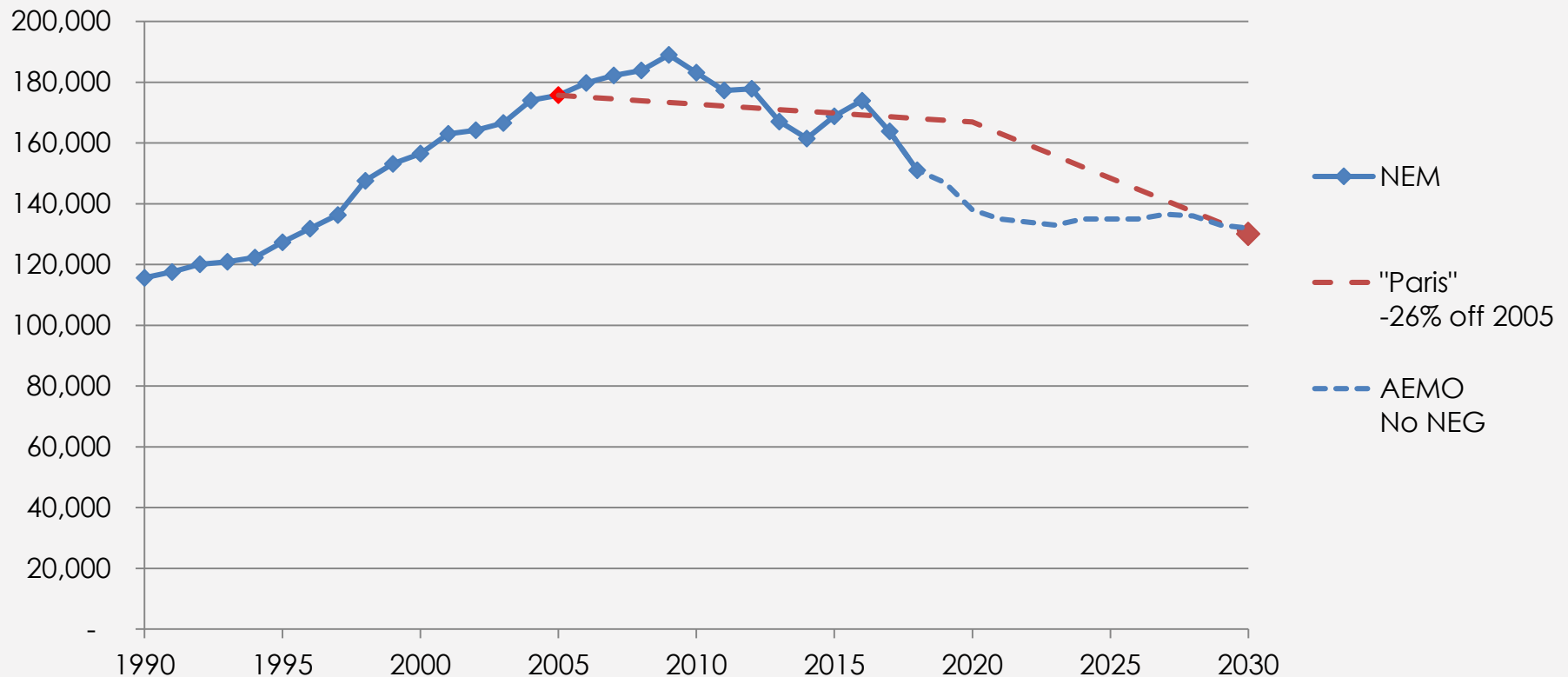
## – how it works (2)

- The market customer's registry entry will have three components: its market load (in MWh), its allocated generation quantity (in MWh) and its allocated emissions (in tCO<sub>2</sub>-e).
- A generator can, by request to AEMO jointly with the market customer, transfer to the market customer a quantity of generated energy from the generator's account in the registry.
- When this quantity transfers to the market customer's account:
  - the generator's generated quantity is reduced by the quantity transferred;
  - the market customer's allocated quantity is increased by the quantity transferred;
  - the market customer's allocated emissions will be increased by that amount of CO<sub>2</sub> which is represented by the transferred generation quantity, multiplied by the emissions intensity of the power station from which the transfer was made.

