OFFSHORE WIND POWER IN EUROPE & ASIA

IS A SINGLE REGULATORY MODEL EMERGING?

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Offshore wind in the Asia-Pacific region

- Asia Pacific expected to represent more than 60% of total global installations by 2050, followed by Europe (22%), and North America (16%).
- Floating offshore wind technologies to have an important role as a technology option enabling deployment of offshore wind at greater water depth.
- Policy frameworks emerging in Australia, Japan, People's Republic of China, the Philippines South Korea, Taiwan, Vietnam supporting offshore wind deployment.

Future uncertainties

JAPANESE GOVERNMENT ANNOUNCES RESULTS FOR FIRST LARGE-SCALE OFFSHORE WINDPARK AUCTIONS

The Japanese government awarded the first large-scale offshore wind park concessions to a Mitsubishi Corporation-led consortium. All three designated sites, at Noshiro-city/Mitane Town/Oga City and Yurihonjo City coast in Akita and the Choshi City coast in Chiba were awarded to the same consortium. The trading house will use GE's 1.2 MW turbines for the projects, making the results rather disappointing for the European offshore wind industry.

According to the announcement, the winning consortium scored highest in both the projects feasibility and the price, with a 40-point gap with the runners up for the Akita Sites. The winning prices were ¥13.26 kWh for Noshiro, ¥11.99 kWh for Yurihonjo and ¥16.49 kWh for the Choshi site.

- Yurihonjo: JPY11,900/MWh (USD103/MWh)
- Noshiro: JPY 13,260/MWh (USD115/MWh)
- Choshi: JPY16,490/MWh (USD143/MWh)

- Auction Cap: JPY29,000/MWh USD252/MWh
- 2030 Target: JPY8-9,000/MWh (USD69~79/MWh)

I. EXPERT ELICITATION OF PRICES AND POLICIES FOR APAC FIXED-BOTTOM & FLOATING OFFSHORE WIND

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ZERO CARBON ENERGY FOR THE ASIA-PACIFIC

Offshore Wind Power in the Asia-Pacific: Expert Elicitation on Prices and Policies

Zero-Carbon Energy for the Asia-Pacific ZCEAP Working Paper ZCWP2-22

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Abstract

Offshore wind power (OWP) is an important technology option for decarbonising the electricity sector globally. A key focus for the deployment of offshore wind is the Asia-Pacific region. The future prospects for the technology are dependent, however, on overcoming technological and economic challenges, and public policy is identified as having a key role in helping the technology become more competitive. Recognising this, we conduct an expert elicitation of future price expectations for offshore wind in the Asia-Pacific region. We study both more mature fixed-bottom offshore wind, and emerging floating offshore wind power technologies. We also examine views on public policies that are likely to support the more rapid deployment of fixed bottom and floating offshore wind technologies. Amongst other results, we find expectations of a convergence in the average levelized cost of electricity (LCOE) to USD70/MWh in 2040 (fixed-bottom) and 2050 (floating). We also find that for both types of projects, a price or capacity target and regulatory streamlining were the most important policy initiatives for the period before 2030. For fixed-bottom technologies, all experts regard installation costs as an important factor that will drive cost declines, while for floating technologies, all experts selected the cost of foundations as an important factor that will drive cost declines.

