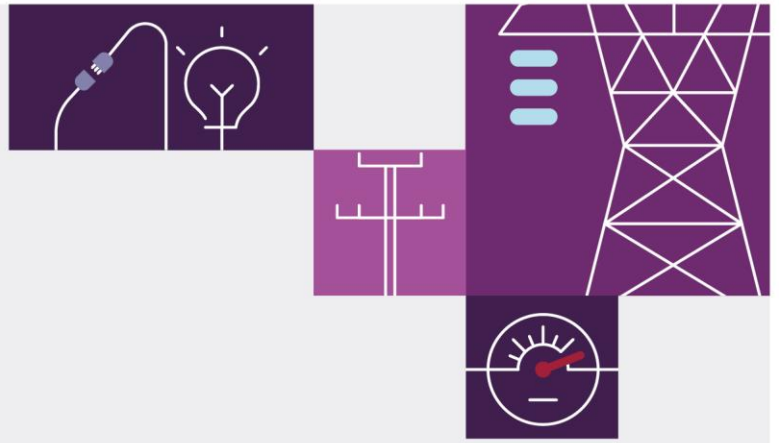


# Appendix 8. Social Licence

December 2023

Appendix to the Draft 2024  
Integrated System Plan for the  
National Electricity Market





# Important notice

## Purpose

This is Appendix 8 to the Draft 2024 *Integrated System Plan* (ISP) which is available at <https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp>.

AEMO publishes the Draft 2024 ISP pursuant to its functions under section 49(2) of the National Electricity Law (which defines AEMO's functions as National Transmission Planner) and its supporting functions under the National Electricity Rules. This publication has been prepared by AEMO generally using information available at 15 October 2023. AEMO has acknowledged throughout the document where modelling has been updated to reflect the latest inputs and assumptions. Information made available after these dates has been included where practical.

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Modelling work performed as part of preparing this publication inherently requires assumptions about future behaviours and market interactions, which may result in forecasts that deviate from future conditions. There will usually be differences between estimated and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.

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## Version control

Version	Release date	Changes
1.0	15/12/2023	Initial release.

AEMO acknowledges the Traditional Owners of country throughout Australia and recognises their continuing connection to land, waters and culture. We pay respect to Elders past and present.



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## Executive summary

AEMO's Integrated System Plan (ISP) is a roadmap for the transition of the National Electricity Market (NEM) power system, with a clear plan for essential infrastructure to meet future energy needs. The ISP's optimal development path sets out the needed generation, firming and transmission, which would deliver significant net market benefits for consumers and economic opportunities in Australia's regions.

The change that Australians will experience through the energy transition over the coming years is significant, and all governments and organisations involved in the transition will need to work with consumers and the broader Australian community, to actively support and guide that change.

Crucial to the success of this transition is social licence, or the ability of involved groups to individually and collectively build and maintain trust and social acceptance with the people most affected by the impacts, opportunities and challenges it brings.

As a deeply personal and often intangible concept, social licence is difficult to measure meaningfully; it can be shaped by people's core values, views and experiences, shift and evolve over time in response to events, and is unique within and across different groups of people and communities.

AEMO acknowledges that social licence is an area of continued learning and development for our organisation. While we are actively working with key groups to improve our understanding of the social, cultural, economic and other impacts, opportunities and challenges that the energy transition affords for local, regional and national communities, this will take time.

In seeking to better understand social licence and its role within the energy transition, AEMO has sought to define its potential influence and impact at three key levels:

- Local community acceptance of new infrastructure development.
- Social acceptance and mobilisation related to CER, including adoption of solar PVs, batteries, EVs, energy efficiency, and the ability for the energy sector to 'orchestrate' CER.
- Social acceptance of the broader energy transition.

While some of these elements have directly informed the development of the Draft 2024 ISP, others are noted in this Appendix as an opportunity to recognise current thinking and work underway across industry, and consider how AEMO could integrate these insights in the ISP and broader work. This includes seeking feedback on ways to further refine or enhance AEMO's approach to social licence considerations in the 2024 ISP or the 2026 ISP, as outlined in the below 'Consultation questions' section of this Appendix.

## A8.1 Social licence overview

As part of the development of the Draft 2024 ISP, AEMO has sought to quantify and take into consideration social licence challenges and opportunities. Integrating an issue as complex as social licence within the ISP is a difficult task.

As the ISP is a roadmap for the energy transition, it focuses on broad planning considerations, and its consideration of social licence can only be at a high level. Much of the responsibility to understand and engage with local communities sits with relevant project developers (whether generation developers, network service providers or others) and tiers of government, as development of infrastructure for the energy transition progresses.

### How social licence is considered in the ISP

Social licence is considered in the Draft 2024 ISP in a range of ways, as summarised below.