# NEG Emissions obligation – how it works (3)

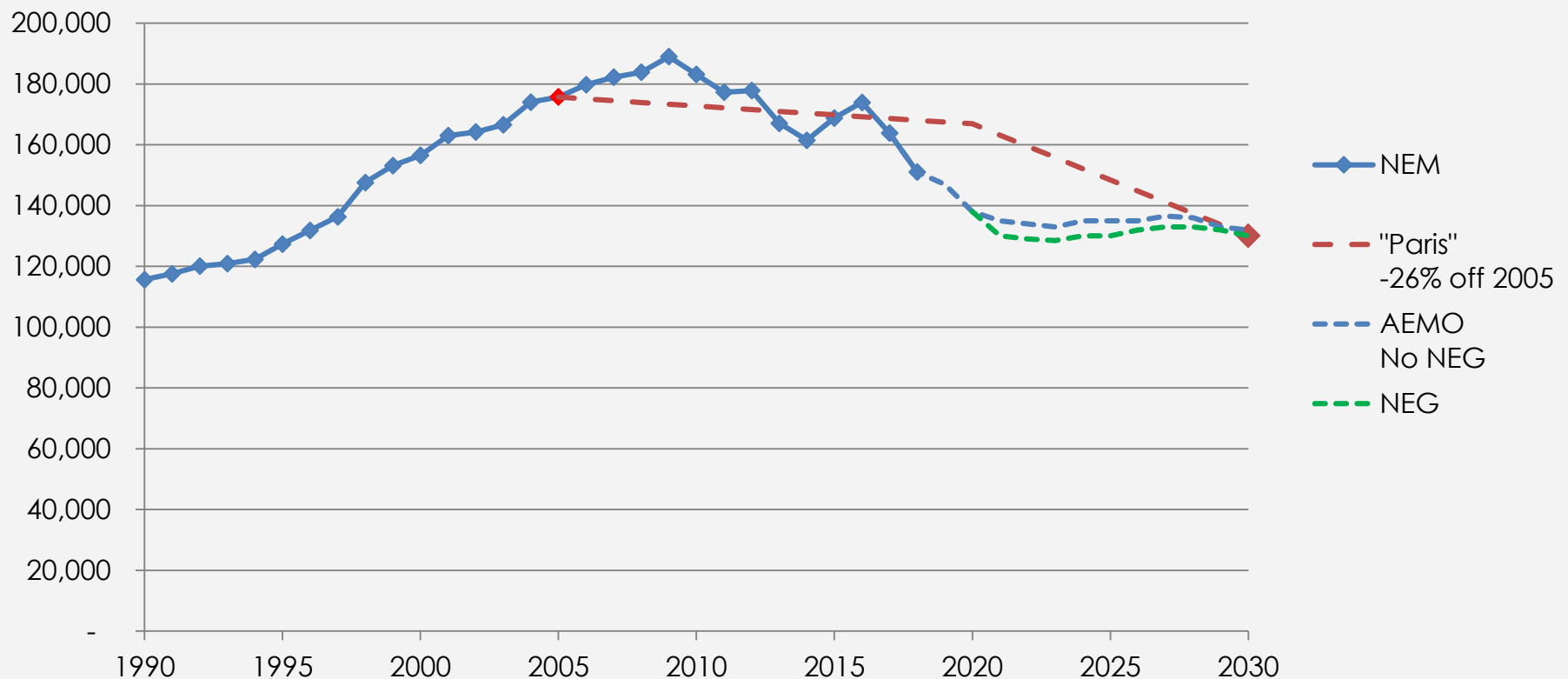
- If the transferred quantity is from a non-emitting source, such as a wind farm or solar farm, the allocated generation quantity will increase but there will be no addition to the market customer's allocated emissions.
- At the end of the compliance year, any residual generation quantities not yet allocated to market customers will be distributed to market customers in the proportion to which they have market load which has not yet been covered by their allocated generation quantities. The market customer's emissions amount will also be increased by the emission intensities of that residual generation.
- At the end of the compliance year, a market customer's allocated emissions amount will be divided by its allocated generation amount, to get its average emissions intensity for the year.
- There is scope for limited carry-over of liability to future years.
- Over-allocated generation cannot be carried forward, but will be added back to residual generation for allocation to other market customers.

