



China Clean Energy: Wind

Riding three tailwinds from grid parity; initiate on Orient Cable, Mingyang, Xinqianglian at Buy

With the expiration of on-shore and off-shore subsidies in 2020/21, end-2021 marked an inflection point for China wind, to move from being subsidy-driven to cost-driven and entering a grid-parity era (see [our report in Jan 2022](#)). **We believe the market is underestimating the growth potential, and we expect China wind installation to accelerate at a 22% CAGR over 2022E-25E from 6% in 2015-21, on the back of rising cost competitiveness and the global carbon neutrality initiative.** In our view, the market is missing the impact of 3 structural tailwinds from grid parity, namely turbine technology upgrades, import substitution and rising off-shore applications. Incorporating those, we raise our 2022E-25E wind installation forecasts by 4-27%, and expect China to add a total 242GW/50GW of onshore/offshore wind installation over the period, with 20% potential upside from replacement demand. We see this inflection point as being similar to solar 3 years back, and expect the share price drivers to move from top line to margin. While we believe rising competition and supply chain disruptions could arise from the accelerating demand growth, we see leaders with exposure to the three above-mentioned tailwinds with strong pricing power and cost leadership as best positioned – and initiate on **Mingyang, Xinqianglian, Orient Cable at Buy, and Three Gorges Renewables at Neutral** – while continuing to like Riyue (Buy, on CL). Our 2023E-24E NI forecasts are 7-17% higher vs. the Wind consensus with c.46% upside (56% for Buy names) implied by our 12m TPs for our 3 Buy initiations.

We like **Mingyang**, the third largest wind turbine maker in China with 14%/6% China/global market share, as it offers the highest exposure to large-size/off-shore turbines with continued innovation on new product launches. **Xinqianglian** is one of the very few domestic manufacturers who can supply main shaft bearings to leading turbine makers. We expect XQL to drive high-end main bearing import substitution with its growing product portfolio, supported by strong R&D. **Orient Cable** is one of the largest Chinese submarine cable solutions providers – and benefits from rising off-shore wind installation. We initiate on **TGR**, China Three Gorges Corporation's subsidiary which specializes in new energy business, at Neutral, largely on valuation despite strong installation growth in wind and solar.

Main risks relate to lower market demand, lower turbine ASP/shipments, slower

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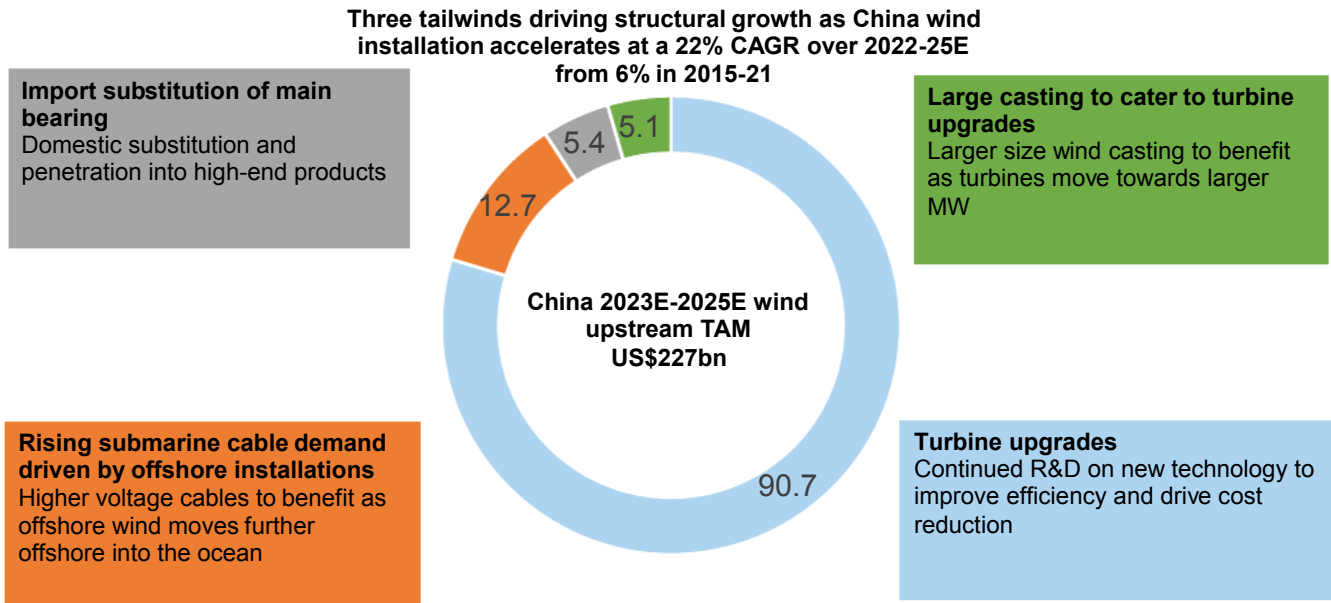
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wind farm construction/capacity expansion, and higher raw material costs.

Exhibit 1: Three tailwinds driving structural growth as China wind installation accelerates at a 22% CAGR over 2022-25E from 6% in 2015-21
Wind industry TAM



Source: Company data, Gao Hua Securities Research

Exhibit 2: We initiate coverage of four wind names in China, which include both upstream leading manufacturers and downstream operators

Wind coverage summary

Company	Xinqianglian 300850.SZ	Riyue Heavy Industry 603218.SS	Mingyang 601615.SS	Xinjiang Goldwind 002202.SZ	Orient Cable 603606.SS	Three Gorges Renewables 600905.SS	China Longyuan Power 0916.HK
	Wind bearing and casting		Wind turbine		Cable	Wind farm	
Main business	Wind bearing manufacturer	Wind casting manufacturer	Wind turbine manufacturer	Wind turbine manufacturer	Submarine and land cable manufacturer	Wind farm operator	Wind farm operator
Market cap (\$mn)	3,818	2,787	7,592	6,636	6,717	22,697	10,806
Rating	Buy (New)	Buy (CL)	Buy (New)	Neutral	Buy (New)	Neutral (New)	Neutral
TP (Rmb)	118.00	41.00	40.00	15.00	107.00	6.65	18.00
TP (+/-%)	44%	100%	69%	35%	54%	18%	78%
China 2023E-2025E wind upstream TAM (\$bn)	5	5	91	91	13	30	30
Key competitor	SKF, Wafangdian, Schaeffler	Yeongguan, Sinojit, Baetr	Vestas, Goldwind, Envision, Siemens-Gamesa	Vestas, Mingyang, Envision, Siemens-Gamesa	Zhongtian, Hanhe Cable, Prysmain, Naxens	Longyuan, Datang Renewable, China RES, Xinyi Energy	Three Gorges Renewables, Datang Renewable, China RES, Xinyi Energy
Current market share in China (2021)		7%	31%	14%	20%	30%	NA
Market share in 2025E		11%	35%	18%	30%	45%	NA
Revenue cagr (22-25E)	34%	29%	24%	24%	33%	16%	11%
NI cagr (22-25E)	38%	64%	27%	22%	46%	18%	20%
Revenue mix (2021)							
Earnings driver	Leading high-end bearing substitution; Cost leadership; Strong pricing power	Large size casting to benefit from turbine upgrade; Cost leadership; Pricing power	Leading wind turbine maker in China; High-quality low-cost product offering; High larger size and offshore wind turbine exposure; Vertical integration and improved product mix	Leading wind turbine maker in China; Cost leadership; Strong pricing power	Largest submarine cable maker in China; Riding on strong China offshore wind outlook; Premiumization and efficient inventory management	High offshore wind exposure; Rapid capacity expansion	Rapid capacity expansion

Priced as of Oct 10, 2022; target prices are based on a 12-month time frame.

Source: Company data, Wind, Gao Hua Securities Research, Bloomberg

PM summary

Accelerating wind installation amid grid-parity era in 2022E. We believe the end of subsidies in 2020-21 sparked a migration in China wind power from being subsidy-driven to cost-driven, ushering in the grid-parity¹ era. In this new era, we expect China wind installation (by volume) to accelerate to a 22% CAGR over 2022E-25E, from 6% in 2015-21, on the back of rising cost competitiveness and the global carbon neutrality initiative. With this, we raise our wind installation forecasts by 4-27% during 2022-25E and expect China to add a total of 242GW of onshore and 50GW of offshore wind installations over the period, with 20% potential upside from replacement demand. We expect three tailwinds – turbine technology upgrades, import substitution and rising off-shore applications – to drive more structural growth opportunities within the China wind power sector on cost-reductions and superior vertical growth.

Gears shifting towards margin and structural competitiveness in the grid-parity era. In order to identify the most structural and compelling investment opportunities within the wind space in this new grid-parity era, we take reference from the solar sector as solar and wind are complimentary renewable power sources that share a similar development pattern; though we note that solar power reached grid-parity 2 years earlier than wind. Our analysis suggests that, leading solar companies' share price performance demonstrated a high correlation with sales growth before the sector entered grid parity in 2019, while the correlation with margins improved once the sector entered grid parity. **We believe this suggests that margin resilience is a more important driver for share prices amid grid-parity. Margin resilience is mainly driven by: 1) strong pricing power on the back of a high-quality or cost-performance product offering; 2) strong cost leadership on the back of efficient cost-control or R&D strength; and 3) a structural vertical growth outlook. As we detail further in sections within, we expect rising competition and supply chain disruption with demand accelerating as the sector has reached grid-parity, and we believe strong pricing power and cost leadership are key to standing out against sector headwinds.**

Technology upgrade and import substitution to drive cost-reductions. The LCOE (Levelized Cost of Electricity²) of wind power has decreased by 56% over 2010-20, and we expect it to see another 24%/29% reduction for onshore/offshore wind in 2022-25E, mainly driven by: 1) efficiency improvement driven by rising adoption of large size wind turbines; and 2) cost reduction from domestic substitution of key components. The mainstream turbine size evolved from 1.5-2.5MW in 2015 to 3-6MW+ in 2021, and we expect this trend to continue to drive cost reductions and the expansion of new application scenarios of wind power (e.g. further offshore wind, lower wind speed

¹ Grid parity occurs renewable power becomes economical without a subsidy.

² LCOE "represents the average revenue per unit of electricity generated that would be required to recover the costs of building and operating a generating plant during an assumed financial life and duty cycle", and is calculated as the ratio between all the discounted costs over the lifetime of an electricity generating plant divided by a discounted sum of the actual energy amounts delivered. Lai, Chun Sing; McCulloch, Malcolm D. (March 2017). "Levelized cost of electricity for solar photovoltaic and electrical energy storage". Applied Energy. 190: 191–203.

zones). For context, with years of R&D efforts and global collaboration, we expect domestic players to gradually gain market share and penetrate into the high-end market, on the back of cost efficiencies and improved product quality.

Offshore wind demand to bottom out in 2022 on cost-reductions. 2021 was the last year for the national subsidy of offshore wind which triggered a rush of installations of 16.9GW in 2021, up 452% yoy. Following the installation spike, we expect slower 2022 offshore wind demand (just like the onshore wind trend in 2021), but expect off-shore installations to see strong growth in 2023 on the back rapid cost-reductions and large project pipelines. With these growth drivers, we expect China's offshore wind installations to grow at a 59% CAGR over 2022E-25E, driving a total TAM of Rmb100bn or c.US\$15bn for submarine cable. With a consolidated competitive landscape, we expect leaders to be best-positioned to ride this trend.

Initiate at Buy on Mingyang, Xinqianglian, Orient Cable; at Neutral on Three Gorges Renewables. We initiate coverage on four wind names in China, which include both upstream leading manufacturers and downstream operators. We expect leading players with strong pricing power and cost leadership to stand out as the wind sector enters the grid-parity era. **While, rising competition and supply chain disruptions could impact the accelerating demand growth trend, we see leaders with exposure to 1) turbine upgrades, 2) import substitution and 3) rising off-shore applications, as more resilient to unfavorable industry headwinds. Furthermore, we believe strong pricing power and cost leadership will be their key differentiators.**

Valuation: We adopt EV/EBITDA as the primary valuation methodology for our solar and wind coverage.

- **Orient Cable:** Our 12m TP of Rmb107, implying 54% potential upside, is based on 18x 2025E EV/EBITDA.
- **Mingyang:** Our 12m TP of Rmb40, implying 69% potential upside, is based on 14x 2025E EV/EBITDA.
- **Xinqianglian:** Our 12m TP of Rmb118, implying 44% potential upside, is based on 18x 2025E EV/EBITDA.
- **Three Gorges Renewables:** Our 12m TP of Rmb6.65, implying 18% potential upside, is based on the average of our 10-year DCF model and 12x 2025E EV/EBITDA.

Risks: Lower-than-expected market demand, lower-than-expected turbine prices, lower-than-expected turbine shipments; slower-than expected wind farm construction/capacity expansion, higher-than-expected raw material costs.

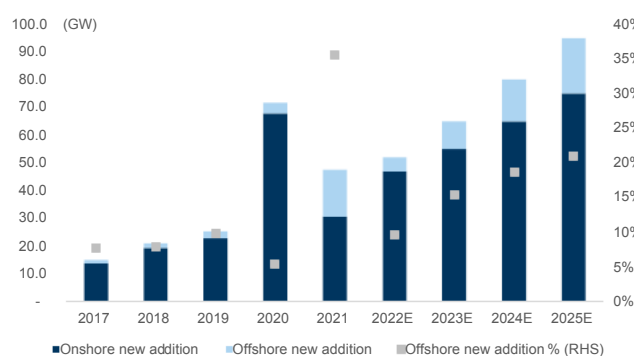
Three tailwinds amid accelerating wind demand

We believe end-2021 was the inflection point when China wind power reached grid-parity level and migrated from subsidy-driven to cost-driven once on-shore/off-shore

subsidies expired in 2020/21. IN this new grid-parity era, we expect China wind installation (by volume) to accelerate at 22% CAGR over 2022-25E from 6% in 2015-21, on the back of rising cost competitiveness and the global carbon neutrality initiative. We expect China to add a total of 242GW of onshore and 50GW of offshore wind installations over 2022-25E, with 20% potential upside from replacement demand. We raise our wind installation forecasts by 4%-27% during 2022-25E. We expect three tailwinds – turbine technology upgrades, import substitution and rising off-shore applications – to drive more structural growth opportunities within the China wind power sector on cost-reductions and superior vertical growth. However, we believe rising competition and supply chain disruptions might come with the accelerating demand growth. **We expect leaders with exposure to the three tailwinds to be more resilient to unfavorable headwinds in the industry, and we believe strong pricing power and cost leadership will be key.**

Exhibit 3: We expect China wind installation (by volume) to accelerate from 2022

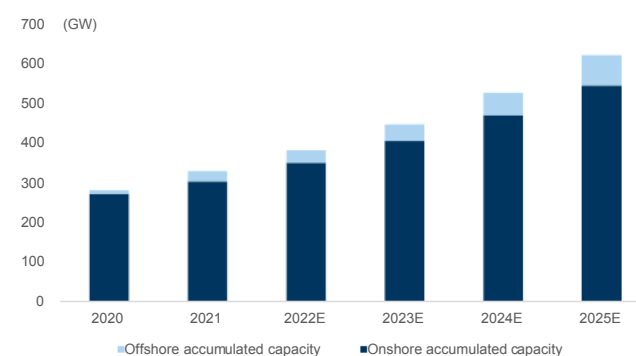
China historical and forecast wind installation



Source: NEA, Gao Hua Securities Research

Exhibit 4: China offshore wind accumulated capacity to reach c.76GW in 2025E

China onshore and offshore wind accumulated capacity



Source: NEA, Gao Hua Securities Research

Exhibit 5: We raise our China wind installation forecasts by 4%-27% during 2022-25E

Forecast revision summary

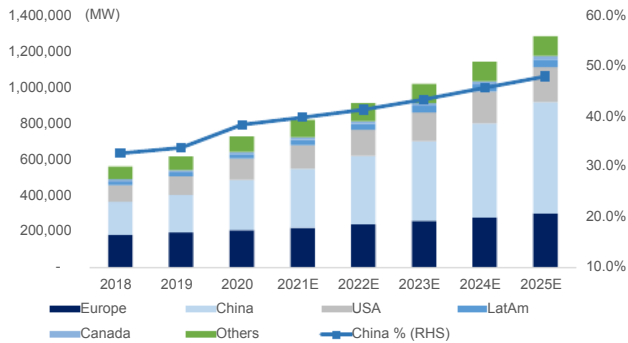
Wind (GW)	2021	2022E	2023E	2024E	2025E
New	47.6	52.0	65.0	80.0	95.0
Old	47.6	50.0	60.0	69.0	75.0
Change %	0%	4%	8%	16%	27%

Source: Gao Hua Securities Research, NEA

Over the past ten years, global wind power cumulative installation grew at a 15.3% CAGR. We note that China's wind installation has been accounting for a growing share of the global market, and we expect a lower LCOE and rising awareness of global climate change to continue to drive demand and its accumulative wind installation share to grow from **38% in 2020 to 47% in 2025E, with global accumulative wind installation growing from 732GW in 2020 to 1,309GW in 2025E. Our global team also estimates that global onshore/offshore annual installation will grow at a 19/10% CAGR over 2022-2025E.**

Exhibit 6: Over the past ten years, the CAGR of global wind power cumulative installation was 15.3%

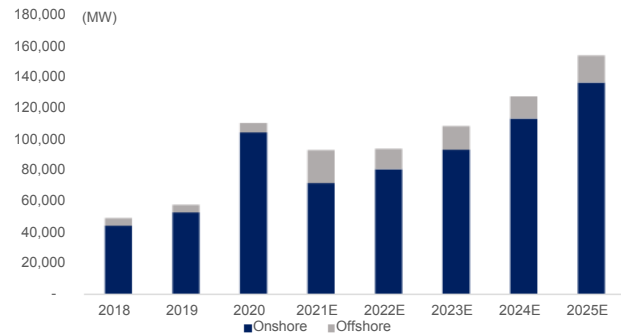
Historical and forecast global cumulative wind installation with China market share



Source: IRENA, Goldman Sachs Global Investment Research

Exhibit 7: Our global team also estimates that global onshore/offshore annual installation will grow at a 19/10% CAGR over 2022-2025E

Historical and forecast annual global addition of onshore and offshore wind



Source: IRENA, Goldman Sachs Global Investment Research

China wind to enter grid-parity in 2022

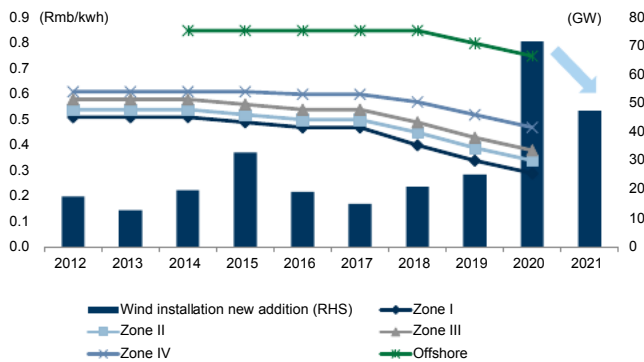
Following a 26% turbine price decline in 2021, on-shore wind now offers highly competitive LCOE and solid economics. We believe 2022 marks the year that China wind officially enters the grid-parity era.

The wind sector in China used to be subsidy driven over 2011-21. To incentivize installation, the MoF, the National Development and Reform Commission (NDRC) and National Energy Administration (NEA) published the “Renewable energy development fund collection and application temporary method” in 2011, which set up a renewable energy fund to subsidize the cost of solar and wind power in the form of higher statutory FiT. In January 2015, the statutory wind FiT for zones I-IV was at Rmb0.49-0.61 per kWh, 26%-57% higher than the on-grid benchmark thermal power FiT. As the installation started to pick up and start to see cost-reductions as technologies advance, China started to de-subsidize the sector gradually since 2016 (on-grid FiT is cut every one to two years). In 2018, the NDRC announced that all newly approved centralized onshore and offshore wind projects should follow the bidding process for on-grid tariff in 2019 and the NDRC announced a max FiT guidance. **In 2019 the NDRC and NEA announced the “Notice on matters related to the construction of wind power and photovoltaic power generation projects” in which the max guidance FiT would be reduced from 0.4-0.57Rmb/kWh to 0.34-0.52Rmb/kWh and all on-shore wind projects approved before 2018 that completed construction before 2020-end would be eligible to enjoy the 2018 FiT as well as off-shore wind projects that were constructed before 2021-end.** This policy triggered rush installations in 2019 (26GW, up 25% yoy) and 2020 (72GW, up 178% yoy). Post the installation spike, we note there was slower demand in 2021 of 48GW (down 34% yoy), together with intensifying competition among turbine makers (we note that Goldwind’s global market share decreased from 14% in 2019 to 12% in 2021 on the back of greater competition within the turbine industry), which resulted in a 26% decline in the turbine price in 2021. **However, thanks to the turbine price decline in 2021, on-shore wind now offers**

highly competitive LCOE and solid economics.

Exhibit 8: Post the installation spike in 2020, we note slower demand in 2021 of 48GW (down 34% yoy)

China's historical wind FiT and annual wind installation addition



Source: NEA

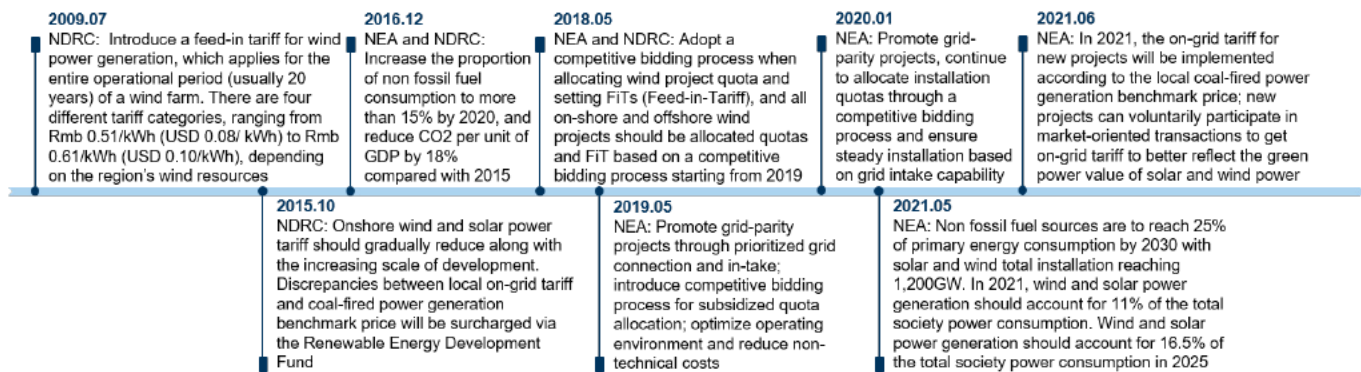
Exhibit 9: Historical wind FiT summary

	2015	2016	2018	2019	2020
(Rmb/kWh)	Statutory FIT	Statutory FIT	Statutory FIT	Max FIT	Max FIT
On-shore					
Zone I	0.49	0.47	0.40	0.34	0.29
Difference		-4%	-15%	-15%	-15%
Zone II	0.52	0.50	0.45	0.39	0.34
Difference		-4%	-10%	-13%	-13%
Zone III	0.56	0.54	0.49	0.43	0.38
Difference		-4%	-9%	-12%	-12%
Zone IV	0.61	0.60	0.57	0.52	0.47
Difference		-2%	-5%	-9%	-10%
Off-shore					
Near-sea zone			0.85	0.80	0.75
Difference				-6%	-6%
Intertidal zone			0.75	Auction	Auction

Source: NEA

Exhibit 10: China has been rolling out various supporting policies to promote wind power development

Onshore wind power supporting policies

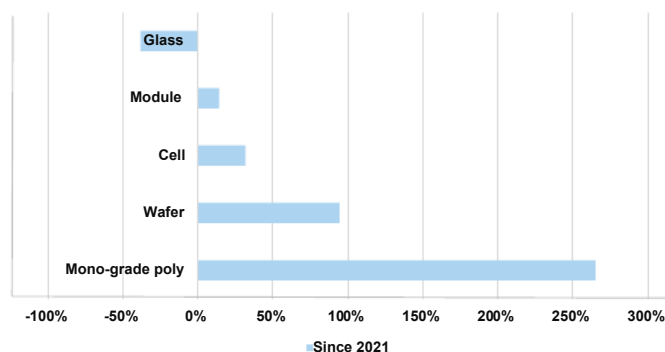


Source: NDRC, NEA

In comparison, due to the poly supply tightness, we saw solar poly ASP rise 177% during 2021 (up 265% from 2021 till today), which caused wafer/cell/module ASPs to rise 54/16/19% respectively. Our sensitivity analysis shows that a 5% decrease in solar capex would result in a 1.3ppt increase in equity IRR, given a fixed FiT. Higher solar supply chain price has resulted in a lower solar project IRR (c.5% for utility scale), which in our view, makes wind power projects more attractive following the decline in wind turbine ASP. Our sensitivity analysis shows that a 5% decrease in wind capex would result in a 1.8ppt increase in equity IRR, given a fixed FiT.

