

To AEMO
Reference 2022 ISP
Submitted via email
Date 1 Feb 2021

Subject Draft inputs, assumptions and scenarios report¹

Overview:

Infigen Energy (Infigen) welcomes the opportunity to make a submission. Infigen delivers reliable energy to customers through a portfolio of wind capacity across New South Wales, South Australia, Victoria and Western Australia, including both vertical integrated assets and PPAs. Infigen also owns and operates a portfolio of firming capacity, including a 123 MW open cycle gas turbine in NSW, a 25 MW / 52 MWh battery in SA, and 120 MW of dual fuel peaking capacity in SA. Our development pipeline has projects at differing stages of development covering wind, solar and batteries and we are also exploring further opportunities to purchase energy through capital light PPAs. This broad portfolio of assets has allowed us to retail electricity to over 400 metered sites to some of Australia's most iconic large energy users.

Infigen thanks AEMO for presenting a detailed discussion of the scenarios and the inputs. It reflects the significant thinking that AEMO has put into the ISP process to date, as well as the increasingly significant and actionable role the ISP plays in the NEM. Infigen is supportive of the ISP being used to drive much needed transmission investment across the NEM, and to inform decisions by investors and policy makers.

Our commentary is primarily focused on two key areas:

- The **Central scenario** is not currently fit for purpose. A scenario where the Paris Agreement targets are not met, despite the support

¹ <https://aemo.com.au/consultations/current-and-closed-consultations/2021-planning-and-forecasting-consultation-on-inputs-assumptions-and-scenarios>

of Federal and state governments as well as energy and business peak bodies, does not represent a credible baseline view of the future.

- A more ambitious bookend **Step Change** scenario should be developed as part of a forward-looking approach to the ISP, ensuring that the market has considered possible (even if seemingly unlikely) rates of change. We propose this should at least align with the most ambitious decarbonisation scenarios being actively considered by global governments that would achieve the underlying commitment made by sovereign nations to limit anthropogenic climate change to no more than 1.5 degrees Celsius.

1. The proposed “Central” scenario is not fit for purpose

The Central scenario is a critical component of the ISP which is intended to be the “baseline” view of future, with “best estimates” of all key drivers.

However, the currently proposed Central scenario does not represent a realistic “central and best” view of future NEM (and Australian) emissions and policy. In particular, the proposed Central scenario is not consistent with a reasonable view of future action on climate. In particular, the scenario is:

- not consistent with global commitments and specifically Australia’s international commitments under the Paris Agreement to limit warming to 2 degrees, and to make best efforts to limit warming to 1.5 degrees;
- not consistent with the stated policies of Australia’s elected state and territory governments to achieve economy wide net zero emissions by 2050;
- not consistent with the “net-zero by 2050” positions of the peak bodies representing the majority of Australia’s generation sector (the Australian Energy Council² and the Clean Energy Council³, as well as

² <https://www.energycouncil.com.au/analysis/towards-net-zero-australian-energy-council-backs-long-term-carbon-policy/>

³ <https://assets.cleanenergycouncil.org.au/documents/advocacy-initiatives/submissions/submission-climate-change-bills-2020.pdf>

specific NEM participants such as Iberdrola⁴, Origin Energy⁵, AGL⁶, and EnergyAustralia⁷);

- not consistent with the policies of major business groups and civil societies including the Business Council of Australia⁸, the Climate Roundtable⁹ (which includes the National Farmers Federation, the ACTU, the Australian Aluminium Council, and Ai Group), and at least half of Australia’s largest resource sector emitters¹⁰; and
- not consistent with the emissions reduction positions of Australia’s major trading partners, including Japan¹¹, South Korea¹², the USA¹³, China¹⁴, the EU¹⁵.

AEMO’s responsibilities to prudently model the market mean Australia’s obligations under international treaties should be modelled in the Central scenario, as required by Clause 5.22.3 of the NER, even if explicit mechanisms don’t yet exist for the full policy.

This is identical to how the projected cost reductions for solar and batteries are included despite not yet being realised.

