New Zealand Wind Energy Association

Unlocking the Power of Onshore & Offshore Wind Energy in Aotearoa New Zealand

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Version 2

About NZWEA

Industry Association

- Established in 1997 as a charitable trust to promote the development of wind as a reliable, sustainable, clean and commercially viable energy source
- Policy and regulatory advocacy, public awareness and industry development

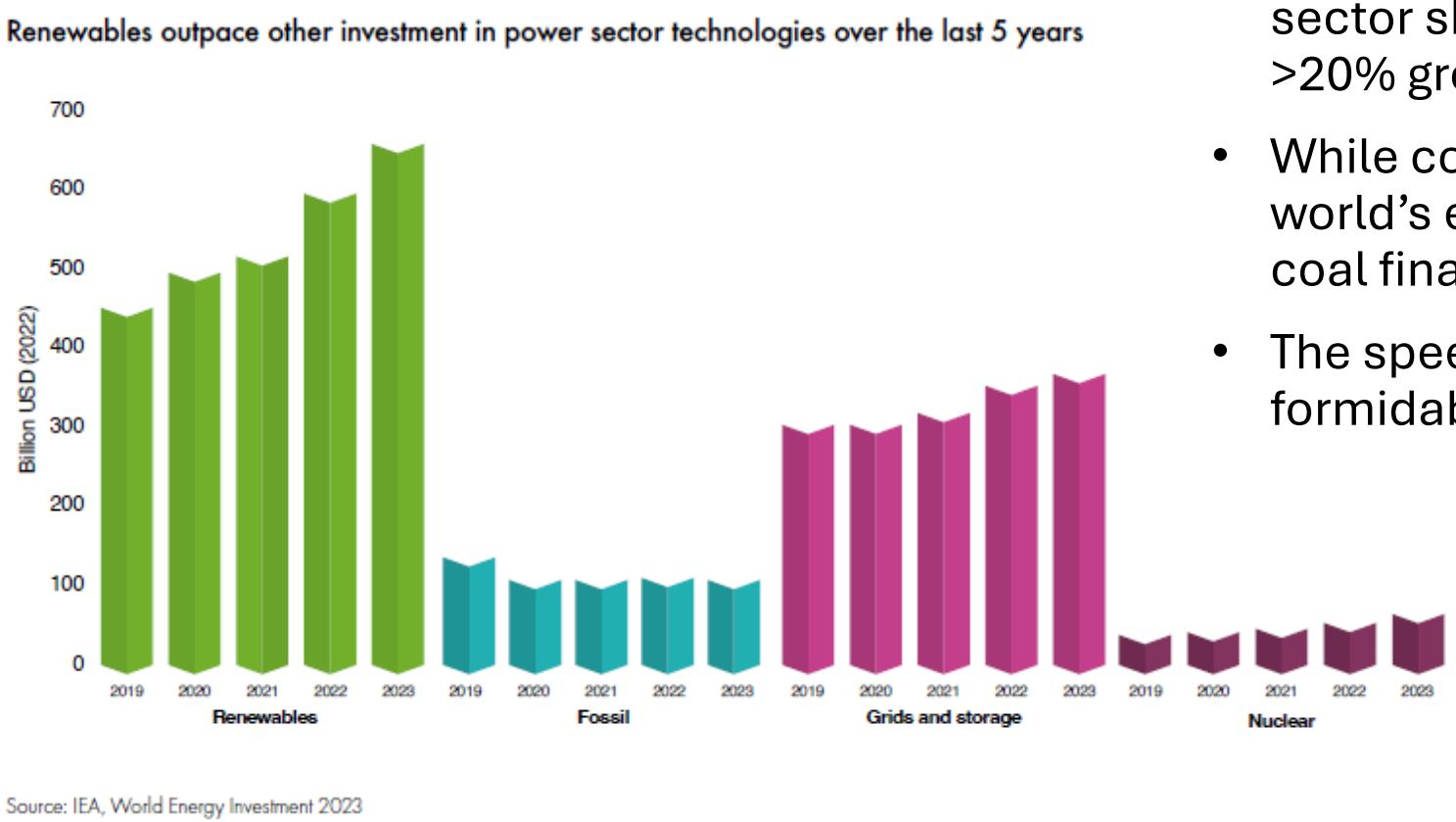
Members include 80 organisations with over 550 individuals

