

Australia's First Offshore Wind Project a Step in the Right Direction

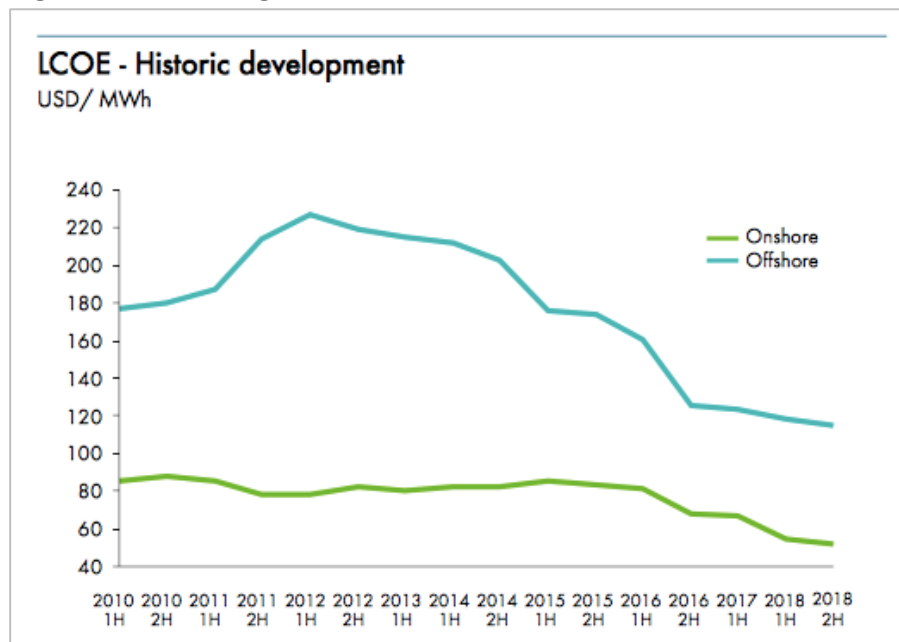
In addition to zero emissions, creates significant industry and employment development opportunities

The penetration of variable renewable generation in Australia's national electricity market has been rapidly growing.

The contribution from wind, utility-scale solar and distributed rooftop solar generation reached **14.7% of the total energy mix** for the last 12 months to October 2019 (and 21.7% including hydro) from just **over 1% a decade ago in 2008/09**.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia calculates the **levelized cost of energy (LCOE)** for wind and solar – the average minimum price at which electricity must be sold in order to break-even over the lifetime of a project - to be between AU\$50-60/MWh. This is low-cost when compared to the LCOE of AU\$80-110/MWh for thermal coal and AU\$60-120/MWh for gas-fired electricity.

Figure 1: Declining Onshore & Offshore Wind LCOEs



Source: Global Wind Energy Council

CSIRO expects the LCOE of solar to further decrease to AU\$30-40/MWh by 2050 and the LCOE of thermal coal and gas-fired power to remain in the same ballpark in real terms as today's costs.

Meanwhile, tariffs for offshore wind have drastically reduced in Europe and the United States (U.S.) due to improved wind turbine technologies, innovative financing models, economies of scale and the low externalities of these resources.

IEEFA expects offshore wind to be increasingly viable as a third alternative source of zero emissions renewable energy globally over the coming decade, expanding the penetration of onshore wind and solar.

Australia's First Offshore Wind Project

While Australia has the highest uptake of solar globally, and onshore wind power generates nearly a quarter of all the renewable electricity in Australia's National Energy Market, offshore wind projects have been slow to get off the ground. Till now.

In March 2019, Australia approved its first ever offshore wind project, which will also be Australia's largest electricity project with reportedly AU\$8bn (US\$5.4bn) investment. "The Star of the South" off the southern coast of Gippsland in Victoria is a massive 2.2 gigawatt (GW) of offshore wind capacity proposed by Copenhagen Infrastructure Partners (CIP).

CIP is a fund management company which currently has EU€6.8 billion (bn) under management. It manages five funds, raised between 2012 and 2019, that mostly have capital involved from institutional investors such as pension funds and insurance companies who prefer investing in infrastructure assets that offer long-term regulated annuity cashflows.

In addition, CIP already has experience in investing in offshore wind with close to €1bn capital deployed in projects in Scotland (664 megawatts (MW)) and Germany (402MW).

Plans for "The Star of the South" include transmitting power through subsea cables into a connection point in Victoria's Latrobe Valley for distribution to the market. CIP has contracted human resource (HR) service provider [Atlas Professionals](#) to survey the labour market to determine availability of skilled labour and other supply-chain capabilities in Australia.

In June 2019, the Australian Energy Market Operator (AEMO) highlighted [the frailty of Victoria's electricity system](#), arguing it did not meet AEMO's reliability standards. AEMO highlighted the unplanned outages of two major thermal power stations, Loy Yang A2 (500MW) located on the outskirts of the city of Traralgon, in south-eastern Victoria and Mortlake (259MW) situated some 200 kilometres west of Melbourne,

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posed a significant risk of insufficient supply during the peak summer period that could lead to material involuntary load shedding.