# National Electricity Market Generation Emissions



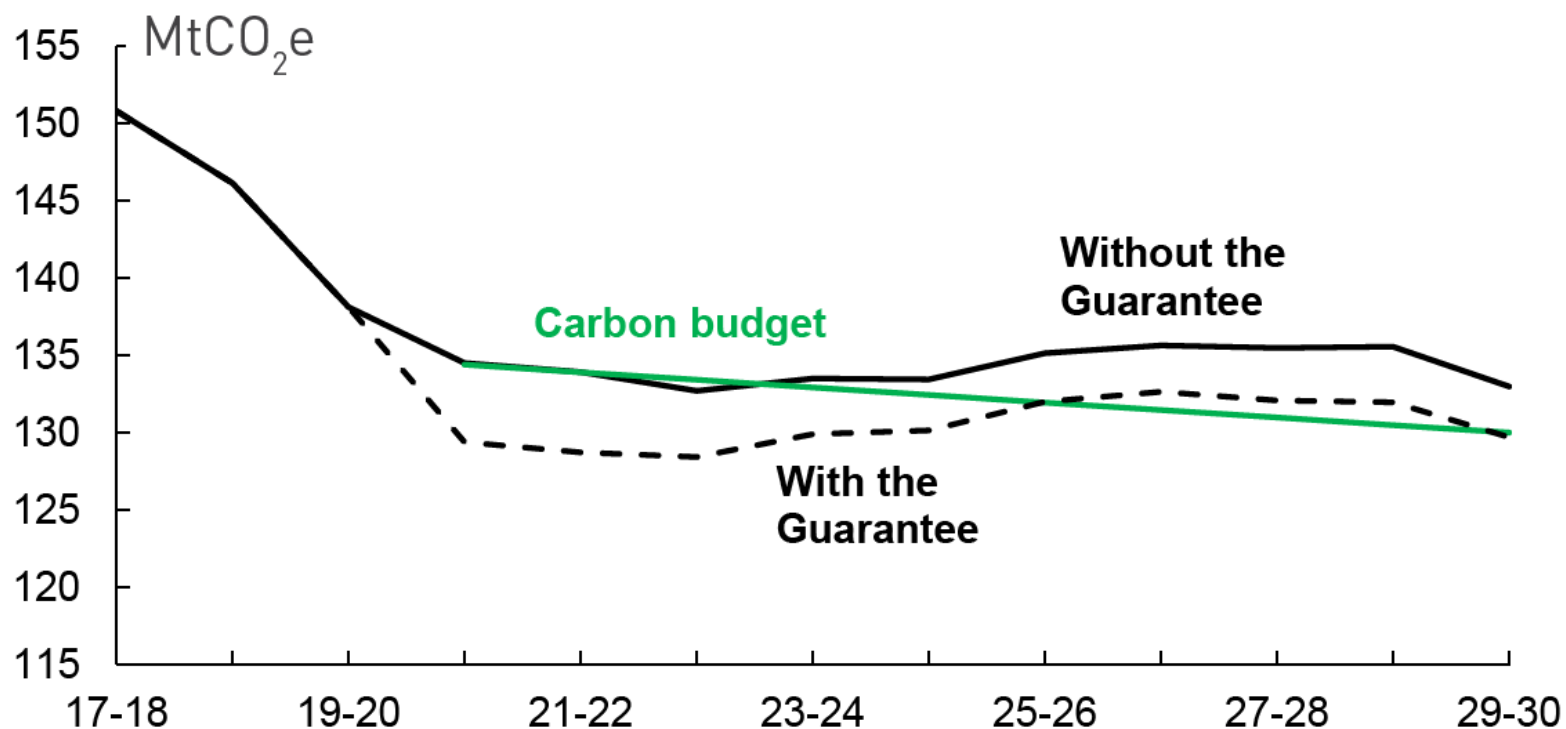
Source: ESB National Energy Guarantee Final Design August 2018 p18

