Renewable energy generation and agriculture in NSW's rural landscape and economy – growth sectors on a complementary path

A report by the NSW Agriculture Commissioner

8 November 2022

Foreword

Land use conflict is a serious problem in NSW, and widely considered to be getting worse as our population grows, its distribution changes, and energy policy developments, among other things, increase the demand for conversion of agricultural land for industrial and residential uses.

This Review was prompted by the land use conflict emerging within regional communities as the NSW Government's renewable energy policy is rolled out. This policy itself has broad support, and its timely delivery is understood to be important to all residents, businesses and communities in NSW.

The Review received 130 individual submissions from a range of individuals, businesses and industry associations. There were many representations about specific projects, with strong community concern and opposition in some cases. There were also many direct representations, meetings and other discussions with parties with an interest in the growth of agriculture and the renewable energy sector in regional NSW.

The renewable energy sector is growing in experience and capacity to support community engagement and is generally trying to respond to concerns about the level and quality of engagement to address land use conflict. It certainly needs to do so, as community acceptance will improve prospects for achieving the required energy supply outcomes. At present, it cannot be said with any confidence that this acceptance will be achieved.

Clearer policy direction, more information provided in more accessible ways to the public, more resourcing for community engagement and for the NSW agencies responsible for this policy rollout will be important to achieve the necessary energy transition. This is a job for both the NSW Government and the energy sector.

The cross-Government Taskforce established for this Review provided valuable input and advice. Those agencies and their Ministers are responsible for the roll out of the energy policy and, with the renewable energy sector, can implement the recommendations in this Report to improve the prospects for success.

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NSW Agriculture Commissioner

8 November 2022

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Executive summary

Regional populations and communities in NSW are experiencing a period of growth and agricultural production is at historic highs and attracting significant investment. While overall this is a positive story for these communities, many are experiencing stresses including limited housing, services and access to labour, and competing demands for land use.

The genesis of this Review was a growing concern among NSW regional communities and their representative organisations, such as the NSW Farmers Association, about the implications of the growth in renewable energy generation and associated infrastructure, and the interaction of this growth with existing land uses and the communities that will host these facilities.

The NSW Government's Electricity Infrastructure Roadmap sets out its plan to modernise the State's electricity system and meet growing energy demand as coal-fired generation plants retire. Most of this new generation will come from renewable energy sources, accompanied by storage facilities.

At the same time, the Government is aiming to support the agriculture sector to reach $30 billion in output by 2030 and maintain strong growth after that. It is also supporting strong growth in regional populations and industry through, among other things, Special Activation Precincts, and a focus on regional housing. While these aspirations and the underlying economic forces complement each other in some respects, they also create conflicts.

Land use change is an integral part of the NSW landscape and economy and has occurred throughout the State since European settlement. While early land use changes in NSW led to substantial growth in the agricultural sector, the long-term trend is now the conversion of agricultural land to housing and industrial development, and a changing and more diverse economic base in many regional communities.

Land use conflict is already a serious and growing issue in NSW (and globally) and has been described by local governments as among their most troublesome and intractable issues. The previous report by the NSW Agriculture Commissioner examined conflict between agricultural production and the expanding urban/industrial footprint and recommended measures to reduce its impact on producers and affected urban communities. There are also likely to be very large rural land use changes required to achieve our agreed carbon emissions targets and improved biodiversity outcomes. While renewable energy presents an opportunity for some farmers to diversify their income, increasing land use conflict will be a confronting reality for many rural landholders and communities, as it has been for landowners in the coastal zone for some time.

The potential for a significant impact on NSW's agricultural production from renewable energy development has been widely asserted. Our analysis of likely and worst-case land use changes, with the renewable rollout to 2051, does not indicate a material impact on agricultural production. It seems unlikely that the conversion of land currently used for production will exceed 80,000ha, and more likely be in the vicinity of 55,000ha. This is 0.1% of rural land. It therefore seems likely that this is a less significant rural production land use conflict issue than the others noted above. Nevertheless, there will be many small local effects given the number of projects involved and it is important these local impacts be minimised.

At this stage, renewable energy development in regional NSW has not become a 'political' issue as there is strong support for the underlying policy. Throughout this Review, submissions, representations and other material provided by participants and communities emphasised their overall support for the NSW Government's energy policy and support for the growth of renewable energy generation to maintain a stable energy system and decarbonise the economy. The concerns raised about these developments were mostly local and specific to individual projects. This explains the generally small number of objections to individual projects during development approval processes.

The evidence available to the Review suggested that the main issues fall under the following broad concerns:

- The unequal capacity of landholders and some local governments to participate fully in the planning approval process with professional and well-resourced project participants.
- A lack of transparency about elements of a projects' commercial arrangements that are of reasonable interest to adjacent landholders, and the potential for those landholders' businesses to be impaired by impacts (such as the risk of reduced property values, increased insurance liabilities, production practice changes to improve compatibility, changed water flows, and increased pest and weed management requirements).
- The local and cumulative impact on food and fibre production, and impact on upstream and downstream businesses in the community and region.
- The adequacy and equity of benefit sharing commitments, and their impact on community cohesion.
- The absence (or awareness) of a visible compliance program monitoring and enforcing development consent conditions and obligations.
- The consultation and engagement practices of the organisations building the expanded transmission network, and the adequacy of the compensation for impacts on land use and visual amenity given the disparities with payments to landowners hosting generating facilities.
- Confusion about the role of the Renewable Energy Zones (REZs), whether all renewable development should occur within a REZ and what rules apply to development proposals inside and outside the REZs.
- Increasing red tape, lengthy approval processes and the need for a coordinated effort from the State and Federal Government in driving community engagement.

The concerns raised during this Review were mostly focused on large-scale solar and transmission facilities. The wind generation sector has matured significantly over the last decade and its community engagement practices are now generally effective in gaining community acceptance. The solar energy sector includes many firms new to the Australian operating environment and regulatory systems and its performance in responding to community issues is variable.

The friction that is emerging has the potential to compromise the timely rollout of the NSW government's energy policy. It may be the most significant risk to policy success. The land best suited for solar development is generally cleared, flat to rolling, arable, with access to the electricity grid. Regional communities will host most of these facilities and we can anticipate the current trajectory of both the growth in developments and the resulting community concerns to continue without further policy measures, such as those recommended in this Report, being implemented.

On the other hand, investors and project applicants have demonstrated a strong demand for opportunities to invest in this sector in NSW, despite raising concerns around increasing red tape, lengthy approval processes and the need for a coordinated effort from Governments on community engagement. Whatever project applicants may think about the planning system, and this Review heard a range of both negative and positive views about the planning system and the risks associated with local land use conflict, it does not appear to be materially affecting the overall enthusiasm for investing in NSW. The REZ policy has been broadly welcomed by project applicants and its further development will only increase this interest.

The Government's intention to establish five REZs has created a new policy and operating environment for the renewable sector in NSW. This has led to some confusion for members of the community about the decision-making regimes that apply to renewable energy development in these areas. The NSW planning and assessment process is identical for all large-scale renewable energy proposals in NSW, regardless of whether they occur within or outside of a REZ. The zones have been created to integrate generation and transmission investment and access.

Some members of the community have interpreted the State's REZ policy as prohibiting these developments in other areas of the State. This is not the case. There is already a substantial pipeline of approved projects and proposals that will be developed outside the identified REZs, and new transmission investment will continue this development.

There are also calls to locate these facilities, particularly large-scale solar energy developments, in less populated areas of the state (e.g., Far West NSW). There are many factors that dictate site selection (including costs, transmission losses, proximity to transport infrastructure and land use constraints) and while an attractive concept, very long transmission distances are not feasible with currently available technology. The locations of the REZs reflect this.

The NSW Planning System provides a framework for assessing, determining and ensuring compliance for State-significant developments (in most cases developments with a Capital Investment Value over $30 million). While there were some dissenting views, the renewable energy sector and investors generally consider that the State-significant development process provides certainty and clarity, but is cumbersome, takes longer and is more costly than in other jurisdictions.

The way impacts are managed and mitigated varies from project to project and will depend on the nature and scale of the predicted impacts. Applicants will implement specific management measures to mitigate impacts on neighbors and closely located landowners. For example, vegetation screening may be implemented to reduce visual impacts. If impacts cannot be mitigated effectively applicants have typically negotiated compensation agreements with landowners. As these are private commercial agreements, they are rarely transparent to other affected parties or the broader community.

Applicants for renewable energy projects will also make payments to the host landholder for the use and access of their land, and voluntary community benefit sharing payments to the wider community hosting the development directly with community groups or via the local council (see **Figure 23** for a summary).

There is a strong sentiment among some regional communities that renewable energy developments will adversely affect them and agricultural production generally with limited long-term benefits. The experience with individual projects is mixed – the renewable energy sector is clearly working to build confidence and relationships with communities through consultation and ongoing partnership and engagement. However, some communities have had less than ideal experiences and, for many, the benefits are difficult to identify, and any industrial land use change will be seen as an intrusion on the rural landscape that cannot be offset by financial or other benefits. The general feeling about new transmission infrastructure is quite negative, even though it does not impose significant restrictions on land use in most cases.

This increase in community concerns and the hesitancy of some communities to support renewable generation has also been noted by the regulatory bodies and entities involved in the sector, including the NSW Department of Planning (DPE), the NSW Office of Energy and Climate Change, Energy Corporation of NSW (EnergyCo), the NSW Electricity Infrastructure Jobs Advocate, and the NSW Renewable Energy Sector Board. The Australian Energy Infrastructure Commissioner (formerly the National Wind Farm Commissioner) has made similar observations and made recommendations to address these in successive reports. Similarly, NSW Farmers identified land use conflict with renewable energy as a key policy issue and passed several relevant motions at its recent 2022 conference. While it is difficult to provide reliable quantified evidence of this sentiment, the consistent themes in submissions to this Review and corroboration from the parties noted above, provide reasonable confidence that the main issues have been accurately diagnosed and examined in this Review.

The regulatory arrangements are also developing and responding to a growing body of experience, and to the concerns raised by communities and discussed in this Review. As noted above, large-scale solar energy developments are causing the most concern. The NSW Government has released the Large-Scale Solar Energy Guideline to provide additional guidance on key matters, particularly in relation to agricultural land and visual impacts. As the guidelines were released after submissions were received and the consultations occurred, the community feedback and sentiment presented in this Report does not reflect any impact this new policy may have on community perceptions.

Guidelines issued by DPE are improving the rigour for assessing visual, noise and other impacts from wind facilities and requiring more from applicants in mitigating their effects. The Clean Energy Council has produced several guidelines, a charter and codes of practice to guide industry towards best practice regarding community engagement, benefit sharing, implementation of projects and decommissioning.

This Report makes 29 recommendations to achieve a better balance between the interests of project applicants, landholders and communities, and in turn accomplish a more successful rollout of the NSW energy policy (**Figure 1**). To maintain an attractive environment for investment in renewable energy and a policy rollout at the required speed, the regulatory controls for renewable energy and transmission developments should remain proportionate to the risk they are trying to mitigate and recognise that a higher level of local community acceptance will be important to a timely and successful energy policy implementation. The solar and transmission sectors, in particular, should be the focus of additional policy and regulatory measures and effort from industry to reduce the risk to successful implementation of the energy policy and improve.

The recommended measures are organised around the themes identified during consultation, and focus on three areas which aim to improve community engagement and social acceptance of the growing presence of renewable energy facilities in rural communities:

- **Improving the knowledge base of interested parties.** There is a lot of publicly available information but communities, councils, and landholders are struggling to access, digest and use it constructively. They would benefit from improved access to information about how, where, and when renewable energy developments are likely to occur and improved transparency about what factors are considered in decision-making. It will also help to improve confidence in the system. This is largely a capacity building need.
- **Improving capacity to participate in the planning system.** Educating affected parties on how to participate in the planning system, setting reasonable expectations for engagement and dialogue, and providing more tools to enable participation will improve capacity and confidence for all parties. There will be a requirement for more resources for Energy Co, DPE and local governments as the sector grows, and more support for the communities that are most impacted, to facilitate their engagement. This should be seen as a necessary investment in successful policy delivery.
- **Clarifying impact management and benefit sharing arrangements.** More clarity and transparency of the financial arrangements for all parties will improve understanding of reasonable benchmarks and provide confidence that landholders receive consistent returns, adjacent and affected landholders are not unreasonably disadvantaged and that any impacts are appropriately managed, and communities benefit from hosting these developments in their local landscapes and economies.

There were calls during this Review for a 'moratorium' on the approval of renewable energy developments while the Review was undertaken. If we were moving from one steady state to another there might be a case for a pause but that is not our current circumstance. We are instead developing policy and technology and investing as fast as reasonably possible to address the real risk of energy shortfalls over the next decade. That policy will continue to evolve over the next decade at least, and it is likely there will be several reviews of progress and opportunities for improving and accelerating the rollout over this period. Periodic pauses in the investment pipeline is not an available option, but continuous improvement is essential.

For the same reasons, this is not simply another planning issue that must be accommodated within the existing approach. There is understandable reticence to accept positions on renewable energy that could create difficult precedents that other sectors and proponents of other types of development might seek to follow. However, it is hard to identify a higher policy priority than maintaining a stable power supply to the NSW community and economy and achieving the required increase in renewable power and transmission connectivity in the required timeframe. This will very likely require taking these positions. Measures to improve community acceptance of these facilities and infrastructure will greatly assist a successful rollout, and while adopting industry specific provisions is generally undesirable this would be a small price to pay for successful outcomes.

Successful rollout of the Renewable Energy Zones (REZs) and the associated policy arrangements will be critical to delivery of the State energy policy outcomes. However, as there will be extensive project development outside these zones and local aggregations around transmission infrastructure and other natural characteristics, some of the government led REZ style community engagement and assistance programs should be implemented in these areas to improve community acceptance and rollout success. The NSW Government and the renewable energy sector will need to increase resourcing and commitment on community engagement to do so.

List of recommendations

Theme	Recommendations	
Delivering the renewable energy transition	1	To maintain an attractive environment for investment in renewable energy and a policy rollout at the required speed, the NSW Government should: • ensure that regulatory controls for renewable energy and transmission developments remain proportionate to the risk they are trying to mitigate • note that a higher level of local community acceptance will be important to a timely and successful energy policy implementation and consider the additional measures proposed in this Report to improve that acceptance.
REZs	2	To improve community awareness and understanding of the likely future development of land use and economic changes in and around REZs and transmission infrastructure, the NSW Government should: • improve accessibility to information about the REZs, including the reasons why particular areas have been chosen and the additional arrangements for developments located within a REZ • continuously improve the user-friendliness of the NSW Government's Planning Portal to better communicate the information it contains; and • prepare and display high-level indicative mapping that identifies areas that are potential transmission routes or suitable for solar and wind developments, based on the AEMO Integrated System Plan, proximity to infrastructure and land characteristics etc. so that communities can understand whether they are likely to be affected and can begin to engage in the development processes in a more informed way.
	3	The NSW Government should play a stronger role in supporting local engagement in the REZs and on planned transmission corridors, separately from its regulatory and consent authority role. This could include supporting local councils or other regional organisations where they exist, to effectively engage on behalf of their communities.
Consultation	4	Consistent with the NSW Government's Large Scale Solar Energy Guideline and Undertaking Engagement Guideline for State Significant Projects, the renewable energy sector and transmission proponents should take steps to undertake meaningful and effective engagement that allows the community to influence the siting and design of projects at an early stage. The sector should consult with adjacent and affected landholders on the measures they are proposing to mitigate potentially adverse impacts at the earliest possible stage of the process.
	5	The NSW Government should coordinate an engagement process for projects outside REZs where multiple renewable developments are proposed in a local area - to reduce stakeholder fatigue and encourage a more consistent approach to sequencing, local economic development and approaches to accessing housing, labour and ancillary services.
	6	The NSW Government should support councils to fulfil their role in providing meaningful input into State Significant Development during the engagement process where multiple renewable energy developments or transmission infrastructure projects are proposed for their area. This should include providing material and planning capacity support, where the impost on council planning activities reaches a specified threshold, in a model similar to the Department of Planning and Environment's Regional Housing Flying Squad.

Theme		Recommendations
Managing impacts & benefit sharing	7	To provide transparency and inform reasonable expectations for landholders and other interested parties, the NSW Government and the renewable energy sector should develop and publish standard agreement 'templates' for agreements with: • parties hosting a renewable energy development, and • parties neighbouring renewable energy developments. These would be a guide for all interested parties and improve understanding of private contracting matters in which there is a general public interest. The parties could of course reach agreements that differ from this.
	8	To improve communities' understanding of the financial arrangements for renewable developments, the renewable energy sector should improve transparency by publishing average or indicative lease prices for common renewable project types from the previous two years (just as there is reasonable public access to agistment, lease and property values). This would help address significant asymmetry in knowledge of current market prices, terms and conditions, and help hosts and communities better understand fair market values. This would reduce potential suspicion and friction in cases where long-term financial terms are perceived to be significantly different from average market rates.
	9	The NSW Government should increase awareness about its existing guidelines, including the Undertaking Engagement Guideline for State Significant Projects to ensure neighbours and applicants are aware of the expectation for community engagement. The renewable energy sector should co-operate to publish advice on the reasonable expectations of neighbours and applicants during community engagement for all types of renewable energy facilities, including outlining their opportunities to participate in the development process.
	10	To improve confidence in the compliance and transparency of the performance of project operators in meeting consent conditions, initially and over the life of projects, the NSW Government should undertake a focused and visible compliance audit for the renewable energy sector. This would reassure communities that compliance with consent conditions and other obligations is taken seriously and impacts on neighbouring properties, such as those relating to surface water flows, etc., are appropriately evaluated and addressed over the life of the project.
	11	The NSW Government should consult with the Bureau of Meteorology to ensure that concerns about the impact of wind generation facilities on the operation of its radar system are addressed and not left for the planning system to consider on a case-by-case development application basis. The Bureau's radar system is an essential service for agricultural producers and its efficacy needs to be preserved.
	12	The NSW Government should monitor and evaluate the operation of guidelines that apply to large-scale renewable energy developments, including the revised Large-Scale Solar Energy Guideline, regularly to ensure they are effectively identifying and mitigating impacts on third parties. This should include guidance developed for the construction and operation of transmission infrastructure.
Land use implications	13	To improve the evidence-base that informs strategic planning, site selection and the regulation of land use in the Planning System generally, the NSW Government should continue the development of State Significant Agricultural Land (SSAL) and Identified Production Areas (IPA) identification and mapping. Although it will not be feasible in the foreseeable future to regulate permissible development on SSAL and IPAs because the policy and data is not sufficiently developed, an improved evidence base is a prerequisite for more effective rural land use planning and regulation.
	14	The NSW Government should investigate opportunities to encourage the development of large-scale renewable energy developments on former mining land and other land already disturbed by industrial activity. This should include the identification of potentially available disturbed land such as closed or abandoned sites, for which renewable energy is an acceptable use.

Theme	Recommendations	
Opportunities for coexistence	15	Research on integrated agriculture and energy generating operations, focused on Australian conditions and commercial opportunities, has the potential to add value to land used for solar generation and should be supported. This is a national issue, and the industry and governments should support the development of an appropriate research program, perhaps though Agrifutures Australia.
Transmission infrastructure	16	As a large number of new landowners will be hosting transmission infrastructure in the future, transmission owners and operators should collectively review their approach to community acceptance including practices, training and compliance procedures, including for contractors to minimise environmental impacts, biosecurity risk and other operational impacts. Transmission operators should make landowners aware of the reasonable expectations they should have for engagement with the operator and for maintenance and operation of the transmission infrastructure, including how to access complaint mechanisms.
	17	The NSW Government's plans to publish Guidelines for the transmission sector provides an opportunity for improving acceptance of new infrastructure which will contribute to a successful rollout. The Review supports the NSW Government's recently announced NSW Strategic Benefit payments Scheme.
	18	Transmission operators should offer landholders a choice about the form in which payments are made, such as allowing for an ongoing annual payment.
Decommissioning & end-of-life use	19	The NSW Government should improve community awareness of end-of-life project decommissioning obligations and provide a public rationale for its policy. This will become increasingly important as the first-generation of wind farms projects in NSW approach end of life stages.
	20	To improve community and landholder confidence in decommissioning arrangements, the standard commercial agreement proposed in recommendation seven should include clauses on decommissioning obligations.
	21	The NSW Government, the renewable energy sector and local governments should continue to investigate and publicise recycling opportunities for decommissioned renewable infrastructure and consider ways to integrate these with regional waste management initiatives.
Fire & insurance risks	22	Project applicants in the renewable energy sector should cover any additional public liability insurance costs incurred by neighbouring landholders as a result of proximity and risk to new energy facilities. In cases where suitable insurance cannot be obtained, the applicant should indemnify the neighbour for reasonable risk in relation to typical public liability cover.
	23	The standard commercial agreement proposed in recommendation seven for neighbours should include clauses to compensate for any land use constraints imposed on neighbouring landowners through public liability insurance policies which reduce land use options, such as effectively requiring no further cropping to reduce fire risk in adjacent areas in order to secure appropriate insurance cover.
Property values	24	In working with neighbouring landowners to mitigate potential impacts the renewable energy sector should acknowledge the significant concern among landowners neighbouring large-scale solar and wind energy developments about the potential for an adverse impact on property values. If evidence supporting these concerns becomes available, the NSW Government should ensure the advice proposed in recommendation seven reflects that evidence.
Commodity supply chains	25	The NSW Government should support the work of the Renewable Energy Sector Board to develop and strengthen supply chains for the construction and operations of renewable energy generation projects and enable they sector to take up higher levels of locally produced materials and services.
Workforce	26	The NSW Government should support the work of the NSW Electricity Infrastructure Jobs Advocate to provide advice on labour and skills which are relevant and portable in and out of the renewable energy and related sectors, and on the benefits for local employment.

Theme	Recommendations	
	27	The NSW Government should support the work of the Renewable Energy Sector Board and the NSW Electricity Infrastructure Jobs Advocate to develop concrete plans for meeting skills demands in regions likely to host renewable energy projects, such as the VET sector training more electricians.
	28	The renewable industry has expressed a strong desire to co-operate at an industry level with the NSW Government on those labour, skills and housing issues which will require well organised regional solutions to achieve the demanding rollout targets. These are sufficiently important and geographically dispersed to warrant the creation of a joint industry and government taskforce, which would include the Jobs Advocate and relevant local governments to undertake a rigorous analysis of these demands and assess the local place-based options to respond to them so that communities and investors can have confidence in the State's rollout planning.
Housing	29	The NSW Government should continue to implement the recommendations of the Regional Housing Taskforce and Housing 2041 (NSW Housing Strategy and NSW Housing Strategy Action Plan). It should also investigate any emerging local accommodation deficits in the REZs resulting from the concentration of renewable energy developments and work with the local councils and renewable energy sector to implement local solutions.

Figure 1: List of recommendations

Introduction

This report has been prepared by the NSW Agriculture Commissioner, in accordance with the terms of reference. The NSW Department of Primary Industries (DPI) provided secretariat support and the Commissioner sought feedback and advice from the Taskforce announced by the Minister for Energy and the Minister for Agriculture and Western NSW on 8 March 2022. The Taskforce included representatives from within the portfolios of the Ministers for Planning, Energy, Enterprise, Investment and Trade and Regional NSW.

The Taskforce reviewed the state-wide framework for managing issues and opportunities from the forecast growth in the renewable energy and agriculture sectors. Although certain concerns, case studies and meetings with stakeholders related to specific projects, this Review focused on the renewable energy sector as a whole and the sector wide issues associated with wind, solar and transmission infrastructure roll-out.

How we engaged and who participated

The Agriculture Commissioner released an issues paper *Renewable Energy & Agriculture in NSW* on 22 April 2022. By 6 June 2022, 130 written submissions had been received from a range of stakeholders (see **Figure 2** for a summary and **Attachment A** for a detailed list).

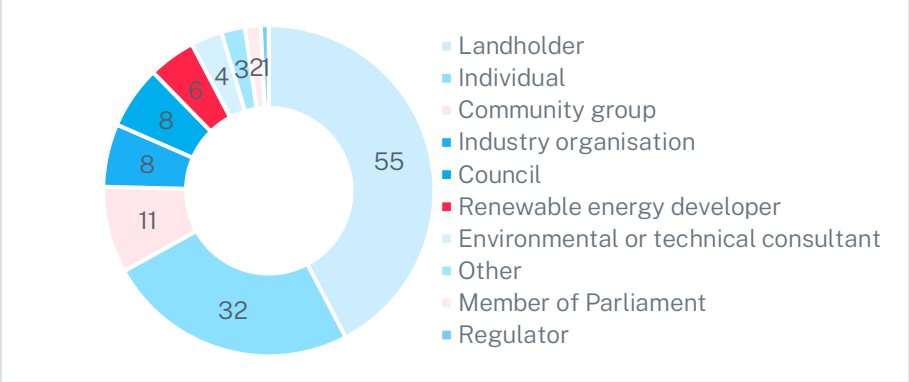

Figure 2: Summary of submitters

While considering the evidence and experiences provided in submissions, the Agriculture Commissioner also met with many individuals, businesses and representative groups. Interested parties also wrote to the Commissioner during the Review, and specific project concerns were referred to the Commissioner from Members of Parliament and participants in the planning system. This material has been considered alongside the submissions.

These contributions and submissions were essential to informing this Review and reflected the range of perspectives that were clear and consistent throughout this Review. Although there is little rigorous evidence available so far, the strong consistency gave the Taskforce confidence that the judgements in this Report are based on a sound understanding of the issues and the views of regional communities, the renewable energy sector, agricultural producers, and representative organisations.

Land use conflict and context for the Review

Growing land use conflict across the agricultural landscape was a key driver in the NSW Government appointing an Agriculture Commissioner to investigate how to better balance competition for agricultural land from urban growth.

The Commissioner delivered Improving the Prospects for Agriculture and Regional Australia in the NSW Planning System in July 2021. That report identified key issues and recommended actions aimed at reducing the likelihood of conflict between agriculture and housing/industrial development. These included but were not limited to:

- **Providing agricultural producers, neighbours and communities with clarity about acceptable agricultural practices** – through a Farm Practices Panel which would be an authoritative resource to support regulators, producers and potential complainants when making decisions about land use and the management of potential and actual conflict.
- **Supporting councils to make informed and consistent decisions** – inconsistent application of state and local policies undermines both community and sector confidence in decision-making and enforcement. Recommendations included providing clearer direction for Councils on land use priorities and opportunities to simplify development requirements, apply more systematic approaches to land use conflict, and better identify agricultural land.
- **Clarifying how agriculture and agricultural land are managed in the planning framework** – while it is inevitable rural land will be converted to other forms of development, a clear policy framework for how agricultural land is identified and managed would provide more consistency and rigour in local councils' land use planning and decision making. The NSW DPI is working to map State Significant Agricultural Land (SSAL).

While conflict between agriculture and renewable energy was outside the scope of that Review, a significant number of stakeholders took the opportunity to raise concerns about the growth in renewable energy developments and transmission infrastructure. They raised concern about potential impacts on agricultural land and agricultural production and a perceived unfairness in how the impacts of the energy transition are distributed.

> 'The costs to regions in loss of land values and rural amenity are large, ongoing, and divisive, and there is little consideration of the long-term impacts in the haste to build while government fiddles with the phase-out of coal power… We need to better define what is acceptable in building solar and wind installations on rural land, and how they impact on neighbours and towns… If it wouldn't be considered appropriate in Woollahra, it shouldn't be considered appropriate for Walgett.' - NSW Farmers

In response to concerns about management of impacts at some sites proposed to host solar or transmission infrastructure, communities have formed groups to provide a stronger voice to their concerns. They generally have little experience with major projects or the details of the planning framework but are maturing with increasing organisation and influence in their opposition to specific developments. Some are feeling overwhelmed by the volume of proposed projects and disappointed that their concerns can be dismissed as 'not in my backyard' views and not being addressed in the decision-making.

The large-scale wind energy sector has matured over the last decade and is now generally managing the development of individual projects in ways that are acceptable to local communities. The performance of the large-scale solar and transmission sectors is variable and shows less experience and capacity than the wind sector at this stage. Additional effort is needed to improve community acceptance of the developments that will occur over the next decade and beyond.