- Covers onshore wind and offshore wind energy sectors
- Generators, retailers, wind farm developers, turbine manufacturers, equipment suppliers, contractors and consultants

Governed by Independent Board of Directors

- 8 Industry appointed directors, 5 Corporate Members & 3 Associate Members
- Chair appointed by Members or independently by the Board

There is no turning back!



- Global investment figures across the power sector show that renewable energy has seen >20% growth since 2019.
- While coal currently provides **35%*** of the world's electricity, many banks are pulling out of coal finance.
- The speedbumps ahead to tripling renewables is formidable, but there is **no turning back**.

The International Monetary Fund (IMF), state that global fossil fuel subsidies reached a record high of $7 trillion in 2022, representing approximately 7% of the total global GDP.

* Source IEA - Global electricity generation by fuel type 2023; coal 35%; gas 23%; hydro 14%; nuclear 9%; wind 8%; solar 6%; other 5%

Wind Energy International Trends

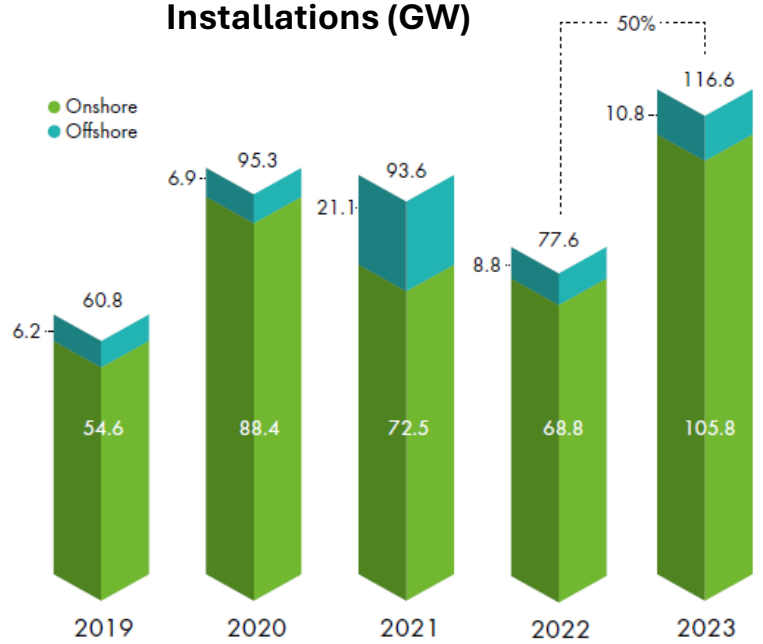
Tailwinds

- Nearly 117 GW of wind power capacity was added globally in 2023, 50% more than in 2022 – bringing the total installed wind capacity to 1.021 TW.
- It took 40 years to reach 1 TW in global capacity, but we'll reach 2 TW by 2029, 1 year earlier than previous forecasts.
- Growth is concentrated in the key markets of China, the EU, the US*, India and Brazil.
- Asian countries have established ambitious wind energy targets – e.g. Japan, South Korea, Australia, Vietnam, and the Philippines.

Headwinds

- Poor regulatory settings and long consenting durations.
- Investment in supporting infrastructure, such as grid expansion, ports and roads.
- Global supply chain challenges continue to exist out to 2035, where demand significantly outstrips supply especially in Europe and Asia (excluding China).

