An Australian Government Initiative

Regional Development Australia

RDA Illawarra

15 November 2023

The Offshore Renewables Team
Department of Climate Change, Energy, the Environment and Water
CANBERRA
via online submission: Have Your Say portal

Dear Madam or Sir

RDA Illawarra submission to proposed Illawarra Offshore Wind Area

Regional Development Australia (RDA) – Illawarra is grateful for the opportunity to comment on this proposal; our submission is attached with this letter.

It is acknowledged that offshore wind can generate the power required to replace end-of-life coal-fired power stations; deliver a reliable power supply in the required timeframe; and help to decarbonise the future regional economy.

On that basis, RDA Illawarra submits its **qualified support** for the development of an Offshore Wind zone but recognises that the following key considerations need to be addressed to gain unreserved support:

- Environmental impact
- Social impact and benefit
- Feasibility of technology
- Regulatory environment.

RDA Illawarra believes that the fifteen recommendations made in our submission will enhance community engagement, acceptance and ease implementation.

We look forward to the continuation of engagement on this topic and to the achievement of Net Zero 2050.

Yours sincerely

Debra Murphy
CEO
RDA Illawarra

An Australian Government Initiative

Regional Development Australia

RDA Illawarra

Submission to the Australian Government (DCCEEW)

Proposed Illawarra Offshore Wind Area

15 November 2023

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Executive Summary and Recommendations

The Australian Government has proposed the creation of an offshore wind zone for the Illawarra, which would stretch from the coast at Wombarra in the north to Gerringong in the south, extend 10-60km off the coast and cover an area of 1,400km^2.

The urgent uptake of offshore wind technology is vital for two reasons:

1. The decommissioning of coal-fired power stations in NSW by 2035 and
2. Achievement of climate commitments for 82% of the nation's energy to be from renewable sources by 2050.

The decarbonisation challenge in the Illawarra is significant. The production of hydrogen, if adopted to decarbonise the steel industry at Port Kembla, would consume as much electricity as produced by the soon-to-be-decommissioned Bayswater power station in NSW.

To sustain life, industry and essential services there is a growing reliance on the supply of electricity. Renewable power must be delivered to coincide with the closure of coal-fired power plants by 2035 – leaving just over a decade to approve, plan, build and commission alternative energy supply options.

There is a need for speed.

We have considered the available options to generate power, along with their weaknesses. Wind and solar could both deliver the power required, but offshore wind is favoured due to its higher capacity factor (i.e. ability to deliver a more consistent supply).

Whilst offshore wind can generate the power required, there are several key considerations that require resolution before it is accepted and progressed.

RDA Illawarra submits its **qualified support** for the development of an Illawarra Offshore Wind zone but recognises that the following key considerations need to be addressed to gain unreserved support:

- Environmental impact
- Social impact and benefit
- Feasibility of technology
- Regulatory environment.

Community environmental concerns centre on the visual impact of an offshore windfarm and the potential disruption to sea life and the marine ecosystem. It is also important to consider the onshore impact of infrastructure required to connect into the existing grid system. The onshore infrastructure needs to be carefully planned and coordinated to deal with any conflicts or competing uses in and around the Port of Port Kembla.

RDA Illawarra feels these concerns need to be acknowledged and addressed by government and proponents. There is a case for locating wind turbines beyond 20km and even out to 50km. The cost/benefit of locating windfarms further from the coastline needs to be examined and carefully considered.

The issue of decommissioning and end-of-life needs to be considered at the design stage – especially for the blades, which are made from composite materials for which there is no easy and cost-effective recycling solution. Other materials used in wind farms – steel, copper, plastics – can be more easily recycled through existing processes.

Investment of billions of dollars in the installation of an offshore wind farm will have significant social impact, which needs to be quantified through the development of a Business Case or Benefit-Cost Analysis (BCA). To understand, address and communicate the key aspects of this social change a clear and compelling vision, business case and communications strategy must be developed that engages the local community, stakeholders and First Nations people.

The 'workforce of the future' needs to be defined and developed. A peak construction workforce of 3,500-4,000 will be required, with workers needed to operate and maintain new technology at sea. This provides an immediate opportunity for tertiary institutions to develop new training programs that will allow existing skills to be repurposed in a new and challenging environment, and for younger workers to train for a career in renewable energy. New supply chains will need to be developed and supported, providing ongoing regional employment.

Consideration should be given to the creation of a community dividend through local content quotas – especially for steel components – as well as other options. RDA Illawarra feels that the inclusion of a tangible community dividend could improve community acceptance and ease the transition to offshore wind.

Offshore wind provides unique engineering challenges and opportunities. Overcoming these challenges provides significant opportunities in site assessment techniques, servicing and maintenance, engineering, welding and material design – forming the basis for a world-leading industry in the Illawarra. The region is well placed to take advantage of this emerging opportunity given our history of manufacturing in heavy industry, an available workforce, the research capability of UOW and ongoing investment in TAFE. However, funding will be required and work on the required technology needs to start now.

The regulatory environment is untested and much of the work required for approval is being delegated to the wind farm proponents. RDA Illawarra feels this approach places too much authority and cost in their dominion and that feasibility assessments should be government supported and delivered by an independent third party.

It is sobering to recognise that without a significant and urgent commitment to offshore wind, Australia will not achieve its goal to deliver 82% of the nation's energy from renewable sources by 2050. In other words, the 'Do Nothing' Scenario is not acceptable.