# National Electricity Market Generation Emissions



Source: ESB National Energy Guarantee Final Design August 2018 p18

Chart 9: NEM emissions under the Guarantee



Source: ACIL Allen consulting



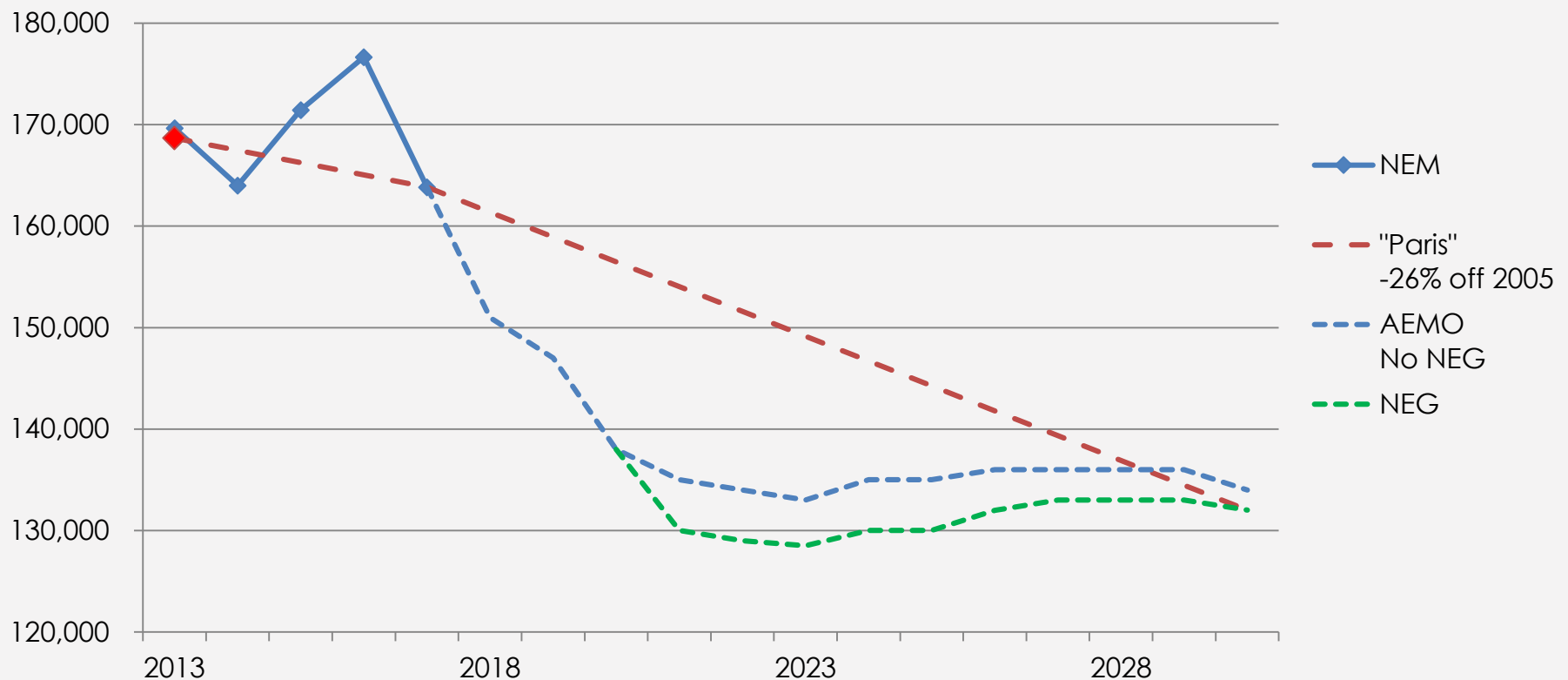
# Conclusion?

- ACIL-Allen's modelling for the Energy Security Board shows the NEM generation emissions are projected to decrease to about 130 MtCO<sub>2</sub>-e per annum in 2030.
- That's a 26% reduction on 2005 levels.
- But without the NEG, AEMO and ACIL-Allen are forecasting NEM generation emissions of about 132 MtCO<sub>2</sub>-e in 2030.
- That's a 25% reduction on 2005 levels.
- That is, the NEG is forecast to achieve only a 1% further reduction than current policy settings.