The settings of the Central scenario, and its sensitivities, are critical. AEMO’s 2020 ISP modelling assumed a 90% probability that the Paris Agreement obligations would not be met¹⁶. In our view, the ISP’s Central baseline scenario should not be contradicting Australian Government, state and territory Government, and global policies and public statements.

⁴ <https://www.iberdrola.com/press-room/news/detail/iberdrola-advances-towards-zero-emissions-europe-2030>

⁵ <https://www.originenergy.com.au/content/dam/origin/about/investors-media/AGM%202017/Scenario%20Analysis%20FY2017.pdf>

⁶ <https://www.agl.com.au/about-agl/who-we-are/our-company>

⁷ https://www.energyaustralia.com.au/sites/default/files/2020-01/Carbon-Neutral-by-2050_v2.pdf

⁸

https://d3n8a8pro7vhmx.cloudfront.net/bca/pages/5085/attachments/original/1581309292/BCA_Climate_and_Energy_Policy_-_Scoping_paper_-_January_2020.pdf?1581309292

⁹ <https://igcc.org.au/wp-content/uploads/2020/09/ACR-statement-on-climate-impacts-August-2020-FINAL-3.pdf>

¹⁰ <https://www.climateworksaustralia.org/resource/net-zero-momentum-tracker-resources-sector/>

¹¹ <https://www.reuters.com/article/japan-politics-suga-idUSKBN27B0FB>

¹² <https://www.climatechangenews.com/2020/10/28/south-korea-formally-commits-cutting-emissions-net-zero-2050/>

¹³ <https://www.theguardian.com/environment/2020/dec/14/us-to-hold-world-climate-summit-early-next-year-and-seek-to-rejoin-paris-accord>

¹⁴ Net zero by 2060, consistent with their role as a developing economy and in line with the IEA’s Sustainable Development Scenario. <https://www.iea.org/commentaries/china-s-net-zero-ambitions-the-next-five-year-plan-will-be-critical-for-an-accelerated-energy-transition>

¹⁵ Committed to 55-60% reduction in economy-wide emissions by 2030, and net-zero by 2050. <https://www.europarl.europa.eu/news/en/press-room/20201002IPR88431/eu-climate-law-meps-want-to-increase-2030-emissions-reduction-target-to-60>

¹⁶ Table 2, <https://aemo.com.au/-/media/files/major-publications/isp/2020/appendix--2.pdf>, and Table 3 https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/isp/2019/2019-to-2020-forecasting-and-planning-scenarios-inputs-and-assumptions-report.pdf. Only the Step Change scenario is reported as consistent with limiting global warming to 2 degrees, and it receives only a 10% weighting by AEMO.

We explore these issues in more detail below.

1.1 The importance of the “Central” scenario

Over previous ISPs, AEMO has oscillated between treating the “Central” scenario as either equal to other scenarios (“Neutral”) without receiving higher weight, or as a central “baseline” scenario. While this might have been appropriate as an information-only document, the ISP is increasingly being used as an actionable study – with obligations on other parties to use ISP assumptions.

This can be very material. For example, the Project EnergyConnect modelling showed materially higher benefits in the High scenario (which included a modest emissions reduction target) versus the Central scenario¹⁷. As noted above, AEMO’s modelling would put only a 10% weight on that scenario – risking underinvestment in critical infrastructure.

As noted above, there is no logical reason why emission reductions would *not* be included while unrealised projections of lower technology costs *are* included.

1.1.1 Role of a central scenario

A good “central” scenario will overestimate just as often as it underestimates potential outcomes. We note that AEMO has consistently underestimated the uptake of renewable generation and the rate of coal retirement in the ISP, suggesting there may be a methodological systemic bias that needs to be addressed.

1.1.2 Impact on investment

The ISP is used by investors and banks to develop credible scenarios for allocating capital. While all participants develop their own scenarios and forecasts, AEMO’s ISP increasingly plays a key role, given the level of consultation and engagement. Non-credible scenarios risk deferring valuable investment.