Exhibit 11: Poly price has increased c.265% since 2021

Solar supply chain price change since 2021



Source: PV Infolink

Exhibit 12: Our sensitivity analysis shows that a 5% decrease in capex would result in a 1.8ppt increase in equity IRR, given fixed FiT

IRR model for a general wind power project

Construction		Operating cost				
Construction period (year)	1	Unit O&M cost (Rmb/kWh)	0.06			
Project timeline (years)	20	Capital structure				
Revenue		Debt	80%			
Capacity (MW)	20.00	Equity	20%			
Utilization (hours)	2,200.00	Interest rate	4%			
Annual power output (MWh)	43,120.00	Loan repayment period (years)	15.00			
On-grid tariff (Rmb/kWh, incl. VAT)	0.35	Income tax				
Unit investment cost (Rmb mn/MW)	7.00	1-3 year	0%			
Total investment (Rmb mn)	140.00	3-6 year	13%			
Fixed asset investment (Rmb mn)	140.00	After 6 year	25%			
VAT refund on FAI (Rmb mn)	20.34	VAT rate	13%			
		Equity IRR without CER income	7.0%			
		FiT (Rmb/kWh)				
	(ppt)	-10%	-5%	0%	5%	10%
Capex (Rmb mn/MW)	-10%	-0.7	1.6	4.0	6.4	9.0
	-5%	-2.4	-0.3	1.8	4.1	6.5
	0%	-4.0	-2.0	0.0	2.1	4.2
	5%	-5.3	-3.5	-1.6	0.3	2.3
	10%	-6.5	-4.8	-3.1	-1.3	0.6

Source: Gao Hua Securities Research

Exhibit 13: Higher solar supply chain price has resulted in a lower IRR (c.5% for utility scale)

IRR model for a general solar power project

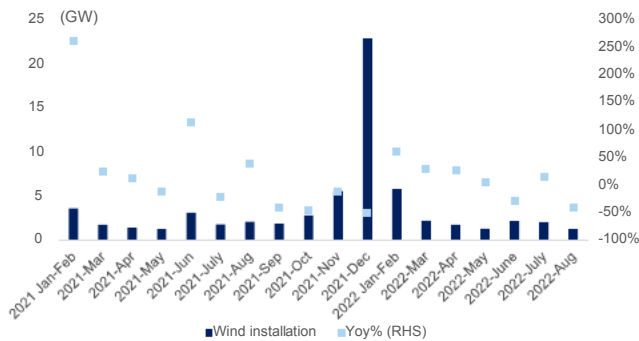
Construction		Operating cost					
Construction period (year)	1	Unit O&M cost (Rmb/kWh)	0.07				
Project timeline (years)	20						
Revenue		Capital structure					
Capacity (MW)	20.00	Debt	80%				
Utilization (hours)	1,300.00	Equity	20%				
Annual power output (MWh)	25,480.00	Interest rate	4%				
On-grid tariff (Rmb/kWh, incl. VAT)	0.35	Loan repayment period (years)	15.00				
Investment		Income tax					
Unit investment cost (Rmb mn/MW)	4.20	1-3 year	0%				
Total investment (Rmb mn)	84.00	3-6 year	13%				
Fixed asset investment (Rmb mn)	84.00	After 6 year	25%				
VAT refund on FAI (Rmb mn)	12.21	VAT rate	13%				
		Equity IRR without CER income	5.3%				
		FIT(Rmb/kWh)					
		(ppt)	-10%	-5%	0%	5%	10%
Capex (Rmb mn/MW)	-10%	-0.9	0.9	2.7	4.6	6.5	
	-5%	-2.1	-0.4	1.3	3.0	4.8	
	0%	-3.2	-1.6	0.0	1.6	3.3	
	5%	-4.2	-2.7	-1.2	0.4	1.9	
	10%	-5.0	-3.6	-2.2	-0.7	0.7	

Source: Gao Hua Securities Research

Accelerating demand growth on more economical supply chain price

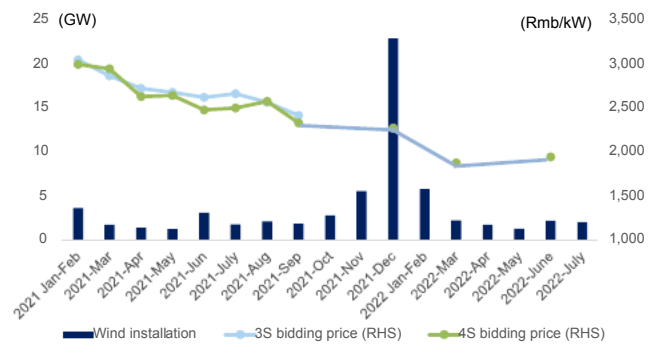
The turbine price reduction in 2021 has gradually triggered a demand recovery. The 2021 wind auction came in at 54GW, 74% higher than the 2020 level. We think the strong momentum in turbine auction will continue in 2022 on the back of solid economics, as we note that 1H22 China wind turbine auction came in at 51GW, up 62% yoy, which is already 107% of the 2021 total installation in China. China's monthly wind installation reached c.16GW in Jan to Aug 2022, up 10% yoy. The strong auction market has stabilized the wind turbine price. We have summarized the recent wind turbine auction prices (in Exhibit 16), and note that the wind turbine auction price recovered 7% by June since April 2022. The data marks a strong signal that turbine prices are stabilizing and might recover as demand further picks up. We expect to see a more clear acceleration starting from 2023.

Exhibit 14: China’s monthly wind installation reached c.16GW in Jan to Aug, 2022
Monthly wind installation in China



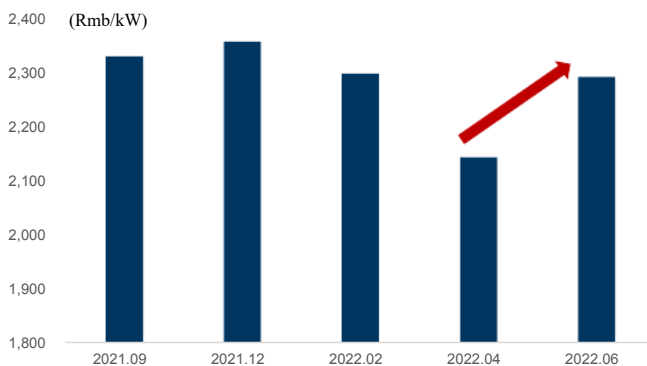
Source: NEA

Exhibit 15: Turbine auction price was down 26% in 2021
Historical turbine average bidding price and monthly wind installation in China



Source: Company data

Exhibit 16: Auction price for 4-5 MW wind turbines increased 7% in June 2022 compared to April 2022
4-5 MW wind turbine tender offer price trend



Source: Compiled by Gao Hua Securities Research based on company data

Accelerating Carbon Neutral initiatives and pipeline projects

As we highlighted in our report [China net zero: The clean tech revolution](#), wind, as a renewable power, is one of the most important technology, potentially aiding the de-carbonization of c.50% of Chinese CO2 emissions. **Entering 2022, we have seen accelerating carbon neutral initiatives and pipeline project roll-outs from the EU’s REPowerEU plan and China’s large low-carbon energy base projects.**

With rising awareness of global warming, many countries have set carbon neutral timelines to address the carbon emissions challenge. Following the [EU Green Deal](#) announcement at the beginning of 2020, China, Japan and Korea also committed in 4Q20 to reach carbon neutral by 2050/2060. A number of counties have also accelerated de-carbonization initiatives, which are set to improve the operating environment of clean energy globally. The power generation sector accounts for 40% of China and global carbon emissions, and clean energy/renewable power stand at the fore-front of global de-carbonization initiatives. As we discussed in our report [China net zero: The clean tech revolution](#), renewable power is the most important technology, potentially aiding the

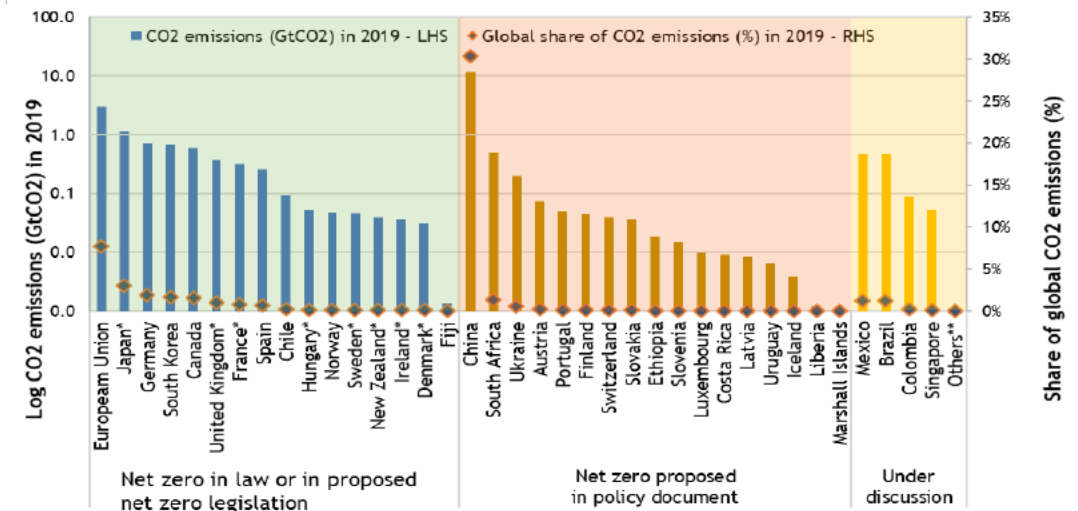
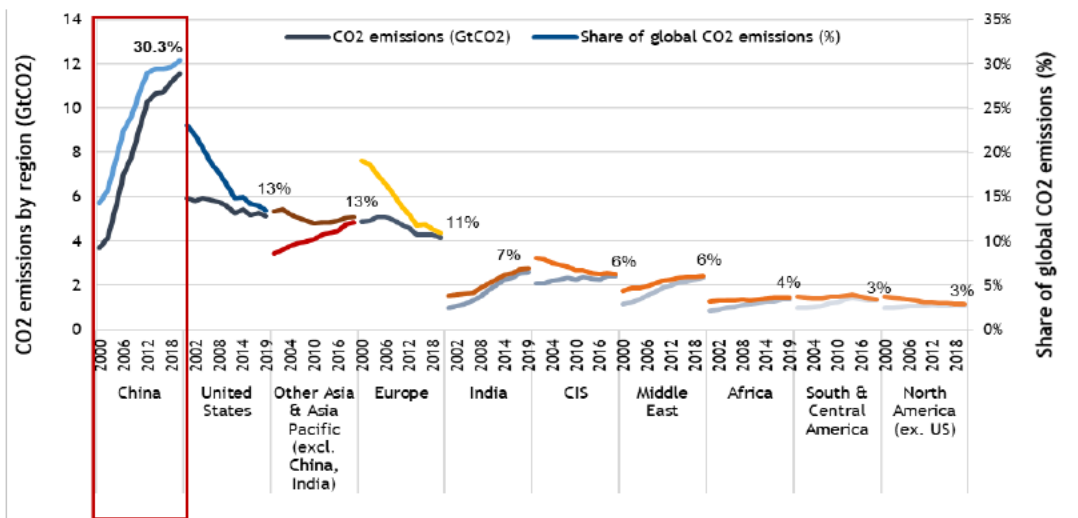
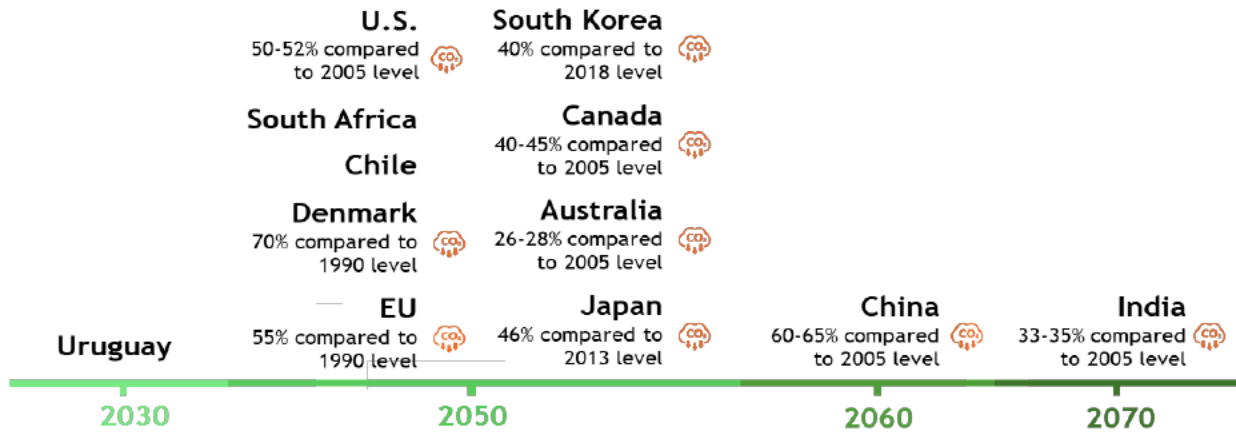
de-carbonization of c.50% of Chinese CO2 emissions. **We expect rising awareness towards climate change and favorable policy support globally will continue to improve the operating environment for green power and drive installation globally.**

Exhibit 17: Global awareness of global warming has accelerated development of renewable power...

Global carbon emission reduction targets

Target year of achieving carbon neutrality

Carbon emission reduction target by 2030

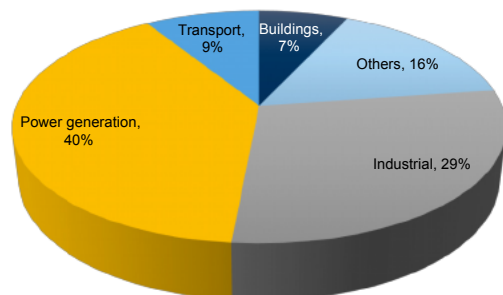


* Denotes net zero pledge is in law, ** Others under consideration includes many countries and regions (list not exhaustive)

Source: Compiled by Gao Hua Securities Research, Energy & Climate Intelligence Unit, European Commission Joint Research Centre (JRC), Emission Database for Global Atmospheric Research (EDGAR) release version 5.0, Goldman Sachs Global Investment Research

Exhibit 18: ...with the power industry contributing the most carbon emissions in China

Approximate split of China's industrial GHG emissions, 2019 (%)



Source: Energy Transitions Commission, FAO, IEA, Goldman Sachs Global Investment Research

China: accelerating roll-out of large energy base projects and “Replacing small scale wind turbines for large scale ones”

In addition, we see that major power generating companies have rolled out aggressive renewable installation plans during the 14th Five Year Plan period. We think a higher wind project IRR might incentivize the generating companies to shift towards wind installation. We also expect a solid demand outlook from the green infrastructure initiative and pipeline large-scale base projects. On April 26th 2022, President Xi emphasized at the Eleventh Meeting of the Central Financial and Economic Commission the move to develop distributed smart grids, build a number of new green and low-carbon energy bases, and speed up the improvement of oil and gas pipeline networks. We note that since 2021, China has rolled out several large-scale solar and wind base projects. Over the longer term, we expect a strong pipeline of projects (listed below) will further help to drive wind installation in 2022 and beyond:

- In Sep 2021, during the Fourth Wind Power Development Enterprise Conference, the NEA authority reemphasized its commitment to **promote wind power in the rural areas**. This promotion will provide support especially for distributed wind systems, and help to address the long distance transmission problem for wind power. The action plan of the “One Hundred Counties, Thousand Villages, Ten Thousand Units Project” should be implemented nationwide. Specifically, in 100 counties across the country, the first batch of 5,000 villages will be selected, and 2 wind turbines will be installed in each village, totaling 10,000 units. **This could roughly contribute to 50GW wind installation during the 14th FYP period.**
- In December 2021, the NDRC and NEA announced the “Notice of the first batch of large-scale wind power and photovoltaic base construction projects focusing on desert, Gobi and desert areas”, with **a total scale of around 97.05GW project quota.**
- In February 2022, the NDRC and NEA announced the “Planning and Layout Plan for Large-scale Wind Power and Photovoltaic Bases Focusing on Deserts, Gobi and Desert Areas”, **which set the target of 455GW solar and wind installation in**

these base areas by 2030.

- In Dec 2021, the NEA solicited ideas on “Measures for the Management of Reconstruction, Upgrade and Decommissioning of Wind Farms.” We expect old wind farms will be enlarged upon reconstruction, thus driving an incremental demand for wind installation.

Exhibit 19: Major energy groups have announced 14th Five Year Plan period renewable installation targets

Company	14th Five-year plan renewable installation target
Huaneng	80GW
China Energy Group	70-80GW
Huadian	75GW
China Resources Power	40GW
Longyuan	30GW
Total	c.300GW

Source: Company data

Exhibit 20: Wind projects and wind+solar projects account for 77% of total scale in the first batch of large-scale wind power and solar base construction projects

Summary of first batch of large-scale wind power and solar base construction projects focusing on deserts, Gobi and desert areas

Province	Wind (GW)	Wind and solar (GW)	Solar (GW)
Inner Mongolia	11.2	7.0	2.0
Qinghai	1.0	5.3	4.6
Gansu		6.1	2.5
Shaanxi		12.5	
Ningxia			3.0
Xinjiang	2.0	2.4	1.0
Liaoning		4.1	
Jilin	3.0	4.3	
Heilongjiang	1.4	1.4	
Hebei	1.0	2.0	
Shandong			2.0
Sichuan		1.4	
Yunnan		2.7	
Guizhou			3.0
Guangxi		4.6	1.4
Anhui		1.2	
Hunan			1.0
Total	19.6	55.0	20.5

Source: NDRC, NEA

Exhibit 21: “Planning and Layout Plan for Large-scale Wind Power and Photovoltaic Bases Focusing on Deserts, Gobi and Desert Areas” set the target of 455GW solar and wind installation by 2030

Summary of Planning and Layout Plan for Large-scale Wind Power and solar Bases

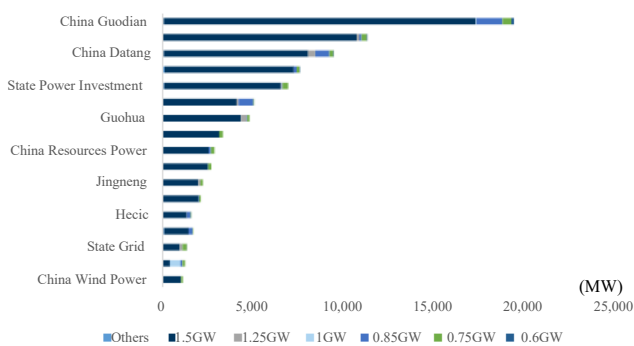
Location	Clean energy project (GW)	
	14th FYP	15th FYP
Kubuqi Desert	39.0	
Ulan Buh desert	21.0	
Tengger Desert	45.0	156.0
Badain Jaran Desert	23.0	
Coal mining subsidence area	37.0	
Others	35.0	99.0
Total	200.0	255.0

Source: NDRC, NEA

Besides the Large-scale Wind Power and Solar Bases plan mentioned above, wind demand will also come from “Replacing small scale wind turbines with large scale wind turbines”: Upgrading of obsolete wind power projects were initially mentioned in 2021 by the NEA, which aims to upgrade wind turbines to larger size ones and increase efficiency of land usage of the wind farms and improve the wind power generation efficiency as a result. The detailed guideline for “Replacing small scale wind turbines with large scale wind turbines” is expected to be involved in the “Administrative Measures for the Transformation, Upgrading and Decommissioning of Wind Farms” that is about to publish in 2H22, according to a [news report](#). Large-scale wind turbines usually refer to 3MW+ wind turbines and small scale wind turbines usually refer to 1.5MW- wind turbines. As of the end of 2018, the total installed capacity of 1.5MW- wind turbines was c.98GW. If all of these small scale wind turbines are replaced and expand capacity by 1:2, it would drive at least 200GW of wind new installation. We expect to see 58GW potential replacement demand during 2022-25E, representing 20% of our current forecast for 2022-25E.

Exhibit 22: As of the end of 2018, the total installed capacity of 1.5MW- wind turbines was c.98GW

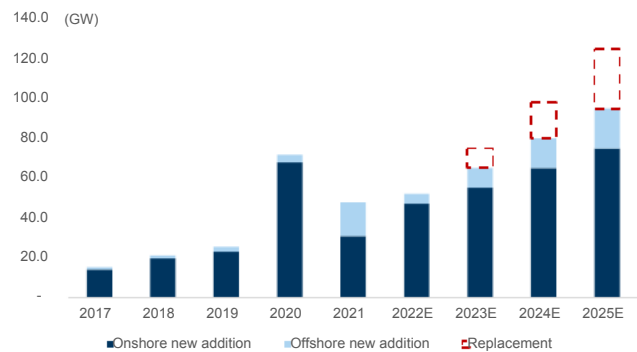
Installed capacity of 1.5MW- wind turbines of major wind farm operators



Source: China Electricity Council

Exhibit 23: Considering the additional demand from the “Replacing small scale wind turbines with large scale wind turbines” policy, there will be 58GW additional demand during 2022-25E

Annual new wind installation addition

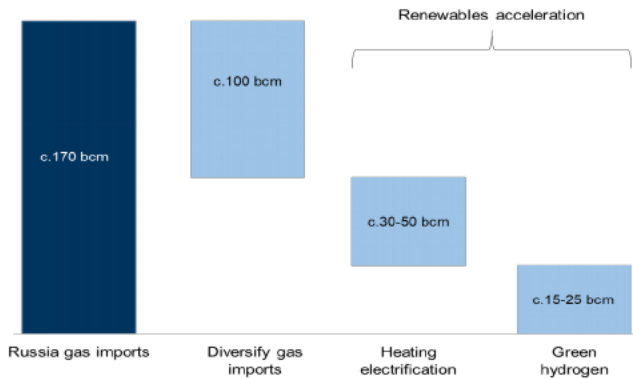


Source: Gao Hua Securities Research, NEA

Rising EU demand driven by increasing fossil energy price

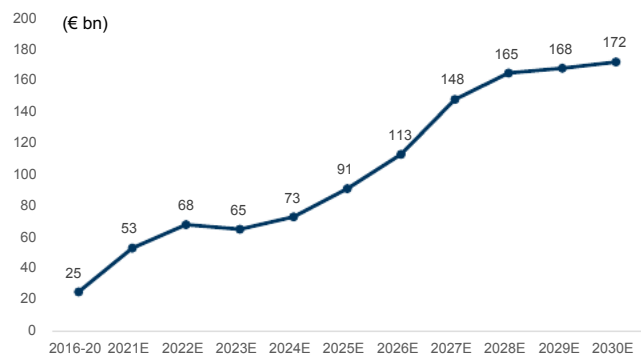
For 2022E, we believe strong EU demand will be driven by more attractive renewable energy costs following gas price hikes due to the Russia-Ukraine conflict (see EU team report [REPowerEU: Stress-testing the EU gas system](#)). In March 2022, the EU released its RePowerEU: Joint European action for more affordable, secure, and sustainable energy to further promote renewable energy. In May, they published an update of its REPowerEU plan. It proposed an increase in the EU’s clean energy target from 40% to 45% by 2030. This will bring total renewable energy generation capacities to 1,236 GW by 2030, a c.15% upgrade vs the recent Fit for 55 plan. According to our EU team, the REPowerEU proposal reiterated the importance of wind power, with wind power targets set at 480GW by 2030 as part of the broader REPowerEU proposal. To reach this target, Europe would need to install an additional ~32GW of wind infrastructure annually, vs a historical average of c.10GW per year (from 2011-2021); our Utilities team forecasts an avg addition of ~31GW/year from 2022 to 2030.

Exhibit 24: Europe’s path to independence from Russian gas imports
EU-28 (as defined as of 2019): Measures to eliminate reliance on Russian gas imports (bcm, medium/long-term)



Source: Goldman Sachs Global Investment Research

Exhibit 25: Annual investments in wind/solar could rise from c.€25 bn pa in 2016-20, to c.€170 bn by 2030E
Annual capex for renewables evolution in Europe, GSe (€ bn)



Source: Goldman Sachs Global Investment Research

A more market driven power market to unlock the potential of wind/green power

We believe the on-going liberalization reform of the power sales market could also be a key driving force to unlock the potential of wind/green power on the back of its cost competitiveness and low-carbon nature.

China has rolled out various power sales reform policies and green trading pilot programs since 2021. As of 2021 leading wind power operators have on average 30% of wind power sold through market-driven trade and the average market-driven trade tariff was up 134% from 2021 Dec to 2022 July (Guangdong Green Power Trading Center as an example) as a result of robust demand for green power following the MIIT’s announcement that green power could be exempted from energy density control. Going forward, we expect further progress of power sales liberalization reform to drive demand for green power and price premium.