New Global Wind Energy Installations (GW)



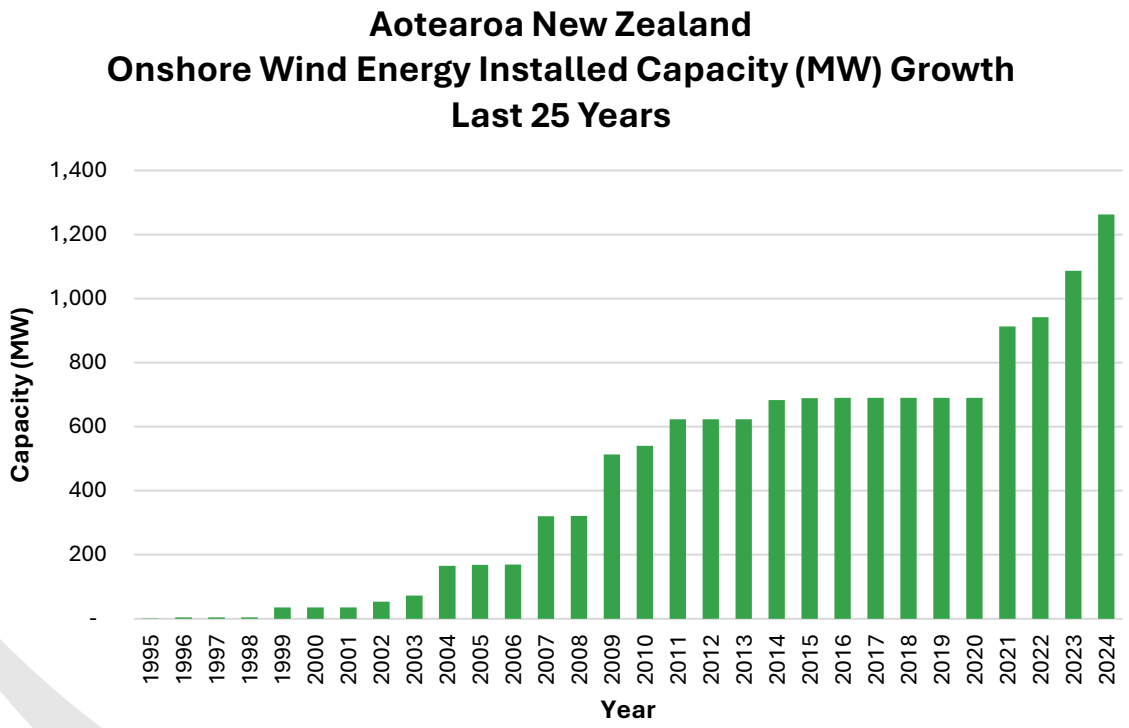
Source: Global Wind Energy Council 2024 Report

*In 2025, the newly elected US Administration announced a withdrawal of all offshore wind permits, and an onshore wind moratorium on federal owned land.

Domestic Trends

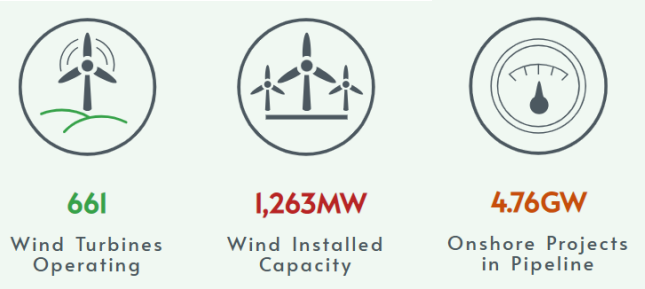
- Aotearoa added 2.9 GW of new generation capacity over the last 25 years, but MBIE forecast 9.4 GW – 15.1 GW of additional capacity will be needed over the next 25 years… a 3 to 5-fold increase!
- Transpower predict that 6.5 GW will come from wind energy.
- But… it took 28 years to reach 1 GW in wind capacity, we now need to build over 6-times this capacity over the next 25 years.

*"**Insanity** is doing the same thing repeatedly and expecting different results"*



Current state - **Onshore**

- Onshore wind energy is one of New Zealand's largest sources of renewable energy.
- There are **21 operational** onshore wind farms, consisting of over **661 wind turbines**, providing **1,263 MW** (1.3 GW) of capacity, supplying up to 553,000 NZ households.
- Onshore wind energy now represents **12.1%** of the grid's total installed capacity.
- In the twelve-month period prior to 30 Sep 2024, onshore wind energy delivered **3,810 GWh/y** equating to **8.8%** of the grid total.



