

### Actuals 2020 vs GWEC forecast

#### China onshore

An onshore installation rush in 2020 was expected, driven by the policy stating that onshore wind projects approved until the end of 2018 had to be grid-connected before the end of 2020 to receive the FiT. The fact that onshore wind installations doubled last year, however, was still a surprise considering that COVID-19 disruption was reported by the Chinese industry in Q1 2020.

#### US onshore

The US onshore wind industry achieved a record year even though the IRS extended the commissioning deadline from 2020 to 2021 for onshore projects that started construction in 2016 as well as the disruption of COVID-19 on global supply chains and project construction execution in the US

#### India onshore

Actual annual installations were not far from the Q3 forecast as the COVID-19 pandemic hit the market hard and GWEC Market Intelligence had already identified significant delays in onshore project construction execution as well as supply chain disruption in India from Q2 2020.

#### Germany onshore

A low level of onshore wind installations was already expected in Q1 2020 considering the ongoing challenging conditions around permitting. In addition, recognising the impact of COVID-19, Germany's federal network agency, BNetzA, has allowed onshore wind developers who were successful in previous auctions to delay project implementation.

#### Brazil onshore

No significant slowdown was reported in project construction execution during the pandemic in Brazil. The significant increase of new installations in 2020 was linked to projects being developed through private PPAs, which are quickly increasing in Brazil due to wind power's very competitive prices, while government auctions have slowed down in recent years.

#### South Africa onshore

No auction was conducted in South Africa in 2020. Projects that came online last year were those awarded from the previous REIPPP rounds. This achievement was not easy as the country had some of the strictest COVID-19 lockdown measures globally. Projects under construction were declared non-essential, therefore sites were closed and construction was halted during the lockdown.

#### UK offshore

Last year, the UK only grid connected 69 units of 7 MW offshore wind turbines, which were the remaining turbines from the 714 MW East Anglia 1 offshore wind project. No floating turbines were commissioned in 2020 from the Kincardine floating wind farm that was expected to be online by the end of 2020.

#### Germany offshore

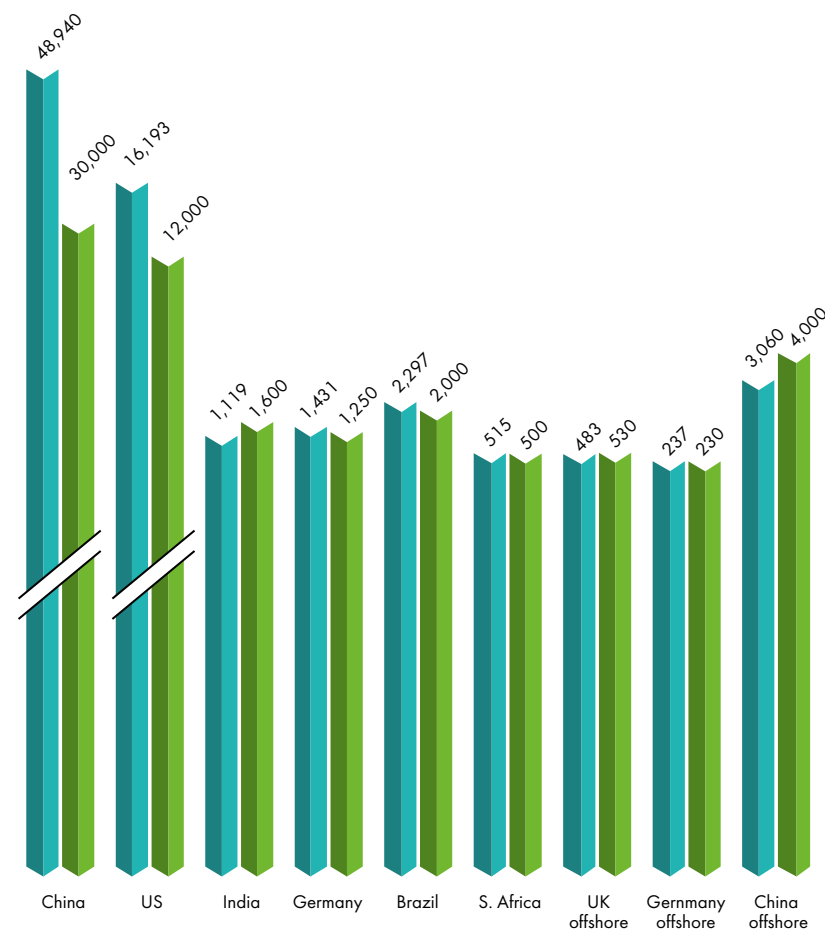
Only 36 units of offshore wind turbines were grid connected and commissioned in Germany last year. All of those turbines, including 16 units of the Senvion 6.3 MW turbine were expected to be fully online before the end of 2019, but this slipped into to 2020.