Existing policies

There is an urgent need for the transition to renewable energy supply as coal-fired plants are coming offline ahead of schedule for commercial reasons. Four of NSW's five coal-fired power stations that currently provide around three quarters of the State's energy supply are scheduled to close by 2033.

The NSW Electricity Infrastructure Roadmap (the Roadmap) sets out the NSW Government's vision for coordinated investment in the network, generation and storage infrastructure. It is facilitated by the *Electricity Infrastructure Investment Act 2020* and focuses on:

- promoting investment in regional NSW
- supporting long-term energy storage
- delivering REZs, by coordinating development in the right places for local communities
- supporting grid reliability and security with gas, batteries, and other reliable energy sources
- empowering industries with cheap, reliable and low emissions electricity.

By 2030, the Roadmap is to deliver at least five REZs and coordinate private investment in at least 12 gigawatts of renewable energy generation and two gigawatts of long duration storage. The Roadmap aims to prioritise the build-out of infrastructure to keep NSW's energy intensive and regional industries competitive. The Government has forecast that the benefits to regional communities include around $1.5 billion in lease payments for landholders hosting infrastructure by 2042 and the creation of around 6,300 construction jobs and 2,800 ongoing jobs, mostly in regional NSW.

The Government has estimated that implementing this Roadmap will also make electricity cheaper and more reliable. Unpublished modelling from 2020 which informed the Roadmap estimated that it will mean NSW's industrial energy prices are within the lowest 10 per cent of OECD jurisdictions. Without the Roadmap, wholesale electricity prices were estimated at $23 per megawatt hour higher on average from 2023 to 2043. The average household is estimated to save about $130 a year and average small businesses $430 a year, between 2023 and 2040. These estimates consider the costs of delivering the Roadmap and benefits are expected to increase over time as the REZs are developed.

The NSW Government has also developed several policies relating to emissions reduction and sustainable development which aim to support its employment and economic development goals:

- The NSW Climate Change Policy Framework sets out the NSW Government's long-term goal to achieve net zero emissions by 2050 and adapt to a changing climate.
- The Net Zero Plan is the foundation for NSW's action on climate change. The Government has a target to halve NSW's emissions by 2030 compared to 2005 levels, and to achieve net zero emissions by 2050. Stage 1 of the plan (2020-2030) has four priorities: increased uptake of proven emissions reduction technologies; empowering consumers and businesses to make sustainable choices; investing in the next wave of emissions reduction innovation, and adopting policy settings for the Government to lead by example. The Government expects the Plan to attract up to $37 billion in private investment to NSW and support more than 9,000 jobs.
- The NSW Waste and Sustainable Materials Strategy 2041 sets out how NSW will transition to a circular economy over the next 20 years; including reforms for reducing greenhouse gas emissions from materials (embedded carbon) and the waste sector.
- The NSW Hydrogen Strategy seeks to rapidly increase the scale and competitiveness of green hydrogen in NSW, with the aim to halve the cost of production of green hydrogen. The Hydrogen Hubs Initiative will provide up to $150 million in grant funding to help industry establish hydrogen hubs in the Hunter and Illawarra regions. In March 2022, NSW signed a memorandum of understanding with the Victorian and Queensland governments to establish

an east coast hydrogen refueling network. This will provide a decarbonisation pathway for the heavy freight sector and establish foundational demand for green hydrogen in NSW.

- The Critical Minerals and High-Tech Metals Strategy outlines the NSW Government's vision to provide the minerals that are required by growth industries such as batteries, technology-enabled primary industries and renewables materials necessary for a low carbon future.

These emission reduction and economic development ambitions are shared by the agriculture sector. The National Farmers Federation's Climate Change Policy notes "Australian agriculture is in a position to take advantage of the social, environmental and economic opportunities presented by a low-emissions future." Its 2030 Roadmap aspires to move towards carbon neutrality by 2030, and livestock industries have adopted a carbon neutral by 2030 policy (MLA, 2020)).

Renewable Energy Zones (REZs)

The rollout of REZs in Australia has been described as the development of modern-day power stations, combining generation, transmission, storage and system strength services to ensure a secure, affordable and reliable energy system.

The first five REZs in NSW will be located in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions of NSW. These locations were chosen as optimal, following a detailed Statewide assessment and consideration of the Australian Energy Market Operator's (AEMO) recommendations on suitable areas, which included:

- analysis of detailed geospatial and land use mapping
- identifying areas with strong renewable energy resource potential
- proximity to the existing electricity network, and
- consideration of potential interactions with existing land uses.

The REZs will help service the growing energy needs of emerging green manufacturing, energy intensive agriculture and export market opportunities.

Strategic land use planning is a key objective of the REZ program, and the Government has committed to continuing to engage with communities to ensure REZ development complements existing primary, agricultural and other land uses, and new infrastructure is built in the right places.

It is important to note, that the assessment of any individual project within these zones must still adhere to the existing and established processes in place under the NSW Planning System.

The main difference within and outside a REZ is the role of EnergyCo, while there are also clear differences from a commercial point of view. EnergyCo is leading the coordination of early strategic planning to facilitate the rollout of REZ infrastructure and the development of new transmission lines and schemes for how private generators can assess these transmission lines. This is being done in consultation with AEMO, Transgrid as the jurisdictional planning body for NSW, program partners and generators.

To connect to REZ declared transmission infrastructure, generators must bid as a part of a competitive tendering process to gain access rights from the NSW Consumer Trustee (AEMO Services). Bidders participating in these access schemes must address several factors ranging from cost to consumers, to community benefits, amenity, environmental impacts and land use compatibility. The Consumer Trustee must act in the long-term financial interests of NSW electricity customers, and its Tender Rules and criteria to make decisions about access rights reflect this.

Long Term Energy Service Agreements (LTESAs) are issued after the competitive tender process. While generally issued within the REZ areas, they can also be issued to projects outside a REZ which satisfy 'outstanding merit' in terms of location, community benefit sharing, amenity preservation and mitigation of land use conflict.

Transmission planning and projects in the pipeline

The AEMO's 2022 Integrated System Plan (ISP) lists the transmission projects that are underway, actionable now, and planned for future. These include:

- **underway:** Vic-NSW and Qld-NSW interconnectors minor upgrades (QNI minor which is complete and VNI minor expected to be completed in 2022), Project Energy Connect which is under construction in South Australian and Western NSW and the Central West Orana REZ Transmission Link
- **actionable now:** Hume Link, Sydney Ring, New England REZ Transmission Link and VNI West; and
- **planned for future:** QNI Connect, New England REZ Extension.

HumeLink, Project Energy Connect, and VNI West are being delivered under the requirements in the National Electricity Rules. The planning and development process for projects under these Rules includes:

- Identifying the need for a transmission infrastructure project in the AEMO's ISP, along with options to address the need.
- The network operator refines the options and identifies a preferred option through network studies and concept design. This work is published first in a Project Assessment Draft Report for feedback, and finally in a Project Assessment Conclusions Report which addresses all of the submission received in response to the PADR and details the final preferred solution.
- The final preferred solution is assessed by AEMO ensure it meets the identified need, and that the costs and benefits are within acceptable boundaries for the project.
- The project proponent completes the Regulated Investment Test for Transmission (RIT-T) and then submits a Contingent Project Application (CPA) to the Australian Energy Regulator (AER) detailing the expected costs for the project and how they would like to recover these from electricity end users. The CPA is published and public submissions are sought, after which the AER assesses the application and makes a decision on how the network operators revenue determination is to be adjusted to account for the project.
- All major transmission infrastructure projects are likely to be considered State Significant Infrastructure for the purposes of planning and environmental approvals. This involves submitting an Environmental Impact Statement (EIS) to DPE which covers the Secretary's Environmental Assessment Requirements (SEARs) for that project. The EIS is exhibited by DPE and public submissions sought, before decisions regarding approvals and conditions are made.
- The EIS for most major transmission infrastructure projects will also need to be approved by the Commonwealth under the *Environmental Protection and Biodiversity Act 1999*.

EnergyCo was appointed in 2020 as the Infrastructure Planner for the first five REZs in NSW. It is a statutory authority established under the *Energy and Utilities Administration Act 1987,* responsible for delivering the REZs. It will coordinate where the generation, long duration storage and firming capacity will be built.

In September 2022, EnergyCo released a draft Network Infrastructure Strategy to help guide the key infrastructure projects that will be needed to deliver the REZs. It sets three objectives in delivering these projects; State-wide coordination, certainty to investors, and promoting meaningful engagement.

The framework for approving, constructing, & operating renewable energy projects

The NSW planning system

The NSW planning system sets the rules and processes for decision making about what development can occur, where it can be built and any conditions that may be imposed on the development. The *Environmental Planning and Assessment Act 1979* (EP&A Act), supported by the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation), set the objectives that underpin the NSW planning system, including:

- promoting social and economic welfare of communities and a better environment
- facilitating ecologically sustainable development
- orderly and economic use and development of land: and
- providing opportunity for community participation in the process.

The planning system comprises a hierarchy of state and local planning legislation and instruments that collectively work to regulate development. State environmental planning policies (SEPPs) are key planning instruments and are organised thematically. Local environmental plans (LEPs) and development controls plans make up the local government component of the NSW planning system and work to regulate local development. SEPPs and LEPs organise land into zones and identify within these zones what developments are permissible with consent, permissible without consent and prohibited.

The planning system is not easy for people without professional experience to understand and use. A certain level of knowledge is needed for interested parties to participate effectively, and that is a challenge for individuals and communities confronting these issues for the first time.

Assessment & approval pathway for large-scale renewable energy developments

The *State Environmental Planning Policy (Transport and Infrastructure)* 2021 permits the development of solar and wind energy projects (defined collectively in the SEPP as electricity generating works) with the consent of the relevant authority, on any land in a prescribed rural, industrial or special use zone.

Most large-scale renewable energy developments in NSW are State Significant Developments (SSD). SSD applications are determined by the Minister for Planning or a delegate (which can be the Independent Planning Commission or an Executive of DPE). **Figure 3** identifies the criteria for a project to be SSD. The SSD planning pathway has been designed to apply to projects which are of key significance to the wider-State due to their size, economic value or potential impacts.

The pathway for smaller renewable energy developments is Regionally Significant Development (RSD). These proposals are still subject to state planning policy but are determined by Regional Planning Panels. **Figure 3** identifies the criteria for a project to be RSD.

Both SSD and RSD pathways require a development application and an assessment of environmental impacts, including social impacts. These pathways are explained in more detail in **Figure 3.**

Local councils are the consent authority for projects below $5 million. There are no industrial scale wind or solar projects below this threshold.

Term	Criteria	Assessment & approval pathway:
State Significant Development (SSD)	• Capital Investment Value (CIV) more than $30 million • Development in an environmentally sensitive area that has a CIV of more than $10 million • Specific development declared by the Minister for Planning	The applicant requests Secretary's environmental assessment requirements (SEARs). An applicant must prepare an environmental impact statement (EIS) in accordance with the SEARs issued for a proposed development. The EIS is the applicant's assessment of the potential impacts of the proposed development. In addition to the SEARS, the EIS must also be prepared in accordance with the: — State Significant Guidelines – Preparing and Environmental Impact Statement — Cumulative Impact Assessment Guidelines for State Significant Projects — Undertaking Engagement Guidelines for State Significant Projects — Social Impact Assessment Guideline for State Significant Projects — Large-Scale Solar Energy Guideline for solar energy developments — Wind Energy Framework for wind energy developments. Once the EIS is submitted, DPE publicly exhibits it, reviews and considers submissions and the applicants' responses to these, and undertakes a thorough environmental assessment of the project. DPE will then make a recommendation to the relevant consent authority as to whether the project should be approved or refused as well what conditions should be applied in the event of an approval. Once DPE makes a recommendation, the Minister for Planning or the Independent Planning Commission (IPC) will consider the department's recommendation (and in the case of the IPC, undertake further assessment and consultation as it sees fit) as the consent authority, before deciding to refuse or approve the project. Approved SSDs typically include conditions of consent that must be complied with by applicants throughout the construction, operation and decommissioning of a project.
Regionally Significant Development (RSD)	CIV exceeding $5 million	The relevant local council assesses the development application and its accompanying environmental assessment (or Statement of Environmental Effects (SEE)). Depending on council policy, this will include a public exhibition of the application and SEE. Council will review, consider and assess submissions received during public exhibition. The development application is then determined by the relevant Planning Panel (either one of the five Sydney-based Planning Panels or the four Regional Planning Panels). Approved RSDs typically include conditions of consent that must be complied with by applicants throughout the construction, operation and decommissioning of a project.

Figure 3: Pathways for large-scale renewable energy proposals in the NSW Planning System

Environmental impact assessment of renewable energy developments

Assessing environmental impacts is a key part of the NSW planning system. The environmental impact assessment process means that the potential environmental and social impacts from a proposed development are analysed, understood and communicated to all stakeholders, including the community, regulators, applicants and consent authorities.

An applicant's initial environmental assessment (i.e., Statement of Environmental Effects for RSD, and an Environmental Impact Statement for SSD) is assessed by the relevant council or DPE before a decision is made by the relevant consent authority based on its merits. The relevant consent authority must consider several matters when reviewing an applicant's environmental assessment and determining a development application, including:

- Matters in the EP&A Act:
  - provisions that relate to the land, including any current or proposed environmental planning instrument (such as a SEPP or LEP), development control plan, planning agreement, or matters specifically set out in the EP&A regulation
  - the likely environmental, social and economic impacts of the proposed development
  - the suitability of the site for the proposed development
  - any submissions received during exhibition of the development application
  - the public interest.
- Matters in the Transport & Infrastructure SEPP:
  - a consent authority must not grant consent for an electricity generating work project if proposed within mapped areas surrounding identified regional cities (Albury, Armidale, Bathurst, Dubbo, Griffith, Orange, Tamworth and Wagga Wagga) unless it is satisfied the development:
    - is located to avoid significant conflict with existing or approved residential or commercial uses of land surrounding the development, and
    - is unlikely to have a significant adverse impact on the regional city's capacity for growth, or scenic quality and landscape character.

Opportunity for community input

Effective community engagement ensures that community and stakeholder groups can provide feedback on key economic, social and/or environmental issues that may arise during the development and implementation of a project. Effective engagement underpins a transparent and fair environmental assessment and can help avoid unintended negative impacts of a project on the economy, the community and the environment.

Figure 4 outlines typical experiences for applicants, landholders, communities and neighbours and the local council as different projects progress through the planning system. It also identifies additions to the process in the REZs.

Applicants for RSD and SSD solar and wind energy projects should start community engagement as soon as possible. This means community and stakeholder groups can provide feedback on key economic, social and/or environmental issues early so that they can be considered, and amendments made to help avoid unintended project impacts or angst.

DPE's Undertaking Engagement Guidelines for State Significant Projects guideline sets out the requirements for effective engagement on state significant projects in NSW. The Guidelines outline the actions the department will take, identify opportunities for the community to participate and set out consultation requirements for applicants.

The EP&A Act provides opportunity for community participation in the planning and assessment process. It requires:

- All SSD applications and accompanying EIS must be exhibited for at least 28 days so stakeholders and community members can make written submissions on the project and raise any issues or concerns
- After public exhibition, DPE must publish all submissions on the Planning Portal (where DPE keeps the community informed about the progress, performance and compliance of SSD projects)
- The applicant must respond to the issues raised in submissions and identify how the project has changed in response to the feedback. This response is also published on the Major Projects website
- The consent authority must consider the issues raised in submissions and the applicant's response when it determines a project, and it must provide reasons for the decision and detail how community views were considered in the decision-making process.

DPE visits the site of all SSD projects (note this did not always happen when COVID-19 restrictions were in place) to consider local realities. In some cases, DPE carries out its own community engagement on SSD projects to better understand community concerns. This can include community information sessions and targeted engagement (through site visits, meetings and workshops) with key people or groups.

DPE may also recommend conditions of approval which require an applicant to conduct further engagement during detailed design, construction, operation, decommissioning or rehabilitation of the project and/or require applicants to establish a Community Consultative Committee.

Scenarios:	1. A typical large-scale wind energy development	2. A typical large-scale solar development	3. A typical transmission line
Pathway	State Significant Development	State Significant Development	State Significant Infrastructure (SSI)
Experience for applicant	Identifies sites with good wind energy potential, access to grid, access to road networks, appropriate land parcels and topography, permissible land use zonings, amenable distances to labour markets, adequate distances from regional cities and other important environmental and commercial considerations. Gains agreement from individual landholders to conduct initial assessments; prepares Scoping Report. Consults with local community informed by the Wind Energy Framework and in accordance with the Undertaking Engagement Guidelines for State Significant Projects. Submits Scoping Report to DPE; SEARs issued, EIS prepared. EIS exhibited, community submissions received. Submissions report prepared by applicant. DPE may require modifications to the EIS to mitigate issues from consultation. DPE assesses the project and makes a recommendation to the consent authority which then determines the project. Whilst infrastructure contributions are a requirement under the NSW planning system, broader benefit sharing is not. Applicants may set up community enhancement funds under a Voluntary Planning Agreement (VPA) with the local Council. Where eligible, a developer may bid through a competitive tender process to gain access to REZ specified network infrastructure or seek to be awarded a LTESA to connect to the grid in non-REZ locations. EnergyCo coordinates access to REZs and LTESA.	As for scenario 1, and they are informed by the Large-Scale Solar Energy Guidelines. If the project is within a REZ, and they simultaneously apply through EnergyCo for access to the REZ and a LTESA to connect to the grid.	Transmission infrastructure is a development without consent, determined under Part 5 of the EP&A Act. Coordinated by DPE through the SSI process where the relevant criteria are met. EnergyCo coordinates the development of transmission lines in a REZ as the infrastructure planner. EnergyCo also selects the transmission routes. Transgrid is responsible for the construction, operation and management of the NSW and ACT high voltage electricity transmission network.
Experience for landholder	Landholders are approached by applicants seeking access to the land in the early stages of the scoping process. Landholders may be asked to enter into commercial agreements, which may include non-disclosure clauses. Landholders should be fully informed of impacts and rights prior to entering agreements. Agreements can be made at any time of the assessment process, however landowner consent is required in order for a project to be determined, meaning that most developers will seek to establish agreements early, prior to investing significant financial capital. Depending on the nature of the development, property titles may be subject to legal instruments establishing easements for 'right of way' access to turbines, roads, batteries or transmission infrastructure. Hosts retain ownership of land under easements. Hosts are paid ongoing income for the lease of land for the life of the project. Some hosts experience social division with other landholders and community members.	As for scenario 1, however solar applicants may also purchase the property in entirety, and therefore the applicant could also be landholder.	Landholders are offered one-off compensation in line with the *Land Acquisition (Just Terms Compensation) Act 1991*. Landholders feel the underlying acquisition powers means the development is inevitable. Easements to allow right of way are placed on individual property titles. Landholders are encouraged to seek independent valuations and advice on transmission compensation assessment.
Experience for community & neighbours	Consultation includes one-on-one briefings, drop-in sessions, site visits, community workshops and community reference groups. Some neighbours near large-scale wind farms are offered compensation for impacts even though they do not host turbines. Other landholders do not receive benefits, usually where there are less significant impacts present. Community division can emerge between those who benefit financially, and those who do not. Some communities and neighbours are concerned about impact mitigation, management, and compliance. These concerns can be exacerbated by non-disclosure agreements. Communities can enjoy the improvements that benefit sharing arrangements (if established by the applicant) can offer.	The consultation process is the same as for scenario 1. Displacement of important agricultural land is a common concern of communities. The amount and distribution of voluntary community benefits schemes is a common concern.	Transmission easements can be up to 80m wide and provide a 'right of way' for the network operator Transgrid to build and maintain lines and towers on private land. Some landholders consider the land acquisition payment does not reflect the ongoing nature of impacts, and that those hosting the developments benefit long-term, while they do not.
Experience for councils	Councils are relied on for leadership and advice by community members, although not responsible for determining SSD projects. Councils are consulted throughout the SSD process, including in the preparation of SEARs by DPE. Housing, workforce impacts, and decommissioning are common concerns. Councils can also experience a surge in road usage due to the number of vehicles during construction. Councils can enter into Voluntary Planning Agreements with applicants to provide benefits across the community (see https://www.planning.nsw.gov.au/Planning-agreements).	As for scenario 1, however councils in the REZs are concerned about: • their capacity to engage and assess the large number of solar energy projects. • the impact of construction activities on accommodation and visitor economy.	Transgrid requires Councils to notify of development near transmission infrastructure.

Figure 4: Typical experiences in developing renewable energy projects

Current reforms in NSW planning and energy legislation and policies

Specific guidelines and frameworks for wind and solar energy developments

Large-Scale Solar Energy Guideline

In 2018, DPE released the Large-Scale Solar Energy Guideline to support assessment of State Significant solar energy developments. After which it became clear that further detailed guidance in relation to emerging assessment issues (such as visual impacts and impacts on agricultural land) was required. Consequently, DPE revised the Guideline in 2022 in consultation with councils, government agencies, the community and industry to provide further guidance on these issues and ensure that the assessment of solar energy developments is transparent, consistent and supported by better information.

The revised Guideline was published, effective 25 August 2022, along with the supporting Frequently Asked Questions document and the Technical Supplement – Landscape and Visual Impact Assessment. Key components of the revised Guideline include:

- A technical supplement for landscape and visual assessment which provides a contemporary and innovative methodology for assessing the visual impacts of solar energy developments.
- Clear performance objectives for when impacts should be avoided or mitigated and provides a range of visual representations to communicate the varying levels of impacts to the community.
- Identifying that the cumulative risk to agricultural land from solar development is low, and that the main agricultural land use issues for consideration are localised impacts (such as erosion and biosecurity) and the potential for broader downstream impacts on regional supply chains.
- In recognising community concerns and the importance of important agricultural land, the Guideline requires an improved and proportionate consideration of the likely impacts of a solar development on agricultural land and ensuring that applicants take reasonable steps to avoid impacts on important agricultural land.
- A six-month transitional period for commencement for projects that are already in advanced stages of preparing a development application and EIS. If SEARS had already been issued for a SSD solar energy development prior to the publication of the revised guideline, then the applicant has up until end of January 2023 to submit an EIS that is not compliant with the revised Guideline.

While the revised Guideline applies to solar energy projects that are SSD, applicants, councils and planning panels are encouraged to consider it when preparing, assessing and determining those that are RSD.

Wind Energy Framework

The Wind Energy Framework provides guidance to applicants, the renewable energy sector, regulators and the community about how these projects are planned and assessed. DPE is reviewing the Framework, including the Wind Energy Guideline, to ensure it remains fit for purpose. The review will aim to address emerging issues arising from advancements in wind energy technology, such as larger sized turbines and more intensive development (significant advancements in wind energy technology mean that larger and more efficient turbines are being produced). This includes addressing visual and amenity impacts. The review will also aim to provide guidance on issues not currently addressed such as aviation safety and night lighting and biodiversity considerations (bird and bat strike).

Operation of renewable energy developments

The applicant of a renewable energy project is responsible for complying with consent conditions under the EP&A Act. If community members or stakeholders have concerns with the operation of a renewable energy project, they can raise those directly with the owner or operator.

SSD compliance

DPE monitors and enforces compliance with the consent conditions for SSD renewable energy projects, including following up complaints and suspected breaches reported by the public. Complaints about compliance with SSD development consents can be made via the DPE website's Make a complaint form.

In line with its Compliance Policy, DPE also conducts surveillance, announced and unannounced inspections of operational SSD wind and solar energy projects, and, where necessary, implements compliance action. Enforcement measures include warning letters, official cautions, penalty notices, enforceable undertakings, court orders and/or prosecution.

Local councils are not responsible for enforcing compliance of SSD development consents.

RSD compliance

Local councils manage compliance with RSD renewable energy projects and along with other local authorities, are generally the regulatory authority for the *Protection of the Environment Operations Act 1997* in relation to these projects, except in circumstances where activities relate to the exercise of functions under an environment protection licence.

The Australian Energy Infrastructure Commissioner

The role of the Australian Electricity Infrastructure Commissioner (AEIC) was expanded in March 2021, from the former Wind Energy Commissioner to cover large-scale solar energy, storage, and new large-scale transmission projects. The AEIC works to resolve complaints about large-scale renewable energy and transmission projects. However, the Commissioner does not have any formal decision-making or statutory responsibility in the planning system.

In 2021, the AEIC received 212 new complaints, significantly higher than the previous year and the highest since inception in 2015. Over 50 per cent of complaints were about major transmission projects in the development or pre-commissioning stage, with 18 per cent of these in NSW. NSW had the most complaints about proposed wind farms in 2021. Since the role was expanded, 15 complaints have been received about proposed solar farms. The AEIC has confirmed the trend identified during this Review that community concerns are increasingly focussed on transmission and solar projects.

The AEIC publishes guidelines and observations and recommendations based on its experience.

The AEIC's key observations from 2021 include:

- Long-distance large-scale transmission infrastructure has not been planned and deployed in recent decades. Skills, including community engagement, will need to be regained
- Careful consideration of transmission route design is required including consideration of underground cabling and large-scale storage options.
- Landholder agreement is vital, and it is essential to have effective community and landholder engagement programs
- Compensation arrangements are perceived as inequitable compared to hosting wind and solar facilities. There is also a need for clear and consistent protocols for working with landholders
- Other key issues include bushfire and firefighting risks, reduction of productive agricultural land and impacts on farming and industry economics, risks of a concentration of projects with an upgraded grid and amenity disruption.

The AEIC's recommendations from 2021 include:

- Separating state government environmental standard setting and compliance roles using an independent compliance agency and local Councils to improve compliance and transparency
- Reviewing current state government arrangements to ensure consistency with best practice governance is applied to energy projects
- Reviewing government noise and setback limits for renewable projects and infrastructure, with default distances for 'materially populated townships' or city boundaries
- Optimal site selection, with NSW REZs identified as having scope to licence or select projects most likely to achieve community acceptance and minimise the unintended cumulative effects as a consequence of a REZ
- Improving complaint handling and emergency procedures.

Impact on agricultural land use and agricultural production

The transition to a renewable energy-based system will result in a significant shift in not only the way energy is generated but where it is generated. REZs have been declared so that energy produced from renewable energy developments can be efficiently stored and transmitted across NSW. As a result, a significant amount of this new development will be located in REZs, where the main land use is agriculture.

Understanding the amount and nature of land needed for renewable energy developments and supporting infrastructure and services and the interaction with agricultural production is essential to assessing the implications of the likely land use change. This raises two principal policy questions that were regularly highlighted in submissions and consultations – will the sector's growth have an impact on agricultural production that is sufficiently large to matter, and, whether any additional constraints on landowners' land use options and discretion can be justified. There is also the practical question of the feasibility of steering this investment in renewable generation towards land that is less productive if a positive case can be made of these questions.

An appreciation of the likely scale of this impact and the consequences of land use change is the starting point for this analysis.

This section of the Report aims to provide data and analysis of the land use required for the likely large-scale solar and wind facility development.

Current energy generation supply requirements and energy mix

There is currently approximately 25 GW of renewable energy capacity installed in the National Energy Market (NEM) including rooftop PV, or approximately 42% of the NEM energy generation capacity. Approximately another 168GW is planned for either upgrades, expansions, committed, anticipated, or proposed projects (AEMO Generation, Aug 2022).

NSW currently has approximately 7.4 GW, or 38% of the generation supply sourced from renewable energy generation capacity. Water, solar and wind make up the largest share of renewable energy respectively and each just over 2 GW of energy each. There is a potential further 66 GW of renewable energy potential through either upgrades, expansions, committed, anticipated or proposed projects currently recorded, with NSW having the highest level of potential projects in the NEM pipeline (AEMO Generation, Aug 2022). Not all these projects will proceed, rather this represents the level of potential interest from the energy sector.