**Table 1 Social licence considerations**

Consideration	Detail
<b>Scenarios</b>	AEMO creates planning and forecasting scenarios which include trends relevant for social licence such as economic conditions in Australia and the pace of investment to decarbonise the economy.
<b>Sensitivities</b>	In collaboration with the ISP Consumer Panel and Advisory Council on Social Licence, AEMO has used sensitivity analysis to test the resilience of development pathways in the ISP to 'Reduced Social Licence' for new generation and transmission projects. AEMO has also tested 'Low CER Orchestration' and 'Reduced Energy Efficiency' to test the impact of lower levels of consumer-led investment.
<b>Joint planning</b>	<p>AEMO has collaborated with TNSPs and jurisdictions to co-design conceptual transmission network options for the ISP. At the conceptual stage, potential routes and locations are indicative only and should not be considered as fixed locations or routes. As projects are further developed, AEMO incorporates the latest advice available from the relevant TNSP or jurisdiction based on their early engagement with potentially affected communities, landowners, and other stakeholders.</p> <p>Joint planning advice can impact on project scope, cost, build times, and even feasibility. As part of preparing transmission augmentation options for the ISP, AEMO takes into account advice on projects that can make use of existing easements, upgrading of existing transmission elements, and consideration of existing network capacity that may be freed-up as existing generation exits the market. AEMO also acknowledges the need for community engagement as part of any network development, and a time allowance is included for this in the assumed 'lead time' for a transmission augmentation.</p>
<b>REZs – identification and location</b>	Through the identification of candidate REZs, AEMO considers both the boundaries and development limits that should be applied to reduce negative community impact and has mapped Aboriginal and Torres Strait Islander title to provide additional information to TNSPs and governments about Indigenous land interests and enable early engagement. The selection of candidate REZs, as well as their indicative location and boundaries, are consulted on through each IASR and ISP cycle to take into account TNSP input, government feedback and other stakeholder advice. Examples of this are ensuring that the New South Wales REZs are updated as community consultation by EnergyCo occurs and taking into account changes to offshore renewable zones following consultation by the Commonwealth government.
<b>REZs – resource limits and land use limits</b>	<p>REZ resource limits are set in the ISP to estimate resources available for renewable energy developments. This availability is determined by existing land use (for example, agriculture) and environmental and cultural considerations (such as national parks), as well as the quality of wind or solar irradiance, and typical land use requirements for renewable energy generation. AEMO adjusts REZ resource limits when the boundary of a REZ changes or when appropriate evidence becomes available.</p> <p>In addition to assuming resource limits for each REZ when undertaking the ISP modelling, AEMO also sets a land use limit for each REZ for the amount of land that could be assumed to be used for renewable energy within a REZ. These land use limits are consulted on through the IASR cycle and were originally derived through consultation with governments and other stakeholders. More information on land use limits can be found in AEMO's 2023 IASR.</p> <p>The Draft 2024 ISP also considers some, but not all, costs related to proposed land use, including some transmission augmentation cost elements, including land elevation, land use mapping, land acquisition, strategic landholder payments where applicable and biodiversity offsets. All capital costs (generation, storage and transmission) include land costs based on historical trends. Strategic land payment schemes have been added more recently and are applied where relevant (QLD, NSW and VIC).</p>

Further information can be found in:

- Appendix 1. Stakeholder Engagement.
- Appendix 3. Renewable Energy Zones.
- Appendix 6. Cost Benefit Analysis.

### Social licence impact on the ISP and optimum development path

While the outcome of AEMO's social licence sensitivity analysis did not change the proposed ODP, it did have a notable impact on the economy-wide net market benefits that could be realised overall, as outlined in Section A8.2.2 of this Appendix.

That said, AEMO is mindful that its application and consideration of social licence is only one potential approach to incorporate social licence at the national planning level. It is the first time AEMO has attempted to consider social licence more explicitly in the ISP, and ongoing stakeholder feedback about how we incorporate social licence in the future is welcomed.

Given its nature, the ISP also does not account for shorter-term and more localised social licence impacts communities are experiencing in relation to projects happening here and now. AEMO continues to support the need for early and good practice engagement by project developers to ensure community voices and concerns are considered and responded to — both to enhance community outcomes and support the timely delivery of works critical to Australia's ongoing energy security, reliability and affordability, and a net zero future.

AEMO also welcomes and encourages submissions from all stakeholders on any aspect of the Draft ISP, including opportunities to further finesse this Appendix and our social licence approach.

#### Consultation questions - social licence

- Do you have advice about how social licence can be further considered in the ISP, or advice on how to quantify the potential impact of social licence through social licence sensitivity analysis?



## A8.2 Social licence for infrastructure development

Historically, the power system was developed to generate and transport large outputs of electricity generated from centrally located coal-fired generators to load centres. However, as coal retires and new large-scale renewable generation is developed to replace it, the structure of the power system needs to change.

### Who is responsible for obtaining social licence?

Obtaining and granting social licence is not a specified process and will vary from location to location and project to project. However, it is evident that there are a number of parties involved. The aspects of social licence regarding specific projects require project proponents, project planners, relevant tiers of government and major construction partners all being involved in talking with communities, well before preferred project location and aspects are decided. A crucial aspect of seeking social licence is that all parties understand that there are many unanswered questions, and social licence starts with identifying the possibilities, concerns and opportunities of any potential projects on and for all parties.

Common principles and industry good practice engagement guidelines should also be applied to ensure a consistent and transparent approach to engagement that meets community expectations.

### ISP forecast for new infrastructure development

The ODP in the Draft 2024 ISP includes over 126 GW of new utility-scale renewable generation by 2050. Future energy consumption from the NEM will rise by approximately 108% by 2050. To meet this growth, renewable energy presents as the least-cost solution when connected with transmission, firmed by storage and backed-up by gas generation. The Draft 2024 ISP highlights the need for:

- Significant new large-scale renewable energy development in the coming years, particularly within designated REZs.
- Approximately 5,000 km of new transmission lines across the NEM over the next decade; and approximately 10,000 km by 2050 to connect new generation and REZs to demand centres, and ease congestion on existing transmission lines.

As part of the development of this infrastructure, the energy industry will need to establish and maintain social licence in local communities that are being asked to host new generation, storage, and transmission.

Establishing social licence for infrastructure development requires intentional and ongoing relationship building between organisations and communities to foster acceptance and trust. Communities also have their own intrinsic social licence 'commitments' to and with each other (for example, the right for farmers to farm, rural communities to function harmoniously, and Aboriginal and Torres Strait Islander people to practice culture) which must be considered. Community acceptance of projects is fostered when organisations prioritise trust and deliver overall positive impact and is granted or withdrawn by the community in line with their social, cultural, and economic conditions<sup>1</sup>.

As a largely qualitative matter, social licence is also difficult to account for in the ISP due to the complexity of trying to define, quantify and model related costs and benefits in a meaningful way. The below table outlines

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<sup>1</sup> See The Energy Charter *Better Practice Social Licence Guideline*, at <https://www.theenergycharter.com.au/better-practice-social-licence-guideline/>.



several social licence considerations AEMO has not yet accounted for in the ISP, but that will influence community views, experiences and engagement around ISP identified projects. This is not intended to be an exhaustive list.

