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AUSTRALIAN CONSERVATION FOUNDATION

1 February 2021

RE: The Australian Energy Market Operation (AEMO) 2021 Draft Inputs, Assumptions and Scenarios Report consultation.

The Australian Conservation Foundation (ACF) welcomes the opportunity to comment on AEMO's draft Inputs, Assumptions and Scenarios Report, which will be used in AEMO's forecasting and planning publications for the National Electricity Market (NEM).

Introduction

ACF is Australia's national environment organisation. We are 700,000 people who speak out for the air we breathe, the water we drink, and the places and wildlife we love. We are proudly independent, non-partisan and funded by donations from our community.

ACF believes Australia and the world face an unprecedented climate and mass extinction crisis caused first and foremost by digging up and burning fossil fuels like coal, oil, and gas.

Australia needs a national approach to reduce climate emissions in line with the science-based temperature goals that Australia committed to under the Paris Agreement.

Transitioning Australia's electricity sector to a clean, renewable energy-based system is a critical element of Australia's transition to net zero emissions and economy-wide action on climate change.

AEMO's Integrated System Plan (ISP) provides a key roadmap to help inform and prioritise necessary investment and ensure a smooth transition to a clean energy system in Australia. The ACF is very supportive of AEMO's efforts related to the ISP including forecasting and planning and consulting widely on inputs and assumptions.

Summary of recommendations

ACF's response to the Draft Inputs, Assumptions and Scenarios Report includes recommendations to:

Apply the following minimum baseline conditions to all scenarios:

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- Policy alignment to a 2 degrees Celsius global warming limit, recognising that the Paris Agreement also commits signatories (including Australia) to pursue efforts to limit the rise to 1.5 degrees Celsius.

- Net zero emissions by 2050, given existing state and territory commitments and an expectation that the electricity sector reach zero emissions around 2030.

- All state and territory commitments on climate and electricity regardless of whether these are policies, plans or law.

- Adopt levels of transport electrification consistent with Australia's emissions projections 2020, with battery electric to remain the dominant zero emissions transport technology.

- Recognise international net zero commitments by China, South Korea, Japan and the United States (under the incoming Biden Administration) as well as the existing commitments of the European Union and United Kingdom.

Amend the following incorrect statements:

- On page 42 the draft document states "*The latest government emissions projections estimate that Australia will overachieve its 2030 target*". This is incorrect as Australia's emissions projections 2020 (Australian Government 2020) show Australia will fall short of its 2030 target, achieving only 22% emissions reductions below 2005 levels.

- On page 32, Table 3 the scenario indicates 26% reduction in emissions (NEM). Presumably this is to reflect Australia's 2030 target. However, Australia's 2030 target submitted under the Paris Agreement is 26-28% below 2005 by 2030.

Exclude the following implausible elements from the final report:

- The diversified technology scenario in its entirety, including:
    - More limited solar, wind or storage price reductions, given these cost reductions are largely driven by global factors
    - Low gas prices, given Australian prices are inextricably linked to world market prices for oil, and due to increasing reliance on unconventional gas prices
    - Any uptake of carbon capture and storage (CCS) in electricity generation, given the technology is high cost, obsolete, and risky technology. Particularly

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given the cost of electricity from coal or gas power stations with CCS would be at least six times that from renewable energy sources.

- The following candidate generation technology options should be excluded:
  - Advanced ultra supercritical PC – black coal with CCS
  - CCGT with CCS.

ACF also suggests AEMO consider a low growth, high decarbonisation scenario given COVID-19's potential impact on economic and population growth, and state and territory governments' focus on green economic recovery measures.

ACF response to selected matters for consultation

2.2 The scenario development process

Matters for consultation *(page 20)*
Are there other scenarios, not currently proposed, that could lead to under- or over-investment, and are sufficiently distinct to warrant inclusion? What would be the scenario narrative for such a scenario, and how would it help inform energy sector decision-making?