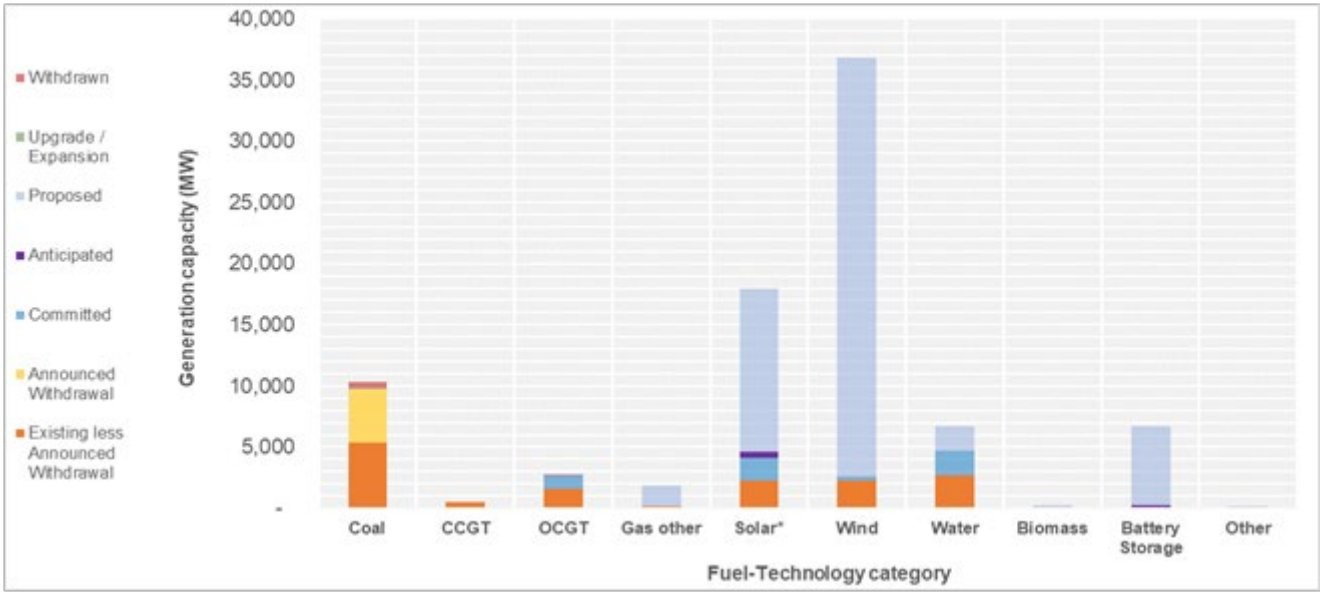

Figure 5: NSW scheduled, semi-scheduled & non-scheduled generation (MW) - existing and new developments by fuel technology category June 2022 (AEMO Generation, June 2022)

Future energy demand projections

While there is no certainty about future demand, modelling allows the identification and evaluation of risks, opportunities, and alternative scenarios. A range of plausible energy futures were explored by AEMO focusing on varying rates of emission reduction, electricity demand, and decentralisation (see **Figure 5**). The scale of electricity demand is influenced by the extent to which other sectors electrify. In the 2022 ISP, AEMO explored four different scenarios and rates of change (AEMO, 2022):

- **Slow Change:** Challenging economic environment following the COVID-19 pandemic, with greater risk of industrial load closures, and slower net zero emissions action
- **Progressive Change:** Pursuing an economy-wide net zero emissions 2050 target progressively, ratcheting up emissions reduction goals over time
- **Step Change:** Rapid consumer-led transformation of the energy sector and co-ordinated economy-wide action
- **Hydrogen Superpower:** Strong global action and significant technological breakthroughs.

In most of the public commentary on this Integrated System Plan, the step change scenario has been described as the most likely of the four scenarios. Under the AEMO ISP 2022 energy demand projections for this scenario, operational demand for energy is expected to rise by approximately 19% on 2022 levels to 76 thousand GWh in NSW in 2042. This is expected to increase by a further 22% on 2042 levels to around 93 thousand GWh by 2050. The largest relative increases in demand by 2042 are forecast to come from Electrical Vehicle load, improving the energy efficiency of businesses, PV Non-Scheduled Generators (PVNSG) generation, and residential electrification respectively (noting that some of these sources of demand are external to the National Electricity Market - NEM). In absolute terms, the increase in operational energy consumption from the NEM will be driven by EV load and residential electrification increases respectively, which will increase by more than 23,000 GWh combined by 2042 (ISP, 2022).

Allowing for the growth in demand, as well as to replace coal and gas energy infrastructure, NSW will need an additional approximately 66 GW to 88 GW of new renewables capacity by 2051, compared to 2024 levels (ISP, 2022).

Future supply requirements and energy mix

The current energy mix in NSW, as of August 2022, is composed of 38% from renewable sources (AEMO Generation, Aug 2022). Based on the ISP 2022 modelling, renewable energy generation in NSW is forecast to increase by almost 306% over the next 20 years, reaching over 71 GW by 2042 under the baseline Step Change scenario (excluding dispatchable capacity). Renewables are forecast to account for 96% of the State's electricity generation by 2042 and become the largest source of generation. Utility scale solar alone is expected to account for 21% of all new renewable energy additions, with almost 23 GW expected to become operational by 2051 under the ISP 2022 step change scenario (ISP, 2022). **Figure 6** illustrates the modelled future energy scale and mix for NSW under the Step Change scenario.

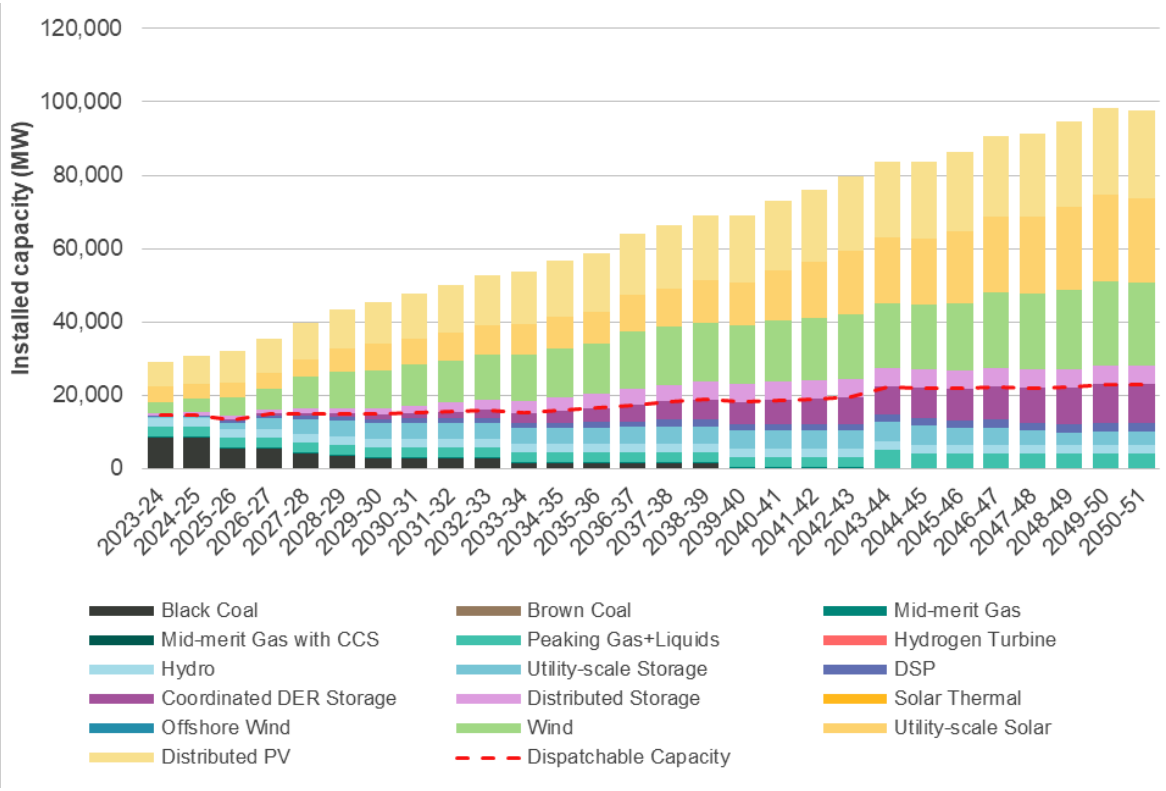

Figure 6: NSW energy generation forecast. ISP 2022, Step Change scenario (ISP 2022)

Annual additions to the State's renewable electricity capacity are expected to average around 3.5 GW per year between 2024 and 2030, 2.6 GW per year between 2031 and 2040 and 2.3 GW per year between 2041 and 2051 under the ISP 2022 step change scenario.

Peaking gas and liquids are the only fossil fuel source forecast to supply energy capacity beyond 2044, making up less than 5% of the energy supply in 2051. (Illustrated in **Figure 7**).

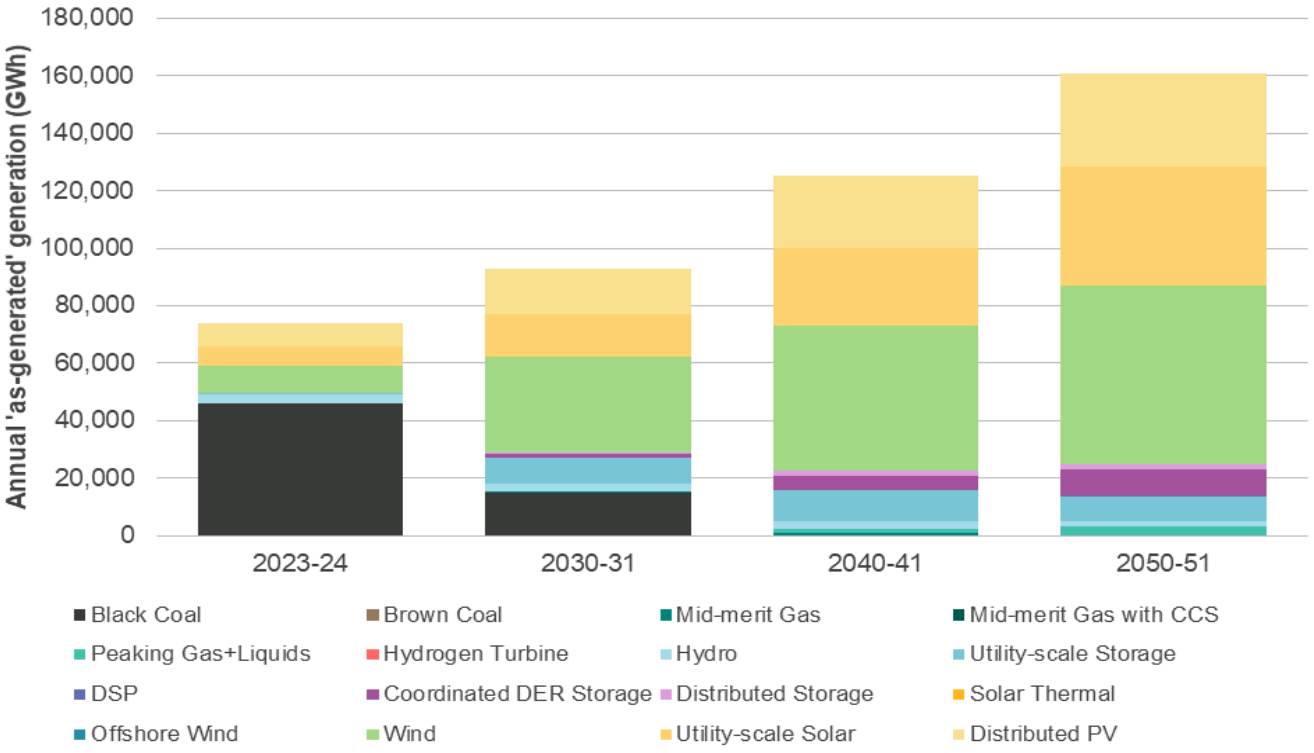

Figure 7: NSW generation by technology type

Land-use profiles

Categorisation and identification of land

There is some confusion about how to define the best agricultural land in NSW, and what, if any, policy protections apply to its development. This is not surprising as councils across NSW do not apply rural land zonings consistently and the attempts that have been made to define, identify and map land by its productive capacity to date are not sufficiently developed to be used in land use regulation (other than for the mining and gas example noted below). **Figure 8** summarises the definitions and land classifications which have differing levels of 'consideration' in the NSW Planning System. While there are varying assessment requirements, there are no prohibitions on renewable, or most other industrial projects, on rural land.

Term	Definition	Consideration in planning framework
Rural Zoned Land	RU1 - Primary Production RU2 - Rural Landscape RU3 Forestry RU4 - Primary Production Small Lots	Electricity generating works are permitted in these zones with consent. Transmission infrastructure is permitted on any land without consent.
Important agricultural land (IAL)	Defined in the Large-Scale Solar Energy Guideline as land mapped as Biophysical Strategic Agricultural Land (BSAL), or a critical industry cluster, Land and Soil Capability classes 1-3, and Important Farmland as identified in the North Coast Regional Plan.	The Large-Scale Solar Energy Guideline requires a detailed Agricultural Impact Assessment.
Biophysical Strategic Agricultural Land (BSAL)	BSAL contains high soil fertility, land and soil capability and access to reliable water and rainfall levels.	Component of IAL above. Verification of the presence of BSAL is required for State Significant mining and coal seam gas projects. A 'Gateway determination' must be issued before these proposals proceed.
Land & Soil Capability Class 1-3	Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	Component of IAL above.
Land & Soil Capability Class 4	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	The Large-Scale Solar Energy Guideline requires a mid-level Agricultural Impact Assessment.
Land & Soil Capability Class 5-8	Land capable of a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	Nil.
'Prime' agricultural land	Nil.	Nil.
State Significant Agricultural Land (SSAL)	NSW DPI developed a draft SSAL map using existing datasets such as BSAL, Land & Soil Capability classes, NSW soil mapping, Important Farmland (as identified in the North Coast Regional Plan), and irrigated land on land use zones RU1, RU2, RU4, RU6, C3 and C4.	Nil.

Figure 8: Commonly used terms for agricultural land and their application in the NSW Planning System

REZ land-use profiles

Each REZ is unique in its location, size, scale of classed rural land, and agricultural profile. The impact of utility-scale renewable energy developments on agriculture will therefore vary both in type and extent across each of the five REZs. Currently, only two REZs have been officially declared; New England REZ and the Central-West Orana REZ.

New England land-use profile

The New England REZ includes Walcha Shire Council and north-eastern parts of Tamworth Regional Council, which are also in the Namoi Regional Jobs Precinct, an initiative of the NSW government to encourage and facilitate the sustainable growth in intensive agriculture and livestock production.

- Total area = 1,550,069 ha (see **Figure 9** for land use profile)
- Incorporates land across six LGA's including the Armidale Regional, Glen Innes Severn, Inverell, Uralla, Tamworth Regional, and Walcha LGA.
- Rural land area = 1,510,720 ha (97% of total REZ area)
- Rural SSAL area = 252,109 ha (16% of rural land area)

The predominant rural land use is livestock grazing (sheepmeat, wool and beef cattle), with some dedicated cropping lands located in the west and north-west of the region and areas of intensive horticulture in the Central-North. Much of the region immediately east of the larger regional centres of Armidale and Glen Innes is undulating or mountainous with the dominant land uses being grazing and to a lesser degree forestry (DPIE NSW Land Use, 2017).

Figure 9: New England REZ land use profile by area (ha)

Central-West Orana land-use profile

- Total area = 2,093,803 ha (see **Figure 10** for land use profile)
- Incorporates land across six LGA's (Warrumbungle, Upper Hunter, Mid-Western Regional, Dubbo regional, Narromine, and Gilgandra).
- Rural land area = 1,839,369 (88% of total REZ area)
- Rural SSAL area = 506,840 (24% of rural land area)

The region is highly diverse due to the variety of landscapes and climates in the region. Mixed farming systems incorporating cropping and grazing (sheepmeat, wool and beef cattle) operations are the dominant land use across the region. Wheat and canola are the main broadacre dryland crops produced and the floodplain areas west of Dubbo support large-scale citrus and cotton operations. The areas immediately surrounding the major regional centre of Mudgee support a viticulture sector and small areas of horticultural production (DPIE NSW Land Use, 2017).

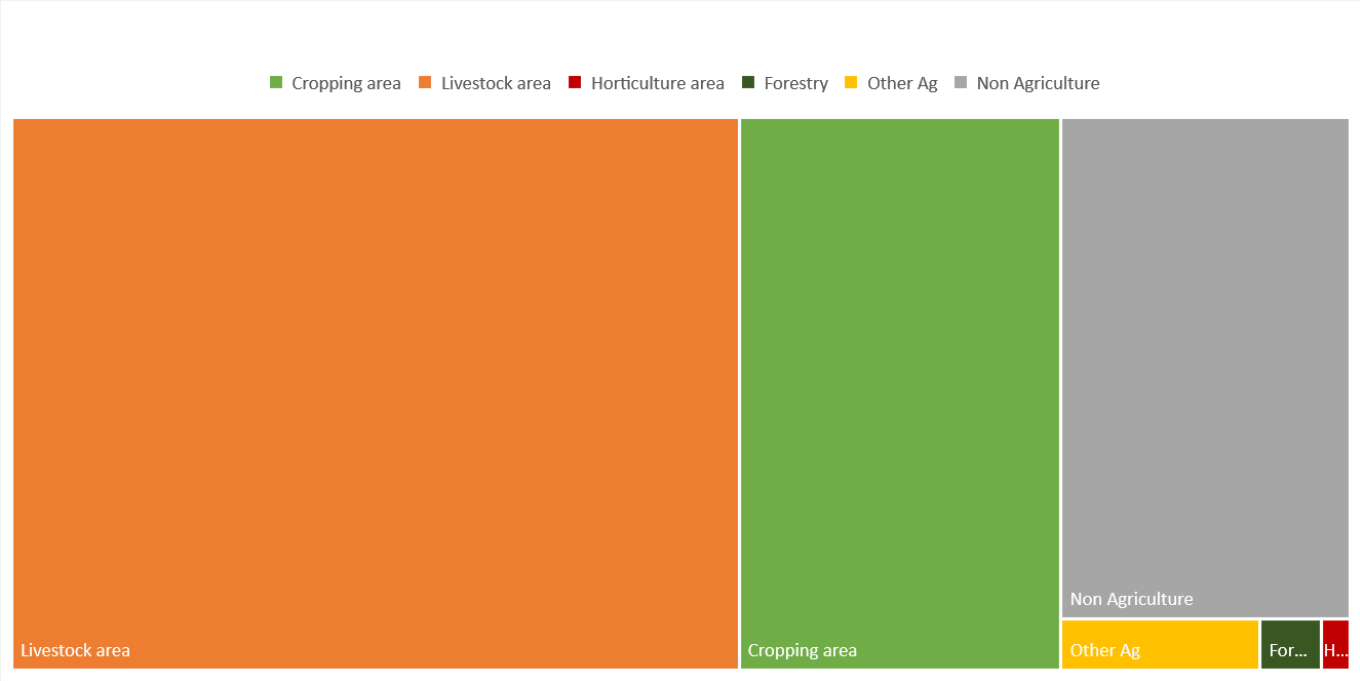

Figure 10: Central West Orana REZ land use profile by area (ha)

Land impacts

Solar

One of the main characteristics of utility-scale solar energy production is its larger land footprint than most other renewable sources. The land-use requirements for solar power installations are subject to a range of factors which determine the efficiency of the development, including the location's proximity to the energy network, climate, site irradiance levels, topography, cell efficiency, and tracking method among others. Owing to the rapid evolution of solar technologies and land-use practices the results reported here do not necessarily reflect future trends. Efficiency in the sector is increasing and land use needs are falling.

Literature and evidence from existing domestic and international utility-scale solar installations indicates that land that is best suited to solar is close to transmission lines, close to end energy users, is open and cleared, with flat or slightly undulating topography (CEC, 2021). Land suitable for broadacre cropping and grazing is where solar PV power potential is generally the greatest. The Clean Energy Council notes that utility-scale solar typically requires access to relatively flat or gently sloping land in sunny areas within proximity to electricity transmission networks, where biodiversity impacts can be avoided or minimised. This often means that land which has been previously cleared or zoned for agricultural use is well-situated to host solar farm developments (CEC, 2021). Point 3 in the Best Practice Charter also notes that signatories "will be sensitive to areas of high biodiversity, cultural, and landscape value in the design and operation of projects" (CEC, 2021).

A conservative basis for estimating the footprint for future solar development in NSW is that it takes approximately 2 hectares to produce 1 MW of electricity, dependent on the solar tracking type, technology, age etc. The Clean Energy Council notes that standard, large-scale solar farms (single-axis tracking) utilise an average of around 2ha/MW of installed solar capacity (CEC, 2021). This energy efficiency was also confirmed in consultation with the NSW DPE, noting that existing developments average approximately 2.86 ha/MW. Panel efficiency is maximised under tracking panels and limited under fixed array solar installations. Newer developments have efficiencies closer to 0.5ha/MW and there is a high likelihood that future technological improvements will increase efficiency further.

By 2042, using the AEMO ISP 2022 and, based on the conservative estimate of 2ha/MW, the amount of land required to meet the utility solar energy generation projected in NSW is likely to increase by 278% and require an estimated 28 thousand hectares of land in total. By 2051 this is projected to increase to 46 thousand hectares under the step change scenario. Under the more ambitious hydrogen superpower scenario, the area of land to support utility scale solar generation projected in 2051 would increase to 69 thousand hectares. This is the projected result of both a changing energy portfolio and increasing demand, and in the case of the hydrogen superpower scenario, the inclusion of hydrogen exports (**Figure 11 and 12**).

	ISP 2022 solar projections to 2051	Estimated utility scale solar area
Scenario	Utility Scale Solar Generation (MW)	Area @ 2ha/MW (ha)*
Step Change CDP2	23,908	46,194
Hydrogen Superpower CDP2	34,534	69,067

** Solar energy production area assumption tested with NSW planning and is considered conservative based on existing solar developments and new solar technology.*

Figure 11: NSW utility scale solar projected land requirements based on Step Change scenario

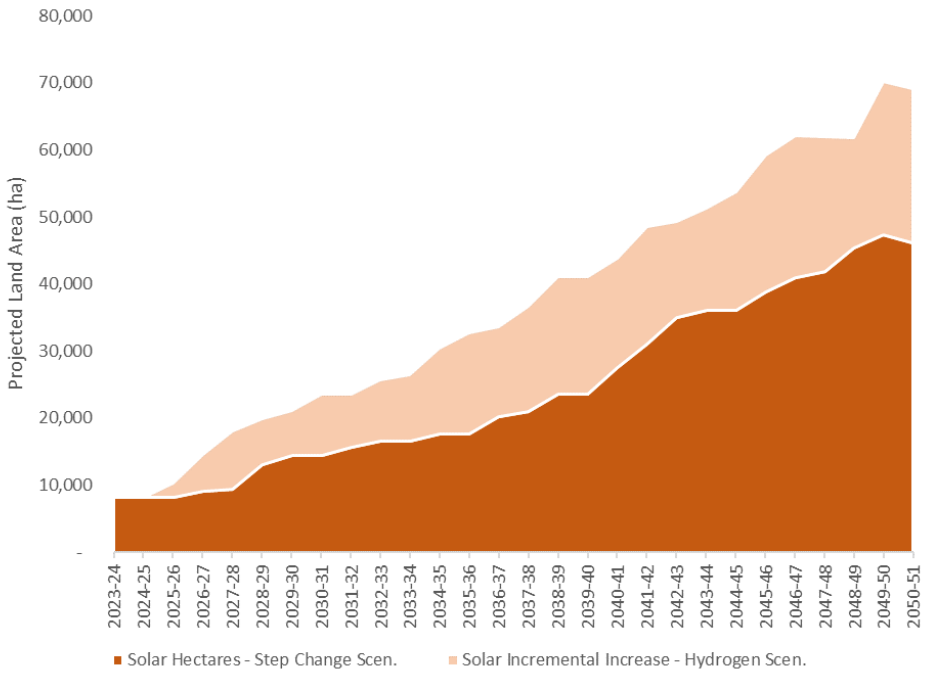

Figure 12: NSW utility scale solar projected land requirements based on Step Change scenario

Wind

Wind speed, direction, and wind turbulence are all factors that affect the suitability of sites selected for wind turbines. The land used for wind power installations is usually less suitable for cropping (i.e., ridgelines) and developments are currently commonly placed on land utilised for grazing or non-agricultural uses although improvements in technology may see future turbines proposed and established on more rolling landscapes, or land that traditionally has not been suitable for wind energy generation to date.

A conservative estimate for wind power development in NSW is that it takes approximately 0.37 hectares to produce 1 MW of electricity, with the average energy output per turbine of 4.1 MW. This efficiency estimate was confirmed in consultation with DPE. It is likely that technological improvements will increase efficiency and reduce this land footprint.

By 2042 and using the AEMO ISP 2022, the amount of land required to meet the utility wind energy generation projected in NSW is likely to increase by 429% and require an estimated 6.2 thousand hectares of land in total. By 2051 this is projected to increase to 8.3 thousand hectares under the step change scenario. Under the more ambitious hydrogen superpower scenario, the area of land to support utility scale solar generation projected in 2051 would increase to 11.7 thousand hectares. This is the projected result of both a changing energy portfolio and increasing demand, and in the case of the hydrogen superpower scenario, hydrogen exports (**Figures 13 and 14**).

At least some offshore wind facilities that are planned will proceed following international experience. While these facilities can be expected to make a significant contribution to overall energy supply, they will complement land-based production and do not change the story that emerges from this analysis. Further discussion of offshore wind energy is included on page 86.

	ISP 2022 wind projections to 2051	Estimated utility scale wind area
Scenario	Utility Scale Wind Generation (MW)	Area @ 0.38ha/MW (ha)*
Step Change CDP2	22,712	8,344
Hydrogen Superpower CDP2	31,843	11,699

Figure 13: NSW utility wind energy projected land requirements based on Step Change scenario

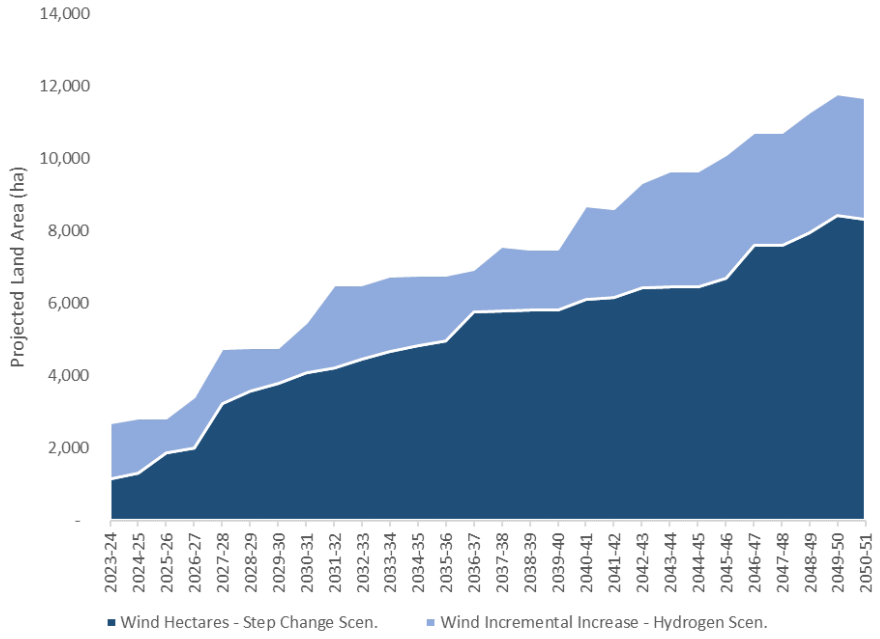

Figure 14: NSW utility wind energy projected land requirements based on Step Change scenario

Land impacts – State and REZ level

Using the AEMO supply generation forecasts, the total amount of land required to support the projected utility solar and wind developments by 2051 would be 54.5 thousand hectares under the step change scenario (**Figure 15**).