Another analysis from think tank The Australia Institute has found the two operating brown coal-fired power plants, Loy Yang A and Yallourn located in the Latrobe Valley, to be the least reliable generating facilities in Australia, accounting for a total **55 plant breakdowns between December 2017 and June 2019**. This analysis supported AEMO's assessment of Victoria's ageing thermal power system as being the least reliable, also experiencing 32% of gas and coal-fired blackouts during the same period.

Offshore wind, although being a variable source of power, operates at a utilisation rate of 50-55% which offers greater reliability as well as supply diversity on the grid.

Both coal-fired power plants, Yallourn and Loy Yang, are using extremely outdated subcritical technology built between 1973-1982 and 1984-1996 respectively. Timely commissioning of the 2.2GW of offshore wind capacity will allow early decommissioning of some of the old, polluting, and unreliable units of the two brown-coal fired stations in Victoria.

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AEMO's Western Victoria Renewable Integration report concludes the Victorian power system is undergoing an unprecedented technology driven change with **sources of supply shifting more towards western Victoria** due to the quality of its renewable energy resources. However, the transmission infrastructure in western Victoria is insufficient to allow efficient access to all the new and committed generation facilities in the main network (see Figure 2).

Figure 2: Map of Victoria's Electricity Transmission Network



Source: AEMO

IEEFA notes that in order to capitalise on low-cost, low-emission renewable resources there needs to be timely investment in network expansion in the western side of Victoria in addition to interstate grid connectivity upgrades.

Investment of AU\$8bn for Australia's first offshore wind project is unarguably an expensive venture, in large part a reflection of Australia's inexperience in the offshore wind sector. Additionally, the investment requirements of port upgrades and logistics to support the construction of the project adds to the project establishment costs.

While the initial cost estimates of "Star of the South" suggest caution, the zero emissions generation and industry / employment development opportunities are significant.

There needs to be timely investment in network expansion and interstate grid connectivity upgrades.

Asia Pacific

IEEFA notes the remarkable expansion of interest in offshore wind across the Asia Pacific in the last two years. Just like Australia, countries such as Japan, Taiwan, South Korea, India and the Philippines have all begun to plan and implement their first offshore wind projects. From the European and American experience of 'learning by doing' these countries have rightly planned to embrace the present opportunity of expected gains from cost declines in the future.

The technological advancements in offshore wind turbines has been dramatic. The rotor diameter of offshore turbines has doubled from 80 metres to more than 164 metres and average turbine capacity has more than quadrupled, climbing from 1-2MW in 2012 to 8-12MW today. Leading players like Vestas, Siemens Gamesa and Goldwind have already implemented offshore wind turbine upgrades and are betting on reaching 14MW turbines by 2024.

These technological improvements and cross-sector learning from other industrial sectors such as maritime, automotive and shipbuilding have pushed costs down significantly in the last decade. IEEFA expects the coming decade will see offshore wind technology continue to narrow the value of the energy gap relative to its onshore counterpart, due to its near-limitless size potential, proximity to coastal city load centres, exceptional utilisation rates, plus the subsea grid technology improvements by world leaders like Prysmian Cables.

Recent offshore wind energy auctions in Europe have seen the usual headline tariff (wholesale electricity prices) of €100/MWh dramatically undercut. Now the industry in Europe is targeting parity with its onshore counterpart with tariffs below €60/MWh, and England has already set a record low of [€44/MWh in September 2019](#).

Top European offshore wind developers such as Ørsted, Equinor and Electricity de France (EDF) have already started developing projects in China, Taiwan and Japan. Moreover, they have entered into partnership agreements with Chinese state-owned energy enterprises such as the State Power Investment Corporation (SPIC) to co-develop projects in China and abroad.

It is also noteworthy that Macquarie Group has become a leading investor in renewable energy infrastructure across Asia, and the bank is a key investor in offshore wind in Taiwan. Macquarie's CEO Shemara Wikramanayake announced the group would be potentially the world's largest renewable energy infrastructure investor over the coming five years, with a global target of 20GW of new capacity.

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Australia's Offshore Wind Project a Step in the Right Direction

In IEEFA's view, Australia's first offshore wind project is a step in the right direction not only for Australia's energy security but also from the perspective of creating local skilled engineering and construction jobs. Progressively this could open up other economic opportunities in adjacent sectors in the rapidly expanding low emissions technology sectors of the future.

Given the coastal vicinity of all of Australia's major cities and the urgency of the need to progressively decarbonise our energy system and economy more widely, offshore wind provides a more reliable source of zero emissions power supply. It could be a key diversification to accelerate the shift above 50% renewable energy penetration in Australia's national electricity market towards 2030, particularly as cost deflation continues to be achieved.

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

Tim Buckley

Tim Buckley, IEEFA's director of energy finance research, Australasia, has 25 years of financial market experience covering the Australian, Asian and global equity markets from both a buy and sell side perspective. Tim was a top-rated equity research analyst and has covered most sectors of the Australian economy. For many years, Tim was a managing director, head of equity research at Citigroup, as well as co-managing director of Arkx Investment Management P/L, a global listed clean energy investment company that was jointly owned by management and Westpac Banking Group.

Kashish Shah

IEEFA Research Associate Kashish Shah has a master's degree in economics from the University of Sydney and an engineering degree from NMIMS University in Mumbai. He has worked in the Global Analytics Division of the Royal Bank of Scotland with a focus on regulatory policies. Kashish has research experiences in India's public sector in his work for a member of Indian Parliament and a University of Sydney-based research group.

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