



22 August 2023

Energy Transition Team
Department of Energy and Mining
Government of South Australia

Via email: DEMenergytransition@sa.gov.au

Dear Sir/Madam

CEC's submission to Green Paper on the Energy Transition

The Clean Energy Council (**CEC**) welcomes the opportunity to make a submission in response to South Australia's *Green Paper on the Energy Transition (the Green Paper)*.

The CEC is the peak body for the clean energy industry in Australia. We represent and work with over 1,000 of the leading businesses operating in rooftop and utility-scale solar, onshore and offshore wind and storage, hydro power, as well as renewable hydrogen. We are committed to accelerating Australia's clean energy transformation.

We commend South Australia for leading the way in many areas of Australia's transition to net zero, and for consulting on issues not only requiring urgent action but also policy beyond the current hurdles. As the Honourable Tom Koutsantonis MP highlights in the Green Paper, we are in a climate emergency requiring a cohesive policy plan to implement direct action. Our submission outlines key issues for South Australia's attention and highlights the need for nation-wide cohesiveness to ensure for a successful comprehensive energy transition policy for the next three decades.

Kind regards

A handwritten signature in black ink, appearing to read 'Arron Wood', written over a white background.

Arron Wood
Chief Policy and Impact Officer
Clean Energy Council

South Australia's energy transition

South Australia should work towards policy objectives that will deliver a rapid and just transition to net-zero. This will not only include schemes to encourage the uptake of consumer energy resources (CER) to lower consumer energy bills and enhance worker mobility in the clean energy sector, but it will also require the inclusion of low-income households and renters in the transition to net-zero. South Australia has led the nation in the uptake of rooftop solar. As is outlined in this submission, the benefits of solar generation can be further enhanced by using storage to support it. We also encourage the South Australian government to support the next phase of the National Construction Code review to promote potential new requirements for rooftop and storage generation in commercial buildings (beyond business as usual).

Home and business electrification are critical to the net zero goals of our energy systems. Australian households have played a large and important role in driving the decarbonisation of our electricity system. This will need to continue if we are to meet our net zero goals by 2050 and the growing demand from the phase out of oil and gas in transportation and buildings. A rapid transition to electrifying homes and encouraging the uptake of distributed energy resources is required.

Fossil-based gas will need to be phased out for Australia to meet its net zero target by 2050. The CEC recommends that each State/Territory Government set an end date for the decarbonisation/operation of fossil-gas networks as part of the sectoral decarbonisation plan for electricity and energy. Both the ACT and Victoria have introduced bans on gas connections for new homes and buildings, with the City of Sydney council voting to make changes to local government planning rules to also ban gas connections in builds. This encourages the electrification of homes and decreasing reliance on gas which is essential for the transition.

Recommendation: Due to the risks of low-income households becoming exposed to, and stranded on, an increasingly expensive gas network over time, the CEC recommends that Governments prioritise support for these households to move off the gas network in the next decade. The earlier this shift occurs, the better, noting that gas prices are likely to remain elevated for a number of years.¹

Introducing schemes to support renters and low-income households move off gas and access solar PV may include tax incentives and interest free loans for solar installations. For example, introducing tax incentives for rental providers that implement CER, coupled with interest free loans that the tenant pays back in increments parallel, and separate to, their rent using the money saved on electricity bills. The loan repayments could be transferrable between tenants.

South Australia should also consider how it can reduce risk, and create more resilience, in supply chains for critical components of Australia's clean energy economy. At present, many of the most critical components are highly concentrated in China. COVID-19 revealed in no uncertain terms the risk of that level and scope of concentration. The US's Inflation Reduction Act aims to help reduce that level of concentration globally but is obviously oriented toward US manufacturing and labour markets. Consequently, this can have only a limited impact for Australia and South Australia. While South Australia may not be able to build value chains of the scale and depth of economies and nations the size of China and the US, likely it can leverage its own resource bases and natural advantages to increase resilience and enhance its share of the clean energy economy.

¹ Reserve Bank of Australia, *Statement on Monetary Policy – May 2023*, URL: <https://www.rba.gov.au/publications/smp/2023/may/economic-outlook.html>

The current and future role of rooftop solar PV

The CEC has identified barriers to/opportunities for the uptake of rooftop solar PV and battery (consumer energy recourses (CER)) in Australia, accompanied by priority areas to overcome said barriers or achieve said opportunities:

- **Recognise and reward the value of CER:** Develop alternative network revenue models, markets and tariff structures that allow for increased grid-enabled value exchanges such as peer-to-peer trading, network service provision by CER and VPP activity.
- **Lack of clarity of CER Governance creating confusion for industry, regulators and consumers:** Advocate for clarity and for a holistic review of governance, including role and responsibilities in standards development and implementation. Advocacy for new national CER technical standards body to provide leadership on standards development, interpretation, and oversight of compliance regimes in future.
- **Distribution networks increasingly constrain export from CER systems:** Advocacy for increased CER hosting capacity of distribution networks. Continue to support improvements to inverter capabilities and CER technical standards, including reforms to the governance of CER technical standards. Advocacy and engagement with regulators on the use of dynamic operating envelopes as a better alternative to zero-export limitations.
- **Lack of effective management of solar PV panels reaching end-of-life:** Advocate for government support in establishing the technology, facilities and infrastructure to manage the impending deluge of solar waste.

The following section outlines what the CEC want from South Australia's energy transition and how we can achieve this, all the while encouraging the uptake of rooftop solar.

CER will play a major role in achieving Australia's decarbonisation ambitions, especially in moving towards our targets in the immediate future and during the current period where we work towards unlocking investment in large scale renewable projects. Forecasts in the 2022 Integrated System Plan publication from the Australian Energy Market Operator (AEMO) forecast that by 2032, over half of the homes in the National Electricity Market are likely to have rooftop PV systems, rising to 65% with 69 GW capacity by 2050.² This will make rooftop PV the largest source of electricity generation in the NEM. The integration and management of that level of distributed generation is forecast to require almost 30GW of distributed storage and flexible demand. The AEMO advises that these findings assume that the investment made in distribution systems will be coordinated with CER expansion for efficient operation and export.³ The CER Implementation Plan is seen as the primary means of ensuring this essential integration and management of CER occurs in a timely and efficient fashion.