Source: NZ Wind Energy Association

Total National Grid Capacity
10,405 MW
(June 2024)

NEW ZEALAND
OPERATIONAL ONSHORE WIND FARMS

Current state - **Offshore**

- Offshore wind energy is one of New Zealand's newest sources of large-scale renewable energy opportunity.
- Legislation for **Offshore Wind Energy** will be introduced in mid 2025 with feasibility permits offered to the market in late 2025.
- There are 5* international developers (4 are NZWEA members) actively progressing 8 overlapping offshore wind projects, ranging in size from 810 MW to 1000 MW.
- Developers are building their social license, undertaking environment studies, legislative frameworks, commercial arrangements and building supply chain logistics.

Total Project Capacity Investigated

8 GW*

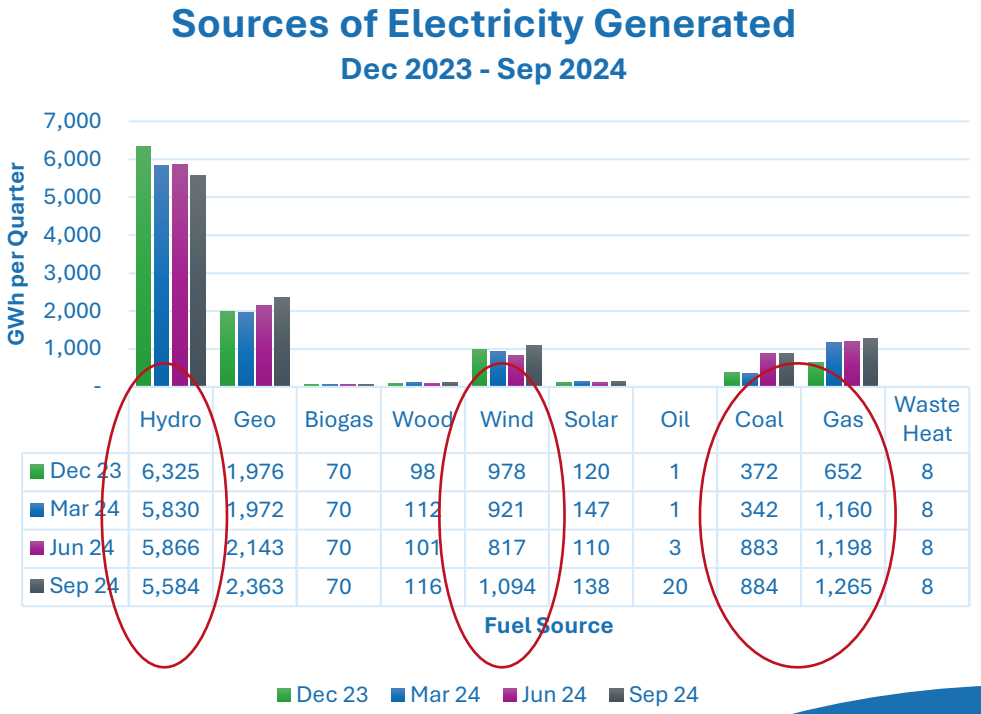
(overlapping)

NEW ZEALAND
POTENTIAL OFFSHORE WIND FARMS

* On 24th October 2024 BlueFloat Energy announced their intention to exit the NZ market in early 2025, reducing the total investors to 5, and the total project investigation capacity to 8GW

Renewables growth & the 2024 energy crisis

- Overall, in 2024 (end Q3), renewable generation delivered **84.5%** of NZ's total electricity, a decrease from **90%** in Q4 2023.
- Decline in 2024 was driven by a **17%** *decrease* in hydro generation (1,115 GWh*) compared to 2023, due to the **dry year scenario** (low lake levels).
- Wind energy produced a record delivered energy in Q4 2023 of 978 GWh but *dropped* by **20%** to 817 GWh in Q2 2024.
- In the winter of 2024, coupled with high winter peak demands, coal fired generation almost tripled** to keep the lights on.
- By September, the wind blew again and combined with the new Tiwai demand response contract, and the release of contracted gas from Methanex (sold to Genesis & Contact), the power system was able to narrowly meet the energy demand.
- This highlighted that substantially more *diverse* generation is needed to support and grow our economy… we can no longer just rely on hydro.



