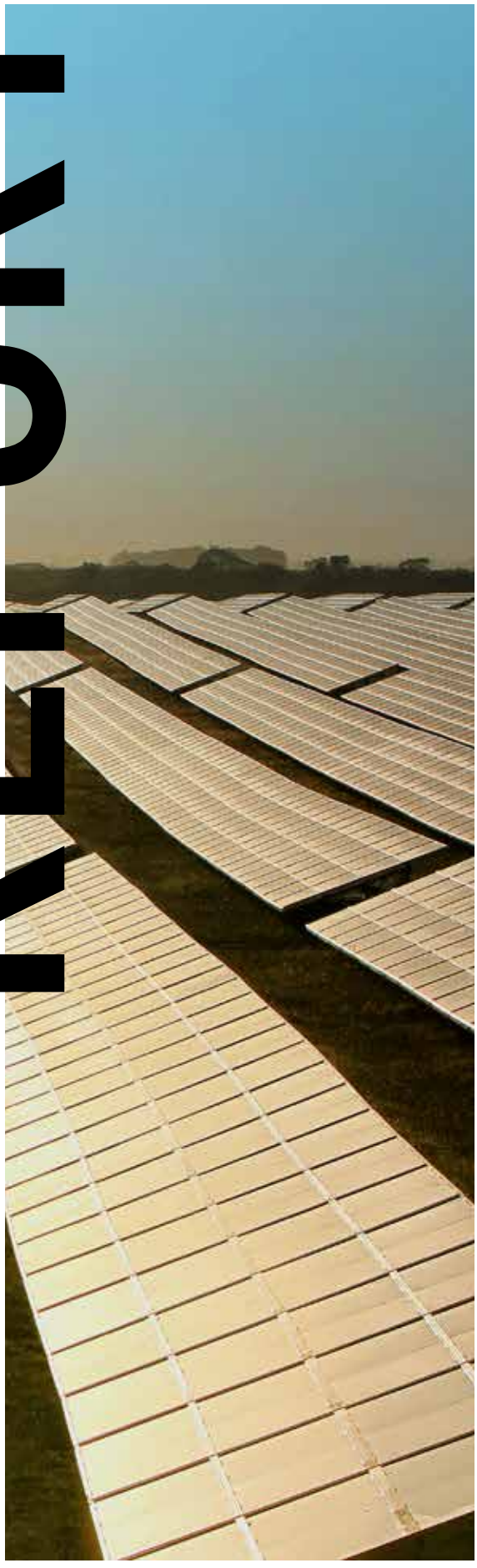
REPORT



Ipsos

ARENA

Australian Government

Australian Renewable Energy Agency

Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry

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Introduction

The social licence to operate is a concept that reflects community support for the operations of an organisation or development. A development can satisfy legal and environmental requirements, but social support from community is also critical for the longer term sustainability of a development.

This document applies the concept of social licence to operate to the large scale solar energy sector in Australia. Based on research with the Australian general public, as well as specific research in communities living in close proximity to planned or established large scale solar energy facilities, this project breaks new ground in terms of setting out the preconditions and best practice principles for establishing social licence to operate. It is hoped that applying this information will help solar project developers streamline the project development process. The social licence to operate concept has not previously been applied to the large scale solar energy sector in Australia.

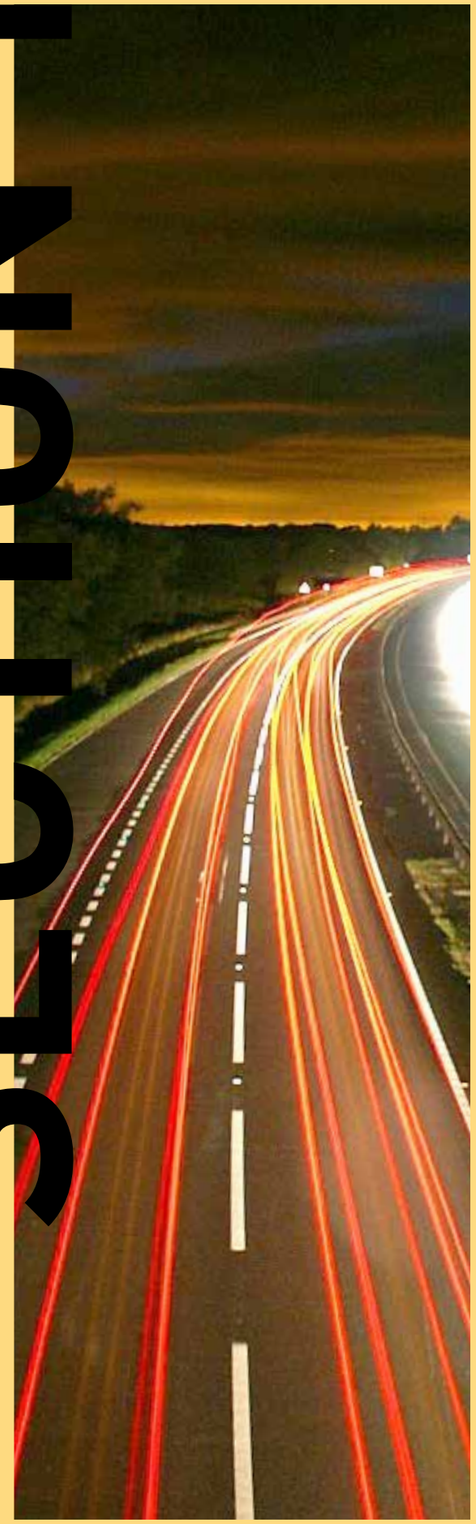
This report has been created based on a mixture of primary and secondary research. The primary research comprised a quantitative survey and a series of focus group discussions. The survey was conducted online with 1,197 people living across Australia aged 18 years and over. Fifteen group discussions were conducted in metropolitan (Sydney, Melbourne, Perth, Brisbane and Darwin) and regional locations (Geraldton, Dubbo and Broken Hill). In addition, a range of in-depth interviews with members of the public and those in planning and community engagement roles from organisations involved in establishing large scale solar projects were also conducted. Consultations with the public were designed to include a cross-section of general population and those living in areas close to established or planned large scale solar projects. The aim was to ensure that this report is based on feedback from both everyday members of the public without direct exposure to large scale solar projects as well as those who have some first-hand experience of living close to a project under development.

As of 2015, there is still a limited number of operational large scale solar energy projects in Australia. Consequently, this report comes at a relatively early stage of the large scale solar energy story in this country. Importantly, this report is based on research that goes beyond general population opinions of solar energy, and looks at how large-scale solar development are viewed by the communities surrounding them. The CSIRO acknowledges that for new industries, it is challenging to understand community expectations as well as concerns and needs; through its Science into Society Group, the organisation is working across a range of industries to promote better understanding of community expectations, needs and concerns. This document therefore contributes to the small but growing body of work that shines a light on how government and organisations involved in large scale solar energy projects can tailor their communications and community engagement work to the issues most pertinent to local communities.

Finally, creating social licence to operate large scale solar energy projects requires developers to collaborate and engage effectively with communities around their expectations, concerns and needs in regard to large scale solar energy; ultimately this will lead to a sustainable contribution to Australia's energy landscape.

This project was commissioned by the Australian Renewable Energy Agency (ARENA) and involved assistance and feedback from a number of renewable energy sector stakeholders. We thank all those who provided their time and expertise.

SECTION 1



Social Research Summary

Research to investigate perceptions of the desirability of utility-scale solar facilities

The following summarises the quantitative and qualitative social research findings on which this report is based. A more detailed research report is available separately from Ipsos.

Research objectives

The main objective of the research was to identify the preconditions necessary for utility-scale solar installations to have a social licence to operate in Australia. Specifically, the research set out to understand general attitudes towards solar energy and the acceptability of large scale solar energy facilities with a view to creating this report.

Methodology

The research consisted of three key components:

- Quantitative phase: a survey of a representative sample of 1,197 Australians.
- Qualitative phase: a series of 15 group discussions held in capital cities, regional centres and communities near large scale solar facilities.
- Review phase: a review of the factors that influence social licence to operate solar facilities, conducted via in-depth interviews and covered in the group discussions with stakeholders in communities living near large scale solar facilities.

The quantitative survey included testing the impact of exposure to two sets of stimuli (consisting of images and information about large scale solar facilities) through asking survey participants about their attitudes towards large scale solar facilities relating to land use; efficiency; reliability; visual impacts; economic impacts; environmental impacts; health impacts and the cost of electricity before and after seeing the stimulus materials.

Quantitative findings

General attitudes towards energy resources

There is strong support for solar energy amongst Australians, with higher levels of support recorded for solar energy than all other sources of energy tested (whether renewable or non-renewable).

Support is strongest for domestic solar installations, with 87% of respondents indicating that they were in favour of roof-mounted solar panels on homes. Support for large scale solar facilities is slightly lower, with slightly more than three quarters (78%) indicating that they were somewhat in favour (34%) or strongly in favour (44%) of these facilities. Just 5% were opposed to large scale solar facilities, and 17% had no views either way or indicated that they didn't know. This means that for every individual opposed to large scale solar facilities in Australia, more than 15 people are in favour.

The next most favoured sources of energy are wind farms and hydro energy with 72% being somewhat or strongly in favour of each of these sources. One in ten (10%) oppose wind farms while opposition to hydropower is lower at 6%.

Knowledge of large scale solar facilities

Australians have relatively low levels of knowledge about large scale solar energy facilities; around one in ten (12%) say they have a fair amount of knowledge and 3% a great deal. Just under one in five Australians (19%) don't know about, or have never heard of large scale solar facilities. More than a quarter (28%) have heard of, but know nothing about large scale solar facilities. The remaining 39% say they know just a little.

Attitudes towards large scale solar facilities

There is strong belief among the Australian population that large scale solar facilities can provide consistent, reliable electricity in Australia. More than three quarters (77%) agree that large scale solar facilities can be a significant source of energy to help meet Australia's energy needs. Almost two thirds (63%) agree that large scale solar facilities can provide a consistent supply of electricity.

Sentiment towards the visual impact of large scale solar facilities is mixed, with slightly more Australians agreeing that large scale solar facilities have a negative visual impact on the local landscape (30%) compared to those who disagree (26%). A higher proportion (31%) neither agreed nor disagreed, indicating a lack of knowledge about the visual profile of large scale solar facilities. Only 8% are unsure about the visual impacts of wind farms.

Perceptions of the economic, environmental and health impacts are more positive. Almost half of respondents (48%) agreed that large scale solar facilities have a positive impact on the local economy, and just 7% disagreed. Over half agreed that large scale solar facilities have a positive impact on the environment (53%), and that increasing the number would reduce Australia's carbon emissions (63%).

Survey respondents appear less certain about local environmental and health impacts; more than half (53%) neither agreed nor disagreed that large scale solar facilities have a negative impact on local ecosystems or gave a don't know response. Similarly, 47% neither agreed nor disagreed that large scale solar facilities could have a negative effect on the health of the people living nearby, or gave a don't know response.

Attitudinal changes on being shown information and photographs of large scale solar energy facilities

Survey participants were asked whether they had changed their mind about any of the attributes or potential impacts of large scale solar facilities as a result of reading a brief description and seeing photos of large scale solar facilities. Those who said yes were then re-asked their agreement with those particular statements. Although there was no statistically significant change in overall support for large scale solar facilities as a result of seeing the two sets of stimuli, there were changes in opinion relating to specific aspects of large scale solar energy.

Exposure to at least one set of stimuli resulted in higher levels of support for large scale solar facilities relating to:

- the reliability of electricity supply;
- the visual impact; the health impact;
- the capacity of large scale solar energy to contribute to the reduction carbon emissions; and
- the impact on the local economy.

Attitude towards funding of large scale solar energy facilities

A majority of Australians (71%) agree that the government should provide funding to develop large scale solar facilities, with only 5% disagreeing.

Three in five (60%) agree that funding for large scale solar facilities should be prioritised over funding for non-renewable energy sources. More than a third (38%) agree that funding for large scale solar facilities should be prioritised over funding for other sources of renewable energy.