Approach

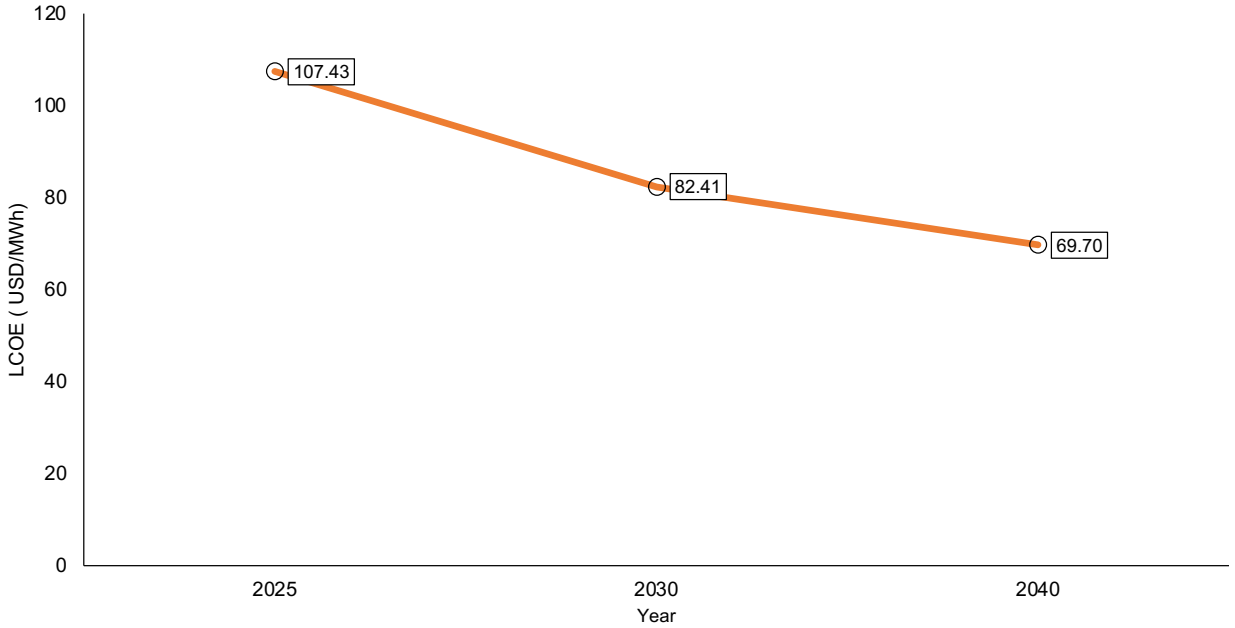
- Offshore wind technologies showing substantial reductions in cost globally.
- Uncertainty about future LCOE in Asia Pacific, and big differences across markets.
- In uncertain knowledge fields, expert elicitation is a useful approach that across different areas, including health, climate change, and environmental policy.
- *Nature Energy* (2021) study showed expectations of large declines in in LCOE of wind energy for onshore & offshore wind by 2050.
  - Global estimates included large number of experts on European and North American markets, with less representation from APAC region.

Approach

- Online survey to elicit estimates for LCOE for fixed-bottom and floating wind projects in Australia & APAC.
  - Also focus on policies supporting reduction in the LCOE.
- Respondents asked a series of questions about their expectations for future costs of offshore wind technologies & views on policy frameworks to support cost reductions for offshore.
- Respondents were asked to select area of expertise.
  - i.e. if respondent selected expertise was in floating offshore wind technologies, they were asked questions relevant to floating offshore wind only.