#### China offshore

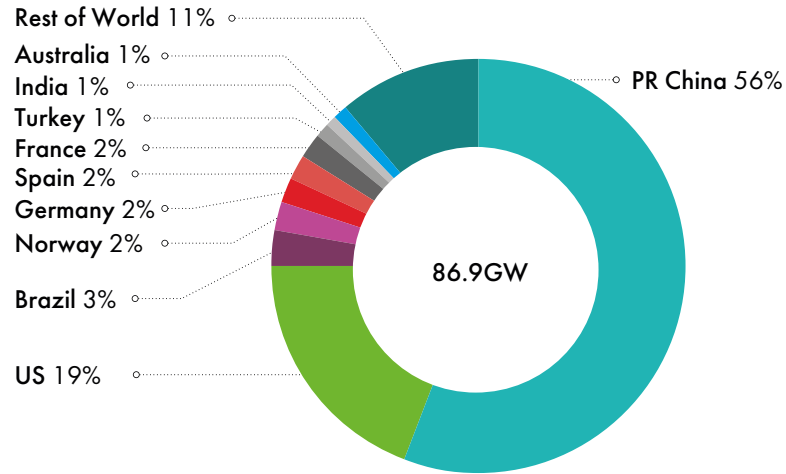
2020 is the second year of an offshore wind installation rush in China as project developers have to get their projects fully grid-connected before the end of 2021 in order to qualify the 0.85RMB/kWh FiT. However, only 3 GW was commissioned last year, mainly due to bottlenecks such as offshore wind turbine installation vessels.

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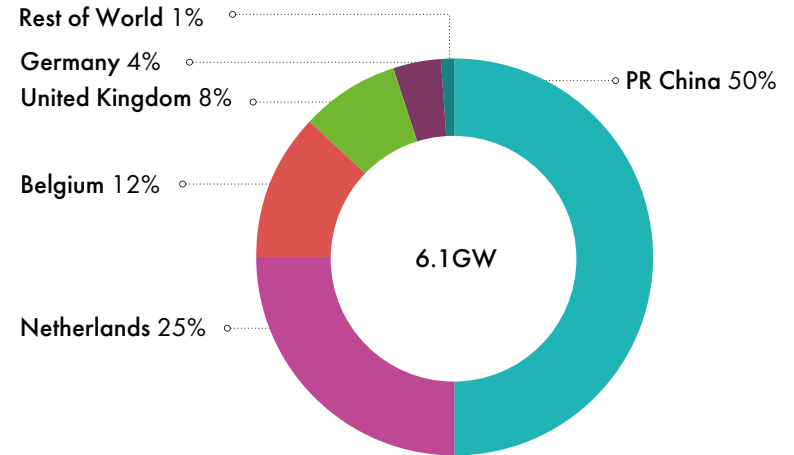
● Actuals 2020  
● Forecast Q3 2020