	Hydro	Geo	Biogas	Wood	Wind	Solar	Oil	Coal	Gas	Waste Heat
Dec 23	6,325	1,976	70	98	978	120	1	372	652	8
Mar 24	5,830	1,972	70	112	921	147	1	342	1,160	8
Jun 24	5,866	2,143	70	101	817	110	3	883	1,198	8
Sep 24	5,584	2,363	70	116	1,094	138	20	884	1,265	8

Source: MBIE Electricity Statistics December 2024

* In September 2023, hydro generated 6,699 GWh in the quarter, compared to the Sep 2024 hydro generated of 5,584 GWh for the quarter. The hydro quarterly average over the last 10 years is 6,255 GWh.
**Genesis Energy investor day announced that in autumn 2024, they had stockpiled 800,000 tonnes of coal vs. a normal stockpile of 350,000 tonnes

Regulatory directions

- The coalition government revised its energy polices to achieve a target of **doubling renewable energy** generated by 2050, translating to an additional 37,000 GWh/y, or 11GW-13GW additional renewable capacity.
- Resource Management Act (RMA) Reforms comprise 3 Phases:

  Phase 1 - Repealing the Natural and Built Environment Act and Spatial Planning Act (previous government initiatives)

  Phase 2 - Progress current RMA amendments, as follows:

  i. ***Fast-track Approvals Bill - 2024***

  ii. Targeted amendments to the existing RMA (two Bills) – 2024 & 2025

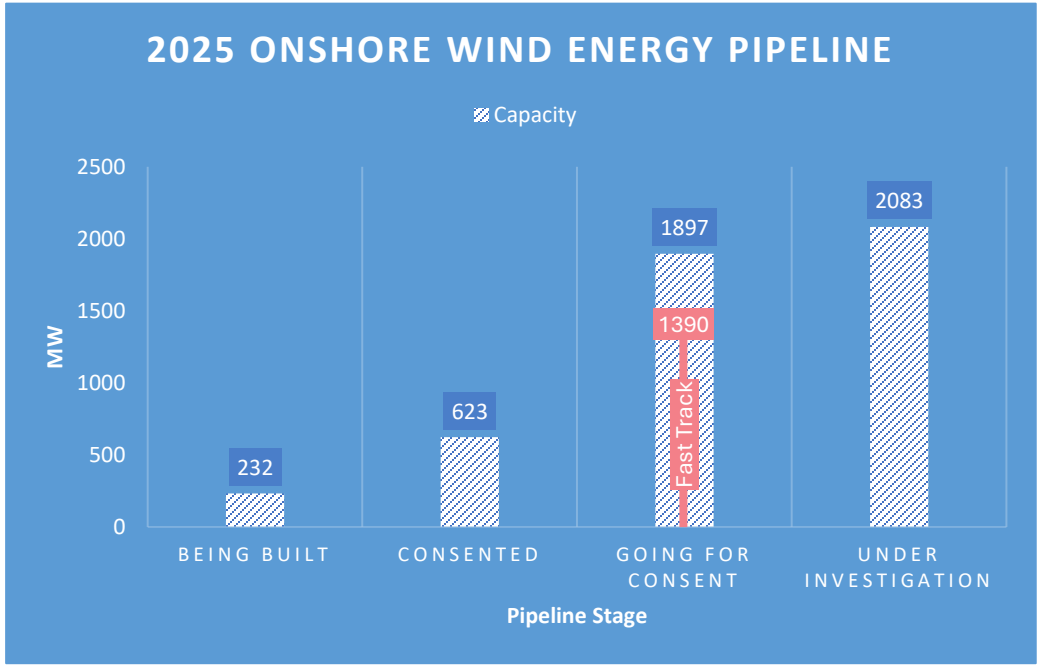
  iii. Changes to 14 National Policy Statements (incl. NPS-REG) & National Environmental Standards – 2024 to 2025