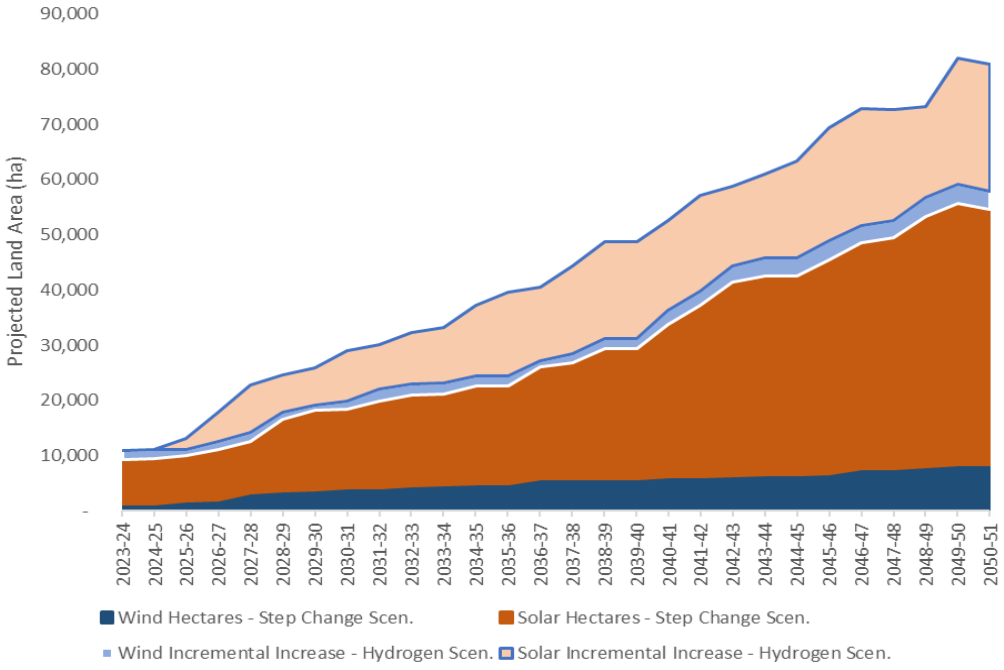

Figure 15: NSW utility combined solar and wind energy projected land requirements based on Step Change scenario

While in reality, these developments would occur throughout the State, for illustrative purposes, this analysis has assumed that all of these developments occur within the boundaries of the REZs. In terms of community impact, this presents a worst-case scenario. The analysis is based on the best available info at the time including the REZs identified to date (noting they may change) and the draft SSAL map (still to be finalised). The assumptions on which this analysis is based are detailed in **Attachment B**.

The estimated land requirements in each REZ are noted in **Figure 16**. These estimates are based on the projected solar and wind capacity and the projected energy mix within each REZ as outlined in the AEMO ISP 2022 report.

The ISP 2022 includes both declared REZs as well as candidate REZs that have been identified by AEMO using a range of factors. While it does not mean the REZs will be declared by the NSW Government, it is important for understanding the potential geographical footprint of future energy supply and subsequent possible land use change. More information on the assumptions underpinning the Integrated Systems Plan 2022 generation forecasts, can be found on the AEMO ISP 2022 website.

Based on ISP 2022 projections 2051	Estimated utility scale solar area Area @ 2ha/MW (ha)	Estimated utility scale wind area Area @ 0.38/MW (ha)
Step Change CDP2 NSW	**46,194**	**8,344**
Broken Hill	642	122
Central-West Orana	14,405	3,053
Cooma-Monaro	0	301
New England	14,393	2,719
North West NSW	503	0
NSW Non-REZ	3,262	599
South West NSW	8,708	1,339
Tumut	0	0
Wagga Wagga	2,616	110
Hydrogen Superpower CDP3 NSW	**69,067**	**11,699**
Broken Hill	777	0
Central-West Orana	35,310	5,651
Cooma-Monaro	0	1,504
New England	7,000	3,843
North West NSW	12,990	0
NSW Non-REZ	0	599
South West NSW	8,708	0
Tumut	0	0
Wagga Wagga	2,616	0

Figure 16: Estimated NSW land requirements to support AEMO 2051 solar and wind energy generation projections

The location of large-scale renewable energy installations will be largely influenced by the cost of connection to the electricity grid. The current grid infrastructure limits the feasible sites and capacity for new renewables developments. Developers will seek to minimise their construction and connection costs by targeting land that is already cleared and within close range of existing power distribution networks that have spare capacity (AgriFutures, 2019). New transmission infrastructure to connect to the REZs to the grid will also provide additional investment opportunities alongside that infrastructure outside the REZ itself.

Land impacts – Rural and SSAL

Figures 17 and 18 summarise the percentage of land required state-wide and for the declared Central-West Orana and New England REZs for both solar and wind technology. These figures assume the entire development footprint is concentrated within each land type category (i.e., 100% development concentration). The impact varies depending on the proportion and type of SSAL, the intended energy mix, and transmission hosting capacity of each REZ. The Central-West Orana REZ has a higher proportion of SSAL within the designated REZ area (20%) than the New England REZ (13%).

The analysis indicates that the maximum possible impact of renewable energy developments on overall Rural land and REZ land is minimal. Under this analysis though, the proportion of SSAL that would be required to support the entire development footprint would be more significant. However, given the presence of significant alternative and less productive land use categories in these regions, the likelihood of this degree of development occurring exclusively on SSAL land is unlikely. The development assessment process and the Large-Scale Solar Energy Guidelines also seek to minimise the development of land that would conform to the SSAL classification and promote the use of less productive land types.

Proportion of Land Required For Solar (assuming developments are 100% concentrated within each land type)*			
Based on ISP 2022 projections 2051	% of Rural Land**	% of REZ Land	% of SSAL Land
Step Change CDP2 NSW	**0.1%**		**0.5%**
Central-West Orana	0.8%	0.7%	2.8%
New England	0.9%	0.8%	5.7%
Hydrogen Superpower CDP3 NSW	**0.1%**		**0.7%**
Central-West Orana	1.9%	1.7%	6.9%
New England	0.5%	0.4%	2.8%

* Assumes that the projected REZ solar development requirements are 100% concentrated into the land type categories mentioned at the top of the column within each region. This is a worst-case scenario for each location, and more plausible land type estimates are provided later in the Report.
** Rural land is defined for these calculations by the RU zones.

Figure 17: Maximum land type requirements for projected 2051 solar generation capacity, assuming generation is concentrated within each land type

Proportion of Land Required For Wind (assuming developments are 100% concentrated within each land type)*			
Based on ISP 2022 projections 2051	% of Rural Land	% of REZ Land	% of SSAL Land
Step Change CDP2 NSW	**0.0%**		**0.1%**
Central-West Orana	0.2%	0.1%	0.6%
New England	0.2%	0.2%	1.1%
Hydrogen Superpower CDP3 NSW	**0.0%**		**0.1%**
Central-West Orana	0.3%	0.3%	1.1%
New England	0.2%	0.2%	1.5%

* Assumes that the projected REZ wind development requirements are 100% concentrated into the land type categories mentioned at the top of the column within each region. This is a worst-case scenario for each location, and more plausible land type estimates are provided later in the Report.

Figure 18: Maximum land type requirements for projected 2051 wind generation capacity, assuming generation is concentrated within each land type

Figure 19 notes the maximum land requirements for Rural Non-SSAL and the percentage of SSAL (assuming generation is concentrated within each land type). The analysis indicates that the proportion of Rural-Non-SSAL Land and SSAL Land required to support projected developments remains relatively small when compared to the total amount of available Rural/Non-SSAL Land and SSAL land, both at a state-level and REZ level. Again, energy generation being fully concentrated within each of these two land-type categories is not a plausible scenario, particularly given the assessment processes that would be required for projects to proceed.

Proportion of Land Required For Solar + Wind (assuming developments are concentrated in each region in the same proportions to the Rural-Non SSAL to SSAL land type ratio)*

Based on ISP 2022 projections 2051	% of Rural/Non-SSAL Land	% of SSAL Land
Step Change CDP2 NSW	**0.1%**	**0.0%**
Central-West Orana	0.6%	0.2%
New England	0.8%	0.2%
Hydrogen Superpower CDP3 NSW	**0.1%**	**0.0%**
Central-West Orana	1.4%	0.5%
New England	0.5%	0.1%

* Assumes that the developments are distributed across land types in the same ratio of Rural-Non SSAL Land, SSAL land within each region.

Figure 19: Maximum land type requirement for projected 2051 solar + wind generation capacity, assuming that developments are concentrated in each region in the same proportions for the Rural-Non SSAL to SSAL land type ratio

This analysis indicates a low level of land use change impact across a range of land categories. Proximity to transmission infrastructure is crucial, and Figure 20 shows the proportion of land required to support the projected solar and wind developments if all of the developments are within a 10-kilometre radius of existing transmission infrastructure in the respective regions. This scenario does produce some higher land use change results, in particular for SSAL land located in the Central West-Orana REZ, where 21.5% of SSAL land would be required to support the projection developments in this scenario. Significant additional transmission infrastructure, and renewable developments outside the REZs, among other factors, mean that the impacts to rural land and SSAL land will be partly dependent on where the transmission infrastructure is located.

Worst case – Land Required For Solar + Wind (assuming developments are 100% concentrated within 10kms radius of existing transmission lines and land use ratios/renewable take up is constant)*

Based on ISP 2022 projections 2051	% of Rural Land	% of SSAL Land	ha cropping Land	ha of grazing land
Step Change CDP2 NSW	**0.4%**	**1.6%**	**15,150**	**39,388**
Central-West Orana	2.9%	9.2%	5,238	16,450
New England	2.2%	9.2%	987	16,125
Hydrogen Superpower CDP3 NSW	**0.6%**	**2.4%**	**22,436**	**58,330**
Central-West Orana	6.9%	21.5%	12,290	28,672
New England	1.4%	5.8%	626	10,218

* Assumes that the developments are fully concentrated within a 10km radius of existing transmission infrastructure and that the developments are evenly distributed across the range of land use categories within this zone. This analysis is based on the information available at the time of writing and could be updated as the REZs and associated transmission infrastructure is further developed and refined.

Figure 20: Maximum land type requirement for projected 2051 solar + wind generation capacity, assuming generation is concentrated by each land tyle within a 10-kilometre radius of transmission infrastructure

Agricultural Output Impact

NSW has strong growth aspirations for the agriculture industry, and high prices and good seasons have seen very strong growth in overall production values in recent years. This has led to rapid increases in rural property values and increased on farm investment. There is every reason to expect these trends to continue and accelerate in some areas. Australian governments have adopted a policy of growing the sector to $100b by 2030, and the NSW Farmers Association is aiming for growth to $30b by 2030. While these values appeared out of reach when first adopted in 2017, with 2020-21 production valued at $75m, favourable seasons and continuing strong industry investment could see these targets reached this decade.

The potential loss of agricultural production due to renewable energy development will be strongly linked to the nature and scale of land utilised for renewable energy developments. That is, the loss in agricultural output will be influenced by the location, size and footprint of renewable developments, noting however that opportunities for co-existence may alleviate some of these impacts as better technology and research becomes available. An estimate of the approximate annual loss in Gross Value of Agricultural Production (GVAP) was developed. Some key assumptions used to develop these estimates, which reflect worst case outcomes, were:

- Projected solar and wind land requirements are based on the estimates using the ISP 2022 forecasts
- An average energy generation efficiency of 2ha/MW for solar developments, and 0.38ha/MW for wind developments
- Five-year average commodity prices were used for key agricultural commodities
- Five-year average yields are used for cropping industries
- Cropping area share for key commodities were based on NSW five-year average proportions
- Livestock stocking rates were based on three-year average for the Northern Tablelands and Central West as proxies as stocking densities within key REZ zones
- Agricultural land substitution was applied to each sector in the proportions which they exist within a 10km proximity to current NSW transmission lines (DPIE Land Use)
- The analysis assumed that all renewable developments occurred on rural land, and that the land was actively being used for agricultural production
- As average land productive capacities were used, this analysis is agnostic of whether the land is identified as SSAL or Non-SSAL
- None of the additional landholder income was used to improve the capital base and efficiency of their remaining farming businesses.

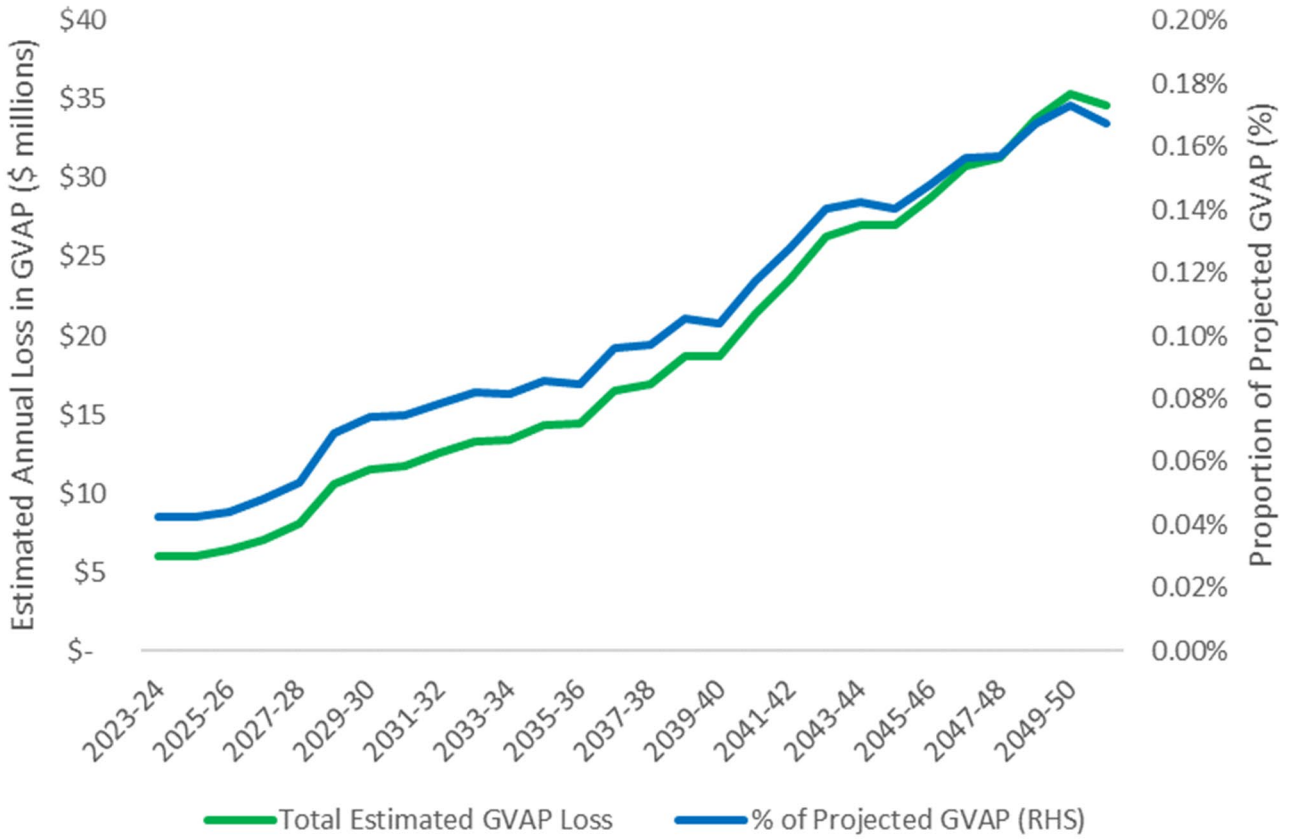

Figure 21: Estimated annual loss in GVAP from agricultural to renewable land substitution

The analysis estimated that the annual loss of GVAP output peaked at approximately $35 million in 2049-50 as land converted from agriculture to renewable energy peaks. This is equivalent to an estimated 0.17% of total NSW GVAP, using a conservative linear GVAP growth projection to 2050-51 (**Figure 21**). In Net Present Value (NPV) terms over 20 years, the cumulative loss of GVAP is estimated at $124 million. This is small when put in perspective, for example, over the past decade, the average annual GVAP of the NSW wheat sector alone was $1.83 billion. Moreover, total landholder returns from rural land use will increase from this land use change which will also provide diversification and mitigation of drought cycle impacts. It is also important to note that this land use change does not represent a perpetual loss, as the land can be returned to agricultural use following decommissioning of the renewable energy facility. Further research into co-existence and new technology, particularly with agrivoltaic systems, may also reduce the agricultural productive losses in the future.

Conclusion

The analysis shows that renewable energy development is not in conflict with agricultural land use at a sufficiently large scale to materially affect the NSW state agricultural base. Even if the highest estimated levels of supply occur, the land required is, in orders of magnitude, significantly smaller than land currently in cultivated agriculture and less than the amount of agricultural land currently utilised for other competing land uses such as urban development.

Despite this, there may be localised impacts on agricultural land when considered on a smaller scale. The presence of REZs and proximity to transmission infrastructure means that in some regions or localities, the land-use change impacts will be more evident.

Whilst the potential land-use impacts of utility-scale renewable energy developments in NSW have been estimated in this analysis there will be other increasing demands on rural land. These include other measures that will be required to reduce greenhouse emissions to achieve net zero emissions goals.

Australia is one of 187 countries that have committed to the Paris Agreement goal to keep global temperature rise to below 2°C. NSW has committed to a net zero emissions target by 2050 (**NSW Gov, 2021**). Similar commitments have been made by agriculture industries. The Australian red meat and livestock industry has committed to a Carbon Neutral by 2030 Initiative (CN30) which, with reductions in emissions from grazing management, lot feeding and processing, also requires very large increases in carbon storage in soils and vegetation (**MLA, 2020**). Similarly for the grains industry, GrainGrowers has announced a climate change policy which supports net zero emissions by 2050 for Australia, and a 15% reduction in industry emissions by 2030, and working towards net zero carbon by 2050 (**GrainGrowers, 2022**). One of the source documents for the CN30 initiative estimated that achieving carbon neutrality for the national livestock industries would require the conversion of between 5 and 12 million hectares to carbon sequestration (**Mayberry et al, 2019**).

Whilst some emissions policy measures will have no immediate impact on land use, climate change mitigation strategies such as carbon sequestration through vegetation and soil are critical to overall emissions reduction strategies. Both the NSW and Commonwealth government policies and the agriculture industries own emissions reduction plans imply land use changes that will have a significantly greater impact on land use than the growth of renewable energy generation over this period to 2050.

Themes from consultation

The evidence provided during consultation about experiences with the early stage, but accelerating, renewable energy rollout, was mostly anecdotal, with a limited number of examples based on operating facilities in NSW from which to draw experiences and lessons. However, consistent and clear observations were made about how the system is currently working.

The macro benefits of renewable energy developments are widely recognised and supported, including in the regional areas of NSW hosting these projects. As a general principle, stakeholders also recognise the benefit of diversifying the economic base of regions and the potential for growth in associated sectors such as ag-tech (with improved connectivity) and renewable energy supply chains.

Advocacy on state-wide and broader benefits is seen as credible and effective. There is much less evidence of and conviction about benefits for local communities, with some experiencing adverse impacts and costs. With many regional communities experiencing labour and housing shortages, and local government authority budgets struggling to manage local infrastructure and other demands, the local economic stimulus from renewable energy project construction has been disruptive in some cases.

Additional requirements on project applicants could affect project viability, but community opposition, delays and political interventions can also affect confidence about timing, design and viability of projects.

Successful implementation of the State's energy policy with necessary momentum will need greater local support and/or acceptance which means at a local and project specific level – more transparency, information and financial 'benefit/compensation.'

These issues are explored through the remaining sections of this Report. The following sections outline the 12 themes identified during consultation (listed in **Figure 22**). Each section sets out the problem description, evidence and material and views shared during consultation, key review findings, and makes recommendations about what could be done to improve the current situation.

Recommendation 1: To maintain an attractive environment for investment in renewable energy and a policy rollout at the required speed, the NSW Government should:

- ensure that regulatory controls for renewable energy and transmission developments remain proportionate to the risk that they are trying to mitigate
- note that a higher level of local community acceptance will be important to a timely and successful energy policy implementation and consider the additional measures proposed in this Report to improve that acceptance.

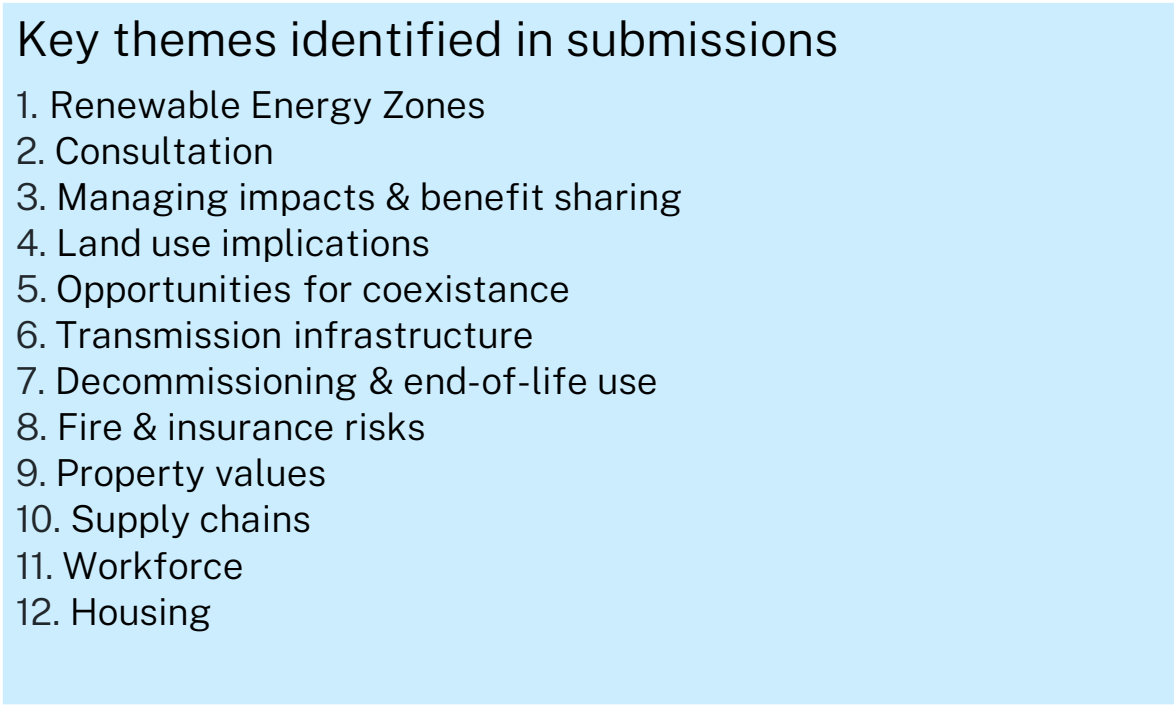

Figure 22: Key themes identified in submissions

1. Renewable Energy Zones

Problem description:

In declaring Renewable Energy Zones (REZs), the NSW Government has set clear development and investment intentions. However, some communities within the REZs feel they do not have enough information on how the REZs were identified, what their role will be in the State's energy generation, how projects will be assessed for inclusion, and what the overall cumulative impact is likely to be on their local industries and communities.

Evidence and what we heard

The renewable energy sector and investors have advised that the NSW planning system and the REZs generally provides certainty and clarity about development and investment opportunities in NSW. However, there were some strongly dissenting views and concerns about regulatory overheads and perceptions of 'political interference' in planning decision making.

Seventeen submitters to this Review felt local communities and councils were not sufficiently consulted about the REZs and renewable energy development opportunities in their region, and this sentiment was expressed regularly in other consultations. Some cited that it is difficult to engage on individual projects, without an understanding of the final footprint of developments in the region. Several submitters suggested the NSW Government should develop a dedicated information portal for the REZs.

> 'There is a lack of understanding of what is the 'end game' in the REZ, and it is then difficult to form a view for many on whether to support or object' - NSW Farmers

The AEIC has recommended that state governments "publish and maintain a map of all operating and proposed wind and solar farms, including the location of the project, location of wind turbines or solar arrays, the status of the project (proposed, permitted, in construction or operating) as well as information about the project's design, including number and size/rating of wind turbines or solar arrays and information about the applicant."

Some participants in this Review were concerned that renewable energy developments are occurring in areas that are not within REZs. While development is encouraged in the REZs, ongoing renewable energy development will continue to occur outside these areas.

It is also worth noting that as transmission infrastructure is established to connect the REZs to the grid, new renewable energy development opportunities may open up along those corridors.

Several submitters suggested that the REZs and all energy generation should occur in Far West NSW only, where impacts to currently identified regional communities would be minimised. However, this is not feasible based on the following:

- *Cost of infrastructure* – the longer the distance the electricity has to travel, the higher the cost of constructing the transmission infrastructure
- *Transmission losses* – the distance from generation to consumption increases transmission losses
- *Existing infrastructure* – the REZs will capitalise on some existing infrastructure, minimising the amount of new infrastructure required.

While there has clearly been a significant effort made to consult REZ communities, this will need more ongoing activity. The necessary content is complex and there is uncertainty about specific proposals, and people will engage at different times and with differing levels of interest. The concerns raised may indicate that future arrangements and regional scenarios have not been communicated effectively to those who are not heavily involved in their development so far, or that this information has been too hard to find. These stakeholders include landholders, potential neighbours, communities and local councils, who can have a strong role to play in gaining support for developments. The NSW Government could clarify the development potential of the State by

mapping areas that are suitable for transmission, solar and wind energy developments and publish this information.

Cumulative impacts and consultation burden in the REZs

Participants in this Review raised concern that the cumulative impacts of several developments proceeding at the same time are not being considered appropriately. In November 2021, the NSW Government released the Cumulative Impact Assessment Guidelines for Significant Projects. These provide guidance and advice for the consideration of cumulative impacts of SSD projects. The assessment of cumulative impacts by the applicant is considered by the decision maker when evaluating the merits of the project.

The AEIC noted that in particular "REZs may need to contend with the issue of cumulative effects as developers concentrate their efforts in the REZ geography to leverage the transmission hub that is to be established."

> 'CWPR acknowledges that this level of development will inevitably result in cumulative impacts in some regions of NSW, in particular REZs, and we seek recognition and further guidance from NSW Government on how this should be addressed in decision making under the current regulatory framework' - CWP Renewables

The renewable energy sector recognises that consultation fatigue is already occurring, and that this could risk robust consideration of each project by the community. Communities and landholders requested locally coordinated resources, consultation and advice to help manage multiple developments in the same area. They also feel that 28 days is not sufficient time for a meaningful consultation given the complexity of the proposals and supporting material and the relative inexperience of the potentially affected parties. The NSW Government should implement measures to improve these public consultation arrangements.

> "The NSW Government should have an active community engagement role in REZ communities. This outreach role should be responsible for explaining to communities about the short-term impacts of renewable energy projects and setting expectations – for example, the traffic caused by over-size loads coming through the town, increase in number of construction workers. Such a role may also be able to alleviate 'consultation fatigue' that regional communities may experience where there are several projects planned for the area." – Clean Energy Council

Industry interest in the REZs and the volume of projects that can be supported

The declaration of the Central-West Orana REZ identified that the NSW Government is seeking to deliver an initial 3GW of new transfer capacity through development of the REZ. However, during the NSW Government's registrations of interest process, the renewable energy sector flagged interest in developing projects that would have the capacity to generate 27GW. This has created some confusion over the actual size and scale of development that may occur in the REZs. As outlined at the beginning of this Report, not all of these registrations of interest will be successful in being permitted to connect to the new REZ infrastructure or proceed to development.

In effect, developers will need to compete amongst each other to present the best value to the NSW community and be awarded access to the limited transmission capacity that will be developed for each REZ. The independent Consumer Trustee will oversee this process through regular tender rounds and will ensure that proposals are selected on merit, with only the best proposals progressing. This approach reflects the AEIC's recommendation for projects in the REZs based on factors such as economic development and the ability to both support regional community and renewable energy sector development.

This means that a project connecting to the new REZ network infrastructure will be required to obtain the necessary development approvals through the NSW Planning System, and also be successful in obtaining access to REZ infrastructure. Once connected to the REZ network infrastructure, these projects will pay a fee to EnergyCo, a portion of which will be held aside for community and employment purposes. EnergyCo will administer revenue from these fees to achieve REZ-wide community benefits. By implementing a REZ-wide benefit sharing scheme, EnergyCo aims to ensure that the cumulative impact of these developments on REZ communities is offset with appropriate benefits.

The identification of this additional source of community funding has created some confusion over its interactions with other sources of funding for community benefits. EnergyCo has clarified that the NSW Government-led benefit sharing arrangements are separate and additional to existing planning agreements and community benefit programs that may already be offered by developers. These existing measures will continue to have relevance within REZs. In fact, the competitive assessment of projects proposed in the REZs should mean that projects offering meaningful benefits to local communities are prioritised.

It is worth noting that there is some risk that this approach may have the unintended consequence of reducing the positive connection (i.e., the applicant's community benefit sharing scheme) between the developer and the local community receiving the related benefit, reducing local acceptance of the individual developer.