Whilst the Energy Security Board (ESB) has done some great work coordinating a policy response to the evolving industry through the CER Implementation Plan, given its transition to the Energy Advisory Panel (EAP), it is critical that Energy Ministers do not lose sight of the requirement for continuing national co-ordination of the numerous workstreams in the CER Implementation Plan. The CEC has sent requests to Federal and State Ministers to make the CER Implementation Plan a standing item on the ECMC Meetings.

Additionally, the work the ESB has done with KPMG to identify priority gaps in the CER Implementation Plan resulted in a report that will serve as the foundation for any future CER program of work. As such, it should be published as a draft for consultation with industry feedback sought. Through our participation in the ESB's CER Stakeholder Industry Reference Group meetings, we are aware of a diversity of views that exist on the report's findings and not necessarily well aligned with the draft conclusions presented to the Reference Group by KPMG. CEC members and other stakeholders believe the focus on developing backstop mechanisms by distribution networks in response to solar generation during the day has

² AEMO, 2022 *Integrated System Plan*, June 2022, URL: <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>

³ AEMO, 2022 *Integrated System Plan*, June 2022, page 10, URL: <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>

been placed ahead of the importance of developing viable markets for CER to participate in and be rewarded. It is our view that the existence of backstop mechanisms – which are activated at the very times when CER response to market mechanisms would be most valuable – will manifestly undermine any subsequent effort to develop markets for CER and ultimately disincentivise consumers from taking up CER solutions.

SAPN are also leaders at unlocking spare capacity on the distribution system through the adoption of Flexible Export Limits and CSIP-AUS as the communication protocol to enable the application of flexible export limits. Flexible export limits as adopted in South Australia will allow those customers who sign up to instal larger solar and battery systems than those who may prefer static export limits. The next phase of reform is to unlock new CER markets.

The AEMC and AER are currently undertaking reviews into the policy and regulatory framework that will unlock these markets in a least cost approach. Victoria has also used smart meter data to undertake a review into voltage management practices by Victorian Distribution Businesses. The outcome of this work showed that rewarding aggregators of CER assets for voltage support and that distribution businesses procuring network support (broader than voltage support) are key factors in a high CER future. There are a range of options for how these new markets are developed, including access to real-time consumption data, network tariff setting that reward efficiently integration of CER assets and network tender program.

Recommendation: South Australian government support the policy work at the national level to unlock future CER consumer benefits through new market opportunities. Further, the South Australian government should develop a work plan on how to leverage the SAPN flexible export limits by undertaking 'no regrets' steps to encourage and support SAPN developing new market opportunities for customers who sign up to flexible exports arrangements to actively participate and provide non-network solutions.

National consistency key to the transition

The CEC commends South Australia for the headway it has accomplished through the integration of renewable and distributed energy resources. Although this stands as a great example for other jurisdictions, it can generate inconsistency across the NEM when other States do not conform and choose a different approach. For example, Queensland's decision of an Emergency Backstop Mechanism in the form of a generation signalling device (GSD). Having such varied approaches to integration of CER across the NEM results in problems and challenges for the industry that could be avoided. As Australia is a relatively small market, national consistency is a key criterion in keeping industry implementation and on-going management costs as low as possible.

National consistency is not only key to encouraging businesses to supply Australia with products, it is essential for increasing the pace of CER uptake Australia-wide. An improved national governance structure will help to ensure ongoing compliance issues continuously raised by industry and market bodies are prevented or managed better in the future. Given the importance of compliance in installing CER, plus the likely increasing need for cybersecurity compliance, a new body to oversee CER technical standards will be the most appropriate and cost-effective approach to assign roles and responsibilities and co-ordinate compliance across the industry.

Currently there is no coordinated or central approach to developing new CER technical requirements and industry has little engagement in the development of CER technical requirements. Current organisations, such as DNSPs, Clean Energy Regulator, State Electrical Safety Regulators, the AER or the Clean Energy Council accreditation processes, capture various aspects of technical standards or compliance but there is no central co-ordinating body to provide governance and co-ordination oversight across these various market bodies. While DNSPs do have recourse through the connection agreement to manage non-compliant connections, they are focused on arrangements within their own service areas only and may not be seen as being sufficiently independent or the most appropriate to coordinate a national response.

Recommendation: The South Australian Government advocate for and facilitate the establishment of a National CER Technical Standards Body.

The current status of CER technical standards regulation is not satisfactory and is neither serving the industry nor consumers. It is clear that a national technical regulatory framework for CER is needed. A structure is required that supports industry to innovate and unlock CER revenue streams for consumers, acknowledge consumers are the investors and owners of these devices, and therefore should have control over the functionality of the devices as well as being rewarded for consenting that their devices provide grid support services.

A National CER Technical Standards Body would have a coordinating and facilitation role, rather than a compliance role, providing strategic oversight of the development of technical standards for CER; aid in developing an appropriate model for testing and certification capabilities to service the Australian market and oversee the development and maintenance of it; and ensure for nationally consistent application and interpretation of standards and key technical approaches (e.g., flexible exports/imports, minimum demand management). See Appendix 1. for a proposed structure recently provided to the AEMC in its review into consumer energy resources technical standards.

Extending the Small-scale Renewable Energy Scheme

Consumer uptake of rooftop solar has been built off the back of a very successful Small-scale Renewable Energy Scheme (SRES) program. Not only has the SRES help diffuse the upfront costs associated with the purchase of rooftop solar, but it has also built a very strong compliance program.

Running in parallel to the policy reform agenda in developing new market opportunities there also has to be a continued focus on maintaining and building a compliance culture established by the SRES program. Rooftop solar and storage is not just nice to have, but essential to meeting Australia's emission and renewable generation targets. It is critical that successful policy settings like SRES continue to underpin the rapid uptake of rooftop solar and storage to deliver on Australia's climate goals.

The CEC is proud in the role it has played in building robust installer and product accreditation programs. These programs have raised rooftop installer standards and also ensured solar products conform to necessary safety and functional requirements. Supported by voluntary codes of conduct, initially the Solar Retailer Code of Conduct that has recently been superseded by the New Energy Technology Code of Conduct, the CEC has provided a framework for consumers to have confidence in purchasing rooftop solar and having it installed safely. This must continue to encourage and support the uptake of DER.