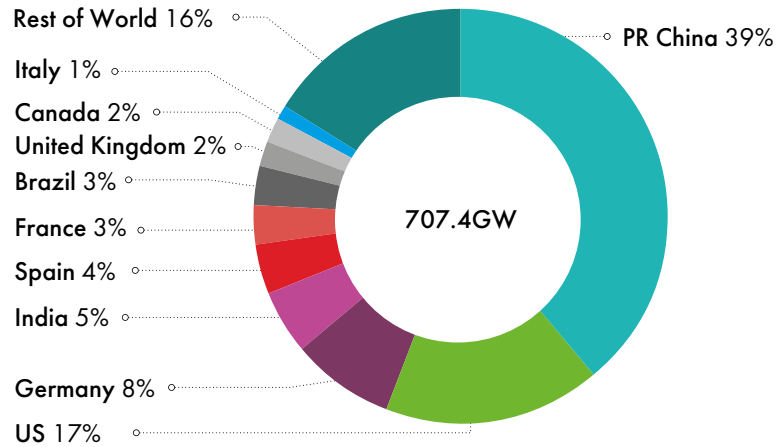
New installations onshore (%)



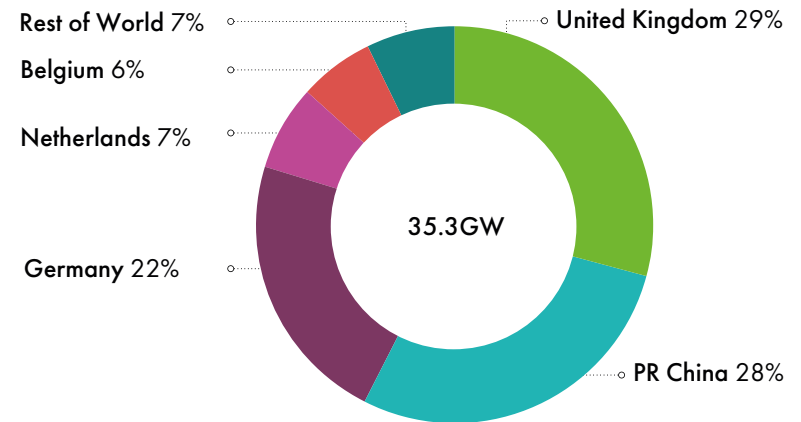
New installations offshore (%)



Total installations onshore (%)