Findings and recommendations:

- REZs are sending effective signals to the renewable energy sector to attract and target renewable energy investment. However, communities in those zones would benefit from greater clarity about REZ arrangements generally, including their identification, their role in the State's energy generation, how projects will be assessed for access to the grid, likely volume/footprint commitments within each zone, etc. so that they can have a realistic understanding of what the long-term land use pattern will be and the decision-making processes to implement these changes.
- Communities advocated for locally coordinated resources, consultation, and advice to improve their capacity to participate in the planning processes and reduce the cumulative impacts of multiple development applications on the same community. The renewable energy sector also recognised this cumulative burden and the value that additional support and information could deliver in reassuring and supporting communities to engage in the development process.
- Although the outreach activities by EnergyCo and the DPE have been widely appreciated, the general perception is that more ongoing, on the ground liaison activity is required to provide a more localised focus to communication and relationship development between those communities and project applicants. Given the significance of successful policy delivery for the NSW economy and government, this seems clearly warranted.

Recommendation 2: To improve community awareness and understanding of the likely future development of land use and economic changes in and around REZs and transmission infrastructure, the NSW Government should:

- improve accessibility to information about the REZs, including the reasons why particular areas have been chosen and any additional requirements for developments located within a REZ
- continuously improve the user-friendliness of the NSW Government's Planning Portal to better communicate the information it contains; and
- prepare and display high-level indicative mapping that identifies areas that are potential transmission routes or suitable for solar and wind developments, based on the AEMO Integrated System Plan, proximity to infrastructure and land characteristics etc. so that communities can understand whether they are likely to be affected and can begin to engage in the development processes in a more informed way.

Recommendation 3: The NSW Government should play a stronger role in supporting local engagement in the REZs and on planned transmission corridors, separately from its regulatory and consent authority role. This could include supporting local councils or other regional organisations where they exist, to effectively engage on behalf of their communities.

2. Consultation

Problem description:

Effective and meaningful participation in consultation requires a concerted effort from individuals and communities. Planning and project proposals contain technical information and can be lengthy documents. Landholders and communities report struggling to digest this information and engage in the available time (generally 28 days for the final formal process). The renewable energy sector has indicted its desire to address the potential for consultation fatigue and to promote engagement.

There is a view that communities are not engaged early enough, with insufficient time to consider proposals and provide input. However, applicants also recognise that consulting too early can lead to additional frustration with an incomplete picture of the final development.

Evidence and what we heard:

Establishing social licence

Meaningful consultation and engagement are integral to establishing 'social licence' for a project. However, while this is a much-used term and is often considered by some to mean that communities have, or should have, a *veto* power over proposals, it actually has no technical regulatory meaning. 'Social licence' is *'the acceptance secured for a development from affected stakeholders within the community in which the development is located'* (Hall et al, 2013). It elicits a form of informal 'permission' that can ease the development approval processes and provide the basis for a long-term relationship between project operators and neighbouring businesses and communities.

> 'more successful proponents… go above and beyond …demonstrating how social licence is created and maintained for shared benefits between us, landholders and our host communities' - CWP Renewables

In practice 'social licence' is established by undertaking a robust, fair and transparent process. Allen et al. 2019 identified six key areas where organisations can target efforts to establish social licence:

- *Creating awareness & shared purpose* – early engagement and clarity around roles and processes
- *Communications & engagement* – two-way dialogue that appreciates respective points of view
- *Relationship-building* – established through the tone of communication and engagement, for example by following through on commitments
- *Managing social licence to operate across scales* – recognising that different approaches may be needed for different sub-groups
- *Responding to community concerns* – setting out what will be done, by who and when and then where other issues arise, responding accordingly
- *Managing procedural & distributional fairness* – ensuring all parties can have their say and can realise a benefit from the activity.

If a development were able to proceed with little 'social licence', this would have an impact on any future development in the community. A poor experience for a community in with one development may be projected onto other projects and applicants.

The NSW Government has a role to play in supporting renewable energy applicants to establish 'social licence' by setting the planning framework for communities to engage in proposals in a manner that appropriately considers physical, social, environmental and economic aspects. This is especially the case in REZs where investments and impacts will be concentrated.

One of the roles of the consent authority is to verify whether engagement has been undertaken in accordance with government guidelines. It then undertakes its own engagement process (through the exhibition process) to validate what people think of the proposal and ensure that key assessment issues are addressed.

Community perspectives on consultation and engagement

The minimum requirement for exhibition of SSD proposals is 28 days. It is uncommon for consultation to occur for longer than the minimum requirement. Thirty-two submitters to this Review considered that they do not have sufficient opportunities to influence outcomes and make their views known, and the Review received similar feedback in numerous other interactions, so this seems likely to be a widely held view.

> 'Developers and planning have months/years to prepare huge documents, but the community only have 30 days to read, absorb, research and respond to EIS documents. The community generally has a lack of expertise in comparison to those facilitating such information which is strongly unfair also given that surrounding agricultural landholders are often busy with farming activities' – NSW Farmers Billabong Branch

As well as feeling like consultation is too short, 33 submitters to this Review considered that communities are not engaged early enough in the planning process. Applicants are aware of this concern and have said that they try to balance the timeliness of their engagement with the availability of information and feel that consulting too early can lead to additional frustration and a sentiment that the applicant is 'hiding information' when it is not yet available. NSW Farmers focused on this issue at its July 2022 Annual Conference with its members voting for the organisation to advocate for stronger requirements for early engagement with affected communities and landholders for SSD projects.

> 'Too often consultation focuses on telling people what is happening rather than on processes that support co-design and collaborative problem solving. More information does not by extension result in improved consultation' – Riverina Joint Organisation

Some communities perceive that consultation is only undertaken to satisfy minimum requirements rather than with the intention to take feedback on board. The tone or attitude of applicants' engagement is not something that can be readily regulated.

> "Major contributing factors to that community anger and stress include people feeling a *fait accompli* has been foisted upon them, as well as their subsequent concerns being mischaracterised as being a NIMBY-ism anti-renewables attitude" – individual

Fourteen submitters to this Review did not think there is enough information about the factors that inform decision-making. Without this they can feel disenfranchised and feel they have no clear way to influence outcomes. Applicants are required to demonstrate how issues raised during consultation on the EIS have been addressed (what changes have been made to the project) or will be managed when submitting their development application. However, despite this information being publicly available, there is a perceived disconnect in closing the loop with communities about how their views have been taken into account or addressed.

> '...stakeholders would have more confidence in the rigour and robustness of the assessment and determination process if it was seen to be more open, transparent and accountable' – Mining & Energy Related Councils

Renewable energy sector engagement efforts

The efforts of applicants to engage communities during the proposal and development assessment process are informed by best practice guidelines, including:

- The NSW Government's *Undertaking Engagement Guidelines for State Significant Projects* – provides guidance to applicants on planning, undertaking and reporting on community engagement activities
- The Clean Energy Council's *Best Practice Charter for Renewable Energy Developments* – sets out ten principles for applicants to adopt when undertaking consultation
- The Clean Energy Council's *Community engagement guidelines for the Australian Wind Industry* – provides specific information about how consultation should be conducted at various stages of the project, including site selection, planning/approvals, construction, operation and decommissioning.

However, varying community experiences indicate that additional effort may be required by at least some project developers within the current framework. Any additional regulated requirements for applicants would need to be balanced with the timely delivery of projects. The renewable energy sector does have a strong practical and commercial interest in understanding and implementing best practices in this area. Consistent feedback to the Review was that this is now generally evident in the wind sector, but less so for solar which seems less mature at this stage, and the transmission industry which operates in a unique legal framework as a provider of essential infrastructure services.

The commitments made in the Clean Energy *Council's Best Practice Charter for Renewable Energy Developments* could be codified and/or strengthened by setting out what communities should expect at each stage of the process, so they can understand what engagement activities should be undertaken from the outset rather than experiencing the process for the first time with little understanding of what appropriate engagement looks like.

Community Consultative Committees

Community Consultative Committees (CCC) were noted during consultation as an avenue for community engagement. CCCs are not decision-making or regulatory bodies, they provide a forum for two-way discussion on issues and should add to the quality of the project applicant proponent's development application. They can continue to operate during construction and operation of the facility.

The membership of a CCC includes:

- *an independent chairperson* - with experience in facilitation, mediation, and SSD projects. The applicant is charged for the chair's time
- *community representatives* – up to seven members, identified through an expression of interest to represent a balance of community views, including stakeholders supportive of the development, opposed, and undecided
- *relevant council representatives* – one representative per council
- applicant representatives – up to three.

DPE has issued guidelines to clarify the roles and responsibilities of CCCs. The guidelines note that if the applicant's community engagement strategy aligns with best practice and recognises the local and project specific needs, then a CCC 'should not be needed in the early stages of the project'.

DPE decides if a CCC is required when considering a request for Secretary's Environment Assessment Requirements (SEARs). It may be included as a requirement of the SEARs or as a condition of the approval of the project. It is common for large-scale wind energy developments to be required to have a CCC. The AEIC recommends that CCCs should be established as early as possible to achieve the maximum benefit.

During this Review, applicants and DPE advised that CCCs are a useful tool for community engagement for operating facilities. However, applicants recognised that during the proposal and development stages that establishing constructive dialogue can be difficult if strongly held views already exist.

Council capacity and engagement

Local councils are the consent authority for projects that have a Capital Investment Value (CIV) of under $5m. As outlined in **Figure 3**, projects with a CIV over $5m are assessed as Regionally Significant Development (RSD), and those over $30m are State Significant Development (SSD). Most large-scale solar energy and wind energy proposals are SSD. Councils are not the consent authority for RSD or SSD, but councils assess RSD proposals, before they are referred to the Regional Planning Panels for determination.

The Independent Planning Commission becomes the consent authority for a SSD or RSD proposal if there are 50 or more unique public objections to the development application and/or the local council objects to the application.

Local Councils have expressed concern they do not have meaningful input into either the SSD or RSD pathway and that the State plans override any local regional planning. The role of councils in these developments is to engage in consultation and provide feedback on developments, which is considered alongside submissions made by the wider community.

Some councils requested a greater role in decision-making on renewable energy developments due to their understanding of local strategic, economic and planning priorities, and believe that their views and input should be prioritised over other submissions. By contrast, in some cases local councils remove themselves from the decision-making process by referring proposals that may not meet the SSD threshold to Regional Planning Panels for determination.

Local councils can play an important role in facilitating and supporting community engagement. But they advise that they do not have enough resources, information or time to do so and meaningfully consider, or support community engagement on proposals.

> "Council is not sufficiently resourced to consider the volume of RE development associated with the REZ. Currently, Council is involved with 17 RE developments at various stages through the planning process..." - Mid Western Regional Council

The NSW Government established the Regional Housing Flying Squad in 2022 to support regional councils experiencing a high volume of housing development applications by outsourcing these assessments. The NSW Government identified a shortage of planners across NSW, particularly in regional NSW, that was resulting in delays in DA assessments and ultimately in the delivery of new housing. A panel of planning consultants were engaged to conduct these assessments on behalf of councils. Councils had to nominate DAs that would deliver regional housing through an EOI process. If projects were evaluated and successful, they were allocated to one of the Regional Housing Flying Squad consultants to assess on behalf of the council, and to the councils' satisfaction.

A similar approach, along with capacity building activities, should be considered for councils where a significant number of renewable energy developments are proposed.

Findings and recommendations:

- Communities can find it difficult to engage in genuine consultation for projects as they have limited capacity and capability, and for many it is a novel experience. Communities reported being overwhelmed with technical information, having insufficient time to engage themselves or seek their own professional assistance (the 28-day period is widely considered to prevent meaningful informed responses), and experience a cumulative burden if several developments are proceeding at once. The renewable energy sector understands that an unintended outcome of their engagement objectives can be consultation fatigue and wants to address this issue. Despite this concern it seems clear that all parties should err on the side of more consultation and information provision rather waiting for higher levels of confidence as project planning develops. As REZ communities particularly become more educated about formal planning processes there should be greater acceptance of the unavoidable uncertainties at some stages of these processes.
- Clarity was sought by communities on what they should reasonably expect from consultation, how developments are assessed, and how feedback influences development decision making. Community engagement is a requirement of the development assessment process. It should include meaningful and open consultation that provides adequate opportunity for engagement. There is also an onus on communities to willingly engage in this process.
- In some cases, additional effort is needed in consulting with landholders and communities, and more information and engagement at regional and project-specific level is needed despite concerns about 'consultation overload'. The renewable energy sector, through the Clean Energy Council, has a Best Practice Charter for Renewable Energy Developments with 50 signatories. There may be an opportunity to describe more clearly what the charter means in practice for communities or formalise as a commitment by development applicants.
- The NSW Government has also recognised this consultation burden and EnergyCo is investigating opportunities to better resource engagement in the REZs by providing local

resources and funding for local councils to support engagement. This Review strongly supports measures by NSW government agencies to assist communities to engage more effectively in the planning decision making processes. Given the significance of successful policy delivery and community acceptance of the growing presence of this industry early public investment in this area should yield high returns over the rollout program.

Recommendation 4: Consistent with the NSW Government's Large Scale Solar Energy Guideline and Undertaking Engagement Guideline for State Significant Projects, the renewable energy sector and transmission proponents should take steps to undertake meaningful and effective engagement that allows the community to influence the siting and design of projects at an early stage. The sector should consult with adjacent and affected landholders on the measures they are proposing to mitigate potentially adverse impacts at the earliest possible stage of the process.

Recommendation 5: The NSW Government should coordinate an engagement process for projects outside REZs where multiple renewable developments are proposed in a local area - to reduce stakeholder fatigue and encourage a more consistent approach to sequencing, local economic development and approaches to accessing housing, labour and ancillary services.

Recommendation 6: The NSW Government should support councils to fulfil their role in providing meaningful input into State Significant Development during the engagement process where multiple renewable energy developments or transmission infrastructure projects are proposed for their area. This should include providing material and planning capacity support, where the impost on council planning activities reaches a specified threshold, in a model similar to the Department of Planning and Environment's Regional Housing Flying Squad.

3. Managing impacts and benefit sharing

Problem description:

Landholders who are approached to host renewable energy developments do not have a public reference for what should reasonably be contained in an agreement, nor an understanding of current leasing rates or other payment terms, while applicants have extensive professional expertise and knowledge of current market rates, terms and conditions. Most market transactions do not involve an information asymmetry of this magnitude, and this quite reasonably leads to hesitancy and suspicion.

Neighbours to large-scale renewable energy developments worry these projects will have a negative impact on them and their businesses, and that mitigation, compensation and compliance measures will be insufficient and unfair. They, along with regional communities and local councils, would like to see greater sharing of benefits across communities hosting developments and infrastructure and more transparency about the contents of commercial agreements.

Evidence and what we heard:

Distribution of benefits from renewable energy sector developments

There are several ways that money derived from renewable energy developments flows to government and local communities. These include those required by law, such as application fees and rates, those that are commercial (with the landholder hosting the project) and those that are considered best practice but not explicitly required, such as negotiated agreements with neighbours and benefit sharing arrangements with communities. **Figure 23** provides an indication of the types of payments that may be made.

How benefits are shared varies depending on the kind of development (i.e., whether they are large-scale solar energy, wind energy or transmission line projects) and whether the applicant has a social (e.g., prevention of homelessness and domestic violence), environmental (e.g., tree planting projects, research grants) or economic (local capabilities, local employment, tourism infrastructure) focus. Who financially benefits directly from a project also varies depending on the level of impact; landholders, neighbours, and/or community within a certain distance of the project. This can create a perception of "winners and losers" in some communities.

Landholder agreements and pricing signals

Renewable energy projects can add an additional income stream for primary producers. This can provide a useful balance to the always variable returns from agricultural production (**Figure 24**).

> "…the rent paid will make a significant contribution to my farm business in terms of sustainability, resilience, improved farm productivity and infrastructure, succession planning and retirement with minimal negative impacts. The footprint of productivity programs funded by the rental the infrastructure will be between 1% and 2% of land which can be readily offset with increased income." – landholder

The payments made to landholders are set out in host agreements which are generally commercial-in-confidence. The rates quoted in solar energy leases vary, ranging between $70 and $2,000 per hectare (ParkesChampion, 2020) in one region, to $700 - $3,000 per acre ($1,700 to $7,500 per hectare) in others (LDC Infrastructure, 2022). A solar energy development lease listed for sale in 2022 had a rate of approximately $1,080 per hectare (LAWD, 2022). The NSW Farmers' Renewable Energy Landholder Guide includes an indicative rate for wind turbine leases of $5,000 per MW, indexed to CPI ($5,857 per MW in 2022 dollars).

Landholders and neighbours submitted to this Review that they lack information about what is reasonable or appropriate to inform their negotiations with applicants.

> "My concern is the fact that there is no oversight from DPIE and the windfarm commissioner as to what neighbours and host landholders are signing" – landholder

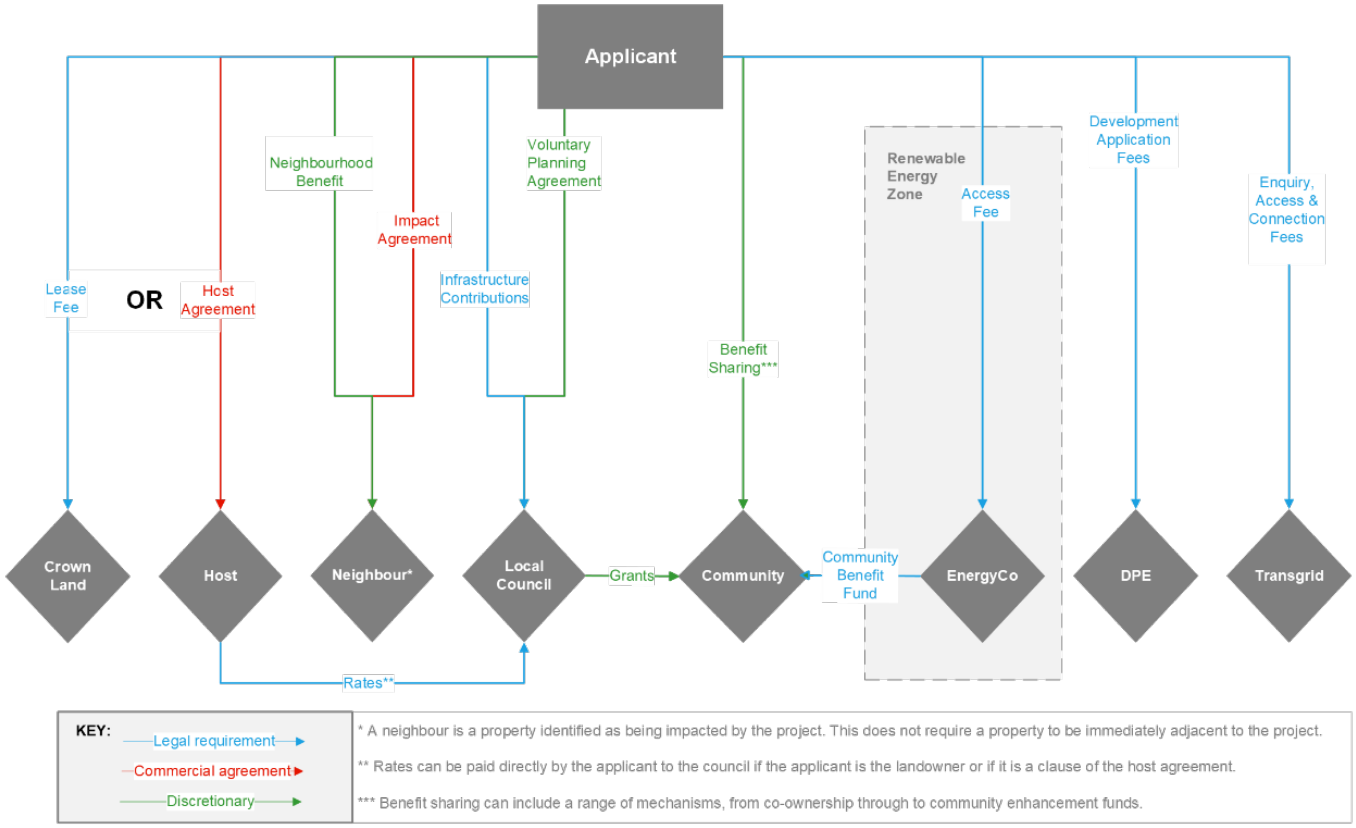

Figure 23: Distribution of benefits from renewable energy sector applicants

Commodity	Gross Margin Range	Year	Source
Cattle	$67 to $416 per hectare	2019	NSW DPI (1)
Sheep	$355 to $540 per hectare	2020	NSW DPI (1)
Wool	$188 to $504 per hectare	2020	NSW DPI (1)
Wheat (North East NSW)	$280 per hectare	2018	NSW DPI (2)
Sorghum (North East NSW)	$669 per hectare	2018	NSW DPI (2)
Cotton (Furrow irrigated)	$3,686 per hectare	2022	Cotton Australia
Oranges (Riverina)	$831 to $10,500 per hectare	2018	NSW DPI (3)
Olives (for oil production)	$12,280 per hectare	2017-18	TAS

Figure 24: Average return per hectare for various agricultural commodities

In October 2021, the AEIC released *Considerations for Landholders before entering into Commercial Agreements*. It includes key points to consider when entering into an agreement including access agreements, option agreements, and activities relating to pre-construction, construction, operation and decommissioning. It also recommends landholders seek independent advice before entering into an agreement. DPE also provided general guidance on this topic in Appendix B of the Large-scale Energy Guideline, released in August 2022.

A published 'standard' agreement would assist all interested parties in ensuring commercial agreements reflect common industry practice and contemporary standards for the protection of landholder interests. It would also provide neighbours and communities with an informed insight, if not certainty, into the likely contents of confidential private contracts. The AEIC has also recommended development of a standard template lease agreement and suggested a comparable model is the Law Institute of Victoria's Lease of Real Estate (Commercial) agreement. Such

template would need to be regularly updated and recognise the need for adaptation in specific locations or situations.

Managing impacts

People living in cities have relative anonymity. However, in rural settings, relationships with neighbours and communities are critical. While people may be curious about what is happening on a neighbouring property, the development rights and obligations associated with that land are subject to planning controls, rather than the neighbour's point of view. Planning controls do consider impacts on neighbours but those impacts cannot be definitive. The main role for neighbours and other interested or affected parties in the planning system is to participate in consultation and engagement to robustly evaluate the proposal.

Twenty-nine submitters to this Review did not consider the planning system adequately mitigates or manages impacts and land use conflicts arising from renewable energy development. Concerns were mostly raised about impacts on visual amenity, noise, dust and glare for neighbours. A list of impacts raised during this Review are outlined below in **Figure 25.**

DPE has published guidelines for both wind and solar developments. The DPE's revised Large-Scale Solar Energy Guidelines were released on 25 August 2022 to make the assessment process clearer and more certain for all stakeholders, including how impacts will be assessed and managed (see page 23 for more detail).

NSW Farmers took the position at its July 2022 Annual Conference to advocate for solar energy applicants to be required to compensate neighbours for impacts through negotiated agreements. It is common for applicants to enter negotiated agreements with neighbours as a part of impact mitigation, but these are voluntary arrangements. Neoen published the proposed arrangements for sharing benefits with neighbours of the Thunderbolt Energy Hub prior to submitting the development application. It set out the formula to calculate benefits; based on distance to turbines (Neoen, 2021). Neighbours would benefit from greater understanding of the types of arrangements commonly available in these agreements to inform their negotiations, much like the standard agreement for those hosting the development.

Confidence in compliance

Landholders have a right to develop their land in accordance with the permissions provided under the planning system. However, hosting a large-scale renewable energy facility on land traditionally used for agriculture can upset neighbours and the local community, and in turn cause stress for the landholder.

> 'The affect on the landholders surrounding the host farms is not sufficiently addressed. We have one situation, at least, where three generations of family friends are no longer speaking to each other. This is not good for a community' - landholder

Some of the concern about impacts and mitigation requirements reflects a lack of confidence in compliance, with claims that impacts such as disturbed water flows have not been dealt with to the satisfaction of the complainant (negative affects arising from the construction or operation of a new facility are not neutralised or otherwise offset, perhaps through compensation). Twelve submitters to this Review considered the compliance processes inadequate to manage impacts and/or potential conflicts once a project is operational. This general concern was also a regular theme in meetings and interactions with community members.

Impact	Concern raised in consultation	Mitigation & management
Glare, glint & visual impacts	The visual impact of large-scale solar developments on neighbouring properties. Some people consider their entire landscape outlook will be 'industrialised' and that they will feel they have to move.	See section 5.1 of the Large-Scale Solar Energy Guideline
Changes to water flows & salinity	Water run-off from large-scale solar developments. People who had been impacted have found it difficult to engage with applicants and the consent authority to recognise and resolve their impacts (some foreseen, others unforeseen).	See section 5.7 of the Large-Scale Solar Energy Guideline
Infrasound and noise	The potential for infrasound resulting from large-scale wind energy developments.	The National Health Medical Research Centre has found that 'currently no consistent evidence that wind farms cause adverse health effects in humans' (NHMRC, 2015). See the Wind Energy Guideline for State significant wind energy development.
Electromagnetic Interference (EMI)	The impacts of large-scale wind developments on the operation of meteorological radars. Accurate weather forecasting and awareness of severe weather events are important for agricultural production.	Wind turbines can interfere with electromagnetic signals by either blocking, reflecting or refracting electromagnetic waves. This impact is also seen with other large structures such as high-rise buildings. An EIS must identify whether hazards and risks can be suitably managed. This includes considering the risk of EMI on telecommunications services to the area. In conducting this assessment, applicants commonly also assess impacts on radar instruments used to identify wind, storms and rain. The Clean Energy Council's Best Practice Guidelines for implementation of wind energy projects in Australia identify that EMI can be mitigated, including through appropriate site selection and turbine design. The Guide identifies meteorological radar as a service that has the potential to be affected by EMI and recommends potentially impacted stakeholders are consulted, potential impacts assessed, and mitigation options pursued.
Biosecurity	Biosecurity risks from the construction and operation of large-scale energy facilities include management of weeds and pests and the risk of contractors introducing biosecurity risks or leaving gates open etc.	The *Biosecurity Act 2015* includes a general obligation for people to be aware of their surroundings and take action to prevent the introduction and spread of pests, diseases, weeds and contaminants. Renewable energy developments are not required to have a biosecurity management plan, and biosecurity is not addressed in DPE's *State significant development guidelines – preparing an environmental impact statement.* If a farm leased for renewable energy development has an established Biosecurity Management Plan, then the Plan would need to be complied with by people entering the site.

Figure 25: Impacts raised during this Review

There are requirements for impact mitigation and for these measures to be prepared in consultation with landholders. Mitigation measures such as screening or buffers are considered on a case-by-case basis. DPE has a dedicated compliance team that works to ensure SSD and SSI projects comply with their consent conditions. In 2018, it audited wind and solar energy developments to monitor compliance with consent conditions. Among other findings it noted that drought had affected the success of mitigation from tree planting screens and requested applicants to work with an ecologist to develop long term solutions. More audit reviews of this nature would provide ongoing confidence to communities that consent conditions are met.

> 'more effective compliance would be achieved by better resourcing the relevant local and state planning and environmental enforcement departments rather than structural change' - CWP Renewables

Based on his observations of best practice, the AEIC makes recommendations in his 2021 Annual Report that independent experts are appointed to improve confidence in decision-making. Independent experts should carry out assessments to inform the proposal, their assessment should then be scrutinised by other independent experts, and compliance post-construction activities also independently assessed and audited.

During the Review several participants raised concerns about the potential for Electromagnetic Interference (EMI) from wind energy generating facilities on the Bureau of Meteorology's radar network, with reason to believe that in some circumstances the accuracy of those radar systems can be compromised. As outlined in **Figure 25** this is a factor that should be considered in the design and development of large-scale wind energy developments and project applicants should consult the Bureau on these matters. Given the importance of accurate weather forecasts for agricultural production, the NSW Government should mitigate and manage any cumulative EMI impacts in the rollout of the REZs and consult with the Bureau to ensure that these concerns are taken seriously and not left for the planning system to consider on a case-by-case development application basis.

Complaints mechanisms

The community can, at any time prior to development approval, during construction or once a renewable energy development is in operation, lodge a complaint to the applicant, the EPA or council (if the matter relates to noise or pollution), the AEIC and/or to the DPE.