Qualitative findings

Awareness of sources of energy in Australia

There was strong awareness of the main sources of energy providing power to homes and businesses, and a general understanding that coal was the main fuel Australia relies on. Participants generally substantially overestimated the proportion of energy obtained from renewable sources, especially younger participants. Although some were informed of the dominant role of hydropower as a source of renewable energy, many assumed that a far greater proportion of energy was supplied by wind and solar sources.

Perceptions of future sources of energy

Many participants anticipated a national move towards greater utilisation of renewable energy sources into the future. For some, this change was thought to be a pragmatic adjustment as fossil fuel supplies began to dwindle. For others, uptake of renewables in the future was linked to a need to address climate change and reduce carbon emissions.

Familiarity with solar energy

Participants were principally familiar with domestic solar generation. Many had, or knew people who had, installed solar panels on their homes. Attitudes towards domestic solar were generally positive. The most important reason for participants installing (or wanting to install) domestic solar panels was to reduce the household energy bill. Environmental concerns were generally a secondary motivation.

Overall, there was low awareness of large scale solar energy. Those who had heard of it regarded it very favourably, and sentiment was almost always positive towards the concept. Some participants had seen images of large scale solar facilities in newspapers or on television, but none had seen large scale solar facilities first-hand. There was even less awareness of large scale solar projects in Australia despite participants expressing the opinion that Australia was an ideal place for generating solar energy on a utility scale.

Support for large scale solar energy

Most felt favourable towards the idea of large scale solar energy projects in Australia. Unsurprisingly, participants of a more environmentally conscious persuasion were unanimous in their support for a move towards a greater proportion of Australia's energy needs being met by solar energy. However, even those who appeared to be quite conservative in their opinions about viable forms of energy generation (i.e. had some concerns about how efficient some forms of renewable energy were) were very interested in finding out more about large scale solar projects and were open to hearing about how the perceived limitations could be overcome.

Support for large scale solar projects is reliant on a number of factors including efficiency, impacts on the price of electricity and impacts on employment and these should be addressed in communications about large scale solar projects.

Perceived advantages of large scale solar energy

Perceptions of the potential advantages of large solar generation centred around reducing reliance on fossil fuels, positive environmental impacts, investment in local communities and lower potentially negative health and safety impacts than other forms of energy generation.

Perceived disadvantages of large scale solar energy

Concerns that were top of mind relating to large scale solar energy generation were focused on two areas: the cost of energy generated from large scale solar energy and the efficiency of producing energy in this way. Concerns around efficiency were twofold: firstly the quantity of solar panels (or other resources) that would be needed to produce a viable amount of energy, and secondly, the storage and transmission of solar energy.

Other concerns that arose around large scale solar generation included land use, financial costs, visual impact, environmental impact and health and safety impacts.

Engagement review findings

Familiarity with large scale solar energy

For those who were not directly engaged with their local facility, understanding of large scale solar energy was mixed. These participants were often no better informed about solar facilities than those interviewed in capital cities and regional centres. Their knowledge of large scale solar facilities tended to be gained from the same mainstream media sources as the wider population.

The local context

The unique geographic and social context in which a community exists is critical to understanding community attitudes towards local solar facilities. The economic benefit to the community of having a solar facility situated locally was seen by most as being substantial, particularly during the construction phase. This engenders a higher level of support in the community for development of the facility than might otherwise exist.

Sentiment towards large scale solar energy facilities

Local residents living near large scale solar facilities tended to have similar feelings towards those facilities as the wider Australian population. During interviews and group discussions with local community members, the issues and themes that arose spontaneously were the same as those raised in capital cities and regional centres. Opinions between stakeholders in local communities differed from those of the wider Australian population most often in a greater positivity about the direct impact of construction and operation on the local economy among those living near a solar facility.

The size of the community living near a large scale solar facility appears to have a direct relationship to the level of community support for its development, with smaller communities being more highly engaged that larger ones. This was evidenced by greater attendance at community meetings in smaller towns. In smaller communities, solar facilities have a greater impact on the economic and social fabric of the town due to the relatively larger impact in terms of both local employment and additional spending in the community.

Perceived advantages and disadvantages of large scale solar energy facilities

Community members were generally supportive of large scale solar facilities as a viable means of energy production, and expressed either no concern, or very low levels of concern, about the environmental, health or visual impacts of construction or operation. Moreover, the interviews provided no qualitative evidence that concerns were heightened in areas near large scale solar facilities when compared to the population capital cities and regional centres. As in the wider population, familiarity with domestic and commercial solar generation appears to translate into positivity about local large scale generation.

Project stakeholders were generally aware that most of the economic benefits to the local community would accrue during the construction phase of any given solar facility rather than during ongoing operation. Employment and contracting opportunities for residents were seen as the key benefits to the local economies well as benefits to local businesses from the influx of workers from outside the local area.

Local community stakeholders interviewed anticipated that most of the employment generated by large scale solar projects would take place during the construction phase; however, some employment opportunities were also expected to accompany the ongoing operation and maintenance of the facilities. Most expected fewer than ten local employees to be working on location past the construction phase of the project.

Engagement experiences and preferences

Most stakeholders, other than adjacent landowners and local government officials, were unaware of any engagement activities undertaken during the planning phase of the projects. In the communities where research was undertaken, this did not appear to impact support for the projects. None of the stakeholders interviewed expressed any concern or frustration at their local project due to not being consulted during the planning phase.

For most community members, a general understanding of the project, and the impacts and benefits it would have for the community, was seen as being sufficient information when being communicated with about the project. Among those who wished to be directly involved with their local project, whether via direct employment or contracting, a higher level of information provision was demanded. In addition to the basic information requested by the wider community, more detailed information was required including more detailed project timelines and information about the types of skills and services required during the project.

A range of media had been employed by the operators of the solar facilities in the communities in which the research was undertaken, all of which were seen as both appropriate and necessary by project stakeholders. Stakeholders voiced the strong opinion that the communication of employment opportunities and tenders required particular attention from facility operators to ensure community expectations of employment opportunities were carefully managed.

SECTION 2

Context: Social licence to operate and community engagement in renewable energy

Large scale solar energy in Australia

With its high levels of sunshine hours, Australia is well placed to utilise large scale solar energy as a key source of renewable energy and use utility scale solar energy to increase the overall proportion of energy sourced from non-renewable sources.

Australian use of renewable energy sources

According to the Bureau of Resources and Energy Economics, in 2012-2013, approximately 13% of all electricity generated in Australia was renewable.[1]

Many researchers have but forward reasons for the lack of uptake of renewable energy in Australia. Understanding these reasons is important considering that Australia is replete with natural resources that make the country particularly amenable to the integration of renewable energy into the generation of electricity. Some of the possible reasons for the relatively slow uptake of renewable energy in Australia include:

- an increase in electricity prices concurrent with the phasing out of coal (an resource abundant in Australia) in the generation of electricity;[2]
- the loss of jobs associated with the coal industry, particularly in coal rich areas;[3]
- community opposition to sources of renewable energy in their area, often referred to as 'not in my backyard' (NIMBY);[4] and
- Australia's economic dependence on coal exports; Australia provides approximately 30% of the world coal trade. [5]

Despite the relatively slow uptake and utilisation of renewable energy in Australia, there are signs of change. Research into renewable energies and renewable energy innovations are increasing steadily in Australia. The Australian Renewable Energy Agency (ARENA) was established on 1 July 2012. The main objectives of ARENA, as outlined in the Australian Renewable Energy Agency Act 2011, are to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia. Further evidence for an increase in levels of innovation in Australia can be seen in trends in patenting. A recent regression analysis of worldwide trends in patenting showed that Australia is one of the highest generators of renewable energy patents in the world.[6]

The Australian Government has also sought to encourage renewable energy generation nationwide by establishing the Renewable Energy Target (RET) 2001. The RET comprises two separate schemes: the Large-Scale Renewable Energy Target (LRET) and the Small-Scale Renewable Energy Scheme (SRES).

The RET aims to:

- encourage additional generation of renewable electricity;
- decrease emissions of GHGs in the electricity sector; and
- ensure that renewable energy sources are ecologically sustainable.[7]

Further, the RET's broad target was to provide some 20% of Australia's total electricity generation through renewable sources.[8] A review of the Renewable Energy Target scheme conducted in 2014 by an expert panel, released in August 2014, made recommendations to amend both LRET and SRES and ultimately reduce the costs of the RET.[9]

Solar energy in Australia

Solar energy is perhaps – along with the use of wind turbines – one of the most appropriate forms of renewable energy for use in Australia. According to research, photovoltaics, solar thermal and wind energy are the only forms of renewable energy that are efficient enough to provide sufficiently large quantities of electricity for wide scale implementation.[10] Research into the levels and uniformity of solar radiation has demonstrated that Australia has outstanding, consistently-distributed solar resources nationwide, indicating that solar energy has the potential to be an excellent source of renewable energy for Australia.[11]

Remote areas of Australia appear particularly suitable for the use of photovoltaic sources of energy, especially locations such as remote Indigenous communities, mines, tourist sites (such as Kakadu) and communications installations.[12] Such areas are often too isolated to be able to access traditional supplies of electricity in the form of a power grid. Further, due to the inaccessibility of these locations, the diesel required for off-grid generators is difficult to feasibly transport.[13]

Current use of solar energy

Despite the suitability of Australia to the utilisation of photovoltaics for energy generation, the use of solar technology for this purpose is relatively low, albeit increasing over recent years. Solar energy generation rose 49% over 2012-2013, although it accounted for only 1.5% of the total electricity generated.[14] This increase in generation has been largely a result of both Federal and state government policies over recent years including the Solar Cities Program, the Smart Grid/Smart City Program, as well as Verve Energy's privately-owned Greenough River Solar Farm.[15] All of these programs demonstrated the use of photovoltaic technology on a large scale, and its applicability in utility businesses.

Despite advances over the past few years, recent results published by the Climate Council suggest that these increases may not continue. According to the report 'Lagging Behind: Australia and the Global Response to Climate Change', investment in sources of renewable energy dropped 70% from 2013 levels during 2014.

Community acceptance of solar technology

One of the most significant barriers to the increased use of solar technology both in Australia and internationally is the community acceptance of solar technology. The NIMBY bias is one of the foremost obstacles to the uptake

and integration of solar technology into the generation of electricity. The bias is defined as being ostensible enthusiasm and positive regard towards a commodity – such as solar energy – until it is to be implemented within their immediate vicinity, at which point the same commodity is opposed.[16] Much of the literature regarding the NIMBY bias in relation to renewable energy technology relates to the use of wind turbines; however, as mentioned by Wustenhagen et al., the same aesthetic (for example, domestic photovoltaic panels' visual properties[17]) and practical considerations (for example, constraints to planting trees because they may cast shadows onto the panels) apply to photovoltaic technologies.[18]

|| Perceptions of reliability and capacity of solar technology

One prominent barrier to the uptake of renewable technology is reliability, as well as community perception of its reliability. Research has shown that renewable technology used in remote Indigenous communities has often been defective, suffering from a lack of ability to withstand the harsh conditions of these regions.[19]

Perceptions of both reliability and capacity – within the community and industrially – may also be obstacles to the greater uptake of solar technology in Australia. On a community level, research has shown residents' perceptions of both the reliability and capacity of solar energy systems is not always completely favourable. In Lowe and Lloyd's survey of residents in remote communities, over a third of the residents (from the 74 remote communities included in the study) complained of both insufficient power and unreliability in their photovoltaic systems.[20] Similar results have been found for tourist industry operators in Queensland. In a survey of tourism operators by Dalton et al, the general perception was that sources of renewable energy can often be unreliable. This view was particularly salient amongst operators in inland Queensland, where issues with reliability of electrical supply are prominent amongst those working within the tourism industry.[21]

Social licence to operate

|| Defining the social licence to operate

Negative opinions and opposition to certain types of development can often result in community outcry and lack of support. As a result of this opposition, governments' and organisations' plans for development are often slowed; for example, community protests that result in the postponement of the opening of a mine.[22]