  Phase 3 - Full replacement of the current RMA – 2025 to 2027

- Implementing a new regulatory regime for **offshore renewable energy**, two step permitting process:
  1. Feasibility Permit - late 2025
  2. Commercial Permit - TBA

Market Evolution – Onshore

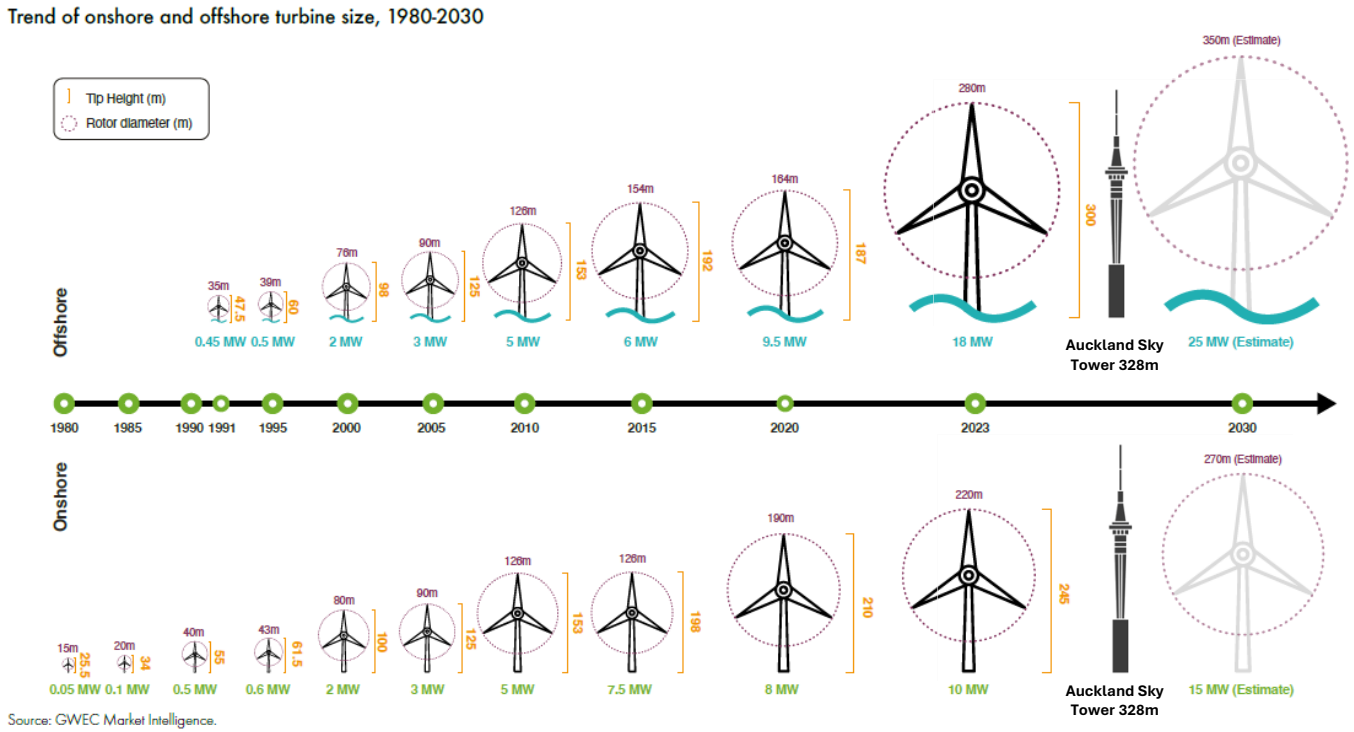
- To date, 4.834 GW of new onshore wind projects are under investigation, with 623 MW already consented, and 232 MW under construction.
- Almost **1.4 GW** is progressing under the Government's Fast Track legislation proposal... which could see over **2 GW of wind consented** within 2 years.
- But... consents don't translate to FID and construction commencement.
- Historically, only 40% of consented projects reach FID.
- Factors affecting the ability for projects to reach FID include:
  - The time taken to secure a resource consent (8-10 years) can change the economics of the project scope
  - Onerous RMA consenting conditions
  - Access to specialist resources
  - Supply chain challenges, abilities to secure turbines and HV equipment
  - PPA market conditions
  - Changing economics and commercial returns