ACF notes the absence of scenarios where low economic growth is paired with high decarbonisation.

The Intergovernmental Panel on Climate Change (IPCC) (2018) considered four illustrative model pathways limiting global warming to 1.5 degrees Celsius. The only pathway capable of achieving 1.5 degrees Celsius with limited emissions overshoot and no reliance on uncertain negative emissions technologies (such as Bioenergy with Carbon Capture and Storage) is the P1 scenario, described as follows:

> *A scenario in which social, business and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A downsized energy system enables rapid decarbonization of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.*

ACF recommends AEMO consider including a scenario of low growth and high decarbonisation. This is particularly relevant given COVID-19's potential impact on economic and population growth, combined with a focus on green economic recovery measures (those targeting renewable energy, sustainable transport and energy efficiency) internationally as well as by Australian state and territory governments.

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2.3 Scenario narratives and descriptions

2.3.1 Central scenario

Matters for consultation *(page 22)*
Acknowledging that AEMO will consider current committed policy settings within this scenario which meet the criteria outlined in Section 4.1 and clause 5.22.3 of the NER, and considering AEMO's best estimates of all key drivers, do you have any feedback on the Central scenario as proposed?

All scenarios should recognise that under the Paris Agreement, Australia's national (economy-wide) emissions reduction target is 26 to 28 per cent below 2005 levels by 2030, and an implied target to achieve net zero emissions between 2035 to 2050.

ACF notes that *Table 3 Public policy settings* indicates Australia's emissions target has been included as a 26 per cent emissions reductions on 2005 levels by 2030. This is incorrect.

Australia has signed and ratified the global Paris Agreement (UNFCCC 2020), which entered into force on 4 November 2016.Australia's target submitted under the Paris Agreement (Australian Government 2015) is expressed as:

> *Australia will implement an economy-wide target to reduce greenhouse gas emissions by 26 to 28 per cent below 2005 levels by 2030.*

The minimum policy setting for 2030 for the Central scenario – and applied across all scenarios - should be 26 to 28 per cent emissions reduction on 2005 emissions by 2030.

Further, under the Paris Agreement, Australia has committed to limiting global temperature rise to 2 degrees Celsius, and pursuing efforts to limit the rise to 1.5 degrees. Scenario modelling by ClimateWorks Australia (2020) indicates that this commits Australia to achieving net zero emissions economy-wide by 2035 (1.5 degrees) or 2050 at the latest (2 degrees).

It is important to note that achieving net zero emissions economy-wide requires the electricity sector to achieve zero emissions much earlier. For example, scenarios for 2 degrees Celsius by ClimateWorks Australia (2020) indicate that the electricity sector would reach near zero emission by 2035.

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Furthermore, the minimum policy setting applied across all scenarios should recognise that all Australian states and territories have also made public commitments to reach net zero emissions by 2050 (the Australian Capital Territory aims to achieve this in 2045).

ACF contends that all state and territory net zero commitments should be included as standard public policy settings. Queensland, New South Wales and Tasmania's net zero emissions targets appear to not be currently included.

For example, ACF notes that the Central scenario should include South Australia's new target for 500% renewable energy by 2050.

2.3.2 Sustainable Growth

Matters for consultation *(page 24)*
What, if any, elements of the Sustainable Growth scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?

ACF contends the following elements from the Sustainable Growth scenario should be included as a baseline condition across all scenarios, particularly the Central scenario:

- Action consistent with the Paris Agreement and achieving net zero emissions by 2050 (this is already current policy under state and territory governments)
- High levels of transport electrification. Australia's emissions projections (Australian Government 2020) expect electric vehicles to make up 26 per cent of new light duty vehicle sales by 2030, and around 7 per cent of the total vehicle stock. These projections should be included across all scenarios.

2.3.3 Slow Growth

Matters for consultation *(page 26)*
What, if any, elements of the Slow Growth scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?