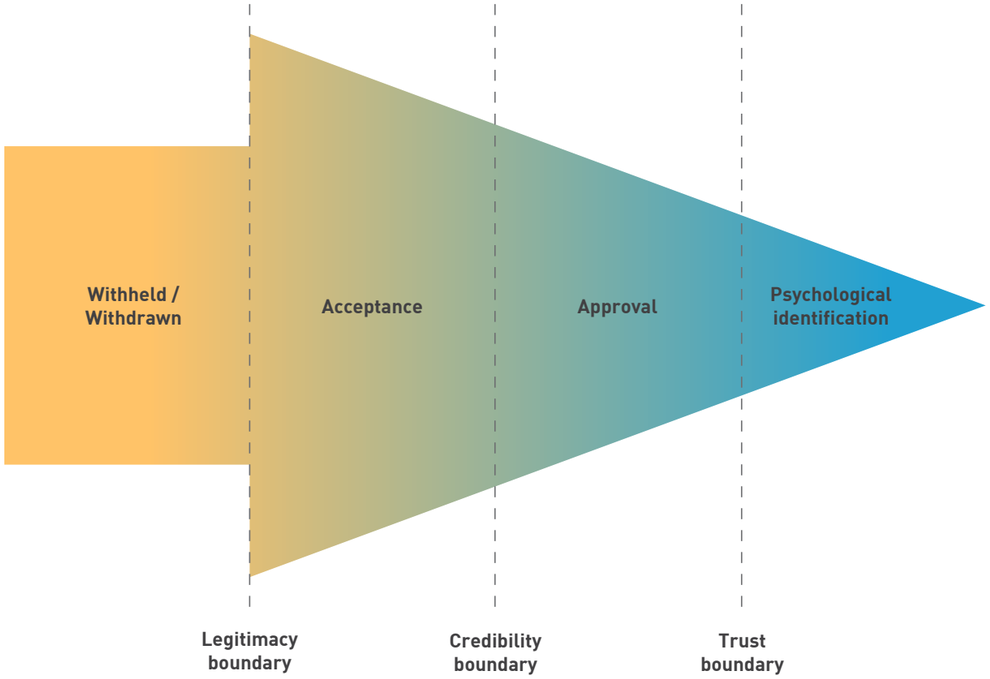
It is within this context that the concept of 'social licence to operate' emerged. Social licence to operate (SLO) is commonly thought of as being related to a critical mass of community acceptance, approval and support of a project or development.[23,24] SLO is context-specific, and may inherently vary according to the industry in which it is applied, as well as social, political and economic conditions of the community in which the proposed development is to proceed.[25] Social licence is not present if a community withholds support and opposes an industry or a development.

A wide range of recommendations for ensuring SLO have emerged from the literature. Included in these recommendations is conveyance of information at all levels of development; utilising methods for conflict resolution; contextualisation of approach according to local traditions and principles; education of stakeholders; and open communication between all stakeholders.[26]

One of the most eminent models of the SLO in mining was suggested by Thomson and Boutilier. In their model, the SLO is composed of four levels **(see Figure 1)**.

- **withdrawn** – in this level, access to important resources is denied, and there is no SLO;
- **acceptance** – this level is the most common level of SLO and reflects a tolerance of the development in question;
- **approval** – this level reflects a general positive regard for the development in question; and
- **psychological identification** – the highest level of SLO; involves trust and indicates a minimal chance of socio-political threat.

Figure 1: An adaptation of Thomson and Boutilier's pyramid model[27]



According to this model, SLO progresses across from the withheld / withdrawn stages towards psychological identification (ultimately trust). This progress is dependent upon the whether the stakeholder population are imbued with feelings of legitimacy, credibility and trust regarding the development and the developer.[28] Four factors contribute to the stakeholders' perception of legitimacy, credibility and trust and ultimately lead to the granting of SLO. These factors comprise stakeholders' perceptions of the development's economic legitimacy and socio-political legitimacy, as well as a sense of interactional[29] and institutionalised[30] trust with the developing company.[31]

Establishing the social licence to operate is not simple as it is based on the diverse values, interests and concerns that contribute to community expectations.

Of late, SLO has been applied to the renewable energy sector; particularly in the wind industry. A report published by the CSIRO in 2012 applied SLO to a case study examination of rural wind farms in Australia. The researchers proposed an SLO framework in which 'trust building' (incorporating the developers' integrity of operation, collaboration of process and understanding of stakeholders' view) and potential positive impacts (comprising the direct impacts for stakeholders, flow-on and compensatory / fiscal impacts for the community) are positioned within the context of the community's experiences.[32]

This context is based on communities' views with regard to global warming, previous experiences of the use of wind turbines, and the local protocol for authorisation of wind farms in the area.[33]

The Clean Energy Council's (CEC) 'Community Engagement Guidelines for the Australian Wind Industry' report also uses the broad principles of SLO as a basis for their method for community engagement. In their approach the level of community engagement to be used is dictated by the extent of the impact of the development upon the community.[34]

SLO and large scale solar facilities

While there is a scarcity of research into the use of SLO-based approaches in large scale solar energy projects, there is little doubt that SLO frameworks can be applied in the solar energy sector.

As mentioned in the CSIRO's 'Exploring community acceptance of rural wind farms in Australia: a snapshot' report, community-scale renewable technology developments (including the use of solar technologies to generate electricity) are especially likely to have the potential to reach Thomson and Boutlier's 'psychological identification' level of SLO because of the nature of their physical location (for example, the placement of photovoltaic power sources in community-owned, residential areas).[35] Upon reaching this 'psychological identification' stage, community advocacy and financial co-ownership of these projects is likely to increase, resulting in an elimination of the threats of community outcry and wide scale social opposition to the development process seen in the mining sector.[36,37]

Community engagement

Effective and meaningful community engagement is central to establishing, building and maintaining social licence for large scale solar energy facilities. Thoughtful, well delivered community engagement programs will strengthen communities and improve the social sustainability of projects and therefore contribute to the success of large scale solar energy projects.

This report focuses on the critical issues relating to large scale solar energy from the community's point of view and therefore informs the content of the messaging and community engagement approaches rather than the specific community engagement activities (although a number of tools are described in Section 5). There is a wealth of resources freely available to guide best practice community engagement and assist developers and government to design community engagement plans. The International Association for Public Participation's (IAP2) Spectrum of Public Participation provides an ideal foundation for considering the appropriate style of engagement and associated activities **(see Figure 2)**.

Best practice community engagement requires an engagement approach that is:

- tailored to the specific needs of a community;
- long-term;
- initiated early in the planning stages;
- flexible; and
- demonstrates a genuine commitment to the principles of community engagement from the developer.

It is widely accepted that more collaborative forms of engagement with communities can facilitate establishment of trust between the community and infrastructure developers and thus contribute to establishing SLO. However, given the relatively low levels of familiarity with large scale solar energy among Australians, engagement tools that comprehensively cover inform and consult engagement approaches are highly relevant.

Community engagement at the appropriate level and time can reinforce and build community support for non-renewable energy projects and even ameliorate opposition of such projects.[38]

With this in mind, understanding community expectations, concerns and considerations about what are regarded as the critical issues relating to large scale solar energy projects (what we refer to as the building blocks of SLO) is critical to helping inform the content of community engagement activities.

Figure 2: The IAP2 Spectrum of Public Participation

Increasing level of public impact

	Inform	Consult	Involve	Collaborate	Empower
Public participation goal	To provide the public with balanced and objective information to assist them in understanding the problems alternatives and/or solutions	To obtain public feedback on analysis, alternatives and/or decisions	To work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution	To place final decision-making in the hands of the public
Promise to the public	We will keep you informed	We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision	We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decision to maximum extent possible	We will implement what you decide
Example tools	Fact sheets Websites Open houses	Public comment Focus groups Surveys Public meetings	Workshops Deliberative polling	Citizen advisory committees Consensus building Participatory decision -making	Citizen juries Ballots Delegated decisions

SECTION 3

Perceptions of large scale solar energy among the Australian public

There is broad support for large scale solar energy in Australia

There is widespread support for solar energy as a source of energy for electricity generation in Australia with the majority of Australians surveyed (78%) indicating that they are in favour of large scale solar energy facilities. Furthermore, solar energy is the most popular of all renewable energy sources amongst Australians.

Public support for renewable energy sources is based on two main beliefs: an understanding of the diminishing supplies of fossil fuels and appreciation that non-renewable energy sources provide a way of reducing carbon emissions. There is wide recognition that the non-renewable energy sources that currently dominate electricity generation in Australia are finite and alternatives are acknowledged as a pragmatic necessity. The timeframe of when non-renewables will decline is contested but most understand it is inevitable at some stage. Although attitudes towards climate change vary, there is an understanding that non-renewable energy sources are a way of mitigating carbon emissions and addressing climate change as well as avoiding the destructive extraction necessary to obtain fossil fuels.

"We're going to run out of coal and gas and those kinds of things, so we really need to steer towards the renewable energy sources in the future."

"It has to [change] otherwise there won't be a future, not in this lifetime. The door is open [for a move towards renewables and nuclear away from coal], it's just a case of pushing it through."

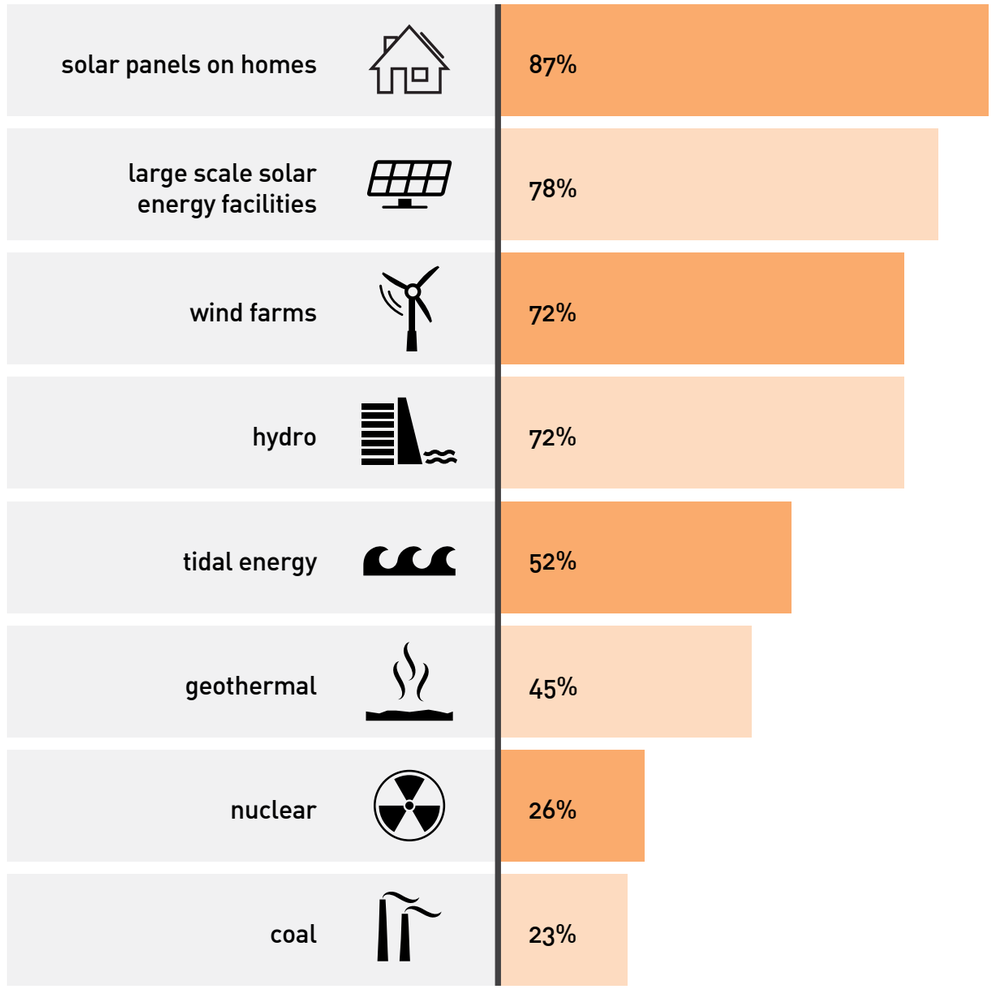
"We should think ahead, find an alternative before we ruin the earth."

Regardless of the scale at which it is utilised, solar energy is thought to be a logical choice for Australia given that its climate provides high levels of sunlight. Furthermore, the amount of space available, especially outside of cities was considered ideal for large scale solar energy facilities.

"It makes sense to have it in this country – it's stupid not to be tapping into it more."