Consumer confidence in the industry is crucial. It has built a social licence and community acceptance of the positive financial benefit to energy bills the uptake of rooftop solar has had. It is great we are exploring policy options to create these incentives. However, it is important that we do not lose sight of the value of a strong compliance culture we have built over the last 15 years through the installer and product accreditation programs. This compliance culture is even more important as we move to a world where consumers are turning their passive rooftop solar generation into active and flexible energy that has both value to the individual consumer and the wider system through the use of storage.

We know the SRES works. Along with the Renewable Energy Target, no policy has delivered as much abatement, given as much certainty and unlocked as much investment as the SRES.

Recommendation: Explore the extension and expansion of the Small-scale Renewable Energy Scheme (SRES) to support distributed battery installation uptake, which will enable Australia to better exploit the immense value of rooftop solar, and support a more flexible and resilient system.

These policy approaches could be introduced quickly, and there is reason to believe the costs associated would be far outweighed by the benefits. Albeit more work needs to be done to explore what an expanded SRES might look like, we believe it shows some real promise as a way to support the transition.

The current and future role of energy storage

Distribution Level

Almost one-third of Australian homes now boast solar PV on their roofs. To date, Australians have invested approximately \$20B in the energy transition through putting rooftop solar on their homes. Total rooftop solar PV installed capacity will need to climb to 35GW by 2030 and 69GW by 2050 in order to align with AEMO's Step Change Forecast. On its own, solar generation is a passive form of generation and there is a limit to its value. Storage makes this passive generation source more flexible and valuable to both the individual and the wider system.

Distributed storage can play an important role in soaking up solar during the day, managing evening peaks, and supporting the flexibility of the system. Australians have embraced these technologies, the opportunities they bring for supporting the energy transition are immense, by and large we do not need to build new distribution networks, everyone's home and business is connected, and rooftop solar and batteries have social license as Australians are already seeing the financial and climate benefits of the technology. Storage is critical in unlocking the full value of distributed solar generation. Additionally, distributed energy and storage builds a more resilient energy system, providing Australians with physical insurance against system wide blackouts caused by natural disasters such as floods and fires.

We would urge the South Government to set a storage target as part of its climate change targets and look to leverage the Residential Energy Efficiency Scheme to support the take up of storage by households and small businesses.

Recommendation: Explore options for supporting the distributed battery installation uptake including an expansion of the Small-scale Renewable Energy Scheme (SRES), which will enable Australia to better exploit the immense value of rooftop solar, and support a more flexible and resilient system.

Many State Schemes and the Federal Energy Efficiency \$1B Fund are all now using no or low interest loans to support the uptake of battery. This is vastly different to solar where subsidies were used to reduce the upfront costs but also feed in rates provided an on-going revenue stream to reduce payback periods. Reforms are important to unlocking new revenue streams and incentivising households without solar to take up solar, and in providing value to households with solar to look for storage solutions and for those households considering solar for the first time to consider solar and storage solutions. Storage allows consumers to store their daytime solar generation they do not use or need and consume it later in the day or evening.

Importantly, distributed energy and storage is the lowest cost approach to the transition and complements the large-scale investment and build required for the transition. In particular, distributed energy and storage can do a lot of the heavy lifting in attaining our climate and renewable goals early, while large scale works through the investment, build and social licence requirements.

Recommendation: Set a distributed battery storage target that reflects the Step Change scenario

AEMO predict that an efficient and effective integration of distributed energy to our energy system can unlock almost 9.3GW nationwide of distributed storage and flexible demand. The AEMO advise that these findings assume that the investment made in distribution systems will be coordinated with distributed energy expansion for efficient operation and export. However, battery storage remains expensive and deployment is sluggish. AEMO's Step Change Forecast anticipates a share of 6% in the forecasted NEM capacity for 2030 – but this has been predicted on the assumption that federal and state public policies are taking place - so such a forecast is unlikely to be realised without policy intervention. See page 5: *Extending the Small-scale Renewable Energy Scheme*.

Further, to achieve AEMO's predictions we need to ensure solar generation and storage policy reform are nationally co-ordinated and that it drives outcomes whereby owners of these assets are rewarded for participating in wholesale market and ancillary services markets, and networks pay for access to solar generation and storage for network services through nationally consistent charging and accessing arrangements.

The current and future role of hydrogen gas

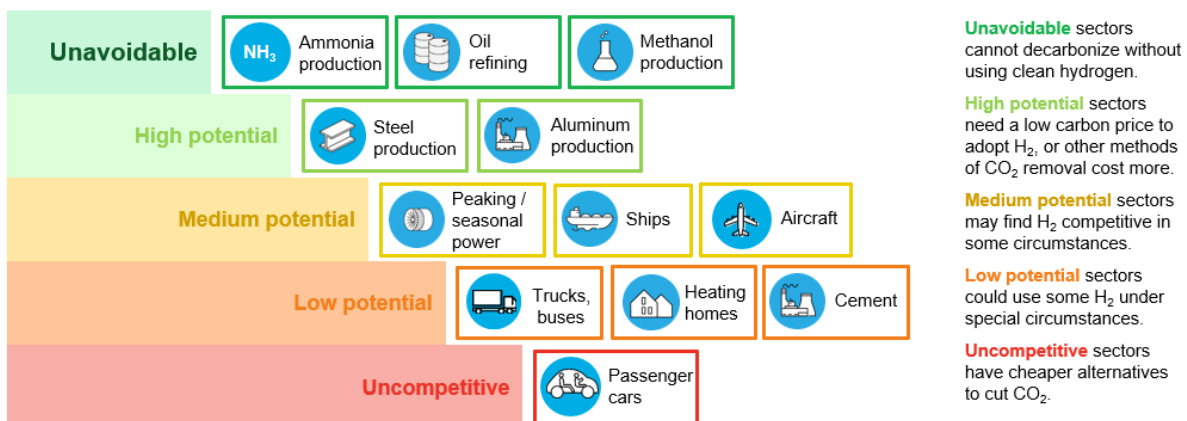
What is the best use of hydrogen in South Australia?