Low decarbonisation is implausible given state and territory governments are leading emissions reductions under current policy arrangements (such as net zero emissions targets and renewable energy targets and policies).

Decarbonisation policy being less of a priority is also implausible given the focus on green economic recovery measures (those targeting renewable energy, sustainable transport, fuel

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switching and energy efficiency) internationally as well as by Australian state and territory governments.

There are also strong indicators that many organisations in the global investor community are moving increasingly away from fossil fuels and toward clean technologies to avoid future climate risks (i.e., risks that have been communicated clearly by Australia's financial regulators). For example, Climate Action 100+, whose signatories include more than 500 investors managing around $US47 trillion, are using their financial power to pressure the world's biggest polluting companies to reduce emissions and address climate risk—including in Australia. Their members include Australian institutional investors and some of the largest institutional investors in the world. The increasing flow of finance and investment to clean technologies adds a further reason why slow growth/low decarbonisation appears implausible.

2.3.4 Diversified Technology

This scenario reflects the Federal Government's commitment to encourage investment to unlock Australia's gas resource potential and enable affordably priced and secure gas supplies. It is a new scenario that was not considered in the 2020 ISP.

Matters for consultation *(page 28)*
What, if any, elements of the Diversified Technology scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?

Affordable prices and secure supplies of gas are implausible.

- Australia's liquefied natural gas (LNG) exports mean that domestic gas prices are now inextricably linked to world market prices for oil.

- Gas prices are likely to remain volatile due to this link to global oil prices, and the fact that domestic prices are controlled by relatively few producers. Further, gas prices are likely to remain high due to increasing reliance on unconventional sources of gas.

- While more gas resources may become available, the most economic and accessible gas reserves are now being exported as LNG. Further gas expansion will drive increased reliance on unconventional gas, which is more expensive. The gas industry

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itself has made clear that price targets set for gas are not going to be met and ignore realities.[1]

- Even at current gas prices, renewable energy such as wind and solar are the least cost new generation technologies.

Higher global investment or uptake of carbon capture and storage (CCS) in the power sector is implausible.

- Economic analysis of CCS related to the power sector by Associate Professor Bruce Mountain of the Victoria Energy Policy Centre at Victoria University shows clearly why CCS is implausible. The analysis concluded that adding CCS to electricity generation in Australia would:
  - More than double the capital outlay for coal-fired power stations.
  - Cost even more for gas generators than coal generators.
  - Increase the cost of electricity by between $90 and $125 per megawatt hour.
  - Likely cost at least six times as much as wind generation plus storage, with comparable dispatchability[2].

- CCS for power generation is largely obsolete worldwide despite significant industry and government funding. It is unlikely to ever be cost competitive for power generation, particularly given the strong global uptake and significant cost reductions for renewable energy technologies.

More limited wind, solar and battery cost reductions are implausible.

- This is because cost reduction in renewable energy technologies is largely driven by global factors.

- Based on relevant global factors including technology improvements and innovations, energy analysts consistently project further cost decreases for solar, wind and battery storage. For example, Bloomberg New Energy Finance recently stated that "On current trends, the LCOE of best-in-class solar and wind projects will

[1] https://www.afr.com/companies/energy/4-gas-price-ignores-realities-says-exxon-head-20200623-p555dq
[2]https://www.acf.org.au/coal_or_gas_plus_carbon_capture_costs_six_times_more_than_wind_plus_battery_storage_new_report

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be pushing below (US) 20 dollars per megawatt-hour this side of 2030." They also noted that there are still many innovations in the pipeline that will drive costs down further.[3]

- The global push for decarbonisation will likely increase and will add momentum to new investment, technology innovation and cost reduction. This is supported by net zero policy commitments by Japan, China, South Korea, the European Union, the United Kingdom and the United States under the incoming Biden administration—amongst many others.