¹⁷ <https://www.electranet.com.au/wp-content/uploads/projects/2016/11/SA-Energy-Transformation-PACR.pdf>

1.2 Australian and global emissions targets

1.2.1 Australia's commitments under the Paris Agreement

Australia has committed to limiting global temperature increases to well below 2 degrees, and pursuing best efforts to limit warming to 1.5 degrees. All 197 members of the UNFCCC have signed the agreement, and only two major emitters are not party to the law: Iran, and the United States, which has now committed to rejoining the agreement.

This will require global net emissions to reduce to zero by 2050, and as a wealthy nation and significant per-capita emitters, Australia's fair share of emissions will need to reduce to zero (or negative) by or before 2050.

1.2.2 State net-zero emissions targets

All states and territories of Australia have an *economy-wide* net-zero emissions target by 2050.

- This is legislated in Victoria and the ACT, with significant Government commitment through the series of reverse auctions already held, and ongoing.
- The NSW Government has established a Net Zero Plan, targeting a 35% reduction in economy-wide emissions by 2030, and zero emissions by 2050¹⁸. Significant funding and legislation already underpin the first stage (2020-2030) and therefore the entire policy should be included (as per NER clause 5.22.3).
- Queensland Government has undertaken significant consultation on net-zero emissions by 2050, has committed to 50% renewables by 2030, has held a series of auctions for renewable energy, and has established a new government owned generator (CleanCo) to develop new renewable generation.
- Tasmania has a legislated target of reducing local emissions by 60% by 2050, with the government committing to net-zero emissions by 2050¹⁹. Tasmania has also committed to 200% renewable generation.

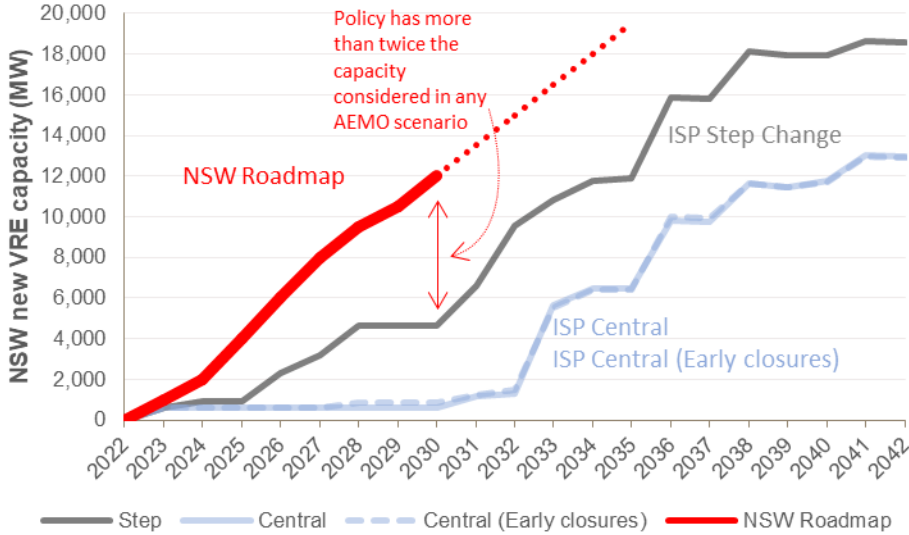
In previous ISP's, AEMO has continually assumed that Governments would not act to continue to reduce emissions after the LRET was met in ~2020. Instead it waited until *after* those policies were announced. Most notably, AEMO did not consider any scenario with an uptake of renewable

¹⁸ <https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan>

¹⁹ http://www.dpac.tas.gov.au/divisions/climatechange/Climate_Change_Priorities/reducing_emissions