Renewed interest in hydrogen sector over recent years stems from its potential as a zero or low emissions fuel or chemical feedstock, which can be used as a substitute for gas, oil and in some cases (e.g., green iron), coal.

Renewable hydrogen, which is the only form of hydrogen capable of being truly zero or low emissions is a highly energy intensive product to produce (~54KWh of electricity to produce 1 kg of hydrogen). In the interests of energy efficiency and least-cost decarbonisation solutions, it is therefore best targeted at those use cases which are difficult to electrify or abate.

The 'no regrets' applications of hydrogen today are for those uses for which hydrogen is 'unavoidable', which include ammonia and methanol production. We note that 94 million tonnes of hydrogen (almost entirely fossil-fuel derived 'grey' hydrogen) is currently consumed in the world annually, much of which is directed to these unavoidable use cases. Converting this grey hydrogen to green would require in excess of 5,000 TWh of power annually, which is almost twenty-times the annual generation of Australia's existing electricity system. It is clear that simply meeting a portion of the world's existing decarbonisation needs for the hydrogen sector would represent a massive market opportunity for an emerging renewable hydrogen sector. We note that with both green methanol and green ammonia shaping up as leading fuel sources for the decarbonisation of shipping, the demand for these products will only grow.

The prospects for widespread adoption of clean H₂ in various sectors



Source: BloombergNEF, concept from Liebreich Associates

South Australia is also ideally placed to expand its role in steel production – featured in the 'high-potential' category above – leveraging its low-cost green hydrogen production potential to turn the state's high-quality magnetite resources into green iron. Undertaking this value-added processing of our iron ore resources onshore would be more economically efficient than exporting both magnetite ore and hydrogen for processing in energy constrained markets abroad.

The CEC strongly encourages the South Australian Government to support the strategic development and growth of a domestic green iron production sector.

How does hydrogen support the energy sector best in the future?

Large-scale hydrogen production in South Australia will provide valuable, flexible load which could assist to balance the electricity system which is more and more frequently experiencing low or negative demand during daylight hours. However, this balancing role will only be possible if electrolyzers are in fact grid connected.

As indicated in the above chart, hydrogen also has 'medium potential' to play a role in the provision of peaking/seasonal power generation. Due to the relatively high cost of hydrogen fuel combustion for power production, it is likely to be a higher cost dispatchable energy solution than utility-scale battery storage.

What are the barriers to developing a hydrogen industry at scale in South Australia?

A recent survey of the Clean Energy Council's renewable hydrogen membership nominated 'lack of offtake' as the number one barrier to project commercialisation and investment for projects.

While there is general support for hydrogen development, there are limited existing offtake opportunities in Australia. Where potential buyers are identified (in Australia or abroad), our members report that they are often reluctant or unwilling to sign long-term offtake deals at this time without additional funding support, given hopes/expectations that costs will fall in future years due to supportive policy or cost reductions in electricity supply and equipment. This is particularly true in the context of generous subsidies being provided to large-scale hydrogen production in the United States, Canada and Europe.

While the Hydrogen Headstart program announced by the Federal Government earlier this year will be helpful to getting at least two large-scale projects moving in Australia, we will need a more robust and longer-term policy response to enable Australia's industry to be cost-competitive with major emerging producers abroad.

Mining, manufacturing and recycling

The finite resources depended upon worldwide means there will come a time when we can no longer rely on resource extraction. A shift towards creating a circular economy is required. The development of an Energy Transition Recycling Strategy is encouraged, whilst also ensuring such a strategy not only leverages the benefits of a circular economy, but has the end goal of creating a circular economy.

Landfill bans are a great start to diverting solar PV panels and other components of solar PV systems from landfill, however an answer to the waste problems is needed. This will require Government support and funding to create/build/buy the technology and establish infrastructure and facilities to process the waste, and said funding and support will need to be at a scale significant enough that it can find solutions to manage the scale of imminent solar PV waste.

With this in mind, the particular focus required to get facilities off the ground and running is on infrastructure for recycling solar PV panels. The demand already exists, but the cost in getting machinery to Australia or the technology required to build such machines requires funding and support from the government.

While old solar PV panels are being stockpiled around Australia awaiting a solution, pleasingly, energy storage and large battery OEMs and the battery recycling industry are collaborating on the recycling of energy storage batteries. Energy storage battery recycling is starting from a stronger position than consumer batteries, reflecting the easier to manage logistics chain. Companies are demonstrating leadership and initiative to recycle these batteries. While further work is required, this is a positive starting point.

Recommendation: provide government funding and support to progress technology, infrastructure and facilities to better manage the waste accruing for rooftop and utility-scale solar PV and windfarms.

Finally, it is imperative that Australia and its States and Territories develop a fully functional product stewardship scheme to ensure the retainment of the critical minerals found in renewable energy infrastructure. Leakage of critical minerals occurs when solar PV panels, wind turbines and other renewable energy infrastructure deemed “waste” is sent to other nations to dispose of them. This “waste” material can then be harvested for its critical minerals and reused or repurposed, ultimately entering another nations’ economy. Whilst the *Basel Convention* may assist in diverting such materials from exportation, this represents a significant opportunity lost by Australia which should and can rely on critical minerals that already exist within the economy.

Decarbonising transport

As the electricity sector continues to decarbonise, transport will rapidly contribute the largest portion of greenhouse gas and other air pollutants. Already across Australia demand for battery electric vehicles (BEVs) continues to stay strong, well outpacing supply. As part of an Energy Transition Emissions Reduction Strategy, the Government should consider ways to:

- Get more BEVs of all classes into SA;
- Expand public Electric Vehicle (EV) charging stations across SA;
- Make it easier for homes to have their own charge points.

These actions can help to ensure that households and businesses of all sizes and incomes can afford to purchase and utilise BEVs and build the pathway for continued market demand over time, leading to a clearer pathway to decarbonise the transport sector.