If there is greater decarbonisation ambition globally, but similar levels domestically – it does not appear reasonable to conclude that there would be 'more limited cost reductions for batteries, solar and wind' given these are influenced by global factors.

2.3.4 Export superpower

Matters for consultation
What, if any, elements of the Export Superpower scenario as proposed are not plausible or internally consistent, and how would you suggest they should be altered?
Do you think the uptake of EVs (based on batteries) is likely to be affected significantly by competition with hydrogen-powered vehicles?

Hydrogen is unlikely to outcompete battery electric technology in transport for most light vehicle and bus applications. The cost, complexity, timeframes and market for hydrogen vehicles makes the role of hydrogen in transport uncertain and unlikely to significantly affect uptake of battery EVs. Battery electric vehicle technologies are likely to dominate, particularly in light vehicles and buses given the existing and increasing uptake, market and cost reductions.

In contrast hydrogen transport faces a number of barriers such as cost, complexity, inefficiency and timeframes involved in the hydrogen supply chain. Hydrogen transport may play a larger role for long haul transport.

[3] https://reneweconomy.com.au/solar-wind-and-battery-storage-now-cheapest-energy-options-just-about-everywhere-95748/

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This view has been backed by analysts including those at BNEF, which concluded that "the bulk of the car, bus and light-truck market look set to adopt [battery electric technology], which are a cheaper solution than fuel cells."[4]

More broadly, it should be noted that there is a wide range of opportunities for Australia to become a renewable export superpower that are deserving of attention. Renewable hydrogen exports – while an enormous opportunity – are not the only option for Australia to become a renewable export superpower. For example, WWF Australia has identified six types of opportunities[5], and has concluded that 'based on the engineering, economics and market sizes of these opportunities, solar or renewable powered products and commodities such as green steel, aluminium, refining other metals and advanced manufacturing represent the biggest renewable export opportunities for Australia.'[6]

Matters for consultation

Should this scenario assume that some industries are contracting, for example, coal mining and gas exports?

Yes, without question this scenario should assume that both coal and gas exports will contract well within the window captured by the 2022 ISP. Failure to make this assumption could result in over investment, particularly in gas-related infrastructure. It could also result in under investment, particularly in alternatives such as renewable energy and infrastructure to support renewable exports.

The fossil fuel industry is already facing decline with coal leading the way. Recent commitments to net zero emissions made by China, Japan and South Korea, trigger changes to the way these countries will be powered in the future. Their commitments also send an important signal to the energy market. Last year, these countries accounted for $75.6 billion of Australia's total $103 billion of coal and gas exports[7].

While the impacts may not be evident immediately, it's clear that before 2042, these huge economies will be well-progressed toward net zero emissions along with the UK, EU, US and

[4] https://theconversation.com/hydrogen-cars-wont-overtake-electric-vehicles-because-theyre-hampered-by-the-laws-of-science-139899

[5] https://www.wwf.org.au/ArticleDocuments/353/WWF_Renewable_policy_final_ver2.pdf.aspx?OverrideExpiry=Y

[6] https://www.wwf.org.au/ArticleDocuments/353/WWF_Renewable_policy_final_ver2.pdf.aspx?OverrideExpiry=Y

[7] https://www.afr.com/companies/energy/net-zero-goals-cloud-76b-of-exports-20201029-p569mk

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the vast majority of the world. The first sector that will need to transition to enable achievement of net zero emissions is the electricity sector. This transition, which is already gaining momentum globally will move investment to clean sources and reduce demand for Australia's fossil fuel exports.

Matters for consultation – all scenarios

What scenarios in the proposed collection, if any, do you think should be removed? If any, please indicate why – is it because the scenario is not plausible, or because it does not achieve the primary purpose of exploring major uncertainties and risks of over- and under-investment?

ACF recommends that the diversified technology scenario be removed on the basis that it is implausible.

Inclusion of this scenario (which despite its name, reflects the federal government's gas-fired recovery scenario), risks a perception of legitimacy that it does not deserve.