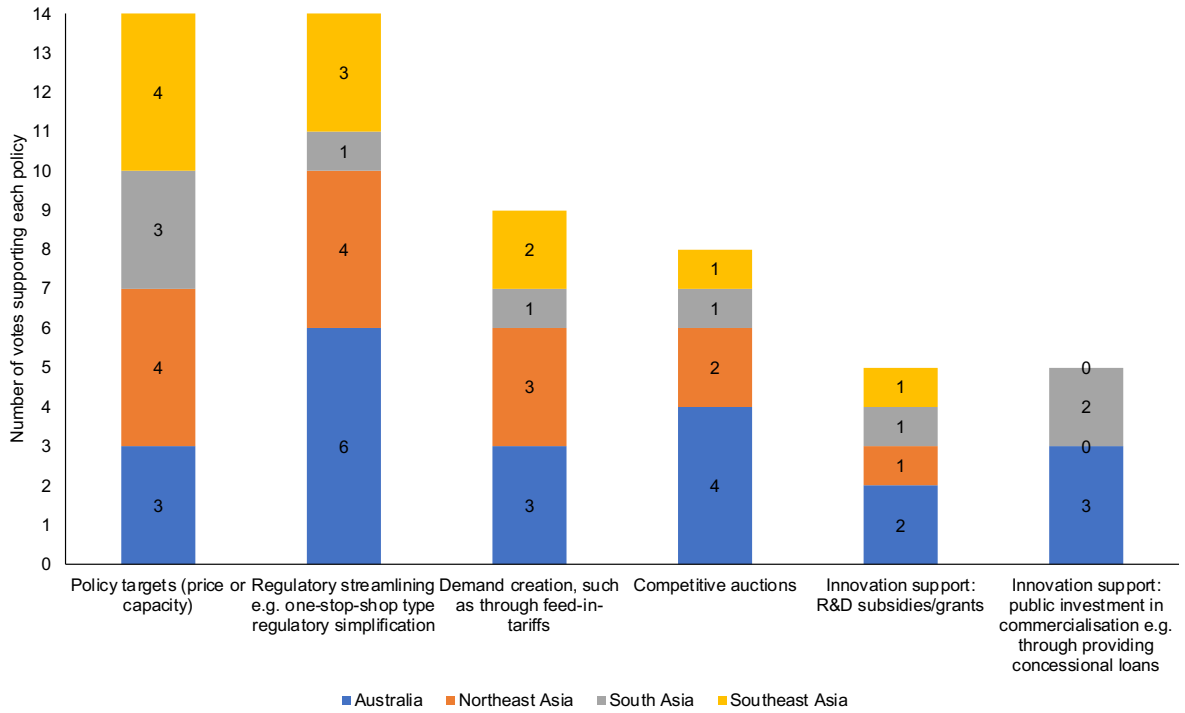
Fixed-bottom Offshore Wind

Figure 1: LCOE for Newly Installed Fixed Bottom Projects



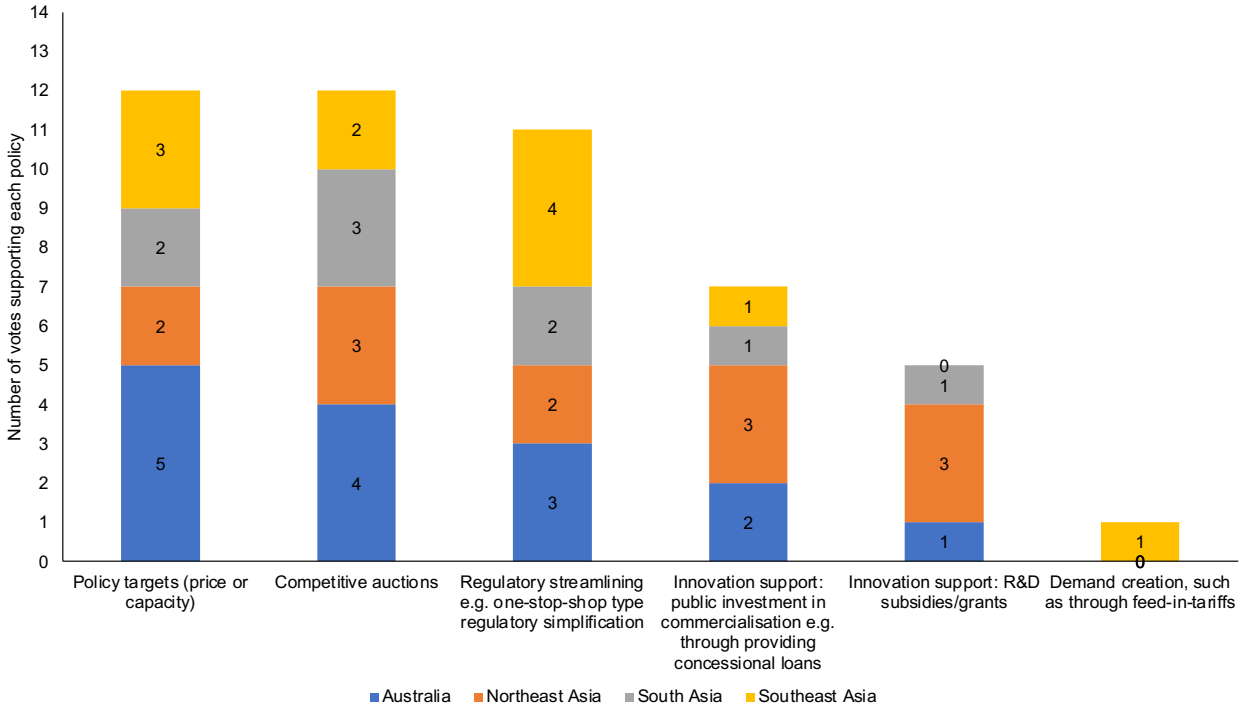
Fixed-bottom Offshore Wind

Figure 3: Policies Identified as Contributing to Reducing the LCOE for Fixed-bottom Technologies up to 2030