"Solar will take over eventually [in Australia]."

Most popular sources of energy for Australia: somewhat or strongly in favour...

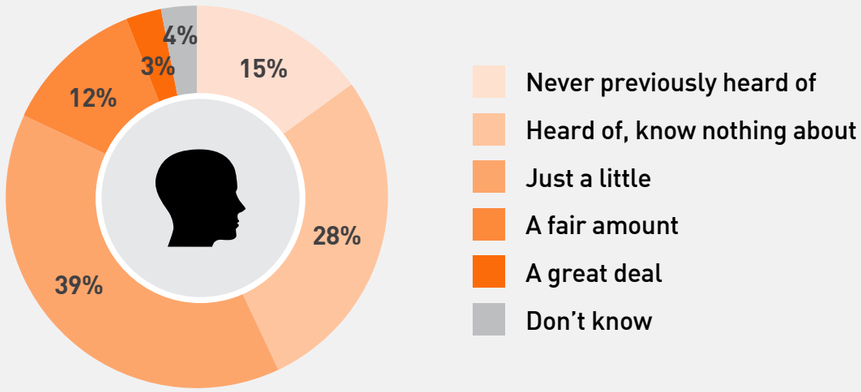


There is limited understanding and knowledge beyond awareness of large scale solar energy

There is broad awareness of large scale solar energy in Australia with 81% having at least heard of large scale solar energy. However, two-in-five (39%) say they know 'just a little' and just more than a quarter (28%) say they have 'heard of but know nothing about' large scale solar energy.

So, although there is clear support amongst Australians for large scale solar energy, there is limited knowledge of large scale solar facilities, around one-in-ten (12%) say they know 'a fair amount' and just three percent say they know 'a great deal'.

Figure 3: Knowledge about large scale solar facilities



This level of awareness was reflected in those who took part in the group discussions, there was fairly low awareness of large scale solar energy beyond having heard of it. Those who have heard of large scale solar energy regard it favourably, but even amongst those who had not heard of large scale solar facilities, first impressions were almost always positive towards the concept, mostly due to sentiment towards domestic PV. A handful of participants had seen images of large scale solar facilities in newspapers or on television, and a Perth participant described having seen a large scale solar project from a light aircraft, but none had seen large scale solar facilities first-hand.

There is less awareness of large scale solar projects specifically in Australia. Despite a feeling amongst participants that Australia was an ideal location for solar energy at a utility scale, most assumed that this technology was more likely to be in use overseas, especially in Europe, the Middle East and America.

> *"I heard of one overseas... a central spire and mirrors... looked really impressive but I can't imagine is producing anything that would offset the cost."*

A few participants in the metropolitan groups thought there might be large scale solar energy projects in Australia, but it was generally considered that these were probably experimental installations at present; almost none of the participants (especially in metropolitan areas) had any definite information about large scale solar facilities operating in Australia.

> ***Participant 1:*** *"We have enough open areas and sunshine [for large scale solar energy production]."*
>
> ***Participant 2:*** *"I think it's [probably happening in] European nations – they're more progressive, we rely on our [non-renewable] resources."*

When asked what they thought large scale solar facilities would look like, opinion varied. For most, a larger version of what was seen on domestic roofs was described, but while some could only imagine these panels still mounted on buildings, others thought of remote areas with large tracks of land covered in PV panels. There was greater enthusiasm for the idea of urban, building-based, large scale solar facilities rather than large scale solar energy facilities elsewhere because of the appeal of using pre-existing surfaces that could be put to use as well as the fact that building-mounted panels would be close to where lots of energy was used.

> *"You see all these big roofs, you think – 'why haven't they got solar panels on them?' What's going on here?"*

Beyond placing PV panels on buildings, regional towns with mining or existing energy generation capacity were seen as the most likely locations for large scale solar facilities in Australia. Participants were firm that plenty of research would be necessary to ascertain the most suitable locations especially to identify the sunniest, hottest places as this was regarded to be a driving factor in the likely success of a large scale solar project by ensuring its efficiency.

Australians' perceptions of large scale solar facilities are framed by experiences of domestic solar energy

Australians are familiar with, and supportive of, domestic scale solar generation. A large proportion of those who took part in the group discussions had installed solar panels on their homes or had family members or friends who had done so; some also had solar hot water. This is reflective of the findings of the survey, which indicate that 22% of Australians have domestic solar panels installed in their homes.

22% have domestic solar panels for **electricity**

16% have solar powered **hot water**

Positive views of domestic solar generation

The most important reason for participants installing (or wanting to install) domestic solar panels was to reduce the household energy bill. Environmental reasons, when cited, were almost always a secondary motivation. Participants who were renting properties without solar panels sometimes felt they were missing out on the potential benefits homeowners were enjoying from solar panels.

Some of the participants who had installed solar panels were keen advocates for household solar panels and shared stories of sharply reduced

19% pay extra on power bill for **renewable energy**

electricity bills, or in some cases, small profits from selling electricity back to the grid. Others were disappointed that they had not realised any savings on their bills as a result of installing panels, and one or two were quite disenchanted having only observed an increase in their bills.

"I've got solar panels and we've also got a pool, that was the main reason we got them - because of the bill, and we've got a reverse-cycle air-con that the wife just loves to have on from sun-up to bedtime, our bill comes in at four hundred dollars, so we put [solar panels] on to make [the power bill] a little more manageable."

Participant 1: "I've got solar, but my bill's gone up to eight hundred from two hundred dollars!"

Participant 2: "Mine's gone down [since getting solar panels]."

Participant 3: "We bank money... it's wonderful... We've not paid a bill for two years."

"There are some farms totally dependent on wind and solar they scrapped their diesel ... they're actually selling electricity to the government."

For many, the ability to install solar panels on their homes represented the opportunity to have greater control over household energy use, specifically to reduce the amount of energy being purchased from the grid and in doing so lower energy bills.

There was some frustration that it was not easier to set up domestic solar from some participants.

"People want it [domestic solar energy] and they're interested, everyone wants to do their bit."

Questions about the efficiency of domestic solar translate to large scale facilities

Some participants questioned the efficiency of domestic solar panels, an area which is mirrored in the questioning of the efficiency of large scale solar facilities.

Some scepticism exists with regard to the positive environmental impact and overall efficiency of solar panels. It was speculated that perhaps the resources required to produce solar panels counteracted the benefits. This concern appeared to be anchored in stories these participants had heard about the green-washing of other technologies marketed as having environmental benefits.

Participant 1: "They use a lot of electricity to make those panels, that's the thing that people don't realise, the same with those hybrid cars..."

Participant 2: "I read somewhere that someone worked out that for wind farms, one of those propellers, it actually takes eight years for it to pay off environmentally in terms of how much has been used to put it together".

Participant 1: "There's all the things: the metal, the paint, the running..."

As described below, participants made similar criticisms of large scale solar energy.

Other areas of concern do not impact large scale solar energy

Much of the technical details of domestic solar panels (for example, the right number to yield the desired savings, the types of panels available, expected level of investment, any rebates, anticipated impact on the bill and timeframes

associated with these impacts) were quite enigmatic to participants who had them installed.

"My mother-in-law has panels in the retirement village; she only pays for electricity in the winter months. There are two different types of panels, there're ones that when you get the slightest bit of shadow they stop working."

"We had [solar panels] put in some time ago, I thought they would have taken effect by now [and reduced the power bill], but not yet. We thought it was a good thing to do at the time, we got them because of the rebate."

The confusion about domestic solar panels was compounded by a feeling that there is a lot of advertising and heavy marketing of solar panels for both energy and hot water. Some mentioned they (or their friends) had felt pressured into purchasing a solar panel system when they were still making up their mind as to whether it was a sensible investment for their household.

Others had calculated that the return on investment for solar panels was not sufficient or too long-term to persuade them to purchase solar panels.

"My husband got bullied into it [buying solar panels]."

"For me to get solar panels... still a lot out of pocket...I worked out it was going to take me like twenty years to start to break even. I'd still be paying more... so it'd be pointless because solar panels only last twenty years...I wouldn't have seen the return."

"The whole thing [solar panels] to me seemed a rip-off."

These areas of confusion and sentiment surrounding domestic panels does not, however, appear to translate directly to large scale solar facilities. Understandably, participants appeared less mindful of the cost and financial payback of solar panels when the expenses were not directly out of their own pockets.

Benefits of large scale solar facilities are heightened close to home

As we have seen, Australians as a whole tend to hold positive views of large scale solar facilities. Those who live nearby to solar facilities under development tend to be as positive, if not more positive, about the prospect as those who live further away.

In group discussions, participants who lived in communities with large scale solar facilities in development nearby expressed many of the same views around the benefits and risks of large scale solar facilities as those who lived in other areas. The major difference in opinions between local residents and others was in their assessments of the local benefits of large-scale solar; in particular, the economic benefits.

Local residents tended to be sensitive to the positive economic impacts of construction and operation of solar facilities in their local area. Many saw a direct benefit not only to local businesses and residents, but to themselves through the injection of money into the local economy. In the regional towns and cities where this research was conducted, this was seen as being a major boon to often struggling local economies. This positivity about the benefits to the local community tends to translate to increased support for the development itself.

The same is not true, however, of the perceived risks. Participants in local communities tended to express questions around potential health and environmental impacts of large scale solar projects in the same ways as those in other locations. As is the case with the community as a whole, familiarity and comfort with domestic scale solar means that residents living near large scale solar developments see the risks to environmental and community health as being relatively low.

SECTION 4

The building blocks of the social licence to operate large scale solar energy projects in Australia

Establishing the social licence to operate large scale solar energy projects in Australia

This section describes the themes that are important to communities when thinking about large scale solar energy projects in Australia. These are the critical issues which communities brought up throughout the research. These themes therefore, are key to establishing the social licence to operate large scale solar energy facilities and can be considered the building blocks of SLO.

Five main themes emerged from the primary research with Australians across the country. Each one in turn is explored outlining community concerns associated with each theme and where elements of the theme are considered to be important drivers of support for large scale solar energy production in Australia. This enables us to establish the critical issues to be addressed in order to build SLO.

The five main themes are shown below:

Reliability and efficiency of large scale solar energy projects

Visual impacts of large scale solar energy projects

Environmental impacts of large scale solar energy projects

Economic and employment impacts of large scale solar energy projects

Health impacts of large scale solar energy projects

An SLO summary box is provided for each theme. Taking the premise of the Thomson & Boutilier pyramid model, that there are four levels of increasing acceptability within the community (withdrawn, acceptance, approval and psychological identification), each theme is described as how it would most likely be manifested against each level of acceptability. The actions required to facilitate an increased level of acceptability, which is, what is required to establish a shift 'up a level', are then outlined for each theme. Currently, there is no method to measure and definitively assess in which level of SLO acceptability a community (or individual) falls, therefore the recommended actions are not proven methods to migrate communities towards a greater level of support. Instead, the actions have been developed based on a combination how concerns and queries relating to large scale solar energy facilities were framed by research participants and the information that resonated with those who had a greater level of acceptance and approval for large scale solar projects.

The overall SLO landscape is more complex than simply the sum of the themes addressed within this report. Despite innovations in large scale solar energy in Australia, the sector is still at a relatively early stage of development. As such the other elements of SLO including the regulatory environment and the role of the companies and other stakeholders involved in large scale solar projects and the degree to which they are able to establish trust are out of the scope of this project.

It should be noted that aspiring to work to help establish SLO within a community at the 'psychological identification' level of acceptability is likely to require substantial effort to achieve. Given that SLO is established from the 'acceptance' level onwards, it is likely that community engagement aimed at achieving acceptance and approval levels will be most rewarding in terms of gaining a critical mass of community support for large scale solar energy projects.

Lastly, it is important to note that the overall SLO is not simply an aggregation of community views relating to each theme. Rather, the interaction of the public's perceptions of the advantages and disadvantages of large scale solar energy projects are critical to informing SLO. There appears to be willingness to trade-off features of large scale solar energy facilities that are considered undesirable if certain aspects can be proven to be an advantage. This is especially relevant with regards to visual, efficiency and reliability concerns. If efficiency and reliability can be demonstrated, other drawbacks are willing to be overlooked. As can be seen in this chapter, addressing messages of productivity, efficiency and reliability underpin much of the precursors for public support of large scale solar energy facilities in Australia.