Market-oriented reform of electricity

- On Mar 1st 2021, State Grid announced its Carbon Peak and Neutrality Action Plan, which aims to promote the coordinated development of the carbon and power market. Based on the achievements of power liberalization reform, the plan aims to accelerate the construction of the national carbon market, and fully implement the market-based trading of carbon emission rights. It also proposes to combine the price of electricity with the cost of carbon emissions, improve the market competitiveness of clean energy, and ask energy-consuming companies take the cost of carbon emissions.
- On March 15th 2021, the ninth meeting of the Central Finance and Economics Committee proposed to deepen the reform of the power system and build a new power system with new energy as the main body, setting out the direction for future power development.
- On Oct 24th 2021, the State Council announced further opinions on carbon peak and neutrality. It proposed to accelerate new power system construction that adapts to renewable energy intake, vigorously improve the comprehensive regulation capability of the power system, accelerate the construction of flexible regulated power sources, guide self-supplied power plants, traditional high-energy industrial loads, electric vehicle charging networks, virtual power plants, etc. to participate in system regulation, and build a strong smart grid to improve the grid security level.
- In Oct 2021, the State Council announced it would promote orderly entry of all coal-fired power electricity into the market, and adjust the floating range of market transaction power prices from no more than 10-15% to 20%. For high energy consumption industries, the transaction price is not subject to the 20% floating limit. It noted it would **avoid blind controls on high energy density industries, and new renewable energy consumption will not be included in the total energy consumption within a certain period of time**. We believe this will support demand for green power and have a price premium over traditional fossil fueled power.
- In July 2022, the start of trial operation of the southern regional power market marked the first implementation of the national unified power market system in the southern region, and the first realization of electricity spot trading between regions. We believe that under the post grid-parity era, the economics of green power will make it a more attractive option in a market driven power market.

Green certificates

China rolled out its green certificate trial in 2017, which verified the on-grid renewable energy. Green certificates are mainly sold by wind and solar power operators to consumers who have green power demand. We view green certificates as the initial step for China to drive a more market-oriented system for renewable energy. As power generated from the sale of green certificates is no longer subsidized, green certificates not only bring extra revenue to solar and wind power operators, but also help to alleviate the subsidy pressure from the government.

Carbon trading

On January 5, 2021, the Ministry of Ecological Environment announced [Measures for Carbon Emissions Trading \(for Trial Implementation\)](#), which became effective from Feb 1 2021. Under these measures, the provincial-level ecological and environmental authorities, based on the total carbon emission allowance determination and allocation plan formulated by the Ministry of Ecology and Environment, allocate prescribed annual carbon emission allowances to key emission units in their respective administrative regions. The allocation of carbon emission allowances is mainly free allocation, and paid allocation can be introduced in a timely manner according to relevant national requirements. On July 14th, the [official national carbon trading market](#) started in China, which mainly targets over 2,000 power generators (with over 4bn ton annual carbon emission), as the sector has the most intensified carbon emissions, but is also equipped with relatively complete and effective data which serves as a prerequisite for carbon trading.

We believe this is a milestone for China's carbon trading market, and a more regulated carbon trading system will benefit renewable power operators and incentivize more clean energy power installation such as solar and wind.

Green power trading

In September 2021, we observed that the green power trading pilot program is making progress with [news flow](#) regarding the NDRC and NEA's reply to State Grid and Southern Grid on promoting the green power trading pilot program and building a new power system based on renewable energy. Green power trading is an independent trading product, which guides enterprises with green power needs to directly trade with power generation enterprises. Accordingly, State Grid and Southern Grid will organize Beijing and Guangzhou power trading centers to implement green power trading. At the beginning of the pilot period, green power trading will be based in areas willing to engage in green power consumption, and after the pilot period, other areas will be supported for participating in green power trading. In Feb. 2022, the [Southern area green power trading details \(trial\) announcement](#) was published for the Guangdong, Guangxi, Yunnan, Guizhou and Hainan Grid companies. In May 2022, the [Beijing power trading center green power trading details announcement](#) were published.

These trial trading schemes help to promote a more market-driven and sustainable environment for renewable energy adoption. We think this will increase demand for green power and expect green power may enjoy a price premium in future power trading markets, thus bringing extra revenue to wind power operators and improve their cash flow.

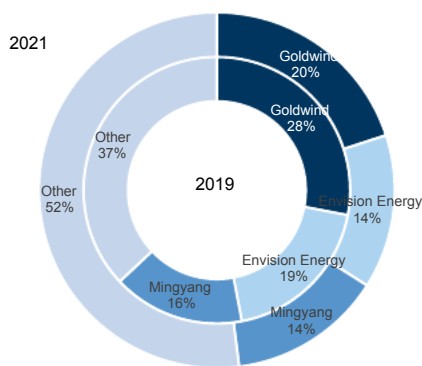
Headwind comes with tailwinds, leaders to stand out on pricing power and cost leadership

As demand accelerates as the sector reaches grid-parity, we have also seen that the strong growth outlook has attracted new entrants and competition is intensifying. Wind turbines, for example, have experienced price competition as we mentioned earlier, where the turbine auction price was down 26% in 2021, and the market share of the

top four wind turbine players shrank from 70% in 2019 to 62% in 2021. In addition to rising competition, in a fast-changing environment, we also see players facing supply chain disruptions such as upstream raw material price hikes. For example, commodity prices such as cooper, iron and steel price were up 20%/11%/17% in 2021, which has squeezed the margins for most component makers. However, **we believe leaders with strong pricing power and cost leadership with exposure to the three emerging tailwinds – turbine upgrade, import substitution and rising off-shore application – can offer more structural growth opportunities and should be more resilient to the unfavorable industry headwinds. Hence, we like Mingyang, Xinqianglian and Orient Cable.**

Exhibit 26: Goldwind’s market share in China was down from 28% in 2019 to 20% in 2021

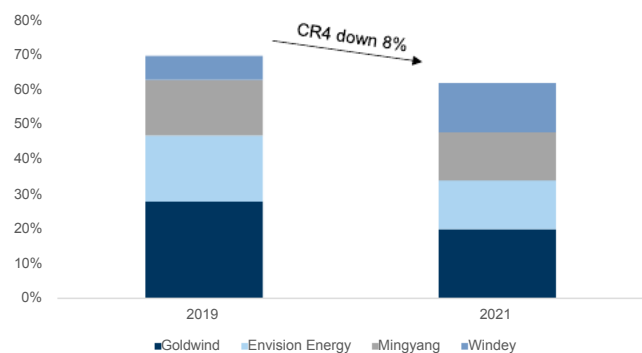
Major wind turbine makers’ China market share



Source: BNEF, Company data

Exhibit 27: For wind turbine, the market share of the top four turbine players shrank from 70% in 2019 to 62% in 2021

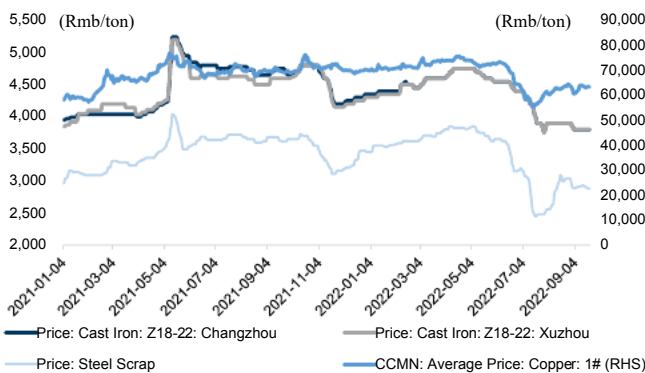
Market share of top four turbine players



Source: Company data

Exhibit 28: Commodity prices such as cooper, iron and steel price were up 20%/11%/17% in 2021

Cast iron, copper and scrap steel price trend



Source: Wind

Shifting gears towards structural competitiveness amid grid-parity

In order to identify structural and strong investment opportunities within the wind space amid the current grid-parity, we take reference from the solar sector as solar and wind are complimentary renewable power sources that share a similar development pattern

and solar power reached grid-parity level in China 2 years earlier than wind. Our analysis suggests that, leading solar companies' share price performance demonstrated high correlation with sales growth before the sector entered grid parity in 2019 while the correlation with margins improved once the sector entered grid-parity level. We believe this suggests that companies with stronger margin resilience are more likely to outperform amid the grid-parity era.

Recap of the solar industry:

In 2011, MoF, the National Development and Reform Commission (NDRC) and National Energy Administration (NEA) published the "Renewable energy development fund collection and application temporary method", which set up a renewable energy fund to subsidize the cost of solar and wind power. In August 2013, the "Notice on using a benchmark tariff to promote the healthy development of the photovoltaic industry" was released which set the FiT for solar power. The policy divided areas into three zones based on solar resource, and the initial solar FiT for zone I/II/III was set at Rmb0.9/0.95/1 per kwh vs. an average thermal power tariff of 0.401 Rmb/kwh in 2014. The solar sector started to de-subsidize gradually in 2016 (subsidy was lowered every year), until 2019 when auction-based tariff scheme was introduced and the sector entered grid-parity level in 2H19 following 10% to 33% supply price decline in 2H18 due to the cancellation of new installation quota and subsidy scheme.

Exhibit 29: Previous subsidy policies supported solar installations in China

Historical solar benchmark FiT/max FiT and subsidy policy summary

(Rmb/kwh)	Ground-mounted solar power benchmark FiT/max FiT (from 2019.07)			Distributed generation solar power subsidy	
	Zone I	Zone II	Zone III	Self-consume, additional on-grid industrial/commercial	Household-rooftop
Until 2011.07	1.15	1.15	1.15		
2011.07-2013.08	1.00	1.00	1.00		
2013.09-2015	0.90	0.95	1.00		0.42
2016	0.80	0.88	0.98		0.42
2017	0.65	0.75	0.85		0.42
2018.01-2018.06	0.55	0.65	0.75		0.37
2018.06-2019.06	0.50	0.60	0.70		0.32
2019.07-2020.05	0.40	0.45	0.55	0.10	0.18
2020.06-2020.12	0.35	0.40	0.49	0.05	0.08
2021	Local coal-fired power generation benchmark price			0.00	0.03
2022 and after	Local coal-fired power generation benchmark price				

Source: NEA, NDRC

Exhibit 30: Solar sector recorded 289GW of installations from 2014 to 2021

Solar cumulative installations and new additions in China

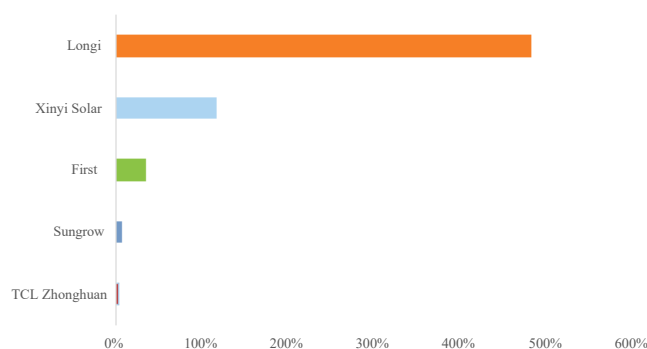


Source: NEA, Gao Hua Securities Research

We selected 7 leading solar players and analyzed the correlation between share price performance and their sales growth and changes in margins over 2015-1H22. We found that over 1H15-1H19 (the period before grid-parity) the share price performance displayed higher correlation with sales growth, while over 2H19-1H22 (the period after grid-parity) the share price performance displayed higher correlation with margin improvement. We believe the share price performance over pre-grid-parity period was driven by sales growth given solar demand being subsidy-driven during the pre-grid-parity period with lower demand visibility. **Entering the grid-parity period, demand became robust with high visibility, and most companies have recorded strong volume growth but margin trends diverged on competition and cost disruptions. Some players saw weaker margin trend despite strong volume growth due to lower ASP on more intense competition or lower pricing power amid cost inflation. As such, we believe investors focused less on volume growth and shifted focus towards margin resilience during this period. We believe this suggests that companies with stronger margin resilience are more likely to outperform amid the grid-parity era.**

Exhibit 31: Longi's share price gained the most during 1H15 to 1H19

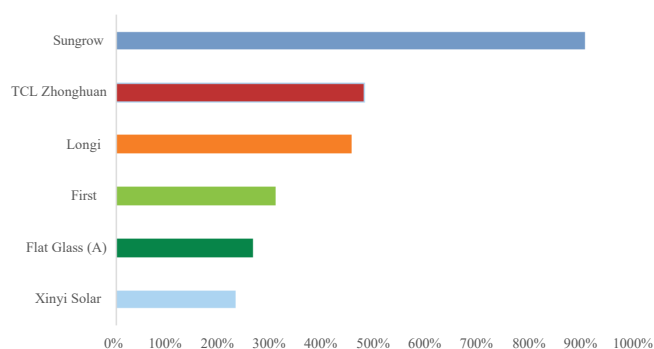
Share price changes during 1H15 to 1H19



Source: Wind

Exhibit 32: Sungrow's share price increased the most during 2H19 to 1H22

Share price changes during 2H19 to 1H22



Source: Wind

Exhibit 33: Revenue growth from main business, GM growth and MV growth are captured for correlation analysis

Revenue growth from main business, GM growth and share price growth for selected solar names

Company	1H15	2H15	1H16	2H16	1H17	2H17	1H18	2H18	1H19	2H19	1H20	2H20	1H21	2H21	1H22
Rev. growth															
LONGi Green Energy Technology Co.	-10%	-19%	162%	123%	13%	61%	124%	43%	8%	11%	49%	149%	181%	61%	41%
Sungrow Power Supply Co.	52%	49%	28%	45%	53%	42%	-1%	26%	32%	35%	52%	4%	-1%	18%	65%
Xinyi Solar Holdings	80%	72%	57%	16%	1%	34%	27%	-3%	-6%	22%	19%	48%	89%	30%	23%
Flat Glass Group					-1%	-13%	-6%	3%	3%	47%	79%	39%	39%	56%	95%
Hangzhou First Applied Material	35%	38%	27%	17%	11%	14%	6%	7%	32%	37%	15%	33%	69%	52%	59%
TCL Zhonghuan	1%	12%	62%	38%	18%	46%	57%	41%	22%	23%	10%	13%	111%	89%	51%
GM growth															
LONGi Green Energy Technology Co.	4%	4%	7%	6%	7%	4%	-7%	13%	1%	1%	-5%	9%	-3%	-5%	
Sungrow Power Supply Co.	-18%	-2%	-1%	2%	7%	-2%	2%	3%	0%	-3%	-16%	-6%	31%	2%	-6%
Xinyi Solar Holdings	1%	3%	10%	6%	-18%	-12%	5%	-4%	-6%	6%	12%	17%	12%	-8%	-25%
Flat Glass Group	0%	-3%	42%	7%	-11%	-11%	-1%	-2%	0%	5%	11%	17%	10%	-14%	-27%
Hangzhou First Applied Material	1%	4%	1%	-3%	-15%	-11%	-2%	-1%	1%	1%	2%	8%	4%	-3%	-6%
TCL Zhonghuan	0%	0%	-3%	-2%	6%	6%	2%	-4%	-4%	3%	3%	0%	2%	5%	-2%
Share price growth															
LONGi Green Energy Technology Co.	234%	115%	-17%	11%	47%	172%	37%	-33%	80%	92%	83%	271%	213%	34%	5%
Sungrow Power Supply Co.	86%	70%	-20%	-17%	0%	82%	-19%	-52%	5%	19%	54%	586%	700%	106%	-13%
Xinyi Solar Holdings	87%	64%	-3%	-21%	-20%	32%	8%	-6%	73%	112%	93%	299%	146%	-34%	-27%
Flat Glass Group					-12%	-4%	-3%	-10%	25%	233%	168%	110%	535%	321%	33%
Hangzhou First Applied Material			31%	-20%	-7%	-39%	-26%	-11%	2%	67%	81%	90%	159%	166%	89%
TCL Zhonghuan	171%	47%	-52%	-32%	0%	39%	-5%	-34%	31%	63%	130%	135%	87%	74%	63%

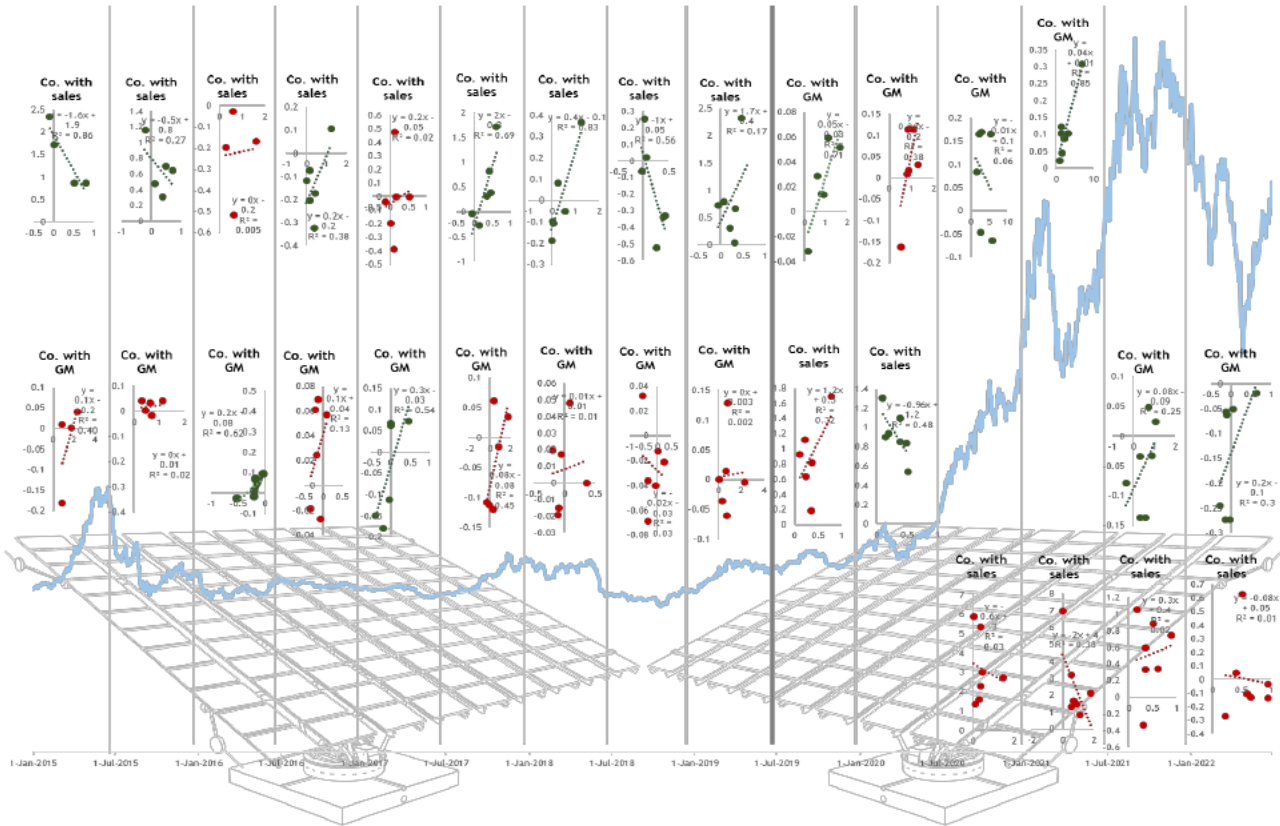
Source: Company data, Wind

Exhibit 34: Companies with higher shipment growth were favored during 1H15 to 1H19 and investors focused more on margin resilience from 2H19 to 2H21Correlation between changes of sales from main business/GM and changes of share price (R²)

		1H15	2H15	1H16	2H16	1H17	2H17	1H18	2H18	1H19
Share price correlation with	Sales growth (R ²)	0.86	0.27	0.00	0.38	0.02	0.69	0.83	0.56	0.17
	Margin changes (R ²)	0.40	0.02	0.62	0.13	0.54	0.45	0.01	0.03	0.00
		2H19	1H20	2H20	1H21	2H21	1H22			
Share price correlation with	Sales growth (R ²)	0.32	0.48	0.03	0.38	0.02	0.01			
	Margin changes (R ²)	0.71	0.38	0.06	0.85	0.25	0.30			

Source: Goldman Sachs Global Investment Research, Company data, Wind

Exhibit 35: Weighted average share price change (2015/01/01 as the base) of representative solar names
 Correlation between changes in sales from the main business/GM and changes in share prices



Source: Wind, Company data

We believe the margin resilience for Wind power companies should be mainly driven by:

- 1) strong pricing power on the back of high-quality or cost-performance product offering;
- 2) strong cost leadership on the back of efficient cost-control or R&D strength;
- 3) strong sub-segment demand.

As we identified in last section, **we see rising competition and supply chain disruption comes with demand accelerating as the sector reached grid-parity. That being said, we see more structural growth opportunity from three emerging tailwinds - turbine upgrades, import substitution and rising off-shore application, and leaders riding on these three tailwinds to remain more resilient to unfavorable headwinds in the industry. We believe strong pricing power and cost leadership will be key differentiating factors.**

We also analyzed leading wind players' share price performance and correlation with their sales growth and margin changes over 1H15-1H22 and found higher co-relation with sales growth over this period before grid-parity level, in line with what we found with solar sector.

Exhibit 36: Companies with higher sales growth were favored during 1H15 to 2H21 for selected wind names

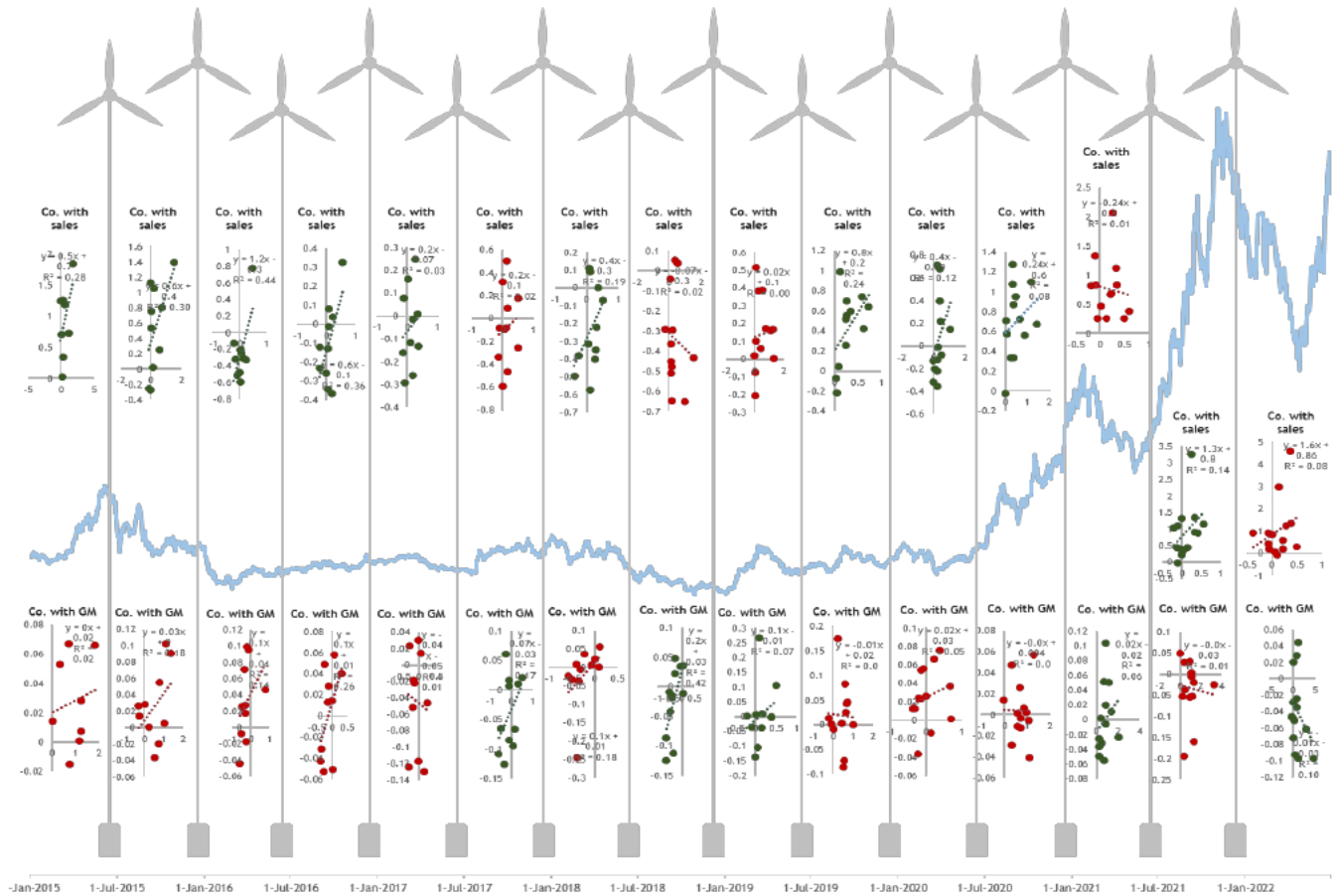
Correlation between changes of sales from main business/GM and changes of share price (R²)

		1H15	2H15	1H16	2H16	1H17	2H17	1H18	
Share price correlation with	Sales growth (R ²)	0.28	0.30	0.44	0.36	0.03	0.02	0.19	
	Margin changes (R ²)	0.02	0.18	0.14	0.26	0.01	0.17	0.18	
		2H18	1H19	2H19	1H20	2H20	1H21	2H21	1H22
Share price correlation with	Sales growth (R ²)	0.02	0.00	0.24	0.12	0.08	0.01	0.14	0.08
	Margin changes (R ²)	0.42	0.07	0.00	0.05	0.00	0.06	0.01	0.10

Source: Gao Hua Securities Research, Company data, Wind

Exhibit 37: Weighted average share price change (2015/01/01 as the basis) of representative wind names

Correlation between changes of sales/GM and changes of share price



Source: Wind, Company data

Technology upgrade and import substitution to drive cost-reduction

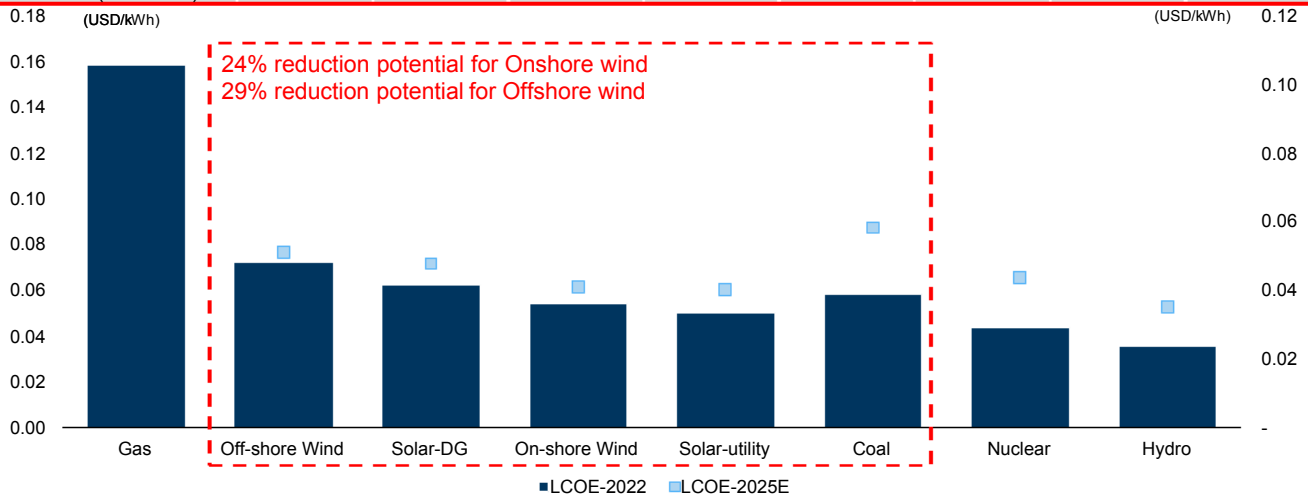
The LCOE of wind power has decreased by 56% over 2010 to 2020, and we expect the LCOE will see another 24%/29% reduction for onshore wind/offshore wind in 2022-25E, mainly driven by: 1) Efficiency improvement from turbine upgrade; 2) Cost reduction from domestic substitution of key components.