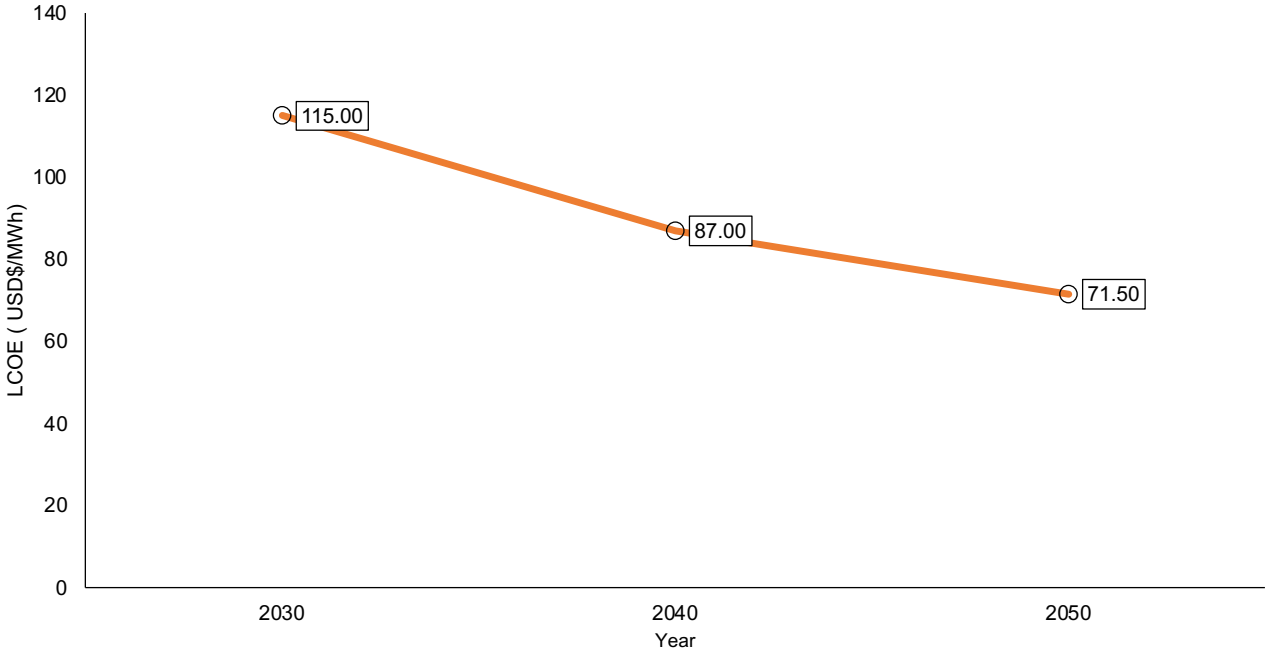
Fixed-bottom Offshore Wind

Figure 4: Supportive Policies for Reducing LCOE for Fixed-bottom Technologies after 2030