Failure to adopt renewable energy will necessitate the continued use of fossil fuels in ageing, expensive coal-fired power stations if reliable power supplies are to be maintained to homes, businesses and industry. Continued use of fossil fuels will result in increased global temperatures of between 2 and 3.5ºC at the end of this century.

The impact on ocean temperatures, marine and human life will be significant.

RDA Illawarra makes fifteen recommendations to address the key considerations identified in this submission.

1. Consideration should be given to reducing visual impact by moving location further offshore
2. The impacts of onshore infrastructure should be planned, coordinated and characterised
3. Potential impact on marine life should be subject to ongoing monitoring and research
4. Impact of low frequency noise on humans and marine should be examined
5. Recycling and/or reuse of decommissioned equipment needs to be provided
6. A clear and compelling business case and community engagement plan is needed
7. 'Workforce of the Future' needs to be defined and training curricula established
8. Economic benefits and requirements for the region need to be analysed
9. There needs to be a commitment to local content
10. A government-led assessment into the impact on current users of the offshore zone is needed
11. A community dividend should be considered and defined
12. Provide funding for the technological development for design, construction and maintenance solutions to the challenges of floating offshore wind infrastructure
13. Establish a plan for the integration of offshore wind power into the national grid which is well coordinated and manages competing onshore land and infrastructure uses
14. Develop the technology and skilled workforce to monitor, service and repair offshore wind infrastructure
15. Establish government supported baseline data collection for offshore wind farms to ensure a unified baseline of knowledge to support the regulatory process.

Background

The Australian Government, through the Department of Climate Change, Energy, the Environment and Water (DCCEEW) has proposed the creation of an offshore wind zone for the Illawarra. The proposed zone would stretch from the coast at Wombarra in the north to Gerringong in the south, and extend 10-60km off the coast, covering an area of 1,400km^2.

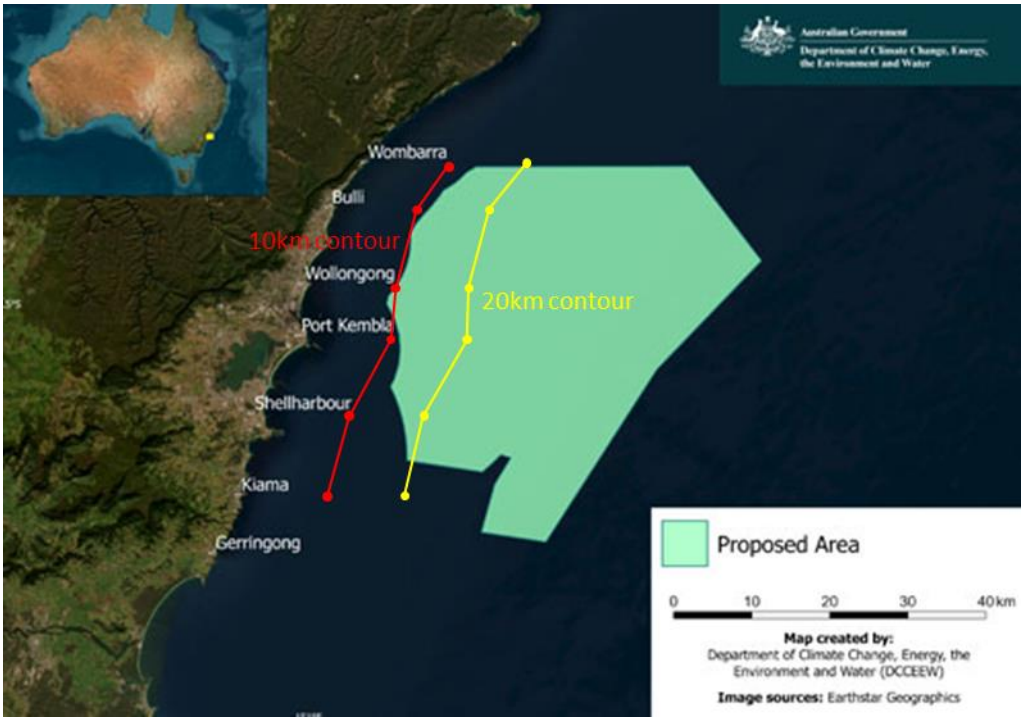

Figure 1: *Proposed Illawarra Offshore Wind Zone showing distance from shoreline at 10 and 20 kilometres*

According to the Australian Energy Update 2022[1], total electricity generation in Australia was 266 terawatt hours in 2020-21. Renewable generation increased 18 per cent that year, contributing 27 per cent of total generation (71 terawatt hours). Solar and wind contributed 10 and 9 per cent of total generation respectively. These figures reinforce the reliance on fossil fuels (coal, gas, petrol and diesel) for the generation of electricity.

Existing coal-fired power stations are aging and will become increasingly costly to operate over the next decade, and their capacity will decline. This, coupled with the depletion of coal reserves from existing leases, will see the retirement of coal-fired generating assets over the next 20 years. As shown in Figure 2, 83% of NSW coal-fired generating capacity is due to be decommissioned by 2035; the figure is 78% in Victoria and 70% in Western Australia[2].