Prior to the Development Approval, if there are 50 or more unique public objections to the development application and/or the local council objects to the application, the Independent Planning Commission becomes the consent authority.

The Development Approval conditions for State Significant Development usually require that for the life of the project, the applicant must have:

- a 24-hour phone number, a postal address and an email address where complaints and enquiries can be registered/made (most developers have 24-hour hotlines during construction too)
- a complaints management system, consistent with AS 4269: Complaints handling, for complaints unable to be resolved, inclusive of a mechanism for complaints to be directed to the Environmental Representative, or if required, the DPE, where the issue cannot be resolved by the Applicant or through mediation
- a Complaints Register where all complaints received, the way they were addressed and whether a resolution was reached, must be registered in, available to DPE, on request
- a program for independent environmental auditing (in accordance with ISO19011:2003 – Guidelines for Quality and Environmental Management Systems auditing) every six months during construction, after one year of operation, and as required by DPE. This includes reporting incidents to DPE and relevant councils, reviewing the complaints received and handling of those complaints, and procedures for rectifying any non-compliance. A copy of these audits must be sent to DPE and relevant councils and published on the project website within three months.

For State Significant Development, the DPE will:

- investigate and respond to any complaints made during construction, operation or decommissioning of the project
- monitor projects to determine whether they are complying with conditions of approval
- investigate and enforce compliance in accordance with DPE's Compliance Policy and Prosecution Guidelines.

Since 2017, DPE Compliance has investigated 120 complaints made by the community about large-scale wind and solar energy developments, with 93 of these relating to wind energy developments. Notably, 57 of those complaints arose from three specific wind energy developments. DPE has also undertaken 188 inspections at large-scale wind and solar energy developments and taken 14 enforcement actions in response to a non-compliance (i.e., enforcement undertakings, penalty notices and official cautions).

The AEIC helps community members address their concerns about proposed or operating wind farms, large-scale solar farms (5 MW or more), energy storage facilities such as large-scale batteries (1 MW or more) and new major transmission projects. The Commissioner does so by referring complaints to relevant authorities and helping ensure that they are properly addressed. The Commissioner provides an Annual Report to the Australian Parliament. This is a national role, and its remit will include a significant number of projects as the energy transition occurs across the country. The Commissioner does not have arbitration or formal mediation roles or powers.

A complaint management mechanism focused on large-scale renewable energy developments in NSW could provide a more local perspective, familiarity with NSW policy, systems and law, and bolster the support available for impacted third parties and communities, in addition to the compliance activities undertaken by the DPE. The volume of projects at present may not warrant the creation of a new mechanism or a specific NSW office within the AEIC, but the need for such a mechanism is foreseeable as the number of projects grows rapidly over the next few years, and this could be considered again in the future.

The role of councils in providing infrastructure services

Contributions can be charged by councils when new development occurs and there is a link between the impact of a development and the infrastructure to be funded (e.g., road improvement). Some communities lack confidence that the contributions are used for their intended purpose. Several participants in this Review were concerned that contributions and other benefits are absorbed into other council funds or not used for the purpose they were collected.

> 'There is an expectation by local community that telecommunication and road services will be improved, but there is no data to demonstrate that this is happening' - landholder

The Productivity Commissioner's Review of Infrastructure Contributions in NSW 2020 report recommended, that as solar and wind projects do not create an infrastructure demand, they should not be required to make such contributions. The Commissioner also recommended that requirements that recover development-associated costs should not be the vehicle to manage benefit-sharing, and that planning agreements should not be used to establish a 'social license'. Instead, the Commissioner recommended that benefit sharing schemes be established outside the planning system. Some wind projects do create infrastructure demands during construction because of the difficulty in transporting very large and long components (especially through rural towns) for assembly on site but this Review did not hear of any cases where these infrastructure changes were not solved co-operatively.

In line with these Productivity Commission recommendations, the NSW Government has proposed simplifying the infrastructure contributions system. The proposal would set a local levy for solar and wind energy developments at $2,000 per megawatts (capped at $450,000 per project). Several local councils and council organisations raised concerns with this proposal as it would significantly reduce the contributions available and not reflect a fair contribution in recognition of the impacts of large-scale RE projects.

> 'The proposed reforms which cap s7.12 contributions for solar farms to $450,000 regardless of the size of the development are inequitable and are likely to undermine the negotiation of Voluntary Planning Agreements' - Riverina Joint Organisation

The NSW Government is currently considering feedback on the proposed changes.

Benefit sharing

The EP&A Act does not mandate benefit sharing programs, and any such programs at present are voluntary. Submissions to this Review from the renewable energy sector demonstrated a commitment to providing both direct and indirect benefits to local communities through their projects. The Clean Energy Council has published A Guide to Benefit Sharing Options for Renewable Energy Projects to support these efforts.

> 'Over $2.4 million was invested in voluntary community benefit sharing programs in New South Wales in 2020, with this number expected to grow with new renewable energy projects coming online each year. There are a range of community benefit sharing programs that can be catered to the needs of the community' - Clean Energy Council

There are a range of community benefit sharing options; they can involve strategies to employ and contract locally; invest in local communities (often in partnership with the local council); provide neighbourhood benefits (by distance to the infrastructure); or include co-ownership of the project.

> 'We proactively strive to workshop with the communities in which we are planning our projects to assess the unique areas of improvement and initiatives most beneficial for that community' - Spark Renewables
>
> 'To ensure Marble's projects maximize the benefits to local communities, a Community Reference Group is generally formed. This CRG is an independent body consisting of local community members to manage the selection and administration of grant funding.' - Marble Energy

The value of benefits varies between projects, with amounts ranging from $500-1,500 per MW per year for wind developments, and $130-800 per MW per year for solar developments (Clean Energy Council, 2019). A benchmark benefit contribution does not seem to have developed so far, nor is one recommended in the various industry practice guides. In the absence of any policy or expectation guidance from the NSW government, expectations for project applicants, communities and local councils could be expected to emerge over time, but it may be more efficient to provide some guidance than allow it to emerge through conflict settlements.

Many applicants are successfully working with landholders to deliver proportionate benefits acceptable to local communities. For example, the proposed 350MW Blind Creek Solar project, near Bungendore, was awarded the Clean Energy Council's community engagement award for its work with the hosting landholder to lead engagement with the surrounding landholders and wider community. The proposal was designed around farming requirements for stock rotation and will include grazing sheep, a Voluntary Planning Agreement with the council, and a Community Benefit Sharing scheme that provides payment to neighbours in a way that is proportionate to the impact of the project on them. This approach led to four objections out of 46 submissions on the development application – which is very low.

Figure 26 sets out some further examples of community benefit sharing arrangements currently occurring across Australia.

Facility	Applicants	Size	Community benefit sharing arrangements:
Bomen, NSW	Spark Renewables	100MW	Community grant fund worth $1 million over 10 years in partnership with the purchaser of its electricity, Westpac. Partnership with Mount Austin High School: • Girls @ the Centre program ($25k/year for 10 years) with the Smith Family to address barriers to school attendance • Transition Program ($25k/year for 10 years) to support 52 year 12 students transitioning out of school. $350,000 planting programs Women in Solar Program to encourage women to work in the construction of large-scale solar farms $50k to the local fire brigade Solar panels for Abbeyfield Kooringal facility hosting residents with a disability.
Winton, Vic	FRV	85MW	Traineeship program for three local apprentices to do electrical engineering and high voltage courses.
Flyers Creek, NSW	Infigen CENREC	138MW	Joint venture with community that owns one turbine (CENREC).
Bodangora, NSW	Infigen	113.2MW 33 turbines	2 per cent income from one turbine to the community fund and a per turbine contribution.
Coonooer Bridge, Vic	Windlab	19.8MW 6 turbines	Equity granted to landholders within 3km of the project and opportunity to invest directly, resulting in 4 per cent owned by 33 local landholders.
White Rock, NSW	Goldwind	20MW	Mobile black spot initiative.

Figure 26: Examples of different community benefit sharing arrangements in Australia

Findings and recommendations:

- Stakeholders recognise that renewable developments can enable individual agricultural businesses to improve their resilience, risk management, and succession planning. Stakeholders also recognise that community benefit sharing programs can include improvements to improve local roads, connectivity, local education and training, environmental and energy access opportunities.
- However, large-scale developments are perceived to create ‘winners’ and ‘losers’ in distributing economic benefits. Neighbours and communities are seeking greater transparency on how benefits will be shared and more information on how benefit sharing arrangements can be designed to provide greater fairness in the distribution of benefits and impacts in local communities.
- Communities would like assurance that any ongoing impacts (such as glare, noise, weeds and pests, impacts on water flows, etc.) will be actively managed and supported by appropriate compliance mechanisms.
- Applicants and communities pointed to the wind and solar energy guidelines to help deliver this. The revised Large-Scale Solar Energy Guideline will improve the clarity, certainty and transparency of the assessment and determination of large-scale solar energy developments and deal with assessment issues.

- There is interest in community-initiated energy projects, and communities would benefit from assistance at the initial stages of projects and guidance from the renewable energy sector about how to develop their proposition. Where developers have undertaken feasibility studies and concluded that a site did not meet their need, there is an opportunity for them to improve their standing in these communities by offering the information gained during the process to the local community.

Recommendation 7: To provide transparency and inform reasonable expectations for landholders and other interested parties, the NSW Government and the renewable energy sector should develop and publish standard agreement 'templates' for agreements with:

- parties hosting a renewable energy development, and
- parties neighbouring renewable energy developments.

These would be a guide for all interested parties and improve understanding of private contracting matters in which there is a general public interest. The parties could of course reach agreements that differ from this.

Recommendation 8: To improve communities' understanding of the financial arrangements for renewable developments, the renewable energy sector should improve transparency by publishing average or indicative lease prices for common renewable project types from the previous two years (just as there is reasonable public access to agistment, lease and property values). This would help address significant asymmetry in knowledge of current market prices, terms and conditions, and help hosts and communities better understand fair market values. This would reduce potential suspicion and friction in cases where long-term financial terms are perceived to be significantly different from average market rates.

Recommendation 9: The NSW Government should increase awareness about its existing guidelines, including the Undertaking Engagement Guideline for State Significant Projects to ensure neighbours and applicants are aware of the expectation for community engagement. The renewable energy sector should co-operate to publish advice on the reasonable expectations of neighbours and applicants during community engagement for all types of renewable energy facilities, including outlining their opportunities to participate in the development process.

Recommendation 10: To improve confidence in the compliance and transparency of the performance of project operators in meeting consent conditions, initially and over the life of projects, the NSW Government should undertake a focused and visible compliance audit for the renewable energy sector. This would reassure communities that compliance with consent conditions and other obligations is taken seriously and impacts on neighbouring properties, such as those relating to surface water flows, etc., are appropriately evaluated and addressed over the life of the project.

Recommendation 11: The NSW Government should consult with the Bureau of Meteorology to ensure that concerns about the impact of wind generation facilities on the operation of its radar system are addressed and not left for the planning system to consider on a case-by-case development application basis. The Bureau's radar system is an essential service for agricultural producers and its efficacy needs to be preserved.

Recommendation 12: The NSW Government should monitor and evaluate the operation of guidelines that apply to large-scale renewable energy developments, including the revised Large-Scale Solar Energy Guideline, regularly to ensure they are effectively identifying and mitigating impacts on third parties. This should include guidance developed for the construction and operation of transmission infrastructure.

Box 1: Community energy

Community energy is generally understood as scenario where a community is involved in developing, producing, or selling renewable energy or storage as an owner, funder or decision-maker. The community might be a group of landholders, a larger community represented by a Council, or any other group formed by agreement to develop a renewable energy project.

The benefits communities receive if they own the development are obviously much higher than if developed by an applicant. For wind energy developments, the benefit to communities (the definition for that 'community of benefit' is defined in different ways by applicants, ranging from residences within a certain number of kilometers of a project, to all people from identified local settlements and townships) has been between $500-1,500 per MW per year (voluntary community payments). However, it is estimated at $6,000-8,000 per MW per year if the community owns the development.

Examples:

- In Australia, there were 19 operating community energy projects as at 2015 (Kirsch et al, 2015)). Those projects are mostly small solar PV systems installed on community facilities, with 2 mid-scale projects: the Hepburn Wind's 4.1MW wind farm near Daylesford (cooperative in VIC) and the Denmark Community 1.6MW wind farm (share-based model in WA).
- Although community energy often consists in small projects, it can be developed at scale (e.g., 29MW Saerbeck Community Bioenergy Park, Germany). Transitioning to a renewable energy system will be assisted by the greater engagement which community renewable energy can play a key role in building.
- Energy4All (https://energy4all.co.uk/) is a UK co-operative that raised A$60m in citizen investment in community-owned wind, solar and hydro projects for almost 20 co-operatives. It's community benefits and investor returns have been around 10% per annum. The group routinely sells their share offers in a matter of days.
- Germany reached 32% renewable electricity in 2015 with almost half of its installed capacity owned by households, communities and farmers (850 energy cooperatives).
- In Scotland there are now 249 community energy projects.

The biggest challenges for community energy projects are access to initial finance, access to appropriate sites and having appropriate capabilities to work through the financial, governance, planning, and technical aspects of the project. Support already exists to assist communities through the different phases of their project, for example:

- The Coalition for Community Energy (C4CE), which is the peak body of the community energy sector in Australia has published a Community Energy Collective Impact Assessment.
- Citizens Own Renewable Energy Network Australia (CORENA) puts solar on community buildings by offering technical support and interest free loans. They have built up a fund of over $150,000 in donations which they lend over and over.
- Clearsky is an investment model. They find the project and call for investors, with returns typically offered in the range of 5-8%. Their investments sell out quickly.
- People's Solar and Clean Energy for Eternity offers donations.
- The Victorian Government has published a Community-owned Renewable Energy Guide for communities interested in developing projects. In 2021, funding of $428,500 to $857,000 was available for the establishment and operation of community hubs (co-contribution of $1 for every $5 in government funding).
- The Australian Energy Foundation and Tandem Energy published a guide for councils.

A private member Bill "Australian Local Power Bill 2021", although not successful, was introduced last year to open commercial renewable energy projects to local investment. Such an investment approach has been adopted in Denmark where farmers were guaranteed shareholdings of up to 20 percent in local wind farms.

4. Land use implications

Problem description:

Primary producers and regional communities are concerned that large-scale renewable energy projects have and continue to be developed in locations that they regard as highly productive agricultural land. This is causing concern as there is little data or other evidence on long-term, cumulative impacts on agriculture and regional communities and there has been very little published analysis of potential land use change.

Evidence and what we heard:

The CSIRO frames the two main areas of conflict in Australia for large-scale solar energy development as aesthetic impacts and the displacement or loss of agricultural land (CSIRO, 2021). There is a consistent view in regional NSW that productive or 'prime' agricultural land should not be displaced by renewable energy developments. The *Impact on agricultural land use and agricultural production* section of this Report discusses the varying categorisations used for rural, agricultural and the most productive land and how it is and isn't catered for in the NSW Planning System.

Submitters to this Review supported the NSW Government progressing with the identification of State Significant Agricultural Land (SSAL), to inform project site selection. When a SSAL map is available for land use planning based on rigorous data and reliable assessments, it should be widely used.

A number of community groups and landholder participants in this Review sought a prohibition of large-scale wind energy and solar energy developments on SSAL. However, such prohibition would be in conflict with the development rights of landholders and could preclude productive agricultural development and investment. Greater consideration, or a 'higher bar' of justification for the development of this land may be more appropriate. However, a lot of work will be required to develop this data and the associated planning tools to a standard that provides rigour and confidence for decision makers, landowners and developers.

> 'Utilising reference tools such as the mapped State Significant Agricultural Lands in planning assessments is one such data set that should be used for potential impact on agriculture and communities' - landholder

The potential for an irreversible and significant impact on NSW's agricultural production is widely claimed. Our analysis has indicated no overall material impact on agriculture or production (see the *Impact on agricultural land use and agricultural production* section of this Report for more detail), and that other forms of land use change are having, and will have, a greater impact in the foreseeable future. However, there will be many small local effects given the number of projects projected, and these matter greatly to the people involved.

> 'Renewables belong on marginal land that is not critical to Australia's well-being and food security. NSW can have both food security and renewables with strategic planning' – individual

Project applicants have told this Review they seek to avoid siting developments on high quality agricultural land, however for reasons noted earlier, it is frequently the most suitable land, particularly for solar facilities. Project applicants are guided in their efforts by several industry and Government guidelines but these developments are not prohibited on this land.

The DPE's revised Large-Scale Solar Energy Guideline include principles for applicants to avoid siting projects on important agricultural land where possible. The Guideline also introduce a process for Agricultural Land Use Impact Assessments, which should be proportionate to the quality of the land and likely impacts of the project, and require consultation with the host landholder and adjacent landholders to understand potential impacts and to develop mitigation strategies.

Under the Clean Energy Council's Best Practice Charter, the renewable energy sector has committed to 'minimise impacts on highly productive agricultural land and explore opportunities to integrate agricultural production'.

Several participants in the Review suggested siting large-scale renewable energy projects on former mining and disturbed industrial land. This would be a 'win-win' because this land has already been significantly modified, is assumed to be of low agricultural value, and its use for renewable energy developments would reduce rehabilitation costs and new power connections. A thorough and well considered site selection process can assist in avoiding or minimising potential land use conflicts and environmental assessment issues, resulting in improved land use outcomes. Not all mining land will be suitable for renewable energy development, some will be subject to existing mining rehabilitation requirements or the management of residual site risks that would not be avoided by new energy developments.

> 'I am very concerned with the expansion of major field mounted solar panels in our rural landscape while the opportunity to place them on mining land is not being considered or apparently preferenced in policy as a better alternative' - landholder

Based on the NSW Resources Regulator's electronic database of coal mines and project status at August 2022, there are 29 coal mines in the closure phase in NSW. The closure phase means that coal production has ceased permanently, and works are currently underway to fulfill rehabilitation obligations. However, this information does not provide a definitive data on closure timeframes for mines across NSW. The decision to close a mine is ultimately the decision of a mining company based on the economic viability of remaining resources.

For instance, the Hunter Regional Plan has identified "areas of interest", which are parts of mines and power stations, in the Upper Hunter District, well suited for alternative post-mining land uses as they have infrastructure, such as power and water. There is over 6,000ha of land identified as areas of interest in the Hunter Region. Renewable energy may however not necessarily be the highest and best use of this land.

The NSW Resources Regulator has developed a new portal which will assist collection of more accurate data on the current status of a mining operation. It will provide information such as the number of hectares of disturbed and/or rehabilitated land. This information should be available by end of 2023. The NSW Government should ensure it utilises such information, to encourage the development of large-scale renewable energy developments on former mining land.

Findings and recommendations:

- There is strong community support to identify higher quality agricultural land in the State and maintain it for future agricultural production. The 'protection' or prohibition of development of this land proposed by some is not desirable in any case. The estimates of the amount of agricultural land required for renewable energy generation identified in this Report indicates there should not be any concerns about aggregate land use change and its impact on the agriculture sector, but there will always be local concerns with land use change.

Recommendation 13: To improve the evidence-base that informs strategic planning, site selection and the regulation of land use in the Planning System generally, the NSW Government should continue the development of State Significant Agricultural Land (SSAL) and Identified Production Areas (IPA) identification and mapping. Although it will not be feasible in the foreseeable future to regulate permissible development on SSAL and IPAs because the policy and data is not sufficiently developed, an improved evidence base is a prerequisite for more effective rural land use planning and regulation.

Recommendation 14: The NSW Government should investigate opportunities to encourage the development of large-scale renewable energy developments on former mining land and other land already disturbed by industrial activity. This should include the identification of potentially available disturbed land such as closed or abandoned sites, for which renewable energy is an acceptable use.

5. Opportunities for coexistence

Problem definition:

Landholders and project applicants are unclear about the additional value of incorporating agrivoltaics systems into developments on their land and into their businesses but are generally keen to do so if they can make informed decisions about how to do so.

Evidence and what we heard:

Wind energy developments and agriculture usually coexist with limited disruption following construction. These developments are generally constructed on ridgelines, away from cropping areas, and livestock can graze around turbines with limited impact. However, as wind turbine designs become more efficient, more developments are likely to be sited on flatter and more accessible and therefore higher quality agricultural land. This is clearly evident in Europe for instance where wind turbines are distributed throughout production agriculture landscapes in many areas.

In contrast, there is a lack of contemporary evidence and experience in an Australian setting about the operation of large-scale solar developments and agricultural production (known as agrivoltaics or agrisolar). The NSW Farmers Association's *Renewable Energy Landholder Guide* considers that "sheep grazing is typically the only feasible agricultural land-use compatible with a solar energy project" and this view is widely held. Sheep grazing arrangements on large-scale solar energy developments commonly are a free or low-cost agistment, with a low stocking rate that helps manage weeds and grass to reduce the bushfire risk, on a seasonal basis as part of a property's cropping/grazing rotation.

> "We understand that there is some scope for sheep grazing but beyond this there are few other activities that can be conducted. We understand that cattle knock into the panels, goats eat the electrics and of course cropping is not appropriate because of sowing and harvesting issues." - Riverina Joint Organisation

The Clean Energy Council's *Australian Guide to Agrisolar for Large-Scale Solar*, includes several case studies and outlines various types of agrivoltaics (grazing, bee-keeping, horticulture, aquaculture and biodiversity regeneration) that could be pursued, involving ground-mounted solar panels, elevated solar panels, greenhouse rooftop solar panels and floating solar systems (or 'floatovoltaics' which refers to solar panels over bodies of water).

Many participants in this Review were skeptical of the added benefit of agrivoltaics for large-scale commercial agricultural enterprises and noted that incorporating agrivoltaics can increase the cost for a solar energy project, as it requires an added level of design, coordination and maintenance. Many submissions to this Review called for research in Australian settings to inform both landholders and applicants about incorporating agrivoltaics into their businesses.

> 'Future research should include how to better enhance the integration of agrivoltaics into Australian farming systems and other international farming systems that include broadacre practices' - individual
>
> 'The facilitation of studies of the coexistence of agriculture and renewable energy projects, particularly solar, would assist in the development of the renewable energy sector, as well as the agricultural sector' - Clean Energy Council

Findings and recommendations:

- It is broadly accepted that wind developments can generally coexist with agricultural production, while solar developments reduce agricultural production options (the most common production activity is low intensity sheep grazing at present).
- There is limited research on the potential of agrivoltaics in an Australian production environment, although there is some evidence from the experience in other countries, particularly in areas of higher rainfall. In Australian conditions there is clearly an opportunity to maximise opportunities for integrating light grazing activities (see **Figure 26** and the Blind Creek Solar project outlined on page 57) through project design but there is no evidence at this stage this will develop beyond a marginal but useful commercial activity for projects in most regions.

Recommendation 15: Research on integrated agriculture and energy generating operations, focused on Australian conditions and commercial opportunities, has the potential to add value to land used for solar generation and should be supported. This is a national issue, and the industry and governments should support the development of an appropriate research program, perhaps though Agrifutures Australia.

6. Transmission infrastructure

Problem description:

Landholders hosting transmission infrastructure do not consider the compensation that they are provided is commensurate with the long-term nature of the infrastructure. There are also concerns that easements preclude common agricultural activities.

Evidence and what we heard:

Transmission lines are built on easements that create a corridor on the relevant land. Easements are property rights that protect the public and the infrastructure and provide a 'right of way' for access to build, operate and maintain infrastructure. Easements can be up to 80m wide depending on the voltage and type of infrastructure.

An extensive network of transmission infrastructure already exists on private land across NSW. The development of the REZs and the infrastructure required to connect them to the grid, along with additional connecting lines in construction or being planned mean that these arrangements will become increasingly relevant to some communities. The Review heard the strong concerns from landowners and communities about Humelink and other transmission projects planned or underway.

Transmission infrastructure has some important differences to the other energy facilities considered in this Review. It has been considered essential public infrastructure for many decades and remains so. Unlike other energy infrastructure its broad location is not a matter of planning discretion – it must provide a service between two points in an efficient cost and manner. The specialised planning arrangements for the development of this infrastructure reflect this, including access to compulsory acquisition powers.

For example, in response to community concern about impact of the proposed Humelink transmission project on land holders, the cost to develop it with underground cables was estimated. Given the scale of the project and the scale of this infrastructure, undergrounding was found to be prohibitively expensive, costing an additional $11.5 billion and adding a further five years to the delivery of the project. Transgrid has committed to continuing to work with landowners to minimise the impacts.

> '…there are significant benefits that will flow to regional areas from increased renewable energy projects…there needs to be recognition that this will [also] come with new transmission projects'. - CWP Renewables

The NSW Government is developing NSW Transmission guidelines. These will provide a framework for planning routes and developing new infrastructure to provide greater certainty for landholders, communities and project applicants. The 2021 AIEC Annual Report makes 17 recommendations for the development, planning, construction, and operation of large-scale transmission projects.

Impact on agricultural activities

Several submitters to this Review expressed concern that transmission infrastructure and their associated easements can limit agricultural practices.

> "Specifically, concerns exist about the height of machinery, safely moving and operating equipment under the lines, and whether farming can continue around the easement." - Regional Development Australia – Central West

Transgrid's Easement Guidelines outline activities or developments that are permitted, require permission from Transgrid (for example installing sheds, stables or electric fencing), or are prohibited (such as burning off). In most cases, agricultural practices can continue unaffected. Cropping and grazing is permitted, if machinery is no more than 4.3 metres above the ground (i.e., the permitted height of general road traffic). All other agricultural activities, including irrigation, are permitted if certain conditions are met.

> ‘It is common for agricultural activities from low to high intensive production, to occur underneath transmission lines. CWPR do not consider there to be a material land use impact associated with new transmission.’ - CWP Renewables
>
> “We currently farm under high voltage transmission lines on our own property and have no problems at all.” - landholder

Submitters to this Review also raised concerns about risks to agricultural production associated with ongoing maintenance of transmission infrastructure. Maintenance workers entering easements on agricultural land have the potential to introduce biosecurity risks, affect the movement of livestock through gates being left open, or impact crop production if appropriate procedures aren't followed.

Transgrid say that they have procedures and training in place to minimise environmental impact and biodiversity risk and work with landholders to find the most practical and efficient ways to reduce these risks. The Review did not hear from other transmission operators but did hear from landowners who had been adversely affected by the conduct of contractors who did not follow these procedures. As a large number of new landowners will be hosting transmission infrastructure in future there would be merit in transmission owners and operators collectively reviewing their practices, training and compliance procedures, including for contractors. Landowners should be made aware of their reasonable expectations and how to access complaints mechanisms.

Calculation of payments

Easements are acquired by agreement or compulsory acquisition. Transgrid engages qualified valuers to value the impact of the easement on the land, considering the *Land Acquisition (Just Terms Compensation) Act 1991*, and offers compensation on that basis. If an agreement is reached, Transgrid will pay the landholder the agreed compensation and reimburse reasonable out-of-pocket expenses. Where an agreement cannot be reached, the easement will be compulsorily acquired, with the compensation determined by the Valuer-General.

> “Our understanding of the process suggests that the bare minimum contained in the Just Terms Compensation Act 1991 is highly unlikely to be adequate. The compensation appears to based solely on the minimum corridor and not on the extensive impact to the land in the broader area around the transmission facilities.” - Landholder

Transgrid was previously a statutory authority and became a private company in 2015 with a 99-year lease of the NSW transmission network. Its powers of compulsory acquisition reflect its historical structure as a statutory authority, the essential nature of this infrastructure and the need to avoid scenarios where a small number of affected landowners unreasonably prolong project development. Continuing access to these powers is therefore necessary.

The tradeoff for transmission operators having these powers and needing to build out a larger network relatively quickly is that they need to work harder on community acceptance, and very likely the adequacy of the financial compensation. The scale of the required development, its urgency, and central importance to the delivery of the overall energy policy suggest there may be scope for a bespoke compensation arrangement that does not have broader implications for the operation of ‘just terms’ compensation policies and laws generally.

A number of submissions to this Review expressed a concern that property owners hosting infrastructure only receive a one-off payment whereas the properties that host a renewable site receive an on-going income stream. Several submissions supported an on-going compensation model which would link the income stream with the perceived ongoing impairment of land values and land use options.

