2025 consultation

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Submission from

Climate Change Balmain-Rozelle

to NSW's

Net Zero Commission

regarding the Commission's

Work Plan to 2028[1]

Climate Change Balmain-Rozelle[2] (CCBR) is an independent community group in inner west Sydney with around 1000 supporters. We campaign to promote local and national action to reduce fossil fuel use, increase the adoption of renewable energy, and head off catastrophic global warming.

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[1] https://www.netzerocommission.nsw.gov.au/about/work-plan
[2] https://www.climatechangebr.org/

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- "The economic cost of this premature mortality was between $1.1 billion and $2.6 billion (central estimate $1.8 billion). In addition, the estimated economic cost of morbidity was between $0.4 billion to $1.2 billion (central estimate $0.8 billion). "
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Question 6 - Renewables Rollout

> *"The speed of deployment of electricity generation and infrastructure is a key risk to emissions reduction targets. What more could be done to fast- track deployment?"*

Planning approvals

In 2023, NSW had one of the most onerous approvals processes of any state. It cost $4m merely to *apply* for approval for a large wind project - more than 100x the cost in Qld![3]. Actual approval times averaged nearly ten years[4].

In late 2024, the NSW government issued a raft of new guidelines setting tightened standards for wind, solar and batteries. Though these add a few percent to the cost, meeting them should allow much faster approval.

Recommendation:

The Commission should track progress on the approvals process and how we compare with other States.

Transmission

Planning

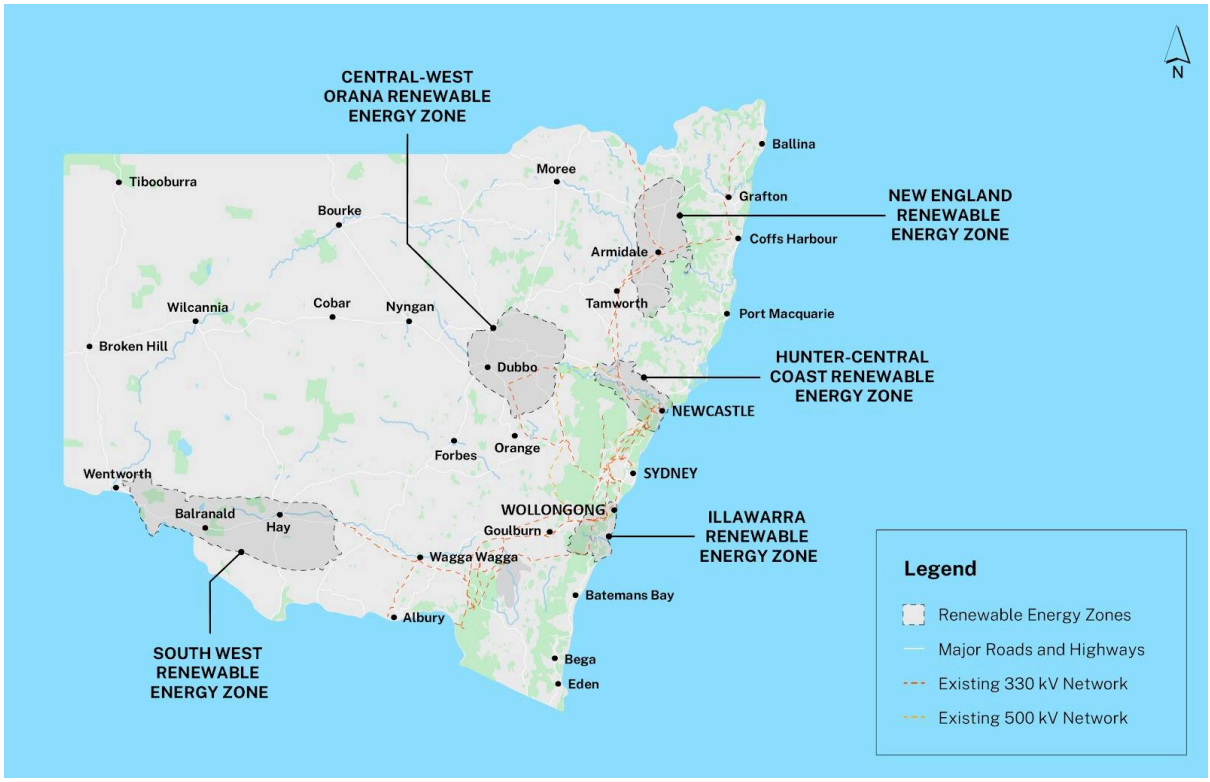
A common problem with renewables is geography:

- Where is the demand?
- Where are the good solar and wind resources?
- How do we connect them?

NSW has defined five Renewable Energy Zones:

[3] https://tbhconsultancy.com/whats-slowing-down-australias-renewable-energy-future

[4] https://www.afr.com/policy/energy-and-climate/turbines-quieter-than-a-fridge-the-nsw-rules-to-fix-renewables-delays-20241112-p5kpux



Part of the SW REZ's rationale is to supply power to SA. It has great resources but may have been oversubscribed by generation proposals as a result. The transmission infrastructure is inadequate and late.

Or is it just too much generation in that one place?

In NSW, four bodies are involved in transmission planning; in Victoria there's one.

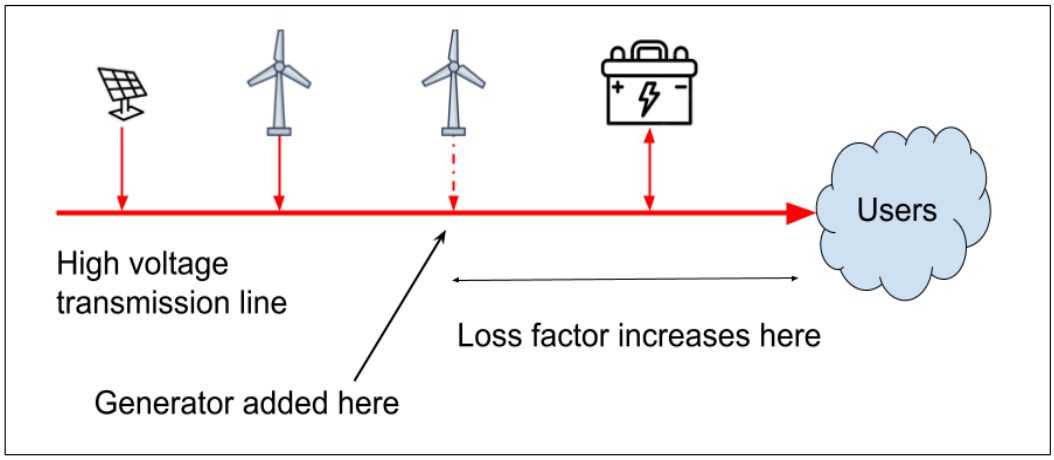
Recommendation:

Investigate the planning process for the SW REZ for lessons to be learnt.

Marginal Loss Factors (MLFs)

There are losses in carrying power from where it is generated to where it is needed. The more current on a line, the higher the losses, and they rise as the *square* of the useful power being delivered. Accordingly, the AEMO deducts a fraction from how much it pays a generator.

If a new generator connects to the same transmission line it increases the total current on that line and so increases everyone's power losses.



At one level, that's just how a free market works. Consider a string of primary producers sending produce to a market at one end of a busy road. If a new producer appears somewhere along the road, congestion increases for the rest, so it costs them all more to get their goods to market.

But here's the catch: the AEMO uses a "marginal cost" rule, treating the additional loss that would result from a bit more power as though it applied to all of the power. This has the effect of doubling the estimated loss.

Unsurprisingly, this is contentious. It certainly undermines certainty in the business case for new renewables.

We find that although there is some justification for amplifying the payment deduction a doubling is excessive. For details see *Appendix on MLFs*.

Recommendation:

Pressure the AEMO to find some compromise, such as outlined in the Appendix.

Distributed Generation and Storage

With transmission constraints inhibiting grid-scale renewables, we need to consider whether generation within the distribution network could be better harnessed. Wind is inefficient at small scale, so this means rooftop solar with enough distributed storage to cover the evening peak.

Rooftop solar

Rooftop solar already generates 10% of NSW's electricity[5]. Sydney has enough rooftop potential to meet 75% of its own needs[6].