# NEG – legislative framework

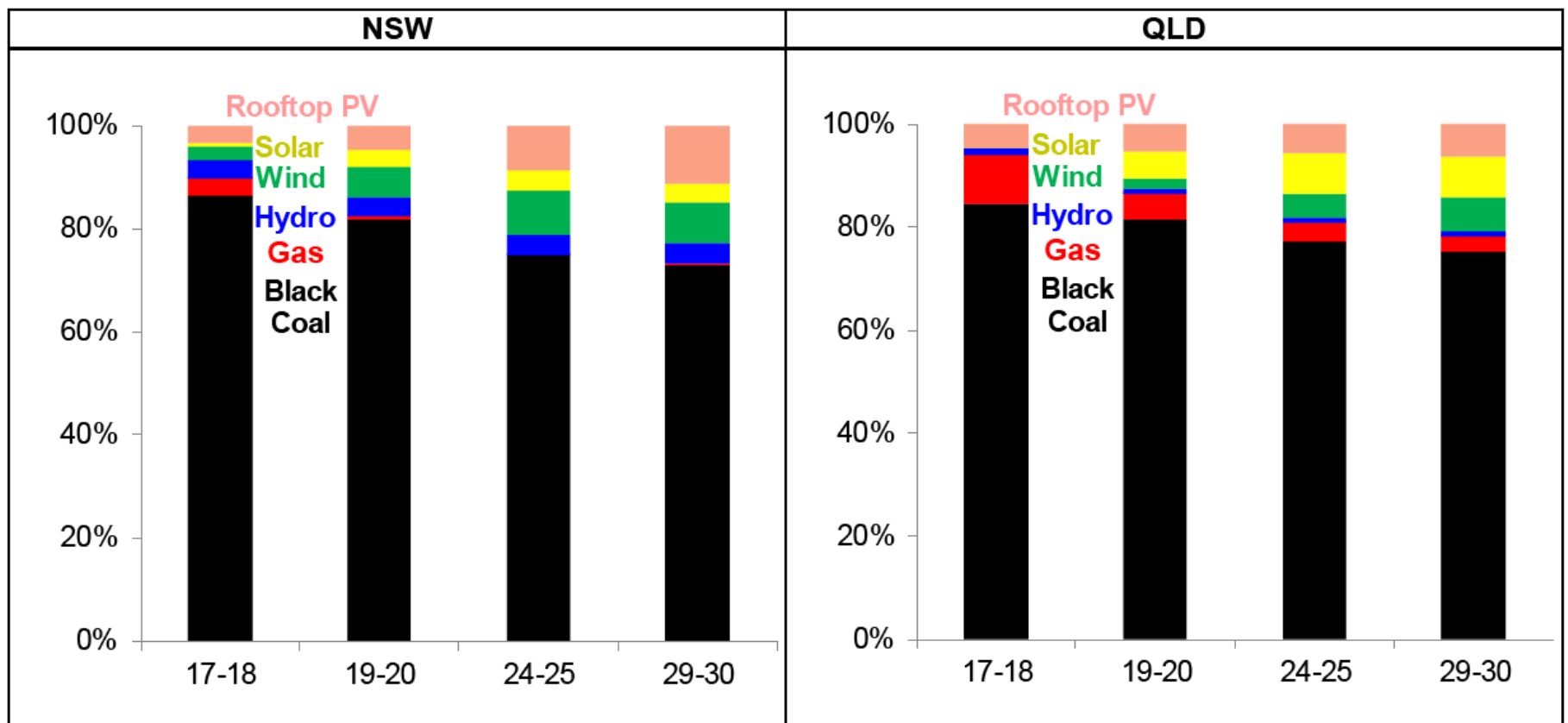
- The emissions intensity target % for each year to 2030 will be prescribed in Commonwealth legislation (requiring Parliamentary amendment).
- Commonwealth legislation will also deal with the issue of Emissions Intensity Trade Exposed Industries exemptions, and with use of international permits and Australian Carbon Credit Units (ACCUs).
- Balance of the scheme implemented through the co-operative state legislative scheme of the National Electrical Law and the National Electricity Rules.

