

Ocean Energy and Offshore Wind Seminar

PIANC ANZ Northern Chapter



7 REASONS TO JOIN PIANC



PIANC A&NZ NORTHERN CHAPTER (QLD/NT) – UPCOMING EVENTS

- 1) Darwin Networking Event
 - 17 May, 5 - 7:30pm
- 2) Pre C&P 2023 Workshop
 - 14-15 Aug Sunshine Coast
- 3) Ports of Townsville
 - 5 Oct 2023, 2:00-5:00 pm
 - Technical presentations + Port tour



AUSTRALASIAN
COASTS & PORTS 15 - 18 August 2023
Novotel Sunshine Coast Resort, QLD
WORKING TOGETHER
50 Years of Coasts and Ports
2023 Sunshine Coast





Professor Tom Baldock

Head of School, Civil Engineering

University of Queensland



Dr Remo Cossu

Senior Lecturer, School of Civil Engineering

University of Queensland



Tara Kennedy

Earth & Environment Energy Sector Lead

WSP





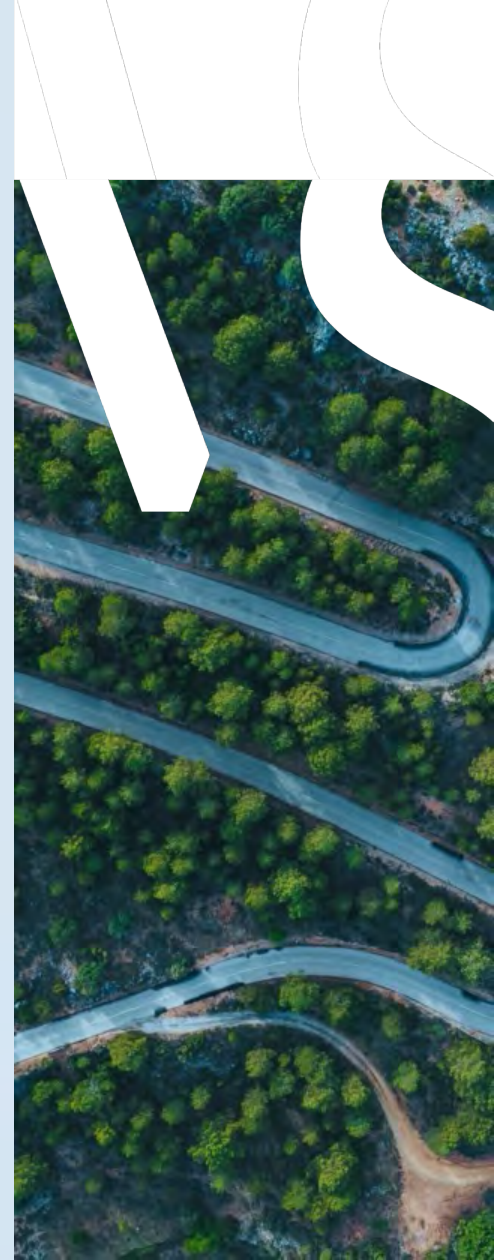
Offshore Wind in Australia

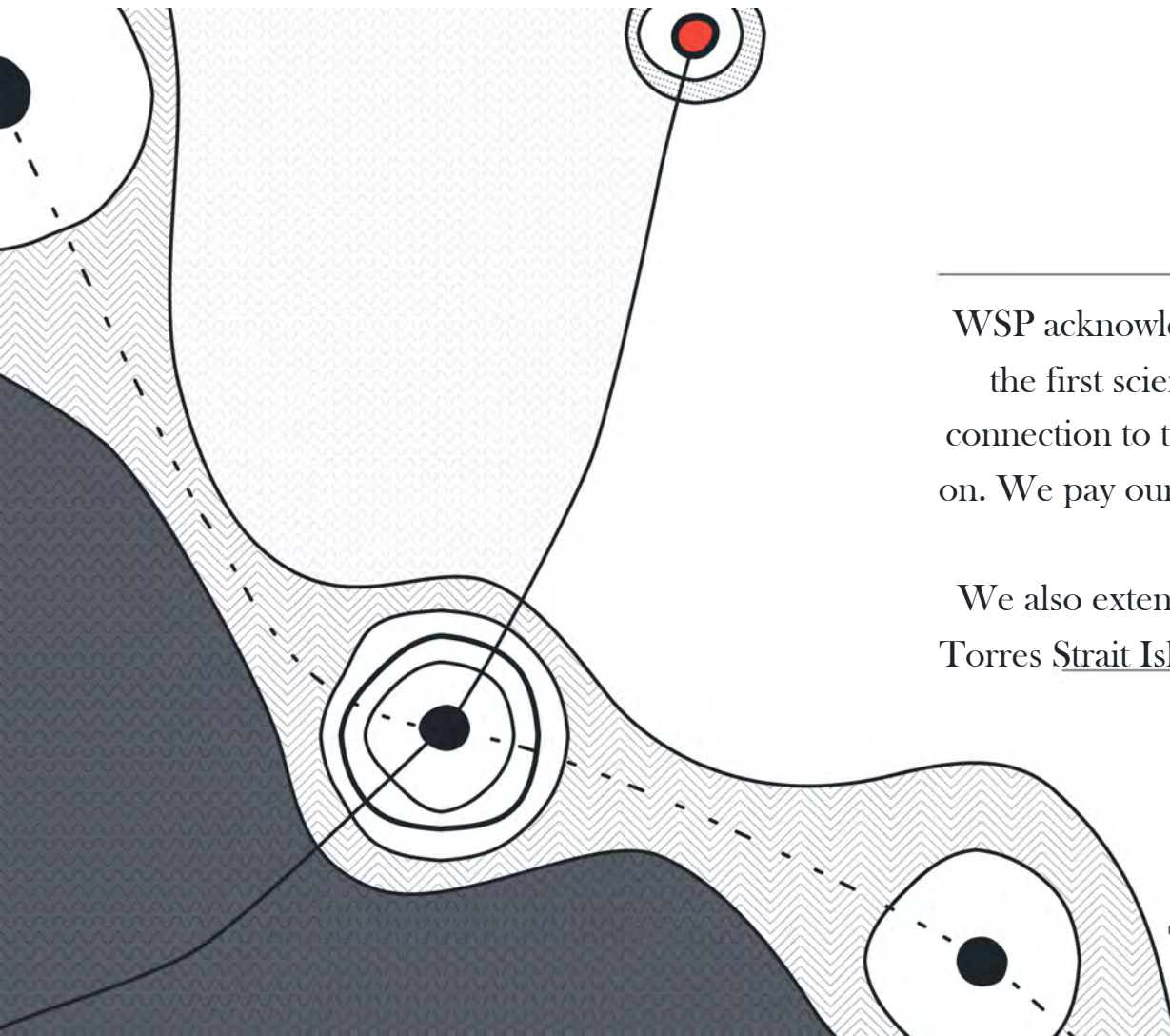