Exhibit 38: We expect wind LCOE to fall 24%/29% for onshore wind/offshore wind in 2022-25E

Onshore and offshore wind power LCOE/CAPEX

2022 LCOE	Gas	Off-shore Wind	Solar-DG	On-shore Wind	Solar-utility	Coal	Nuclear	Hydro
Capex/kW (Rmb)	5,000	13,000	4,300	7,000	3,950	3,500	15,000	8,000
Capex/kW (USD)	735	1,912	632	1,029	581	515	2,206	1,176
Lifetime (Yrs)	20	20	20	20	20	30	30	30
Utilization hours	3,000	2,800	1,100	2,000	1,250	4,500	7,000	3,500
Equity financing %	25%	25%	25%	25%	25%	25%	25%	25%
Debt financing %	75%	75%	75%	75%	75%	75%	75%	75%
Equity required return	8%	8%	8%	8%	8%	8%	8%	8%
Debt required return	5%	5%	5%	5%	5%	5%	5%	5%
LCOE(Rmb/kWh)	1.08	0.49	0.42	0.37	0.34	0.40	0.30	0.24
LCOE(USD/kWh)	0.159	0.072	0.062	0.054	0.050	0.058	0.044	0.035

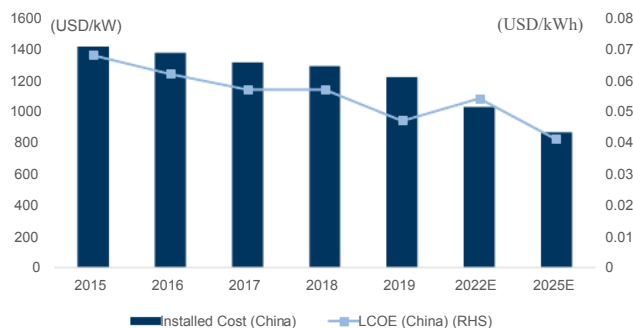
2025E LCOE	Gas	Off-shore Wind	Solar-DG	On-shore Wind	Solar-utility	Coal	Nuclear	Hydro
Capex/kW (Rmb)	5,000	10,300	3,650	5,900	3,500	3,500	15,000	8,000
Capex/kW (USD)	735	1,515	537	868	515	515	2,206	1,176
Lifetime (Yrs)	20	20	20	20	20	30	30	30
Utilization hours	3,000	3,069	1,202	2,185	1,366	4,500	7,000	3,500
Equity financing %	25%	25%	25%	25%	25%	25%	25%	25%
Debt financing %	75%	75%	75%	75%	75%	75%	75%	75%
Equity required return	8%	8%	8%	8%	8%	8%	8%	8%
Debt required return	5%	6%	5%	5%	5%	5%	5%	5%
LCOE(Rmb/kWh)	1.09	0.35	0.33	0.28	0.27	0.40	0.30	0.24
LCOE(USD/kWh)	0.160	0.051	0.048	0.041	0.040	0.058	0.044	0.035



Source: NEA, Gao Hua Securities Research

Exhibit 39: China has seen a rapid reduction of its wind construction cost and LCOE

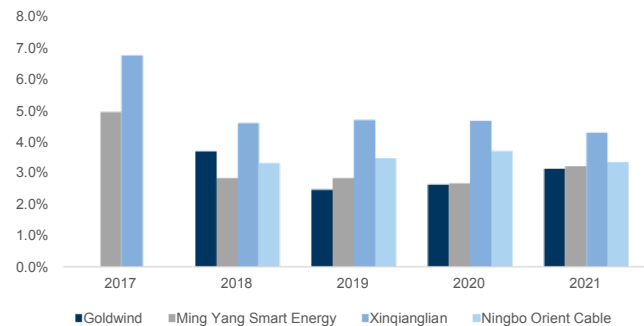
Historical China wind LCOE and construction cost of onshore wind



Source: NEA, IRENA

Exhibit 40: Leading makers' R&D ratio remained in the range between 3.4% in 2019 to 3.5% in 2021 on average

Leading wind industry company's R&D ratio

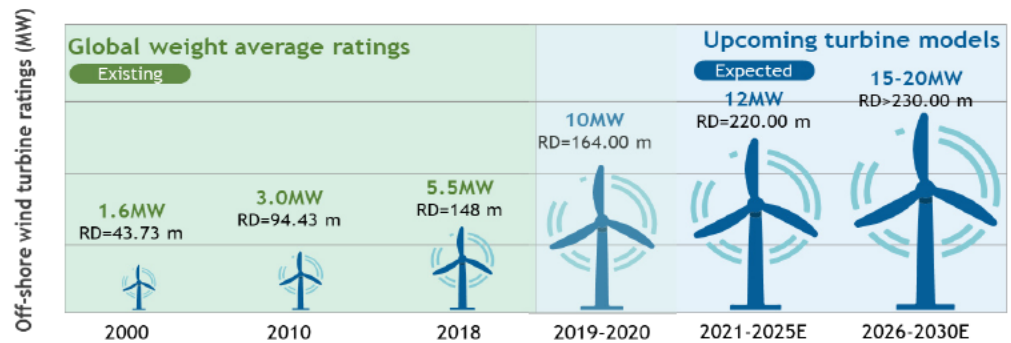


Source: Company data

Turbine technology upgrade: bigger and leaner

We believe evolving wind turbine technology has served as one of the most critical parts of driving cost reduction for wind power. Through years of R&D, major turbine makers have continuously been innovating new technologies to reduce unit cost, and increase generating efficiency. We observe that leading turbine makers such as Mingyang (3.XMW-5.XMW product) and Goldwind's (3MW product) per watt turbine cost has declined from Rmb4.2 in 2017 to Rmb3.0 in 2021 (by -29%) and Rmb5.4 in 2017 to Rmb2.6 in 2021 (by -52%) respectively. More importantly, **We have seen the mainstream turbine size to evolve from 1.5-2.5MW in 2015 to 3-6MW+ in 2021.**

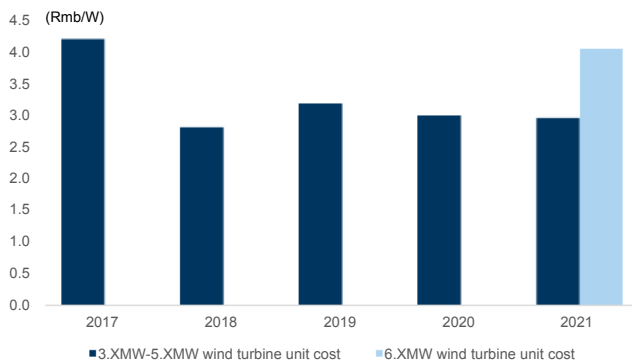
Exhibit 41: Larger-capacity turbines, increased hub heights and rotor diameters are future trends
Offshore wind turbine ratings



Source: IRENA

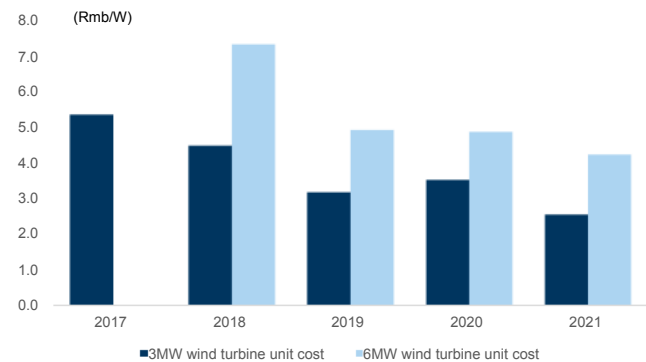
Going forward, we expect turbine upgrade to be the most important approach to drive cost-reduction, as it can effectively dilute the BOS and save front load capex. On top of this, we expect more efficient turbines to help drive continued new application scenarios of wind power (further offshore wind, lower wind speed zones). In response to intensifying competition, we also expect a stronger and more efficient product offering is key for major turbine makers to stand out.

Exhibit 42: Mingyang's per watt turbine cost (3.XMW-5.XMW product) has declined from Rmb4.2 in 2017 to Rmb3.0 in 2021
Mingyang's per watt turbine cost (3.XMW-5.XMW and 6.X MW products)



Source: Company data

Exhibit 43: Goldwind's per watt turbine cost (3MW product) has declined from Rmb5.4 in 2017 to Rmb2.6 in 2021
Goldwind's per watt turbine cost (3MW and 6MW products)



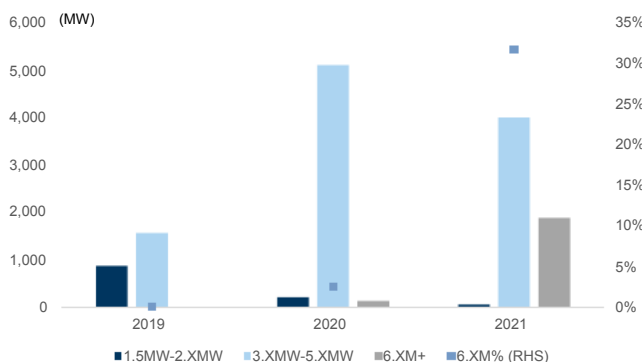
Source: Company data

Going forward, we expect to see two trends for turbine upgrades: 1) A shift

towards larger size turbines; 2) generator solutions that balance installation cost and efficiency. With mature turbine models such as duly-fed and direct-drive turbine, we have seen the roll out of Semi-direct permanent magnet turbines and floating off-shore turbines to address the increasing sophisticated wind environment and facilitate cost reductions.

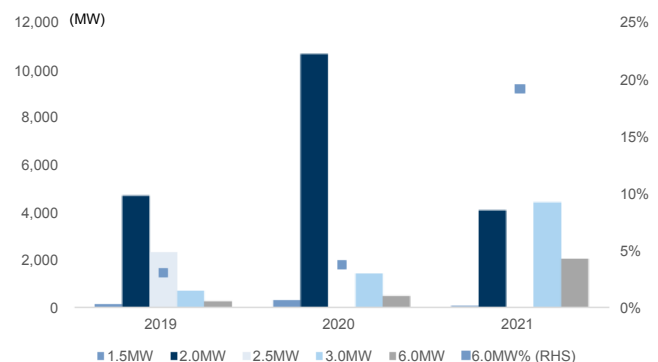
- Large size wind turbines improve generating efficiency, diluting BOS cost. We continue to see a growing share of larger-size wind turbines (6/8S) in the shipment of leading turbine makers. For example, the share of 6M wind turbines in Mingyang’s external sales expanded from 2% in 2020 to 31% in 2021. The share of 6S wind turbines in Goldwind’s external sales expanded from 4% in 2020 to 19% in 2021.
- Turbines with low wind speed solutions-extended blades, higher towers, combined with intelligent control and precise location selection, have increased the generating efficiency of wind turbines in lower wind speed areas, effectively expanding the wind application space.
- Floating wind turbines make it possible for off-shore wind farms to be installed offshore (over 70km) and in deeper water (over 50m) and can greatly increase the flexibility of offshore wind farm site selection.

Exhibit 44: The share of 6M wind turbines in Mingyang’s external sales expanded from 2% in 2020 to 31% in 2021
Mingyang turbine order breakdown



Source: Company data

Exhibit 45: The contribution of 6S wind turbines in Goldwind’s external sales expanded from 4% in 2020 to 19% in 2021
Goldwind turbine order breakdown



Source: Company data

For generator solutions, from Double Fed, direct drive, to semi-direct drive technology, we expect to see rising innovation that could balance installation cost and efficiencies amid an increasingly more sophisticated operating environment

- **Double Fed** technology uses multi-grade gearboxes to accelerate blade speed, and drive double fed generators to generate power. Double Fed is one of the most mature turbine technologies, and has stable performance in high wind speed areas.
- **Direct-drive permanent magnet** turbines directly connect blades to generators, and have no gearbox. Direct-drive permanent magnet wind turbines have higher power generating efficiency and lower maintenance costs as most maintenance costs are related to gearboxes, but require high power frequency converters, which cost 3.5-4 times more than the converter within Double Fed turbines. Direct-drive

permanent magnet turbines perform the best in lower speed wind areas.

- **Semi-direct drive permanent magnet** turbines connect a mid-speed gearbox with a permanent magnet generator. It reduces the weight compared to Direct-drive permanent magnet turbines, but retains the generating efficiency. The generation performance from semi-direct drive turbines are between Double Fed and Direct-drive magnet turbines, but has more economical LCOE. Semi-direct drive permanent magnet turbine can offer good cost performance on offshore wind.

Exhibit 46: From Doubly-fed, direct drive, to semi-direct drive technology, we expect to see rising innovation that could balance installation cost and efficiencies

Comparison of three major turbine technologies

	Doubly Fed	Direct-drive	Semi-direct drive
Features	Doubly Fed technology uses multi-grade gearboxes to drive double fed generator to generate power	Direct-drive permanent magnet turbine directly connects blades to generators with main shaft	Semi-direct drive permanent magnet turbine connects mid-speed gearbox with permanent magnet generator
Advantages	<ul style="list-style-type: none"> · Most matured solution · Lower weight and cost of generator compared to Direct-drive wind turbine 	<ul style="list-style-type: none"> · Lower maintenance cost due to fewer parts · Higher generation efficiency 	<ul style="list-style-type: none"> · Higher reliability of gearbox VS Doubly-fed wind turbine · Lower weight and smaller size in generator and main shaft VS Direct-drive
Disadvantages	<ul style="list-style-type: none"> · Lower reliability · Higher maintenance cost related to gearbox 	<ul style="list-style-type: none"> · Higher turbine weight and higher cost 	At the relatively early stage of development

Source: Company data

Exhibit 47: Semi-direct drive permanent magnets are adopted by an increasing number of major wind turbine manufacturers

Summary of major wind turbine manufacturers' technology

	Double Fed	Direct-drive permanent magnet	Semi-direct drive permanent magnet
Vestas	√		√
Siemens-Gamesa	√	√	
Goldwind		√	√ (MSPM)
Mingyang	√		√

Source: Company data

Slewing Bearing: Ongoing import substitution in high end component

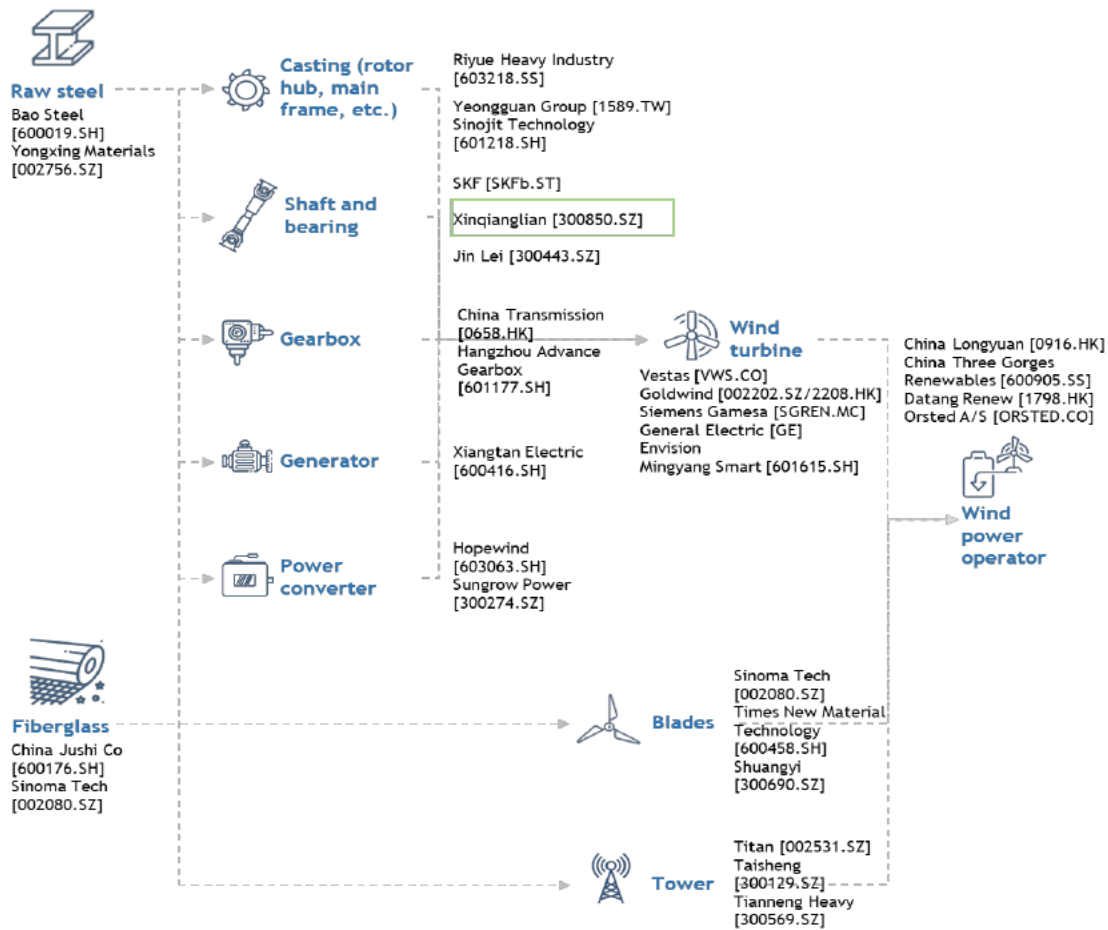
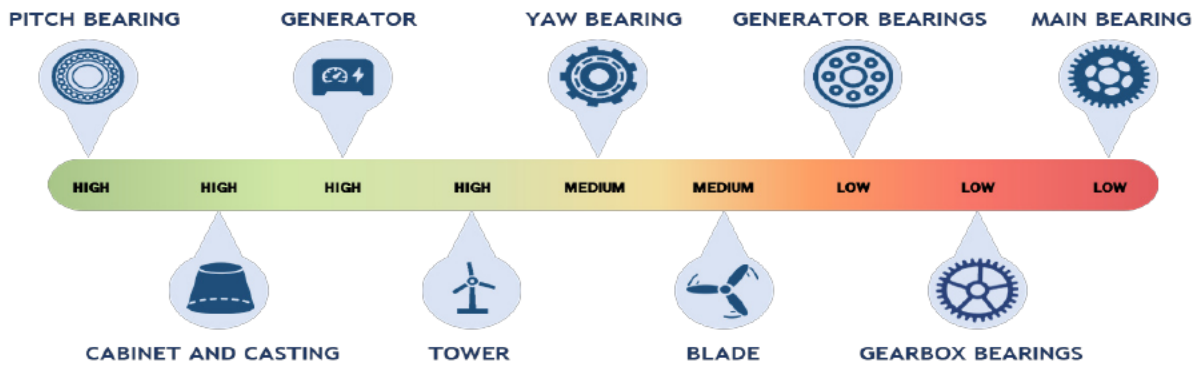
Wind turbines are composed of blades, generator, gearbox, slewing bearing and main shaft etc. While most parts can be domestically manufactured, slewing bearing (c.5.6% of total turbine costs) remains one of the segments that is concentrated with international players. Slewing bearings consist of an inner and an outer ring, with rollers in between the rings. Slewing bearings' main function is to support the shaft rotation movement, and bear the transmitted load by the shaft or the parts on the shaft. Slewing bearings' accuracy, performance, lifespan and reliability play a decisive role in the performance and reliability of the wind turbine. A typical wind turbine requires one to two main bearings, one pitch bearing, three yaw bearings, one set bearing for generator and one set bearing for the gearbox.

While most domestic manufacturers are capable of producing pitch and yaw bearings, main bearings, due to their more sophisticated production techniques, are mostly produced by overseas manufacturers, such as SKF, Schaeffler Group and NTN. As of 2020, Schaeffler and SKF respectively accounted for 29% and 24% of the global wind slewing bearing market, followed by several Japanese and US manufactures. Domestically, LYC Bearing Corporation and Wafangdian Bearing Company each enjoyed

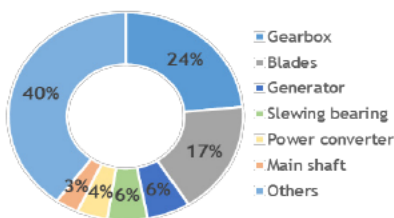
c.4% of global market share in 2019. However, with continuous R&D efforts, we expect we will continue to see domestic leaders entering the more high end market.