Widespread electric vehicle uptake can play a helpful role in balancing the grid at times of surplus solar generation and, while expenditure will be required to increase network capacity to meet higher peak demands caused partly by electric cars, these costs will be more than offset by improved network utilisation. As has been evidenced in other jurisdictions like California USA, this will result in lower electricity bills for everyone through better network utilisation from EV use.⁴

The EV to grid opportunity largely relates to the high proportion of detached houses, with solar PV, relative to markets like Asia and Europe. Approximately, 33 per cent of homes in Australia, and 40 per cent of homes in South Australia, have rooftop solar installed. In Australia, 83 per cent of homes are separate house or townhouses meaning connecting a vehicle to the home for charging purposes is very simple. There exists a huge opportunity to utilise EVs and detached houses with bi-directional charging to establish enough storage to support the grid, particularly during peak demand periods. In accordance with AEMO's 2022 ISP, the NEM will require 640 GWh of all forms of storage by 2050. ARENA reported that the usable storage in Australia's EV fleet at that time will be nearly four times the total NEM storage requirements.⁵

Recommendation: South Australia should adopt an ambitious Fuel Efficiency Standard, continue to co-invest in charging network infrastructure and set an end date for the sale of new internal combustion vehicles.

The South Australian Government should adopt an ambitious Fuel Efficiency Standard and continue to co-invest in charging network infrastructure. Policy certainty helps businesses and consumers make informed decisions and we encourage South Australia to set an end date for the sale of new internal combustion engine (ICE) vehicles. The International Energy Agency (IEA) has recommended that countries adopt 2035 as the end date for the sale of new ICE vehicles.⁶

⁴ Energy Consumers Australia, *Stepping Up: A smoother pathway to decarbonising homes August 2023*, URL: <https://energyconsumersaustralia.com.au/wp-content/uploads/Stepping-Up-Report-Final.pdf>

⁵ ARENA, *V2X.au Summary Report – Opportunities and Challenges for Bidirectional Charging in Australia*, 30 June 2023, page 3, URL: [Proposal for Services Development of robust implementation options for a EVSE standing data register 8 August 2022 \(arena.gov.au\)](https://www.arena.gov.au/development-of-robust-implementation-options-for-a-evse-standing-data-register-8-august-2022)

⁶ International Energy Agency, *Cars and Van: Latest findings*, URL: <https://www.iea.org/energy-system/transport/cars-and-vans>

Education and workforce

Which areas need training and industry development to keep up with demand? Should the Government of South Australia continue to develop a targeted Energy Transition Workforce Strategy to identify and address workforce issues specific to the energy sector, or should its scope be broader?

The workforce development impacts of the energy transition are substantial. Almost two thirds of jobs are blue-collar and most of these require vocational education and training, which includes electricians, electronics and telecommunications trades workers, construction workers and labourers. One third of jobs will require a tertiary degree and include professional occupations such as electrical and civil engineers, project managers and administrators. The 2022 Clean Energy Council report [Skilling the Energy Transition](#) provides an overview of the existing and worsening skills shortages experienced by the clean energy sector. Core roles in shortage include electricians and engineers. These shortages are due to a range of factors:

- **Visibility** – jobs in clean energy jobs and pathways to work in the industry are poorly understood, with most workers side-stepping from other industries. Consequently, the industry has low participation of workers under 30.
- **Location** – the regional location of most jobs is a major impediment to attracting qualified graduates, who are typically attracted to metropolitan areas.
- **Training** – the clean energy industry is already experiencing a critical lack of training capacity, notably in electrical trainers. A slow and unwieldy VET system has been a brake on the development of relevant and meaningful qualifications for electrical and mechanical tradespeople in renewable energy. Australia’s enduring STEM (science, technology, engineering, mathematics) crisis threatens clean energy project developments, which rely heavily on STEM-based skills.
- **Mobility** – workers currently face barriers to mobility between projects. There are opportunities to increase worker mobility, such as harmonising the required qualifications and training, and enabling the portability of long service leave and parental leave entitlements.
- **Entitlements** – long-standing policy uncertainty and tight operating margins have meant that the clean energy sector has struggled to compete with more established (and subsidised) sectors on salaries and entitlements such as oil and gas.⁷

Additionally, considerations affecting future workforce supply and demand for large-scale renewable projects include:

- **Low unemployment, and a record pipeline of infrastructure investment.** This will induce intra- and interstate competition for construction workers due to large-scale public infrastructure projects.
- **Lack of coordination and strategic sequencing of projects.** This can lead to boom-bust construction cycles and exacerbate workforce competition between states and regions. This increases costs for developers and consumers through unnecessary delays. Furthermore, a lack of national coordination of the development of the emerging hydrogen industry may exacerbate interstate competition for trainers and workers. **Global competition for investment and skilled workers.** This is due to large-scale subsidies offered through the United States Inflation Reduction Act (IRA) and competing policies such as the European Commission’s Green Deal Industrial Plan, China’s Made in China 2025 industrial plan and Saudi Arabia’s Vision 2030 program.

The South Australian Government should develop a Workforce Strategy that encompasses all priority industries that the Government will actively seek to grow during the energy transition. This should include an expanded role for domestic manufacturing and the critical minerals industry. Sectoral plans developed in isolation create unnecessary competition between growing industries for a limited supply of workers. This risk is particularly acute for common skills in the

⁷ Clean Energy Council. (2022). *Skilling the Energy Transition*. URL: https://assets.cleanenergycouncil.org.au/documents/CEC_Skilling-the-Energy-Transition-2022.pdf

construction and installation industry. Clean energy would also struggle to compete on salaries and entitlements with high-wage extractive industries such as critical minerals. Holistic planning also delivers clear government signals on energy and workforce policy, creating a stable environment for investment and long-term workforce planning.

Recommendation: South Australian Government should develop a holistic Energy Transition Workforce Strategy that includes all sectors that will grow during the energy transition.

Tertiary education provision

On the university side, the issues are both quantitative – concerning the number of graduates from relevant disciplines – and qualitative – relating to the misalignment of course content with the needs of industry. Australia is experiencing an enduring STEM crisis. Australia’s proportion of engineering graduates is just 8.2%, which is the lowest in the OECD, compared with Germany at 24.2%⁸. As a result, there is a dependency on skilled migration to meet demand, with over half of all engineers working in Australia being born overseas⁹. The enduring effects of the COVID-19 pandemic on skilled migration can be seen in the 2022 Skills Priority List, which identified national shortages of all engineering occupations, with moderate to strong anticipated future demand¹⁰. Finally, the Job-Ready Graduates Program in 2020 reduced funding for units in STEM, which disincentivises universities from offering robust STEM programs.