**Table 2** Examples of drivers that can ‘dial up or down’ social licence

<b>Community expectations</b>	People’s understanding and acceptance of the need for new infrastructure development, their roles within this, and feeling that their voices, preferences and concerns are being considered and acted on by project proponents.
<b>Social and cultural values</b>	People’s perceptions of potential developmental impacts on their sense of place and community, wellbeing, culture, ways of living, and connection to Country.
<b>Environmental values</b>	People’s perceptions of potential impacts to local biodiversity, biosecurity, Indigenous heritage, sites of local and community significance, and the visual landscape.
<b>Economic values</b>	People’s perceptions of the potential impacts to their households, livelihoods and ability to carry out business, local economies, and the equitable distribution of associated benefits within and across communities.

### A8.2.1 Sensitivity analysis to explore low social licence for infrastructure

AEMO recognises the challenges associated with development and delivery of this scale of infrastructure. As part of developing the Draft 2024 ISP, and for the first time, AEMO has developed a social licence sensitivity as an input to help inform the selection of the ODP.

This sensitivity considers the more tangible, or quantifiable impact of ‘reduced’ or ‘low’ social licence with respect to new infrastructure development, including potential delays to project delivery timelines and increased costs related to proposed land use, including some transmission augmentation cost elements. These are explored further in the next section.

At the outset of the process, AEMO aimed to develop a social licence sensitivity to understand and consider any negative impacts of low social licence for the energy transition and the selection of the proposed ODP.

In this context, low social licence refers to a future state where there is low social acceptance of large-scale energy infrastructure development within a region, to the degree that a development cannot progress, is delayed, or requires considerable change to meet community expectations.

Assessing the potential impact of low social licence was challenging, as it required defining and applying measurable metrics for what is a largely qualitative topic to the economic model that underpins the ISP. Again, AEMO recognises that the approach and assumptions used to model this sensitivity present just one option, and AEMO is still developing understanding of how social licence could be considered in power system planning.

AEMO also greatly values the guidance of the 2024 ISP Consumer Panel and Advisory Council on Social Licence in shaping the design of this sensitivity and welcomes broader feedback as part of the Draft 2024 ISP consultation.

#### Social licence sensitivity guiding principles

In looking to develop a social licence sensitivity, AEMO first sought to outline some high-level guiding principles to drive its direction, including:

- **Utility-scale infrastructure focus (social licence impacts on transmission, new generation developments and storage solutions).** This principle reflects that as coal retires it will need to be replaced by substantial volumes of low-cost VRE, transported from new REZ locations to existing load centres via new

transmission lines. While local distribution networks may be able to host small volume renewable projects at times, they will often encounter constraints when exporting to load centres and have highly correlated generation resources (increasing the impact of low production periods), making transmission-scale infrastructure a necessary option to meet increasing demand.

- **A generalised focus (social licence impact NEM-wide rather than analysing individual regions or projects).** This principle reflects that localised social licence information is not available for all project options across the ISP horizon, making these difficult to account for.
- **Increasing understanding of impact (incorporate cost and delay impacts from social licence).** This principle reflects that AEMO is still early on in its journey to understand, quantify and adjust inputs to the ISP model to accurately predict a future state where there is low social licence and particularly acceptance of large-scale energy infrastructure development in the NEM.

### Social licence sensitivity parameters

Following the development of the above principles, AEMO considered, with ISP Consumer Panel and Advisory Council on Social Licence input, a number of modelling input parameters in the ISP that could be varied to reflect the impact of potentially adverse social licence outcomes. AEMO recognises that there was no consensus on the application of all principles among those consulted, given the complexity of the topic, and looks forward to doing further work on this in the development of the 2026 ISP.

Importantly, these parameters needed to be compatible with the cost-benefit analysis that AEMO applies to all ISP activities. That is, they needed to be able to quantify the potential impacts of low social licence on net market benefits (defined as the ‘net economic benefit to all those who produce, consume and transport electricity in the market’) associated with the ODP.

The parameters AEMO varied in modelling to consider social licence included:

- Transmission project delays (adding a delay to transmission to reflect longer lead times to develop transmission projects).
- Transmission projects that cost more to gain social acceptance (adding a cost impost to projects excluding committed and anticipated projects).
- REZ generation cost (adding a cost impost to onshore solar and wind generation build costs within a REZ to reflect increased cost to gain social acceptance).

More details on each of these is provided in Table 3 below.

**Table 3 Draft ISP 2024 social licence sensitivity parameters**

Sensitivity	Details
<b>Transmission timing</b> Extending project lead times for all transmission augmentation options by two years.	<ul style="list-style-type: none"> <li>• Reflects delay impacts from low social licence for transmission. The delay does not include committed and anticipated projects, as these projects are already progressed to be delivered and there is more certainty surrounding the completion date.</li> <li>• This reflects the impact of low social licence on extended lead times in obtaining transmission easements and property rights.</li> </ul>
<b>Transmission costs</b>	<ul style="list-style-type: none"> <li>• Add a cost impost to transmission augmentations to reflect scope changes to routes and designs.</li> <li>• Designed to capture small re-routings, re-design of towers, easement adjustments.</li> </ul>