Reliability and efficiency of large scale solar energy

Australians are enthusiastic about large scale solar energy, but many don't feel informed about its efficacy

While Australians are positive about solar energy in general, there are questions for some around its ability to become a large, efficient provider of energy.

Overall, most Australians believe that large-scale solar is capable of being a valuable contributor to the energy mix. More than three quarters (77%) agree that large scale solar facilities can be a significant source of energy to help meet the nation's energy needs, indicating that there is strong notional support in the population for the idea that solar energy can contribute in a meaningful way to the nation's energy mix. However, almost one in five (19%) neither agree nor disagree, or don't know. Similarly, while just under two thirds (63%) agree that large scale solar can provide a consistent supply of electricity, more than a quarter (28%) neither agree not disagree, or don't know.

This gap in knowledge of many Australians has the potential to be a fertile breeding ground for theories about the inefficiency of the solar energy production process.

There is anticipation that new technology and economies of scale will make solar a more efficient mode of energy generation in the near future

Among participants in the qualitative research, many felt that a shift towards renewables was likely to be a slow process and expected coal to continue to provide the majority of Australia's energy needs for the foreseeable future. Participants often spoke of the eventual phasing out of non-renewables, but not for at least fifty or one hundred years in the future.

"It comes back to how all the technologies they've got for solar power at the moment are not efficient – you don't get much back for what you've got to do and what you've got to spend. I think it will always play a part, but I don't think it will be a big part."

"It's gonna take them a long time before they get into using [renewable] resources"

Solar energy generation was generally seen as playing a part in a diverse future energy mix, rather than providing the majority of energy. Most felt, however, that the contribution of solar energy in domestic, commercial or large scale form, would continue to grow over the coming years, and welcomed this development.

"It makes sense to put money into the research to make it more efficient."

Those who had experience with domestic or commercial scale solar panels were often very positive about the returns on their investment, although it was generally noted that since government subsidies for installation were cut, the financial incentive was much less. The decreased cost of production for solar panels due to economies of scale driven by increased demand was noted by some. Many believed that this trend, combined with new, more efficient technology, would see the competitiveness of solar energy improve over time.

Some felt that there should be a sense of urgency in moving from non-renewables to reliable renewable technologies such as wind and solar. These participants often cited the impacts of non-renewables on climate change, and the environment more generally, as the key consideration driving the need to move away from reliance on non-renewables.

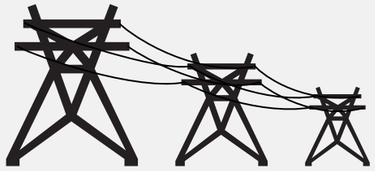
"We'll have to change [away from non-renewable sources of energy]."

"We're running out of fossil fuels, and we're killing things off, we need to find a way to produce the fuels and the electricity and everything else without doing the damage we're doing."

"Everything that gives energy that we don't have to dig out of the ground is a good thing."

"We're gonna run out of resources in the ground eventually, and we've got no back up. What happens when it does?"

Indeed, the concept of prioritising investment in solar energy is supported by Australians. Well over half (60%) agree that funding for large scale solar facilities should be prioritised over funding for sources of non-renewable energy. In addition to this, 38% agree that large scale solar facilities should be funded ahead of other sources of renewable energy.



77% agree large scale solar facilities can be a **significant source of energy** to help meet **Australia's energy needs**

63% agree large scale solar facilities can provide a **consistent supply of electricity**

60% think **funding for large scale solar facilities** should be **prioritised** over funding for sources of **non-renewable energy**

38% think **funding for large scale solar facilities** should be **prioritised** over funding for other **renewables**

Can large scale solar energy produce a reliable base load?

Some participants were of the opinion that coal and other non-renewables would provide the majority of Australia's energy for the foreseeable future, due to the established ability of coal-powered stations to provide a reliable base load.

"There's too much consumption, there's too much people using electricity for solar to be fifty percent [of the energy mix]."

These participants were not, however, necessarily opposed to large-scale solar facilities becoming a greater part of the energy mix. Their concern was most often built around the belief that renewables such as wind and solar are inherently unreliable and therefore can only ever supplement the base load provided by non-renewable generators.

Concerns about energy in versus energy out

There is a recurring question in the minds of some Australians about whether the energy output of solar panels (and indeed wind turbines) is greater than the energy input to produce them. Participants in group discussions often mentioned that they had heard that wind turbines require more energy to build and maintain than they produce over their lifetime (a claim refuted by the findings of at least one meta-analysis[39]). This information was often presented as hearsay, and put forward as an area of uncertainly rather than as a definite objection in relation to large scale solar facilities.

"I've heard that producing solar cells is very energy intensive."

"They reckon they take more carbon to build one panel than what that panel's gonna save."

Participant 1: *"We have the technology now [to reduce our reliance on fossil fuels] we've proved that – the thing is, it's the cost efficiency of it. Wind is one of the cheapest and solar's a bit more expensive than wind, that's why the government will build all these wind farms down Albany way – there'll be a huge one south of Geraldton I believe."*

Participant 2: *It's the maintenance and upkeep of all those wind farms, the technology is lacking a bit there for what it should produce in terms of energy compared to what it does, they're only about half way there for what they should produce."*

Participants often noted that large scale solar facilities are most likely to be located in regional or outback areas of Australia, away from the metropolitan areas with the highest demand. This was seen as a limitation of large scale solar energy in that energy would be lost transmitting any power produced to the location where it is most needed.

Concerns about land use

Minor concerns were raised in some discussions about the amount of land large scale solar facilities would use. This was often couched in terms of the opportunity cost of using potentially productive agricultural land for energy generation, although some participants also mentioned the ecological value of the land.

Participants living in urban areas, in particular, were likely to find this issue concerning. Those in regional areas tended to be less concerned, often expressing the view that Australia has substantial land resources, and that many farms are of low production value. Solar energy was therefore often seen as a more productive alternative to farming by some.

However, participants were generally unaware of the area of land a solar farm would occupy, and as such found it difficult to decide whether these concerns are justified or not.

"I know they're around, but I don't know what they do, or how big they are, or what they cost, or what they look like."

Conversation often turned to the trade-off between the amount of land a large-scale facility would occupy, and the number of households it could power. This is seen by many as an intuitive, comprehensible way to present information on the scale and efficiency of solar facilities compared to technical information around generation potential.

"Large areas for not much back out of them... they're just not very efficient but I suppose if you've got a big area and you fill it with panels or reflectors, every little bit helps."

Summary of SLO stages and approaches to driving support relating to efficiency and reliability

SLO stage	Withheld	Acceptance	Approval	Psychological identification
Characteristics of stage	Perception that large scale solar facilities are inherently inefficient and produce less energy than they take to construct and maintain	Perception that large scale solar could provide some of the community's energy needs. Considered to be mostly reliable and reasonably efficient	Perception that large scale solar facilities can contribute towards Australia's current and future energy needs	Perception that large scale solar facilities are crucial to meeting Australia's current and future energy needs
Approaches to drive support	• Provide information about the efficiency of solar panels (or other solar technologies)	• Provide information land use in comparison to energy output • Provide evidence that large-scale solar can provide a reliable and consistent supply of energy to the grid	• Provide evidence that solar can compete on a par with other source of renewable energy in terms of reliability and efficiency to produce a consistent supply of energy.	
	• Couch information about size in terms that are readily understandable by the populace (as well as in technical terms) • Provide information about connections to the grid, and where the energy produced by facilities will be used • Provide information about the efficiency of solar in comparison to other forms of energy generation			

Visual impacts of large scale solar energy projects

Overall, Australians are divided about the visual impact of large scale solar facilities

Australians are divided about perceptions of the visual impacts of large scale solar energy facilities with similar proportions agreeing (30%) and disagreeing (26%) that these facilities have a negative visual impact on the local landscape. Just less than a third (31%) neither agree nor disagree about the visual impact of large scale solar facilities on the local landscape and 14% don't know, this reflects the limited knowledge about large scale solar facilities.

There is little spontaneous concern for the negative visual impacts of large scale solar facilities & large scale solar is regarded more favourably than other energy generation facilities

Concerns about the negative visual impact of large scale solar energy facilities are rarely top of mind for Australians. While people do not expect large scale solar facilities to be especially visually appealing, most do not regard these facilities as an eyesore. In contrast to other facilities used to generate power and electricity, large scale solar energy is considered to be less intrusive than mines and less contentious than wind farms.

30% agree large scale solar facilities have a **negative visual impact** on the local landscape

"I've not heard a single bad word about the solar plant. It doesn't have some of the issues of a wind farm, for example. As far as everyone is concerned it just sits there"

"They're probably not overly attractive, but better [than wind farms]."

"They'd probably be spread for miles, there'd be nothing particularly attractive about them, but they could probably be hidden."

"[Looking at photo of large scale solar energy facility] They look great at first, but they may not look that pretty over time, might need to build things around it so you don't see them... but they won't be able to seen like wind turbines."

The one aspect of large scale solar facilities that is considered to be potentially problematic is issues with glare from highly reflective surfaces. Most participants were relatively unconcerned about this, considering it likely that that glare could be easily managed by using visual barriers and locating facilities away from homes and roads.

Provision of images and descriptions of large scale solar facilities improves perceptions of the visual impact

Showing images and providing a description of large scale solar facilities is likely to prompt Australians to change their minds about the visual impacts. The research has found that showing images of large scale solar facilities results in a larger proportion disagreeing that large scale solar facilities have a negative visual impact on the local landscape. Around a third (30%) agreed with the statement 'large scale solar facilities have a negative visual impact on the local landscape'; however, once shown images and some facts and figures about large scale solar facilities, agreement fell to between 23% and 19%.

Currently there is limited understanding of what large scale solar energy facilities look like in an Australian context

Although some have seen television documentaries or photographs accompanying news articles that convey what large scale solar facilities can look like, generally there is limited understanding amongst the public of what these facilities can look like, especially beyond photovoltaic panels.

Domestic and commercial scale solar infrastructure is the dominant image that informs the way Australians imagine large scale solar facilities to look; most imagine the PV panels they have seen on homes and office buildings transferred to a utility scale setting. Showing images of a range of different types of large scale solar energy infrastructure, including Concentrated Solar Power (CSP) towers, solar dishes, parabolic troughs with concentrating linear fresnel reflectors and photovoltaic (PV) panels, generated curiosity and surprise at the variety of possible forms of the infrastructure for producing electricity from solar energy.

Where large scale solar energy facilities will adopt PV panels, explaining and likening these projects to the domestic context where appropriate will help communities to picture and understand how the facility will work. However, where a facility is likely to adopt alternative solar technology, images and descriptions of these technologies should be used in conjunction with simple explanations of how these technologies work to help communities to understand how a facility will look and how it might contrast with any preconceptions they have.

There is a general assumption that large scale solar energy facilities will be quite low in profile and a less obvious feature of the landscapes where they might be located, especially when compared with wind farms. Despite this assumption, showing the CSP tower images garnered interest and were not necessarily rejected on the basis of height.

Scale is important

One of the potential concerns relating to the visual impact of large scale solar energy facilities is the scale of such facilities. However, a facility taking up a large amount of land is not inherently a problem, especially if it is located a distance away from pre-existing communities. Instead, the importance of size is entwined in perceptions of efficiency and reliability of

large scale solar energy. It is clear that concerns around the size of facilities, and facilities that are not considered particularly attractive, will be alleviated if efficiency and reliability can be clearly demonstrated.

"I'm less concerned about the visual thing ... it comes back to how much power is it actually producing, and is it worth taking up that much land?"

Given that there is some concern around the amount of land that is taken up, clear communication about the area that a large scale solar energy facility will need is important. Using easy-to-visualise descriptors such as football fields will help communities to picture the amount of land, but these descriptions of size should always be accompanied by clear explanations of the output, efficiency and reliability of the facilities.

Visual changes to the landscape

Aside from the changes to the landscape as a result of the infrastructure to be installed at a large scale solar energy facility site, there was interest in how land might need to be changed in order to accommodate such a facility. Some have concerns about land needing to be cleared in order to accommodate large scale solar infrastructure and envisage a destructive process that would change the appearance of the area even before the technology was established.