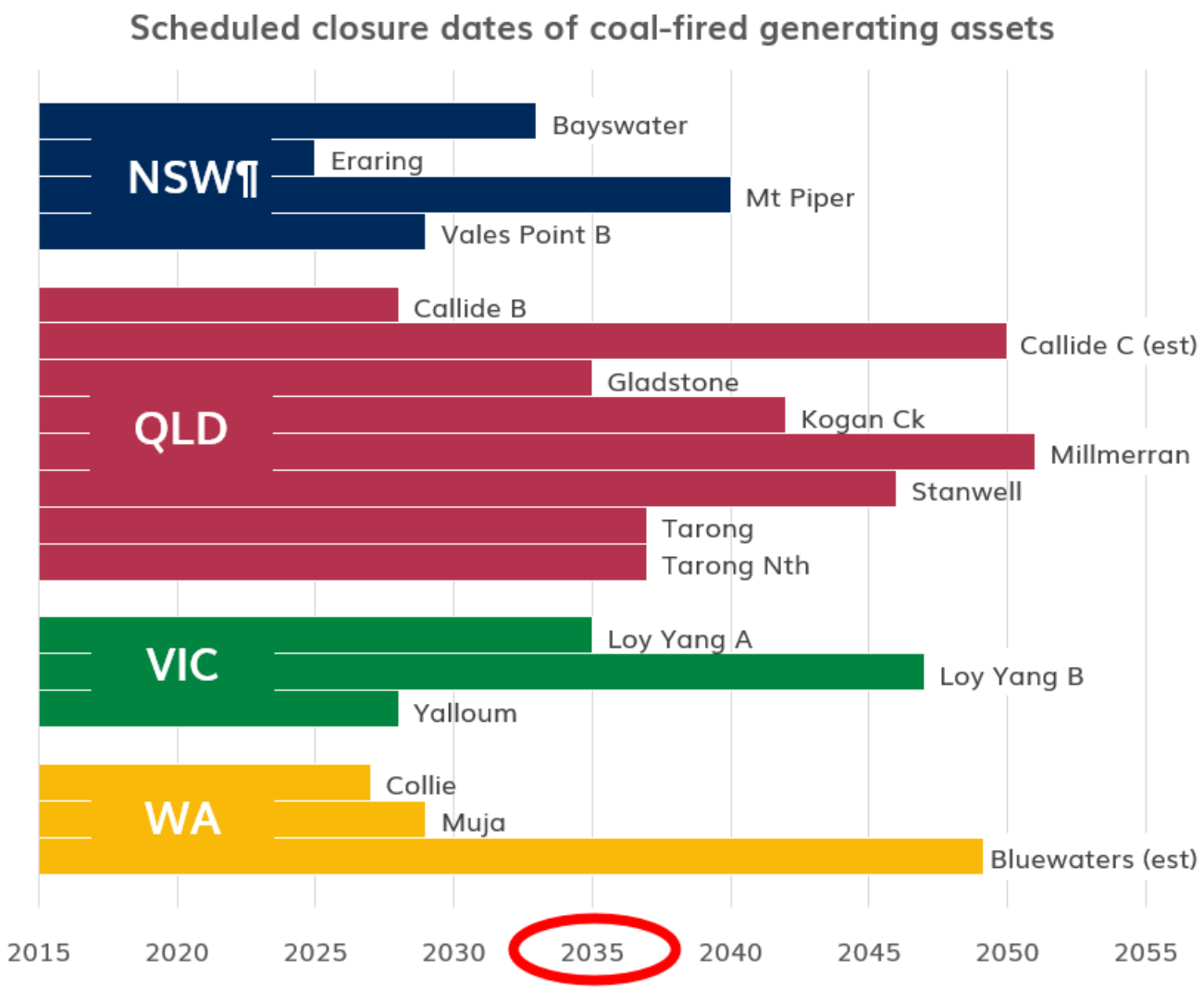

Figure 2: *Scheduled closure dates of coal-fired generating assets indicates that nine facilities will cease operation by 2035 unless their life is extended at potentially higher operating cost and reduced capacity*

If implemented as scheduled, this decommissioning will result in reduced generating capacity of nearly 14,000MW by 2035 – with nearly half of that in NSW (6,840MW).

Over the 20-year forecast horizon to 2036-37, annual operational electricity consumption is forecast to remain relatively stable, growing less than 6% in a 'neutral' scenario. Forecast consumption is initially flat as speedy uptake of rooftop solar and energy efficiency measures offset growth from increased population and higher economic activity. However, consumption is projected to increase from mid-2020's because of an increase in electric vehicles (EVs), and as the installation rate of rooftop solar reduces.

A 'strong' scenario projects consumption growing faster, ending approximately 14% higher by 2036–37 than in the neutral scenario, driven by stronger growth in population and the economy.

These drivers are projected to work in the opposite direction in the 'weak' scenario where consumption is forecast to decrease, ending up 21% below the neutral scenario by 2036–37[3].

The most likely case is that power consumption will remain relatively flat, and that capacity lost from the closure of coal-fired generators will need to be replaced over the next decade if reliable electricity supply is to be maintained to homes and businesses on the east coast.