There are two problems to overcome:

1. Driving continued uptake of rooftop solar to, say, 40-50% of daily energy demand.

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5 https://cleanenergycouncil.org.au/news-resources/rooftop-solar-generates-over-10-per-cent-of-australias-electricity

6 https://sydney.org.au/wp-content/uploads/2025/06/Committee-for-Sydney-Sydney-as-a-renewable-energy-zone-June-2025.pdf

2. Achieving enough distributed storage to save excess daytime generation for the darker hours.

Driving continued uptake

Apartments

In NSW, over 35% of detached houses have installed rooftop solar systems but only about 3.5% of apartment buildings do. This reflects a combination of regulatory, technical, and governance challenges specific to multi-unit dwellings. Key barriers include the need for majority or unanimous approval from owners corporations, complex roof ownership arrangements, technical difficulties in sharing solar energy across multiple units, and the absence of clear financial incentives for individual owners[7].

Furthermore, older apartment buildings were not designed with solar infrastructure or optimal roof access in mind. Recognising these challenges, the NSW Government has launched the Solar for Apartment Residents[8] (SoAR) Grant Program, offering up to $150,000 per building to cover 50% of the installation cost of rooftop solar for shared benefit. While this is a positive step, uptake remains low, and broader regulatory reforms and streamlined decision-making processes are needed to unlock the potential for decarbonising energy use in the strata sector.

Apartment blocks that include up to 50 units, and are no more than three storeys high, can supply a substantial portion of the power needed by residents. *Allume Energy's SolShare* system[9] can invoice individual units. A single 'behind the meter' invoice is used to pay for top-up power from the grid if required.

Feed-in tariff

We note that Victoria's Essential Services Commission has recently ceased to mandate a minimum feed-in tariff, even for the evening peak[10]. A key argument used is that the daytime minimum tariff was already set at zero, but this fails to consider households with solar and a battery.

In NSW latitudes, PV output has a longer day. Augrid's afternoon peak charge period starts at 3pm AEST (4pm AEDT) in eight months of the year[11]. Modelling[12], we find that at Ausgrid's published Time of Day residential rates a panel in Sydney oriented 60°W would be worth 20% more over the year than one oriented due North. Encouraging more installations at such an orientation would match demand better.

The ESC further argues that households do better by using what they generate, but, inevitably, generation and consumption vary independently from day to day; even with the ideal provisioning of both PV and battery capacities there will be a surplus on some days.

Paying a household for the value of its feed-in is simply the right thing to do.

As the ESC notes, an alternative for solar plus battery households is to participate in a Virtual Power Plant. But it is early days yet for VPPs in Victoria and still earlier in NSW.

Proximity network charging

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[7] https://energyconsumersaustralia.com.au/sites/default/files/2025-05/opportunities-and-barriers.pdf
[8] https://www.nsw.gov.au/grants-and-funding/solar-for-apartment-residents-soar-grant-program
[9] https://allumeenergy.com/au/
[10] https://www.esc.vic.gov.au/sites/default/files/documents/Final%20Decision%20Paper%20-%20Minimum%20feed-in%20tariffs%20to%20apply%20from%201%20July%202025.pdf
[11] https://www.ausgrid.com.au/Your-Energy-Use/Understanding-tariffs/Time-of-use-pricing
[12] Using equations at http://les.edu.uy/FRS/duffie_beckman.pdf and allowing for atmospheric attenuation as a function of solar elevation

We note that Ausgrid has introduced two trial Local Use of Service tariffs, EA955 for small business and EA956 for residential[13]. These should allow a better return on feed-in where there is nearby demand matching the feed-in power profile.

Recommendations:

Mandate a feed-in tariff

At least until VPPs become mainstream, IPART should mandate a minimum feed-in tariff based on Time of Day. (Indeed, at the Federal level, the Default Market Offer should include such.)

Measures that reduce curtailment, such as distributed storage, will also help.

Implement smart curtailment in NSW

Rooftop solar feed-in may exceed what can be routed to storage (perhaps owing to local distribution constraints). The approach by NSW DNSPs has been to shut down the PV households' inverters, thereby denying the households use of their own energy.

South Australian Power Networks (SAPN) has pioneered a more flexible arrangement[14].

Encourage DNSPs to expand Local Use of Service.

Distributed Storage

Community Batteries

In principle, community batteries should be a more efficient arrangement than each household having its own. The challenge is 'value capture', ensuring the beneficiaries finance it.

Various studies have struggled to find a viable model[15], but such studies soon become out of date. With the fall in battery prices over the last year a scheme such as LUoS could make it work.

Recommendation:

Engage a research group to provide a public app allowing the user to keep the results up to date by varying the parameters.

Virtual Power Plants

The NSW government provides a VPP membership incentive[16], complementing the Commonwealth's *Cheaper Home Battery Program*. The more lucrative arrangements available through VPPs are already helping home owners who have purchased a solar + battery package

[13] https://www.ausgrid.com.au/-/media/Documents/Regulation/Pricing/PList/Ausgrid-Network-Price-List-2025-26.pdf?rev=d03e3b238a144e8abf3325bcc92eed08

[14] https://reneweconomy.com.au/rooftop-solar-is-a-burning-platform-warns-network-boss-dont-wait-for-the-fire/

[15] https://arena.gov.au/assets/2020/08/community-batteries-cost-benefit-analysis.pdf

[16] https://www.energy.nsw.gov.au/households/rebates-grants-and-schemes/household-energy-saving-upgrades/connect-your-battery-virtual

to pay off their investments. Retailers such as *Amber Electric* purchase stored power from battery owners during peak hour, at a price rather greater than the 4 to 7¢ per kWh feed-in tariffs generally on offer.

Uptake will depend on public understanding of what VPPs are, and trust in the likely benefits.

Recommendation:

Community education will be essential to promote understanding and uptake of VPPs.

Community Retailers

Some rural towns have achieved a high level of solar uptake by establishing their own retailer with a community battery large enough to meet local need. The best-known example is Yackandandah (Vic) and its *Indigo Power*[17] company. The company buys top-up power if needed from the NEM and sells back any surplus.

Electric Vehicles as grid batteries

Vehicle-to-grid (V2G) requires a bi-directional EV charger. Ausgrid permits these[18].

Since the key need for feed-in is during the early evening peak demand, the preferred location for such chargers is in residential areas, either in homes or kerbside.

A 2024 report prepared for ARENA[19] found that:

"*V2G can substantially reduce substation critical peak demand.*"

But it also found that standard Time of Use feed-in tariffs are insufficiently rewarding:

"*Bidirectional ToU network tariffs are unlikely to support efficient outcomes from V2G*"

(For 2025/2026, IPART's recommended feed-in tariff in the evening peak is 15-20¢/kWh[20] for the Ausgrid network.)

Instead, it found that dynamic or spot passthrough tariffs are needed. That would be a major obstacle for householders as, in the absence of a smart system managing home demand, they would be exposed to great risk. It would seem to require a reverse flow form of a Controlled Load circuit, activating only when the grid is short of power, as opposed to only when it is flushed. This would limit the dynamic pricing to feed-in.

(Of course, it must not be permissible to draw from the grid on a ToU circuit when the spot price is high while simultaneously feeding the same power back in on a spot price circuit.)

Recommendation:

Investigate options for a reverse-flow, spot-price, controlled load circuit or equivalent.

Other likely barriers to uptake:

- Fear that too little will be left "in the tank".
- Concern over extra charging cycles reducing battery life.

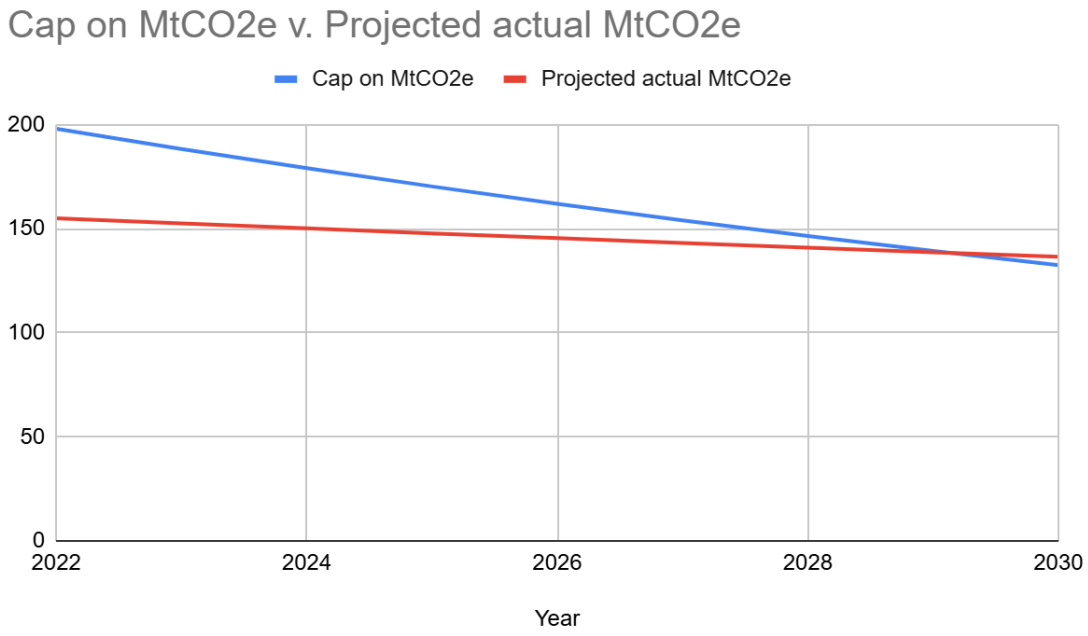
[17] https://indigopower.com.au/
[18] https://www.ausgrid.com.au/About-Us/Future-Grid/Electric-Vehicles/V2G
[19] https://arena.gov.au/assets/2024/02/ARENA-Vehicle-to-Grid-Network-tariffs-report-1.pdf
[20] https://www.ipart.nsw.gov.au/iparts-solar-feed-tariff-price-guide