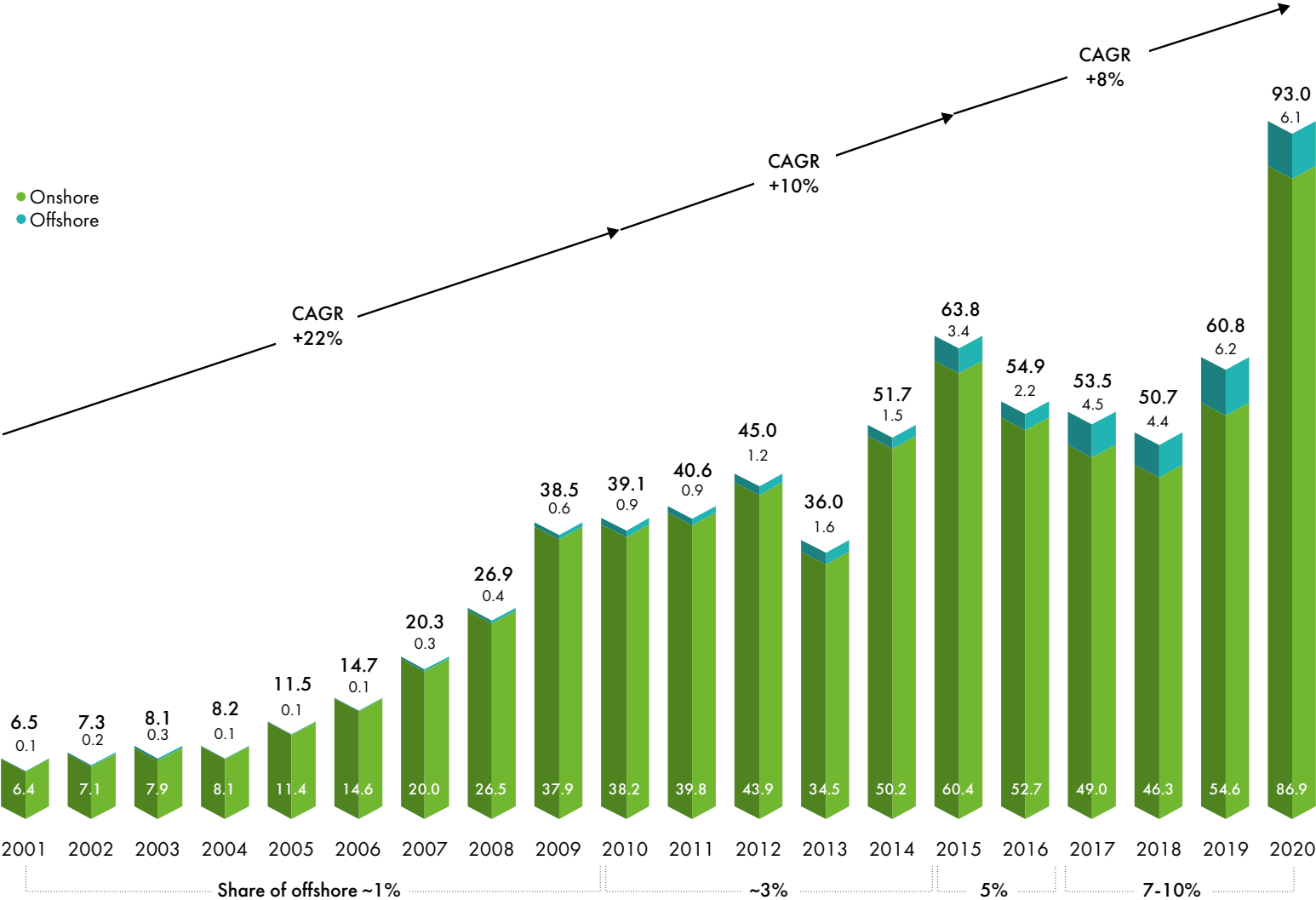


Total installations offshore (%)