Tara Kennedy



Offshore wind in Australia

Tara Kennedy, Energy Sector Lead, Earth
and Environment





WSP acknowledges the Traditional Owners as the first scientists and engineers, and their connection to the lands our projects are located on. We pay our respects to their Elders past and present.

We also extend that respect to Aboriginal and Torres Strait Islander peoples across this nation.

NGALAYA / FRIEND AND ALLY *Dharug*
Artwork co-designed by:
Michael Hromek, *Budawang*
Technical Executive – Indigenous (Architecture),
Design and Knowledge, WSP and
Sandra Palmer, Creative Director, WSP

Forecast



2022 Integrated System Plan (ISP)

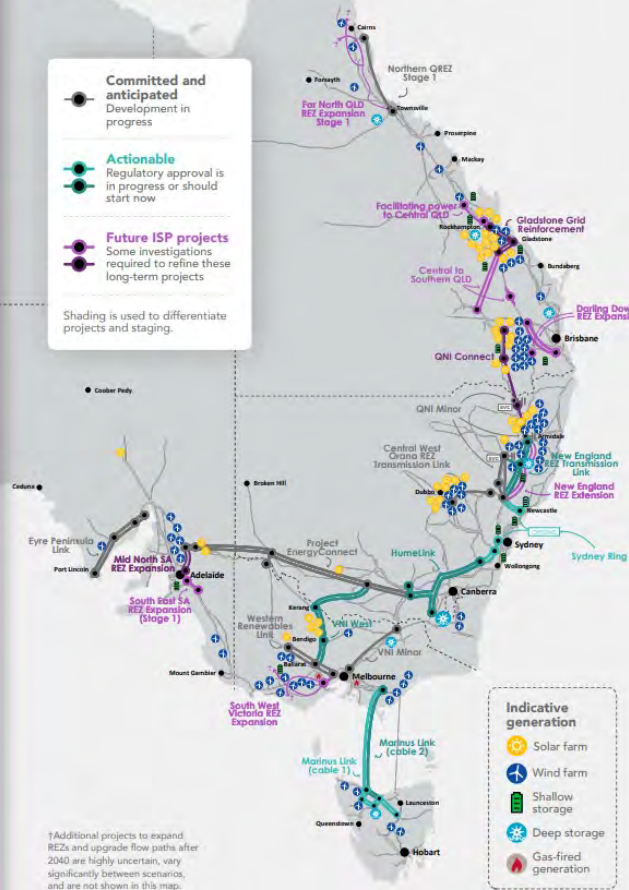
The Australian Energy Market Operator (AEMO) has published the 2022 ISP, a 30-year roadmap for essential and efficient investment in the National Electricity Market (NEM).