- Paucity of models. There are currently only three EV models in Australia that support it, and they all use the superseded CHAdeMO connectors[21].

The Safeguard Mechanism

Bizarrely, the Safeguard Mechanism applies a *whole-of-sector* test to electricity generation. There is no pressure on fossil fuel-based generators so long as the cap on the whole sector, 198 MtCO2-e in 2022, is not exceeded. In the 12 months to March 2023, reported sectoral emissions were 153 Mt, and since March 2016 have been declining at an average of 1.58% p.a. as a result of the shift to renewables[22].

At that rate, if we assume the cap on the sector reduces at the standard 4.9% p.a., no pressure will be exerted on emissions in the sector until 2030.



Since the SGM is a Federal scheme, It may be hard for NSW to remedy this. There would be a risk of interstate leakage if fossil fuel generators were subject to different regulations in different states.

Recommendation:

Investigate the possibility of closing this hole through the National Cabinet.

Question 9 - Transport

"What are likely to prove the most effective approaches to accelerate rapid decarbonisation across freight and passenger transport?"

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21 https://thedriven.io/2025/02/17/which-evs-can-do-bidirectional-charging-in-australia-the-answer-is-not-many/

22 https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-gas-inventory-quarterly-update-march-2023

Passenger Transport

Private cars

Electric Vehicle uptake

In 2024, EVs (BEV+PHEV) were 9.5% of new car sales in NSW[23]. In 2021, NSW Government schemes had been laid out to achieve 52% by 2031[24] and are roughly on track.

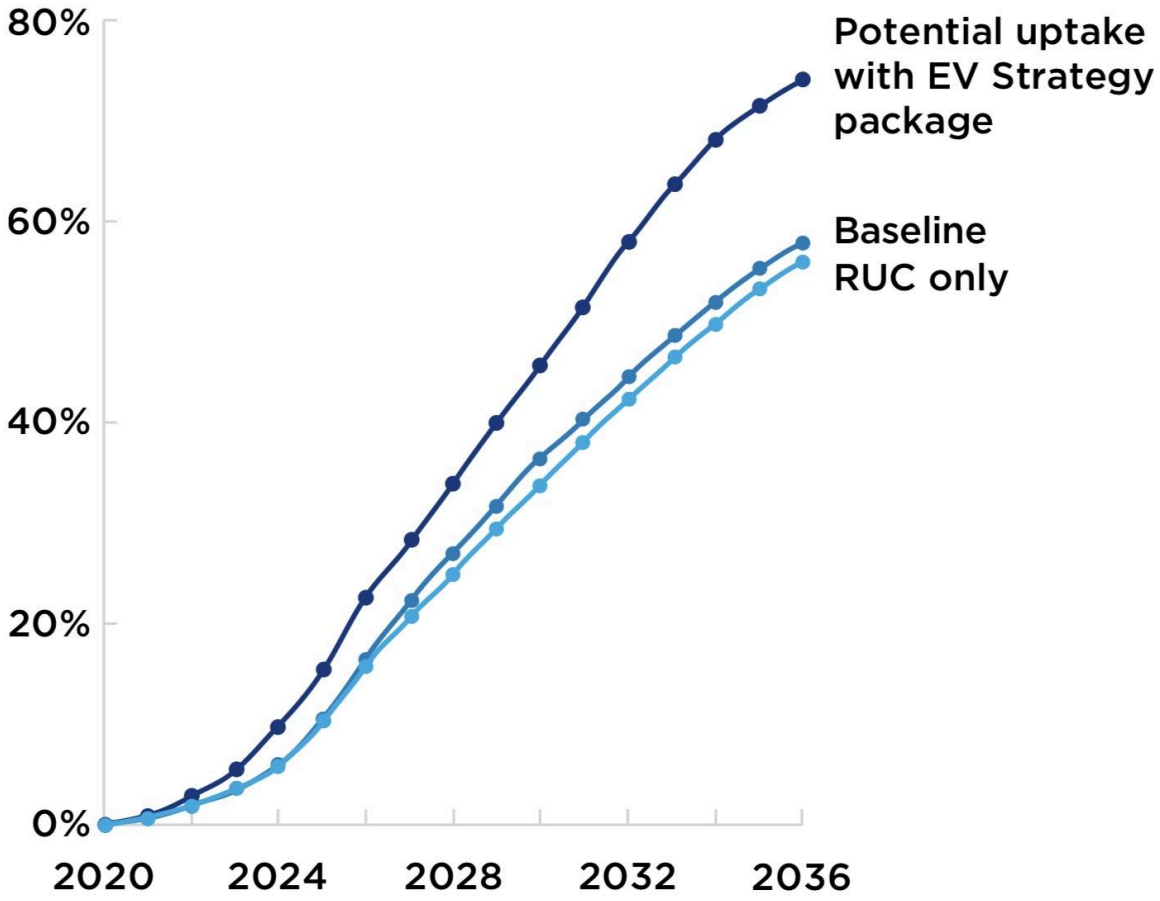


Figure 6 Share of battery electric vehicles in annual sales.

RUC = Road User Charge

Incentives

However, the rebate and stamp duty incentives partly responsible ended in 2023, funding being redirected to charging infrastructure. Stamp duty on EVs will end in 2027, with a Road User Charge - of 2.5¢/km for BEV, 2¢/km for PHEV being - introduced at the same time[25].

[23] https://electricvehiclecouncil.com.au/wp-content/uploads/2024/12/1734312344781.pdf
[24] https://www.energy.nsw.gov.au/sites/default/files/2022-09/nsw-electric-vehicle-strategy-210225.pdf
[25] https://www.mynrma.com.au/open-road/advice-and-how-to/ev-incentives/nsw

Sales percentage versus on-road percentage

On Australian roads today, EVs are only 1% of light passenger vehicles. The average age of a passenger car in Australia is ten years[26]. Taking that to mean half will be replaced in the next five years, while the EV percentage of sales rises from 10% to 40% linearly, we can expect only 13.5% of cars to be electric by 2030.