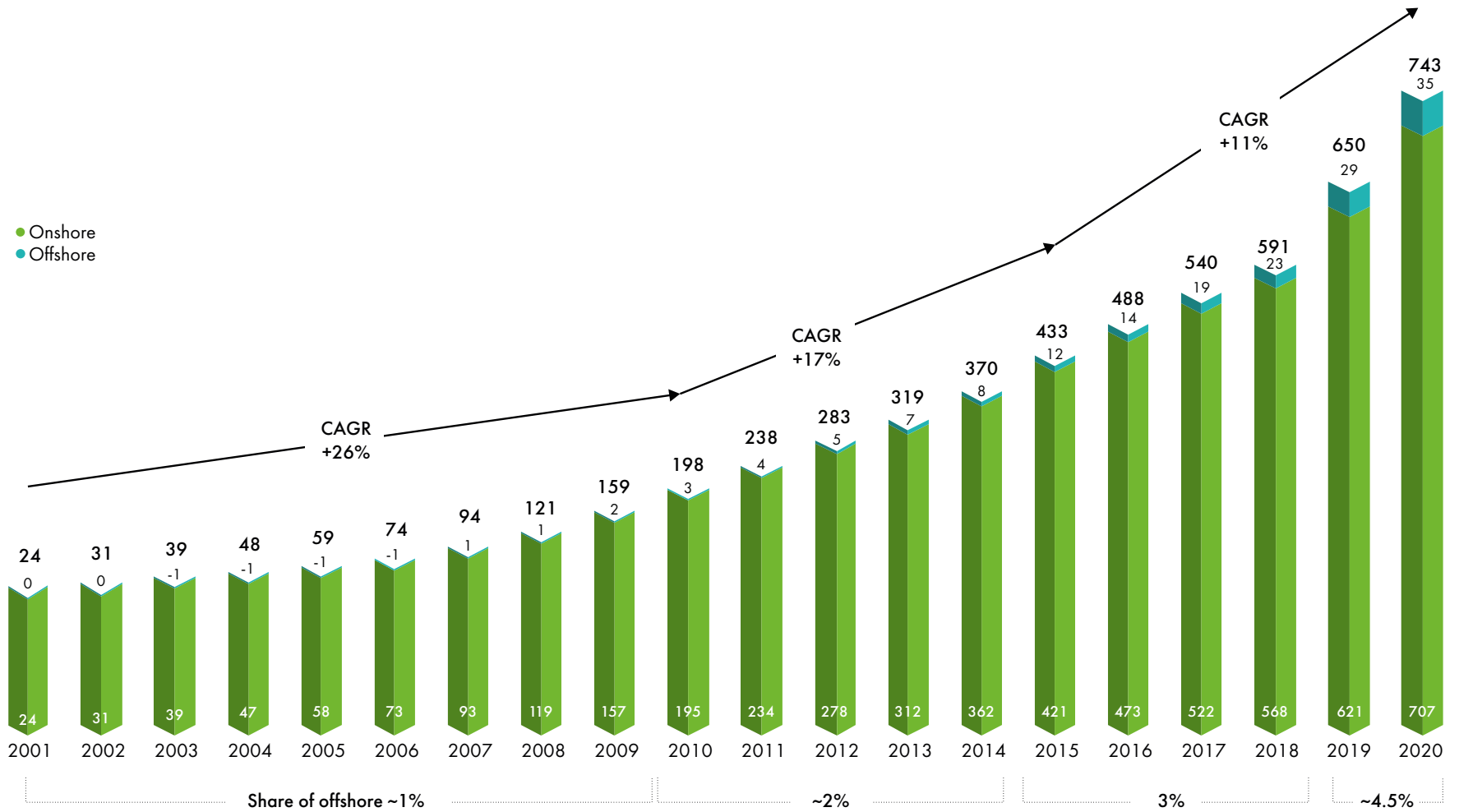
Detailed data sheet available in GWEC's member only area. For definition of region see Global Wind Report – Methodology and Terminology (Link to page)

Historic development of new installations (GW)



# Market status

Historic development of total installations (GW)



MW, onshore	New installations 2019	Total installations 2019	New installations 2020	Total installations 2020
<b>Total onshore</b>	<b>54,634</b>	<b>650,199</b>	<b>86,932</b>	<b>742,689</b>
<b>Americas</b>	<b>13,437</b>	<b>148,081</b>	<b>21,750</b>	<b>169,758</b>
USA	9,143	105,436	16,193	122,275
Canada	597	13,413	165	13,577
Brazil	745	15,452	2,297	17,750
Mexico	1,281	6,215	574	6,789
Argentina	931	1,604	1,014	2,618
Chile	526	2,145	684	2,829
Other Americas	214	3,817	823	3,920
<b>Africa, Middle East</b>	<b>830</b>	<b>6,454</b>	<b>823</b>	<b>7,277</b>
Egypt	262	1,452	13	1,465
Kenya	0	338	0	338
South Africa	0	1,980	515	2,465
Other Africa	568	2,684	295	3,009
<b>Asia-Pacific</b>	<b>28,626</b>	<b>283,780</b>	<b>52,546</b>	<b>336,286</b>
China	24,292	229,384	48,940	278,324
India	2,377	37,506	1,119	38,625
Australia	837	6199	1097	7296
Pakistan	50	1,239	48	1,287
Japan	274	3857	551	4,373
South Korea	191	1,420	100	1515
Vietnam	160	388	125	513
Philippines	0	427	0	427
Thailand	322	1538	0	1538
Other Asia	123	1,822	566	2,388
<b>Europe</b>	<b>11,741</b>	<b>182,651</b>	<b>11,813</b>	<b>194,075</b>
Germany	1,078	53,913	1,431	55,122
France	1,336	16,643	1,318	17,946
Sweden	1,588	8,804	1,007	9,811
United Kingdom	629	13,617	115	13,731
Turkey	686	8,056	1,224	9,280
Other Europe	6,424	81,618	6,718	88,185
MW, offshore	New installations 2019	Total installations 2019	New installations 2020	Total installations 2020
<b>Total offshore</b>	<b>6,243</b>	<b>29,232</b>	<b>6,068</b>	<b>35,293</b>
<b>Europe</b>	<b>3,627</b>	<b>21,901</b>	<b>2,936</b>	<b>24,837</b>
United Kingdom	1,764	9,723	483	10,206
Germany	1,111	7,491	237	7,728
Belgium	370	1,556	706	2,262
Denmark	374	1,703	0	1,703
Netherlands	0	1,118	1493	2,611
Other Europe	8	310	17	327
<b>Asia-Pacific</b>	<b>2,616</b>	<b>7,301</b>	<b>3,120</b>	<b>10,414</b>
China	2,493	6,936	3,060	9,996
South Korea	0	73	60	136
Other Asia	123	292	0	282
<b>Americas</b>	<b>0</b>	<b>30</b>	<b>12</b>	<b>42</b>
USA	0	30	12	42