The 2022 ISP supports Australia's highly complex and rapid energy transformation, switching from higher-cost, high-emission energy to lower-cost renewable energy, doubling capacity to power transport and industry, and at all times providing consumers with reliable, secure and affordable power.

Network projects in the optimal development path

- Committed and anticipated**
Development in progress
- Actionable**
Regulatory approval is in progress or should start now
- Future ISP projects**
Some investigations required to refine these long-term projects

Shading is used to differentiate projects and staging.



Consultation

The 2022 ISP is based on rigorous economic and engineering analysis, and almost two years' in-depth stakeholder engagement with energy consumers and providers, State and the federal governments, and energy regulators and analysts.

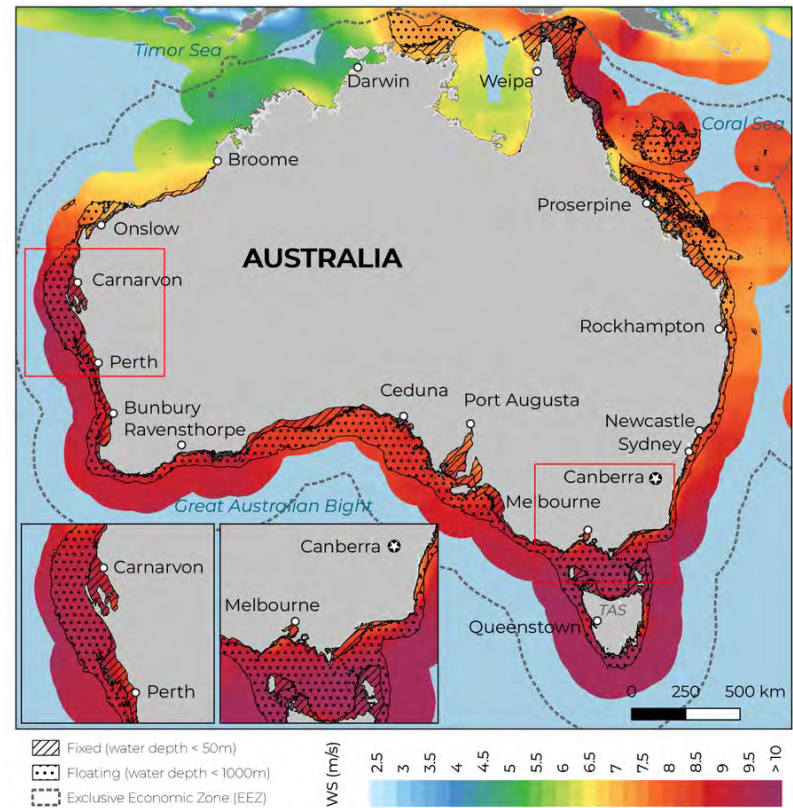
- Over **1,500** individual stakeholders
- Discussions convened through **31** webinars and **39** reports
- Detailed feedback received through **198** submissions

Expected energy transition to 2050 ('Step Change' scenario)