"I just don't like something like that taking up that amount of space... It's like what they used to do in housing estates – they'd go in there and bulldoze everything..."

When shown some of the various images of large scale solar energy facilities, perceptions of whether large scale solar facilities would have a detrimental impact on the appearance of the landscape were dependent on whether participants thought the landscape was attractive in the first place. Therefore, for some, images with landscape that was perceived to be uninteresting was thought to be an ideal location for a large scale solar facility as the change was regarded to be less intrusive. Images that showed some vegetation (mostly grasses) amongst the infrastructure appealed to those who were concerned that establishment of a facility may require removal of vegetation.

Explanations of how landscape will need to be changed are important when describing the impact a large scale solar energy facility will have on a local landscape to the community. If the landscape is to change very little in preparation for establishing a large scale solar energy facility this will allay most fears. Where landscape needs to be changed in appearance in the preparation for construction and operation, descriptions accompanied with explanations about why the change is necessary and relating this information back to the productivity of the site is likely to help those with concerns to appreciate why changes are necessary.

Summary of SLO stages and approaches to driving support relating to visual impacts

SLO stage	Withheld	Acceptance	Approval	Psychological identification
Characteristics of stage	Perception that large scale solar facilities are fundamentally ugly	Perception that large scale solar facilities are not a 'blot' on the landscape Large scale solar facilities are out of town / not in sight	Perception that large scale solar facilities are not a 'blot' on the landscape and are preferable to other energy source infrastructure	Large scale solar facilities are not perceived to be ugly, perception that industrial design is appealing in its own way
Approaches to drive support	• Large scale solar facilities have rarely been seen, exposure to a variety of images • Domestic scale often valued, demonstrate potential similarities between domestic and utility scales	• Describe the current function of the land proposed to hold the facility • Describe what steps are needed to prepare the land for the facility	• Describe and show innovative technologies involved in large scale solar	
	• Images of large scale solar facilities are relevant and important for communities from the very initial stages of projects and as such should be used from the outset • Use images from a variety of angles and scales to include aerial shots as well as those images in closer proximity • Ensure all printed and electronic communications include images of similar large scale solar facilities • Ensure all information sessions are accompanied by images of similar large scale solar facilities			

Environmental impacts of large scale solar energy

The broad environmental benefits of large scale solar energy are established amongst Australians

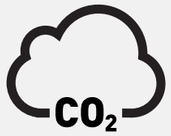
Around three-in-five (63%) Australians believe that increasing the number of large scale solar facilities would reduce Australia's carbon emissions, and just more than half (53%) agree that large scale solar facilities have a positive impact on the environment.

There is less certainty about local environmental impacts

However, when thinking about the local environment surrounding large scale solar energy facilities, Australians are less sure about the impacts. While a third (34%) disagree that large scale solar facilities have a negative impact on local ecosystems (14% agree), more than half (53%) neither agree nor disagree or say they don't know.

There are many questions about the impact on local ecosystems

When discussing possible issues for local environments to large scale solar energy facilities, topics that participants raised were usually posed as questions rather than identified as established issues.



63% think that increasing the number of large scale solar facilities would **reduce Australia's carbon emissions**

53% think large scale solar facilities have a **positive impact on the environment**

34% disagree that large scale solar facilities have a **negative impact on local ecosystems**

These questions often reflected low levels of awareness of what large scale solar energy facilities look like.

"Birds might get distracted by the reflections."

"You might have to clear land, destroy local habitat and disturb animals."

Despite the questions around the impact of large scale solar energy projects on the environment, coal seam gas (CSG) extraction was commonly mentioned as an energy source that many considered deleterious to the environment; and large scale solar energy was regarded very favourably compared with CSG.

Timeframes and scale are important when considering ecosystem disturbance

For many, there is a feeling that small-scale, localised disturbance of land and the ecosystems they support is inevitable when establishing large scale solar energy facilities by virtue of the need to erect buildings and the infrastructure that holds the solar technology. This low-level disruption generally seems acceptable; however, there are questions over the magnitude of the impacts and a requirement to understand what the local environment implications are before endorsing these facilities.

"I'd want to know how much environmental impact there was in the short-term."

Similar to concerns relating to health (discussed below), some concerns associated with the environment relate to possible unforeseen negative impacts that would not necessarily be realised for some time into the future by which stage it would be too late. Concerns of this nature are rare, and again, were raised usually as questions, but demonstrate the need to be clear about environmental impacts to ensure messages are consistent.

"It's hard to know, we might start off thinking [solar is] good, but you could find out twenty years later [that there's a problem] – that it's killed off all the bandicoots or something!"

Large scale solar energy is considered to be a much better energy resource option in terms of the environmental impact compared with non-renewable energy sources. Participants were aware of the reduction of carbon emissions that would be realised through transitioning to renewable energy resources. Some commented that ultimately, more energy from large scale solar facilities could help mitigate global warming trends. To some extent there is openness to potential environmental trade-offs relating to large scale solar energy projects, some outlined their tolerance for minimised, localised and less desirable environmental impacts (such as some vegetation removal) in order to achieve a better environmental outcome overall. However, the details of any environmental impacts – both positive and negative - need to be clearly communicated.

"I think it would be good for the environment in the long term. I mean obviously short term you've got the disruption and so on and so forth and the energy that goes into producing the material to create it and that's going to take a while to pay off in terms of the carbon footprint. But no, long-term I think it's certainly worthwhile."

"I would want to know what they would save environmentally [by having large scale solar energy facility], what's the pay off?"

Summary of SLO stages and approaches to driving support relating to visual impacts

SLO stage	Withheld	Acceptance	Approval	Psychological identification
Characteristics of stage	Perception that large scale solar energy facilities negatively impact local ecosystems	Perception that although there might be some disruptions to local environment, they are perceived as minimal	Perception that although there might be some disruptions to local environment, overall there is net environmental benefit	Perception that although there might be some disruptions to local environment, overall the environmental benefits far outweigh local impacts
Approaches to drive support	• Broader environmental benefits need to be highlighted • Communicate environmental disruption minimisation or mitigation approaches • Caution: benefits of CO2 reduction won't resonate with those who are sceptical about climate change impacts	• Ensure messages include any information about environmental rehabilitation on or proximate to the site	• Concentrate on long-term and wider environmental benefits of large scale solar energy	
	• Be clear about localised environmental disturbances associated with establishing large scale solar energy facilities • Be mindful when preparing messages about environmental impacts to address both short-term and long-term impacts • Be mindful when preparing messages about environmental impacts to address both local and wider environmental impacts • Images of large scale solar energy facilities assist communities to envisage the infrastructure and may help alleviate fears related to environmental impacts			

Economic and employment impacts of large scale solar energy facilities

Almost half of Australians (48%) see the presence of large scale solar facilities as being economically beneficial, agreeing that their presence has a positive impact on local economies. However, a further 46% neither agree nor disagree, or don't know whether such facilities impact the local economy.

This is reflective of apathy about large scale solar facilities' impact on the economy as a whole among those who do not have a solar facility in their immediate vicinity.

48% agree large solar facilities have a **positive impact on the local economy** in the areas where they are situated

Most participants, particularly those in metropolitan and larger regional centres, did not expect substantial employment from large scale solar relative to the economy of their region as a whole. However, in small regional communities where solar facilities are located, the projects can take on a greater meaning to residents.

The creation of jobs, especially for communities close to solar facilities, was anticipated to be an advantage of large scale solar projects.

Job creation is the key benefit for regional communities

Job creation and the corresponding opportunities for local businesses and residents are seen as the key economic benefits of large scale solar projects. In regional communities where the local employment narrative is often built around the closure of mining operations or changes to the agricultural sector which cost jobs, a small number of additional jobs is seen as having a large impact on the economy.

Job creation is likely the single most important factor in building a social

licence to operate in these communities. The economic benefits for regional towns was seen by residents as far outweighing any risks in the operation of large scale solar facilities.

Expectations around local employment

Participants in group discussions tended to anticipate that most of the employment generated by large scale solar projects would take place during the construction phase; however, some on-going employment opportunities were also expected to accompany the ongoing operation and maintenance of the facilities.

Most participants found it difficult to estimate the number of jobs that were likely to be generated due a general lack of any specific knowledge and information about the size of large scale solar facilities. Residents in local communities where facilities were under construction generally accepted the number of jobs generated (in the case of the projects involved in this study, between 200 and 300) as being appropriate to the project.

Residents tended to have the expectation that the company developing a solar facility in their town or city would make efforts to engage with the local economy. These expectations included measures such as contacting local employment services and advertising tenders for contracting work in local print media to be taken. In cases where these measures were perceived not to have been taken, or to have been taken half-heartedly, frustrations were expressed by some local residents.

"Obviously not everything can come from town, but there was a bit of an issue in that some of the things that could possibly have been got from town like meat supplies for the dining room, are being brought in from elsewhere because apparently they can get it cheaper. I realise that there's an economic factor to the whole thing, but it's a bit harder for some in the community to understand.... We've had some comments from some of the local suppliers, 'What about us? We were promised something good.'"

There was general acceptance, however, that in relatively small communities where labour resources and skills were not always available or appropriate for the job, that workers would inevitably be brought in from outside.

Opportunities for local businesses to win contracts were seen as benefiting the community in general, with the profits being spent in and around the community. The definition of "local" businesses in regional communities tends to be limited to the local town, and perhaps small towns nearby. Larger regional centres are not always viewed as being "local", and as such, contracts won by businesses in these areas may not be recognised as such by residents.

"They could lead to other flow-on industries, so job growth in the local area."

"The council was pretty definite when we spoke to [the contractor] right at the beginning that the labour camp be located in town rather than out on site. We've had some discussion before with a couple of mining companies that are very strong on putting their labour camps out on site so they don't waste any time bussing people in and out, but council felt that if that was going to be the case that people wouldn't be in the shops or in the pub... and that seems to be working."

The knock-on benefits for other local businesses of having large numbers of temporary construction workers in town was also identified as a benefit to the town as a whole. Examples of this included the pubs and clubs which feed construction workers during their stay, and the hotels that accommodate them.

Tourist trade generated by the solar facilities was also a consideration for some in regional towns, with many residents expressing the hope that people would stop to view their local facility once it was operational.

Access to information is important

The provision of information about employment and contracting opportunities is an important expectation held by residents in towns and cities associated with large scale solar facilities in regional areas.

A range of information was deemed useful to local residents and businesses in helping them access these opportunities:

- Project budget
- Realistic project timelines
- The job and contracting opportunities associated with each stage or construction and operation

Residents also held expectations that a range of media would be used to disseminate this information to the public. Advertisements in local media and mail drops were often considered to be the most effective channels, although in towns where this had been conducted, the proportion of group members who had noticed such advertisements appeared to be low. The use of large information boards at community meeting areas or shopping centres was commonly suggested by discussion participants, as was the idea of a shop-front for the project which could provide information or take enquiries. Local councils were also seen as a potential source of information.

Word of mouth is perhaps one of the most powerful media in regional towns. Local residents had often gained most of their information about the local solar project from discussions around the town, and knew people who were involved.

Drawbacks of local employment

In one small town where a solar facility was under construction, concerns had been raised by local police and community members about the impact that an influx of workers from outside of the town may have on law enforcement. At the time of the research, these concerns had proven unfounded.

This issue was not raised in larger towns or cities where large employers such as mines were an existing part of the social fabric.

Expectations about changes to the price of electricity

The idea that the operation of a large scale solar facility in the local area would lead to lower energy prices for residents was a relatively common theme during group discussions. In all of the communities included in this research, this was a misconception.

Some participants reasoned that solar energy would be cheaper than non-renewables, leading to lower energy prices.

Participant 1: *"In fifty years if they're thinking about doing all these solar panels and farms, bloody power should be free. We should be able to have these solar farms and the power should be free... "*

Participant 2: *"There's still costs in there – they've still got to build them – but it should bring the costs down a lot."*

The misconception generally arose from the concept of rebates on energy supplied to owners of domestic solar panels. Participants in group discussions, particularly those living near a solar facility under construction, often wondered whether the same type of rebate would apply to the local area as a whole.

Information that rebates would not apply were generally met with acceptance, although some residents were of the opinion that some benefits should be shared directly with the local community.