An aerial photograph of a massive wind farm in a desert landscape. The scene is captured during the "golden hour" of sunset, with the sky transitioning from a deep blue at the top to a warm orange and yellow near the horizon. The terrain is hilly and arid, with numerous white wind turbines scattered across the landscape. The turbines are densely packed in some areas and more sparse in others, extending far into the distance. The overall atmosphere is serene and emphasizes the scale of renewable energy infrastructure.

# MARKETS TO WATCH





# Chile

As electricity demand falls at an unprecedented rate due to the impact of COVID-19, the unfolding energy crisis will test the commitment of both industry and the government to their renewable energy agendas.

Ambitious plans to harness more wind energy in conjunction with the commitment to putting sustainability and decarbonisation at the heart of COVID-19 recovery plans make Chile's wind market a challenging yet attractive proposition for international companies and investors.

Chile's exceptional natural resources make it attractive for wind energy investment and development. In 2020, wind energy capacity expanded by more than 30%, with new installations of 683.5 MW. Chile now has 2.83 GW of wind capacity in operation and a further 1.5 GW of capacity under construction, which was delayed in 2021 due to Covid-19. More than 6 GW of approved wind projects were awarded PPAs in Chile's 2015 power auction but are still pending, while others will deliver

power to corporations via bilateral agreements.

While the drying up of the wind installation pipeline is a worrying issue, Chile's wind market may, on the other hand, be spurred on by government plans to deploy storage solutions to balance demand and supply. That the government acts on these plans, as yet, remains to be seen.

## Signs of Chile's resiliency for green recovery adoption

Against a backdrop of COVID-19 and social tensions, the government updated its NDC as a step up on its climate policy. It now aims for GHG emissions to peak by 2025 at the latest; to phase out coal power by 2040; and to become the first country in the Americas to formally commit to net zero emissions by 2050.

Coal is still heavily relied on to power Chile's energy needs, meeting 37% of total consumption in 2020. Despite this, Chile has deepened its commitment and acted on a progressive retirement of coal-powered generation.

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As part of the state policy to combat climate change, Enel and AES, among others, voluntarily announced the retirement of their coal plants earlier than planned, equivalent to more than 20% of current coal capacity. These closures demonstrate a proactive move by private corporations to support Chile's policy towards transitioning into renewable energy, including the production and exportation of green hydrogen.

## Near-term installations may be constrained

Chile postponed its 2020 planned electricity auction after downward revisions to GDP, with the auction for 2.3 TWh/year of renewable energy to be held in June this year. Projects awarded contracts under

the auction will supply electricity under 15-year PPAs for 2026-2040 to distribution companies.