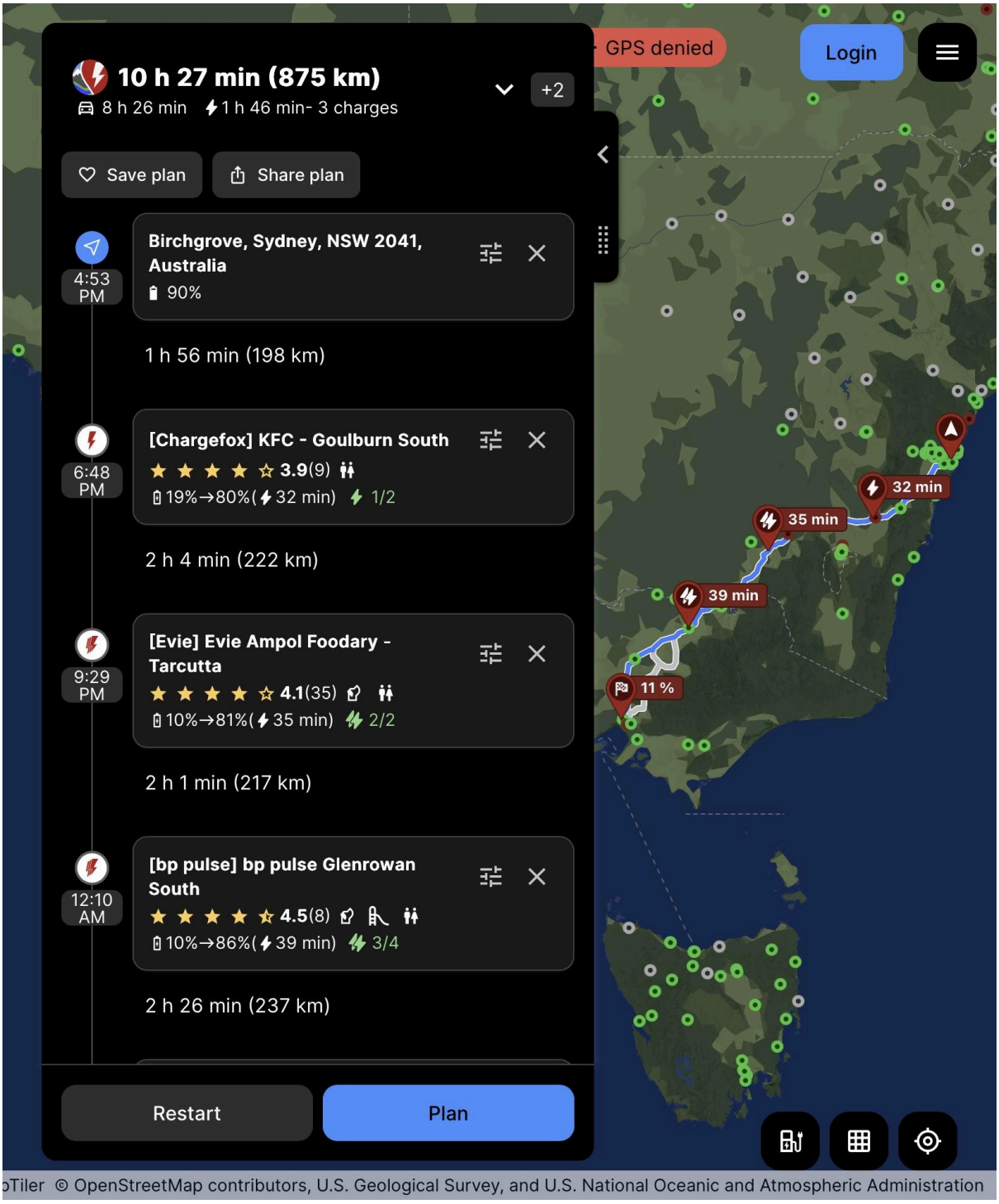
Inhibitions

An ongoing concern is route planning for EVs. As I write this, TfNSW's charging map[27] is dysfunctional on both iPad and smartphone. Fortunately, international apps exist[28] that cover Australia and provide not only a map but also route planning based on the car model and various preferences. Here is a sample output for a low-end EV:

26 https://www.aaa.asn.au/wp-content/uploads/2018/03/AAA-ECON_Benefits-of-reducing-fleet-age-summary-report_Dec-2017.pdf

27 https://www.transport.nsw.gov.au/projects/electric-vehicles/charging-an-electric-vehicle/nsw-electric-vehicle-charging-map

28 https://abetterrouteplanner.com/



Oversized cars

The steady increase in the average size of the Australian family car must be halted and, preferably, reversed. A significant cause is exploitation of lower taxes on commercial vehicles[29].

29 https://australiainstitute.org.au/post/suvs-and-utes-are-no-longer-just-work-vehicles-but-tax-subsidised-behemoths/

The Federal Government's New Vehicle Efficiency Standard[30] penalises vehicles not for high emissions but for a high emissions to weight ratio. Thus, it fails utterly to achieve a stated aim of encouraging the use of lighter materials. It fails even to mention encouraging smaller vehicles.

Oversized cars pose a danger to others. Road trauma costs NSW around $8bn a year[31]. Attempts to reduce this in recent decades have failed signally. A 10cm increase in the height of a vehicle's front end has been found to correspond to a 22% increase in pedestrian mortality[32].

Recommendations:

- *Base any Road User Charge on the fourth power of axle weight rule, plus a component related to front-end vehicle height. (See Appendix on Road User Charge.);*
- *As part of discouraging unnecessarily large cars, make use of graduated parking bay sizes, with longer bays at a higher rate. Correspondingly, reduce the minimum bay length to 5m (currently 5.4m) as is standard for a compact car space in Europe[33];*
- *Introduce Low Emissions Zones. Europe has hundreds of Low and Zero Emissions Zones[34], and these have proved highly successful[35];*
- *Lower vehicle registration for no- and low-emission vehicles, sharply rising for higher-emission and larger vehicles;*
- *TfNSW to abandon maintaining its charger map, instead redirecting the web page visitor to a more usable route planner.*

Active and public transport

A quicker route to decarbonising private transport may be incentives to leave the car at home, or even dispense with one altogether, in favour of walking, cycling, electric bike or public transport. These will also improve health through exercise, reduced congestion stress and better air quality.

We commend the plans laid out by Transport for NSW[36] and hope that these represent a real shift away from the historic obsession with private motor vehicles.

Meanwhile, the substantial toll rebates[37] in NSW are serving to encourage car use. However, cutting those could lead to some drivers continuing to drive but switching to untolled routes, increasing congestion and emissions.

There are several other measures that would also help.

Recommendations:

- *Introduce congestion charging in Sydney. Several cities around the world have found significant reduction in commute times through congestion charges[38,39];*
- *There is at present a push at State level to increase housing near the city. Such moves should prioritise active transport over private cars, e.g.*

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30 https://www.infrastructure.gov.au/infrastructure-transport-vehicles/vehicles/new-vehicle-efficiency-standard

31 https://www.aph.gov.au/DocumentStore.ashx?id=c74ab111-433e-4069-8622-97fdd6d188b1&subId=684956

32 https://www.sciencedirect.com/science/article/abs/pii/S2212012224000017

33 https://www.interparking-france.com/en/what-are-the-dimensions-of-a-parking-space/

34 https://cleancitiescampaign.org/research-list/lez-essential-guide/

35 https://datahub.roadsafety.gov.au/progress-reporting/monthly-road-deaths

36 https://www.future.transport.nsw.gov.au/strategy-highlights/more-choice-better-access

37 https://www.service.nsw.gov.au/transaction/claim-the-toll-relief-cap

38 https://ops.fhwa.dot.gov/congestionpricing/assets/world_examples.pdf

39 https://en.wikipedia.org/wiki/Congestion_pricing#External_links

- *tightly limiting the parking per household;*
- *areas that are limited to active transport, service vehicles, deliveries, mobility, etc.*

- *More generally, the State government should pressure LGAs to cut down on free parking, particularly in high density areas with narrow streets. This could be a significant gain of income for some.*

Public transport

Public transport use in Sydney is close to its pre-Covid peak, having climbed 20% from 2023 to 2024.

https://www.nsw.gov.au/media-releases/passengers-vote-their-feet-and-return-to-public-transport

TfNSW's plans could boost use significantly, as could several of those recommended above.

Active transport

Nearly 50% of all car trips in Australian cities are less than 5 km, a distance suited to walking, cycling, and e-biking. Substituting for one car trip per day saves 0.5 tCO_2 per year[40].

Australia allocates less than 2% of its total road infrastructure budget to active transport[41]. The EU has earmarked 12% for 2021-2027[42].

Key here is safety. For walking and cycling, avoidance of steep hills and circuitous routes is also important.

Recommendations:

- *A general shift to 30kph in most suburban streets, both to make active transport safer and to reduce one incentive for motorised transport.*
- *Significantly increase funding to active transport infrastructure, with a focus on enabling short-trip substitution. This would deliver a high return on investment through co-benefits to health, emissions, equity, and urban livability.*

Corridors

TfNSW plans a 250km network of active transport corridors in the more densely populated areas of Sydney[43], but no timeline is given. We note that the online information is dated April 2022. Also, many households will be over 2km from the nearest corridor, so much work will be needed at the LGA level to establish capillaries allowing residents to reach them safely.

Recommendations:

- *TfNSW to lay out a timeline for the corridors, keep online information up to date and publish maps as soon as reasonable;*

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40 https://www.ox.ac.uk/news/2021-02-02-get-your-bike-active-transport-makes-significant-impact-carbon-emissions

41 https://www.climatecouncil.org.au/wp-content/uploads/2022/07/CC_MVSA0315-CC-Mini-Transport-Policy-Brief-Core-Update_V3-Single.pdf

42 https://www.eiturbanmobility.eu/knowledge-hub/mastering-mobility-with-the-15-minute-city/

43 https://www.transport.nsw.gov.au/system/files/media/documents/2022/April_2022_Strategic_Cycleway_Corridors_Eastern_Harbour_City_Overview.pdf

- *For mutual benefit, pedestrian and wheeled active traffic to be kept separate where possible;*
- *As details appear, LGAs to develop plans for local connections.*

Cycling and Rail

A review of the bike parking facilities is due in August 2025.