<p>Storage capacity to increase by a factor of 30 <small>(Batteries, virtual power plants, pumped hydro)</small></p> <table border="1"> <tr><th>NOW</th><th>2030</th><th>2050</th></tr> <tr><td>2 GW</td><td>15 GW</td><td>61 GW</td></tr> </table>	NOW	2030	2050	2 GW	15 GW	61 GW	<p>Grid-scale wind and solar to increase 9-fold</p> <table border="1"> <tr><th>NOW</th><th>2030</th><th>2050</th></tr> <tr><td>16 GW</td><td>44 GW</td><td>141 GW</td></tr> </table>	NOW	2030	2050	16 GW	44 GW	141 GW
NOW	2030	2050											
2 GW	15 GW	61 GW											
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16 GW	44 GW	141 GW											
<p>Distributed solar PV to increase 5-fold</p> <table border="1"> <tr><th>NOW</th><th>2030</th><th>2050</th></tr> <tr><td>15 GW</td><td>35 GW</td><td>67 GW</td></tr> </table>	NOW	2030	2050	15 GW	35 GW	67 GW	<p>Electricity usage from the grid to nearly double</p> <table border="1"> <tr><th>NOW</th><th>2030</th><th>2050</th></tr> <tr><td>180 TWh</td><td>184 TWh</td><td>320 TWh</td></tr> </table>	NOW	2030	2050	180 TWh	184 TWh	320 TWh
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<p>Gas-fired peaking plants to increase <small>While current mid-merit plants will all retire within that period.</small></p> <table border="1"> <tr><th>NOW</th><th>2050</th></tr> <tr><td>7 GW</td><td>10 GW</td></tr> </table>	NOW	2050	7 GW	10 GW	<p>Coal generation to be withdrawn <small>Capacity to be retired by:</small></p> <table border="1"> <tr><th>2030</th><th>2043</th></tr> <tr><td>60%</td><td>100%</td></tr> </table>	2030	2043	60%	100%				
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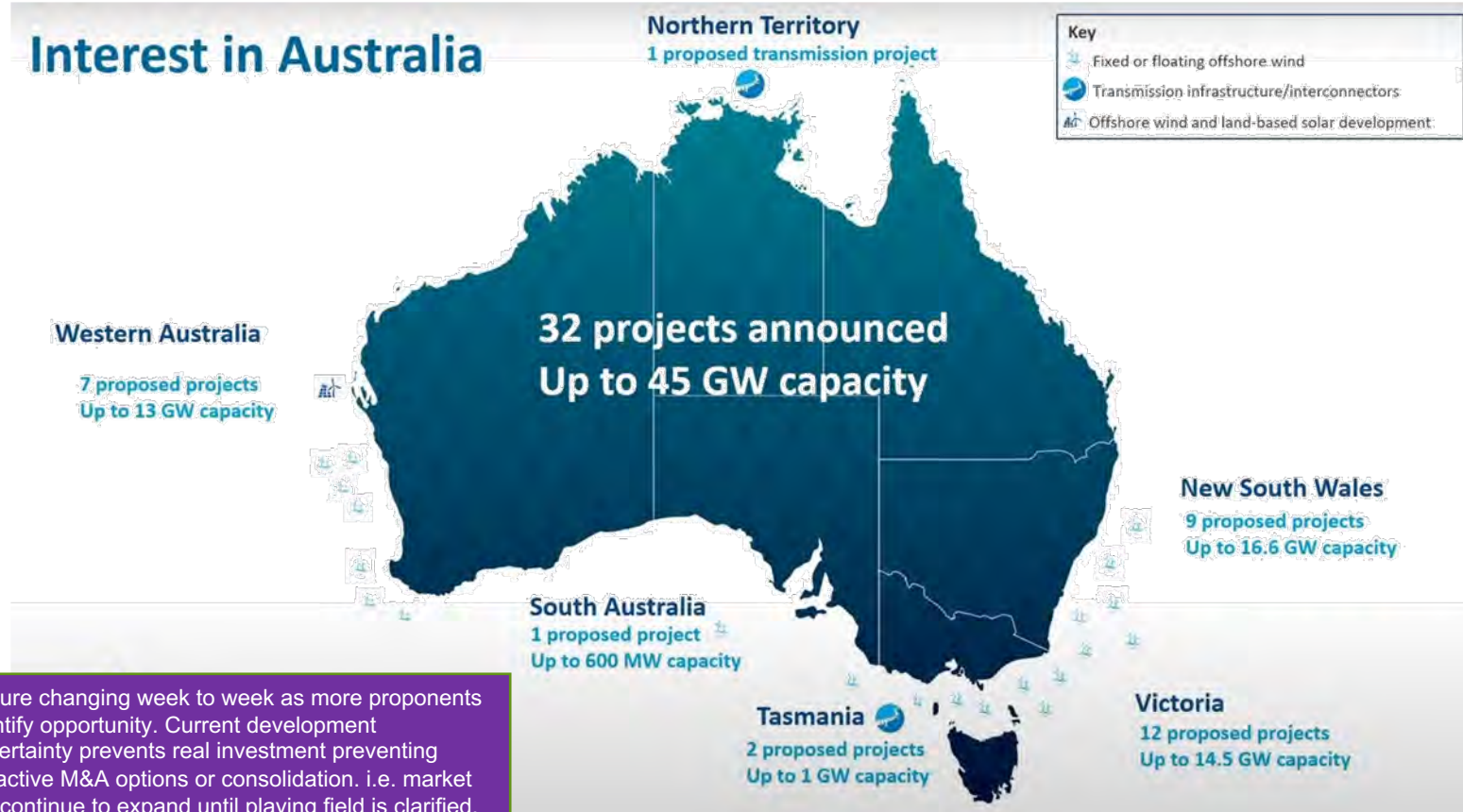
Why offshore wind?