Exhibit 48: Understanding slewing bearings' position within the wind supply chain

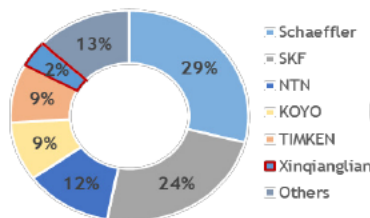
Wind industry supply chain



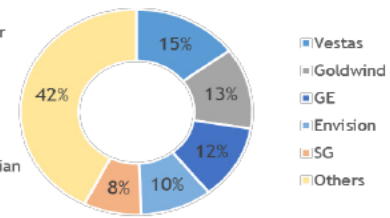
Wind turbine cost breakdown



Bearing global market share



Global wind turbine market share



Wind turbine cost breakdown as of 2021, bearing and wind turbine market share as of 2020

Source: Company data, Wood Mackenzie

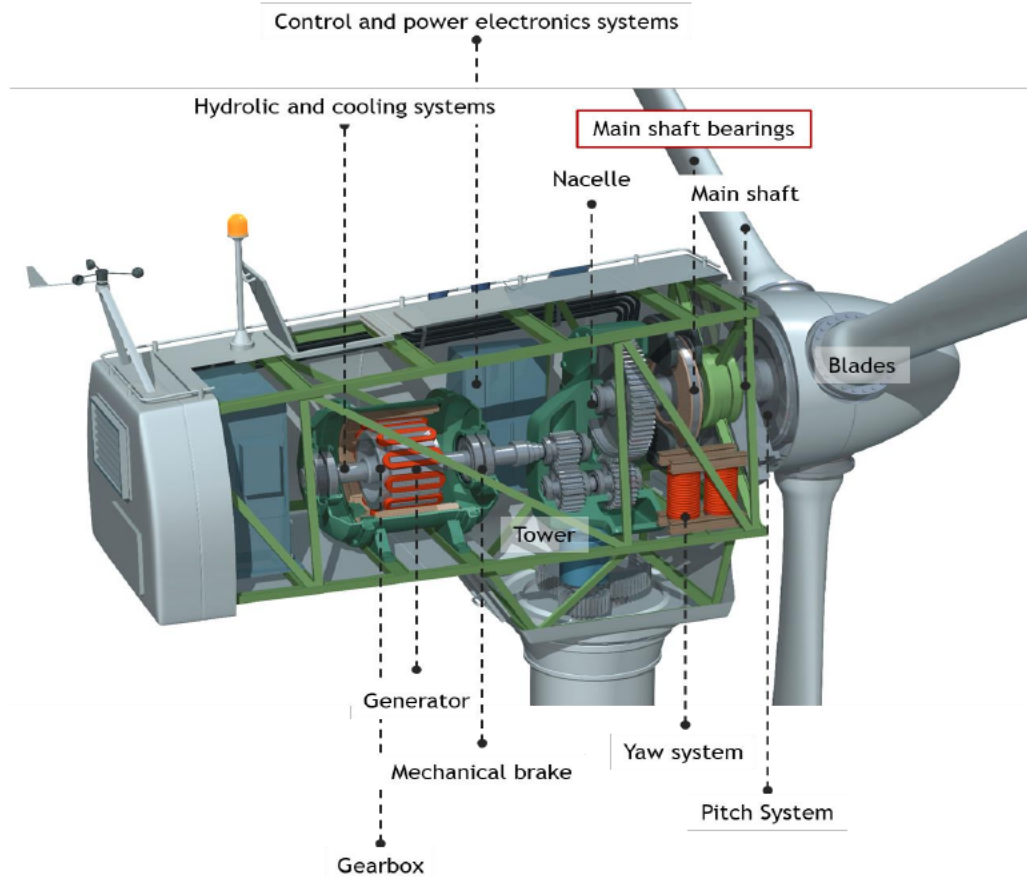
Penetration into high end market to gain market share and ASP improvement

Bearings are one of the most critical and sophisticated components in wind turbines. Due to the complex nature in wind bearings’ raw material and production techniques (see appendix), slewing bearings enjoy one of the highest gross margins among the wind supply chain. Historically overseas makers dominate in high end markets such as main bearings, which is more complex and critical in wind turbines. Domestic players’ product is concentrated in pitch and yaw bearing. However, with years of R&D efforts and global collaboration, we expect domestic players to gradually gain market share and penetrate into the high end market, on the back of cost efficiencies and improved product quality. For example, Xinqianglian has been already capable in producing wind bearings for 3MW size turbines. They have also started to supply 5.5/6.25MW main bearings to Mingyang.

Meanwhile, we continue to see a growing share of larger-size wind turbines (6/8S) in the shipment of leading turbine makers. The 6/8S turbine requires larger size and more sophisticated slewing bearings to support its rotation movement, thus we note the average ASP of slewing bearing has risen from Rmb42k/unit in 2017 to Rmb116k/unit in 2021 on the back of improved bearing mix.

Exhibit 49: Main shaft bearing is an important component in wind turbine

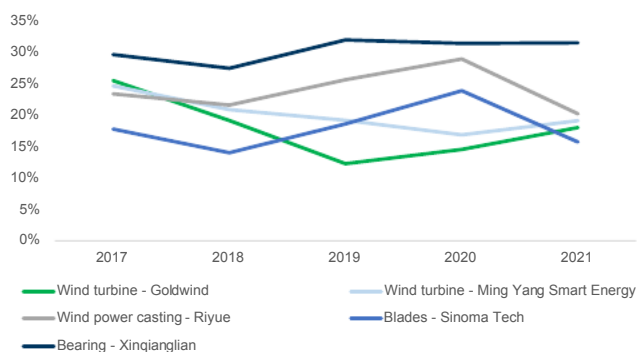
Wind turbine components



Source: Company data

Exhibit 50: Leading bearing manufacturer Xinqianglian has higher gross margins

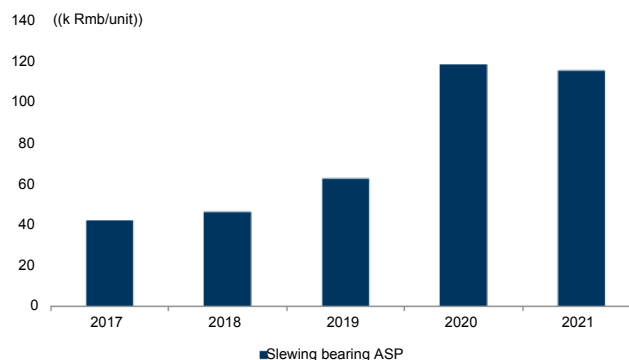
Major wind power components producer's gross margin



Source: Company data

Exhibit 51: Xinqianglian's slewing bearing ASP has increased at a cagr of 29% over 2017-2021

Xinqianglian's slewing bearing ASP



Source: Company data, Gao Hua Securities Research

Rising offshore application

Following the installation spike, we expect slower 2022 offshore wind demand (like the onshore wind trend in 2021), but we expect off-shore installation to see strong growth in 2023 on the back rapid cost-reduction and large project pipelines. With these growth drivers, we expect China's offshore wind will grow at a 59% CAGR over 2022E to 2025E.

Offshore wind possesses the advantage of rich wind resources, high utilization hours, non-occupation of land, and is suitable for large scale development. According to IEA and World Bank Group, installation of 1GW offshore wind can reduce carbon emission by 3.5mn tons each year. The development potential of global offshore wind power technology is 71TW, and offshore wind energy resources are more than ten times the global electricity demand. Only 1% of offshore wind energy resources can be developed to meet 10% of electricity demand.

With China's subsidy support on offshore wind installation, we have seen installation CAGR growing from 41% CAGR over 2011-2015 to 57% CAGR over 2016-2020, making China one of the fastest growing offshore wind installation countries globally. In June 2014, the NDRC announced the aim to promote the healthy development of the offshore wind power industry. Benchmark FiT (Feed-in tariff) are categorized by offshore wind power projects (0.85 Rmb/kWh) and intertidal wind power projects (0.75 Rmb/kWh), 102-129% higher than coal-fired FiT. In 2019, NDRC changed the FiT subsidy from the current statutory FiT to max FiT for wind projects approved in 2019 and after. Offshore wind FiT is determined by competitive auction process. Max FiT of offshore wind projects in near-sea zone is 0.8 Rmb/kWh in 2019, which will be further decreased to 0.75 Rmb/kWh effective from 2020. Offshore projects approved before the end of 2018 can enjoy the approved FiT if completed construction before the end of 2021-end.

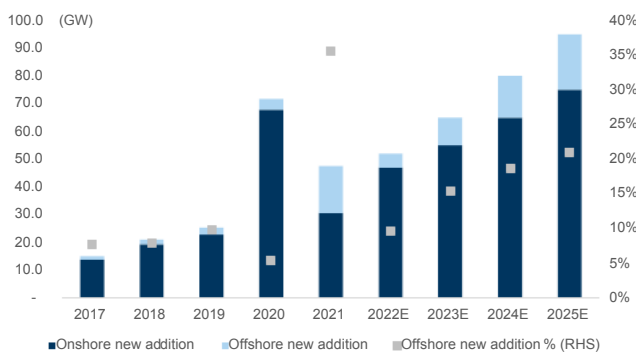
This change in the FiT scheme means that 2021 was the last year for national subsidy of offshore wind and triggered a rush installation of 16.9GW in 2021, up 452% yoy.

Following the installation spike, we expect a slower 2022 offshore wind demand (just as onshore wind trend in 2021), but we expect off-shore installation to see strong growth in 2023 on the back rapid cost-reduction and large project pipelines. We expect China’s offshore wind will grow at 59% CAGR over 2022E to 2025E.

In addition, our EU team’s Assessing the dynamics in global offshore report outlined that based on official government capacity targets, the offshore market could enjoy auctions of +18 GW pa (ex-China) until 2025. This compares with average auctions during 2017-19 of c.7 GW. By 2026, our EU team anticipates a substantial acceleration, potentially leading to average auctions of +32 GW pa through to 2045 (c.€75 bn capex pa). They derive the estimates by assuming that (by 2050) offshore will achieve a 25% share in the European mix, and of c.10% elsewhere. In the RepowerEU plan, they also mention that offshore wind enhances significant growth opportunities in EU, and they see EU as the global leader in offshore wind. We expect global offshore wind installation will grow at 10% CAGR over 2022E to 2025E.

Exhibit 52: China offshore wind new installation accounts for 36% in 2021

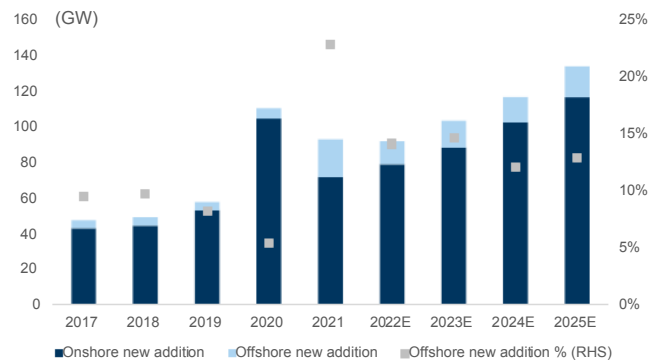
China historical and forecast wind installation



Source: NEA, Gao Hua Securities Research

Exhibit 53: Global offshore wind new installation accounts for 23% in 2021

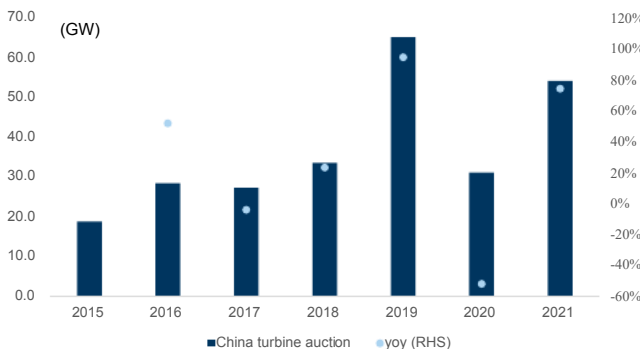
Global onshore and offshore wind new installation mix



Source: IRENA, Goldman Sachs Global Investment Research

Exhibit 54: China wind auction was up 74% in 2021

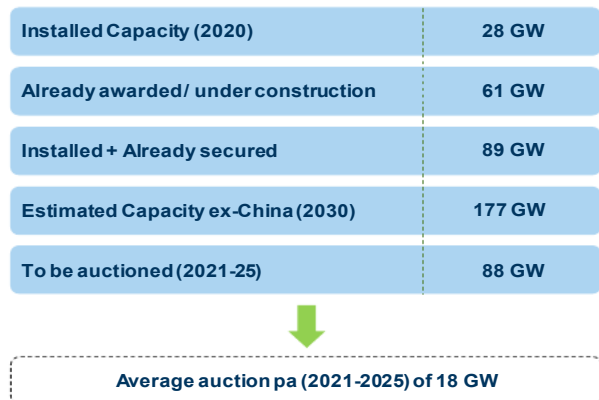
Historical China wind turbine tender volume



Source: Company data

Exhibit 55: Our European team estimates average annual auctions of +18 GW between 2021-25

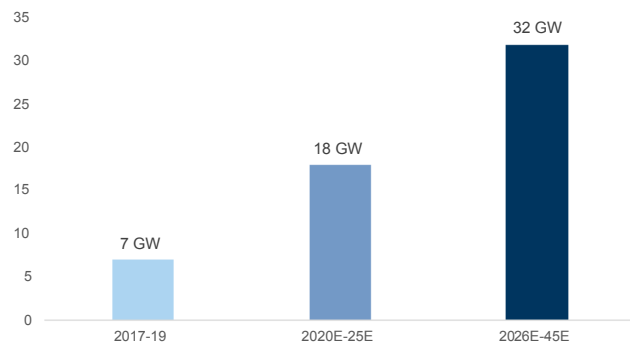
Offshore wind installation forecast



Source: Goldman Sachs Global Investment Research

Exhibit 56: Our European team estimates average auctions could accelerate to 32 GW pa between 2026 and 2045, from 18 GW between 2021-2025

Average annual auctions ex-China (GW)



Source: Goldman Sachs Global Investment Research

Exhibit 57: Many provinces have set offshore wind development plan during 14th FYP period, Guangdong, Zhejiang and Shandong have rolled out offshore wind subsidy policies

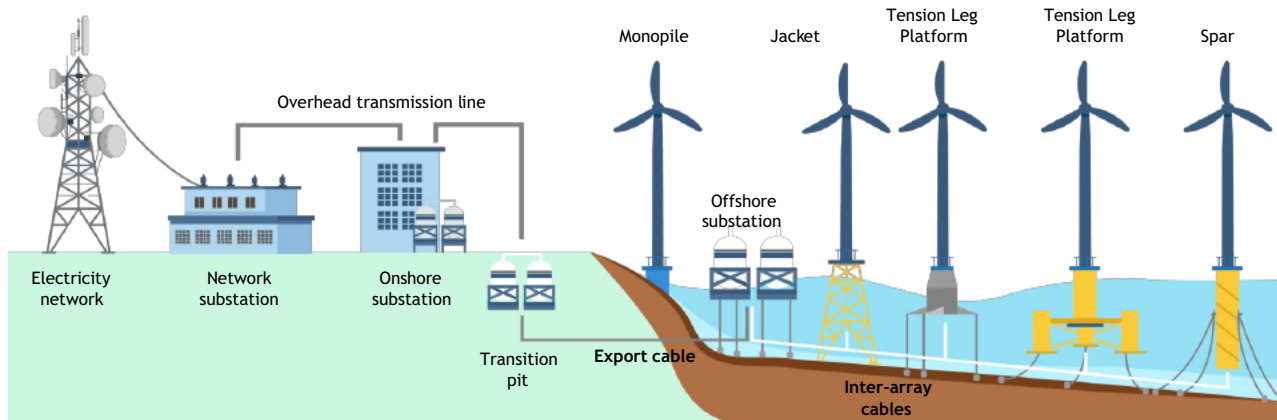
Local offshore wind supportive policies and subsidy table

Province	14th FYP for offshore wind installation (GW)	Subsidy policy
Guangdong	18.0	Rmb1.5/1.0/0.5 k/kW for grid connection projects in 2022/23/24
Jiangsu	12.1	
Zhejiang	4.6	In 2022 and 2023, the provincial subsidies for offshore wind power will be limited to 0.6GW and 1.5GW respectively, and the subsidy standards will be Rmb0.03/kWh and Rmb0.015/kWh respectively
Fujian	10.3	
Shandong	8.0	Rmb0.8/0.5/0.3 k/kW for grid connection projects in 2022/23/24 with total subsidized scale of 2.0/3.4/1.6GW
Guangxi	3.0	
Total	56.0	

Source: NDRC

Exhibit 58: Submarine cable plays an important role in offshore wind

Submarine cable illustration



Source: Gao Hua Securities Research

Submarine cable: Riding on China’s offshore wind development

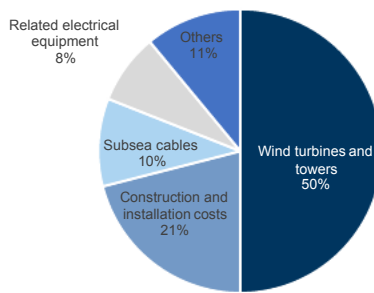
Submarine cable is a conductor wrapped with insulating materials and laid on the seabed and underwater for power and signal transmission. Submarine cable is a critical part in offshore wind power generation, and accounts for 10-12% of total offshore wind investment. Submarine cable faces high barriers to entry, longer capacity expansion cycle and verification process. According to Grand View Research, the global submarine cable TAM was USD23.4bn in 2020, and is expected to grow at a CAGR of 7.1% from 2020 to 2027. Of which, the submarine cable market for offshore wind is the largest,

accounting for 45% of total submarine cable market. For China submarine cable market, we expect to see a total TAM of Rmb100bn or c.USD15bn over 2022-25 with a 59% CAGR on the back of rapid off-shore wind installation. There are two major categories of offshore wind submarine cables:

- **Array cable:** Used for connecting wind turbines to the substation. We see a trend of array cable shifting from 35kv to 66kv as wind turbines are moving towards larger MW and can have lower transmission loss.
- **Export cable:** Used for transmitting power from substation to onshore network, and include both AC (alternate current) and DC (direct current) cables. The voltage of AC export cable is usually 110/ 220kV, and we note that the higher voltage, the more difficult to make and only leading cable makers are able to produce 220kV cables. DC cables are mostly used for longer distance and larger amount power transmission. Usually lower voltage cables are three cores, and higher voltage cables are single core (see exhibit below).

Exhibit 59: Subsea cable accounts for around 10% of offshore wind investment

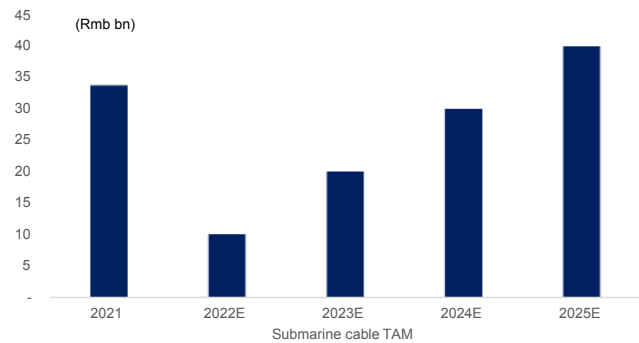
Offshore wind investment distribution



Source: Company data

Exhibit 60: For China submarine cable market, we expect the TAM to grow 59% CAGR of 2022-25 on the back of rapid off-shore wind installation

Historical and forecast submarine TAM



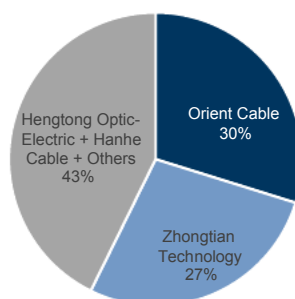
Source: NEA, Gao Hua Securities Research

Leaders best positioned to ride on robust demand

With the announcement of [China Manufacture 2025](#) and [New Infrastructure](#) strategies, China’s submarine cable industry has entered a rapid growth era. The localization has brought reduction in investment costs for State Grid and power companies, and also improved the submarine cable manufacturing technology. Domestic submarine cable is a quite consolidated market, with CR2 (consolidation ratio) over 50%. Of which, Orient cable accounts for c.30% in 2021, followed by Zhongtian Technology (accounts for c.27%). Due to technology requirements and a longer capacity expansion cycle, submarine cable presents a high entry barrier for new comers. In addition, wind operators usually put high standards on submarine cable, with a strict verification process; thus,once cooperation has been established, it is usually long lasting. We believe that leading submarine cable makers, with their pioneer advantage, strong R&D and financing capability, will be best-positioned to ride on robust demand.

Exhibit 61: Orient cable accounts for around 30% of subsea market share as of 3Q21

Subsea cable market share distribution



Source: Company data

Initiate at Buy on Mingyang, Xinqianglian, Orient Cable at Buy, at Neutral on Three Gorges Renewables

We initiate coverage on four wind names in China, which include both upstream leading manufacturers and downstream operators. We expect leading players with strong pricing power and cost leadership to stand out as the wind sector enters the new grid-parity era. While rising competition and supply chain disruptions could disrupt the accelerating demand growth trend, we see leaders with exposure to 3 key tailwinds – turbine upgrades, import substitution and rising off-shore applications – as more resilient to unfavorable headwinds in the industry. Furthermore, we believe strong pricing power and cost leadership will be their key stand out differentiators.

We use EV/EBITDA to value wind names, adjusting multiples for earnings visibility

Orient Cable: We use an 18x 2025E EV/EBITDA (in line with the historical average of Orient Cable's peer group), discounted back to 2023E at an 8.5% COE, to derive our 12m TP of Rmb107, implying 54% potential upside.

Mingyang: We use a 14x 2025E EV/EBITDA (in line with the historical average of Mingyang's peer group), discounted back to 2023E at an 8.5% COE, to derive our 12m TP of Rmb40, implying 69% potential upside.

Xinqianglian: We use an 18x 2025E EV/EBITDA (in line with the historical average of XQL's peer group), discounted back to 2023E at an 8.5% COE, to derive our 12m TP of Rmb118,, implying 44% potential upside.

Three Gorges Renewables: We derive our 12m TP of Rmb6.65 by taking the average DCF and EV/EBITDA:

- **10-year DCF model:** 2023E-2032E net operating profits with unlevered free cash

flow, terminal growth rate of 2%, and WACC of 6.2% to derive a per share value of Rmb6.3/sh; and

- **12X 2025E EV/EBITDA** (in line with the historical average of Three Gorges Renewables' peer group), discounted back to 2023E at 8.5% COE, to derive a per share value of Rmb7/sh.

We believe DCF is an appropriate methodology to value Three Gorges Renewables given the company's growth outlook and limited operational history.

Our TP implies 18% upside potential.

Exhibit 62: 12-month TP summary

	Mingyang 601615.SH	Xinqianglian 300850.SZ	Orient Cable 603606.SH	Three Gorges Renewables 600905.SH
2022 EV/EBITDA	9.8	28.0	31.1	13.5
2023 EV/EBITDA	7.0	20.7	19.7	12.3
22-25E NI cagr	27%	38%	46%	18%
22-25E EBITDA cagr	25%	36%	44%	14%
Historical average	6.4	24.4	22.0	14.3
Peers' average	14.0	18.0	18.0	12.0
Target multiple	14.0	18.0	18.0	12.0
Benchmark	Historical average for peer group		Historical average for peer group and DCF	
Target price	40.0	118.0	107.0	6.7
Current Price	23.7	82.2	69.3	5.6
Price currency	CNY	CNY	CNY	CNY
Upside	69%	44%	54%	18%
Rating	Buy	Buy	Buy	Neutral
Implied 2023 EV/EBITDA	12.0	28.0	30.0	13.0
Implied 2024 EV/EBITDA	9.0	20.0	22.0	11.0
Implied 2023 PE	19.9	41.0	39.0	19.2
Implied 2024 PE	15.4	30.0	28.0	15.7
<i>Price as of 2022/10/10</i>				

Priced as of Oct 10, 2022; TPs are based on a 12-month time frame.

Source: Wind, Company data, Gao Hua Securities Research

Exhibit 63: Valuation comps

Ticker	Company	Mkt Cap USD Mn	Price Loc cur	EV Loc cur	P/E 2022E	2023E	P/B 2022E	2023E	2021	ROE 2022E	2023E	Gearing 2020	2021	2021	EV/EBITDA 2022E	2023E
Wind turbine manufacturer																
2208.HK	XINJIANG GOLD-H	6,298	7.88	74,329	9.22	7.68	0.87	0.81	10%	10%	11%	49.60	60.92	32.22	18.61	14.52
002202.SZ	XINJIANG GOLD-A	6,298	11.32	94,832	13.11	10.92	1.24	1.15	10%	10%	11%	83.31	92.25	36.23	22.91	17.72
VWS.CO	VESTAS WIND SYST	18,031	137.10	20,769	NA	40.68	4.68	4.25	4%	-21%	11%	(40.83)	(25.55)	23.10	36.53	11.74
SGREN.MC	SIEMENS GAMESA R	11,811	17.90	14,532	NA	NA	3.08	3.44	-13%	-22%	-14%	9.17	26.57	44.01	201.72	136.37
NDXG.DE	NORDEX SE	1,599	7.79	1,164	NA	NA	1.45	1.97	-25%	-45%	-16%	16.71	(31.31)	36.54	NA	43.23
603218.SS	RIYUE HEAVY IN-A	2,788	20.71	23,464	39.21	21.03	2.21	2.03	8%	6%	10%	(49.00)	(19.11)	40.14	24.81	13.96
601615.SS	MING YANG SMAR-A	7,734	24.48	74,329	14.28	11.83	2.48	2.10	19%	19%	19%	(7.06)	17.93	9.02	9.38	6.69
Average					18.96	18.43	2.29	2.25	2%	-6%	4%					
Median					13.11	11.38	1.97	2.03	7%	-6%	11%					
Wind bearing manufacturer																
603985.SS^	JIANGYIN HENGR-A	1,425	23.23	11,437	20.59	14.69	2.44	2.44	17%	12%	0%	30.75	(41.25)	16.14	26.48	26.48
NTNX^^	NUTANIX INC - A	4,602	20.27	3,398	18.99	15.87	0.70	0.68	-7%	4%	4%	NA	NA	12.59	9.45	6.98
SKFB	SKF AB-B SHARES	6,255	154.85	82,338	13.03	10.53	1.52	1.44	19%	12%	14%	8.92	12.25	8.44	6.32	5.71
300850.SZ	LUOYANG XINQIA-A	3,780	82.42	31,177	40.71	28.27	6.69	5.48	21%	18%	21%	(4.13)	12.50	21.10	27.27	19.37
Average					23.33	17.34	2.84	2.51	12%	11%	10%					
Median					19.79	15.28	1.98	1.94	18%	12%	9%					
Submarine cable																
002498.SZ^	QINGDAO HANHE-A	1,772	3.84	14,274	16.00	12.00	1.79	1.79	NA	12%	0%	(24.44)	(14.14)	NA	NA	NA
600522.SS^	ZHONGTIAN TECH-A	10,692	22.53	77,921	20.28	16.41	2.52	2.52	1%	13%	0%	8.63	(14.08)	25.79	13.17	13.17
PRY	PRYSMIAN SPA	7,974	30.70	9,450	12.92	12.91	2.40	2.11	12%	19%	12%	81.63	57.36	10.26	7.71	7.46
603606.SS	NINGBO ORIENT -A	6,774	70.81	50,789	40.30	25.44	8.19	6.39	30%	22%	28%	8.41	1.30	12.20	30.37	19.27
Average					22.38	16.69	3.72	3.20	14%	17%	10%					
Median					18.14	14.66	2.46	2.32	12%	16%	6%					
Wind operator																
0916.HK	CHINA LONGYUAN-H	16,674	9.05	199,118	10.12	8.61	1.19	1.07	11%	12%	13%	129.09	131.10	9.50	7.23	6.60
1798.HK^	CHINA DATANG C-H	1,770	1.72	75,102	6.88	5.79	0.84	0.84	7%	12%	0%	185.07	175.78	8.33	7.59	7.59
EDPR.LS	EDP RENOVAVEIS S	19,280	20.72	29,300	58.00	52.57	1.82	1.71	8%	4%	4%	48.26	36.71	14.40	17.40	16.56
600905.SS	CHINA THREE GO-A	22,813	5.73	295,417	18.84	16.28	2.06	1.85	10%	12%	12%	167.11	113.63	19.13	13.53	12.28
Average					23.46	20.81	1.48	1.37	9%	10%	7%					
Median					14.48	12.44	1.51	1.39	9%	12%	8%					

Note: ^ denotes Not Covered companies; ^^ denotes Coverage Suspended companies, data for Not Covered companies is from Bloomberg; priced as of 10/10/2022.