Recommendation:

We concur with the recommendations[44] made by Bicycle NSW in anticipation of the review.

Freight

Short haul

Recommendation:

We endorse the report by the Electric Vehicle Council[45].

Long haul

Europe is forging ahead with long haul electric vehicles, but this is made feasible partly by an EU rule that drivers take a 45 minute break each five hours. That is just enough time to add 500km range with a 750kW charger[46].

In Australia, only a fifteen minute break is required. This leaves the following options:

- Battery swap

  This is an option in Australia now[47]. It is also used increasingly in China[48].

- Fuel cell using Green Hydrogen

  As the rest of the world goes electric, obtaining hydrogen trucks may be difficult. Producing green hydrogen efficiently has proved harder than anticipated.

- Rail

  We note in the very recent report by Dr Kerry Schott, *Delivering freight policy reform in New South Wales*[49],:

  > "*The most substantial immediate reduction in freight emissions would come from a shift from road to rail. Measures recommended throughout the report focus on making rail more competitive*"

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[44] https://bicyclensw.org.au/bike-park-and-ride-on-sydney-metro/

[45] https://electricvehiclecouncil.com.au/wp-content/uploads/2022/01/ATA-EVC-Electric-trucks_Keeping-shelves-stocked-in-a-net-zero-world-2.pdf

[46] https://thedriven.io/2025/06/26/europe-is-racing-ahead-on-electric-trucks-but-heres-why-australia-cant-be-a-carbon-copy/

[47] https://www.januselectric.com.au/

[48] https://www.engineering.org.cn/engi/CN/10.1016/j.eng.2025.06.022

[49] https://www.transport.nsw.gov.au/system/files/media/documents/2025/Delivering-freight-policy-reform-in-NSW-june-2025.pdf

The electrified sections of the regional NSW TrainLink network are the intercity lines to Newcastle, Lithgow, and Kiama, as well as the entire Sydney metropolitan area. Beyond, bi-modal locomotives have been introduced, using overhead power where available but switching to Diesel as necessary[50].

Options for further decarbonisation:

- Expanding electrification
- Switching from Diesel to Hydrogen fuel cell

Grey Hydrogen can work out cheaper than Diesel[51], but has similar emissions[52]. The barrier to making fuel cells a zero emissions technology is the cost of Green Hydrogen.

	$kgCO_2e/kg$	AUD/kg
Grey Hydrogen	11	2-3
Green Hydrogen	0	6-9

Costs and emissions of Grey and Green Hydrogen[53] [54]

To cover a price difference of AUD5/kg requires an effective carbon price of AUD450/tCO2e.

Since the storage and transportation costs are the same, the key costs are production of the electricity and the electrolysis. To maximise use of the electrolyser, the electricity needs to be produced 24/7, though not necessarily at any guaranteed power level.

Offshore wind and solar from the grid are relatively expensive, so this implies a combination of off-grid solar and onshore wind.

The accustomed decline in the cost of solar energy came to a shuddering halt in early 2021, largely as a result of supply chain issues:

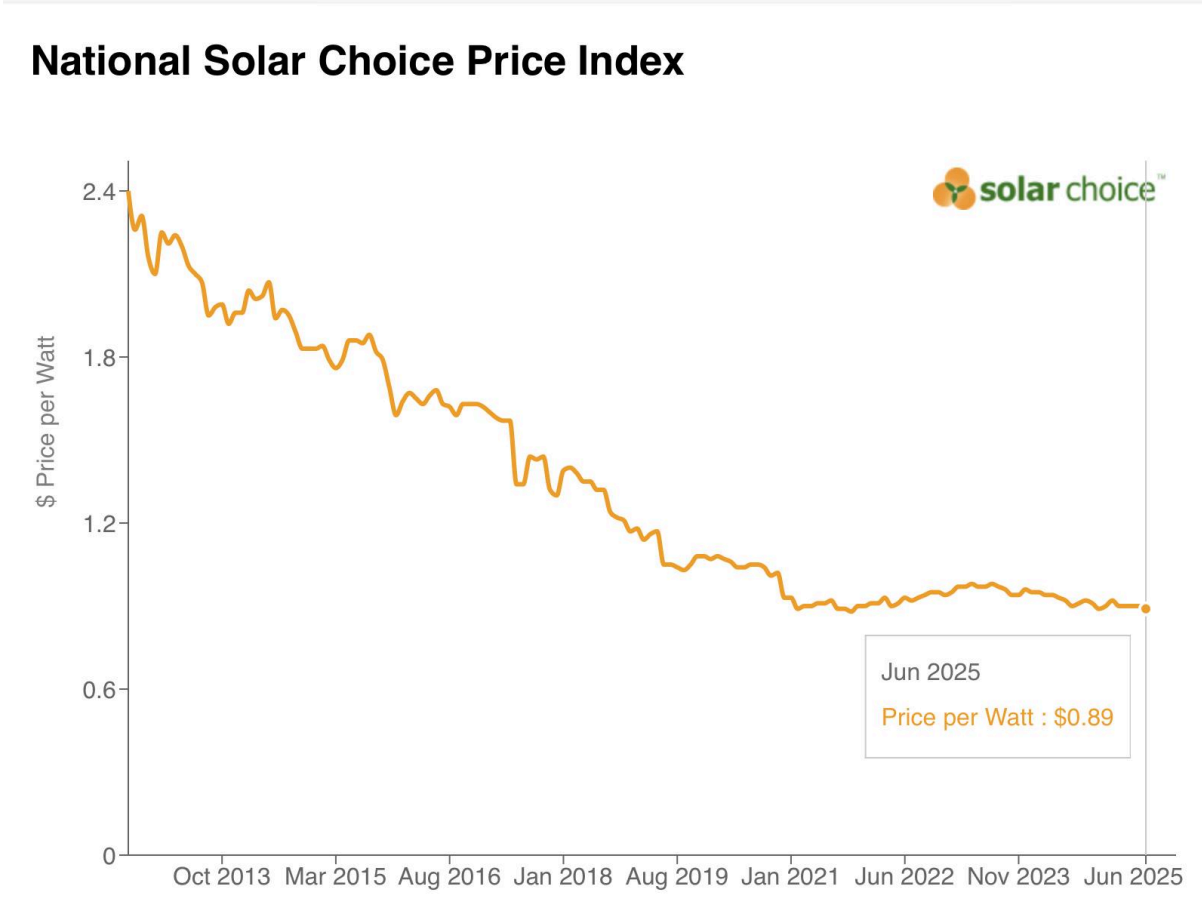
50 https://www.transport.nsw.gov.au/system/files/media/documents/2022/Bi-mode%20fact%20sheet%20October%202022%20-%20WCAG.pdf

51 https://www.weforum.org/stories/2018/09/germany-just-rolled-out-the-world-s-first-hydrogen-powered-trains/

52 https://www.hydrogeninsight.com/transport/grey-hydrogen-can-be-used-in-heavy-duty-vehicles-in-eu-s-fossil-fuel-phase-out-despite-being-as-polluting-as-diesel/2-1-1550561

53 https://arena.gov.au/blog/australias-pathway-to-2-per-kg-hydrogen/

54 https://www.sciencedirect.com/science/article/pii/S0360319925011991



As against that, in 2023 CSIRO was still predicting continued decline, so the plateau may well be temporary:

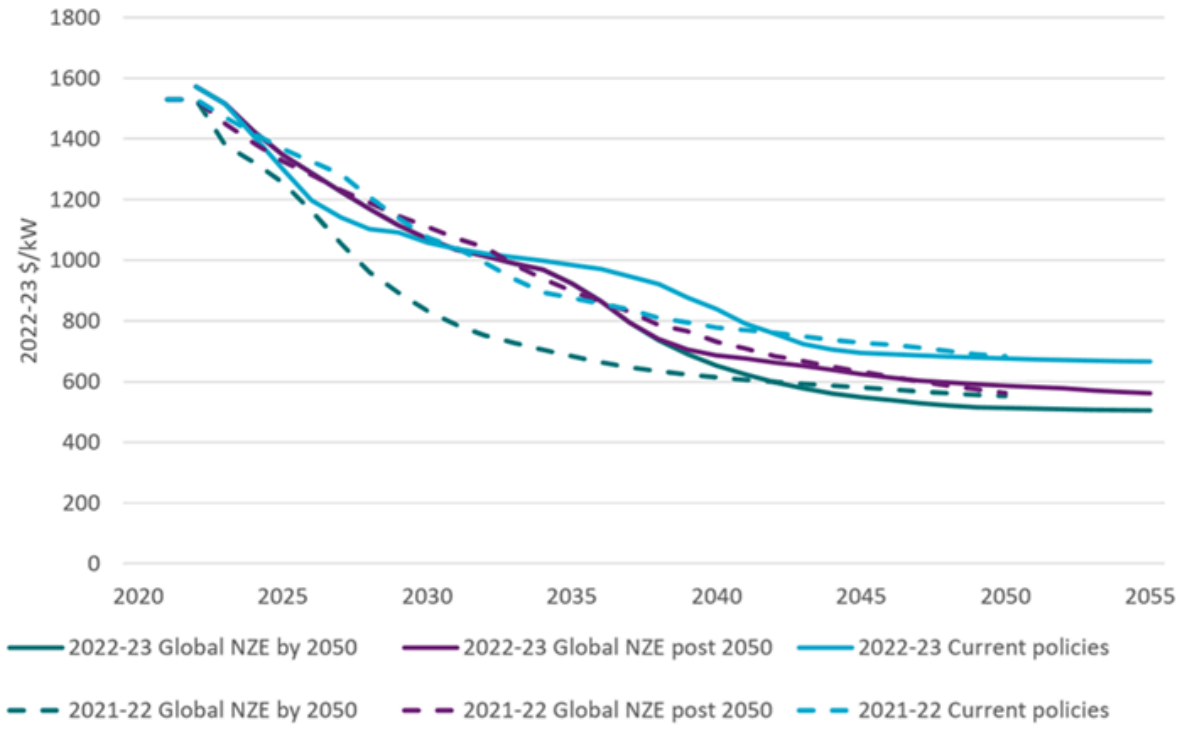


Figure 11: Large-scale solar projected capital costs

from Jul 27 2023 GenCost verdict[55]

> Onshore wind is a fairly mature technology, and has also been hit by supply issues, so no near term cost decline is expected.
>
> The cost of electrolysis depends on its capital cost and efficiency. Most achieve 70-80% efficiency, but a recent advance claims 95%[56]. Capital cost should fall as the market expands[57].

Recommendation:

Further research is needed to choose between:

- *Expanding rail electrification, or*
- *Switching from Diesel to Green Hydrogen*

Question 16 - Coalmines: Transparency

"How could transparency of how coal mines meet their Safeguard Mechanism obligations be improved?"

The issue is whether meet their SM obligations, not how. The current gap between reported and actual emissions is a scandal. Airborne measurements found a Queensland mine emitting three to eight times its reported emissions[58] and a satellite showed NSW coal mine emissions being double those reported[59]

Recommendation:

- *NZC urgently initiates independent assessment of emissions, including methane emissions, from existing and retired coal mines,, using state-of-the-art technology;*
- *NSW Government legislate that when an independent assessment finds significant under-reporting in prior self-assessment, that approval to continue operations be conditional on prompt remediation to significantly decrease emissions so that emissions from operations since passing of the Net Zero Future Act in 2023 are in line with the 2030 and 2035 targets in that Act. - .*

Question 17 Coalmines: Offsets

"What measures would lead to coal mines prioritising on-site abatement over offsetting?"

Unfortunately, ACCUs can be far less worthy than SMCs because of the excessive discount rate used for sequestration that is not permanent.

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55 https://www.energycouncil.com.au/analysis/gencost-verdict-onshore-wind-and-solar-remain-lowest-cost-generation/

56 https://hysata.com/

57 https://www.pv-magazine.com/2024/03/28/pv-driven-green-hydrogen-may-be-sold-in-australia-at-2-kg-by-2030/

58 https://www.unsw.edu.au/newsroom/news/2025/03/coal-mine-methane-emissions-much-higher-than-previously-reported

59 https://ember-energy.org/latest-insights/satellite-analysis-identifies-more-methane-from-australian-coal-mines/

If, for example, a forestry plantation under that scheme is undisturbed for 25 years the effective sequestration is treated as 80% of that amount of carbon having been sequestered permanently. A 5% margin is subtracted from that, leaving an assessment of 75%.

This appears to be a consequence of using a discount rate of about 6%. To achieve actual permanent sequestration, the Emissions Reduction Fund would need to pay an amount *X*, say, every 25 years. Discounting at 6% p.a., the total in today's dollars is $\Sigma_n X(1\text{-}0.06)^{25n}=X/0.79$, hence 80% of permanent.

However, that assumes *X* is constant - no inflation and no increased need to sequester carbon - and 6% is excessive[60]. The discount rate set by the US Federal Reserve tracks nearly one percentage point below the recent inflation rate at the time, so the real discount rate (i.e. after subtracting inflation) is about 1%. Using this instead of 6%, 25 years of sequestration should only be credited as 20%-5%=15% of permanent, which is only a fifth of the present evaluation of 75%.

Recommendation:

An ACCU should only be counted as one fifth of an SMC.

Question 18 - Safeguard Mechanism: Resources

> *"What measures should be considered beyond the Safeguard Mechanism to reduce emissions of the resources sector, particularly methane emissions, to meet NSW's emissions reduction targets?"*

The *Federal* Safeguard Mechanism has the potential to be quite effective, but cannot prevent projects that should never have started. The problems start at the *State* level in the proposal stage.

Modifications vs Expansion Projects

Coal miners are avoiding full scrutiny of their projects by splitting them into smaller chunks, and calling them modifications or similar, when the clear intention of the miner is to "bank" approval of a larger project. Modifications are assessed within the Planning Department, while larger projects need to be examined more thoroughly, likely by the independent Planning Commission, allowing scrutiny of greenhouse gas emissions as well as other environmental and social impacts.

Hunter Valley Operations, for example, withdrew a proposal for the largest expansion ever proposed in NSW, to continue until 2045 and 2050, when the Environment and Energy Minister made it clear that it would blow NSW's carbon budget to meet its NZF targets. The operator Glencore then replaced the application with one for an 18 month extension to one of the 2 mines involved. The miner has indicated it will submit another revised proposal, which will likely cover at least part of the massive original. Further applications could then follow.

In another example, Idemitsu's Boggabri Coal mine proposed a "Modification 8" to extract 61.6 million tonnes of extra coal, when it was already approved until 2033. It then amended the proposal to 28.1 million tonnes extra, out to 2036. This was approved by the Planning Department in 2024. It is now following up with a Modification 10 for a further 30 million tonnes, out to 2040.

We are concerned that if the NSW Government approves coal mine projects to start in the next decade and beyond and new information shows the unacceptability of the damage to our climate of these projects, the NSW taxpayer would be liable for costs of withdrawing these approvals.

[60] There is an unfortunate tendency to reach for discount rates like 7% out of convention instead of paying attention to the circumstances. If an amount *X* has to be paid out every 25 years to achieve real permanent sequestration then the test is how much has to be invested up front *at low risk* and *after taxes* to fund that. This implies a discount rate of no more than 3%.

Recommendations:

- *NZC urgently calls on the Government to approve no further coal mine expansions **under any name**, especially where these are not slated to begin before 2030.*
- *NZC proposes a phasedown plan as suggested by the NSW Productivity Commission in its recent Net Zero report[61] for "a clear deadline for decommissioning thermal coal mining for export".*
- *To inhibit use of these salami tactics, when categorising the magnitude of a proposal it should be accumulated with all proposals by the same company, across all sites, in the preceding ten years.*

Environmental Impact Statements

A coalmine proposal is required to provide an EIS stating, *inter alia*, estimates of fugitive methane emissions, but:

- Scrutiny can be minimised or avoided by having the proposal classified as a consolidation / extension / modification / continuation / expansion…; on present statistics, fossil fuel proposals automatically qualify;
- In operation, the operators are allowed to assess their own performance;
- The estimates are not commitments and no penalties are defined for exceedance;
- Minimisation plans are allowed to be rendered meaningless by weasel phrases such as "where feasible".

Recommendation:

In conjunction with the recommendations under Q16 above:

- *apply the full level of environmental impact scrutiny to all proposals expected to increase lifetime emissions;*
- *legislate serious penalties where exceedances are found, applied on an annual basis, with no banking of credits or debits allowed;*
- *any reviewing body, such as the EPA, to disregard nonspecific minimisation plans;*
- *to ensure penalties for emissions exceedances are exacted, site rehabilitation bonds need to include a component to cover delayed detection*.