- There should be no doubt that gas is a fossil fuel that drives climate change. Climate change poses a range of investment risks that include physical, transition and liability risks, and that investors are becoming acutely aware of these risks while at the same time the global economy is moving to decarbonise.

- The inclusion of CCS in the power sector is completely implausible. This technology is obsolete worldwide, due to its problem-plagued technology, high costs, high risks, and associated emissions.

- The assumed limited cost-reductions for renewable energy contradicts real world experience where wind and solar have consistently outperformed expectations in terms of uptake and cost reductions.

Including this scenario and related parameters, many of which also look implausible but were added to distinguish it from other scenarios (e.g., lower levels of distributed PV), will not assist in real world planning for Australia's energy future.

Although a gas fired recovery remains a direction being pursued by the federal government, there are many forces at work that will limit the extent to which a gas fired recovery can, should and will occur. Some of these points have been outlined above, and several additional points are provided below.

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- For domestic use, AEMO's own 2020 ISP made clear that new gas-fired power is not needed (or projected to occur) for an optimal, no regrets national electricity market that focuses on reliability, security and consumer costs. This included a finding that gas cannot compete with renewable energy plus storage on the basis of cost and that the only way new gas could play a greater role is if gas prices remained at $4 to $6 per gigajoule over the 20-year outlook period. The gas industry has rejected that price range. The head of ExxonMobil has recently said that it 'ignores realities.'[8] The new Origin Energy director Mick McCormack said that 'a cheap gas target on the east coast is a pipe dream[9]. The gas industry has been very clear that the government's target gas price is unrealistic.

- A gas fired economic recovery from COVID-19 has been shown by a wide range of experts to be ill-advised. The pace of dangerous climate change and the vastly better economic and jobs growth prospects of alternatives such as energy efficiency, renewable energy and energy storage make support for opening up new gas basins, new gas infrastructure and an expanded new gas hub poor choices for economic recovery. The entire notion of a gas fired recovery should be reconsidered, not included as a scenario for NEM planning.

- There are more important and more likely scenarios that deserve AEMO's attention and should be prioritised. These include stepped up decarbonisation and clean energy scenarios such as the Sustainable Growth and Export Superpower scenarios.

2.4 Key Scenario Parameters

Public policy settings (Table 3)

- In Table 3 (pg 32) the scenario indicates 26% reduction in emissions (NEM). Presumably this is to reflect Australia's 2030 target. However, as noted above, the target is 26-28% below 2005 by 2030. And the target is economy wide. This implies a

[8] https://eutility.com.au/article/4-gas-price-ignores-realities-says-exxon-head/
[9] https://esdnews.com.au/origin-director-says-someones-been-smoking-something-over-east-coast-gas-price-targets/

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much higher and faster reduction in emissions for the electricity sector (and even faster for the NEM specifically). It is not clear that this is adequately reflected in this policy setting.

- Similarly, a NEM carbon budget for 2 degrees Celcius should see electricity emissions reach zero around 2030.

- The table should be updated to include South Australia's announced target of 500% by 2050.

- Net zero emissions by 2050 should apply in all scenarios as this is a commitment made by all Australian states and territories and implied by Australia's commitment under the Paris Agreement to limit temperature rise to 2 degrees Celsius and aim for 1.5 degrees Celsius. Currently, the table only includes Victoria and the ACT's net zero emissions targets. Although it is stated that only legislated targets will be included, the net zero by 2050 targets of other NEM states - Queensland, South Australia, New South Wales and Tasmania are firm commitments and should all be included in the policy settings.

Public policy settings (Table 4)

- Battery electric vehicle uptake should be at least as high as the current government's projections for 2030, which includes 26% of all new vehicles and 7% of light vehicle stock.

- Generator retirement dates may be influenced by decarbonisation objectives in central, diversified or slow growth scenarios where power station owners are based in countries with high ambition.