Source: Goldman Sachs Global Investment Research, Gao Hua Securities Research, Bloomberg

Mingyang Smart Energy Group (601615.SS): Leading large-size turbine migration; initiate at Buy

601615.SS	12m Price Target: Rmb40	Price: Rmb23.72	Upside: 68.6%		
Buy	GS Forecast				
		12/21	12/22E	12/23E	12/24E
Market cap: Rmb53.9bn / \$7.5bn	Revenue (Rmb mn) New	27,158.0	36,530.2	46,346.5	56,804.4
Enterprise value: Rmb47.9bn / \$6.7bn	Revenue (Rmb mn) Old	--	--	--	--
3m ADTV :Rmb1.4bn/ \$200.8mn	EBITDA (Rmb mn)	3,706.8	5,104.7	6,384.0	7,928.2
China	EPS (Rmb) New	1.60	1.66	2.01	2.59
China Clean Energy	EPS (Rmb) Old	--	--	--	--
	P/E (X)	13.4	14.3	11.8	9.1
M&A Rank: 3	P/B (X)	2.3	2.5	2.1	1.7
Leases incl. in net debt & EV?: No	Dividend yield (%)	1.0	1.1	1.3	1.6
	CROCI (%)	116.3	52.9	47.3	60.3
		3/22	6/22	9/22E	12/22E
	EPS (Rmb)	0.68	0.50	0.33	0.15

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10 Oct 2022 close.

Key debates and how we differ

■ Can Mingyang maintain its margin resilience following a sector-wide turbine price decline 2021?

We expect Mingyang's margin resilience to be driven by: 1) product mix improvement; and 2) its more vertically integrated business model. Mingyang had the highest shipment contribution from larger size turbines (5-6MW+) in 2021 compared with peers. With its strong offshore and large-size turbine offerings, we continue to see rising shipment contribution from larger size turbines (6MW+), growing from 2% in 2020 to 31% in 2021 (by sales volume in MW). We expect this number to continue to grow to 52% by 2025 as the company is well-positioned to ride on China's rising off-shore/large-size turbine demand in our view. We expect its blended ASP to decline 8% from 2021-25 vs the -26% average turbine tender price decline in 2021. Mingyang is able to internally produce wind blades, frequency converters and key controlling systems to reduce production cost which play critical roles in determining turbine quality. For blades in particular, Mingyang has a complete design and development capability for blade aerodynamics, blade structure and blade load. Frequency converters and blades account for c.4% and c.17% of turbine cost as of 2021. We expect its product mix improvement and vertically integrated model to drive its turbine margin to grow from 19.6% in 2022 to 22.3% in 2025. Our sensitivity analysis shows that a 5% increase of wind turbine ASP, or a 5% increase wind turbine unit cost, will result in a 36%/-32% increase/decrease in net income.

■ **Can Mingyang maintain its market share as new entrants enter the sector?**

With its sector-leading R&D strength and in-depth understanding of diversified needs from different types of wind projects, Mingyang has developed a complete turbine product-line, ranging from 1.5MW to 7MW onshore wind turbines, to 5.5MW to 11-16MW offshore wind turbines; it also includes more innovative compact semi-direct drive turbines. According to Totaro and Associates, Mingyang is a leader in offshore wind innovation with the largest offshore wind energy IP asset ownership share among global peers. We expect Mingyang to be well-positioned to ride on strong large-size/offshore demand and record a 29% and 24% wind turbine shipment and revenue CAGR over 2022-25 on the back of its innovative and high cost performance product solutions; we expect its China market share to increase from 14% in 2021 to 18% in 2025.

Leader in large-size/off-shore turbines. Founded in 2006, Mingyang Smart Energy is the third largest wind turbine manufacturer in China, accounting for 14%/6% of China and global market share in 2021 per Bloomberg BNEF. The company boasts the highest exposure to large-size/off-shore turbines with continued innovation on new product launches. Mingyang's 6S turbine's shipment mix (by sales volume in MW) increased from 2% in 2020 to 31% in 2021. We expect this number to continue to grow to 52% by 2025 as the company is well-positioned to ride on China's rising off-shore/large-size turbine demand in our view.

High-quality low-cost product offering built on strong R&D to grow market share and revenue. With its sector-leading R&D strength and in-depth understanding of diversified needs from different types of wind projects, Mingyang provides both onshore (1.5MW to 7MW) and offshore wind turbines (5.5MW to 11-16MW), as well as more innovative compact semi-direct drive turbines. We forecast a record wind turbine shipment/revenue CAGR of 29%/24% over 2022-25, on the back of its innovative and high cost performance product solutions. We look for it to lead the sector migration towards large-size turbines in the new grid-parity era and forecast its China market share to increase from 14% in 2021 to 18% in 2025 per our estimates.

Vertical integration and improved product mix drive LT GM expansion. Mingyang's average gross margin was 2.7% higher than its peers in the past 5 years, mainly due to: 1) Vertically integrated business model. Mingyang is able to internally produce wind blades, frequency converters and key controlling systems to reduce production cost. 2) Offshore large-size wind turbines to improve product mix. Thanks to an improving product mix its turbine margin improved by 2.3ppt YoY to 19.2% in 2021 as its higher-margin 6S turbine mix increased from 2% in 2020 to 31% in 2021. Going forward, we expect the company's gross margin of turbine will improve from 19% in 2021 to 22% in 2025E despite a -26% sector-average turbine tender price decline in 2021, on the back of both continued product mix improvement and vertical integration.

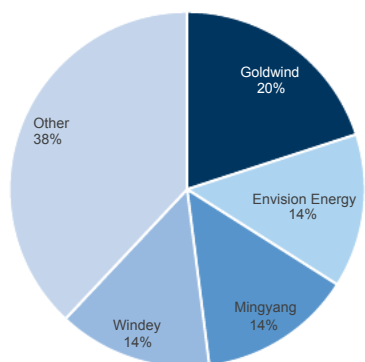
Leading sector migration towards large-size turbine solution; initiate at Buy. We expect the company to be well positioned to ride on rising off-shore/large turbine demand and record 27% net income CAGR over 2022-25E; our 2024 net income estimates are 11% higher than consensus. We use 14x 2025E EV/EBITDA (in line with

the historical average of Mingyang’s peer group), discounted back to 2023E at 8.5% COE, to derive our 12m TP of Rmb40.

Leader in large-size/off-shore turbines

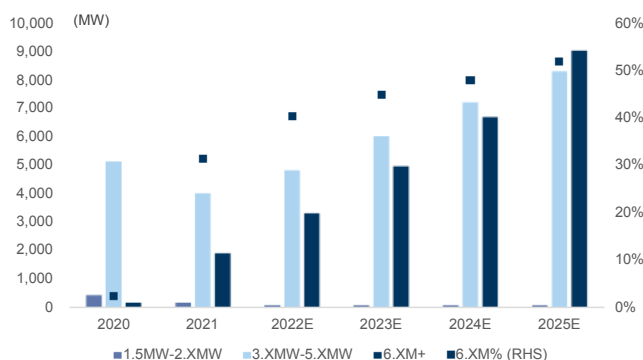
Founded in 2006, Mingyang Smart Energy is the third largest wind turbine manufacturer in China, accounting for 14%/6% of China and global market share in 2021. 90%+ of its revenue is from wind turbine sales as of 2021. The company is also involved in wind farm operation and high-efficiency solar cell manufacturing. Thanks to its strong R&D strength, Mingyang has developed an industry leading semi-direct drive wind turbine solution, providing the company with a strong competitive advantage in moving towards large size/offshore wind turbines. We see the company’s 6S turbine’s shipment mix (by sales volume in MW) increased from 2% in 2020 to 31% in 2021. Riding on the strong global wind outlook (both our global team and ours), we expect Mingyang’s sales volume will grow at a 29% CAGR over 2022-2025E, which will drive its revenue to grow at 24% CAGR. We expect the vertical integration of blade manufacturing will continue to drive cost reduction for the company, and expect its turbine gross margin to grow to 22% in 2025E, and net income to grow at 27% CAGR.

Exhibit 64: Mingyang is the third-largest wind turbine manufacturer in China, accounting for 14% of China market share in 2021
2021 wind turbine market share distribution in China



Source: Wood Mackenzie

Exhibit 65: Its 6S turbine shipment mix (by sales volume in MW) increased from 2% in 2020 to 31% in 2021
Sales volume breakdown



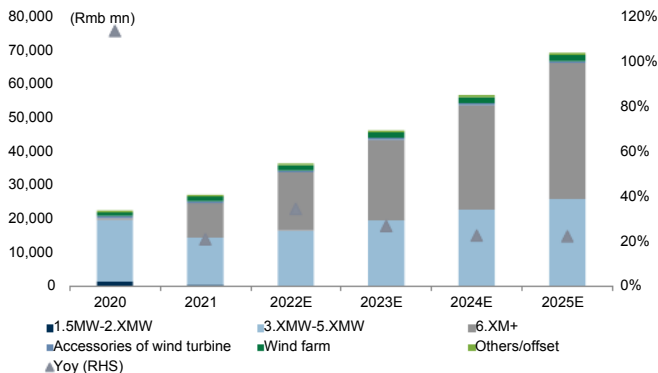
Source: Company data, Gao Hua Securities Research

High-quality low-cost product offering built on strong R&D to grow market share and revenue

With its sector-leading R&D strength and in-depth understanding of diversified needs from different types of wind projects, Mingyang provides a complete turbine product-line, ranging from 1.5MW to 7MW onshore wind turbines, to 5.5MW to 11-16MW offshore wind turbines, as well as more innovative compact semi-direct drive turbines. We view the company as well-positioned to ride on strong wind demand and record a 29% and 24% wind turbine shipment and revenue CAGR over 2022-25, on the back of its innovative and high cost performance product solutions. We forecast its China market share to increase from 14% in 2021 to 18% in 2025.

Exhibit 66: We expect Mingyang to post a revenue CAGR of 24% in 2022-25E

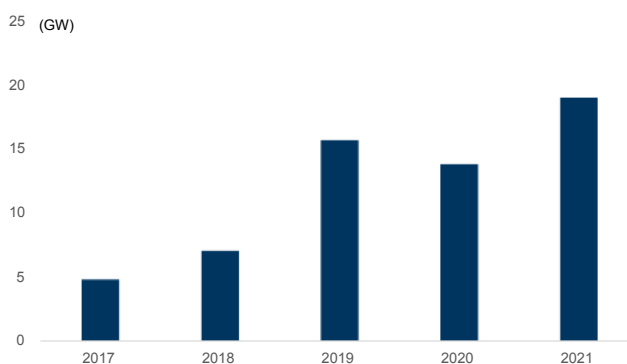
Historical and forecast revenue



Source: Company data, Gao Hua Securities Research

Exhibit 67: As of 2021, Mingyang's order backlog was 19.07GW, up 37.39% yoy

Mingyang's order backlog



Source: Company data

High-quality low-cost product offering built on strong R&D strength

Mingyang's turbines range from 1.5MW to 7MW onshore wind turbines, to 5.5MW to 11-16MW offshore wind turbines. For each series of wind turbines, it also comes with different blade lengths, to accommodate the wind resources in different applications. The company has also rolled out turbines for ultra low temperature, coastal and anti-typhoon situations:

- Innovative ultra-compact semi-direct drive solution:** Mingyang's MySE wind turbines adopt the ultra-compact semi direct-drive technology which combines the advantages of direct-drive and doubly fed drive. It features smaller size, lighter weight and higher stability compared with direct drive and doubly fed wind turbines. MySE wind turbine includes a two-stage gearbox (transmission rate is c.98.5%) and a medium-speed permanent magnet generator (transmission rate is c.98.3%). Two-stage gearbox could increase the speed of the permanent magnet generator. Wind turbines using ultra-compact semi-direct drive technology could generate approximately 5% more electricity than other solutions, per the company. In addition, by adopting Mingyang's ultra-compact transmission chain technology, the load transmission path is shorter, which can effectively reduce the load on the gearbox and generator, greatly improving reliability of the turbine.
- Ultra long blade solution:** While most wind turbine makers do not have independent blade manufacturing capacity, Mingyang has a complete design and development capability for blade aerodynamics, blade structure and blade load. The in-house production of blades helps Mingyang to better integrate with its turbine R&D initiatives. The company has also actively explored more advanced blade technology such as segmented blade technology and carbon glass blending technology. The company's self-developed segmented blade design technology has completed the sample verification of 58.8M blades, and obtained DNVGL certification, which is qualified for mass production. By changing the ratio of carbon yarn and glass fiber, the modulus can be changed linearly from 46GPa to 120GPa, which provides the possibility for design, optimization, weight reduction, cost reduction, and enables them to meet the design requirements of large blades for

the current pure glass fiber modulus. The MySE16-242 model released by the company in 2021, using a 118-meter-long carbon fiber hybrid blade, won the second place in Windpower Monthly’s 2021 Global Best Wind Power Blade.

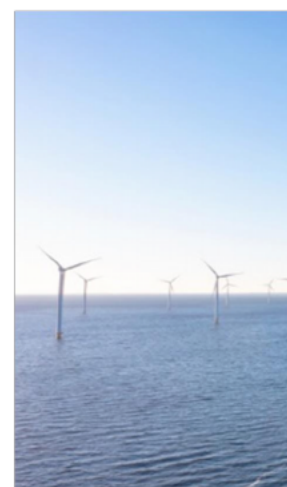
- Deep ocean floating wind turbine:** With extensive wave data collection, innovative research and development of offshore wind turbine solutions, Mingyang has laid a solid semi-submersible and innovative floating foundation with reasonable load transfer, safe structure and stable motion response turbine products. In 2021, the “Three Gorges Leader,” which was installed with MySE5.5 floating wind turbine was officially connected to the grid for power generation on December 7, 2021, becoming the first floating wind turbine to be put into commercial operation in the Asia-Pacific region. The MySE5.5 offshore wind power floating wind turbine can meet the normal household electricity consumption of 11,000 families of three for one year, and is expected to reduce carbon dioxide emissions by about 20,000 tons annually, according to the company.

Exhibit 68: Mingyang has a complete offering of products

Summary of Mingyang’s products (as of 2021)



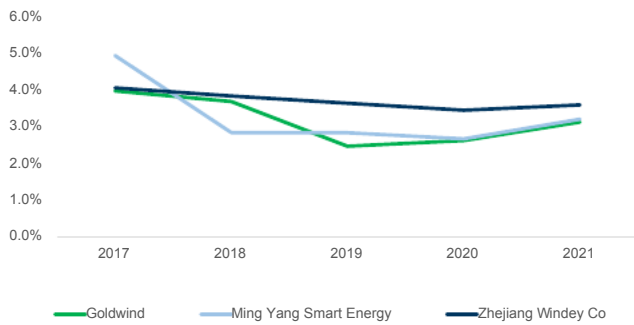
	MySE onshore wind turbine product line	MySE offshore wind turbine product line	
Anti-typhoon, high and medium wind speed area	MySE3.0-112/121	MySE4.0-156	Low wind speed and no typhoon risk area (e.g. Jiangsu, Hebei)
	MySE3.0/3.6-135	MySE6.25-180	
	MySE2.5/3.0/3.2-145	MySE9.0-2.30	
	MySE3.2/4.0/5.0-156	MySE5.5-155	
Medium and low wind speed area	MySE3.6/4.0-166	MySE6.45-180	Low wind speed with typhoon risk area (e.g. Guangdong, Zhejiang, Hainan)
	MySE3.6/4.0-173	MySE8.0-195	
	MySE4.0/5.0/5.56-182	11-230/12-242	
	MySE5.0/5.56-193	MySE7.0/7.25-158	High wind speed with typhoon risk area (e.g. Fujian, Taiwan)
	MySE5.0/5.56-200	MySE8.0/8.3-180	
High wind speed area	MySE5.0/5.2-166	14-16MW Product	Domestic and overseas market
	MySE6.25-172	R&D of 20MW product	
	MySE6.0/6.25/6.7/7.0-182		
	MySE6.0/6.25/6.7/7.0-193		
	MySE6.0/6.25/6.7/7.0-200		



Source: Company data

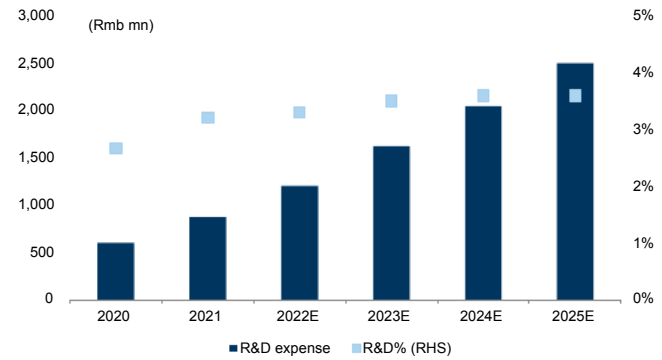
Mingyang invested Rmb197-872mn in R&D expense over 2017-21. We expect it to maintain its high R&D investment and its R&D ratio to remain at high levels during 2022-25E, at 3.3% to 3.6%.

Exhibit 69: Mingyang’s 5-year average R&D ratio is 3.3%
Mingyang R&D comparison with peers



Source: Company data, Wind

Exhibit 70: We expect Mingyang’s R&D ratio to remain at high levels during 2022-25E, at 3.3% to 3.6%
Mingyang’s R&D expense and ratio



Source: Company data, Gao Hua Securities Research

Innovative semi direct-drive solution to drive large-size/off-shore turbine migration

As a leader in off-shore wind solution, Mingyang’s MySE wind turbine series adopting ultra-compact structure design, have advantages of lower turbine weight, smaller size, higher electricity generation efficiency and easy maintenance compared to peers. Besides, MySE wind turbine is equipped with a fully sealed nacelle design and a high-efficiency heat exchanger to ensure reliable offshore anti-corrosion performance. MySE wind turbine is also equipped with the world’s leading “Module-Based Control (MBC) system”; which could realize the automatic optimization of operation. In addition, active yaw systems could track the wind direction, so that the whole machine has minimum load.

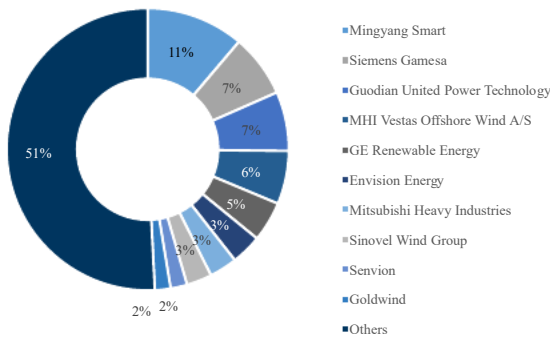
More importantly, Mingyang comprehensively analyzes typhoon wind speed and direction, turbulence intensity, turbine operation status, etc., and integrates the data analysis results into the typhoon resistance design of MySE wind turbines. The company’s R&D team calculates the load of turbine under typhoon conditions by simulating its working conditions, and thus MySE wind turbines meet the requirements of most stringent typhoon environmental conditions. Through years of R&D, the company has acquired the most operational data under typhoon situations in the industry and becomes the “first brand” in typhoon-resistant wind turbines.

Supported by the aforementioned technologies, Mingyang has invented low-cost, high stability and high generation efficiency turbines, and thus enjoys a leading advantage in the offshore/large-size turbine market. Its flagship MySE compact semi-drive offshore wind turbine is well-received by the market. The company’s MySE16.0-242 product has also become the largest offshore wind turbine globally. **With its strong offshore turbine offerings, we continue to see a rising shipment contribution from larger size turbines (6MW+), growing from 2% in 2020 to 31% in 2021 (by sales volume in MW). Mingyang had the highest shipment contribution from larger size turbines (5-6MW+) in 2021 compared with peers. We expect this number to continue to grow to 52% by 2025 as we see the company as well-positioned to ride on China’s**

rising off-shore demand.

Exhibit 71: Mingyang is a leader in offshore wind innovation as of 2016

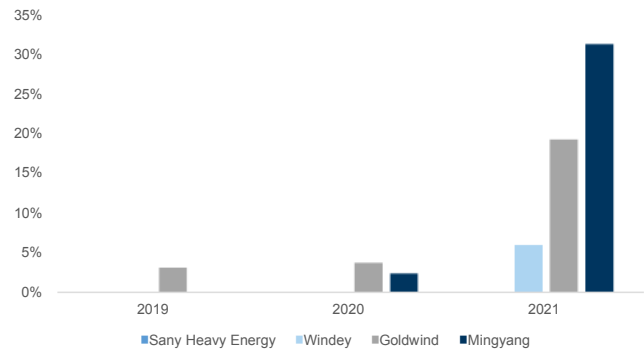
Global offshore wind energy IP asset ownership share



Source: Totaro and Associates

Exhibit 72: Mingyang had the highest shipment contribution from larger size turbines (5-6MW+) in 2021 compared with peers

Shipment contribution from larger size turbines (5-6MW+)



Source: Company data

Exhibit 73: MySE turbine combines the advantage of direct drive and double fed, which has the characteristics of smaller size, lighter weight and higher stability

Basic parameter of MySE6.0MW product line

Model	Unit	MySE5.5-155	MySE7.25/7.0-158	MySE6.45-180	MySE8.3-180
Rated power	kW	5500	7250/7000	6450	8300
Designed wind zone class		IEC IB	IEC IB	IEC S	IEC S
Cut-in wind speed	m/s	3	3	3	3
Rated wind speed	m/s	10.1 (static state)	11.1 (static state)	10.5 (static state)	11.3 (static state)
Cut-out wind speed	m/s	30 (3s Average)	30 (3s Average)	30 (3s Average)	30 (3s Average)
Designed lifetime	year	25	25	25	25
WTGS operating temperature	°C	-10 ~ +40			
WTGS survival temperature	°C	-20 ~ +50			
Adaptable environment		Offshore, Anti-typhoon			

Source: Company data

In addition, we note the company has plans to continue to make progress towards larger size, higher power wind turbines, and explore turbine technology around low wind speed areas and ultra large blade. Mingyang has also actively expanded in its overseas market. It has established three R&D and sales centers in Hamburg, Germany; New York, US and Copenhagen, Denmark. For 2021, the company recorded 455MW overseas orders, 19.74% yoy, mainly from Vietnam and Italy. South East Asia is one of the fastest growing power markets, and also is one of Mingyang’s key overseas markets. We expect its overseas business revenue contribution will grow from 2022 and beyond.

Vertical integration and improved product mix to drive LT GM expansion

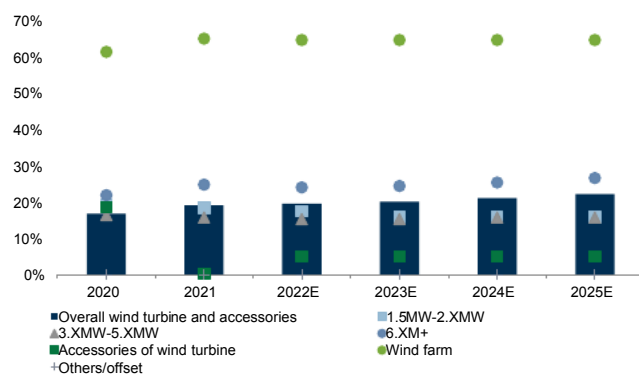
Mingyang’s average gross margin was 2.7% higher than its peers in the past 5 years, mainly due to: 1) Vertically integrated business model. Mingyang is able to internally produce wind blades, frequency converters and key controlling systems to reduce production cost. 2) Offshore large/size wind turbines to improve product mix.