How will regions attract and retain skilled workers to support the development, maintenance and operation of energy infrastructure? What other elements will support the attraction and retention of skilled workers in South Australia? What measures are needed to ensure gender balance in job creation at all levels?

Attraction

It is important to invest in resources to help regional communities understand what jobs are available, and the pathways open to working in the clean energy industry. The Clean Energy Council is working with the Energy Efficiency Council and industry partners to deliver a Careers for Net Zero Fair, a one-day exhibition and conference to showcase jobs needed in net zero future. This exhibition is being paired with a major advertising campaign to promote the top jobs to prospective employees. These initiatives could be replicated in South Australia and delivered as a roadshow to key regional areas to increase the visibility of jobs in clean energy.

A comprehensive Workforce Strategy would also assist the Government in identifying key opportunities for regional growth, as well as capacity analysis to understand regional capacity shortfalls. Attracting workers with families to regional South Australia may require additional investments in social infrastructure, including education, health, transport, and housing.

Recommendation: South Australian Government to partner with the Clean Energy Council and industry partners in delivering an annual Career for Net Zero Fair from 2024.

Retention

The CEC has recently initiated a project in Victoria that seeks to harmonise the required training across employers in each renewable energy technology, including wind, solar and batteries. An SA-CERT project – short for South Australia Clean Energy Required Training – would see clean energy developers in South Australia coming together to agree on a

⁸ Clean Energy Council. (2022). *Skilling the Energy Transition*. URL: https://assets.cleanenergycouncil.org.au/documents/CEC_Skilling-the-Energy-Transition-2022.pdf

⁹ Engineers Australia. (2020). *Migrant engineers – research and resources*. URL: <https://www.engineersaustralia.org.au/news-and-media/2022/07/migrant-engineers-research-and-resources>

¹⁰ Skills Priority List. (2022). URL: <https://www.nationalskillscommission.gov.au/topics/skills-priority-list>

harmonised training matrix. This matrix would underpin a digital platform to track worker training and competencies. This project would deliver the following outcomes:

- Improved worker safety, by clarifying, harmonising, and tracking worker competencies and training. This could establish any existing training programs as mandatory and provide government with a digital platform to monitor compliance.
- Improved training participation, by clarifying demand to the TAFE and training sector and aligning delivery with industry requirements. It would also provide government with the evidence-base to make data-driven decisions regarding training investment.
- Improved productivity, by increasing efficiency for project owners and contractors in attracting and employing workers with the right skills from the outset, reducing time-to-competency.
- Improved regional community employment outcomes by clarifying renewable career pathways, enabling communities to mobilise more effectively and respond to employment opportunities as projects are announced. This would also assist workers from marginalised labour groups (e.g., First Peoples, the long-term unemployed, migrants, women). It would assist workers in regional communities to seamlessly move between renewable projects across REZs.

This program could be developed in partnership with the South Australian Government, the design informed through consultation with key stakeholders including industry, education and training providers, government, and unions.

Recommendation: enhance worker mobility by initiating an SA-CERT project to harmonise and track training and qualifications.

Retention and diversity

Businesses with inclusive practices and high levels of diversity are more successful, boasting higher profits and performance, tending to have fewer safety incidents, and achieving higher rates of staff retention. Research by the Diversity Council of Australia shows that diverse and inclusive organisations are three times more likely to be effective, five times more likely to be innovative and three times more likely to provide excellent customer service. When employees feel valued and connected at work, they are five times more likely to be satisfied with their job and three times less likely to leave it. Employers that are known to be inclusive and have employees that are empowered to bring their own true self to work tend to attract a larger pool of highly skilled and capable talent. In the context of a growing industry with concerns around skills shortages, expanding the talent pool is critical. Female participation in trades is low, with more work required to attract and retain women in trades. There is also an opportunity to ensure the hydrogen industry enshrines these practices from the outset and avoids replicating the biases present in the oil and gas industry. It is incumbent on government, industry, unions, and workers to collaborate effectively in setting meaningful objectives regarding workplace equity and diversity.

Work also needs to be done at upstream levels of the STEM pipeline. The Australian Academy of Sciences' Women in STEM Decadal Plan provides a long-term program of strategic recommendations and implementation guidelines to address the enduring disenfranchisement of women in STEM. These recommendations cohere around six core opportunities: leadership and cohesion, evaluation, workplace culture, visibility, education, and industry action. The South Australian Government could play a key leadership role in committing to implementing the Plan's strategic recommendations in full and coordinating a whole-of-government response to address the persistent barriers to participation of women in STEM.

Recommendation: Develop a strategy and effective mechanisms to overcome barriers to under-represented labour groups participating in the energy transition; plus commit to implementing the Women in STEM Decadal Plan strategic recommendations in a coordinated, whole-of-government response.

How can the Government of South Australia ensure Aboriginal people are respected, consulted and are able to realise the opportunities?

As most clean energy projects are located regionally, there are significant opportunities for empowering and upskilling local Indigenous populations. There is strong potential for communities to benefit from regional investment and the infrastructure development opportunities outlined above. There are economic opportunities from royalties and benefit sharing, as well as training and education opportunities for short-term and ongoing jobs.

It is essential for industry to engage with local communities early in the process and establish them as genuine partners in decision-making. Negotiations must be entered in good faith, ensuring communities are empowered to give free, prior and informed consent on all relevant matters, including siting, design and implementation. Projects need to prioritise the establishment of long-term relationships of mutual benefit with local communities as a key success criterion. Cultural awareness and safety training can help ensure that a project's workspace is a safe and welcoming place for local communities.

An honest communications strategy is needed on the employment opportunities in clean energy, particularly in relation to the transient nature of many roles in the construction phase. Where there is prior and informed consent for a project and it is co-located with local Indigenous communities, preferential employment opportunities should be provided. In these instances, additional support should be also provided. This could include training on how the clean energy industry functions and what effective partnership might look like with clean energy industry projects to maximise the opportunities to self-determine outcomes. It should also include assistance in navigating administrative and employment tasks such as acquiring identification, opening a bank account, understanding a pay check, assistance with transportation etc. Government support could be provided to assist industry in engaging on-site mentors and support assistants for Indigenous employees.