While a rebound in the build is expected over 2021-22, the postponed auctions of 2020 suggest that energy supply might emerge an issue post-2024. However, this will not equate to a lack of appetite for wind in Chile. Chile became the second-largest destination for new wind investment in Latin America with US\$2 billion and the uptake of bilateral renewables PPAs in 2020, exemplifying investor and corporate confidence in Chile's wind potential.

Lack of interconnection from world-class wind spots in the centre of the country, where population and demand are concentrated, have resulted in curtailment of wind generation as well as wholesale price volatility. While the bottleneck situation has already been eased after important transmission lines were commissioned in 2017 and 2019, both lines have quickly reached full operation capacity.

In September 2020, a long-awaited Power System Flexibility Strategy was revealed, with focus on: (i)

market design to allow the development of a flexible grid, (ii) changes in regulation for energy storage systems and other new technologies that provide flexibility and (iii) optimisation of system operation. Earlier this year, positive news of a US\$717 million transmission system expansion proposal was announced by the National Electric Coordinator (CEN) of Chile. This was translated into a call for transmission projects to be awarded later this year.

### Chile unveils hydrogen ambitions

As the world's largest copper exporter with energy-intensive mining processes, ramping up Chile's green hydrogen production is an inevitable move to support the switch to cleaner fuel.

For this reason, Chile presented its National Green Hydrogen Strategy in November 2020. An action plan was drafted to accelerate green hydrogen production to 5 GW by 2025, produce the world's cheapest green hydrogen by 2030 and make the country one of the top three exporters of the fuel by 2040.

Copper producer Antofagasta PLC announced that it is considering changing to hydrogen-powered

trucks. This was followed by Enel Green Power Chile and Andes Mining & Energy SA unveiling a plan to install a pilot production project in the country's south. Another initiative came from major mining company BHP, which began a pilot project in its Spence copper mine to replace the diesel and natural gas used for its copper obtaining process.

While most of the projects so far are pilots, that could change as hydrogen gets cheaper and the pressure to decarbonise increases. More hydrogen-related announcements from Chile in 2021 would not be a surprise.

### Green growth: Key to Chile's recovery from the social, health, and climate crisis

Chile's commitment towards a net zero economy is in motion under the consensus that a fundamental transition to renewables is inevitable, with transmission upgrades and green hydrogen as enablers. As well, the World Bank and the NDC-SF are currently supporting the Ministry of the Environment to develop a participatory mechanism for a large and inclusive consultation of Chile's long-term climate policy.





## Saudi Arabia

The Kingdom of Saudi Arabia (KSA) is in the midst of a historic shift. Over the last decade, KSA launched an ambitious, multi-faceted plan to transition from reliance on hydrocarbons. Development of hydrocarbons in the 1930s ushered an isolated desert kingdom into modernity. Vision 2030, launched in 2016, is the blueprint for this ambitious national development program, based on KSA's investment power to create a more diverse and sustainable economy. The sheer scale and scope of KSA's vision has attracted global attention, leaving observers to wonder what can be realised within proposed timelines. A key part of Vision 2030 is the King Salman Renewable Energy initiative.

Sound fundamentals for wind power

### **Sound fundamentals for wind power**

In 2010 KA-CARE was launched which set KSA's first targets for 54 GW of renewables by 2032 including 9 GW from wind. KA-CARE undertook wind assessments, identified 40 sites

with promise and selected more than 35 sites to be developed by 2030. KA-CARE called for 1.7 GW of wind to be procured via auctions and for wind to help satisfy electricity needs in desalination plants. By 2014 KA-CARE's efforts stalled and no auctions were held. In 2016 Saudi Aramco launched KSA's first utility-scale wind turbine, a GE 2.75-120 single WTG demonstration project, at the Turaif Bulk Plant inland and a second identical WTG in Huraymila, near Riyadh.