- Onshore energy generation constraints
- Greater generation consistency
- Some of the best offshore wind resources in the world
- Offshore impacts, away from communities



Source: Global Wind Energy Council, June 2021

Interest in Australia



Picture changing week to week as more proponents identify opportunity. Current development uncertainty prevents real investment preventing attractive M&A options or consolidation. i.e. market will continue to expand until playing field is clarified.

source: NOPSEMA

Regulatory / policy framework

- *Offshore Electricity Infrastructure Act 2021* (commenced June 2022)
- *Offshore Electricity Infrastructure Regulations 2022*
- Links
- [Establishing offshore renewable energy infrastructure – DCCEEW](#)
- [Consultation hub | Offshore electricity infrastructure framework: regulations and cost recovery - Department of Industry, Science, Energy and Resources](#)



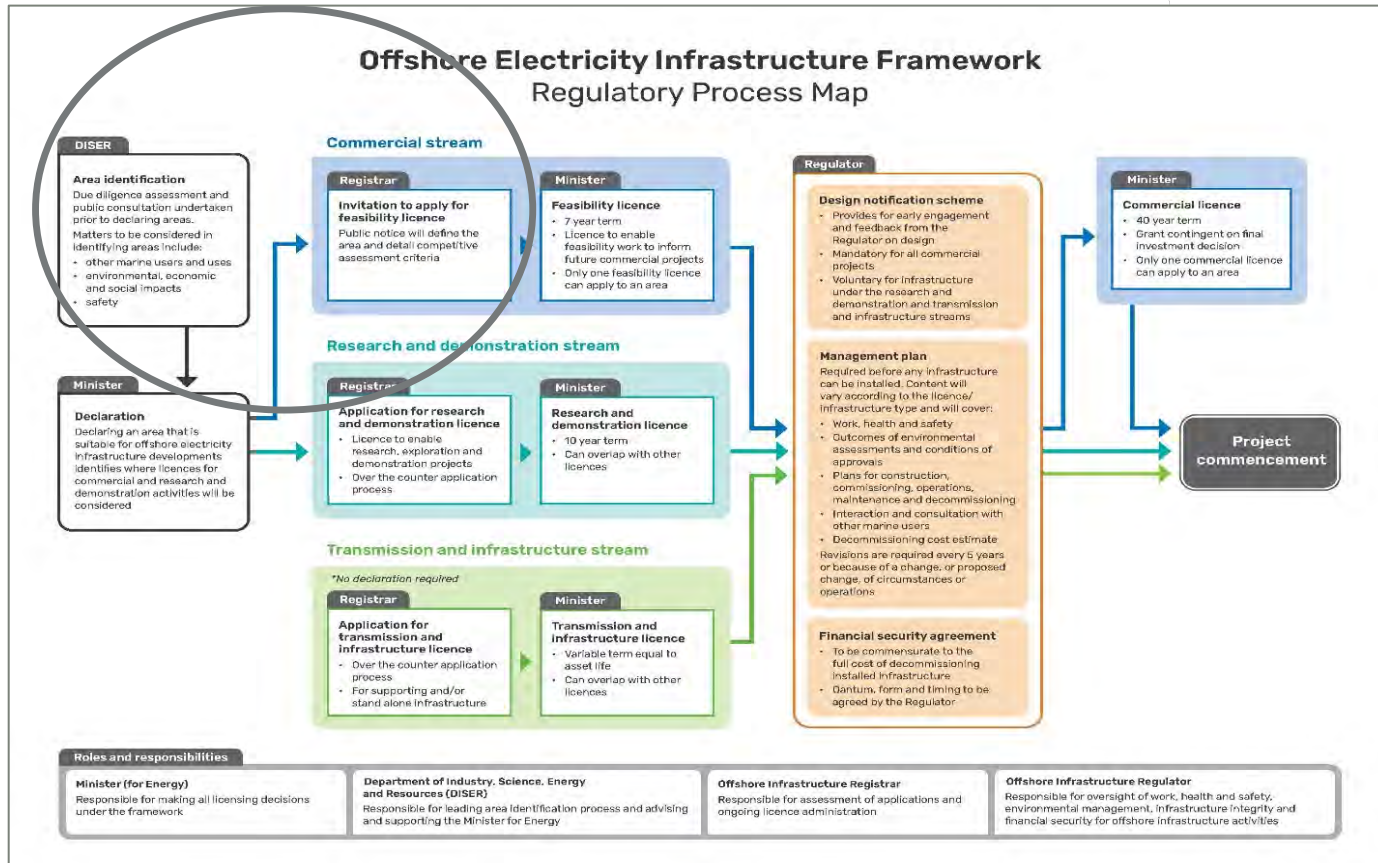
Offshore Electricity Infrastructure Act 2021