Frequency converters and blades account for c.4% and c.17% of turbine cost, and these two components play critical roles in determining turbine quality. Mingyang has independent R&D and manufacturing capabilities for these core components as well as the ability to conduct integrated modeling and model verification research. For blades in particular, Mingying has a complete design and development capability for blade aerodynamics, blade structure and blade load. We think Mingyang’s vertical integration not only can help it to continue drive cost reduction, but also help the company to better control product quality and further develop high-efficiency turbines. We note Sinoma (leading wind blade maker in China) recorded c.28% GM in the past three years.

Mingyang’s turbine gross margin came in at 19.2% in 2019, but declined to 16.9% in 2020; we think its higher GM in 2019 was mainly due to higher ASP (+11%) thanks to a rush of installations given 2021 was the last year of national subsidies for offshore wind which triggered a spike in installations for onshore wind. The rush installation has driven up its average turbine ASP by 11% to Rmb3,787/MW in 2019, but followed by a -2% ASP decline to Rmb3,702/MW in 2020. Although its 1.5-2MW and 3-5MW product ASP declined -22% to -2% in 2021, its 6S turbine mix has increased from 2% in 2020 to 31% in 2021, which helped its blended turbine ASP to increase by 13% to Rmb4,186/MW in 2021, and also lifted its GM by 2.3ppt to 19.2%. Going forward, we expect the company’s gross margin of turbine will improve from 19% in 2021 to 22% in 2025E despite a -26% sector-average turbine tender price decline in 2021, on the back of both product mix improvement and vertical integration. Our sensitivity analysis shows that a 5% increase of wind turbine ASP, or a 5% increase of wind turbine unit cost, will result in a 36%/-32% increase/decrease in net income.

Exhibit 74: We expect Mingyang’s gross margin for wind turbine to reach 22% in 2025E

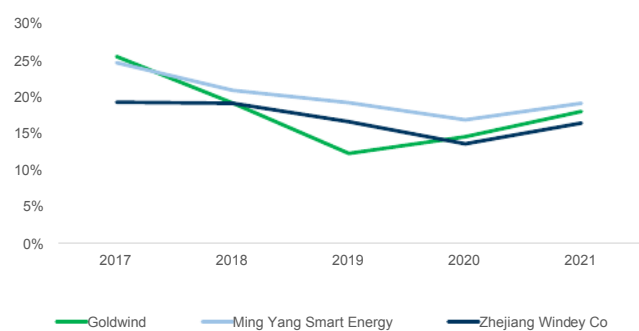
Historical and forecast gross margin



Source: Company data, Gao Hua Securities Research

Exhibit 75: Mingyang’s average gross margin was 2.7% higher than its peers in the past 5 years

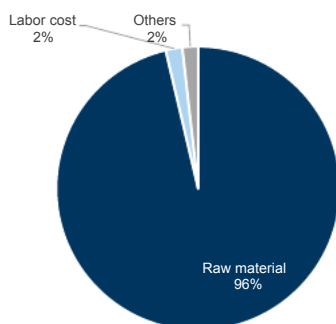
Mingyang’s turbine GM comparison with peers



Source: Company data, Wind

Exhibit 76: Raw materials accounted for c.96% of Mingyang’s wind turbine cost in 2021

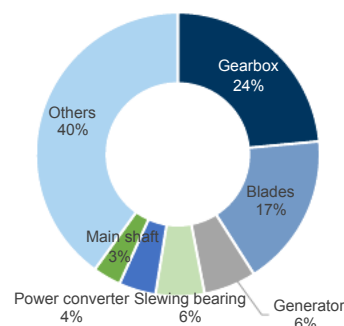
Mingyang’s wind turbine cost breakdown



Source: Company data

Exhibit 77: Gearbox and blades account for c.24% and c.17% of wind turbine costs

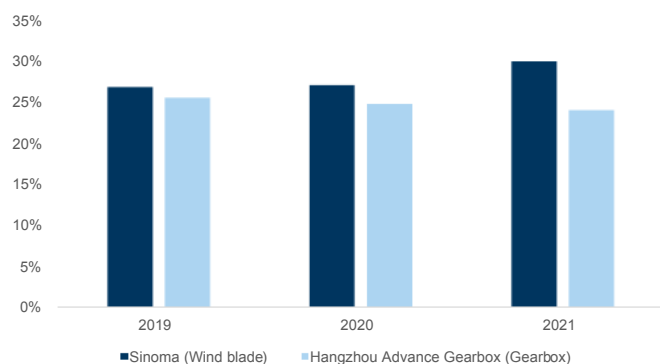
Wind turbine cost breakdown as of 2021



Source: Company data

Exhibit 78: Sinoma (wind blade maker) and Hangzhou Advance Gearbox (gear box maker) recorded c.28% and c.25% GM in past three years

GM of Sinoma and Hangzhou Advance Gearbox



Source: Company data

Exhibit 79: Our sensitivity analysis shows that a 5% increase of wind turbine ASP, or a 5% increase in wind turbine unit cost, will result in a 36%/-32% increase/decrease in net income

Sensitivity analysis of wind turbine ASP and wind turbine unit cost on net income

		Wind turbine ASP (Rmb/kW)				
		-10%	-5%	0%	5%	10%
Wind turbine unit cost (Rmb/kW)	-10%	-7.6%	28.0%	63.6%	99.1%	134.7%
	-5%	-39.4%	-3.8%	31.8%	67.4%	102.9%
	0%	-71.2%	-35.6%	0.0%	35.6%	71.2%
	5%	-102.9%	-67.4%	-31.8%	3.8%	39.4%
	10%	-134.7%	-99.1%	-63.6%	-28.0%	7.6%

Source: Gao Hua Securities Research

Solar and ESS business to diversify its portfolio

In addition to its strong wind turbine segment, Mingyang also taps its footprint into the solar business. In November 2020, the company started its first “wind-solar-thermal-ESS” integrated project in Inner Mongolia, which would build

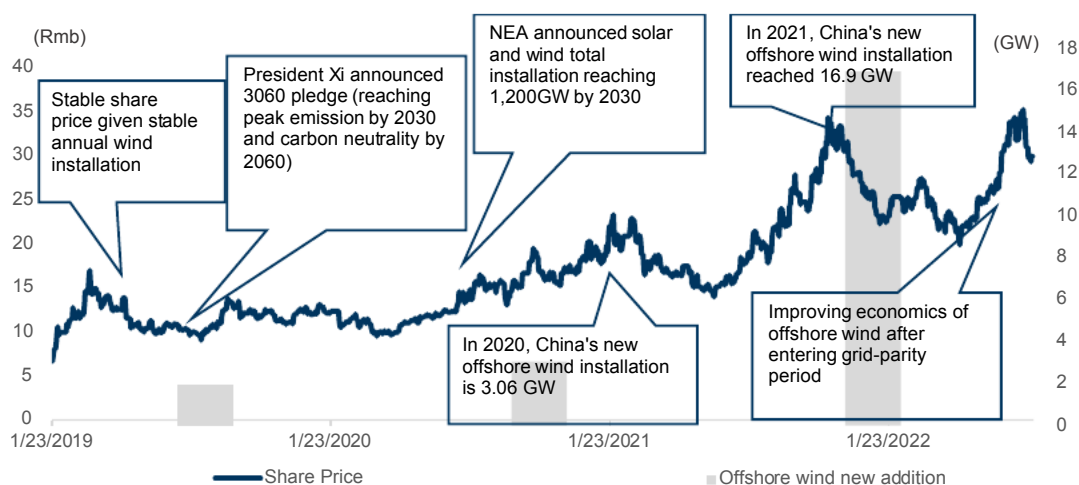
1.7GW wind, 0.3GW solar and paired up with 0.32GW ESS. This project will transform the company from an upstream manufacturer to a consolidated clean energy system provider. In May 2021, Mingyang announced plans to invest Rmb3bn in 5GW HJT cell and 5GW solar module. The project is planned for three phases through 2021 to 2025, with 1GW HJT and module ramp up capacity in 2021 and 2022, and the total project is expected to finish by 2025E. Mingyang has also established CdTe solar module capacity, which is mainly used in the BIPV area, and the product was used in National Speed Skating Hall and the National Museum. In addition, Mingyang also actively explores in other solar, ESS and hydrogen related businesses. We believe these renewable projects will help the company to diversify its business and drive the potential second leg of growth.

Leading large-size/off-shore turbine migration; initiate at Buy

Wind installation and clean energy development in China as well as improving economics of offshore wind show a relatively strong correlation with Mingyang's historical share price fluctuations. Mingyang's share price was relatively stable due to mild offshore wind installation in 2019. Starting from 2H20, the Chinese government released numerous policies and announcements supporting the development of renewable installation. China's '3060' pledge, announced in September 2020, signaled a commitment to reach peak carbon emissions by 2030 and carbon net zero by 2060. Then in April 2021, the National Energy Administration (NEA) published a revised document noting that non fossil fuel sources are expected to reach 25% of primary energy consumption by 2030, with solar and wind total installation reaching 1,200GW, which supported the development of wind power in China and also supported the share price increase during the same period. In 2021, new offshore wind installation reached 16.9 GW (up 452% yoy), which further supported Mingyang's share price growth. After entering grid-parity in 2022 for offshore wind, its share price has performed on rising expectation of off-shore installation.

Exhibit 80: China offshore wind installation shows a relatively strong correlation with fluctuations in Mingyang's share price

Historical share price performance with influencing factors



NEA is National Energy Administration

Source: Company data, Gao Hua Securities Research, Wind, Bloomberg

Valuation

We adopt EV/EBITDA as the primary valuation methodology for our solar and wind coverage, as we have found that historical share prices are highly correlated to EBITDA growth, giving us a reliable and measurable benchmark across the sector. We select the comparable peer group as a valuation reference based on the nature of each company's business. Our peer group consists of Vestas, Goldwind and Longyuan, which are close peers in the wind supply chain. We believe these companies represent an appropriate peer group for Mingyang given their similar business models and industry growth outlooks.

Mingyang is trading at 7x 2023E EV/EBITDA and its peer group's historical average was 14x (avg since IPO). We use 14x 2025E EV/EBITDA (in line with the historical average of Mingyang's peer group), discounted back to 2023E at 8.5% COE, which we use across our coverage companies, to derive our 12m TP of Rmb 40. We chose its peer group to include close peers in the wind supply chain as mentioned above. As the company's historical share price tends to move broadly in line with its EBITDA growth, we believe the historical average EV/EBITDA multiple of Mingyang's peer group offers an appropriate valuation reference, as this period (since its IPO) represents China's wind sector transition from being subsidy driven to cost driven. We expect Mingyang's EBITDA margin will improve from 14% to 14.4% from 2022E to 2025E and thus the target 14x 2025E EV/EBITDA multiple is higher than its current trading multiple. Our target price implies 69% potential upside.

Exhibit 81: Rating and TP summary

Company	Rating	Price currency	Current price	Target price	Upside/downside (%)	Valuation methodology	Target multiple (x)	Benchmark
Mingyang	Buy	CNY	23.7	40.0	69%	2025 EV/EBITDA (discount back to 2023 at 8.5% COE)	14	Peer group's historical avg

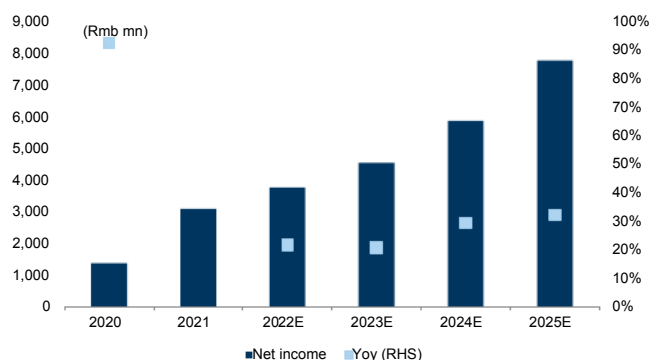
Price as of 2022/10/10

TPs are on a 12-month time frame.

Source: Gao Hua Securities Research, Wind

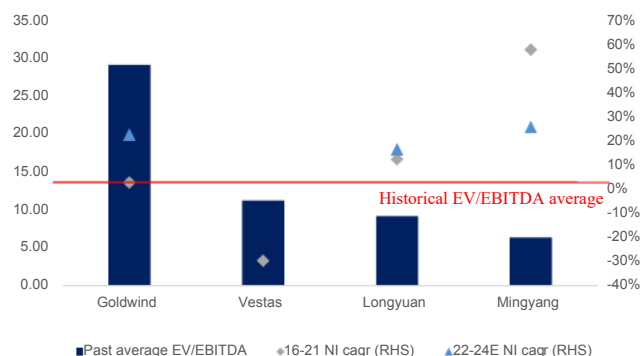
Exhibit 82: We expect Mingyang to record a 27% net income CAGR in 2022-25E

Historical and forecast net income



Source: Company data, Gao Hua Securities Research

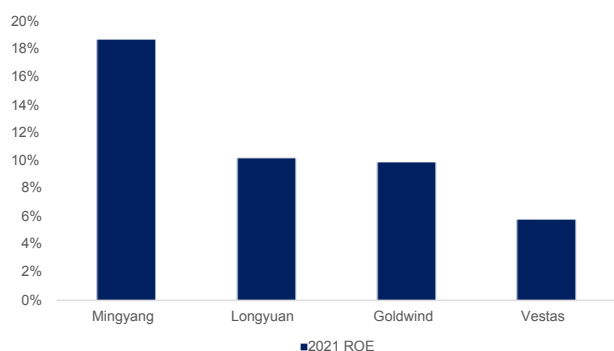
Exhibit 83: We adopt 14x 2025E EV/EBITDA to calculate our TP for Mingyang based on the historical average of comparable peers



Vestas Goldwind, Longyuan and Mingyang are based on GSe and GHe, using net income CAGR

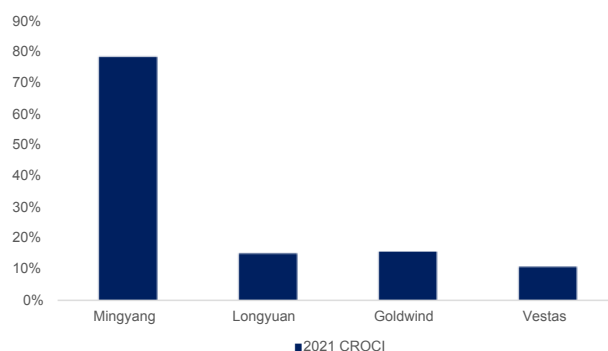
Source: Company data, Wind, Gao Hua Securities Research

Exhibit 84: Mingyang had the highest ROE in 2021
Peers' 2021 ROE



Source: Company data

Exhibit 85: Mingyang had the highest CROCI in 2021
Peers' 2021 CROCI



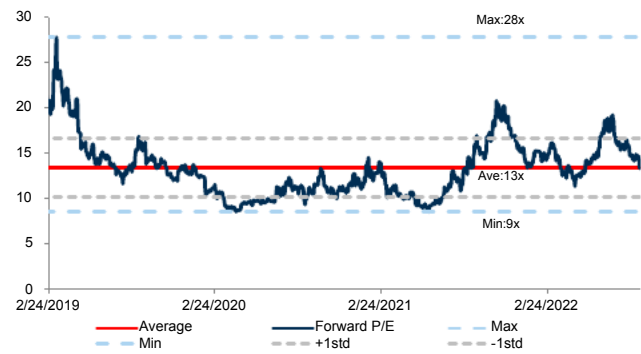
Source: Gao Hua Securities Research

Exhibit 86: Rolling EV/EBITDA



Source: Wind, Gao Hua Securities Research

Exhibit 87: Rolling P/E



Source: Wind, Gao Hua Securities Research

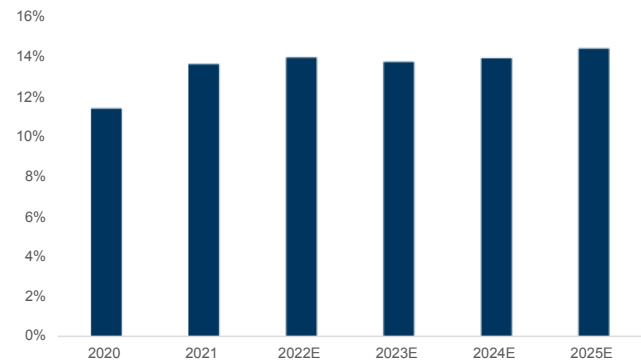
Exhibit 88: Rolling P/B



Source: Wind, Gao Hua Securities Research

Exhibit 89: We expect Mingyang's EBITDA margin will improve from 14% to 14.4% from 2022E to 2025E

Mingyang's EBITDA Margin



Source: Company data, Gao Hua Securities Research

GHe vs. consensus

Our net income and EPS estimates are 11% higher compared with Wind consensus for 2024E, considering our expectations for improving gross margin and higher operational efficiency. We expect strong downstream wind installation, and improved margin in the LT on the back of Mingyang's R&D experience and product mix.

Exhibit 90: We are -4% to 11% compared to Wind consensus for 2022-24E net income

Company Name	Sales			Net Income			EPS			Net Margin		
	GHe vs. cons			GHe vs. cons			GHe vs. cons			GHe vs. cons		
	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3
Mingyang	22%	30%	37%	-4%	0%	11%	-4%	0%	11%	-3%	-3%	-2%
Differences												

Source: Wind, Gao Hua Securities Research

Financial analysis

P&L: We forecast a 24% revenue CAGR in 2022-25E driven by a 29% CAGR in shipments of wind turbines. We expect gross margin to steadily expand to 23% by 2025E (from 21% in 2022E) driven by ASP expansion, better product mix (higher

proportion of higher-margin, larger scale wind turbines), and continuous cost control measures. We expect EBIT margin to rise to 12.9% in 2025E (from 10.6% in 2022E) and EBITDA margin to reach 14.4% in 2025E (from 14% in 2022E) as we believe Mingyang's continuous R&D will help improve its margin. We expect the company to post net profit of Rmb 7,796mn in 2025E compared to Rmb3,774mn in 2022E, with a 27% net income CAGR in 2022-25E.

Balance sheet: As at 2021, Mingyang's cash balance was Rmb13,106mn and net receivable days at 79. In 2025E, we forecast receivable days to decrease to 65 due to its stable client portfolio and stronger AR management ability. Inventory turnover days was 164 in 2021, which we expect to improve to 140 in 2025E. We also expect improving net working capital to increase from Rmb6,128mn in 2022E to Rmb24,725mn in 2025E. Meanwhile, we expect Mingyang's cash to grow from Rmb13,925mn in 2022E to Rmb28,810mn in 2025E, and inventory to grow from Rmb12,611mn in 2022E to Rmb20,448mn in 2025E driven by a 24% revenue CAGR over the same period.

Statement of cash flows: We forecast capex of Rmb500mn to Rmb5,000mn from 2022-25E, mainly to support building more wind turbine capacity. We estimate total cash flow of Rmb550mn by 2025E (compared with Rmb819mn in 2022E). We also forecast ROE to improve to 20.5% (from 17.3% in 2022E) over the same period due to increasing net income.

Exhibit 91: Financial summary

Profit model (Rmb mn)	12/21	12/22E	12/23E	12/24E	Balance sheet (Rmb mn)	12/21	12/22E	12/23E	12/24E
Total revenue	27,158.0	36,530.2	46,346.5	56,804.4	Cash & equivalents	13,105.8	13,924.8	20,112.3	28,259.5
Cost of goods sold	(21,337.7)	(28,769.6)	(36,341.9)	(44,103.7)	Accounts receivable	5,872.0	8,006.6	8,888.4	10,115.8
SG&A	(1,856.8)	(2,447.5)	(3,012.5)	(3,635.5)	Inventory	9,604.0	12,611.3	14,935.0	16,916.5
R&D	(872.4)	(1,205.5)	(1,622.1)	(2,045.0)	Other current assets	9,044.0	9,044.0	9,044.0	9,044.0
Other operating profit/(expense)	(216.3)	(227.1)	(238.4)	(250.3)	Total current assets	37,625.9	43,586.7	52,979.7	64,335.8
EBITDA	3,706.8	5,104.7	6,384.0	7,928.2	Net PP&E	9,608.1	13,502.2	13,871.6	13,338.9
Depreciation & amortization	(831.9)	(1,224.2)	(1,252.4)	(1,158.2)	Net intangibles	1,046.9	928.6	806.7	681.2
EBIT	2,875.0	3,880.5	5,131.5	6,769.9	Total investments	563.6	1,363.6	1,963.6	2,463.6
Interest income	203.3	183.5	194.9	281.6	Other long-term assets	12,648.5	12,648.5	12,648.5	12,648.5
Interest expense	(404.0)	(503.8)	(663.8)	(743.8)	Total assets	61,492.9	72,029.5	82,270.0	93,468.0
Income/(loss) from uncons. subs.	32.8				Accounts payable	19,437.8	23,646.2	28,874.4	33,832.9
Others	936.8	800.0	600.0	500.0	Short-term loans	98.5	98.5	98.5	98.5
Pretax profits	3,589.4	4,360.2	5,262.7	6,807.7	Other current liabilities	13,714.0	13,714.0	13,714.0	13,714.0
Income tax	(630.0)	(566.8)	(684.1)	(885.0)	Total current liabilities	33,250.2	37,458.7	42,686.8	47,645.4
Minorities	141.7	(19.0)	(22.9)	(29.6)	Long-term debt	4,699.1	7,699.1	8,699.1	9,699.1
Net income pre-preferred	3,101.1	3,774.4	4,555.6	5,893.1	Other long-term liabilities	5,049.5	5,049.5	5,049.5	5,049.5
Preferred dividends					Total long-term liabilities	9,748.6	12,748.6	13,748.6	14,748.6
Net income (pre-exceptionals)	3,101.1	3,774.4	4,555.6	5,893.1	Total liabilities	42,998.8	50,207.3	56,435.4	62,394.0
Post tax exceptionals					Preferred shares				
Net income	3,101.1	3,774.4	4,555.6	5,893.1	Total common equity	18,394.5	21,703.7	25,693.2	30,902.9
EPS (basic, pre-exception) (Rmb)	1.60	1.66	2.01	2.59	Minority interest	99.6	118.6	141.5	171.1
EPS (basic, post-exception) (Rmb)	1.60	1.66	2.01	2.59	Total liabilities & equity	61,492.9	72,029.5	82,270.0	93,468.0
EPS (diluted, post-exception) (Rmb)	1.60	1.66	2.01	2.59	BVPS (Rmb)	9.5	9.6	11.3	13.6
DPS (Rmb)	0.22	0.25	0.30	0.39					
Dividend payout ratio (%)	14%	15%	15%	15%	Ratios	12/21	12/22E	12/23E	12/24E
Free cash flow yield (%)	-5%	-3%	10%	14%	CROCI (%)	116%	53%	47%	60%
					ROE (%)	19%	19%	19%	21%
Growth & margins (%)	12/21	12/22E	12/23E	12/24E	ROA (%)	5%	6%	6%	7%
Sales growth	21%	35%	27%	23%	Inventory days	154.6	140.9	138.3	131.8
EBITDA growth	44%	38%	25%	24%	Receivables days	64.4	69.3	66.5	61.1
EBIT growth	45%	35%	32%	32%	Payable days	277.9	273.3	263.7	259.5
Net income growth	126%	22%	21%	29%	Net debt/equity (%)	-45%	-28%	-44%	-59%
EPS growth	69%	4%	21%	29%	Interest cover - EBIT (X)	11.3	12.1	10.9	14.6
Gross margin	21%	21%	22%	22%					
EBITDA margin	14%	14%	14%	14%	Valuation	12/21	12/22E	12/23E	12/24E
EBIT margin	11%	11%	11%	12%	P/E basic (X)	13.4	14.5	12.0	9.3
					P/B (X)	2.3	2.5	2.1	1.8
Cash flow statement (Rmb mn)	12/21	12/22E	12/23E	12/24E	EV/EBITDA (X)	9.0	9.6	6.8	4.6
Net income pre-preferred dividends	3,101.1	3,774.4	4,555.6	5,893.1	EV/GCI (X)	6.5	4.1	3.7	3.3
D&A add-back	831.9	1,224.2	1,252.4	1,158.2	Dividend yield (%)	1%	1%	1%	2%
Minorities interests add-back	(141.7)	19.0	22.9	29.6					
Net (inc)/dec working capital	1,561.1	(933.4)	2,022.7	1,749.6					
Other operating cash flow	45.2	(800.0)	(600.0)	(500.0)					
Cash flow from operations	5,397.5	3,284.2	7,253.6	8,330.6					
Capital expenditures	(7,387.1)	(5,000.0)	(1,500.0)	(500.0)					
Acquisitions									
Divestitures									
Others	451.6								
Cash flow from investments	(6,935.4)	(5,000.0)	(1,500.0)	(500.0)					
Dividends paid (common & pref)	(414.8)	(465.3)	(566.2)	(683.3)					
Inc/(dec) in debt	269.0	3,000.0	1,000.0	1,000.0					
Common stock issuance (repurchase)	1,220.2								
Other financing cash flows	(1,710.2)								
Cash flow from financing	(635.8)	2,534.7	433.8	316.7					
Total cash flow	(2,186.6)	818.9	6,187.5	8,147.2					

Note: Last actual year may include reported and estimated data.
Source: Company data, Goldman Sachs Research estimates.