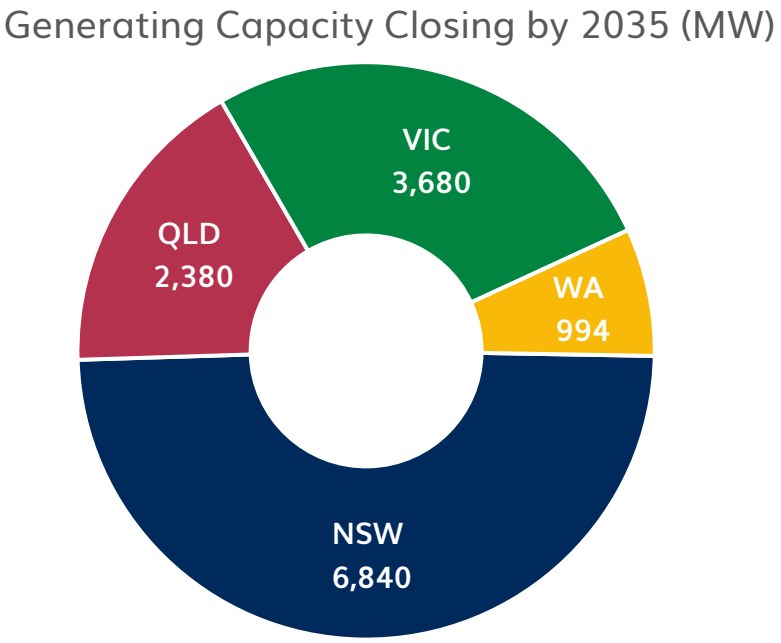

Figure 3: *Decommissioning of coal-fired assets as scheduled will result in reduced national generating capacity of nearly 14,000MW by 2035 – with nearly half of that in NSW (6,840MW).*

Successful decarbonisation of our nation will mean adopting renewable and / or alternative energy sources and adopting more sustainable fuels for transport and industry, which currently include battery technology and the use of hydrogen.

Whilst each of these technologies will contribute to the future energy mix, the production of hydrogen at the scale required will consume significant amounts of electricity. For context, the production of sufficient hydrogen to decarbonise iron and steelmaking operations just at Port Kembla steelworks is estimated to require 15 times its current power consumption[4] - potentially requiring an additional 2,600MW in generating capacity. This is the equivalent of the soon-to-be-decommissioned Bayswater power station in NSW.

As climate change delivers more variable – and extreme - weather patterns, Australia will experience longer periods of drought and more flooding rains. Absent the capability to capture and store rainwater through more large-scale dams, survival through drought will require increasing reliance on desalination.

The existing technology used at the Sydney Desalination Plant uses approximately 38MW to produce 91.25 gigalitres/year and can provide drinking water to 16.5 percent of the residents in Greater Sydney[5]. Planned future expansion of the plant will double its output and power usage to over 70MW. As population increases, further expansion will be needed, and additional facilities located at major population centres including Wollongong and Newcastle.

In summary, to sustain life, industry and essential services there is a growing reliance on the supply of electricity. Power must be delivered in increasing amounts to coincide with the closure of coal-fired generating assets by 2035 – leaving just over a decade to approve, plan, build and commission alternative supply options.

Speed is of the essence.

What are the Options?

To maintain power supply and continue our national commitment to reducing greenhouse gas emissions and decarbonising the economy ('Net Zero by 2050'), reliance on fossil fuels must be significantly reduced or eliminated.

The options are to use either renewable or alternative energy, as defined below[6]:

Alternative Energy	Renewable Energy
Energy sources that are not fossil fuels, including biofuels, solar, wind, geothermal, tidal, or even nuclear power. These sources release few to no greenhouse gas emissions. However, only some alternative energy sources are infinitely renewable, and sources such as nuclear may carry their own adverse effects.	Energy derived from sources such as sunlight, wind, and water, which have a steadily replenishing supply. These sources contrast with fossil fuels, which emit large amounts of greenhouse gases and regenerate only over enormous periods of time.

There are five main renewable and alternative energy technologies:

Technology	Description
Wind	Power is generated when wind spins the vanes of a windmill to turn a turbine. Wind turbines can be located on land or offshore.
Solar	Uses the sun's energy in two ways: Photo-voltaic (solar panels): converts the sun's light directly into electricity when the sun is out; or, Solar thermal energy: uses the sun's heat to create electricity, a method that works even when the sun is down.
Hydro	Rapidly flowing water turns turbines (usually inside a dam), generating electricity.
Biomass	Power is produced using organic materials (predominantly wood, agricultural crops and waste, food waste, and animal manure) that contain stored energy from the sun. Once dried, biomass can be burned to create heat (direct), converted into electricity (direct), or processed into biofuel (indirect).
Nuclear	Energy is generated by the process of nuclear fission and harnessed to produce electricity.

Other options include wave and gravity generation although these are not proven at scale and the latter could be considered a storage solution rather than an energy generator.

Each of these technologies has a weakness: solar is only available while the sun shines or there is sufficient 'sensible' heat; wind generation requires a consistent airstream; hydro a consistent water supply - even during drought; wave power needs favourable ocean conditions; biomass sufficient feedstock to be sustainable; and nuclear power lacks a social or political licence in Australia.

The technology to deliver the required volume of power will be:

- Low or no emission
- Proven at scale
- Available for deployment and commissioning from 2030
- Capable of delivering the required amount of power (higher capacity factor)
- Renewable.

A comparison of available technologies on these criteria is shown in the table below[6,7]:

Source	Fuel Type		Emissions	Proven at scale	Available by 2030	Capacity Factor
	Alternative	Renewable				
Biomass (Other)	✓	✓		✗	✓	
Biomass (Landfill)	✓	✓		✗	✓	
Hydro	✓	○		✓	✗	
Nuclear	✓	✗		✓	✗	
Solar	✓	✓		✓	✓	
Onshore Wind	✓	✓		✓	✓	
Offshore wind	✓	✓		✓	✓	

○ Because hydropower plants can significantly damage the ecosystems where they are built, hydropower is not always classified as renewable energy.