Sensitivity	Details
Project costs observed to increase by approximately 15%. Reflects changes in work scope due to low social licence.	<ul style="list-style-type: none"> <li>• Also captures associated materials and labour.</li> <li>• Additional to existing cost estimates that already include scope changes and risks.</li> <li>• Reflects more adjustments and engagements will be needed for transmission projects.</li> <li>• This parameter has also been applied to pumped hydro projects.</li> <li>• Committed and anticipated projects included smaller adjustments, as they are progressed actionable projects that have already undertaken some measures.</li> </ul>
<b>REZ generation costs</b> REZ generation costs observed to increase by approximately +5% to +60% based on private land parcel density, and applied to specific REZ generation costs by technology type (such as wind or solar).	<ul style="list-style-type: none"> <li>• Applied to onshore solar and wind generation build costs within each REZ.</li> <li>• Add a cost impost to REZ generation to reflect increased social licence costs within a REZ such as scope changes and additional community engagement and benefit sharing.</li> <li>• Additional to existing cost estimates that already include community engagement and benefit sharing programs.</li> <li>• Reflects more dense REZs that may have more stakeholders and pose higher social licence risks.</li> <li>• Use a generalised approach towards all NEM REZs.</li> </ul>

### What was not modelled in the sensitivity

Due to issue complexity and infancy of this sensitivity, the below factors were excluded from modelling:

- **Reduced social licence for GPG and batteries.** This was excluded based on the assumption that gas-fired electricity generation and large-scale batteries require smaller land footprints than variable renewables, and are likely to be co-located near existing transmission substations. Depending on the storage depth of these technologies, less land (and gas infrastructure) is required for these installations.
- **Reduced social licence due to Native Title and Indigenous Land Use Agreements.** This was excluded based on the complexity of data available, and the fact that Native Title applications, claims and determinations can occur at different times in overlapping coverage areas, making it difficult to quantify in estimating impacts on REZ costs. More information is included in Section A8.2.3 in this Appendix.
- **Undergrounding transmission options.** This was excluded based on the assumption that undergrounding of high voltage alternating current transmission lines across Australia are used for short distance (<30 km) low-capacity connections, and that they are cost-prohibitive compared to overhead lines (four to 20 times higher<sup>2</sup>), so they are less likely to be commercially feasible or actioned by project developers. More information is included in Section A8.2.3 of this Appendix.
- **Reduced social licence for offshore wind.** While AEMO does not dispute the applicability of social licence considerations to offshore wind projects, it has not been modelled in this Draft ISP for several reasons. At a high level, these include the complexity of estimating associated costs (for example, visual amenity) and insufficiency of relevant data due to the relative immaturity of the offshore wind industry in Australia. At a broader level, the ODP in the Draft 2024 ISP also does not identify the need for offshore wind in the NEM except in Victoria, where it forms a formal part of government policy and emission reduction targets.
- **Reduced social licence for non-REZ-based generation.** This was excluded based on the assumption that generation in REZs offers more scale efficiencies and lower costs than generation connecting outside of these areas.

<sup>2</sup> Underground and underground options, 2023 *Transmission Expansion Options Report*. at <https://aemo.com.au/-/media/files/major-publications/isp/2023/2023-transmission-expansion-options-report.pdf>

## A8.2.2 Results of the social licence sensitivity analysis

Table 3 summarises the outcomes of the modelling.

**Table 4 Social licence sensitivity outcomes**

Key outcome	Details
<b>Low social licence did not materially change the projects in the ODP</b>	<p>The results of the modelling confirmed that the high-level mix, timings and locations of projects identified in the ODP is still the most cost-effective option to support Australia’s energy transition and ongoing power reliability and security. Specifically, the ODP is resilient to the ‘Reduced Social Licence’ sensitivity, where its ranking does not change significantly (from first to second). The ODP, across a range of sensitivities and scenarios, remains the best candidate development path overall.</p> <p>There were however some noticeable smaller scale shifts, including:</p> <ul style="list-style-type: none"> <li>• In REZs, AEMO observed a shift in some project locations from ‘more dense’ to ‘less dense’ areas – notably away from REZs near load centres, or those in particularly dense regional areas, with higher numbers of private landholders. The main implication of this is that impacted REZs may not be taking advantage of relatively nearby transmission – rather, more transmission needs to be built to these more remote areas. It also resulted in corresponding earlier development of pumped hydro to compensate, and more solar and less wind built overall.</li> <li>• For transmission projects on major flow paths, AEMO still saw a requirement for proposed new transmission augmentations, however delivered slightly later. We note that uniformly increasing transmission costs reduces the net market benefits overall, as the ISP model selects the least cost solution of transmission and generation to meet electricity demand.</li> </ul>
<b>Low social licence did affect net market benefits</b>	<p>The additional costs and delays to ODP projects associated with low social licence were found to result in an approximately \$4 billion decrease in net market benefits. This highlights the risks to the energy transition and importance of project proponents engaging early and genuinely with local communities to build trust and acceptance with respect to new electricity infrastructure.</p> <p>It is also important to highlight that the realisation of net market benefits is subject to the actions and reactions of local project proponents and communities, which the ISP has not been designed to account for. AEMO expects local transmission network service providers or jurisdictional bodies to engage early with stakeholders to minimise impacts to communities through the detailed design phase of projects.</p>
<b>Determining a ‘tipping point’ for low social licence impacts on the ODP would be complex and likely unproductive to model</b>	<p>AEMO considers that increasing the ‘Reduced Social Licence’ parameters to the extent that no new renewable transmission or generation is developed would result in a scenario that resembles the ‘counterfactual development path’ outlined in Appendix 6. Cost Benefit Analysis. This effectively means that where coal generation is retired, substantial tranches of GPG, CCS, and batteries are installed instead. This would cost consumers an extra \$17 billion relative to the ODP.</p>

More information on the economic outcomes for the social licence sensitivity is provided in Appendix 6. Cost Benefit Analysis.

In applying the above social licence sensitivity and parameters to ISP modelling for the first time, AEMO wishes to acknowledge the ISP Consumer Panel members and Advisory Council on Social Licence for their guidance and also constructive challenge in its shaping and application.

Importantly, AEMO also acknowledges that as an initial view of an incredibly complex and evolving topic, the social licence sensitivity and considerations present just one potential future view. AEMO welcomes feedback from stakeholders on opportunities to better integrate and model social licence considerations as part of developing the 2024 ISP, through the outlined consultation questions.