# National Electricity Market Generation Emissions

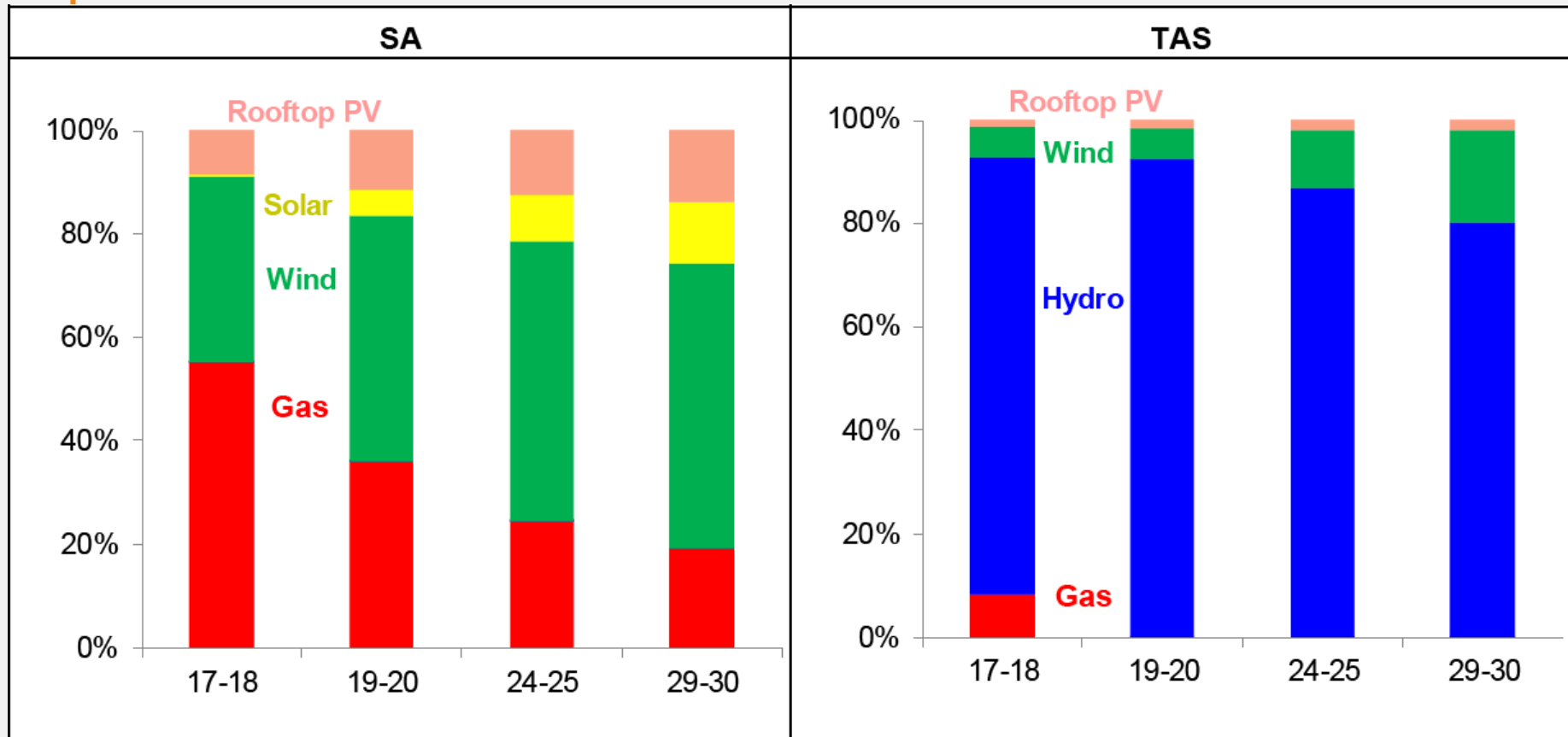


Source: ESB National Energy Guarantee Final Design August 2018 p18