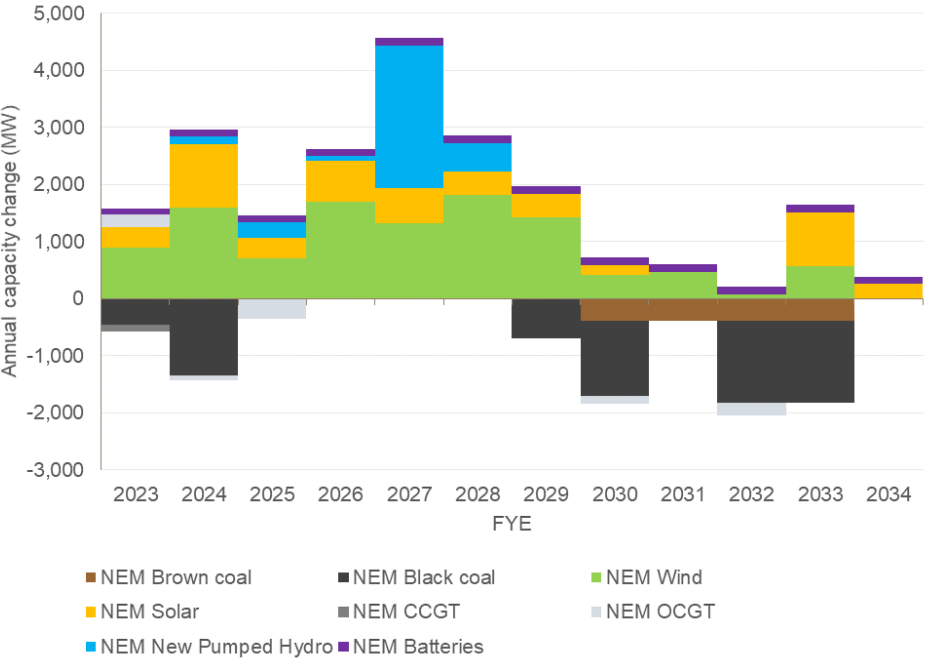
generation now legislated in the (bipartisan) NSW Electricity Roadmap. This is despite the NSW Government having earlier already committed to net zero emissions.

Figure 1 Comparison of 2020 ISP scenarios and legislated NSW roadmap



It therefore does not seem reasonable to assume policies will cease at the end of 2030. In particular, Infigen has modelled an indicative scenario which we consider would be consistent with AEMO’s proposed Central scenario (only announced coal closures). In this world, almost no new renewable generation would be developed from 2030 until at least 2035. It seems unlikely that the massive job losses associated with that collapse would be tolerated (even if there was a social license for emissions delay).

Figure 2 Drop off in renewable investment post-2030 under proposed "Central" scenario



Source: Infigen modelling

Investment in infrastructure is decadal in nature. As such, it is not realistic or commercial to assume that investments made in the 2020s will have no regard to the climate risk associated with that investment in the 2030s and beyond. Unless this is considered in AEMO’s modelling (using a credible carbon budget), the model will simply not reflect real-world commercial and financial decision making.

AEMO acknowledges that modelling the future necessarily requires assumptions, but AEMO already recognises that assuming no demand growth or technology change is not credible. Similarly, assuming “no change” in policy is, while perhaps the “easiest” pathway, highly unlikely to be the “Central” scenario.

1.2.3 Electricity sector emissions

AEMO has proposed that the national emissions budget for Australia will be allocated pro-rata to the electricity sector. We do not consider this reasonable. It is far more likely that the electricity sector will do a greater share of the “heavy lifting”, as has been observed to date. Electrification of other sectors such as transport is already occurring.

1.3 Recommendation for the Central scenario

AEMO should develop a self-consistent view for the Central scenario – consistent with national, state, international, and private sector commitments. In our view, it is much *more* likely that the commitments outlined in this submission are met and existing decarbonisation trends and government policies continue, rather than all emissions reduction efforts cease at 2030.

In developing the Central scenario, AEMO should:

- Assume the Paris Agreement is met, and an appropriate emissions trajectory is set for Australia. This should be consistent with limiting global warming to 1.5 degrees.
- Develop (including working with external experts, such as the CSIRO, IGCC, Climate Council, ClimateWorks Australia, etc.) a projection of:
 - Australia’s share of global emissions budgets;
 - the sectoral emissions leading to Australia meeting their emissions budget; and hence
 - the corresponding budget for the electricity sector as well as any expected electrification of other sectors.
- Model the resulting NEM subject to this emissions budget

Of the existing scenarios, we consider the proposed **Sustainable Growth** scenario is most closely aligned with a reasonable Central scenario.