Summary of SLO stages and approaches to driving support relating to economic and employment impacts

SLO stage	Withheld	Acceptance	Approval	Psychological identification
Characteristics of stage	Perception that the construction of large scale solar facilities benefits only workers and contractors from outside the community	Perception that large scale solar facilities can provide limited economic benefits to the Australian economy	Perception that large scale solar facilities make valuable contributions to the economic development of regional Australia	Perception that large scale solar facilities are important to the ongoing economic development of regional Australia
Approaches to drive support	• Provide realistic information about project size and timelines • Provide information about the job and contracting opportunities at each stage of the project	• Ensure that opportunities are seen to be "pushed" into the community via local employment agencies in addition to more passive approaches such as advertising	• Provide evidence of the economic impacts of construction of large scale solar facilities in the local community	
	• Ensure that local residents and businesses are provided opportunities for involvement in projects • Use a range of media to communicate opportunities to residents • Ensure that concerns around any influx of workers are managed • Set clear expectations around the impact (or lack of impact) on local electricity prices			

Health impacts of large scale solar energy

Many are unsure about the negative health impacts of large scale solar energy

Almost half of Australians are unsure about whether large scale solar facilities have a harmful impact on community health, 47% either 'don't know' or neither agree nor disagree that large scale solar facilities could have a negative effect on the health of the people living nearby. However, two-in-five (40%) disagree that large scale solar energy has a harmful impact, and 13% agree.

47% are unsure whether large scale solar facilities could have a **negative effect on the the health** of the people living nearby

Solar energy is regarded as relatively safe

When asked to think about any issues or concerns they had with large scale solar energy, impacts on health are usually one of the last concerns mentioned, if at all. Large scale solar energy is also usually thought to have fewer potential health risks than other sources of energy. In addition, the widespread use of PV panels in domestic solar energy settings is sufficient evidence to many that PV technology is safe.

> ***Participant 1:*** *"Solar, I don't think there's any [health] risk involved. I mean, mobile towers there's a risk of radiation; your wind ones are noisy; your nuclear ones, we could all die from radiation; but solar, I don't know."*
>
> ***Participant 2:*** *"Well there's been no outcry about people putting panels on their roofs."*
>
> ***Participant 1:*** *"Yep, so there you go [it's ok]."*

If any aspect of large scale solar energy technology was a possible threat, there is a sense that people would have to be in close proximity and probably in direct

contact with the technology for any adverse effects to ensue.

Although considered unlikely, there is some concern of the possibility of unknown health impacts from solar energy technology

Although few think large scale solar energy facilities are likely to have negative impacts on human health, for some there is a nagging feeling of the possibility of harmful effects of the technologies used in large scale solar facilities.

Some have heard of health issues relating to wind farms and as such, wind farms were cited as an example where energy-related technology that had appeared safe may not actually be as trouble-free as initially thought. Similar to some other issues associated with wind farms relating to efficiency and reliability, this information was spoken about as hearsay and as an area of uncertainly rather than grounds for objection to large scale solar facilities.

Participant 1: *"They [solar panels] could even cause cancer, you just don't know."*

Participant 2: *"Is there any research into that?"*

Despite some very limited concerns about the potential negative health impacts, there is little demand for 'proof' that large scale solar energy technology was safe, most seem content that the technology is safe and research that proved otherwise would be of interest but there is little appetite for claims of safety.

The broader scale of health benefits is an attractive message

Although few think of the wider health benefit of large scale solar energy as contributing to a reduction in pollutants produced through fossil fuel combustion, where this was spoken about in groups the idea was appealing to others who had not thought about this.

"It's one less chemical being pumped into the air."

"[At least it's] not like the Latrobe Valley and the air pollution there."

Most regard large scale solar energy as a safer way of producing energy compared with non-renewable sources. The absence of processes considered to be potentially dangerous such as using explosives, constant use of heavy machinery to access and transport resources and combustion involved in coal mining is considered an important advantage of large scale solar energy facilities.

"If there are no coal mines you do away with coal mining accidents, there aren't many of them, but they're huge when they happen."

"Nuclear explosions, coal accidents – solar seems pretty safe!"

Summary of SLO stages and approaches to driving support relating to health impacts

SLO stage	Withheld	Acceptance	Approval	Psychological identification
Characteristics of stage	Perception that large scale solar energy facilities are likely to be harmful to health	Perception that there is a chance that there might be negative health impacts, but if they do exist not a risk at a community level. Broader positive health impacts thought to outweigh potential negative impacts	Perception that there are no negative health impacts, or if risk perceived, considered to be very limited in nature. Perception that replacing non-renewable energy sources with renewables will have positive health impacts	Perception that there are negative health impacts and a perception that replacing non-renewable energy sources with renewables will have positive health impacts
Approaches to drive support	• Messaging to focus on basic health and safety assurances • Utilise established overseas examples to address fears of latent long-term health risks		• Promote the health and safety features of large scale solar energy facilities that have better outcomes / avoid issues associated with non-renewables: air pollution, mining accidents, explosions etc.	
	• Health issues generally of a lesser importance to community than other themes, still important to provide information, consider promoting health information with environmental information			

SECTION 5

Applying the building blocks of the social licence to operate large scale solar energy projects to community engagement planning

Community engagement planning for large scale solar energy projects

Objectives

The engagement planning suggestions in this section are based on the overall objective of establishing and growing SLO for large scale solar energy projects. As stated in Section 2, best practice community engagement involves an engagement approach that is:

- tailored to the specific needs of a community;
- long-term;
- initiated early in the planning stages;
- flexible; and
- demonstrates a genuine commitment to the principles of community engagement from the developer.

Taking this into account, the suggestions within this section should be regarded as a collection of tools and approaches to be considered when attempting to establish and maintain SLO for large scale solar facilities.

In addition, the following actions should be seen as complementary objectives to building SLO.

- Establishing the needs and expectations of the local community and other stakeholders surrounding the establishment and operation of large scale solar facilities and consideration of the potentially diverse nature of these needs and expectations
- Keeping all community stakeholders updated about the intention to establish, the construction and operation of a large scale solar project
- Creating and strengthening positive relationships with community stakeholders
- Being responsive to any community stakeholder concerns or general community importance
- Providing a strong foundation for ongoing dialogue to maintain SLO.

Benefits of establishing a social licence to operate

There are important benefits to establishing SLO. By obtaining and maintaining SLO in the community, infrastructure projects are usually able to use resources more effectively, are less likely to encounter delays or obstructions to operations and generally find political support easier to establish.[40] In contrast, failure to establish SLO potentially presents financial risks through loss of productivity or damage to assets (e.g. through vandalism) and lost opportunities generally. Reputation damage associated with the lack of SLO can have other repercussions such organisations encountering problems securing labour.[41]

Integrating the building blocks of social licence to operate

The five building block themes for establishing the social licence to operate large scale solar energy facilities in Australia should be used to inform the community engagement approach that accompanies these projects.
This final section outlines how the building blocks can be incorporated into community engagement and communications planning.

Preparation and stakeholder mapping

Aside from establishing the objectives of community engagement and the resources available to be dedicated to engagement activities, as much information as possible should be gathered to help inform the best ways to go about community engagement and establish who engagement should be designed for. This involves understanding the community in proximity to a proposed large scale solar energy facility in as much detail as possible.

The following should be completed as preparation:

- Identify stakeholders: both direct and indirect
- Establish the demographic profile of the community including age profile, presence of Languages other than English (LOTE) communities, Indigenous communities etc.
- Research the distribution of population in the area (e.g. concentrated in a township or low density)
- Identify the community in close proximity to the actual site (assuming any land has already been acquired)
- Identify the community in close proximity to access routes for site (relevant to construction phase especially)
- Investigate the current visual 'accessibility' of site. For example: can the community currently 'see' the site, or is it somewhere they have to go out of their way to visit?
- Establish the likely visibility of proposed facility by different members of the community, who is most affected? (this might be different to proximity)
- Identify local community groups
- Identify local environmental groups
- Presence of local industry / business groups (e.g. Chamber of Commerce)
- Investigate the economic profile of community including employment profile and level of unemployment / underemployment
- Gather any information about known community communications and engagement preferences
- Research sentiment towards sources of renewable energy. For example: find out to what degree renewable energy is considered important and viable
- Establish the community history of engagement with other industry and infrastructure projects. For example: any history of support or opposition against buildings, CSG, wind farms etc.

Community engagement during planning, construction and operation

The following recommendations are made regarding the engagement and communications messages that should be prepared and implemented with the community. The messages are organised according to the building blocks of the social licence to operate established in the research. These messages should also be incorporated into general communications where possible in order to pre-empt likely concerns in the community around large scale solar projects.

Generating capacity and reliability of large scale solar facilities

Community members living near large scale solar facilities are often concerned about the generating capacity of their local facility. This is most often expressed in terms of the amount of land used by the array and the resulting volume of energy produced. While technical information such the size and capacity of the facility in hectares and megawatts is useful, most community members find it easiest to understand size capacity in terms they can readily relate to, for example:

- **Size:** football fields (adapt for local code of football) or cricket fields
- **Generation capacity:** number of average households powered (and the analogy to a well-known town or city of similar size)

In the absence of this information, community members tend to speculate whether the facility's output is commensurate with the volume of land utilised.

Information around the ability of solar facilities to provide a consistent, reliable supply of energy will also help to ensure that community members are aware that large scale solar facilities can contribute a significant volume of energy to the grid. Some community members may also desire technical information about how solar facilities contribute to the grid. This should be made available where possible.

Visual impacts of large scale solar energy projects

In contrast to wind farms, the visual impacts of large scale PV solar facilities do not illicit strong reactions among most local community members. Facilities are typically visualised by those with no prior experience, relatively accurately, as rows of PV panels set up in arrays on the ground.

However, many community members, while having a general perception of the layout, are unsure of more specific details. It is therefore useful to provide information about the visual impacts to fill this information void.

Initial communications and engagement materials should describe the size of the facility. The size should be referred to in both standard units of measurement and be described in terms that are easily relatable e.g. football fields. Comparisons to existing energy projects of similar size will help to normalise the presence of the facility in the community.

Images of both the area the facility will occupy and the components of the facility are crucial in helping community members understand the visual impacts involved in solar facilities. Providing renderings of the profile of the site on the landscape from public viewpoints will negate the need for community members to imagine (and potentially exaggerate) the visual impacts. Images of similar facilities, particularly in Australia, and details outlining their size and location may also be useful.

Environmental impacts of large scale solar energy projects

Most Australians are familiar with solar energy generation and believe that it has a net-positive impact on the environment when compared to non-renewable sources of energy. The macro-level environmental impacts of solar energy (e.g. reduced carbon emissions) are therefore useful to include in communications, and community members may seek to understand the impact of a particular facility from this perspective.

The local environmental impacts of solar facilities are far less well understood by community members. Some do question the impact of solar facilities on local flora and fauna. It is therefore recommended that any information that is available in relation to local environmental impacts be communicated to community members during the early stages of engagement in order to pre-empt concerns in this area.

Economic and employment impacts of large scale solar energy projects

The local economic benefits of construction and operation are important in building a social licence among community members living near large scale solar facilities. Clearly communicating the overall impacts in terms of job creation and contribution to the local community has a positive impact on general attitudes towards solar projects.

Publicising policies and efforts by project sponsors to engage local businesses and employees will also build a positive narrative around projects. However, project sponsors should be careful to set realistic expectations among the local community around the number and timing of local employment opportunities, as well as which skill sets will be required. Providing information which sets out the opportunities available to the community at different stages of the life of the facility will ensure that expectations are managed appropriately.

Advertising job opportunities via local media and employment agencies is also recommended, in order to ensure that community members with relevant skills are given the opportunity to be involved in the project.

Evidence suggests that word of mouth is an effective vector of positive news about large scale solar facilities in smaller communities (where facilities are most likely to be located). Local employees and contractors can therefore facilitate positive sentiment in the community. In contrast, the presence of large numbers of temporary employees from outside the area has the potential in smaller communities to incite questions about whether locals have been given an equal opportunity to be employed.

Clarity of messaging around the impact (or lack of impact) of having a facility situated locally is also important. This should include a rationale for the impact on energy prices. In the absence of this information community members may expect that their energy prices will be reduced.