No. 120, 2021

**An Act to regulate offshore renewable energy
infrastructure and offshore electricity transmission
infrastructure, and for related purposes**

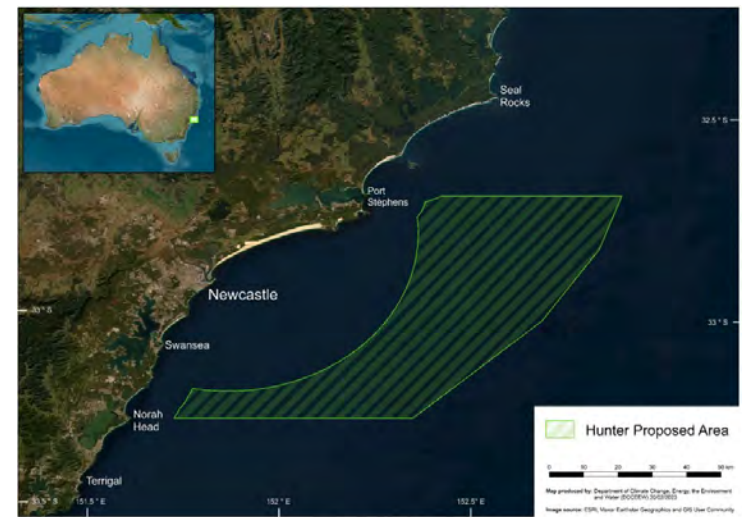
Note: An electronic version of this Act is available on the Federal Register of Legislation
(<https://www.legislation.gov.au>)

Offshore Electricity Infrastructure Regulatory Framework (NOPSEMA, Nov 2021)



Offshore wind areas

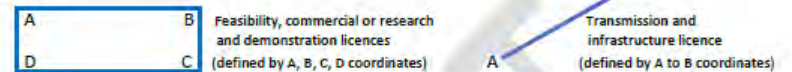
- Gippsland area declaration finalised
- Hunter zone currently out for consultation (draft only)
- Other proposed offshore wind areas:
 - Illawarra, NSW
 - Portland, Vic
 - Northern Tasmania
 - Perth / Bunbury, WA



Picking an area

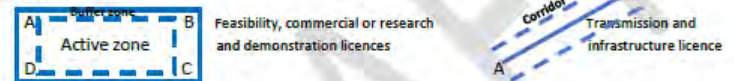
- Maximum 700km²

Example:



- (b) The total square kilometre size or kilometre length of the proposed licence area, with clear distinction between the active project area and any buffers.

Example:



- 4.3.8 A licence application must include a detailed map showing the proposed licence area and be accompanied by shape files in ESRI format of the proposed licence area.

Special Note: Feasibility Licences, Commercial Licences and Transmission and Infrastructure Licences