Table 1: *Comparison of available technologies indicates that solar and wind – especially offshore wind – are the most feasible options within the timeframe required.*

Wind and solar both could deliver against all the selected criteria, but offshore wind is favoured due to its higher capacity factor (i.e. ability to deliver a more consistent supply).

Whilst offshore wind has the potential to generate the power required for domestic and industrial purposes, there are several key considerations that require deliberation and resolution before it is accepted and progressed.

RDA Illawarra qualified support

RDA Illawarra submits its qualified support for the development of an Illawarra Offshore Wind zone but recognises that the following key considerations need to be addressed to gain full support:

- **Environmental impact**
  - Visual amenity – onshore and offshore
  - Impact on marine life as well as the marine ecosystem
  - Noise
  - Decommissioning/end-of-life considerations.
- **Social impact and benefit**
  - Stakeholder and community engagement, including First Nations' concerns
  - Workforce availability
  - Analysis of economic or other benefits to the region
  - Local content commitment
  - Effect of on-going marine operations / tourism; and,
  - Community dividend.
- **Feasibility of technology**
  - Floating turbine construction and mooring
  - Power transmission
  - Servicing requirements.
- **Regulatory environment:** as a new industry in Australia, regulation is recent and untested with much of the work required for approval being delegated to the wind farm proponents.

Key Considerations

Environmental impact

Visual Impact

There is considerable community concern about the visual impact of an offshore wind farm. These concerns need to be acknowledged and addressed by government and proponents.

Reference to Figure 1 indicates that there will be no wind towers built less than 10km from the coastline, as that is the nearest extent of the proposed Offshore Wind Zone. Visualisations created by the Australian Government indicate that from 20km offshore, any proposed windfarm would be decreasingly visible. Recent work commissioned[8] by the Department of Industry, Science, Energy and Resources, confirmed that capacity factors for offshore wind are higher than for onshore installations, and that the capacity factor increased further out to sea.

There is a case to locate wind turbines beyond 20km from shore - even out to 50km – depending on the technical feasibility of anchoring or stabilising structures at greater ocean depths and the economics of servicing them at a greater distance from shore. The cost of transmission and line losses over greater distances will also need to be considered by proponents in this cost/benefit analysis.

As well as offshore visual impact, the installation of onshore transmission infrastructure needs to be addressed and considered by project proponents. Power transmission from windfarm to shore will be through underwater cables, but these will exit the ocean at one – or several - locations and will presumably require additional onshore transmission infrastructure. That could include pylons, transmission lines (and additional easements for their construction), substations and storage infrastructure.

Marine Life

The second greatest community concern is regarding potential impact on marine life. Greenpeace has made its position clear on this matter[9]:

> **"The short answer: no, offshore wind farms aren't killing whales.**
> **Not a single peer-reviewed study has found that offshore wind farms kill whales."**
>
> *The Low-down on Whales & Windfarms, Greenpeace*

Despite this, there is recognition that everything done at sea has some impact on marine life, so it is important that offshore wind farms are developed in the right locations and that the industry is properly regulated. Site selection could minimise any impact on marine life and migration channels; and monitoring and research can assess long-term impact on marine life.

Renewable energy sources including offshore wind are an essential tool to reduce the use of fossil fuels and combat the impacts of climate change, which are already affecting ocean ecosystems and marine life[10]. North Atlantic Right Whales have already shifted their main feeding locations in response to changing ocean temperatures, which has increased their risk of vessel strikes – one of the main causes of strandings[11].

> **"Technological advancements can and must co-exist with nature-based solutions including protecting whales and improving habitat, and the siting, construction, operation, and maintenance of offshore wind farms should not create a conflict with protecting marine life."**
>
> *Whale and Dolphin Conservation, USA*

Noise

The impact of low frequency noise has been reported from many who live close to existing onshore wind generating installations. However, there is – yet - little scientific evidence to support health impacts from this noise.

It would be beneficial if independent scientific study of existing offshore wind farms could quantify their noise profile and the likely distance at which they can be heard by humans and marine mammals; and especially examine the impact of low frequency sound that can travel a greater distance.

Decommissioning/end-of-life considerations.

On- and off-shore wind turbines are increasing in size as technology matures. Increased size gives access to more undisturbed airflows and larger generating capacity per turbine.

The generator, tower, float, anchor lines and transmission cables are manufactured from metals or alloys – predominantly copper and steel, which have existing recycling channels.

Bigger turbines require longer blades and engineering issues such as structural stiffness, fatigue resistance and stiffness-to-weight ratio become increasingly important. As a result, composite materials (resin bonded fibre glass, carbon fibre and Kevlar) are typically used in blades of wind turbines. Blades are the most important composite based part of a wind turbine, and the highest cost component of turbines – they are also the least recyclable.

The difficulties related to the recycling process are mainly due to the structure of the blade and to the composite materials used, which are a thermosetting matrix and glass fibres, or a combination of glass and carbon fibres.

Unlike thermoplastics, thermosetting matrix cannot be remoulded to form new product. So the options are either to:

1. Reuse the blade and the composite material elements as they are found in the blade
2. Transform the composite material into a new source of material[12].