Economic benefits assessments

Many development proposals are required to include an assessment of the net benefit to NSW. Under current rules, greenhouse gas emissions form one cost to be counted, but only insofar as they affect NSW financially. An algorithm commonly used in coal mine proposals is:

1. Estimate the scope 1 and 2 GHG emissions expected (principally fugitive methane) in each year
2. Multiply by a carbon price (possibly increasing over years)
3. Apply a discount rate, typically 7%
4. Sum over the project lifetime
5. Scale down according to one of the following ratios:
    a. NSW's GDP as fraction of World GDP
    b. NSW's population as fraction of World population
    c. Australia's GDP as fraction of World GDP
    d. etc.

Naturally, the final step reduces it to a trifling sum. It is indefensible from a global equity standpoint and for the purpose of meeting legislated State targets it is obviously inappropriate.

[61] https://www.productivity.nsw.gov.au/ensuring-a-cost-effective-transition

Recommendations:

- *Abolish the scaling down. This would allow the net benefit test to assist in achieving the State's targets.*
- *Mandate the carbon price trajectory and discount rates to be used; we recommend the values set by the US Environmental Protection Agency (EPA) in 2023[62], but an option would be to tailor them dynamically to the legislated State targets.*

Question 19 - Buildings

"What additional measures could accelerate electrification and increase energy efficiency of new and existing buildings?"

Thermal efficiency standards

New builds

Since 2023, new NSW homes must achieve a BASIX energy efficiency rating of 7[63], but rules that only apply to new builds only raise the average standard at a glacial pace.

Existing stock

NSW plans to upgrade 10% of its social housing under its Social Housing Energy Performance Initiative (SHEPI)[64].

For other upgrades, rebates under the Energy Savings Scheme[65] started in 2009, but there is no financial assistance for efficiency assessments. Without that, it is hard for householders to judge the cost/benefit.

Rentals

For rental properties, there is the problem of a split incentive; the landlord bears the cost of an upgrade whereas the tenant bears the cost of none. Thermal efficiency does not currently feature in the NSW minimum standards for rentals[66].

By November 2026, the ceiling of any ACT rental property with an R value[67] less than 2 must be upgraded to R5[68].

Certification

The UK's Energy Performance Certificate[69] is based on a 2002 EU directive[70]. It is required on most house sales and new tenancies.

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[62] https://www.epa.gov/environmental-economics/scghg

[63] https://www.planning.nsw.gov.au/policy-and-legislation/buildings/sustainable-buildings-sepp/sustainability-standards-residential-development-basix

[64] https://www.dcceew.gov.au/about/news/energy-performance-upgrades-up-to-13500-nsw-households

[65] https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/energy-security-safeguard/energy-savings-scheme

[66] https://www.nsw.gov.au/housing-and-construction/rules/minimum-standards-for-rental-properties

[67] The R value of a thermal barrier is the temperature difference maintained across it divided by the thermal power per unit area passing through it. In Australia it is expressed in SI units: Km^2W^{-1} (Kelvin square metres per Watt)

[68] https://www.act.gov.au/__data/assets/pdf_file/0010/2602927/Tenant-factsheet-minimum-energy-efficiency-standards-for-rental-properties.pdf

[69] https://en.wikipedia.org/wiki/Energy_Performance_Certificate_(United_Kingdom)

[70] https://en.wikipedia.org/wiki/Energy_Performance_of_Buildings_Directive_2024

Recommendations:

- *Provide assistance with efficiency assessments;*
- *Set minimum standards for new tenancies;*
- *Develop a certification scheme.*

Electrify everything

There are currently around 1.5 million homes in NSW using gas, generating 1.5% of the State's emissions[71]. Victoria, where domestic gas is responsible for 6.5% of the emissions[72], has taken strong action to phase out domestic gas.

Recommendations:

- *Rebate or interest-free loan incentive to convert existing gas-fired hot water, heating and cooking appliances to electric (EELS[73]);*
- *Emulate the Victorian Gas Substitution Roadmap[74];*
- *Education programs to challenge the advertising-driven belief that gas is better for cooking.*

Prefabricated housing

Factory-made homes reduce carbon emissions by up to 45%[75,76]

- Suitable for low-rise and high-rise buildings
- Speeds up building and saves costs
- Could be implemented for all new government-funded housing

However, there are reasons to believe some clarification of NSW planning laws will be needed before such construction can become common[77].

Recommendation:

Clarify/simplify planning rules around prefab housing.

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[71] https://snapshotclimate.com.au/region/australia/new-south-wales/
[72] https://snapshotclimate.com.au/region/australia/victoria/
[73] https://www.rewiringaustralia.org/report/2024-2025-pre-budget-submission-to-the-australian-government
[74] https://www.energy.vic.gov.au/renewable-energy/victorias-gas-substitution-roadmap
[75] **https://theconversation.com/a-prefab-building-revolution-can-help-resolve-both-the-climate-and-housing-crises-220290**
[76] https://tideconstruction.co.uk/wp-content/uploads/2023/07/Tide-Extended-Abstract-Valentine-Ten-Degrees.pdf
[77] https://www.madisonmarcus.com.au/news-media/areas-of-law/planning-environment-government/prefab-revolution-navigating-planning-law-requirements-for-prefabricated-buildings/

Appendix on MLFs

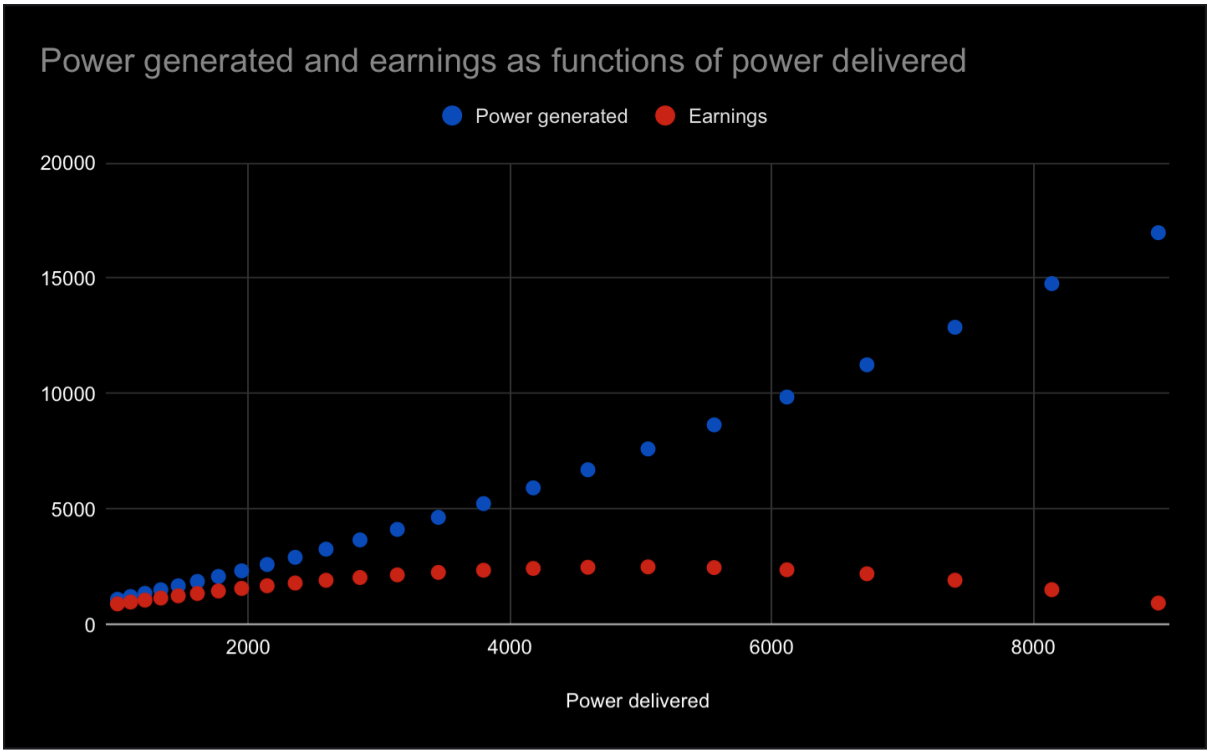
Loss factors

A loss factor is a number which is multiplied by the power a generator supplies in order to estimate the useful power that reaches the grid[78]. (The terminology is a bit confusing because it is actually the fraction which is *not* lost. If 10% of the power will be lost in transmission then the loss factor is 90%.)