> ‘Preference for this model to be based on an initial upfront payment based on land value and assessed future risks, plus an ongoing annual payment reflecting the mw energy capacity/usage of the infrastructure each quarter period (or whatever period is utilised by the energy sector)’ - landholder

If the net present value of these payments are equivalent, transmission operators should be indifferent about the mode of payment and be able to meet landowner preferences.

Separate to the compensation paid for easements, the NSW Government has established a Strategic Benefit Payment Scheme for new major transmission projects. It will provide private landowners hosting transmission infrastructure $200,000 per kilometre (paid over 20 years and indexed to inflation). These payments will apply to transmission infrastructure across NSW, including in the REZs, if the project is 'critical to the energy transformation and the future of the energy grid'. This Scheme seeks to recognise the critical role these landowners will have in supporting the renewable energy transition.

Findings and recommendations:

- To address significant concerns and misunderstandings, clarity is needed on what agricultural activities are permissible on easements for, and adjacent to, transmission infrastructure.
- Transmission operators should review their compliance with 'good tenant' obligations to landowners hosting their infrastructure, including by their contractors, make those findings available to landowners and publicise their complaints handling processes.
- The NSW Government's plans to publish Guidelines for the transmission sector provides an opportunity for improving acceptance of new infrastructure which will contribute to a successful rollout. Many landholders consider the compensation received for hosting transmission infrastructure is insufficient and inequitable compared to income received for hosting renewable developments. Although this should have been addressed to some degree with the recent introduction of the NSW Strategic Benefits Payments scheme. Successful policy delivery could be assisted by bespoke arrangements for the extensive transmission rollout that will occur.
- Some landowners feel that one-off payments are detached from the ongoing nature of the impacts, and there seems no substantive reason why payments of an equivalent value could not be made in a form preferred by landowners.

Recommendation 16: As a large number of new landowners will be hosting transmission infrastructure in the future, transmission owners and operators should collectively review their approach to community acceptance including practices, training and compliance procedures, including for contractors to minimise environmental impacts, biosecurity risk and other operational impacts. Transmission operators should make landowners aware of the reasonable expectations they should have for engagement with the operator and for maintenance and operation of the transmission infrastructure, including how to access complaint mechanisms.

Recommendation 17: The NSW Government's plans to publish Guidelines for the transmission sector provides an opportunity for improving acceptance of new infrastructure which will contribute to a successful rollout. The Review supports the NSW Government's recently announced NSW Strategic Benefit payments Scheme.

Recommendation 18: Transmission operators should offer landholders a choice about the form in which payments are made, such as allowing for an ongoing annual payment.

7. Decommissioning & end-of-life use

Problem description:

Communities and landholders are uncertain about decommissioning obligations and who is responsible for end-of-life arrangements.

Evidence and what we heard:

Decommissioning obligations

Under the current planning system, the responsibility for decommissioning and rehabilitation generally sits with the applicant. DPE includes conditions on all development consents for solar and wind energy development for infrastructure to be decommissioned and the land returned to its pre-existing use. Nevertheless, there may be circumstances in where this obligation falls to the landowner because the conditions apply to the land and not to individual persons or parties. Consequently, landowners should be aware that they are party to these conditions and negotiate for the decommissioning and rehabilitation of projects through commercial agreements.

The recently revised Large-scale Solar Energy Guideline clarifies that the owner or operator of a solar energy project should be responsible for decommissioning and rehabilitation to the original state, and this should be reflected in an agreement with the host landholder. In the event operations were to cease, the applicant would typically be required to decommission the project and rehabilitate the site within 18 months.

Renewable energy sector applicants considered that existing requirements are both fair and flexible. The Clean Energy Council has publicly outlined its members' decommissioning commitments for the large-scale wind energy sector.

> 'While there are generally no strict requirements on the methodology for decommissioning, the asset owner does have an obligation to return the land to its pre-existing state. This flexibility enables the asset owner to consider decommissioning methods which may not currently exist' - Marble Energy
>
> 'Based on our experience end of life and decommissioning are topics of great importance to our host landholders. In addition to any requirement in a development consent, CWPR's land agreements all contain a requirement to return the land to its previous use. These obligations are legally binding and enforceable' - CWP Renewables

However, there is a concern in some communities that a developer may sell and walk away from a project or become insolvent before the project is decommissioned and rehabilitated, and that the decommissioning obligations would then fall to the landholder. Submissions to this Review highlighted concerns that substantial infrastructure would not be removed, and sites would not be remediated in accordance with the consent conditions or undertakings of the applicant. Due to the long life of solar and wind energy developments, stakeholders felt there was a significant risk of circumstances changing between approval and subsequent decommissioning.

> "The requirement to rehabilitate and decommission is a Consent Condition that is tied to the land. Consequently, when a solar farm reaches its end-of-life, it is the landholder and not the developer that carries the responsibly to 'make good.' We are not convinced that farmers who have leased their land to solar operators are sufficiently aware that if the operator walks away from the enterprise that it will be the farmer what must pay the cost of rehabilitation." - Riverina Joint Organisation, Council

Commercial agreements between landholders and applicants are frequently subject to non-disclosure clauses, so there is no opportunity for public scrutiny of decommissioning arrangements. Twenty-five submissions to this Review suggested a financial guarantee or other mechanism (e.g., bonds or trusts) to ensure funds would be available to meet future decommissioning and remediation obligations.

> 'Estimates put the cost of removing such towers [wind turbines] at $800k to $1.4million, no farmer or Council can afford that. In addition, there is the disposal problem of any non-recyclable material, for instance wind blades and huge lumps of concrete in the ground' - landholder

Because there are currently no examples in NSW where renewable energy projects have reached a decommissioning phase, submitters to this Review drew comparisons with the mining sector where rehabilitation security bonds are held by the NSW Government to fulfill the applicant's obligations (in the event the applicant defaults on their obligations).

However, mining and renewable energy developments differ in a number of ways. Mining involves a significant change to the landscape which can be costly and take a number of years to rehabilitate to safe and stable condition. It can also have irreversible impacts on the capability of land. Mining is also governed under separate legislation (the *Mining Act 1992*) and the government is almost always a party to the mining development (as it owns the mineral rights and issues a licence for the extraction of these minerals).

In the case of solar or wind energy projects, bonds are not required by the NSW planning system. This is consistent with Victoria and South Australia. Unlike mining development, the government does not own the renewable resource, is typically not the landowner and is not a party to the commercial arrangement. The NSW Government's role is to enforce conditions that are requirements under the project's approval.

For solar and wind energy developments, a common condition of consent is for land to be returned to its pre-existing use and capability. As outlined in the Large-Scale Solar Energy Guideline, when landholders enter into agreements with project applicants, they could consider including some arrangements to ensure adequate measures are in place to ensure funds are available for decommissioning as part of the private negotiations related to the lease agreement. The AEIC's guideline *Considerations for Landholders before entering into Commercial Agreements* recommends landholders consider and discuss arrangements to ensure funding is available for decommissioning, including a bank guarantee, bond or trust fund. A provision along these lines should be included in the standard agreement proposed in recommendation seven. This will ensure landowners are aware of the need to negotiate any terms for decommissioning and rehabilitation as a part of a commercial agreement. Communities would also benefit from the NSW Government clarifying and communicating the existing requirements and the rationale for not requiring some additional regulated security (as described briefly in the previous paragraph).

Opportunities for recycling

Councils are anticipating that decommissioning will be problematic, as although technically recyclable, much of the material from decommissioning will be treated as waste and have a significant disposal cost for them. Facilities currently being developed will not be decommissioned for decades, but Australia will see a continuous and growing need to recycle and dispose of for example, rooftop solar energy systems installed since the early 2000s.

> "There is now technology available in Australia that allows 99 per cent of solar panel materials to be recovered and reused…The CEC suggests that to encourage this recycling and end-of-life use of solar panels and to prevent the dumping of solar panels in landfill, e-waste should be banned from landfill in NSW, similar to Victoria. There should also be increased government support to further help establish this market." - Clean Energy Council

Participants in this Review recognised that the recycling and end-of-life use sector present opportunities for local communities if investment occurs now. Setting the foundations for a strong end-of-life use sector was identified in the Renewable Energy Sector Board's Plan and should be prioritised by the NSW Government and local councils. As this is a national rather than state-based matter, the NSW Government may be able to develop any policy, infrastructure and systems that may be required in co-operation with other states. Individual councils should not have to accept responsibility for recycling of decommissioned material and will very likely not have the capacity to do.

Findings and recommendations:

- Communities are concerned that decommissioning and rehabilitation arrangements are inadequate. As this is a relatively new sector, current decommissioning arrangements have not been tested. There was support from communities for bonds or additional assurances to ensure that any risks or costs are not borne by the landholder.
- Councils are seeking clarity on how waste streams will be treated and managed. These concerns have arisen due to an apparent information vacuum and no clear policy or details about the nature of commercial agreements. Additional transparency and preparation for future waste disposal and recycling is required.
- Submitters to this Review, including the renewable energy sector, recognised that the recycling and end-of-life use sector presents opportunities for local communities with sufficient preparation and investment.

Recommendation 19: The NSW Government should improve community awareness of end-of-life project decommissioning obligations and provide a public rationale for its policy. This will become increasingly important as the first-generation of wind farms projects in NSW approach end of life stages.

Recommendation 20: To improve community and landholder confidence in decommissioning arrangements, the standard commercial agreement proposed in recommendation seven should include clauses on decommissioning obligations.

Recommendation 21: The NSW Government, the renewable energy sector and local governments should continue to investigate and publicise recycling opportunities for decommissioned renewable infrastructure and consider ways to integrate these with regional waste management initiatives.

8. Fire & insurance risks

Problem description:

Landholders are concerned about their ability to acquire insurance to cover potential liabilities when operating in the vicinity of large-scale solar energy developments, with reports that the risk is uninsurable or the costs prohibitive. Communities are also concerned about the ability of rural fire services to manage risks in fighting fires on and around these facilities.

Evidence and what we heard:

Insurance liabilities for neighbours to large-scale renewable energy facilities

Public liability insurance of up to $20 million is commonly sought and held by landowners, but those neighbouring renewable energy developments are concerned that this is not enough to cover their risk due to the value of the development and its future income. During this Review, landholders who have sought to increase their public liability cover above $20 million provided evidence that their current insurer has been unable to provide this additional cover. In the absence of adequate insurance coverage, some neighbouring landholders may feel compelled to adjust their land use practices to mitigate fire risk, e.g., changing from cropping to grazing, and bear a loss of productivity and profitability of that land.

> "Quotations provided by insurers when briefed that a solar factory would be installed next door to a relevant property, saw premiums increase and insurers state that Public Liability Insurance for the sum of $70 million would be required to be procured by neighbouring properties." - landholder
>
> "Consideration must be given to ensure that landholders that neighbour a solar or wind development do not have their business jeopardised due to the inability to obtain or fund a public liability insurance policy that would cover [...] infrastructure should some form of negligence occur. Neighbouring landholders have these developments located next to them on agricultural land at absolutely no choice of their own and renewable energy developments should be required to provide a total indemnity to the surrounding landholders should unintentional damage occur." - NSW Farmer – Billabong Branch

The Insurance Council of Australia was consulted on these matters and indicated that the insurance market is currently experiencing a very difficult cycle with insurance premiums typically becoming more expensive. It also noted that the additional cover sought would likely be available in the market but at a higher premium in line with the higher coverage limit provided.

While the Review did not receive advice on any specific land use changes that might be required, it seems logical that there may be exclusions in insurance policies designed to reduce fire risk could prevent cropping on adjacent land which would reduce the profitability of that land use.

The principle for addressing this increase in risk and liability should be that adjacent landholders bear no additional net costs due to the installation of these new facilities. Any additional insurance costs should be included in an agreement between these landholders and the applicant. The AEIC notes these agreements could include 'reimbursement of any increased insurance premiums levied to the neighbour as a result of any increases to the sums insured for public liability due to the presence of the wind or solar farm' (AEIC, 2020).

Where suitable insurance cannot be obtained, the applicant should indemnify the neighbour for reasonable, uninsurable risks relating to typical public liability cover.

Where suitable insurance can be obtained, and it comes with conditions that restrict land use, the profits from that land may be reduced. This is a consideration that should be raised in discussion with project applicants and considered in agreements with landholders so that where such changes cannot be avoided, they are reflected in benefit-sharing arrangements. This is another matter to be considered in the standard agreement template outlined in recommendation seven.

Firefighting at large-scale renewable energy facilities

During consultation landholders and local communities raised concerns about local volunteer fire services safely carrying out firefighting within and around large-scale solar energy developments. Submitters to this Review considered that large-scale solar energy developments present risks and tactical challenges and therefore additional training, equipment and specific protocols may be required.

> "There is significant concern in our community about [the] safety of volunteer firefighters as RFS local brigades are not adequately trained or resourced (e.g. not hazmat trained, no breathing apparatus) to fight hazardous fires, in confined spaces, with dangerous battery storage systems. Volunteers do not wish to be presented with this increased risk and local brigades may not enter a renewable energy facility." - NSW Farmers Billabong Branch

Applicants are required, when preparing their Environmental Impact Statement (EIS), to conduct a Bushfire Risk Assessment. This Assessment must identify, and where possible reduce, potential hazards and risks associated with bushfires and the use of bushfire prone land. It must also demonstrate that the proposed development can be designed, constructed and operated to minimise ignition risks and reduce the likelihood of a fire impacting the project area or spreading to surrounding properties. The *Rural Fires Act 1997* also imposes obligations on land occupiers to take all practicable steps to prevent the occurrence and spread of wildfire to adjoining lands from lands under their care and management.

The Bushfire Risk Assessment also includes consulting with the NSW Rural Fire Service, ensuring access to fire fighters, water supply, understanding vegetation hazards and managing those with protection zones, and preparing a Bushfire Management Plan. In Victoria, the Country Fire Association released Design Guidelines and Model Requirements for Renewable Energy Facilities this year to support this planning. The guidelines emphasise the importance of a risk management plan and a fire management plan, which includes consideration of bushfire hazards.

The Australasian Fire and Emergency Service Authorities Council's 2018 Wind Farms and Bushfire Operations publication (AFAC Publication No. 2053) discusses the potential risks to emergency responders operating in and around planned and existing large-scale wind facilities and infrastructure and provides measures to avoid, mitigate and manage these risks. The publication recommends that operators of large-scale wind energy facilities develop incident action and emergency response protocols - which include shutting turbines down immediately during emergency operations. Operators should also have communication protocols with fire and land management agencies to enable timely responses.

In the large-scale solar energy setting, several fire agencies are developing guidance, protocols and training to support firefighting in this developing space.

- The Council's Alternative and Renewable Energy Technologies Working Group is considering hazards specific to solar developments and working towards best practices and guidance for fire agencies.
- NSW Rural Fire Service training contains a component for incidents involving fires associated with residential solar panels and hybrid vehicles.
- The NSW Rural Fire Service has developed a draft Operational Protocol for incidents involving solar arrays and battery storage systems (which includes content on large-scale developments).
- Fire and Rescue NSW's Safety of Alternative and Renewable Energy Technologies Working Group is also guiding a research program into renewable energy safety and firefighting issues.

Findings and recommendations:

- Landholders neighbouring renewable energy developments should not be adversely affected by increased insurance costs or forced land use practice changes which have commercial costs. Project applicants and these landowners should reach agreements to ensure this principle is implemented.
- Rural fire services are aware that fires on or near large-scale solar energy facilities present tactical challenges, while these are similar to those seen with existing transmission infrastructure, state and national fire organisations are developing research programs, guidance material and operational procedures to identify and manage local conditions and site-specific risks.

Recommendation 22: Project applicants in the renewable energy sector should cover any additional public liability insurance costs incurred by neighbouring landholders as a result of proximity and risk to new energy facilities. In cases where suitable insurance cannot be obtained, the applicant should indemnify the neighbour for reasonable risk in relation to typical public liability cover.

Recommendation 23: The standard commercial agreement proposed in recommendation seven for neighbours should include clauses to compensate for any land use constraints imposed on neighbouring landowners through public liability insurance policies which reduce land use options, such as effectively requiring no further cropping to reduce fire risk in adjacent areas in order to secure appropriate insurance cover.

9. Property values

Problem description:

There is concern that renewable energy developments may adversely affect property values. This reflects both a concern that sites suitable for renewable energy developments will be in high demand (bidding up prices), and that impaired visual amenity on neighbouring properties will reduce their property values (particularly for rural residential properties).

Evidence and what we heard:

Twenty-eight submitters to this Review expressed concern about renewable energy developments decreasing property values due to visual amenity and land use impacts, particularly for large-scale solar energy developments.

> "my family property will see a significant reduction in the value of our property should the proposed development go ahead. This is fact as valued by reputable locally licensed real estate agents who estimate losses of upwards of 25%." - landholder
>
> "The reality of having a solar farm next door or within view means that your bank will value the property 7% to 10% less than if those developments were not there. This in turn results in a reduced leverage ability, that is, you will be able to borrow less as your equity value has reduced. For me, that is a reduction of $617,000 based on current values." - landholder

A contrasting issue was also raised where competition for land near transmission lines with good renewable energy potential is driving land values up.

> "There are further developments proposed on highly productive land in the Wongarbon area, where the applicant has reportedly paid around 8 x the "going rate" for the land." - Country Women's Association
>
> "In December 2021 the neighbouring property (720ha) was placed on the market to sell. In an attempt to expand our family business we attempted to purchase this property at auction. This property was sold at Auction to Origin Energy. The property sold well above market. There were 4 other farming families attempting to purchase this property including us." - landholder

There is very little reliable evidence of large-scale renewable energy developments influencing adjacent land values, particularly for solar facilities. In the literature that does exist, outlined below, a consensus has not been reached regarding the impact on rural property values.

In 2016, the NSW Government commissioned an independent report to explore if large-scale wind energy developments influence land values (Urbis, 2016). It found that these developments do not significantly impact rural properties used for agricultural purposes and noted that there is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines. This is assumed to be largely due to the relatively slow turnover of agricultural land when compared to residential or commercial land, combined with the small number of representative renewable energy developments at that time.

The Urbis report builds on the NSW Valuer General's 2009 report which investigated eight large-scale wind energy developments and found no reduction in value for properties in rural/agricultural areas. The only properties where a possible effect was observed were lifestyle properties in Victoria within 500 metres of a wind farm, some of which were found to have lower than expected land values.

A 2019 study by the Department of Agricultural Economics at Humboldt University in Berlin on the influence of wind energy on farmland prices found that there is a relationship between wind energy expansion and the market for farmland, that landholders are paid compensations that exceed the usual lease prices for agricultural land, and that land prices are also spatially correlated.

A 2020 real estate impact study conducted by the Orion Renewable Energy Group in the US, aimed to determine if existing solar farms had any measurable impact on the value of adjacent properties. The study found that the proximity to the solar farms did not deter sales of nearby agricultural land and residential homes, nor did it deter the development of single-family homes on adjacent land. The study concluded that there was no consistent negative impact that had occurred to adjacent property that could be attributed to proximity to the adjacent solar farm, with regard to unit sale prices or other influential market indicators.

Findings and recommendations:

- Landowner concerns about impacts on property values are significant
- There are many factors influencing property value and it is difficult to assess whether this is a genuine issue directly related to renewable energy developments without evidence
- As professional valuations would typically rely on recent local sales of similar assets, there is insufficient evidence of such sales, or comparable sales, to respond to those concerns with any rigour at present. However, the concern is understandable and significant in affected communities.

Recommendation 24: In working with neighbouring landowners to mitigate potential impacts the renewable energy sector should acknowledge the significant concern among landowners neighbouring large-scale solar and wind energy developments about the potential for an adverse impact on property values. If evidence supporting these concerns becomes available, the NSW Government should ensure the advice proposed in recommendation seven reflects that evidence.

10. Commodity supply chains

Problem description:

While local businesses that provide products and services needed in the renewable energy supply chain can increase local economic opportunities, there are concerns about the impact of renewable energy developments on agricultural supply chains.

Evidence and what we heard:

Councils and regional communities expressed concern about the implications of growth in the large-scale renewable energy sector for local industries and supply chains that have traditionally driven the local economy.

> "With the volume of SSD proposals, council considers there will be significant impacts to the local supply chains and access to infrastructure and services" - Mid Western Regional Council

Although the overall impact on production will not be material, the idea that a critical mass of agricultural supply or activity must be sustained for a region's agricultural economy to remain viable is a logical concept. The NSW Government has recognised the community concern in this space, and the revised Large-Scale Solar Energy Guideline require assessment of impacts on agricultural supply chains for proposed developments on Important Agricultural Land (IAL).

Economic assessment

There are economies of scale in both input and output businesses and services that are essential to agriculture. Reduced production in any region, can influence both the profitability and sustainability of the businesses in the supply chain. The threshold or 'critical mass' at which agricultural enterprises and supporting businesses become unsustainable will vary depending on the commodity, the region, and factors such as the size and range of industries it supports, the existing infrastructure, and local growing conditions.

Agricultural industries that will be the most resilient, and the least likely to be affected by agricultural land conversion, operate over a broad area, have many individual producers (suppliers), and multiple marketing options and support services. As discussed in the *Impact on agricultural land use and agricultural production* section of this Report, the land type typically identified for large-scale solar energy developments is cleared and relatively flat or gently undulating, typical of land suitable for broadacre cropping and grazing. Both sectors are well-supported in NSW by a range of producers, suppliers, and buyers, at a state, regional, and local level, and have demonstrated supply chain resilience in the face of production challenges. One example is the drought that impacted eastern Australia during 2017 through to the end of 2019 which had a severe impact on the ability of NSW agricultural industries to maintain production. Despite the production challenges, supply-chains remained remarkably resilient.

Small industries, niche commodities, and regional economies that are highly dependent on certain agricultural industries, are the most likely to be at risk of reaching a critical threshold and being negatively impacted when agricultural land is converted to renewable energy development. One example is irrigated horticulture. Farmers will farm the land until the value in an alternative use exceeds the current value. Taking this into consideration, and the type of terrain that is most appropriate for large-scale renewable energy production, it is unlikely that relatively high-value agricultural enterprises will be affected at any scale that would greatly impact their production, or any downstream processing.

Technological improvements may change the critical threshold level for certain industries over time. For example, improved transportation and communications infrastructure may reduce the costs of moving product and purchasing inputs and increase marketing options. Historically, farmers have adapted to more limited industry support in their regions by shifting to alternative farming enterprises that are less reliant on nearby purchasers or suppliers.

Findings and recommendations:

- There is limited experience and evidence available on impacts on local supply chains and most of the specific concerns raised during the Review are related to local employment and housing (covered in sections 11 and 12 below).
- It's difficult to assess the potential impacts on niche industries or indirect implications for other parts of the economy without evidence of specific problems.

Recommendation 25: The NSW Government should support the work of the Renewable Energy Sector Board to develop and strengthen supply chains for the construction and operations of renewable energy generation projects and enable they sector to take up higher levels of locally produced materials and services.

11. Workforce

Problem description:

Renewable energy (and other industrial) developments are often promoted as bringing jobs to regional communities during their construction and operation. While communities recognise some benefits and opportunities, there are concerns that local workers will be drawn from existing businesses to work on these developments, damaging local businesses and further increasing labour shortages for industries like agriculture. In other regions, the principal concern is that local workers will miss out on opportunities because they do not have the necessary skills.

Evidence and what we heard:

Labour needs

The labour market in Australia is very tight. This is true in most regions in NSW, with employers in most industries reporting that an inability to recruit new employees as their most significant commercial problem.

The Review heard that communities recognise there will be a surge in employment and economic activity during construction of renewable energy facilities but consider that claims about long-term employment opportunities are overstated. Implementing the Net Zero Plan and the Electricity Infrastructure Roadmap has been estimated to create over 9,000 jobs and see up to $37 billion in private investment, mostly in regional NSW.

> The labour needs of renewable energy developments peaks during construction. In a 2020 University of Technology Sydney and the Clean Energy Council study, the construction of solar farms was estimated to create 2.3 job-years per megawatt of capacity and 0.1 FTE per megawatt in ongoing operations and maintenance (Renewable Energy Jobs in Australia: Stage One).
>
> "While much emphasis was placed on the employment opportunities during the development stage of the project with upward of 300 jobs being provided for a short period of time, the post development employment of 6-8 jobs is the real long-term economic impact" - individual

In regional communities that are already experiencing workforce and housing shortages, large projects (whether renewable energy or not) that will increase this demand are causing concern. This is a shift from how communities may have responded during drought or until recent years when regional economies and the agriculture sector typically had spare capacity and higher unemployment. Agriculture has been experiencing issues with workforce availability for some time, which has become acute following the COVID-19 induced changes to immigration flows.

> "We cannot fill the jobs we have, let alone those that are in the pipeline…in the short term it is a scramble for skilled people with whoever is paying the highest wage hailed the winner" - Riverina Joint Organisation

Skillset shortage

Renewable energy developments require a range of skills, from labourers and administrative workers to highly-skilled technicians and electricians. There is concern that regional workers will not have the specific skills needed to take up these employment opportunities. To enable increased local workforce participation, submitters to this Review noted that co-ordinated investment and organisation of vocational training, particularly in the REZs, would improve participation and improve the benefits that the developments bring to the local community.

> "The development of a local skilled labour workforce is essential to ensure that community outcomes from these projects are maximised" - landholder
>
> "There is no benefit to local jobs. The installation, construction and maintenance of a solar factory is a specialist industry. This will require short-term roles to be brought to the relevant community, but those roles will not be recruited locally due to the specialist nature of those roles" - landholder

A number of the submissions to this Review concluded that these jobs would largely be occupied by a fly in fly out (FIFO) workforce. The long-term economic benefit to local economies from FIFO workforces was considered limited, as it would not result in increased employment or skills development locally. As a comparison, the long-distance commuting of the mining workforce in the Pilbara has provided flexibility to businesses and workers, however this benefit reflects an economic opportunity cost to local communities (Haslam McKenzie, 2020).

> "We are also very aware that some solar farm operations rely on established teams of FIFO workers. These workers do little to expand the local economy and certainly do not create a legacy of skilled workers." – Riverina Joint Organisation

Existing work in the Roadmap

The Electricity Infrastructure Jobs Advocate's role is to advise the Minister for Energy appointed on:

- strategies and incentives to encourage workforce development, employment, education and training in the energy sector as NSW transitions to renewable energy; and
- road, rail and port infrastructure required in the regions specified above to promote export opportunities for generation, storage and network technology.

The Advocate has engaged widely with regional communities, businesses, government agencies, unions and the non-profit sector to understand the opportunities and challenges the energy transition presents. He has heard concerns similar to those raised in this Review about inadequate skills to participate in the renewable energy sector. In his first report to the Minister, the Advocate identified a range of areas for investigation, including:

- mapping career pathways in the renewable energy sector
- finding methods to promote renewable energy sector careers in high schools, particularly those within REZs
- continuing to engage across the five REZs to build a local picture of employment and infrastructure opportunities relevant to each region and to fully understand issues in the rollout of the Roadmap
- investigating the feasibility and usefulness of establishing local renewable energy training schools in the REZs and more flexible training delivery approaches, including mobile training delivery, to address issues with local training availability. [TBC REPORT RELEASED]

The Renewable Energy Sector Board has prepared a plan, which recommends minimum requirements for local workforce engagement and local procurement, as it seeks to develop renewable energy supply chains in NSW. These requirements inform one of the criteria that applicants are assessed against in seeking inclusion in the REZs.

As a part of its role in coordinating the rollout of the REZs, EnergyCo is also conducting studies to identify skills and training capabilities, coordinated accommodation, and enabling infrastructure solutions, gaps and opportunities in each REZ. EnergyCo will also hold aside a portion of the access fees that the NSW Government is charging developers to connect to the new REZ network infrastructure and will be spending this funding on a range of economic and employment outcomes for REZ communities.