Source: NZ Wind Energy Association

Under current RMA legislation, it takes between 8-10 years to secure a resource consent, and only 2 years to build a wind farm.

Technology Developments



Source: GWEC Market Intelligence.

Domestic Nuances

- International OEM's have been racing to build bigger, and better, at the expense of product stability.
- Aotearoa New Zealand onshore market is currently constrained to circa. 7 MW - 8 MW turbines due to road and bridge limitations and locations of some wind farm sites.
- Turbine *efficiency* is ***better*** than ***bigger***!

The average wind farm size in the onshore pipeline is 148 MW (largest at 350 MW), while offshore project size is typically 800 MW - 1 GW.

Supply Chain Constraints – Asia Pacific

- Within the decade, the Asia Pacific region is targeted to double its onshore wind capacity to 1,084 GW and grow its offshore wind to162 GW.
- China is by far the largest onshore and offshore wind market in the region; however other key markets include India, Australia, Vietnam, Japan, South Korea, Indonesia and the Philippines.
- APAC's current wind energy supply chain is concentrated in China (onshore & offshore) and India (onshore).

Category	Assembly	Key Components						Critical Materials					Offshore Wind Balance of Plant		Offshore Wind Enablers		
Subject	Nacelles	Gearboxes	Generators	Blades	Power Converters	Towers	Castings	Rare Earth	Carbon Fibre	Steel Plate	Concrete	Copper	Foundations	Cables	Vessels	Ports	Workforce [8]
APAC onshore level criticality[9]	◔	◔	◕	◑	◕	○	◕	◑	◑	◔	○	◔					
APAC offshore level criticality	◑	●	◕	●	◕	○	◕	◑	◑	◔	○	◔	◔	○	◕	◕	◑

APAC Supply Chain – China

- Onshore (ONW) and offshore (OFW) nacelle assembly is concentrated in China (85% and 87% respectively).
- High concentration risk on China for supply of generators who supply 90% ONW and 100% OFW.
- New regional suppliers for some components can come from Australia, Indonesia, Japan, the Philippines, Singapore, South Korea, and Vietnam.

We can no longer exclusively rely on European OEM's meet our growing needs

With China Supply & Demand to 2030

Supply and demand analysis of key wind components in the APAC region (including all APAC suppliers)								
Component	Unit	2024	2025	2026	2027	2028	2029	2030
ONW Nacelle Assembly	MW	79013	82515	83840	90572	91790	92440	98380
ONW Gearbox	MW	79013	82515	83840	90572	91790	92440	98380
ONW Generator	MW	79013	82515	83840	90572	91790	92440	98380
ONW Blades	MW	79013	82515	83840	90572	91790	92440	98380
ONW Power converters	MW	79013	82515	83840	90572	91790	92440	98380
ONW Towers	units	13326	12588	12707	12994	13089	12272	12790
ONW Castings	tonnes	963959	1006683	1022848	1104978	1119838	1127768	1200236
OFW Nacelle Assembly	MW	11136	13740	17562	17805	19885	20980	21070
OFW Gearbox	MW	11136	13740	17562	17805	19885	20980	21070
OFW Generator	MW	11136	13740	17562	17805	19885	20980	21070
OFW Blades	MW	11136	13740	17562	17805	19885	20980	21070
OFW Power Converters	MW	11136	13740	17562	17805	19885	20980	21070
OFW Towers	units	1137	1343	1439	1391	1410	1404	1347
OFW Castings	tonnes	197107	243198	310844	315149	351965	371346	372939
OFW Cables	km	3959	4885	6243	6330	7069	7458	7490
Fixed Foundations	units	1136	1337	1406	1359	1380	1364	1242
Floating Foundations	units	1	6	33	32	30	40	105
WTIV	MW	11136	13740	17562	17805	19885	20980	21070