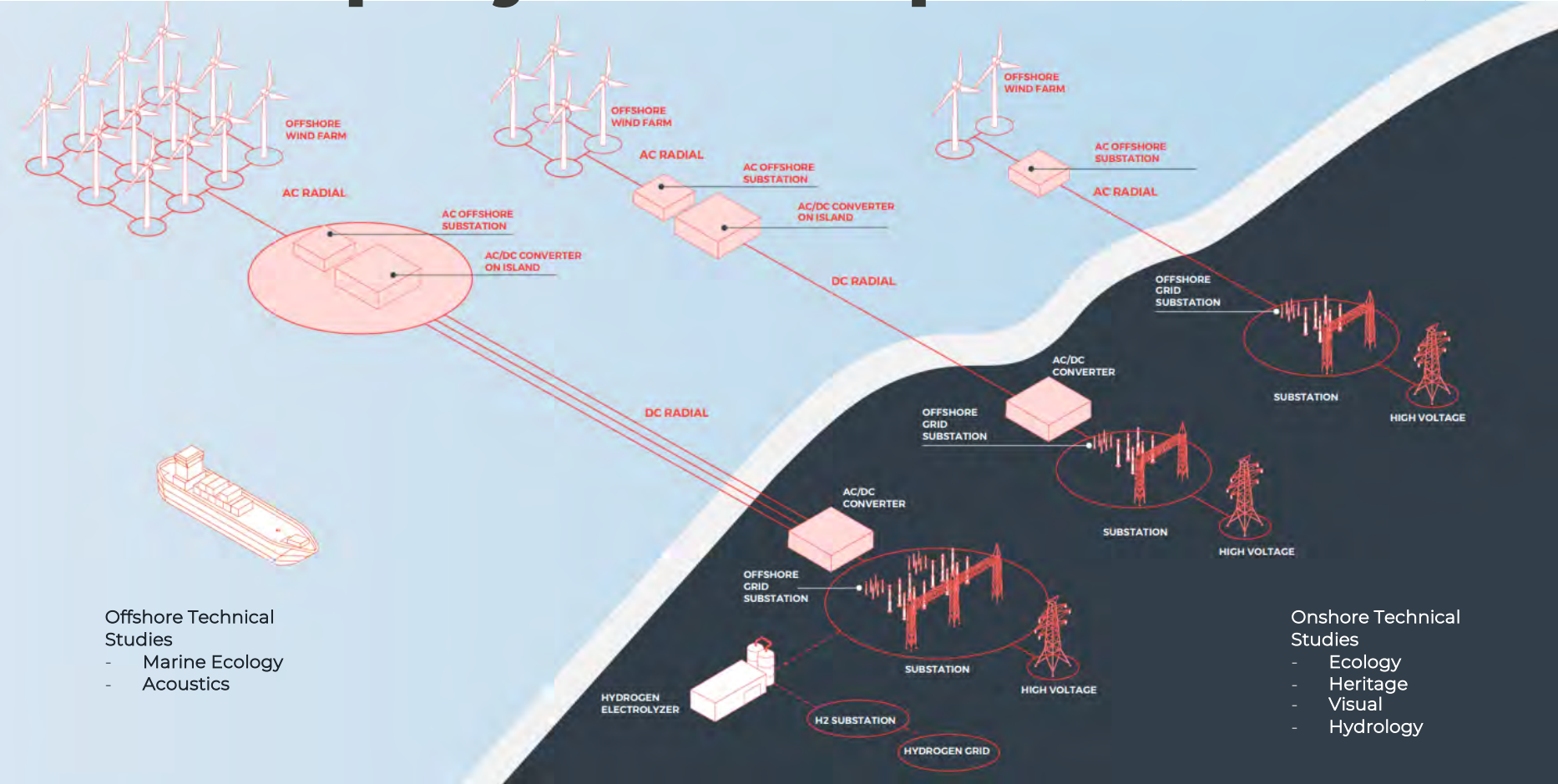
For a feasibility licence or a commercial licence, the licence area must not include any part of the licence area of any other feasibility licence or commercial licence. The buffer zone should ensure that any infrastructure is located at least 2.5 km from the edge of the licence area.

For a transmission and infrastructure licence, any easement or "corridor" should not exceed a maximum of 250 m on either side of the cable or infrastructure.

Feasibility licence applications - Merit criteria

Technical and financial capability			
Technical resources available	Complexity of the project	Past performance in OI projects in Australia or internationally	Impact and contribution to the economy and community
Financial resources available	Route-to-market for the project	Corporate governance structure	National security
Ability to carry out the operations and work	Estimated commercial return to the licence holder		Complexity of the project
Ability to discharge the licence obligations at law.			Conflicts that may arise with other users/ users of the licence area
			Any measure proposed to mitigate such conflict.