## A8.2.3 Additional social licence considerations in the ISP

### Community benefits

AEMO recognises there are challenges and risks associated with the energy transition for communities. However, the energy transition can also bring benefits to rural and regional communities through economic diversification, REZ development, new manufacturing zones, and new technology.

These benefits have the potential to bring significant opportunity to communities, and work is already underway across government and industry to identify and fund benefits to assist with both social licence for the energy transition and consumer mobilisation. For instance, economic opportunity work is being undertaken by State Governments, the Federal Government's First Nations Clean Energy Strategy and Net Zero Economy Agency.

AEMO provides some insights in the Draft 2024 ISP about potential workforce requirements indicated by the ODP, but does not directly consider localised community benefits as part of its cost benefit analysis. The ODP is designed to optimise the net economic benefit to all those who produce, consume and transport electricity in the market. For more information, see Appendix 6. Cost Benefit Analysis.

AEMO encourages collaboration between governments, industry, and the community during the development of new infrastructure, to maximise the impact that these benefits bring to local communities.

### Aboriginal and Torres Strait Islander considerations

The ISP includes candidate REZs that overlap with native title and Indigenous estates. Appendix 3. Renewable Energy Zones shows REZs overlaid on the National Native Title Tribunal Indigenous Estates map, reproduced with the permission of the Australian National Native Title Tribunal.

AEMO has undertaken this mapping and provided this information as a guide to assist insights to support governments, councils, and rule-makers with social licence frameworks. As REZs progress to pre-feasibility studies, it will be important that Traditional Owners and land councils are consulted early and regularly in the process. AEMO also recognises the view of the First Nations Clean Energy Network that the energy sector needs to ensure First Nations people play a central role and are able to also harness and benefit from the opportunities presented by the energy transition.

More broadly, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) is progressing with the First Nations Clean Energy Strategy, which seeks to give First Nations people a say in renewable energy policies and identify improvements and areas for future investment. The strategy aims to target fairer access to renewable energy for Indigenous households, reduce diesel-powered energy generation, and support cheaper energy finance and more skilled employment in remote areas.

Development of the First Nations Clean Energy Strategy will come in addition to the Federal Government's partnership with First Nations Australians through the First Nations Community Microgrids program to support deployment of microgrids in First Nations communities, and the Hydrogen Headstart Program to help First Nations communities engage with hydrogen project developers.

The Federal Government released its First Nations Clean Energy Strategy consultation paper in November 2023 to inform the development of the strategy and is seeking feedback by 31 January 2024.



## Undergrounding transmission lines

Overhead lines are often an economic, flexible, and responsive design choice for augmenting the high-voltage transmission network. Overhead lines represent the vast majority of the Australian transmission network and have reliably served the community for many years.

In the 2023 *Transmission Expansion Options Report*, AEMO found that the costs of underground cables are approximately four to 20 times higher<sup>2</sup> than overhead lines, depending on a range of design factors such as voltage, capacity and whether the cables can be direct buried or require tunnels. AEMO publishes a Transmission Cost Database that allows stakeholders to explore cost estimates for overhead transmission lines and underground cables.

In contrast to transmission projects in countries that have high population and energy density, Australian transmission projects tend to stretch very long distances. Implementing underground transmission network over these long distances will often be cost-prohibitive and should only be considered on a case-by-case basis. Opportunities for undergrounding network may be feasible for generator connection assets, where distances are shorter, and the investment cost is largely dictated by the capital cost of generation (for example, wind or solar farms).

Recognising the concerns many regional landholders and communities hold around the potential impact new overhead transmission development projects may have on their lives and livelihoods, and preference for undergrounding options, AEMO is also participating in The Energy Charter’s ‘Evaluating Transmission Undergrounding’ initiative. Delivered in collaboration with industry and community representatives, the initiative seeks to enhance transparency around how underground compared to overhead transmission designs are evaluated by transmission businesses and improve communications and engagement for impacted landholders and communities. Expected deliverables include co-developing a shared knowledge and evidence-base, including better practice approaches to assessing and evaluating social costs and mitigating impacts, and addressing public information and evidence gaps through supporting materials.

This work is expected to continue into 2024 and is likely to be further informed by other jurisdictional and industry led initiatives including the New South Wales Government’s Inquiry into Transmission Undergrounding and the Australian Energy Infrastructure Commissioner’s Community Engagement Review.

## A8.2.4 Reforms and reviews

There are many programs of reform and review work currently underway in relation to social licence and this is a developing space for the energy sector, particularly in relation to transmission development.

AEMO actively participates in the extensive work being led by various jurisdictions, industry members and advocates on social licence. Although not all of these components of work relate directly to the ISP, AEMO has sought to explore some of the key elements of social licence and the broader energy transition below. This is not intended to be an exhaustive list.

**Table 5 Reforms and consultations underway**

Initiative	Details
<b>AER Social Licence for Electricity Transmission Directions Paper</b>	The AER recently consulted on its Social Licence for Electricity Transmission Directions Paper, released on 23 October 2023. The AER will develop detailed regulatory social

Initiative	Details
	<p>licence guidance on new transmission for the energy industry and is expected to be released in 2024.</p>
<p><b>DCCEEW National approach to social licence for transmission projects</b></p>	<p>The DCCEEW is undertaking work to define a national approach to social licence for transmission projects, due early 2024.</p> <p>The guidance is likely to cover national community engagement principles, guidance on benefit-sharing, an impact evaluation framework that allows social licence monitoring and clarified roles and responsibilities for all levels of government and key participants in the energy market.</p>
<p><b>DCCEEW Nationally Significant Transmission Projects</b></p>	<p>In addition to the National approach to social licence for transmission projects, DCCEEW is also creating a Nationally Significant Transmission Projects Framework to speed up delivery of transmission projects. AEMO understands that social licence will be a key consideration of the framework.</p>
<p><b>AEIC Community Engagement Review</b></p>	<p>The Australian Energy Infrastructure Commissioner (AEIC) is undertaking a Community Engagement Review, with a final report due December 2023. The review considers community attitudes towards renewable energy infrastructure and provide advice on the best way to maximise community engagement and benefit in planning, developing and operating renewable energy infrastructure.</p>
<p><b>AEMC Rule change – enhancing community engagement</b></p>	<p>In November 2023, the AEMC published a final determination and rule in relation to enhancing community engagement in transmission building. This rule sets out requirements for community engagement and local community consultation on major transmission projects at the RIT-T stage.</p>



## A8.3 Consumer mobilisation, adoption, and orchestration

Australians are evolving the way they are using energy in their homes and business, which is changing when, how, and how much energy is needed to meet demand.