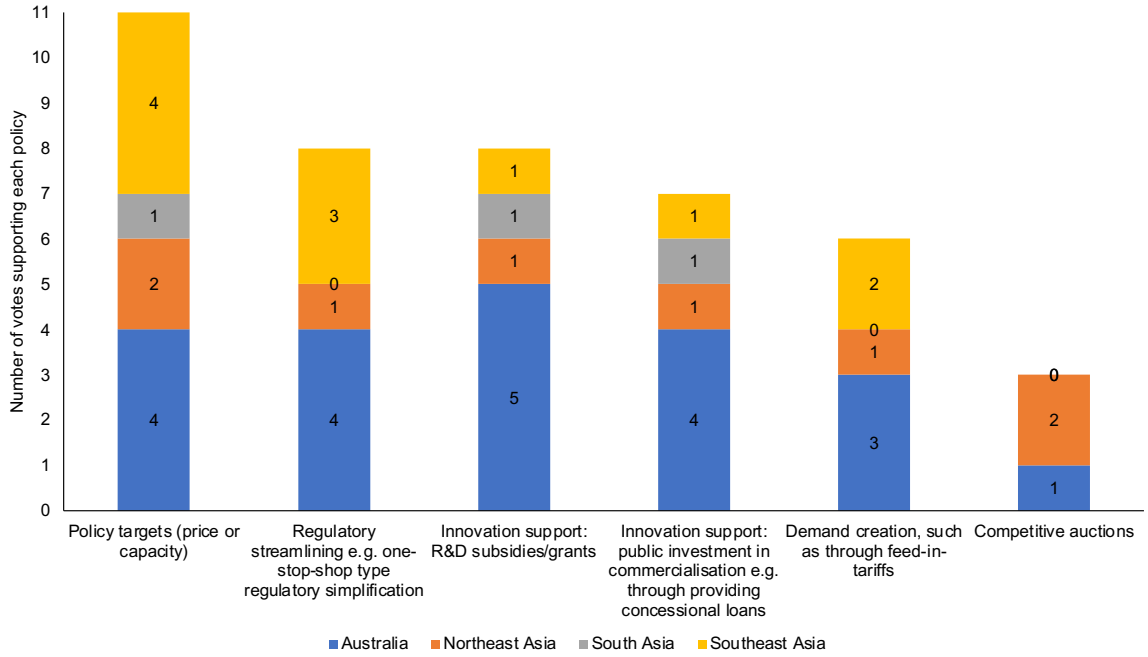
Floating Offshore Wind

Figure 5: LCOE for Newly Installed Floating Projects – Average



Floating Offshore Wind

Figure 7: Supportive Policies for Reducing LCOE for Floating Technologies up to 2030



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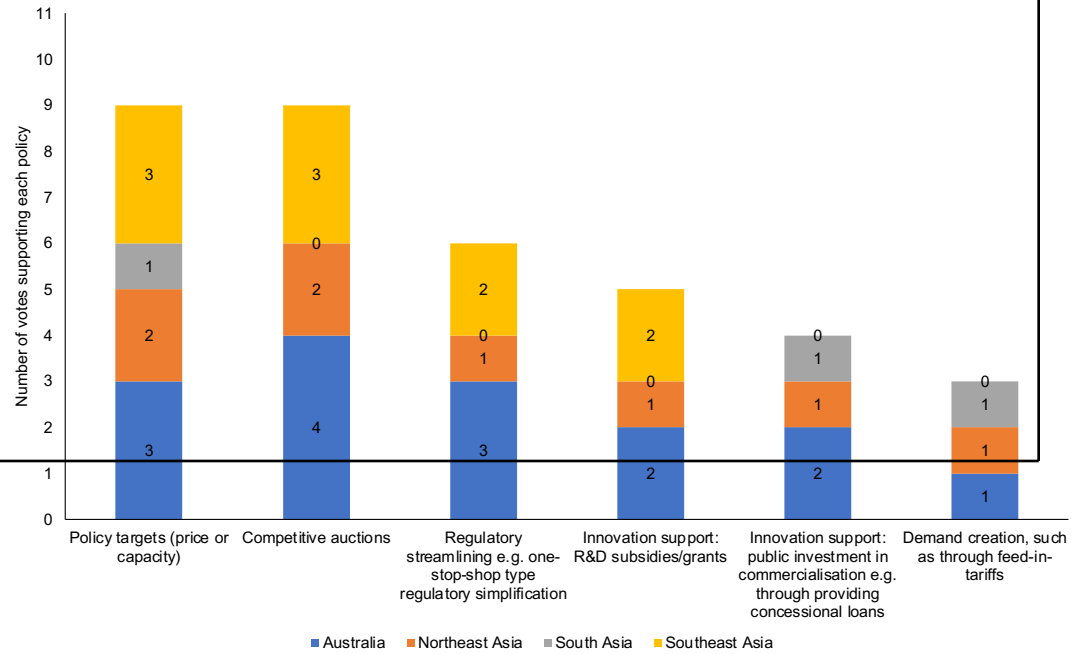
Floating Offshore Wind

Figure 8: Supportive Policies for Reducing LCOE for Floating Technologies after 2030



II. EMERGING REGULATORY FRAMEWORKS IN ASIA PACIFIC

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ZERO CARBON ENERGY FOR THE ASIA-PACIFIC

Governing Offshore Wind in the Asia-Pacific: Emerging Regulatory Frameworks

Zero-Carbon Energy for the Asia-Pacific ZCEAP Working Paper ZCWP2-22

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Abstract

Offshore Wind Power is an important technology option for promoting decarbonisation of the electricity sector globally. Europe has led the development of the industry, however the Asia-Pacific region is projected to emerge as central in the deployment of offshore wind power in the future in capacity terms. In addition to technical and engineering challenges, offshore wind development involves complex governance challenges, involving marine spatial planning, environmental impact assessment processes, connecting to transmission grids, and the design of effective financial incentives. An important question facing governments is the degree to which governance processes for offshore wind power development should be centralised or dispersed to sub-national levels of government. A second important dimension of governance is the extent to which authority over steps involved in project development is retained by the state, or is given to project developers. A key area of interest is the connection right for the transmission grid. We develop a framework for assessing laws and regulations governing offshore wind power development. We then apply the framework against countries in the Asia-Pacific region developing offshore wind power, including Australia, Japan, the People's Republic of China, and Vietnam. The case of the Netherlands, a key European market for offshore wind, is included as a comparative case.