The first option only requires cutting the blade, but transformation requires advanced processes. Heat is necessary to degrade or dissolve the matrix material, which may be detrimental to the mechanical properties and surface roughness of glass fibres. The cost of the transformation remains a key obstacle for implementation on an industrial scale, as non-recycled fibres remain less expensive[13]. A simpler transformation of the composite material is shredding but the shredded composite can only be used as a filler or similar material – for example in cement or sound insulation. As of 2017, there were only two companies operating industrial composite recycling stations in Europe.

A sustainable solution for recycling wind turbine blades will need to be developed.

Environmental Recommendations

1. Consideration should be given to reducing visual impact by moving location further offshore
2. The impacts of onshore infrastructure should be planned, coordinated and characterised
3. Potential impact on marine life should be subject to ongoing monitoring and research
4. Impact of low frequency noise on humans and marine should be examined
5. Recycling and/or reuse of decommissioned equipment needs to be provided

Social impact and benefit

Stakeholder and community engagement

It is incumbent on proponents, government, peak bodies and business to engage with the local community regarding the advantages and disadvantages of offshore wind in the Illawarra. Acknowledging, accepting and allaying justified community concerns is part of the overall engagement process and must be consistent and continuous from initial consultation to eventual decommissioning and recycling or re-use.

A clear and compelling vision and communications strategy must be developed that engages the local community, stakeholders and First Nations people.

Workforce availability

With proponents considering offshore wind farms of approximately 100 turbines and $10Bn in investment, the workforce requirements for construction are considerable. Modelling completed by RDA Illawarra confirms a peak construction workforce of 3,500-4,000 for such a project. Continuing operations would employ fewer workers directly, but the flow-on to the region would be considerable. New supply chains will emerge, and existing industries will be enhanced, securing increased regional employment.

However, new skills will be required to operate and maintain new technology at sea. This provides an immediate opportunity for tertiary institutions to develop new training programs that will allow existing skills to be repurposed in a new and challenging environment, and for younger workers to train for a career in renewable energy.

Identification of the skills required, and the development of suitable curricula need to be a matter of urgency if the region is to have the skills and workforce required to build, operate and maintain offshore wind facilities.

Analysis of economic or other benefits to the region

There needs to be a detailed analysis (a Benefit-Cost Analysis or overall Business Case) of the direct impact on the local economy and employment for the region. This should include examination of the requirements for housing and services that comes with an increased workforce, as well as the opportunity cost if the project does not proceed, (e.g. future impact on iron and steel making operations, hydrogen investment). Similarly, analysis of alternative technologies or other locations should be undertaken to provide the community with a clear understanding of the rationale for offshore wind.

Local content commitment

It is apparent that BlueScope may not be able to supply rolled sections of sufficient size for use in offshore wind towers. However, they can manufacture the steel required for the floating bases and ancillary assemblies, which could amount to more than 4,000 tonnes per tower – or nearly 1,000,000 tonnes of steel. As part of the local community dividend, the successful proponents must give a firm commitment to the use of locally produced steel wherever that is within the capability of Australian-based manufacturers.

Effect of on-going marine operations / tourism

Numerous parties use the area of ocean proposed for the offshore wind zone. These include commercial and recreational fishers, divers, shipping, tourism and other recreational activities. It is anticipated that the offshore wind zone would have restricted access once it is operational, which has potential impact on the existing users. Further, coordination of users' rights will be under the purview of project proponents – of which several may exist within the designated offshore wind zone. This could result in conflicting determinations regarding access and permitted activities.

RDA Illawarra would like to see a government-led assessment of the impact on interested parties and direct engagement with them to plan the future use of the designated zone

Community dividend

Whilst the economic benefits for the region may be positive with the creation of an offshore wind industry, consideration could also be given to a community dividend from the project. Certainly a commitment to local steel content would be an encouraging start for the region, but other dividends could also be considered; discounted energy prices, co-contributions to housing or local services, or community projects as well as the creation of industry-specific traineeships and apprenticeships are just some options.

RDA Illawarra feels that the inclusion of a tangible community dividend could improve community acceptance and ease the transition to offshore wind.

Social & Economic Recommendations

6. A clear and compelling business case and community engagement plan is needed
7. 'Workforce of the Future' needs to be defined and training curricula established
8. Economic benefits and requirements for the region need to be analysed
9. There needs to be a commitment to local content
10. A government-led assessment into the impact on current users of the offshore zone is needed
11. A community dividend should be considered and defined

Feasibility of technology

Floating turbine construction and mooring

Despite lengthy and enduring experience with offshore oil and gas, Australia has no experience in offshore wind technology, which provides unique engineering challenges and opportunities. The challenges include design, construction and maintenance of floating infrastructure in a harsh environment that includes deep water anchorage, strong and constant winds, high waves, storms and corrosive saltwater spray.

RDA Illawarra concurs with the Blue Energy Futures Lab at UOW in their assessment that the floating platform design will need innovative design to provide a stable anchoring and mooring system that will withstand massive dynamic loads and be adaptable to changing ocean-floor geological conditions[14].

However, overcoming these challenges provides significant opportunities in site assessment techniques, engineering, welding and material design – forming the basis for a world-leading industry in the Illawarra. The region is well placed to take advantage of this emerging opportunity given our history of manufacturing in heavy industry, an available workforce, the research capability of UOW and ongoing investment in TAFE. However, funding will be required.