Main project components

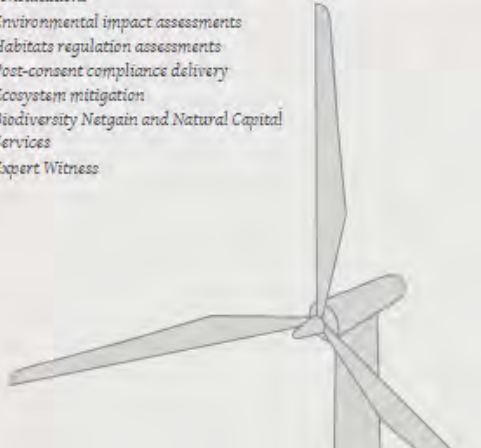


Engineering opportunities

Offshore Geotechnics <ul style="list-style-type: none">• Marine GI / survey management• Ground models• Cable route selection, CBRA and trenching advice• Geotechnical input to foundation design• Pile drivability• Dynamic foundation analysis• Cyclic loading• Scour analysis	Onshore Geotechnics <ul style="list-style-type: none">• Onshore cable route• Ground investigation• Geotechnical input to substation foundation design• HDD	Electrical Offshore <ul style="list-style-type: none">• Cable feasibility and routing analysis• HVDC, VSC offshore platform• Cable network optimization• Transformer specification and analysis• Construction methodology
Offshore Geophysics <ul style="list-style-type: none">• Geophysics• Survey management• Survey delivery	Strategic <ul style="list-style-type: none">• Feasibility Studies• Cost modelling• Local content• Supply chain• Operational analysis• Due diligence, Lenders Technical Advisor / Independent Engineer• Visualisation	Electrical Onshore <ul style="list-style-type: none">• Grid connection feasibility• Site selection• TNO management• Contract negotiations• Cable feasibility and routing analysis• Power Systems Design and analysis• Harmonics• Machine modelling expertise• Statcom expertise• Losses analysis• TNO acceptance• HVDC expertise, VSC, DC hubs• Cable engineering• Substations and converter stations
Coastal, Sediment Mobility <ul style="list-style-type: none">• Scour protection• Downtime assessments• Numerical modelling - spectral and phase-resolved waves, hydrodynamics, water quality and sediment transport• Nearshore morphology	Project Support <ul style="list-style-type: none">• Project management• Commercial / procurement support• Project programming• Risk & value management	

Engineering opportunities

Offshore Structures <ul style="list-style-type: none">• Offshore foundations (jackets, monopiles, gravity bases)• Floating structures	H&S <ul style="list-style-type: none">• Design risk assessments• Compliance with H&S regulations (OSHA, EN)	Land & Property Services <ul style="list-style-type: none">• Land referencing• Access agreements• Landowner & stakeholder engagement• Land acquisition• Wayleave agreements
Ports <ul style="list-style-type: none">• Port selection studies - manufacturing facilities, construction ports, O&M ports• Port due diligence• Port master planning• Facility design - concept and detailed, maritime, civils, structures and buildings• Heliports• Cable Stores	Environmental <ul style="list-style-type: none">• Planning applications and appeals, consents, environmental permits• Various ecology surveys (onshore / coastal / offshore)• Socio-economics• Landscape and visual impact assessments• Stakeholder engagement and community consultations• Environmental impact assessments• Habitats regulation assessments• Post-consent compliance delivery• Ecosystem mitigation• Biodiversity Netgain and Natural Capital Services• Expert Witness	Wind Resource Assessment <ul style="list-style-type: none">• Data collection and analysis• Wind resource modelling• Energy yield analysis• Long-term data management• Layout design / wake optimization
Onshore Civils / Structures <ul style="list-style-type: none">• Substations and converter stations		
Quality Services (onshore and offshore) <ul style="list-style-type: none">• Establishment of quality procedures• Supply chain monitoring• Factory inspections• FAT witnessing• Mechanical, electrical, welding inspections		



Thank you!

- **Tara Kennedy, Energy Sector Lead**
- **WSP Australia**
- tara.kennedy@wsp.com
- 0447 231 021

PIANC IS

A **worldwide network** of professionals,

Providing **expert advice**
on **cost-effective and sustainable**
waterborne infrastructure,

And the **leading partner**
for governments and the private sector
in the design, development and
maintenance of ports,
waterways and coastal areas

...

SINCE 1885!



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- Deliver **high-quality technical reports** within our International Commissions and Working Groups
- Create a **worldwide network of the best international experts**, both public and private, on technical, economic and environmental issues pertaining to waterborne transport infrastructure
- Support **Young Professionals and Countries in Transition**
- Keep the network connected through **PIANC's international/regional/local events**

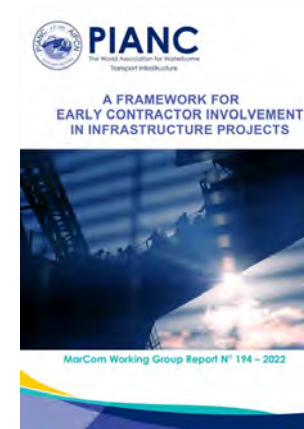
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