Matters for consultation
Which of these risks represents the most important considerations for forecasting and planning the NEM? Please rank the risks listed in order of importance, and separately, in order of likelihood. Are there any other risks that are more material to forecasting and planning the NEM than those proposed above? If so, which of the above would be of least importance?

Possible risk scenarios (Table 5)

- The discussion paper notes that: *Given the commissioning of Snowy 2.0 already scheduled for 2025-26, AEMO is proposing that this additional storage would be*

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applied as a single development constraint by 2030, rather than a gradual build, given the lumpiness of investments in storage technologies, and to better align with expected coal retirements in the 2030s. Given the size of Snowy 2.0 and its impact, it would be useful to consider a risk scenario where Snowy 2.0 is not delivered or not delivered on schedule.

Matters for consultation
Do you support the approach outlined for the inclusion of government policy across the scenarios?
Do you have any further views on the individual policies and their application?
Are there any energy or environmental policies missing that you consider important to include in some or all of the proposed scenarios? Please provide details.

4.1 Public policy settings

- The ACF does not agree that legislation should be the bar for inclusion in policy settings. Many state and territory based policies are firmly held and effective without legislative change, for example South Australia's renewable energy targets.

- As noted above, the following is incorrect and should be updated to include the full 26-28% target*: The Federal Government has set a target to reduce greenhouse gas emissions economy-wide to 26% below 2005 levels by 2030.* In addition, Australia's commitment to the Paris Agreement implies reaching net zero by 2050, at the latest.

- The following statement on page 42 is incorrect: *The latest government emissions projections estimate that Australia will overachieve its 2030 target.* Australia's emissions projections 2020 (Australian Government 2020) anticipate Australia will fall short of its 2030 target, achieving only 22% emissions reductions below 2005 levels.[10]

- NCC Futures should be applied across all scenarios. On 1 February 2019 (COAG Energy Council 2019) federal, state and territory energy ministers agreed the Trajectory for Low Energy Buildings, a national plan that sets a trajectory towards zero energy (and carbon) ready buildings for Australia.

Matters for consultation

[10] https://www.industry.gov.au/publications/australias-emissions-projections-2020

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Do you consider the proposed scenario alignment to the IEA scenarios appropriate?
Do you consider the proposed scenario alignment to the SSPs appropriate?
Do you consider the global temperature pathways proposed to be assigned to each scenario appropriate?
Would you support the use of the AR6 updated climate assessments, if available ahead of the final 2021 IASR?

4.2 Scenario alignment to international climate outcomes

- Policy alignment around a 2-degree Celsius global warming limit should be the minimum applied across all scenarios. The Paris Agreement also commits signatories to pursue efforts to limit the rise to 1.5 degrees Celsius.

- Scenarios should incorporate recent net zero commitments by China, South Korea, Japan and the United States (under the new Biden Administration) as well as the existing commitments of the European Union and United Kingdom across all scenarios.

- ACF notes that the IEA will release a comprehensive roadmap for the energy sector to reach net zero emissions by 2050 in May 2021. [11]

4.3 Domestic emission targets and reduction

- In Table 3 (pg 32) the scenario indicates 26% reduction in emissions (NEM). As noted above, the target is 26-28% below 2005 by 2030. And the target is economy wide. This implies a much higher and faster reduction in emissions for the electricity sector.

- The rate of decarbonisation in the NEM would be expected to be even faster (and overall carbon budgets for the NEM much lower) than the electricity sector generally, given the uptake of renewable energy is greater in the NEM than in the Northern Territory or Western Australia. This is not adequately reflected in the scenarios.

[11] https://www.iea.org/news/iea-to-produce-world-s-first-comprehensive-roadmap-to-net-zero-emissions-by-2050

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- Given state and territory commitments, faster decarbonisation and smaller carbon budgets (similar to the export superpower and ClimateWorks 1.5 degrees in Figure 3) should be the case across all scenarios, not just the 'more ambitious decarbonisation scenarios'.