There is already strong social acceptance and uptake by energy consumers across the country in rooftop solar systems, where it is affordable and possible, and uptake of EVs, battery storage systems and other home energy management solutions is increasing.

Consumer adoption of small-scale distributed PV systems has grown at an average rate of 25% year on year over the past five years. Distributed PV generation contributed a substantial 12.1% to the NEM's total electricity generation in the summer (Q1) of 2023, more than utility-scale solar (7.5%), wind power (11.6%), hydro (6.1%), and gas (4.6%) contributed over the period<sup>3</sup>.

Rooftop solar has become the most common form of generation in the NEM, overtaking black coal for the first time due to both the closure of Liddell Power Station and trending increases in rooftop solar installations, and providing 23% of connected generation capacity (18,012 MW)<sup>4</sup>.

AEMO's most recent projections, in the 2023 IASR, include:

- Forecasts of distributed PV generation per annum surging from 26 TWh to 77 TWh by 2040, serving 22% of underlying electricity demand.
- A substantial 27-fold increase in CER storage by 2040.
- EVs comprising 60% of overall road transport by 2040, representing almost 20% of underlying electricity demand<sup>5</sup>.

There is a need for the energy sector to continue to enable new technology, standards, and markets to support adoption of consumer-led energy solutions and promote active technologies that provide opportunity for coordination. As these technologies continue to be installed, the power system needs to continue to evolve to accommodate broader two-way power flowing both from the home or business into the network, and from large generators to the home or business.

The success of the energy transition requires consumer-led investment in CER such as solar, batteries and EVs, along with greater focus on energy efficiency. CER can help provide reliability and security to the energy system at a lower cost for consumers, by reducing the need for further investment in transmission and generation. However, if not effectively managed, growth in CER has the potential to increase energy costs, as costly network and generation infrastructure would need to be built to keep up with forecast increases in electricity demand, and to address potential negative system reliability and security issues<sup>6</sup>.

<sup>3</sup> AEMO Quarterly Energy Dynamics Report Q1, April 2023, at <https://aemo.com.au/-/media/files/major-publications/qed/2023/qed-q1-2023-report.pdf?la=en>.

<sup>4</sup> Energy Council, October 2023, at <https://www.energycouncil.com.au/analysis/nem-generation-profile-2022-23/#:-:text=The%20report%20notes%20that%202023,increases%20in%20rooftop%20solar%20installations.>

<sup>5</sup> Percentage based off AEMO's ESOO electricity demand forecast for 2040 at 240 TWh (2022), and *Electric Vehicle Projects Report* by CSIRO (2022) in which 43,000 GWh in 2040 is the expected EV consumption figure.

<sup>6</sup> For further explanation of related issues, see AEMO's submission to the AEMC's Scheduled Lite mechanism rule change request, at [https://www.aemc.gov.au/sites/default/files/2023-01/ERC0352\\_Rule%20Change%20Request\\_Scheduled%20Lite%20-%20including%20Appendix.pdf](https://www.aemc.gov.au/sites/default/files/2023-01/ERC0352_Rule%20Change%20Request_Scheduled%20Lite%20-%20including%20Appendix.pdf).

Realising the opportunity and managing the risks of continued CER integration will require new approaches. It will require new levels of cooperation and concerted action across industry, governments, consumer groups and market bodies to deliver in the best interest of all energy consumers. Regulatory, technical, governance and policy settings must all be worked on to ensure the benefits of CER can be realised and risks mitigated.

A fundamental component to the success of CER is the ability to orchestrate CER, which has a significant social element to it, and is explored further below.

### A8.3.1 Social licence for CER orchestration

The term 'CER orchestration' refers to the coordination of consumer batteries and EVs to support reliability of the power system, manage power system security risks and maximise consumers' financial returns. Where undertaken effectively, orchestration of these consumer investments can likely reduce the need for other investments in generation, storage and transmission assets and hence save costs in the transition to net zero.

This can be achieved when commercial energy management system operators, networks or other parties enter agreements with consumers to change the way their batteries and vehicles are charged and discharged, to manage grid reliability and security.

Technologies to coordinate and 'orchestrate' batteries and EVs continue to emerge and will be a key feature of the energy transition, with the potential to integrate consumers' energy assets in a way that maximises their potential, while providing access to new markets and lowering the energy costs for all consumers.

The Draft 2024 ISP incorporates a range of forecasts from the 2023 IASR on CER and its orchestration. The *Step Change* scenario represents a future with a rapid, consumer-led transformation of the energy sector and a coordinated economy-wide approach to efficiently lower emissions. This includes, in 2050:

- An additional 64 GW of generation capacity from small-scale solar, and additional 33 GW of batteries to complement large-scale generation and provide network support. In addition, 80 TWh of EV consumption is forecast, representing 97% of the vehicle fleet.
- A total volume of storage capacity that is orchestrated from CER representing 80% of the total consumer storage capacity. Alongside that stationary coordinated storage, is 11 GW of Vehicle to Grid (V2G) orchestration potential. By orchestrating these resources, consumers are assumed to benefit from cost savings pass-through, as utility investments can be reduced relative to if these devices retained passive, factory default operating settings.