> "The local government sector supports renewable energy, not only to achieve emissions targets but to ensure affordable clean energy for NSW, to provide employment and to facilitate investment in regional and rural communities" – Local Government NSW

Findings and recommendations:

- Communities recognise there will be a surge in employment and economic activity during construction (which may be mostly disruptive where local labour supply and accommodation are already tight) but consider that the long-term employment opportunities are overstated. In most cases, there is a transition from one land use activity with a very low employment intensity to another.
- Local communities are concerned that they will not be able to capitalise on the employment opportunities presented due to existing workforce shortages, a lack of specialised skills, and a preference for applicants to employ an already experienced 'FIFO' workforce. Submitters to this Review, including the renewable energy sector, recognised that with investment or coordination in training, there is an opportunity to improve the skills of the local workforce, particularly in the REZs.
- The NSW Government has established the Electricity Infrastructure Jobs Advocate and Renewable Energy Sector Board to maximise opportunities for local employment, sector development and economic benefit from the REZs.
- There is clearly a lot of goodwill and good intentions from project applicants on local content and employment and achieving a lasting improvement in the skill base in these regions. The concentration of projects in the REZs provides an opportunity and business case for investment and co-ordination to deliver this. However, the opportunity may be short lived - this rollout will proceed for a decade at least but the returns from this investment will be highest the sooner these arrangements are in place. This is especially the case for commercial investments to produce local content.

Recommendation 26: The NSW Government should support the work of the NSW Electricity Infrastructure Jobs Advocate to provide advice on labour and skills which are relevant and portable in and out of the renewable energy and related sectors, and on the benefits for local employment.

Recommendation 27: The NSW Government should support the work of the Renewable Energy Sector Board and the NSW Electricity Infrastructure Jobs Advocate to develop concrete plans for meeting skills demands in regions likely to host renewable energy projects, such as the VET sector training more electricians.

Recommendation 28: The renewable industry has expressed a strong desire to co-operate at an industry level with the NSW Government on those labour, skills and housing issues which will require well organised regional solutions to achieve the demanding rollout targets. These are sufficiently important and geographically dispersed to warrant the creation of a joint industry and government taskforce, which would include the Jobs Advocate and relevant local governments to undertake a rigorous analysis of these demands and assess the local place-based options to respond to them so that communities and investors can have confidence in the State's rollout planning.

12. Housing

Problem description:

Regional centres are experiencing unprecedented housing demand, evident through house sale data and rental occupancy rates and rents and supported by anecdotal evidence of agricultural producers struggling to find accommodation for seasonal workers. Regional communities are concerned that they have a limited capacity to accommodate further growth and to meet the housing needs of the renewable energy sector during construction.

Evidence and what we heard:

Housing pressure and community concern

The NSW Government's 2022 population projections estimate that population growth in regional NSW will require an additional 321,000 dwellings by 2041. Communities are concerned that the growth in the renewable energy sector will compound existing pressure on regional housing. Rents increased by 15.6 percent in regional NSW in the year to June 2022 (Domain, June 2022) and net migration to regional areas remains 15 per cent higher than pre-pandemic levels (Regional Australia Institute, 2022). Constructing more houses faster, while an obvious solution, is not feasible in many settings as the building sector is also facing the same labour and materials supply constraints and waiting lists for new homes are long in many regional areas.

Several submitters to this Review expressed concern that the construction workforce for the renewable energy sector will outcompete low-income households. In Central West NSW, house values increased by 31.9 per cent and unit values increased by 21.0 percent in the year to November 2021 (Corelogic, Regional Market Update, February 2022). Several submitters were also concerned that a lack of housing may restrict employment opportunities in the renewable energy sector and/or act as a barrier to delivering the REZs.

> 'The Clarence Valley is already under accommodation stress especially since the recent bush fires and floods. Projects such as the proposed Clarence Valley Solar Farm would further exacerbate this shortage impacting mainly on the lower socio-economic families.' - landholder
>
> 'CWPR acknowledge the strain that short term peaks and troughs in workforce can place on local short to medium term accommodation. A contributing factor is undoubtedly the historic boom and bust cycle of renewable energy development in Australia. CWPR is hopeful that the REZ initiative in NSW will attract and maintain a medium to long term workforce seeking permanent accommodation.' - CWP Renewables

The renewable energy sector is recognising these concerns and needs. For example the benefit sharing plan for Tilt Renewables' Dundonnell Wind Farm in Victoria included a $500,000 partnership for a Safe Housing Program with two not-for-profits providing urgent accommodation for women seeking to escape domestic violence.

There are also concerns about housing and accommodation access for other industries which are integral to the local economy. Local tourism operators are concerned they will be negatively affected as tourists are displaced (motels booked out, etc). Agricultural operators reliant on short-term seasonal workers (e.g., cherry and citrus harvesting and viticulture) are already concerned about the lack of suitable accommodation for its workforce, and fear reduced options.

> "This has resulted in available local accommodation being taken up which prevents or limits existing tourist facilities resulting in a deterioration of the visitor economy, potentially over the long term, and reducing the short-term economic benefits of the renewable energy construction phase." - Murrumbidgee Council

Identifying and managing cumulative impacts

There is a concern that the scale of the development projected in the REZs, along with other major infrastructure projects, such as the Inland Rail, may have a significant negative impact on local communities. For example, construction of the Central-West Orana REZ is estimated to deliver over 3,900 jobs.

> "if the volume of development in the preliminary engagement and planning process stages, were to progress to the construction phase at a similar stage, or even if two developments were be constructed at the same time, it is anticipated significant pressure on other housing stock would be experienced and ultimately have impacts on housing affordability." - Mid Western Regional Council

Renewable energy applicants are not currently reporting worker accommodation as a factor limiting development. It is common for conditions of consent to require staging strategies if several developments are occurring in the same area and to require that an Accommodation and Employment Strategy be prepared in consultation with the local council. These strategies often include:

- measures to ensure there is sufficient accommodation for the development's workforce
- consideration of the cumulative impacts associated with other SSD projects in the area
- options for prioritising the employment of local workers (during construction and operation)
- a program to monitor, evaluate and review the Strategy over the life of the development.

To help identify any overlap (both in terms of distance and time), DPE released Cumulative Impact Guidelines in 2021. The guidelines indicate what type of impact assessment and mitigation strategies will be required if there is overlap. To further understand any potential impacts within the REZs, EnergyCo is conducting a cumulative impact study on workforce accommodation in each REZ.

Strategies and suggestions to improve supply

Submitters to this Review supported applicants investing in housing for their construction workforce and retaining the housing for future community use. This approach was seen to avoid short term and disruptive housing demand and contribute to long term supply needs.

> "Government could require the RE applicants to fund the construction of additional housing, initially for the construction workforce, then handed over for local and/or social housing needs." - Mining & Energy Related Councils

> "One solution to the housing issue is that state or local governments could co-invest in new housing built by the clean energy developer and then buy the housing back when the construction workforce no longer needs the accommodation. This way, permanent housing solutions are provided. Another solution where permanent housing solutions are not needed in the regional community is that perhaps the housing should be modular and transportable." - Clean Energy Council

While there is a role for individual applicants to identify the accommodation needs of their project and to work with local councils to consider a range of accommodations solutions to meet those needs and the needs of the community (per consent conditions outlined above) some centralised co-ordination is clearly required – this issue is both an impediment to successful energy policy delivery and creates a risk of significant social disruption if not given appropriate attention. The state Government will need to be an active participant in improving housing access in a number of regions for both these reasons.

Housing 2041 is the Government's overarching housing strategy for NSW. It sets a long-term vision and objectives for better housing outcomes - *housing in the right locations, housing that suits diverse needs and housing that feels like home.*

In July 2021, in response to increasing pressures on the supply and affordability of housing in Regional NSW, the NSW Government established a Regional Housing Taskforce to investigate

these issues. It made recommendations in October 2021 to improve the supply, diversity and availability of housing in regional NSW, including to:

- Support measures that bring forward a supply of “development ready” land
- Increase the availability of affordable and diverse housing across regional NSW
- Provide more certainty about where, when and what types of homes will be built
- Investigate planning levers to facilitate the delivery of housing that meets short term needs
- Improve monitoring of housing and policy outcomes and demand indicators.

Findings and recommendations:

- Many NSW regions are experiencing serious housing supply challenges, with rents increasing and physical shortages affecting many communities. Additional demands on already stressed local housing access can have major consequences for the most disadvantaged community members.
- Local tourist accommodation can be crowded out during construction. Landholder and community submissions to this Review supported models where developers contribute directly or indirectly to local housing initiatives.
- Local councils, the renewable energy sector and agriculture industry groups are keen to work together and with the NSW Government on regional housing supply solutions. Housing will become a major social problem and economic constraint if these supply problems are not addressed.

Recommendation 29: The NSW Government should continue to implement the recommendations of the Regional Housing Taskforce and Housing 2041 (NSW Housing Strategy and NSW Housing Strategy Action Plan). It should also investigate any emerging local accommodation deficits in the REZs resulting from the concentration of renewable energy developments and work with the local councils and renewable energy sector to implement local solutions.

Opportunities for energy supply from other sources

While this Review is focused on the policy and legal settings for large-scale wind and solar developments and associated infrastructure, there are other sources of renewable energy supply which will influence land use outcomes.

Bioenergy

Bioenergy is generated by converting biomass (organic matter) into heat, electricity, biogas or liquid fuels. In 2021, bioenergy accounted for 1.3 per cent of Australia's electricity generation (Department of Climate Change, Energy, the Environment and Water, 2022). The Australia's Bioenergy Roadmap recognises that, by 2050, the sector has the potential to reduce the amount of waste going to landfill, and to contribute up to 20 per cent of Australia's energy needs. Incorporating bioenergy into the future electricity grid could reduce system capacity requirements (by 32 per cent) and costs (by 21 per cent) (Li et al. 2022).

Bioenergy presents a range of opportunities for agriculture, regional economies and NSW:

- Shoring up the State's energy supply by complementing intermittent/inconsistent energy production from wind and solar energy (Li et al., 2020)
- Recovering energy from wastes or residues that would have otherwise resulted in greenhouse gas emissions (by being burned or left to decompose). This energy can be in the form of industrial heat or electricity, renewable gas or biofuels
- Supporting primary producers to manage waste streams through a viable alternative use. There is also the potential to generate income from supplying these residues or reduce cost of energy when used on-farm
- Supporting biofuel production to diversify fuel sources. This is particularly important in relation to the production and supply of Sustainable Aviation Fuel (SAF) and biodiesel. This is a growing sector, with more than 60 countries mandating biofuel use to reduce emissions associated with transport and improve security of supply. Australia exports the bulk of its canola, mainly to the EU for use in biodiesel production, with the remainder going to food producers in Asia and the Middle East[1]
- Co-products from bioenergy offer additional benefits to agriculture: biochar from gasification and pyrolysis can enhance land productivity and sequester carbon; residues from anaerobic digestion of manure or biosolids are a slow-release fertiliser; residues from ethanol and biodiesel production are high-quality animal feed.

The Australian Biomass for Bioenergy Assessment project indicated there are large unrealised energy sources in primary industries waste streams, and identified the following barriers to primary producers participating in the bioenergy supply chain:

- regulatory limitations where some biomass feedstocks are considered wastes and have significant restrictions on their use e.g., where they can be processed
- a lack of distributed energy conversion plants within viable transport distance from sites of feedstock production
- a lack of sector maturity and coordination among sector participants, and
- biomass feedstocks and technologies to generate energy from them vary greatly, meaning there is not one simple supply chain and, in reality, bioenergy is a number of different industries.

Like other emerging energy industries, there are some myths about how they operate and what best practice looks like. For example, primary producers may have concerns that removing residue from

[1] https://gro-intelligence.com/insights/australia-to-produce-a-second-record-canola-crop-gro-predicts

harvested crops is detrimental to the soil as the residue is needed to control erosion, manage weeds and conserve moisture. However, research has found that only 1.5 and 1.0 tonnes of residues per hectare for the northern and southern cropping regions respectively are required to support soil health (Herr et at. 2012), and the supply of crop residues for bioenergy could be an additional and sustainable income source for grain growers.

The NSW DPI is researching opportunities for landholders to grow woody biomass crops on poorer quality land (or marginal land) in short cycles of harvest and regrowth (see DPI website). This would have the benefit of providing an income diversification opportunity, from both the sale of biomass and carbon credits from the sequestration in the trees, as well as other environmental benefits. This land use does not compete with food production on high-productivity agricultural land and maintains the amenity of rural landscapes.

Box 2: Examples of bioenergy projects in NSW

Family Fresh Farms at Peats Ridge on the Central Coast has a 5MW bio-energy boiler (fed by wood chips from local plantations) to maintain the temperature and humidity in its cucumber glasshouse. It is a low emissions system and is cheaper than using LPG or natural gas.

Established in 2007, **Blantyre Farms** in the South West Slopes of NSW became the first farm in Australia to have a registered project under the government's Carbon Farming Initiative program in 2011. A biogas generator was installed capturing methane from pig manure and turning it into electricity.

Manildra Group's **Shoalhaven Starches** site in Nowra manufactures ethanol from gluten waste streams which is used for beverage production and biofuel.

In a partnership between Jemena, ARENA and Sydney Water, the **Malabar Biomethane Injection Project** will refine biogas from the wastewater treatment plant using anaerobic digestion into 'biomethane' for use in Jemena's NSW gas distribution network.

Offshore wind energy

Although offshore wind does not have a direct impact on agricultural land, it is briefly discussed here because its contribution to future energy supplies is likely to reduce the land use change resulting from onshore wind and solar development.

The plan for Australia's future energy supply (the Integrated System Plan) relies on a significant amount of offshore wind energy (with more than 10GW identified in NSW). This potential new source of renewable energy generation could complement onshore generation by diversifying the energy mix and strengthen energy security.

The potential for an offshore wind industry in NSW has been recently flagged in the Australian Government's announcement of the Hunter and Illawarra coastlines as areas warranting further consideration as potential Offshore Wind Zones under the Commonwealth *Offshore Electricity Infrastructure Act 2021*. These potential zones are optimally located near large load centres and would complement the NSW Government's planned onshore development of REZs in these regions.

Offshore wind energy generation is a significant source of power in some countries but in its infancy in Australia. There was an official commencement for Commonwealth waters (outside the three mile zone) in August 2022, of the process to declare Gippsland, in Victoria, as Australia's first zone for offshore wind project development, and the designation of five other regions. These include the Pacific Ocean regions off the Hunter and Illawarra in New South Wales, the Southern Ocean region off Portland in Victoria, the Bass Strait region off northern Tasmania, and the Indian Ocean region off Perth/Bunbury in Western Australia.

There are many overseas experiences to learn from. It is possible that the offshore wind energy sector will face similar but lesser issues with potential impacts on communities and industries operating in the marine environment as with renewable energy developments on land. These include impacts on visual amenity, displacement of fishing effort, impact on the marine environment, licensing and participation mechanisms, opportunities for coexistence of activities (e.g., allowing co-location of commercial fisheries, recreational fisheries and aquaculture with offshore wind farms) and concerns about end-of-life arrangements and decommissioning.

Given the significant and expected potential of offshore wind energy to complement land-based renewable energy developments, best practices should be established early to minimise the potential for friction in the sector's development, including early and meaningful inclusion of sector representatives (e.g., fisheries, tourism and transport operators) in planning and decision-making, studies on cumulative impacts, legal, safety and insurance issues associated with offshore wind energy.

The NSW Renewable Energy Sector Board's Plan includes an action to support the development of an offshore wind industry in NSW and should be pursued.

Conclusion

This Report has considered the development of the renewable energy industry within the State's planning system and acknowledged the importance of successful implementation of the Government's energy rollout policy. The two principal agricultural land use policy questions that were regularly highlighted in submissions and consultations for this Review were:

- will the sector's growth have an impact on agricultural production that is sufficiently large to matter and have broader industry policy implications, and
- can additional constraints on landowners' land use options and discretion be justified to account for the interests of neighbouring landowners and local agriculture industries.

There is also the practical question of the feasibility of directing this investment in renewable generation towards land that is less productive if a positive case can be made on these questions.

On the first question, this Review has assessed that the impact of the renewable energy growth on agricultural land, at State level, will not be significant. However, there are, and will be, localised impacts which should be considered and minimised. Most of this Report is focused on these local project specific issues.

There are significant pressures on rural land use. The development of land for renewable energy development adds at the margin to the land required for urban and industrial development, and the land that will be required for carbon sequestration to reach industry and government net zero emission targets. The cumulative impact of these for a country like Australia with a growing population is not widely understood.

As countries formulate plans to achieve net zero emissions outcome estimates of land required for sequestration are emerging. Analysis by the UK Committee on Climate Change estimated that a net zero by 2050 outcome will require 20 per cent of current agricultural land be repurposed. (**CCC, 2019**).

Domestically, the required land use change has not been estimated with any confidence. However a study that contributed to the Australian red meat industry's CN30 policy estimated that the livestock sector alone would require 5 to 12 million hectares of afforestation to offset emissions that could not be reduced/offset through other pathways such as vegetation management (reduction in land clearing), increasing feedlot numbers (reduction in slaughter age) and reducing enteric methane emissions (through improved cattle diets and/or a reduction in the number of individual animals) (**Mayberry et al, 2019**). At the larger end of the range, this is equivalent to approximately 1.6% of the total Australian land area for a sector that currently accounts for around 10% of our national emissions.

Australian Governments and regional communities will have to undertake significant new policy development to manage these land use changes effectively. In the specific case of renewable energy development and the associated transmission and storage infrastructure the NSW Government's focus should be on the mitigation and management of local impacts of specific projects through the planning system and industry specific policies such as the Electricity Infrastructure Roadmap.

On the second question a number of participants in this Review have sought additional constraints on the land use change options open to landowners to reduce impacts on third parties and food and fibre production and the communities that depend on those production systems. This Review has found that while it may not seem to be the case locally this sector's development will not have a material impact on the State's agriculture industry. Third party impacts are project and location specific, and best dealt with through the existing development assessment and approval processes for individual projects.

The Review has considered whether provisions specific to renewable energy developments should be applied in addition to the general planning regime. There are measures proposed in this Report which aim to improve the operation of that regime in the handling of these developments, and the

application of that regime in this sector is improving as our experience grows (e.g., the recently revised Large-Scale Solar Energy Guideline). However, it is hard to see the case for more fundamental changes to that regime specific to renewable energy, particularly when it is not the most significant source of pressure for rural land use change.

The Review has also noted that if imposing additional constraints on rural land use change associated with the utility of that land were to be considered rigour in the definition and identification of that land would be required. Neither the policy framework nor the data that would be required to implement regulation of this kind exist at present. Increased knowledge of our natural resource base will be valuable whatever view you may have about increased rural land use regulation. DPI's project to improve our understanding of rural lands through the identification and mapping of State Significant Agricultural Land will be important to inform improved decision making about this land in future and should continue.

Attachment A: List of submissions on the issues paper

1. O'Brien Ag
2. Burrendong Save Our Surroundings action group
3. Andrea Strong
4. Andrew Wilson
5. Anthony Gardner
6. Beth White
7. Brad Plum
8. Brigitte Thomas
9. Private submission
10. Carl & Deborah Clark
11. Christine White
12. Christpher Cabot
13. David & Jenny Thompson
14. David Knyvett
15. Deborah Murdoch
16. Diane Willman
17. Don Kirkpatrick
18. Don Pratley
19. Eleanor Cook
20. Emily Kirkpatrick
21. Ewan & Sally Chandler
22. Greg Schaefer
23. Ian Napier
24. Isabella Van De Paar
25. Jacinta Evans
26. James & Helen Gooden
27. Jane Lieschke
28. Jason Harrop
29. Jennifer Jacob
30. John McGrath
31. Kate Gooden
32. Lilian Mutyiri
33. Louis & Jenny Lewington
34. Luke Moloney
35. Margaret Armstrong
36. Michael Katz
37. Michele Simpson
38. Nat Barton
39. Nigel & Emma Roberts
40. Nigel Wood
41. Yass Landscape Guardians Inc
42. Pamela & Richard Martin
43. Peter Drayton
44. Peter, Anita, Sarah & Alison Ostenfeld
45. Peter York
46. Richard & Ann Heller
47. Rick Campbell
48. Rob & Katrina Blomfield
49. Rodham Family
50. Roel & Isabella Van de Paar
51. Ross Smith
52. Roy Currie
53. Sally & Simon Oates and John & Penny Holland
54. Sally Gilder
55. Sam & Polly Bonanno
56. Sarah Roche
57. Private submission
58. Stephen Grimes
59. Stephen Noon
60. Steven Brussos
61. Terry Conn
62. Tinos Mutyiri
63. Turlough Guerin
64. Virginia Knyvett
65. OzEnvironmental Pty Ltd
66. Clean Energy Council
67. Cotton Australia
68. Country Women's Association
69. DP Energy Australia
70. Dr Joe McGirr MP
71. Dunedoo Coolah Landcare
72. EMM - Environmental & Planning Consultants
73. Geni Energy
74. Goulburn Mulwaree Council
75. Private submission
76. Humelink Alliance Inc
77. Janelle Saffin MP
78. Private submission
79. Local Government NSW
80. Marble Energy
81. Merriwa-Cassilis Alliance
82. Mining & Energy Related Councils
83. Murrumbidgee Council
84. New England Renewable Energy Zone Councils
85. NSW Environment Protection Authority
86. Re-Alliance
87. Regional Development Australia - Central West
88. Riverina Joint Organisation
89. Save Our Surroundings
90. Spark Renewables
91. Tilt Renewables
92. Timber NSW
93. Cathryn Hughes
94. Etta Payne
95. Shane Kilby
96. Private submission
97. Richard Croft
98. Mid Western Regional Council
99. Darren Fisher
100. Coolah District Development Group
101. Angus Wilson
102. Charlie Wagstaff
103. Deb & Michael McRae
104. Deborah Murdoch
105. Felicity Harding
106. Gerald & Lynden Spry
107. Jennifer Palmer
108. Jessica Keatley
109. Jim & Heather Allen
110. Jo Petch
111. John Davies
112. John Karakoultsidis
113. John Keogh
114. Kristopher Hughes & Jane Heller
115. Max Lieschke
116. Maxwell Community Group
117. Mick & Ellen Hendrson
118. Nicole Killen
119. Paul Meggison
120. Ricky Evans
121. Rosemary Hughes
122. Tony Price
123. NSW Farmers
124. Walcha Energy
125. NSW Farmers - Billabong Branch
126. Lynette Lablack
127. Clare Bruton, Robbie Stevens, Patrick Stevens & Cassidy Stevens
128. Gemma & Ross Pride
129. Lock the Gate Alliance
130. University of Technology Sydne

Attachment B: Land-use analysis assumptions

Area of land required

Solar	Area of land required (ha/MW)	Source
Single axis tracking	2	(CEC, 2021)
Fixed array	5	NSW Department of Planning & Environment

Wind		Source
Average disturbance area per turbine (ha)	1.51	NSW Department of Planning & Environment
Average MW per turbine	4.11	NSW Department of Planning & Environment
Turbine area required per MW	0.37	NSW Department of Planning & Environment

Land Type Proportions (Source: Draft SSAL and NSW Department of Planning & Environment Zoning)

	Non-Rural Zoned	Rural/Non SSAL	Draft SSAL	Rural Zoned
NSW	23%	65%	12%	77%
Central-West Orana	12%	64%	24%	88%
New England	10%	75%	15%	90%

	Total Land Area (ha)	Non-Rural Land Area	Rural Land Area	Rural SSAL Area	SSAL Area
NSW	80,081,063	18,543,547	61,537,516	9,362,203	9,453,581
Central-West Orana	2,093,803	254,434	1,839,369	506,840	508,156
New England	1,550,069	39,349	1,510,720	252,109	254,155
NSW Transmission Buffer	17,875,653	4,069,777	13,805,877	3,275,160	3,343,692
Central-West Orana Transmission Buffer	702,441	109,323	593,118	170,554	190,467
New England Transmission Buffer	796,846	29,625	767,220	197,187	186,590

Land Use (Source: DPI Land Use Mapping)

	Cropping Area (ha)	Livestock Area (Ha)	Horticultural Area (ha)	Forestry Area (ha)	Other Ag (ha)	Non-Agriculture (ha)
NSW	12,958,738	46,692,769	729,010	2,826,521	2,242,286	14,719,277
Central-West Orana	503,464	1,138,749	4,058	8,984	28,943	409,607
New England	61,951	1,300,376	315	28,286	12,090	147,052
NSW Transmission Buffer	3,418,878	8,888,526	99,146	837,889	255,653	4,372,771
Central-West Orana Transmission Buffer	173,351	404,420	3,495	1,672	17,104	100,552

New England Transmission Buffer	41,847	683,557	305	6,701	9,816	52,248
% of Land Area	Cropping Area (ha)	Livestock Area (Ha)	Horticultural Area (ha)	Forestry Area (ha)	Other Ag (ha)	Non-Agriculture (ha)
NSW Transmission Buffer	19%	50%	1%	5%	1%	24%
Central-West Orana Transmission Buffer	25%	58%	0%	0%	2%	14%
New England Transmission Buffer	5%	86%	0%	1%	1%	7%

NSW Average Cropping Statistics -Select Commodities (Source: (ABARES2022a); (ABARES 2022b)

	NSW Yields 5-yr Average (t/ha)	Area Planted 5-yr Average (kt)	Prices 5-yr Average ($/t)	Proportion of Area
Wheat	2.51	3,133	356	57%
Barley	2.45	845	298	15%
Canola	1.72	614	748	11%
Chickpeas	1.46	169	773	3%
Oats	1.07	292	298	5%
Cotton	1.87	260	2,728	5%
Sorghum	3.60	137	356	3%

Note: Only select crops used as a proxy. Regional variations will occur however, these change from year-to-year. Therefore, it is assumed that the proportions are relevant crop proportions and yields within REZs on average over time.

Combined Stocking Densities

	2017-18	2018-19	2019-20	Average	Average Price (cwt/head)
Average Central-West & Northern Tablelands					
Sheep	1.11	0.94	0.75	0.93	178*
Cattle	0.19	0.16	0.17	0.17	1,855**
Ewe % of Flock	58%	60%	61%	60%	
Wool					39***

* Per ha – Total sheep/total grazing area. Price for average carcase weight with 5-year average lamb prices.

** Per ha – Total cattle/total grazing area. Price for medium steer heavy end of carcase range with 5-year average beef price (EYCI).

*** Price based on total sheep flock being shorn once per year and average 4.5kg fleece weight and 5-year average greasy wool prices (EMI).

Agricultural GVP

Year	Actual GVP Ag Only ($ million)	Trend ($)	Year Number
1981/82	3,601	3,618	1
1982/83	2,955	3,865	2
1983/84	4,595	4,112	3
1984/85	4,407	4,359	4
1985/86	4,527	4,607	5
1986/87	4,781	4,854	6
1987/88	5,902	5,101	7
1988/89	6,826	5,348	8
1989/90	6,880	5,596	9
1990/91	6,426	5,843	10
1991/92	5,803	6,090	11
1992/93	5,817	6,337	12
1993/94	6,341	6,584	13
1994/95	5,964	6,832	14
1995/96	7,040	7,079	15
1996/97	8,262	7,326	16
1997/98	7,683	7,573	17
1998/99	7,700	7,821	18
1999/00	7,936	8,068	19
2000/01*	8,473	8,315	20
2001/02	10,233	8,562	21
2002/03	8,023	8,810	22
2003/04	8,548	9,057	23
2004/05	8,560	9,304	24
2005/06	9,022	9,551	25
2006/07	7,741	9,798	26
2007/08	8,590	10,046	27
2008/09	9,091	10,293	28
2009/10	8,359	10,540	29
2010/11	11,458	10,787	30
2011/12	10,550	11,035	31

2012/13	11,858	11,282	32
2013/14	11,086	11,529	33
2014/15	11,943	11,776	34
2015/16	13,086	12,024	35
2016/17	14,501	12,271	36
2017/18	13,264	12,518	37
2018/19	11,679	12,765	38
2019/20	11,196	13,012	39
2020/21f	16,847	13,260	40
2021/22		13,507	41
2022/23		13,754	42
2023-24		14,001	43
2024-25		14,249	44
2025-26		14,496	45
2026-27		14,743	46
2027-28		14,990	47
2028-29		15,238	48
2029-30		15,485	49
2030-31		15,732	50
2031-32		15,979	51
2032-33		16,226	52
2033-34		16,474	53
2034-35		16,721	54
2035-36		16,968	55
2036-37		17,215	56
2037-38		17,463	57
2038-39		17,710	58
2039-40		17,957	59
2040-41		18,204	60
2041-42		18,452	61
2042-43		18,699	62
2043-44		18,946	63
2044-45		19,193	64

2045-46		19,440	65
2046-47		19,688	66
2047-48		19,935	67
2048-49		20,182	68
2049-50		20,429	69
2050-51		20,677	70