4.3.1 State-based emissions targets

Matters for consultation
Do you believe AEMO should implement high-level, state-based emission targets in any sccenarios, if not legislated?
In your view, what is the best way to implement such targets? How would you estimate the contribution of "carbon sink" sectors, such as LULUCF and the use of carbon offsets?

ACF does not agree that legislation should be the bar for inclusion in policy settings.

In addition, some states such as South Australia and Tasmania, do have legislated emissions reduction targets which have not been included.

Achieving net zero emissions should primarily involve reducing all fossil fuel extraction and use to zero.

A target of 'zero emissions' should apply for most sectors, especially for electricity, buildings, and land transport, given the availability or mature, cost effective, zero emissions solutions.

While nature solutions such as conservation and wildlife recovery are critical to protect Australia's biodiversity and natural environment, solutions such as carbon forestry, LULUCF, or offsets (and the like) should not be relied upon for Australia to achieve zero emissions.

Unfortunately, nature solutions are highly vulnerable to bushfires, drought and heatwaves. For example, while ClimateWorks Australia (2020) included as much as 5 to 8 million hectares of carbon forestry by 2030 as part of its 2 and 1.5 degree scenarios, in contrast an

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estimated 24 million hectares of land was burnt during the 2019-20 Black Summer bushfires.[12]

Given Australia's vulnerability to climate impacts, the focus of any net zero emissions policy should prioritise reducing emissions to zero, or as close to zero as possible.

Matters for consultation
Are the proposed mappings of EV uptake to the new scenarios appropriate?
Is the assumption that BEV uptake will plateau in the proposed Export superpower scenario, with an increased relative share of hydrogen fuel-cell vehicles, appropriate?
Was the breadth of EV uptake trajectories in the 2020 scenarios sufficiently broad to cover possible outcomes?
What other factors should AEMO consider in developing the updated EV uptake forecasts?

- AEMO's interim Central outlook (as forecast by CSIRO) assumes that the uptake of EVs across the NEM will reach only 3%, or about half a million vehicles, by 2029-30. However, the latest government emissions projections expect EVs to make up 7% of light vehicle stock by 2030. The government has accepted these projections. The central outlook should be updated to reflect this expectation.

- In the Export Superpower scenario, the uptake of BEVs is initially strong but then plateaus due to the uptake of hydrogen fuel-cell vehicles. This is *unlikely* to eventuate. As noted above, hydrogen fuel-cell light vehicles are unlikely to crowd out BEVs due to factors such as cost, inefficiency, and complexity.

- Some states have made commitments to start transitioning bus fleets to electric buses. For example, the NSW government will replace its 8,000 bus fleet with battery electric vehicles by 2030. It is not clear whether the scenarios incorporate these commitments, but they should be included.

- Some states have made large-scale battery announcements which appear not to have been included. For example, Figure 28 appears to be missing Victoria's announced 'big battery' a 300MW battery to be installed at the Moorabool Terminal Station, near Geelong.

[12] https://www.abc.net.au/radio/newsradio/lessons-from-the-black-summer-fires/12904990

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4.6 New entrant generator assumptions
4.6.2 Candidate technology options

Matters for consultation
Is AEMO's proposed list of candidate technologies reasonable? If not, what should be included/excluded?

ACF notes that reasons given for excluding new brown coal generation, geothermal and tidal/wave technologies also apply to coal and gas generation with CCS. These are:

- No such projects are publicly announced in the NEM and there are lower cost dispatchable alternatives that offer greater system flexibility and are more environmentally friendly.
- Too costly
- Not sufficiently advanced or economic to be included in the modelling.

The following candidate generation technology options should therefore be excluded:

- Advanced ultra supercritical PC – black coal with CCS
- CCGT with CCS.

Kind regards,

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