# Changing generation mix?

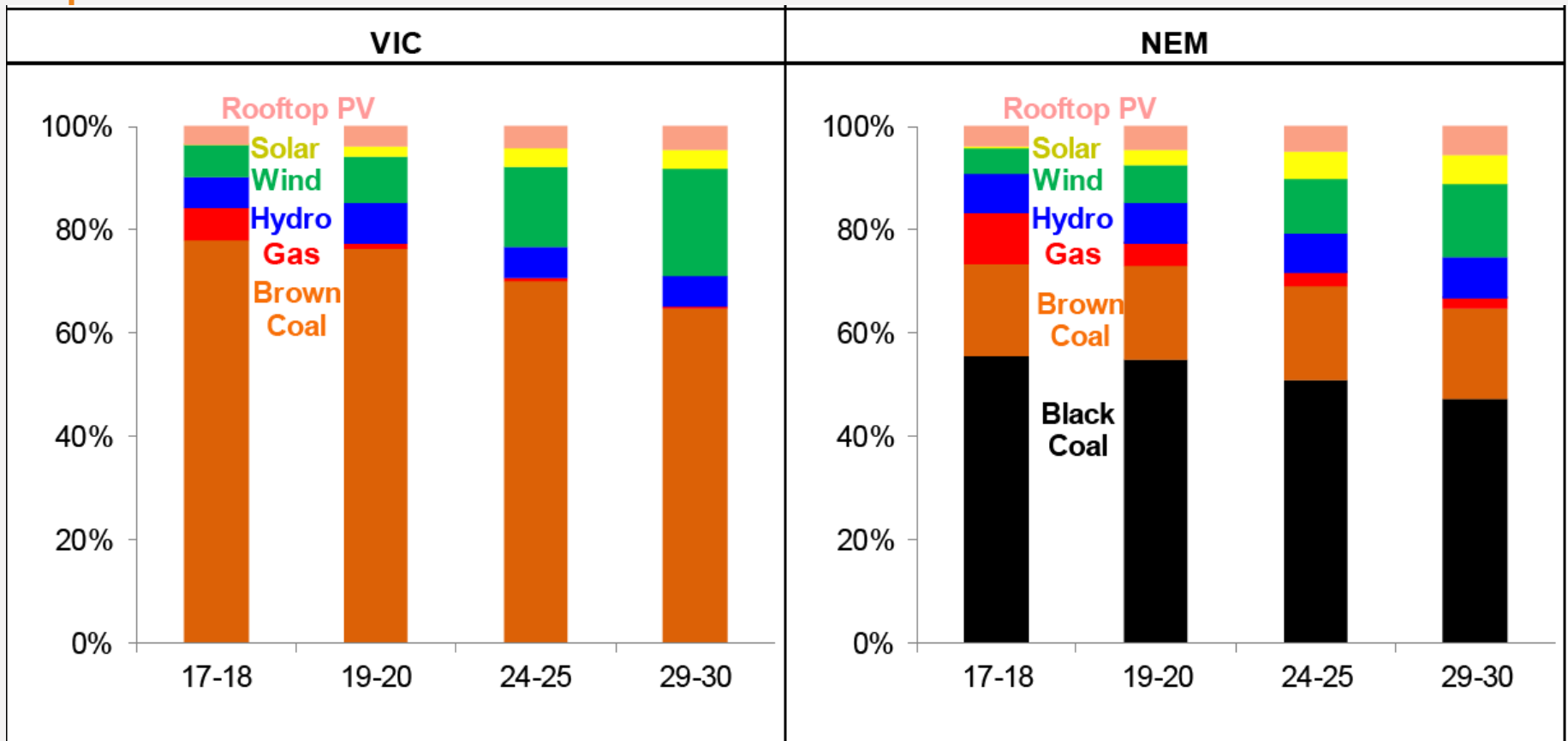


# Changing generation mix?





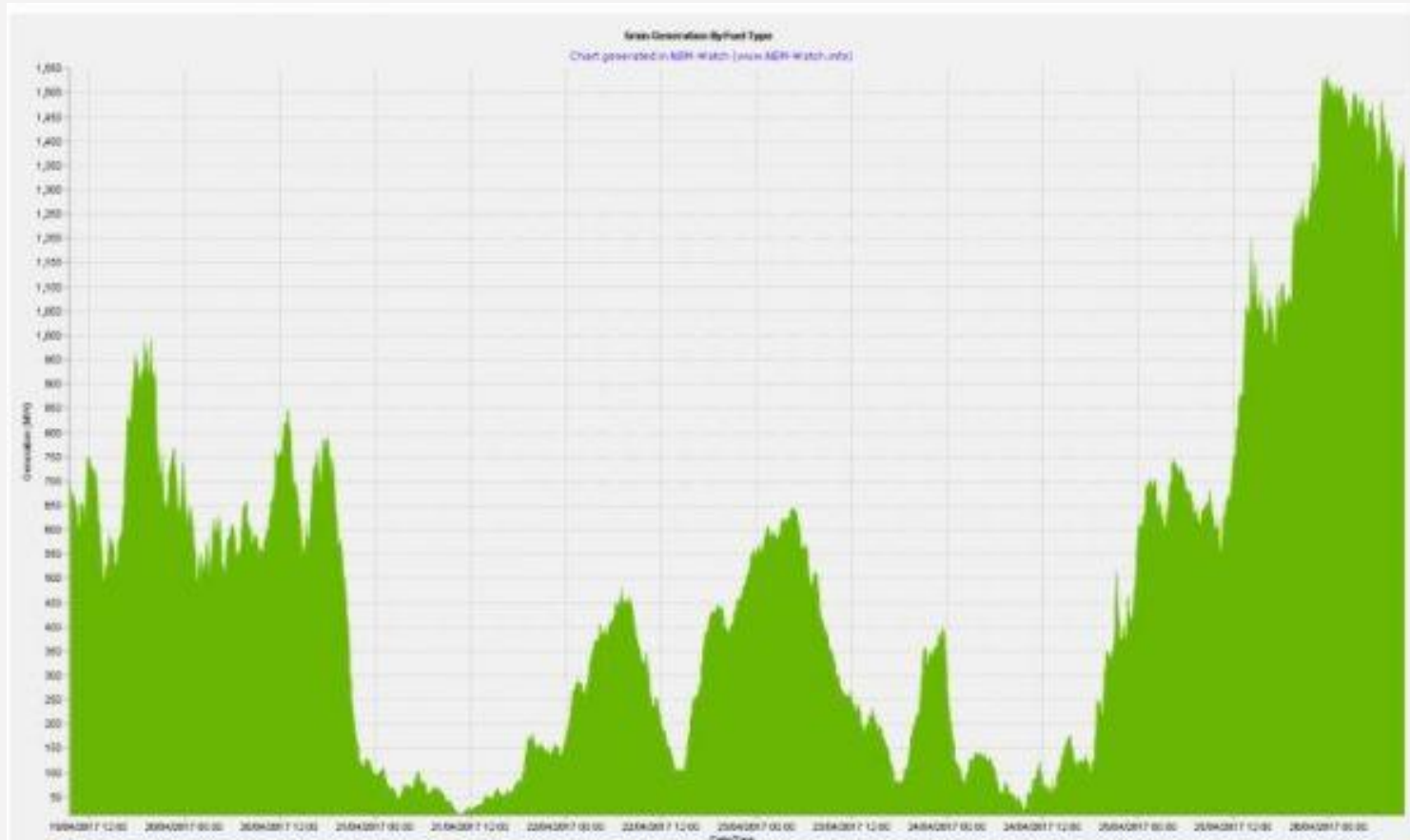
# Changing generation mix?