2. Scenario development: AEMO must be future focused

“We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don’t let yourself be lulled into inaction.”

Bill Gates

It is critical that AEMO is future focused, and works to identify potential changes to the NEM *before* they become certainties. AEMO has the opportunity to be a leader in forecasting and risk management, in both Australia and internationally.

The ISP has consistently underestimated the pace of change in the NEM. AEMO has an opportunity to engage with industry leaders such as CSIRO and ClimateWorks Australia to identify *possible but unlikely* changes, and *possible but unlikely* timelines.

In developing their input assumptions, we recommend that AEMO consider and model true “bookend cases”. For example:

- What would electricity look like under a zero-emissions economy?
- What would be the impact on the Victorian grid of the conversion of all natural gas appliances to either electricity or hydrogen?
- If Australia adopted a zero electricity emissions sector by 2035, as proposed by President Biden, what would be required to achieve that?
- What would a saturated rooftop PV uptake scenario look like?
- What would be the impact of a significant battery technology breakthrough that immediately reduces costs?

2.1 The role of scenarios

Infigen supports AEMO’s approach to establishing several ISP scenarios. We see this as serving two distinct purposes:

- a) scenarios allow for appropriate risk-weighted or “least regrets” approaches to investment decisions; and
- b) robust scenarios enable AEMO and the market to identify key risks or potential failure points *before* they become critical issues.

Historically, there have been significant risks that have historically not been captured in the ISP modelling (as well as related forecasts). Infigen has identified a number of these in our recent submission to AEMO²⁰. For example, the risk of zero or negative operational demand in South Australia appears to have only been identified due to an explicit request by the South Australian Government. In our view, this risk should have been identified in bookend scenarios of the 2018 ISP and suitable risk management plans put in place at that time.

As a general rule, low-change scenarios do not impose significant system stress. They do little to identify future risks, but do help with appropriate

²⁰ https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2020/nem-settlement-under-zero/infigen.pdf?la=en

weightings. However, this does not necessarily require more than one scenario – a higher weighting can simply be put on a single scenario²¹.

In contrast, there are a broad range of scenarios that could materially impact on AEMO’s ability to manage the power system and impact on generation and transmission investments.

2.2 At least one scenario must be “ahead of the curve”

An effective bookend scenario should capture scenarios that are possible, *useful*, but perceived to be unlikely. That is, while the chance of that scenario occurring might currently perceived to be low, there would be value in assessing it and understanding the risks.

The historical evidence is that change always occurs faster than expected, particularly around emissions reduction and the uptake of renewables. As demonstrated by recent evidence, the ISP scenarios have not yet been ambitious enough to ensure that the market is not “surprised” by what were in hindsight inevitable changes. This requires urgent but inefficient market changes and disruptions, and with adverse outcomes for consumers and the market.

AEMO must therefore model a scenario with significant decarbonisation, across both the NEM and the wider economy, and explore how this system would be operated (both in terms of reliability and essential system services). If critical gaps are identified, it is important that these are identified *now* rather than when it is too late.

2.3 Recommendation: a new “Step Change” scenario

AEMO’s 2020 ISP included a “Step Change” scenario that represented a material shift in AEMO’s thinking. However, as noted above, this scenario *already* dramatically underestimates the rate of change.

We recommend AEMO needs a new “**Step change**” scenario, where Australia adopts a significant climate abatement target. This scenario should include:

²¹ This is analogous to P10/P50/P90 demand scenario probability weightings (30/40/30), where explicit modelling is typically only done of P10 and P50 scenarios, with the assumption that P50 and P90 outcomes will not be materially different, leading to the standard 30% P10 and 70% P50 weightings.