Regulatory Frameworks

- In addition to technical and engineering challenges, OWP development involves complex legal and regulatory processes incorporating Marine Spatial Planning (MSP), technical surveying and assessment, connection to transmission grids, and the potential design and implementation of economic incentives.
- Two issues :
  - Degree to which regulatory models for offshore wind should be streamlined.
  - Extent to which the regulatory model confers authority over the stages required for siting and project development to project proponents, or whether it centralizes authority in government.

Activity/ Market		Netherlands	Japan	Vietnam	PRC	Australia
Planning	Marine Spatial Planning					
	Location Technical Due Diligence					
Approvals	Developer Qualification					
	Allocation Mechanism					
	Awarding of Titles					
	Grid Connection Responsibility					

Results

	Activity/ Market	Netherlands	Japan	Vietnam	PRC	Australia
Planning	**Marine Spatial Planning**	• National govt.	• National govt. • Local govt.	• Developer • (National and/or local govt.)	• National govt. • Local govt.	• National govt.
	Location Technical Due Diligence	• National govt.	• Developer • (National govt.)	• Developer • (National and/or local govt.	• National govt.	• Developer
Approvals	**Developer Qualification**	• National govt.	• National govt.	• National govt. • Local govt.	• National govt.	• National govt.
	Allocation Mechanism	• Auction	• Auction	• First come, first served	• Auction	• Auction (feasibility license)
	Awarding of Titles	• National govt.	• National govt. • Local govt.	• National govt. • Local govt.	• Local govt.	• National govt.
	Grid Connection Responsibility	• National govt.	• Developer • (National govt.)	• Developer	• Developer	• Developer

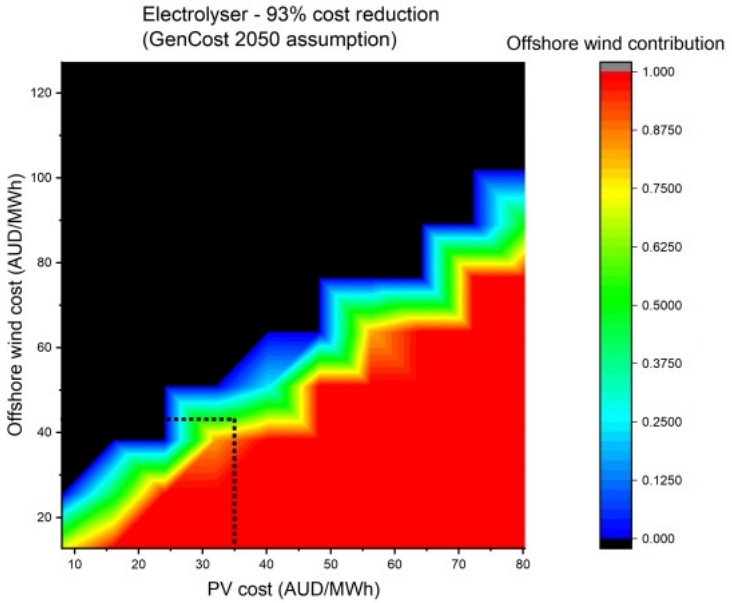
Implications

- Expectations of falling LCOE in APAC region for both fixed-bottom and floating offshore.
- Expectation LCOEs converge across technologies.
- Key policy contributors to lowering LCOE across technologies:
  - Policy targets (price, capacity)
  - Regulatory streamlining
- RD&D important in near-term for floating offshore.

- Substantial differences in regulatory frameworks across APAC markets:
  - Allocation mechanisms.
  - Economic incentives.
  - Degree of regulatory streamlining and centralization.
- Moving feast: project proponents required to monitor ongoing regulatory reforms.

Finally: Potential for offshore wind to play a role in Australia's hydrogen exports?

- Model off-grid system powered by offshore wind and solar photovoltaics, with electrical storage providing balancing.
- At 2050 GenCost solar PV cost assumption of (AUD35/MWh), offshore wind contributes 50% of total electricity input if cost falls to AUD43/MWh.
- This leads to a LCOH of AUD2/kg, equivalent to the Australian federal government stretch target for hydrogen production costs.
- Currently exploring grid-connected modelling.



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