# Will the market overtake the planners?



# The challenge of intermittency

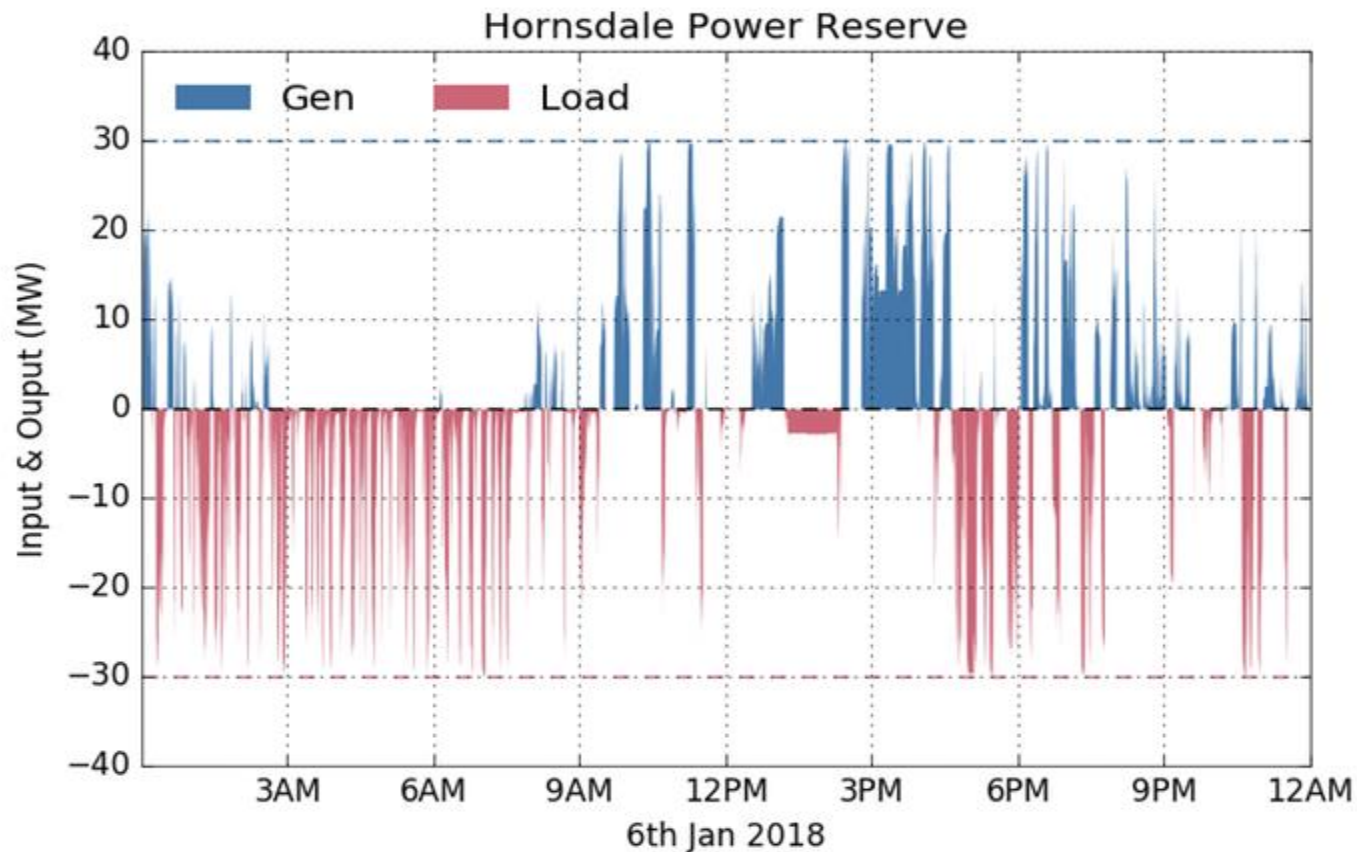


# The role of battery storage

- Time-shifting generation for price arbitrage.
- ‘Firming up” output by covering short-term outages (such as clouds).
- Assisting with “black start”, when there is no power in the system.
- Time-shifting generation to cover evening peaks.
- Fast frequency response for unanticipated outages.
- Ancillary services for voltage support.
- Ancillary services for frequency regulation.



# Frequency regulation (FCAS)





# Regulatory impacts

- Batteries treated as market load and market generation.
- System strength impact and modelling requirements.
- Network voltage controls.
- Requirement for integrated system planning.
- Requirement for new transmission nodes to support renewable generation.
- Will the current regulatory investment tests remain?



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