The First Nations Clean Energy Network has recently published a negotiation guide to support First Nations peoples with this. The Clean Energy Council is working to develop industry guidelines on best practice for engaging with First Nations communities for its members. The CEC and FNCEN are partnering on a project to provide education to communities on the clean energy transition and how traditional owner groups can be involved.

Recommendation: Support local Indigenous communities with any needed training, education, capacity and funding to effectively engage with clean energy proponents, to achieve free, prior and informed consent for all projects early in the development process. Partner with the CEC and FNCEN on bespoke training for SA indigenous communities.

Appendix 1. National Consumer Energy Resource Technical Standards Body

Why a national body for CER technical standards is needed

Given the importance of compliance and a nationally consistent approach to Consumer Energy Resources (CER) technical standards, plus the likely increasing need for cybersecurity compliance, a new body to oversee CER technical standards will be best and least cost approach to assign roles and responsibilities and co-ordinate compliance across the industry.

Current organisations, such as DNSP, Clean Energy Regulator, State Electrical Safety Regulators, the AER or the Clean Energy Council accreditation processes, capture various aspects of technical standards or compliance but there is no central co-ordinating body to provide governance and co-ordination oversight across these various market bodies. While DNSP do have recourse through the connection agreement to manage non-compliant connections, they are focused on arrangements within their own service areas only and may not be seen as being sufficiently independent or the most appropriate to coordinate a national response.

Proposed responsibilities of a National CER Technical Standards body

The National CER Technical Standards Body would have a coordinating and facilitation role, rather than a compliance role:

- Strategic oversight
 - Oversee the development of technical standards for CER through support and guidance. This would include working closely with already existing bodies, such as Standard Australia's Smart Energy Advisory Board, to support the development and maintenance of a CER technical standards roadmap.
 - Maintain watching brief on relevant standards internationally, liaising with Standards Australia.
 - Review and track the implementation and performance of CER technical standards.
- Test, certification and standardisation
 - Develop an appropriate model for testing and certification capabilities to service the Australian market and oversee the development and maintenance of it.
 - Ensure such a model administers appropriate testing and certification for relevant standards, including: AS4755, AS4777, the Australian implementation of IEEE 2030.5 (CSIP-AUS), and relevant future standards like Electric Vehicles.
 - Although having an Australian test lab would be beneficial to ensure industry standards are adhered to, the burden of costs and intermittently requiring extensive workforce to operate a testing facility on Australian shores would be too great.
 - Instead, the current requirement that the CEC applies should continue, namely, test labs that perform the testing and certification are required to have ISO Accreditation.¹¹ However, it should be accompanied by further oversight by the National CER Technical Standards body. Specifically, this body can be given legislative powers to hold test labs to account, whereby they are removed from the Australian market or suspended until audited, if it is found that the test lab has been testing or interpreting standards incorrectly.
 - Ensure nationally consistent application and interpretation of standards and key technical approaches (e.g., flexible exports/imports, minimum demand management) through the development of a model and overseeing the implementation and management of it.
 - Adjudicate and clarify standards disputes.
- Standard revisions would progress through routine Standards Australia process, with handbooks as more responsive guides to technical requirements.

¹¹ For Certificates, the Certifier should be accredited to ISO/IEC 17065 with the required Standard in Scope. For test labs, the test lab should be accredited to ISO/IEC 17025 with the required Standards in Scope.

- Ensure nationally consistent application and interpretation of standards and key technical approaches (e.g., flexible exports/imports, minimum demand management)
- Facilitate national testing days to support interoperability.

Interactions

Working with industry, State Electrical Safety Regulator and Standards Australia to develop and interpret standards relevant to DER/CER.

Establishment

Establishment of a new National CER Technical Standards Body would be complex and take time (years) given that it would require federal endorsement and endorsement by each jurisdiction (perhaps via the National Energy Transition Partnership) to ensure that state electrical safety regulators and national bodies could be coordinated and funded appropriately.

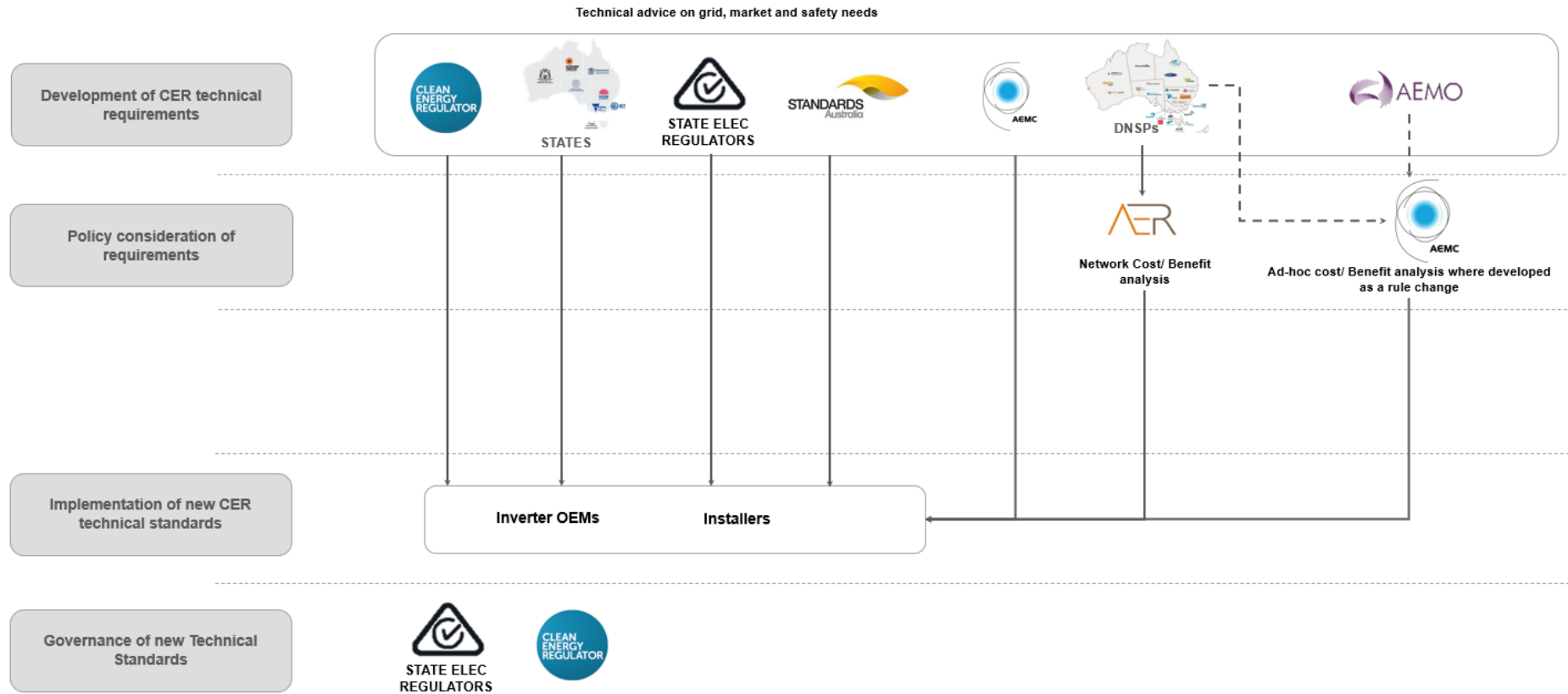
Discussions with the Australian Energy Market Commission (AEMC) indicate that enabling legislation would likely be needed (commonwealth and state).