Power transmission

The integration of individual wind turbines and transmission of the accumulated power to shore create additional challenges. Individual connections between offshore wind turbines will potentially use cables that are ballasted to float 100-150m beneath the surface – generally below the depth that adult whales dive in search of food. Development of this technology for Australian conditions will provide a further engineering challenge.

Of more significance is the transmission of power to the shore and integration with the existing national grid system. This will undoubtedly require additional on-shore infrastructure for transmission and – potentially – storage to deal with the intermittent nature of wind

energy. Planning for this would need to commence immediately after the offshore wind zone is proclaimed by the Minister.

This onshore infrastructure will need to be carefully planned and coordinated to deal with any conflicts or competing uses in and around the Port of Port Kembla. RDA Illawarra believes the development of this complex system is of the utmost urgency, and local consultation should be simultaneous to this initiative. RDA Illawarra has been working on a parallel project on long-term plans for renewable energy and other major developments around the Port of Port Kembla, and are willing to champion the coordination work required.

These challenges – along with the associated costs – will need to be carefully considered by proponents and government and the coordination role requires turbocharging.

Servicing requirements

Given the operating environment and required maintenance cycle of turbines, safe delivery of regular servicing will present unique challenges. A facility maintenance supply chain will be required, as will the use of advanced remote monitoring technology coupled with human and remote robotic maintenance techniques.

The development of this technology and the skills required to operate it will be an immediate priority for proponents so that it is ready for implementation at the commissioning of the first wind turbines.

RDA Illawarra feels that the development of the required technology and skills should begin immediately and be funded to benefit the Illawarra region.

Technology Recommendations

12. Provide funding for the technological development for design, construction and maintenance solutions to the challenges of floating offshore wind infrastructure
13. Establish a plan for the integration of offshore wind power into the national grid which is well coordinated and manages competing onshore land and infrastructure uses
14. Develop the technology and skilled workforce to monitor, service and repair offshore wind infrastructure

Regulatory environment

As a new industry in Australia, regulation is recent and untested with much of the work required for approval is being delegated to the wind farm proponents. A significant number of specialist assessments could be required within a highly complex environment. This will result in the investment of many millions of dollars and the duplication of efforts across multiple proponents. There is also likely to be a lack of understanding on the cumulative impacts across multiple wind farm proponents. As a result, there is a higher risk of failure.

Similarly, there is a risk that planning approval resources are overextended in assessing applications in a new and untested environment. As a result, there could be lengthy delays to approvals for offshore wind developments.

RDA Illawarra feels this approach places too much authority and cost on the proponent and could delay implementation at a time where speed is of the essence.

Governments should start now to collect baseline data. This investment in the future of renewable energy could be recouped from the various offshore wind proponents. Government driven data collection and a centralised sharing system will enable better, faster and more certain outcomes for both proponents and renewable energy development.

Regulatory Recommendation

15. Establish government supported baseline data collection for offshore wind farms to ensure a unified baseline of knowledge to support the regulatory process

'Do Nothing' Scenario

The Australian Government – as part of its climate commitments – has a goal to deliver 82% of the nation's energy from renewable sources by 2050. As can be seen from Figure 4[15], wind and solar energy make up a considerable portion of this renewable commitment.