- Electricity sector emissions reach zero by no later than 2035 (consistent with the USA policy)
- National economy-wide emissions reduce 60% by 2030 (consistent with the most ambitious EU policy *currently* proposed)
- Suitable electrification of other sectors to meet these targets, with credible impacts on NEM demand

2.4 Recommendation: detailed scenario analysis

AEMO has taken positive steps towards identifying and managing risks in the emerging grid. This includes the Renewable Integration Study and the Engineering Framework.

However, AEMO's studies to date have primarily been about identifying short-term limits (which are highly likely to be exceeded more rapidly than expected).

A more helpful approach is to recognise that a zero emissions grid is a highly likely (in fact, certain) endpoint. Developing a plan for how that endpoint *could* be achieved will provide more insights than debating near-term limits. It will also help identify and quantify future risks and the volume of essential system services that might be required.

- AEMO needs to conduct detailed simulations of the ISP scenarios, particularly the proposed **Step Change** scenario.
- This will require not just resource adequacy modelling, but power systems modelling (PSS/E, PSCAD) to identify the necessary essential system services for operating the future grid.
- This is a necessary, and in-scope, requirement of the ISP because (for example) new transmission and grid forming batteries will be competing tools for delivering essential system services as well as providing revenue adequacy.
- This is not just of theoretical interest; there has been significant focus on renewable energy zones and utilising existing system strength. Understanding whether current “high system strength” locations will still be so once coal retires will be critical for making efficient decisions. Without understanding the potential end-points, investments risk not being consistent with least-cost outcomes for consumers.

Recognising that this will be a significant exercise, we propose that a first step would be to:

- Conduct detailed modelling of 2035 in the proposed “**Step Change**” scenario
- Provide a *viable* operational model – including the number and location of future synchronous condensers, batteries, etc. – even if this model cannot yet be shown to be least-cost

2.5 Comments on AEMO scenarios

- As noted above, we recommend the **Sustainable Growth** scenario be used as the basis for the Central scenario
- It is unclear what insights the currently proposed “**Export Superpower**” scenario will deliver. Hydrogen production for export is likely to be located close to resources and may in fact not be grid connected. Furthermore, while this scenario has higher emissions reduction targets, there is lower uptake of EVs, potentially resulting in *less* strain on the grid.
- A “missing input” is the rate of electrification of other sectors (e.g., gas appliances).
- High rates of electrification under this scenario would help assess the infrastructure needed
- The “**Diversified Technology**” scenario would illustrate how the availability of non-conventional dispatchable technologies would change the optimal (least regrets) pathways. However, we note that operating the grid with synchronous, dispatchable resources is relatively well understood and there will be limited insights for AEMO from this scenario.
- The “**Slow growth**” scenario appears highly unlikely. We suggest it could be combined with the previously proposed Central scenario assumptions in a new “**Policy inaction**” scenario.
- More generally, AEMO’s approach of pro-rata electricity sector emissions reductions (relative to national reductions) may not be least-cost. Further analysis is required.

2.6 AEMO “risk scenarios” may be useful

Infigen supports the proposed approach of developing risk scenarios that can identify key risks and provide confidence in investment decisions.

However, these scenarios should be targeted: either helping to demonstrate that key risks do not fundamentally change investment decisions, or to identify or highlight key risks that *would* change decisions.

Building off the currently proposed “Central” scenario, however, would deliver limited insight. The AEMO proposed risk scenarios may not deliver meaningful insight as they are based on the currently proposed Central scenario. They therefore represent only small deviations that are almost certain to be exceeded.

However, we support the basic concepts expressed in the scenarios, depending on the definitions. For example, “Central with early Victorian coal closure” could be appropriate if it considered more aggressive (near-term) coal closures on an otherwise climate-consistent Central scenario.

We suggest that these scenarios should be an opportunity to address short-term challenges – for example,

Conclusion:

We look forward to the opportunity to continue to engage with AEMO on these vital issues, particularly given the key role the ISP now plays in the market.

If you would like to discuss this submission, please contact Dr Joel Gilmore (Regulator Affairs Manager) on joel.gilmore@infigenenergy.com or 0411 267 044.

Yours sincerely

Ross Rolfe
Managing Director