Health impacts of large scale solar energy

At the present time, neither the general community members nor those living near large scale solar facilities appear to hold strong convictions about the potential impacts of solar generation on their health. This is in marked contrast to some of the questions asked in the public space around wind farms in recent years.

This research suggests that messaging drawing comparisons between the PV technology used in household solar panels and those employed in large scale facilities will resonate with the community. Community members tend to be familiar with domestic solar systems, and hold positive attitudes towards them as a source of energy.

Community engagement tools

The following are community engagement tools that can be adapted to engage communities regarding large scale solar energy facilities. Each tool is labelled with where it falls on the IAP2 spectrum of public participation along with practical tips on how to incorporate the building block themes of building social licence to operate into the use of each tool. The list of tools is not exhaustive and more ideas can be sought from organisations such as IAP2.

The tools below relate to the following stages along the IAP2 spectrum:[42]

Inform – providing the community with information to assist them to understand the situation and the project

Consult – obtaining community feedback on the project

Involve – working with the community to incorporate any community issues into the project approach

Collaborate – partnering with the community to incorporate community feedback into decisions around the project

Note that no engagement tools relating to the IAP2 empower part of the spectrum have been covered in this document, however, there are examples of community owned renewable energy projects which provide the community with an active role in the decision-making stages (for example the Hepburn Community Wind Park Co-operative in Victoria).

Engagement tools to inform the community

Fact sheets

As well as being fairly easy to design and distribute, fact sheets are particularly useful for proactively addressing the reliability and efficiency impacts, environmental impacts, economic impacts and health impacts of large scale solar energy facilities by providing facts and figures related to these themes (see specific message recommendations above). Factsheets can be handed out at community events, made available in local businesses / meeting points, delivered to residences and businesses as well as being made available online. Information contained within factsheets should be brief and easy to understand. Ideally, the text to be included should be tested for general community comprehension before being distributed. Where possible, images of the facility should be used to complement the written information and to help address any concerns relating to the visual impacts of large scale solar facilities.

Newsletters

Although similar to factsheets in many ways, newsletters should be produced as a series that provide updated information on progress. For this reason they are especially useful in the construction phase of large scale solar energy facilities. Visual and economic impacts of facilities are best addressed in newsletters as these aspects typically change over time (e.g. labour changes over the construction period). Given the importance of addressing visual impacts of large scale solar energy facilities in newsletters, photographs of the site should be included wherever possible, especially if multiple images can be used to show changes over time.

Newsletters are particularly useful for providing updates of timelines to enable the community to track the progress of the project. Updates are usually still valued by the community during what appear to be 'quieter' periods, an absence of information when previously there were updates can lead to speculation and potentially inaccurate word of mouth communications within the community.

Displays

Displays to communicate information about large scale solar energy projects are ideal in smaller communities with established community hubs (such as community centres and libraries) where locals are likely to drop in fairly frequently. The more visual nature of displays mean that they are effective ways to share maps, diagrams and photographs with community. Text information should be minimal. Displays can also be used if a facility developer has a physical presence in the community in the form of an office (see Shop-front below) so that any members of the public who approach the premises are easily able to view the display as well as access additional information.

Fieldtrips / site visits / open days

Fieldtrips to large scale solar energy facilities during construction and operation stages are a useful approach to address community concerns and interest relating to the visual impacts of large scale solar energy projects. The drawbacks are mostly associated with cost as organising and hosting a fieldtrip can be quite resource intensive. However, providing the community with images of the actual or similar projects does not compare with the opportunity for community members to see the project in person.

Website

Information on websites is particularly useful to provide intelligence to members of the community who may be unable to attend or participate in in-person interactions (e.g. public meetings) due to disability or distance (e.g. absentee landlords). Websites can provide up-to-date information and a homepage of brief, concise information can be supplemented by far more detailed text and document repository for those who wish to click through to those resources. In addition, websites lend themselves to providing diagrams and photographs of large scale solar energy facilities to help address any concerns about visual impacts.

Engagement tools to consult the community

Public meetings

Community meetings provide a forum to both provide information to the community about large scale solar energy projects and plans to establish a local facility (or updates about progress), but also the opportunity to seek feedback from the community and provide a forum for the community to ask questions directly to project stakeholders. Information about all five building blocks of the social licence to operate large scale solar facilities would be practical to provide in public meetings in a presentation format, and it would be especially important to address all five themes in initial community meetings.

A presentation at a public meeting is an ideal opportunity to show the community images of the projected facility or of similar facilities in other parts of the country (or world).

Meetings with special interest groups

Like general public meetings, meetings with special interest groups provide an opportunity for two-way communication about large scale solar energy projects. Special interest groups might include environmental groups and local business networks. The information / presentations prepared for these meetings can usually be more tailored in nature due to the specific interests of the groups, however, in smaller communities be mindful that individuals are members of the broad community as well as members of special interest groups and are likely to have personal and specific interests in the project (i.e. come prepared with general communications materials too). If good relationships can be built with special interest groups, these can be useful allies and public supporters of large scale solar energy projects.

Surveys

Surveys could be used to investigate community sentiment towards large scale solar energy in general as well as levels of support for a potential or actual project. Surveys can also be used to measure changes in community attitudes over time. Importantly, surveys can be used to provide feedback on engagement such as satisfaction with project communications. Especially if provided in an anonymous way, e.g. through an independent researcher and / or online, surveys will elicit candid information. Surveys are best used where quantitative feedback is sought.

Focus groups

Like surveys, focus groups are useful for investigating community attitudes and opinions about large scale solar energy and feelings towards a local project. Focus groups are particularly useful for understanding the reasons behind community members' opinions which is often challenging in the confines of a survey, but will not enable attitudes to be quantified.

Shop-fronts

Shop-fronts are site offices situated in the heart of community (such as a busy high-street or shopping centre) that provide an easily accessible place for members of the community to drop in to obtain information in several formats: a take-away format (e.g. factsheets, newsletters), an on-site format (e.g. observing a display), or face-to-face communication (queries answered directly by the representative hosting the shop-front). While there is a financial investment involved (staffing and possibly hiring premises), a shop-front has the potential to increase the profile of the solar project in the local community. This is particularly relevant if engagement is around a facility that will be positioned out of town.

Engagement tools to involve the community

Deliberative events

Deliberative events (often involving deliberative polling) involve a combination of seeking public opinion and exposing participants to information about large scale solar energy facilities. Deliberative events enable facility developers to understand the information about large scale solar projects that resonates with specific communities and use that information to tailor communications materials. In effect, deliberative events are targeted versions of the stimulus material testing conducted in the quantitative survey that informs this report (see Section 1 for an overview). Deliberative events are resource heavy involving recruiting between approximately 10 and 100 people to attend a half day workshop with an array of information pre-prepared and experienced facilitators in attendance. Participants' attitudes and opinions towards large scale solar projects are sought throughout the session both initially and following participants' consideration of various types of information in order to establish which information sources are most effective in communicating key messages.

Telephone information / enquiry hotline

A telephone hotline can be used in a variety of ways. A pre-recorded message regularly changed with up-to-date information about relevant events such as details about an upcoming public meeting will provide the community with an additional channel of information through which to access timely information. Alternatively, callers can take the opportunity to leave their contact details and a brief description of their query, this enables community engagement officers to prepare the information they are likely to need to provide and seek specialised information ahead of time if required.

Engagement tools to collaborate with the community

Community reference group

A community reference group (or advisory committee) is a longer-term engagement approach that involves inviting members of the community to apply to (or directly inviting them to join) a small panel that meet with project stakeholders throughout the duration of the planning and construction phases and may be called upon to meet less regularly on an ongoing basis.

The community reference group can be consulted to help developers to understand community sentiment outside of direct point-in-time research activities (such as surveys and focus groups). A reference group can be invaluable if a relationship is built such that members become unofficial champions of the solar project, however, careful consideration must be given to the recruitment of the group ensuring that the group consists of a good mix of people and is not considered biased by the broader community. Inviting members of different special interest groups and including a mix of ages, genders and backgrounds will help to achieve a diverse group that will better represent the community.

Stakeholder mapping

Although stakeholder mapping is most critical in the planning stages to inform a developer of the community profile, stakeholder mapping can be a useful tool to engage the community too. By approaching the community to seek its assistance to establish who the relevant community stakeholders are, the community can be reassured that the developer wishes to cater to the needs of and engage with all sections of the community.

Technical notes

This report is supported by the *Social licence to operate large scale solar facilities in Australia, social research report* which provides a comprehensive description of the broader research project.

Methodological notes

Quantitative methodology

A quantitative survey with members of the Australian general public was conducted to explore knowledge and understanding of, as well as attitudes towards, large scale solar facilities.

The survey was conducted online with 1,197 people living across Australia aged 18 years and over. Fieldwork was conducted between 3 and 15 May 2013. The sample was broadly representative of the Australian population by age, gender, and location. The questionnaire can be found in the *Social licence to operate large scale solar facilities in Australia, social research report*.

Experimental method

In order to test the impact of information about large scale solar facilities on their attitudes, respondents were randomly allocated and exposed to one of two sets of stimuli. The stimuli were labelled Stimulus 1 and Stimulus 2. Prior to viewing the stimuli, respondents were asked a set of questions relating to their attitudes towards large scale solar facilities in order to gain a baseline measure of their attitudes. The questions were related to a range of attributes and potential impacts of large scale solar facilities:

- Land use
- Efficiency
- Reliability
- Visual impacts
- Economic impacts
- Environmental impacts
- Health impacts
- Cost of electricity

After viewing the stimuli, respondents were asked whether they had changed their mind in relation to any of the issues. For issues where participants reported changing their minds, they were re-asked the relevant questions. Differences between the baseline responses and post-exposure responses were contrasted in order to ascertain changes in attitudes due to exposure to the additional information in the stimuli.

Qualitative methodology

Fifteen group discussions were held across Australia in total. Groups were held in Sydney, Melbourne, Perth, Geraldton, Darwin and Brisbane in 2013. Groups conducted in Dubbo and Broken Hill were held in 2014. In total, 109 members of the public participated in the discussion groups. Additional members of the community and project stakeholders participated in in-depth interviews. In total 36 interviews were conducted.

Group location	Number of participants	Profile	
Melbourne	8	General population, 40+	No fewer than three participants of each gender, at least half were main or joint bill-payer
Melbourne	8	General population, 18-39	
Sydney	6	General population, 40+	
Sydney	8	General population, 18-39	
Perth	8	General population, 40+	
Perth	7	General population, 18-39	
Geraldton	10	General population, 18+	
Darwin	7	General population, 40+	
Darwin	3	General population, 18-39	
Brisbane	8	General population, 40+	
Brisbane	6	General population, 18-39	
Dubbo	8	General population, 40+	
Dubbo	7	General population, 18-39	
Broken Hill	8	General population, 40+	
Broken Hill	7	General population, 18-39	

Each group lasted an hour and a half, participants were provided with an $80 EFTPOS card to reimburse them for any expenses incurred, as well as to thank them for their time and in so doing encourage participation from a range of members of the public. Participants were advised that the groups were on the topic of energy, not specifically about large scale solar energy, and along with the incentive, this helped to ensure not only those with a specific stance on large scale solar energy were encouraged to attend.

A discussion guide was prepared prior to the groups to structure the discussion and ensure all relevant topics were covered in the groups (also available in the full research report). Towards the end of each group, participants were presented with a number of images of large scale solar projects from Australia and around the world. The objective of showing participants these images was in part to capture reaction to seeing these facilities (given that very few had seen a photograph of large scale solar facility previously), but also to further stimulate conversation about the topic.

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Authors:

Jennifer Brook

Research Director,
Ipsos Social Research Institute

e: Jennifer.Brook@ipsos.com

t: 03 9946 0888

Stuart Clark

Research Manager,
Ipsos Social Research Institute

e: Stuart.Clark@ipsos.com

t: 02 9900 5100

About ARENA

ARENA was established by the Australian Government to make renewable energy technologies more affordable and increase the amount of renewable energy used in Australia. ARENA invests in renewable energy projects, supports research and development activities, boosts job creation and industry development, and increases knowledge about renewable energy.

p: +61 2 6243 7773

e: arena@arena.gov.au

w: arena.gov.au