If, at some instant, power P is to be delivered at voltage V at the grid, the current, I, is P/V. If the transmission line has resistance R then the loss in it is $I^2R = P^2R/V^2$. This shows that as more power, P, is to be delivered the transmission losses grow faster. The fraction of generated power successfully delivered is $1/(1+PR/V^2)$.

However, the AEMO does not simply estimate the average actual losses (ALF). Instead, it calculates a "marginal loss factor", or MLF. If the demand, P, increases by ΔP (the marginal increase) then the loss rises by approximately $2\Delta P(PR/V^2)$. The AEMO pays the generator as though that fraction applied to all of its generated power:

- Generator generates $P(1+PR/V^2)$
- Grid gets P
- Generator is paid for $P(1-PR/V^2)$



Note that beyond a certain point the generator is penalised for helping to meet high demand.

[78] Specifically, a place in the grid called the Regional Reference Node (RRN). There is one in each State.

The reasoning

The AEMO appears to justify this on several grounds[79],[80]:

1. That it is "in line with the economic principle of marginal pricing".

   Any principle is only valid under specified conditions. The standard economic principle of marginal pricing applies where a producer has a fixed overhead cost plus a per unit of production cost. The principle (not universally accepted by economists) claims that the selling price should be the per unit cost plus a bit of profit.

   That's fine if production (and sales) can be ramped up to the point that the fixed costs become negligible.

   The transmission loss context is very different. Here, the overheads rise as, and faster than, production rises. If anything, the thinking behind the economic principle suggests the producer should be paid *more* per unit of power delivered to the grid.

2. That it is consistent with electricity spot prices being based on the incremental cost of buying a little more from the pool of generators.

   Yes, spot prices do follow a marginal pricing system. When demand threatens to exceed supply, more expensive sources of power are called upon and all producers enjoy the resulting increase in the spot price on all the power they deliver. But in what way, beyond magical thinking, is a MLF "consistent" with that?

   Say the spot price follows a monotonically increasing function *f(P)*. There are several problems with this:

   - *f*() is not known. Statistically, it seems to be roughly exponential up to some astronomical cap.
   - *f* depends on the relationship between supply and demand, not purely on demand.
   - *f* applies at the Reference Node. If the routes there from generators A and B overlap, and the failure of generator B results in a more expensive generator C supplying power on an entirely separate route, then the losses incurred by A's output go down, not up.

   But more fundamentally, there is no relationship between the function *f* and the MLF formula.

3. Dispatch decisions

   Each so many minutes, the AEMO has to choose which bids to accept from the generators making bids to provide power. The MLFs naturally figure in making the choices.

   However, there is no apparent reason why applying the doubling in making the bid choices means it also has to be applied in calculating payments.

4. Price signal to prospective generators

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79 https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/loss_factors_and_regional_boundaries/forward-looking-loss-factor-methodology.pdf

80 https://wattclarity.com.au/articles/2019/11/lets-talk-losses/

The AEMO argues that the MLF system encourages new generators to connect to the network in the most efficient way. Without it, a new generator might choose a connection point which makes economic sense to them but disadvantages the other generators and customers.

To assess this argument, we need to identify what the AEMO should be optimising. It could be:

1. Maximising the additional useful power, or
2. Minimising the average cost of power to the users.

Suppose a new generator might inject power p at one end of a link with resistance R, and power P is already being injected there. Useful power is defined as what reaches the other end of the link, which is at (fixed) voltage V.

If the existing current in the link is I then the power input equals the losses plus the useful work:

$$P_{in} = I^2R+IV$$

If adding p there increases the current by i then

$$P_{in}+p = (I+i)^2R+(I+i)V$$

whence

$$p = 2IiR + iV + i^2R$$

If i is small compared with V/R, we can drop the quadratic term:

$$p = 2IiR + iV$$

$$i = p/(V+2IR)$$

It will be useful to define $\lambda=IR/V$, which is the fraction of P_{in} already being lost.

$$i = (p/V)(1/(1+2\lambda))$$

If the AEMO applies a loss factor with multiplier k (k=2 being MLF and k=1 reflecting actual losses, i.e. ALF) then the new generator earns in proportion to

$$p(1-k\lambda)$$

The generator will therefore choose a connection point which maximises this. Note that both p and λ depend upon the choice of connection point.

Given aim (1) above, maximising delivered power, the AEMO will want i to be maximised. This will align with the new generator's earnings aims if:

$$(1-k\lambda) = 1/(1+2\lambda)$$

whence

$$k = 2/(1+2\lambda)$$

Unfortunately, having k depend on λ doesn't work. The point of setting $k > 1$ is to drive an optimum choice of connection point, and λ is unknown until that choice is made.

However, this analysis does suggest that if, for example, λ is typically 5% then k should be set to 1.8, not 2.

Alternatively, using aim (2), we obtain the pathological result that if $k > 1$ then the AEMO would be happiest for the new generator to select the *most* congested link. In an extreme case, half of the fed-in power would be lost in transmission and, with $k = 2$, the grid customers would enjoy free power.

Conflict with other price signals

An important aspect of using the marginal cost to set the spot price is that it sends price signals both ways: it discourages demand and encourages supply. Applying marginality to loss factors serves to weaken both of these: it lowers the price to the consumer and discourages generation.

A possible compromise: earning equity

Even if a value of $k > 1$ is justified, we would still have the awkward fact that the generators are being underpaid for the useful power delivered. A possible resolution is to take the underpayment to be an investment in future upgrades to the transmission links traversed. In this way, the generators acquire equity in the transmission network.

Appendix on Road User Charge

The proposed Road User Charge will be some deterrent on shifting to EVs and it is not justified.

Road Maintenance

The per km damage done by a vehicle axle rises as the fourth power of the axle load. On that basis, an articulated truck does 5,000 times the damage per km as even a large car.

If vehicles were to pay a road use charge in proportion to that, private cars, even electric ones, would pay less than 0.1¢/km.

Direct Health Costs of ICE emissions

According to *Health impacts of transport emissions in Australia: Economic costs, 2005*[81] *(Dept Infrastructure and Regional Devt)*

> *"The economic cost of this premature mortality was between $1.1 billion and $2.6 billion (central estimate $1.8 billion). In addition, the estimated economic cost of morbidity was between $0.4 billion to $1.2 billion (central estimate $0.8 billion). "*

This implies the health costs of emissions from ICE vehicles is 6-14¢/L.

Climate Cost of ICE emissions

The difficulty with this component is whether to count the cost to humanity (around $6/L), as by rights we should, or only that to Australia, around 10¢/L.

Proposal

It follows from the above that a fair, scheme would:

- *Keep the fuel excise at 50¢/L, as a compromise between global and national costs;*
- *Apply a Road User Charge to all vehicles depending on the number and (loaded) weight of axles, rising from 0.1¢/km for the average private car to nearly $2/km for the heaviest trucks.*

However, from a practical point of view, collecting 0.1¢/km might not be worth the cost.

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[81] https://bitre.gov.au/publications/2005/files/wp_063.pdf

Glossary

Acronym	*Expansion*	*Description*
AEMO	Australian Energy Market Operator	
ALF	Average Loss Factor	The fraction of the power that a generator feeds into the grid that it will be paid for after discounting what will be lost in transmission.
ARENA	Australian Renewable Energy Agency	
BASIX	Building Sustainability Index	
BEV	Battery only Electric Vehicle	
DNSP	Distribution Network Service Provider	
EIS	Environmental Impact Statement	
EELS	Electrify Everything Loan Scheme	https://www.rewiringaustralia.org/report/2024-2025-pre-budget-submission-to-the-australian-government
EPA	Environmental Protection Authority	
ESC	Essential Services Commission	
IPART	Independent Pricing And Regulatory Tribunal	https://www.ipart.nsw.gov.au
LUoS	Variously as “Locational Use of System” or “Local Use of Service”	A billing arrangement that takes into account how far the electricity had to travel from generator to user.
MLF	Marginal Loss Factor	The fraction of the power that a generator feeds into the grid that it will be paid for after discounting *twice* what will be lost in transmission.
MtCO2-e	Million tonnes of Carbon Dioxide Equivalent	
NZF	Net Zero Future	
PHEV	Plug-in Hybrid Electric Vehicle	
REZ	Renewable Energy Zone	
RUC	Road User Charge	
SGM	Safeguard Mechanism	

SHEPI	Social Housing Energy Performance Initiative	
TNSP	Transmission Network Service Provider	
V2G	Vehicle to Grid	A technology allowing power to be fed from an EV battery into the electricity grid. It requires support by the network, the charger, the charging connector and the vehicle's battery.
VPP	Virtual Power Plant	