AEMO recognises that to achieve the levels of orchestration forecast in the 2023 IASR and the Draft 2024 ISP, the energy sector must gain consumer trust and confidence to enable orchestration in the future.

There are several barriers to gaining consumer trust and acceptance, including an existing lack of trust in institutions and organisations, differing motivations, complexity, lack of perceived value and high perceived costs<sup>7</sup>.

To address these barriers, the energy market requires ongoing funding, support, and innovation from governments and industry to work collaboratively with consumers to establish social licence. Consumers must be able to clearly see and understand the benefits of CER, have confidence in how they will be able to use the CER in which they

<sup>7</sup> Acil Allen, *Barriers and enablers for rewarding consumers for access to flexible DER and energy use*, June 2022. At <https://www.datocms-assets.com/32572/1658964119-barriers-and-enablers-final-report-v2-352146-1-3-1.pdf>.



invest, and have transparency over the orchestration of CER to manage reliability and security of the energy system.

There are also increasing demonstrations of innovations that provide end-to-end technical capabilities that will integrate CER into the NEM in a way that benefits all consumers<sup>8</sup>. Work must be done to transfer those learnings into enduring mechanisms and frameworks that enable CER orchestration.

AEMO will continue working with governments, market bodies, industry and consumers to ensure the benefits of CER orchestration are realised. For more information, see Appendix 2. ISP Development Opportunities and Appendix 6. Cost Benefit Analysis.

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<sup>8</sup> As examined and reported by *Project Edge* and *Project Symphony*, available at: <https://aemo.com.au/en/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge> and <https://aemo.com.au/en/initiatives/major-programs/wa-der-program/project-symphony> respectively.



## A8.4 Social licence and the energy transition

As the pace of the energy transition accelerates, Australia needs to invest urgently in new energy generation, transmission, and storage. The transition presents many opportunities and challenges beyond the remit of the ISP, including affordability, economic and social change, considerations of equity, fairness and a ‘just’ transition.

AEMO acknowledges the many social licence and consumer considerations across the broader energy transition, which are being explored and addressed through a range of reforms and reviews.

AEMO is highly supportive of the development of a nationally consistent narrative to help build societal awareness and understanding of some of the broader issues of the energy transition, including the investment needed and change expected and economic opportunities. This will be central to establishing social acceptance and AEMO welcomes the work being progressed by the Federal Government’s Net Zero Economy Agency and Rewiring the Nation initiative, as well as state governments, to develop the national energy narrative.

### A8.4.1 Affordability

AEMO understands that cost of living, and electricity prices, are an issue at the forefront of the minds of many Australians. The whole energy sector has a stake in enabling the energy transition, and part of this is to ensure Australians have access to affordable energy.

The ISP must optimise value to end consumers by designing a low cost, secure and reliable energy system capable of meeting relevant Australian energy policies at an acceptable level of risk.

The Draft 2024 ISP outlines an ODP that is designed to optimise the net economic benefit to all those who produce, consume and transport electricity in the market. Should this pathway and the projects it calls for not be delivered, there is a risk this will cost Australia and consumers \$17 billion more than the cost of the transition in the ODP.

However, the ISP does not optimise the price of electricity (wholesale market price) and its overall affordability to consumers, which are subject to a range of market conditions. There are many elements that contribute to the ultimate price consumers pay, including market design, government policies and structures. It is important to ensure appropriate settings to put downward pressure on energy prices to gain and maintain support during the energy transition. The cost of the ODP ultimately forms a part of the energy cost paid for by consumers in electricity bills.

# Glossary

This glossary has been prepared as a quick guide to help readers understand some of the terms used in the ISP. Words and phrases defined in the National Electricity Rules (NER) have the meaning given to them in the NER. This glossary is not a substitute for consulting the NER, the Australian Energy Regulator's (AER's) Cost Benefit Analysis Guidelines, or AEMO's *ISP Methodology*.

Term	Acronym	Explanation
<b>Actionable ISP project</b>	-	<p>Actionable ISP projects optimise benefits for consumers if progressed before the next ISP. A transmission project (or non-network option) identified as part of the ODP and having a delivery date within an actionable window.</p> <p>For newly actionable ISP projects, the actionable window is two years, meaning it is within the window if the project is needed within two years of its earliest in-service date. The window is longer for projects that have previously been actionable.</p> <p>Project proponents are required to begin newly actionable ISP projects with the release of a final ISP, including commencing a RIT-T.</p>
<b>Actionable New South Wales project and actionable Queensland project</b>	-	A transmission project (or non-network option) that optimises benefits for consumers if progressed before the next ISP, is identified as part of the ODP, and is supported by or committed to in New South Wales Government or Queensland Government policy and/or prospective or current legislation.
<b>Anticipated project</b>	-	A generation, storage or transmission project that is in the process of meeting at least three of the five commitment criteria (planning, construction, land, contracts, finance), in accordance with the AER's Cost Benefit Analysis Guidelines. Anticipated projects are included in all ISP scenarios.
<b>Candidate development path</b>	CDP	<p>A collection of development paths which share a set of potential actionable projects. Within the collection, potential future ISP projects are allowed to vary across scenarios between the development paths.</p> <p>Candidate development paths have been shortlisted for selection as the ODP and are evaluated in detail to determine the ODP, in accordance with the ISP Methodology.</p>
<b>Capacity</b>	-	The maximum rating of a generating or storage unit (or set of generating units), or transmission line, typically expressed in megawatts (MW). For example, a solar farm may have a nominal capacity of 400 MW.
<b>Committed project</b>	-	A generation, storage or transmission project that has fully met all five commitment criteria (planning, construction, land, contracts, finance), in accordance with the AER's Cost Benefit Analysis Guidelines. Committed projects are included in all ISP scenarios.
<b>Consumer energy resources</b>	CER	Generation or storage assets owned by consumers and installed behind-the-meter. These can include rooftop solar, batteries and electric vehicles. CER may include demand flexibility.
<b>Consumption</b>	-	The electrical energy used over a period of time (for example a day or year). This quantity is typically expressed in megawatt-hours (MWh) or its multiples. Various definitions for consumption apply, depending on where it is measured. For example, underlying consumption means consumption being supplied by both CER and the electricity grid.
<b>Cost-benefit analysis</b>	CBA	A comparison of the quantified costs and benefits of a particular project (or suite of projects) in monetary terms. For the ISP, a cost-benefit analysis is conducted in accordance with the AER's Cost Benefit Analysis Guidelines.
<b>Counterfactual development path</b>	-	The counterfactual development path represents a future without major transmission augmentation. AEMO compares candidate development paths against the counterfactual to calculate the economic benefits of transmission.