Sound fundamentals for the market to scale exist. KSA is a wind market to watch, despite the global attention focused on solar, due to abundant insolation. KSA is ranked 13th globally among countries with highest potential for onshore wind production. Annual average onshore wind speeds at good sites are between 6-8 m/s with strong winds through most of the year. KSA's renewables sector could create up to 750,000 jobs over the next decade. Realising this employment goal helps create the knowledge-based economy which Vision 2030 foresees.

### **Frameworks steering renewable energy growth**

By 2016 a new approach for the King Salman Renewable Energy Initiative started. The National Renewable Energy Programme (NREP) was launched as part of Vision 2030. An integral part of NREP was creation in 2016 of a new Renewable Energy Project Development Office (REPDO), made up of procurement specialists. After Ministry of Energy's recent 're-brand' to emphasize KSA's energy transition, other agencies will likely follow suit. In 2018 Saudi Electricity Company (SEC) created a new subsidiary, Saudi Power Procurement Company (SPPC), to issue 20-year PPAs for REPDO awarded wind projects. These are for competitively awarded Build-Own-Operate (BOO) independent power producer (IPP) projects.

REPDO's approach involves tendering projects with much pre-development completed: site selection and land lease agreements, two-year wind resource data, environmental and social impact assessment, and grid integration studies. In addition,

SEC is responsible for building needed substations.

NREP's new target is for 58.7 GW of renewables by 2030 of which 16 GW is wind. The interim target is for 27.3 GW by 2023 of which 7 GW is wind. REPDO will make 30% of KSA's capacity additions via IPP auctions. REPDO's first wind auction in 2018 awarded the 400 MW Dumat al-Jandal wind project to Masdar (UAE) and EDF-EN (France) using Vestas V150 4.2 WTGs (99 x 4 MW). The \$500 million project – the most cost-efficient wind energy project in the world and largest Middle East wind farm – is a big step for the sector. The project's tariff of \$19.9/MWh attracted considerable attention, turbine erection is underway, with commercial operations expected Q1 2022. REPDO announced plans for an 850MW wind farm in Yanbu, as part of NREP's fourth round, and plans to build 35 more wind farms by 2030. Saudi National Grid Company's CEO recently stated that KSA expects to attract more than \$20 billion in renewables investments by 2030.

### Developing the local wind industry

Doing business in KSA has

conditions, known as "Saudization", aimed at increasing private sector employment of Saudi nationals. This is understandable as 50% of KSA's population is under 30. However, in late February 2021, Investment Minister and Aramco former Chairman Khalid Al-Falih, announced that Saudization would still be encouraged but is no longer required so long as companies doing business in KSA establish a global or regional headquarters there.

Still, the Saudization principle informs Vision 2030's plan for localisation of renewables manufacture. REPDO's first round of competitive tenders included a capex-based 30% local content requirement. However, second and third rounds moved to a new mechanism where KSA's local content agency 'scores' suppliers and manufacturers to reach similar levels as for round one. These localisation targets are expected to increase in later bid rounds.

Initially, towers, nacelle and hub assembly, and rotor blades are targeted for local manufacturing. In the medium term, nacelle housing, and in the long term, nacelle electricals, generators, and drive

train gearboxes may be included. Two or three OEMs are expected to commit to localise.

### New growth opportunities for wind

A new \$5 billion green hydrogen project in Neom, the 100% renewables "smart city" in Tabuk Province, is a case in point. This is the world's largest green hydrogen project powered by 4 GW of wind and solar. It involves a partnership between ACWA Power, the Kingdom's largest IPP and national renewables champion, and Air Products and Chemicals (US).

Plambeck Emirates (UAE) signed an MOU with Saipem to design and develop a 500 MW floating offshore wind farm to propose to the Saudi government.

Still, crucial questions remain about the Saudi wind market. Will new thinking on Saudization pose barriers for global wind players to enter KSA? Will solar's development eclipse wind's envisioned role? Will hydrocarbon-based energy generation persist longer than expected? Only time will tell, but Saudi Arabia is certainly a market to watch and one too large to ignore.