Interim approach (while STCs remain)

A proposed interim approach would see the CER hold compliance data, which would be provided by the DNSP. The DNSP would require the installer to provide evidence that the installation has met the compliance obligations of the DNSP prior to connection being completed and this evidence would be provided to the CER to support issue of STCs.

While the CEC set up an Australian Standards interpretation enquiry channel, allowing for a formal process to discuss standards interpretation.

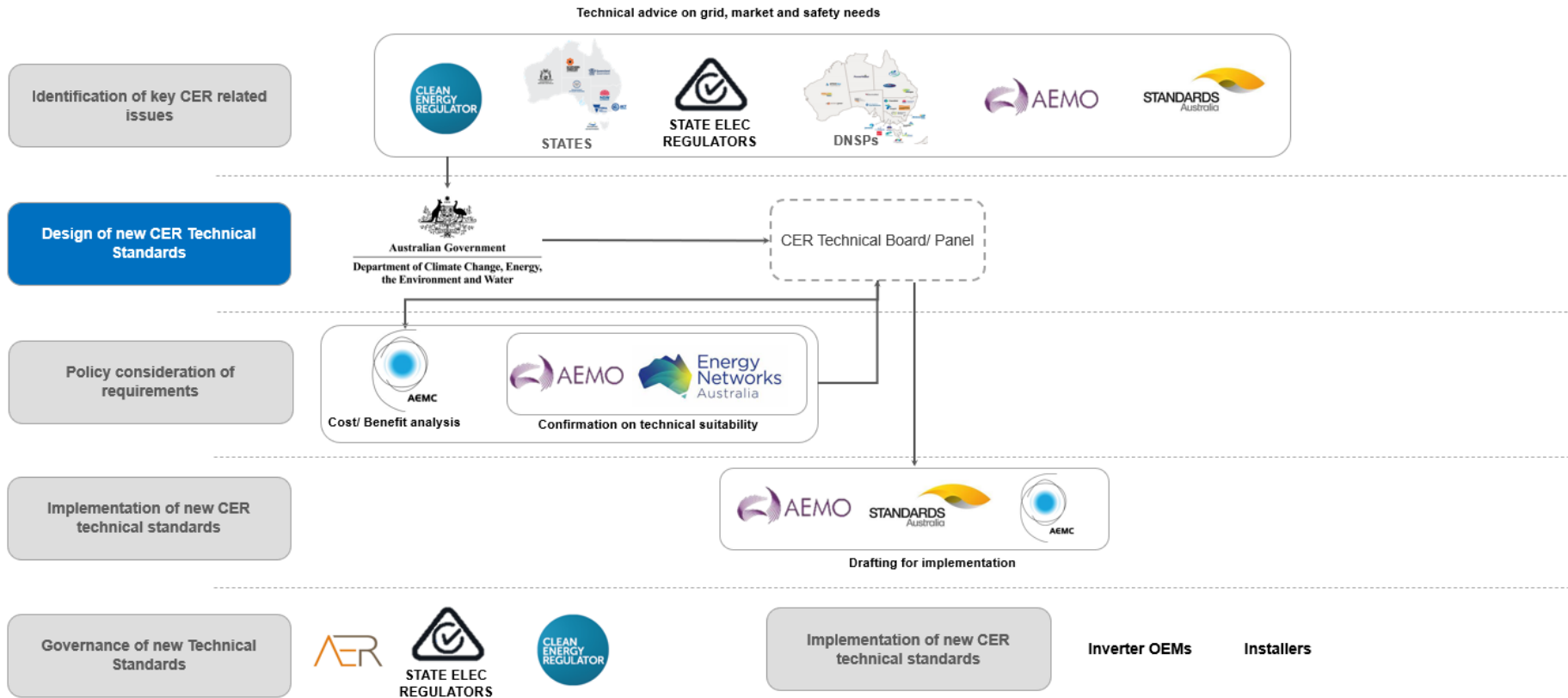
Current approach to introduction of CER standards:



¹² See [joint submission](#) to AEMC Review into Consumer Energy Resources Technical Standards Draft Report by SolarEdge Technologies (Australia) PTY LTD (SolarEdge), Enphase Energy Australia (Enphase), Tesla Motors Australia Pty Ltd (Tesla), sonnen Australia Pty Ltd (sonnen), Redback Technologies (Redback), SMA Australia Pty Ltd (SMA), and Fronius Australia Pty Ltd (Fronius).

New CER Governance: Option 1 – DCCEEW ownership of CER under Electrification umbrella:

 New body



13

¹³ See [joint submission](#) to AEMC Review into Consumer Energy Resources Technical Standards Draft Report by SolarEdge Technologies (Australia) PTY LTD (SolarEdge), Enphase Energy Australia (Enphase), Tesla Motors Australia Pty Ltd (Tesla), sonnen Australia Pty Ltd (sonnen), Redback Technologies (Redback), SMA Australia Pty Ltd (SMA), and Fronius Australia Pty Ltd (Fronius).