Term	Acronym	Explanation
<b>Demand</b>	-	The amount of electrical power consumed at a point in time. This quantity is typically expressed in megawatts (MW) or its multiples. Various definitions for demand, depending on where it is measured. For example, underlying demand means demand supplied by both CER and the electricity grid.
<b>Demand-side participation</b>	DSP	The capability of consumers to reduce their demand during periods of high wholesale electricity prices or when reliability issues emerge. This can occur through voluntarily reducing demand, or generating electricity.
<b>Development path</b>	DP	A set of projects (actionable projects, future projects and ISP development opportunities) in an ISP that together address power system needs.
<b>Dispatchable capacity</b>	-	The total amount of generation that can be turned on or off, without being dependent on the weather. Dispatchable capacity is required to provide firming during periods of low variable renewable energy output in the NEM.
<b>Distributed solar / distributed PV</b>	-	Solar photovoltaic (PV) generation assets that are not centrally controlled by AEMO dispatch. Examples include residential and business rooftop PV as well as larger commercial or industrial “non-scheduled” PV systems.
<b>Firming</b>	-	Grid-connected assets that can provide dispatchable capacity when variable renewable energy generation is limited by weather, for example storage (pumped-hydro and batteries) and gas-powered generation.
<b>Future ISP project</b>	-	A transmission project (or non-network option) that addresses an identified need in the ISP, that is part of the ODP, and is forecast to be actionable in the future.
<b>Identified need</b>	-	The objective a TNSP seeks to achieve by investing in the network in accordance with the NER or an ISP. In the context of the ISP, the identified need is the reason an investment in the network is required, and may be met by either a network or a non-network option.
<b>ISP development opportunity</b>	-	A development identified in the ISP that does not relate to a transmission project (or non-network option) and may include generation, storage, demand-side participation, or other developments such as distribution network projects.
<b>Net market benefits</b>	-	The present value of total market benefits associated with a project (or a group of projects), less its total cost, calculated in accordance with the AER’s Cost Benefit Analysis Guidelines.
<b>Non-network option</b>	-	A means by which an identified need can be fully or partly addressed, that is not a network option. A network option means a solution such as transmission lines or substations which are undertaken by a Network Service Provider using regulated expenditure.
<b>Optimal development path</b>	ODP	The development path identified in the ISP as optimal and robust to future states of the world. The ODP contains actionable projects, future ISP projects and ISP development opportunities, and optimises costs and benefits of various options across a range of future ISP scenarios.
<b>Regulatory Investment Test for Transmission</b>	RIT-T	The RIT-T is a cost benefit analysis test that TNSPs must apply to prescribed regulated investments in their network. The purpose of the RIT-T is to identify the credible network or non-network options to address the identified network need that maximise net market benefits to the NEM. RIT-Ts are required for some but not all transmission investments.
<b>Reliable (power system)</b>	-	The ability of the power system to supply adequate power to satisfy consumer demand, allowing for credible generation and transmission network contingencies.
<b>Renewable energy</b>	-	For the purposes of the ISP, the following technologies are referred to under the grouping of renewable energy: “solar, wind, biomass, hydro, and hydrogen turbines”. Variable renewable energy is a subset of this group, explained below.

Term	Acronym	Explanation
<b>Renewable energy zone</b>	REZ	An area identified in the ISP as high-quality resource areas where clusters of large-scale renewable energy projects can be developed using economies of scale.
<b>Renewable drought</b>	-	A prolonged period of very low levels of variable renewable output, typically associated with dark and still conditions that limit production from both solar and wind generators.
<b>Scenario</b>	-	A possible future of how the NEM may develop to meet a set of conditions that influence consumer demand, economic activity, decarbonisation, and other parameters. For the 2024 ISP, AEMO has considered three scenarios: <i>Progressive Change</i> , <i>Step Change</i> and <i>Green Energy Exports</i> .
<b>Secure (power system)</b>	-	The system is secure if it is operating within defined technical limits and is able to be returned to within those limits after a major power system element is disconnected (such as a generator or a major transmission network element).
<b>Sensitivity analysis</b>	-	Analysis undertaken to determine how modelling outcomes change if an input assumption (or a collection of related input assumptions) is changed.
<b>Spilled energy</b>	-	Energy from variable renewable energy resources that could be generated but is unable to be delivered. Transmission curtailment results in spilled energy when generation is constrained due to operational limits, and economic spill occurs when generation reduces output due to market price.
<b>Transmission network service provider</b>	TNSP	A business responsible for owning, controlling or operating a transmission network.
<b>Utility-scale or utility</b>	-	For the purposes of the ISP, 'utility-scale' and 'utility' refers to technologies connected to the high-voltage power system rather than behind the meter at a business or residence.
<b>Virtual power plant</b>	VPP	An aggregation of resources coordinated to deliver services for power system operations and electricity markets. For the ISP, VPPs enable coordinated control of CER, including batteries and electric vehicles.
<b>Variable renewable energy</b>	VRE	Renewable resources whose generation output can vary greatly in short time periods due to changing weather conditions, such as solar and wind.