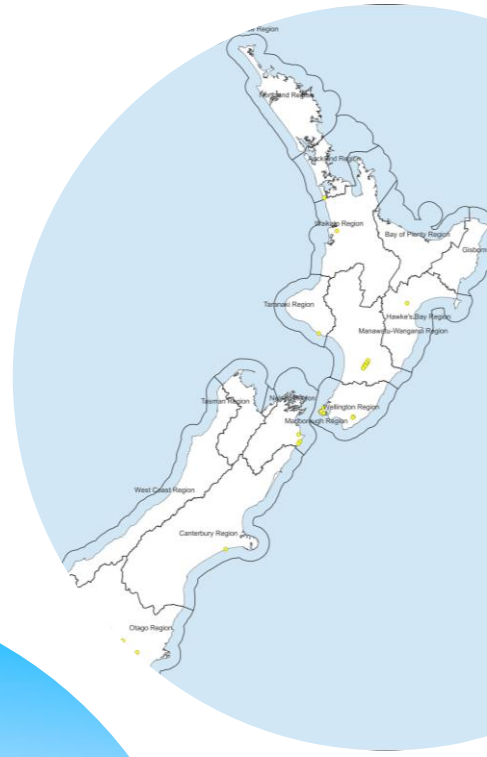
Without China Supply & Demand to 2030

Supply and demand analysis of key wind components in the APAC region (excluding Chinese supply and demand)								
Component	Unit	2024	2025	2026	2027	2028	2029	2030
ONW Nacelle Assembly	MW	9013	12515	13840	15572	16790	17440	18380
ONW Gearbox	MW	9013	12515	13840	15572	16790	17440	18380
ONW Generator	MW	9013	12515	13840	15572	16790	17440	18380
ONW Blades	MW	9013	12515	13840	15572	16790	17440	18380
ONW Power Converters	MW	9013	12515	13840	15572	16790	17440	18380
ONW Towers	units	2557	3255	3374	3619	3714	3449	3378
ONW Castings	tonnes	109959	152683	168848	189978	204838	212768	224236
OFW Nacelle Assembly	MW	1136	1740	2562	2805	4885	4980	5070
OFW Gearbox	MW	1136	1740	2562	2805	4885	4980	5070
OFW Generator	MW	1136	1740	2562	2805	4885	4980	5070
OFW Blades	MW	1136	1740	2562	2805	4885	4980	5070
OFW Power Converters	MW	1136	1740	2562	2805	4885	4980	5070
OFW Towers	units	137	143	189	237	339	338	347
OFW Castings	tonnes	20107	30798	45344	49649	86465	88146	89739
Fixed Foundations	units	137	143	181	230	315	298	272
Floating Foundations	units	0	0	8	7	24	40	75
Cables	km	404	619	911	997	1737	1770	1802
WTIV	MW	1136	1740	2562	2805	4885	4980	5070

Unlocking Growth

- Aotearoa New Zealand must build at least 6 times more wind energy capacity in the next 25 years, than the last 25 years.
- The Government is proactively attracting foreign direct investment, but the regulatory frameworks must support this narrative.
- Investments in the associated infrastructure such as electricity transmission, ports and roads must be a priority.
- We must develop regional supply chain partnerships and bring a sense of scale to our market by aligning with countries like Australia, Japan, South Korea and Singapore.
- We must be open to aligning with the Chinese supply chain to build the assets.

Working together is our key to unlocking the power of wind energy!



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Thank You
Ngā mihi maioha