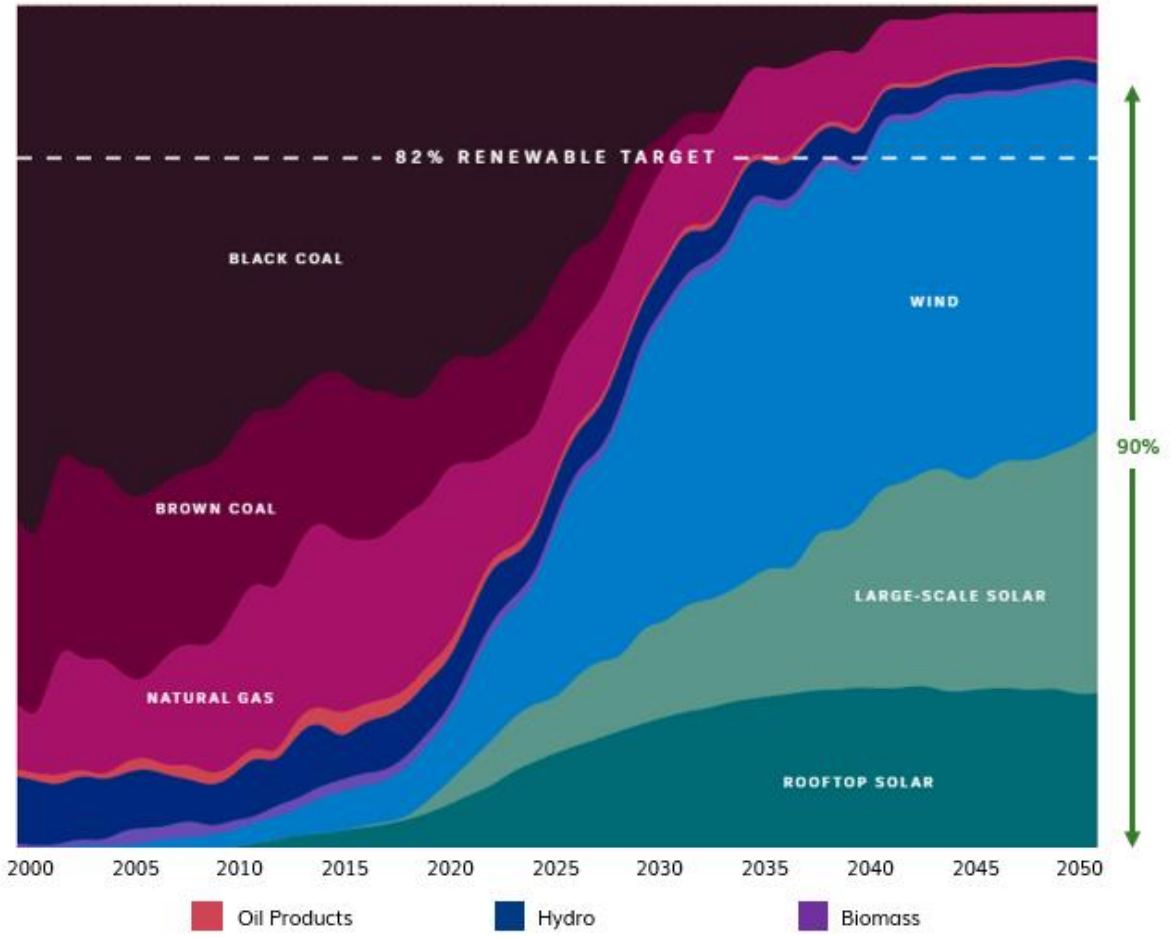

Figure 4: *Solar and wind are crucial to achieving a national 82% renewable energy target*

Offshore wind is a significant contributor to this target, which cannot be achieved by either technology in isolation. The onshore wind profile of the Australian East Coast will not deliver sufficient consistent electricity, and solar has an inferior capacity factor. Alternative technologies such as nuclear cannot be developed in the time available before coal-fired power stations reach the end of their operational life and are decommissioned.

The uptake of rooftop solar in Australia has been significant. The amount of energy now generated has placed unplanned demands on the national grid, which requires ongoing upgrades and modifications to handle the increasing load. As Figure 4 indicates, rooftop solar is expected to double its contribution to renewable power generation by 2050. All levels of government can take a leadership role in delivering this, by adopting solar and battery storage on government buildings and other sites where it can provide benefit.

Reference to Figure 5[16] indicates that if use of fossil fuels usage continues then the predictions are – based on medium release of carbon dioxide (CO_2) into the atmosphere – that the planet will increase in temperature by nearly 2°C at the end of this century. The impact on ocean temperatures, marine life and human life will be significant.

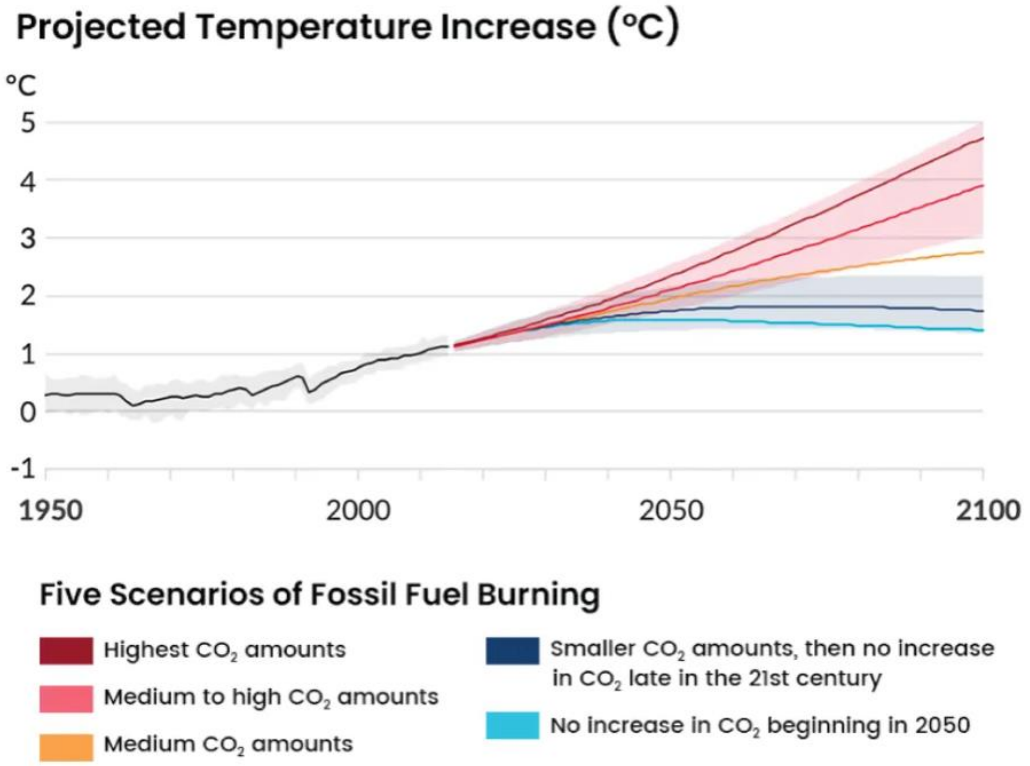

Figure 5: *The medium fossil-fuel burning scenario sees the Earth's temperature increase 2°C by the end of this century.*

We conclude that the 'Do Nothing' Scenario is not viable.

The choice seems to be a rapid but sensitive adoption of offshore wind generation or accept the consequences of increased global warming and an increasingly unreliable and expensive fossil-fuelled power supply.

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