Source: Gao Hua Securities Research, Company data

Risks

Lower-than-expected market demand: As 2022 marks the beginning of the grid-parity era for offshore wind and newly approved wind projects will no longer be eligible for the national subsidy, the return rate for wind power project might be affected in the short term and thus influence market demand. A prolonged disruption in activities due to COVID-19 could lead to suspension of production, transportation and demand in the underlying markets and thus impact the installation of wind power equipment.

Lower-than-expected turbine prices: Turbine prices are critical to Mingyang's gross margin. As such, its gross margin would be impacted if turbine prices turn lower due to fierce competition.

Lower-than-expected turbine shipment: We expect Mingyang to record 8/11/14GW in turbine shipments over 2022-24E. Lower-than-expected turbine shipment due to fiercer competition than we expect would impact revenue from turbine sales.

Slower-than-expected wind farm construction: We expect Mingyang to build 130MW over 2022-24E wind farms and to promote turbine sales and build its brand equity. Slower-than-expected wind farm construction would impact underlying revenue.

Luoyang Xinqianglian (300850.SZ): Driving high-end bearing import substitution; initiate at Buy

300850.SZ	12m Price Target: Rmb118	Price: Rmb82.2	Upside: 43.6%		
Buy	GS Forecast				
		12/21	12/22E	12/23E	12/24E
Market cap: Rmb27.1bn / \$3.8bn	Revenue (Rmb mn) New	2,476.9	3,386.4	4,562.9	6,151.2
Enterprise value: Rmb27.1bn / \$3.8bn	Revenue (Rmb mn) Old	--	--	--	--
3m ADTV :Rmb519.4mn/ \$75.8mn	EBITDA (Rmb mn)	675.7	995.3	1,394.8	1,875.5
China	EPS (Rmb) New	2.78	2.02	2.91	3.94
China Clean Energy	EPS (Rmb) Old	--	--	--	--
	P/E (X)	27.4	40.7	28.3	20.8
M&A Rank: 3	P/B (X)	4.1	6.7	5.5	4.4
Leases incl. in net debt & EV?: No	Dividend yield (%)	0.3	0.2	0.4	0.5
	CROCI (%)	26.8	24.1	27.5	30.6
		3/22	6/22	9/22E	12/22E
	EPS (Rmb)	0.50	0.24	0.57	0.71

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10 Oct 2022 close.

Key debate & how we differentiate:

- **Can XQL can sustain its gross margin as the turbine value chain is seeking more cost reductions amid the grid-parity era?**

XQL's slewing bearing business recorded 31.8% to 35.1% gross margin from 2017 to 2021, which was 12ppt higher than its peers in the past 5 years; we think is mainly driven by higher revenue contribution from its main shaft bearing products. With the removal of the national wind subsidy, we still expect XQL to deliver a resilient overall gross margin of 31-32% over 2022E to 2025E, on the back of: **1)** Wind power bearings, especially main shaft bearings, possesses high entry barriers, which prevents new entrants from easily tapping into the market. **2)** As a bearing domestic substitute player, XQL's pricing was already lower than international competitors, thus the company faces less ASP downward pressure compared to other segments on wind supply chain. **3)** Improved product mix towards main bearings and bearings for large size turbines (mentioned above); **4)** Vertical integration into upstream forging production.

- **Can XQL successfully penetrate into the high-end main shaft bearing market for large-size turbines?**

We believe turbine makers are incentivized to drive cost-reduction through import substitution amid the grid-parity era. With continuous R&D efforts, we gradually expect XQL to enter the more high end market, serving as a leader driving import substitution in main shaft bearing manufacture on the back of industry-leading cost performance. XQL has mastered the key technologies of three-row roller main

bearings for 2MW-3 MW direct-drive wind turbines and is gradually rolling out more high-end large size bearings. XQL's client portfolio has successfully penetrated into domestic leading wind turbine makers such as Mingyang, Envision, Dongfang Electric and Sany Renewable Energy in recent years.

Leader in main bearing import substitution on strong R&D strength. Established in 2005, Luoyang Xinqianglian Slewing Bearing is one of the very few domestic manufacturers who can supply main shaft bearings to leading turbine makers. While 2021 was a slower year, with 20% yoy revenue growth following on-shore rush installation, we expect XQL to benefit from main shaft bearing domestic substitution under this cost driven grid-parity era and record 35% bearing shipment cagr over 2022 to 2025E and 34% revenue cagr, on the back of: **1)** Higher cost performance to help downstream turbine makers to drive cost reduction. **2)** High quality product driven by strong R&D. **3)** Improved product mix towards main shaft bearings and bearings for large size turbines driven by offshore wind development. **4)** A more diversified product offering: the company also taps into gearbox bearings and upstream forging manufacture.

Resilient margin on strong product offerings with high cost performance. XQL's slewing bearing business recorded 31.8% to 35.1% gross margin from 2017 to 2021, which was consistently higher than its major China and international peers in the past 3-5 years (same on the EBIT margin level); we think this was mainly driven by higher revenue contribution from its main shaft bearing products and its vertically integrated production model. As the sector enters grid-parity era, we expect XQL to deliver a resilient overall gross margin of 31-32% over 2022E to 2025E, on the back of: **1)** High technical barriers for main bearings. **2)** As a bearing domestic substitute player, XQL's product helps downstream turbine makers to drive cost-reduction on the back of its higher cost performance. **3)** Improved product mix towards main bearings and bearings for large size turbines; **4)** Vertical integration into upstream forging production.

Driving high-end main bearing import substitution, initiate at Buy. We expect XQL to drive high-end main bearing import substitution on the back of its sector-leading R&D strength and growing product portfolio; we estimate a 38% net income cagr over 2022-25E, and our 23/24 estimates are 7% and 17% higher than Wind consensus. We use 18x 2025E EV/EBITDA (in line with the historical average of XQL's peer group), discounted back to 2023E at 8.5% COE, to derive our 12m TP of Rmb 118.

Leading high-end main bearing maker in China

Established in 2005, Luoyang Xinqianglian Slewing Bearing Co Ltd is one of the very few domestic manufacturers that can supply main shaft bearings to leading turbine makers. The company's main products include wind power main shaft bearings, yaw bearings and pitch bearings. In addition, the company also produces tunnel boring machine bearings and components, and marine and offshore crane slewing bearings.

Riding on strong global wind demand and a rapid increase in demand for high-end main bearings for large turbines, we expect XQL's bearing shipment will grow at 35% cagr over 2022 to 2025E, which would drive its revenue to grow at 34% cagr. We expect

improved product mix towards main shaft bearings and bearings for larger size turbines will help its gross margin to reach 31% to 32% over 2022 to 2025E, and net income to grow at 38% cagr.

Exhibit 92: Xinqianglian mainly offers main shaft bearings, pitch bearings and yaw bearings for wind turbine

Wind turbine bearings introduction and Xinqianglian's wind turbine product offering

Bearings needed for one wind turbine		Xinqianglian wind turbine bearings product line
Main shaft bearing (1-2units)	Main shaft bearing should withstand axial and radial loads and also operate under harsh, dynamic situations	Single row tapered roller main bearing for offshore wind turbine
		Triple-row roller main bearing
		Double-row tapered roller main bearing
Pitch bearing (3 units)	Pitch bearing connects the rotor hub and the rotor blade to control loads and power of the wind turbine	Individual triple-row roller pitch bearing
Yaw bearing (1 unit)	Yaw bearing connects nacelle and tower to enable smooth rotation of the nacelle	Yaw bearing
Gearbox bearing (1 set)	Support gearbox operation	
Generator bearing (1 set)	Support generator operation	

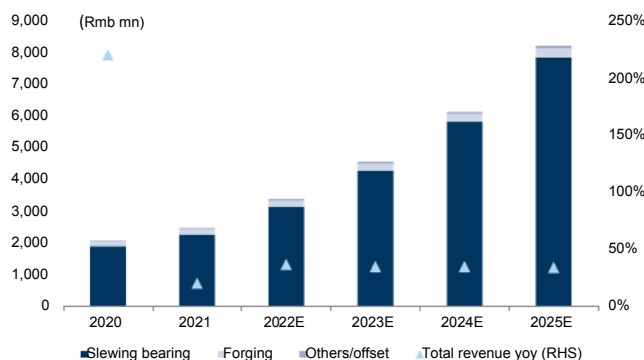
Source: Company data, Data compiled by Goldman Sachs Global Investment Research

Leader in main bearing import substitution on strong R&D strength

We believe XQL's sector-leading R&D strength has enabled the company to lead the import substitution of main bearing amid the grid-parity era on the back of its strong R&D strength and high-quality product offerings. We expect XQL's bearing shipment will grow at 35% cagr over 2022 to 2025E, driving its revenue to grow at a 34% cagr.

Exhibit 93: We expect Xinqianglian to post a revenue cagr of 34% over 2022-25E

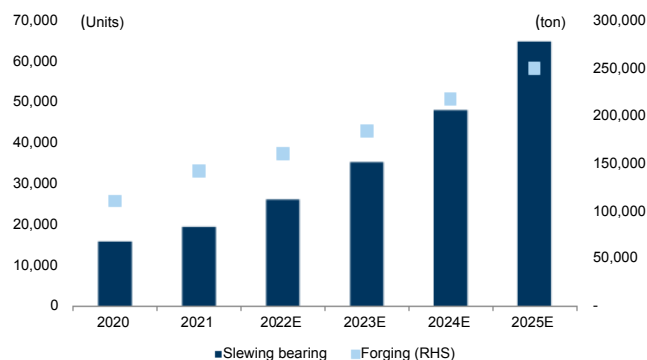
Historical and forecast revenue



Source: Company data, Gao Hua Securities Research

Exhibit 94: We expect Xinqianglian's bearing shipment will increase at a cagr of 35% from 2022 to 25E

Sales volume breakdown



Source: Company data, Gao Hua Securities Research

While most domestic manufacturers are capable of producing pitch and yaw bearings, high-end bearings such as main shaft bearings, due to their more sophisticated production techniques, are mostly dominated by international manufacturers, such as SKF, Schaeffler Group and NTN. As of 2020, Schaeffler and SKF respectively accounted for 29% and 24% of the global wind slewing bearing market, followed by several Japanese and US manufacturers. Since 2009, XQL has seized the rapid wind development opportunity, and made several technological breakthroughs in main shaft bearings, yaw bearings, pitch bearings.

Riding on China's rapid development of wind installation (growing at a cagr of 33% over 2017 to 2021), with a high quality product offering and as one of the few domestic makers that can provide main shaft bearings, the company's bearing shipment recorded a 31% cagr from 2017 to 2021. XQL's revenue was up 221% yoy in 2020, marking a historical high growth rate, on the back of a rush of installation due to the removal of the onshore wind subsidy. While 2021 was a slower year, with 20% yoy revenue growth following the installation spike, we expect XQL to benefit from main shaft bearing domestic substitution under this cost driven grid-parity era, on the back of: **1)** Higher cost performance helping downstream turbine makers to drive cost reduction, as XQL's pricing was already lower than international competitors, but the quality of its main shaft bearings is continuously catching up with international peers. **2)** High quality product driven by strong R&D: XQL has mastered the key technologies of three-row roller main bearings for 2MW, 2.5MW and 3MW direct-drive wind turbines and the manufacturing technology of double-row tapered roller main bearings. They have also started to supply 5.5/6.25MW main bearings to Mingyang. **3)** Improved product mix towards main shaft bearings and bearings for large size turbines driven by offshore wind development. **4)** A more diversified product offering: the company also taps into gearbox bearings and upstream forging manufacture.

Compared with its major China and international competition, Wafangdian bearing and SKF, XQL is able to offer more high-end large main bearings for 6MW+ large size turbines to leading high-profile turbine maker such as Mingyang and Envision, while Wafangdian's main product offering remains 3-6MW sized bearings. Leading turbine

makers have strict quality requirements and certification processes as main shaft bearings need to under-take large axial loads, radial loads and overturning torque during the 20-year wind farm life-span; as such, main bearings' accuracy, performance, lifespan and reliability play a decisive role in the performance and reliability of the wind turbine. We believe XQL's growing high-profile client portfolio is driven by its growing high-end product offering that is catching up with leading international peers such as SKF, which can supply 10+MW main bearings.

Exhibit 95: XQL's growing high-profile client portfolio is driven by its growing high-end product offering that is catching up with leading international peer such as SKF

Product comparison of peers

Wind turbine main shaft bearing	Product comparison		
	Xinqianglian	Wafangdian Bearing	SKF
Small size (3MW-)	√	√	√
Medium size (3-6MW)	√	√	√
Large size (6MW+)	√		√
Key Clients	Ming Yang Smart Energy	Goldwind	Goldwind
	Envision Energy	CSSC Haizhuang Wind Power	Envision Energy
	Sany Heavy Energy	Sany Heavy Energy	Shanghai Electric
	Dongfang Electric Corporation	Dongfang Electric	Vestas
	CSSC Haizhuang Wind Power		

Source: Company data

Exhibit 96: XQL's client portfolio has successfully penetrated into domestic leading wind turbine makers such as Mingyang, Envision, Dongfang Electric and Sany Renewable Energy in recent years.

XQL's major clients

Product Type	Client	Market position	Years since collaboration
Wind power bearings	Ming Yang Smart Energy Group Limited	Rank #3 in wind power capacity expansion and #3 in cumulative installed capacity in China as of 2019	8
	Envision Energy Co., Ltd.	Rank #2 in wind power capacity expansion and #2 in cumulative installed capacity in China as of 2019	3
	HE Windpower Co., Ltd.	Rank #11 in wind power capacity expansion and #11 in cumulative installed capacity in China as of 2019	11
	Sany Heavy Energy Co., Ltd.	Rank #10 in wind power capacity expansion and #10 in cumulative installed capacity in China as of 2019	3
	Dongfang Electric Corporation Limited	Rank #10 in wind power capacity expansion and #5 in cumulative installed capacity in China as of 2019	2
	CSSC Haizhuang Wind Power	Rank #10 in wind power capacity expansion and #7 in cumulative installed capacity in China as of 2019	2
Tunnel boring machine bearings and components	China Railway Engineering Equipment Group	A large state-owned enterprise specializing in the production of tunnel boring machine, and its market share has remained the first in China for three consecutive years	13
	China Communications Construction Tianhe	A large state-owned enterprise specializing in the production of tunnel boring machine with a high market share	5
	China Railway Construction Heavy Industry Corporation	A large state-owned enterprise specializing in the production of tunnel boring machine with a high market share	5
Marine and offshore crane slewing bearings	Shanghai Zhenhua Heavy Industries Company	Large state-owned heavy equipment manufacturing enterprise, with port machinery accounting for more than 82% market share globally	16
	CSSC (South China)	Affiliated to China CSSC Holdings Limited (600150.SH), an important member unit of China Shipbuilding Industry Corporation	12
	CSSC (Wuchang)	Affiliated to China Shipbuilding Industry Group Power (600482.SH), an important member of China Shipbuilding Industry Corporation	14

Source: Company data

We summarize some of the company's other core technologies and their applications as follows:

- **It is a pioneer in China with expertise in the technology of intermediate frequency quenching without soft belts, and has become a domestic supplier of offshore wind main shaft bearings with high reliability, long service time and high load capacity, to replace imported products**

The slewing bearings, especially the main bearings, need to withstand large axial loads, radial loads and overturning torque during the entire life-span of a turbine. XQL adopts an advanced intermediate frequency quenching technique to design high-speed, high-reliability non-soft-belt slewing bearings. Slewing bearings without soft belts can be applied to wind turbine bearings, and tunnel boring machine bearings, etc. At present, the company has obtained four utility model patents and another four invention patents have entered the assessment procedure. Since there is no soft belt area after intermediate frequency quenching of slewing bearings, there is no weak point in the slewing bearing raceway, which can improve the capacity, reliability and service life of the slewing bearings to meet the demand of

high-speed and heavy loads situations. Due to the low cost of intermediate frequency quenching and the stable process of heat treatment, it can greatly reduce the production cost of bearings and increase the reliability of products.

- **Three-row roller structure high-power wind turbine main shaft bearing**

XQL selected 42CrNiMo bearing steel as the major ring material. Compared with traditional 42CrMo bearing steel, 42CrNiMo bearing steel has higher yield strength and tensile strength, better ductility, stronger low temperature resistance, and can better adapt to the working environment and performance requirements of wind turbine bearings.

The company adopts a simultaneous quenching process of three rows of raceways, and the soft belt is controlled within 15mm through process control, so as to ensure the depth of the hardened layer, the uniformity of hardness to improve the bearing performance and reliability; this technology has won a new utility patent.

XQL adopts logarithmic curved rolling elements to make the load distribution of rolling elements even and to improve the capacity of bearings.

In terms of deep hole processing, the large size of the main shaft bearing ring leads to difficulty in hole processing. To solve this problem, the company continues to explore hole processing technology, and can currently achieve deep hole processing ability (hole diameter of 36mm, drilling depth of more than 400mm, hole true position within 0.2mm), which has obtained a utility model patent.

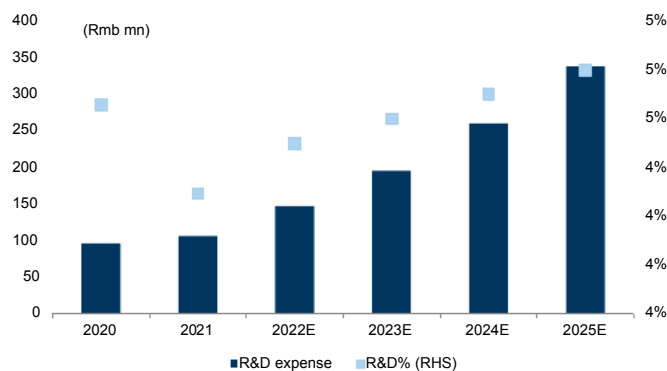
In terms of bearing inspection, the company has manufactured a special wind turbine bearing testing machine through continuous R&D, which can simulate the use of bearings under different working conditions, improve product inspection capabilities, and ensure product quality; meanwhile, it also provides a test platform for the company to develop new bearing products, and this technology has been patented for invention.

- **XQL invented the weld-free structure in tapered roller bearings; it also solved problems like stress concentration, deformation, fracture, etc. of traditional welding, and further improved the reliability and service life of the bearings.**

- **XQL invented a preload test method of double-row tapered roller bearings, which guarantees the installation and usage of the bearings, and improves their service life.**

At the same time, XQL has several ongoing R&D projects which have seen solid progress. The company has supplied direct-drive triple-row roller wind turbine spindle bearings and double-row tapered roller wind turbine spindle bearings to Mingyang, Dongfang Electric and **XQL invented** Energy. They have also started to supply 5.5/6.25MW main bearings to Mingyang. In May 2021, China Huaneng Group Co., Ltd. led the development of China's first 5 MW localized offshore wind turbine. Xinqianglian provided self-developed triple-row cylindrical roller main bearings for localized offshore wind turbines, breaking the long-term dependence on foreign imports for the main bearings of large offshore wind turbines. We believe XQL's R&D ratio will be maintained at a high level during 2022-25E at 4.5% to 4.8% to support continued product innovation.

Exhibit 97: We believe XQL's R&D ratio will maintain at high level during 2022-25E at 4.5% to 4.8%
R&D expense and ratio



Source: Company data, Gao Hua Securities Research

Exhibit 98: XQL has several ongoing R&D projects which have seen solid progress

XQL's R&D projects

Name of project	Achievement	Current stage
Research on improving the accuracy of the overall cage of wind power bearings	Improve product performance, domestic leading	Passed the trial production and prototype testing
Development of rotor bearings and yaw bearings for offshore 5.5 MW wind turbines	Domestic advanced, replace imports	Through trial production and testing, the prototype test is completed and enters the small batch production
Development of double row tapered roller main bearings for offshore 3 MW wind turbines	Domestic advanced, replace imports	The design scheme has won three utility model patents, and three invention patents have entered the actual examination stage. Structural design and process validation of critical parts are underway
Development of oversized diameter shield joint bearings	Domestic advanced, replace imports	The design scheme has been declared an invention patent and has entered the actual examination procedure. Trial and test passed, and is installing construction verification
Development of large diameter heavy-duty slewing bearings	Domestic leading	Passed trial production, testing, installation verification, into small batch production
Study on the uniformity of extra-large bearing rings	Domestic advanced	The process design has been completed and the cooling system transformation is being carried out
Large-section ring forging research project	Domestic leading	Through the demonstration of the process design scheme, it entered the trial production stage
Precision forming mill expansion forging research project	Domestic leading	Through trial production and experimentation, it enters small batch production
Offshore wind power bearing precision ring forging research project	Domestic advanced	Through trial production and testing

Source: Company data

To fuel the rapid growth of wind development, the company raised Rmb1.46bn by issuing shares to specific investors in 2021. The majority of the fund was used for bearing production projects for 3.0MW and above size wind turbines. The project was started in Jan 2021, and was expected to ramp up capacity in 2023E. According to the company, upon ramp up of the project, it will bring annual revenue of Rmb1.6bn, gross

profit of Rmb501mn, and net income of Rmb279mn, accounting for 29% of our 2023E net income forecast. The project will also increase annual wind main shaft/yaw/pitch bearing production by 1,500/1,350 and 4,050 units.

With this issuance, we think XQL will continue to expand the production capacity of wind power bearings, increase its market share, and enhance the company's overall profitability on improved product mix.

Exhibit 99: XQL raised Rmb1.46bn by issuing shares to specific investors in 2021

XQL's fund raising purpose

Project name	Investment needed for the project (Rmb mn)	The amount of raised funds to be invested in the project (Rmb mn)
3.0MW and larger-size wind power bearings production line construction project	935	935
R&D center construction project	197	197
Supplementary fund	328	328
Total	1,460	1,460

Source: Company data

Exhibit 100: According to the product plan at the time of new share issuance, the project will produce 6,900 units of wind power bearings annually

Product plan and estimated revenue contribution of new share issuance

Product type	Annual production (unit)	Revenue estimation (Rmb mn)	
		ASP (excluding tax)	Revenue (excluding tax)
Wind turbine main shaft bearing			
3MW \leq N < 4MW	1,200	0.50	600
4MW \leq N < 6MW	300	0.60	180
Subtotal	1,500		780
Wind turbine yaw bearing			
3MW \leq N < 4MW	810	0.13	108
4MW \leq N < 5MW	405	0.18	72
5MW \leq N < 6MW	135	0.26	36
Subtotal	1,350		216
Wind turbine pitch bearing			
3MW \leq N < 4MW	2,430	0.13	312
4MW \leq N < 5MW	1,215	0.18	219
5MW \leq N < 6MW	405	0.26	104
Subtotal	4,050		635
Total	6,900		1,631

Source: Company data

Tapping into supply chain with a complete product offering

In addition to optimizing its main bearing product offering, XQL is actively tapping into other segments of the supply chain to better expand the company's business scale and brand influence, and enhance the company's sustainable profitability and comprehensive advantage.

Gearbox bearings

In 2022, XQL has issued a convertible bond of Rmb1.5bn, mainly for gearbox bearings and precision components development. The company can leverage on its expertise in

wind power bearings, to tap into wind power gearbox bearings and precision parts, which should generate synergy and help to diversify its product offerings.

Exhibit 101: XQL has raised Rmb1.5bn by issuing convertible bonds in 2022

XQL's fund raising plan

Project name	Investment needed for the project (Rmb mn)	The amount of raised funds to be invested in the project (Rmb mn)
Gearbox bearings and precision components projects	1,113	995
Supplementary fund	360	360
Total	1,473	1,355

Source: Company data

Forging

In August 2011, XQL set up a subsidiary called Shengjiu Forgings, which is a ring forging manufacturer. Ring forging products are the main raw materials for the company's slewing bearing production. With subsidiary Shengjiu, XQL can secure forging supply and better integrate in the supply chain. It helps XQL with continued R&D improvement in its bearing products, and enhances gross margin with more control on upstream raw material supply.

Currently the ring forging technology of domestic small-sized rings is quite mature, but the production of large and ultra-large rings are still at an early stage. The current trend is seeing fr market demand transforming towards largers sizes.

The company has purchased four CNC ring forging production lines heated by natural gas, of which the maximum diameter is 12 meters. According to the diameter of the forging blank, the thickness of the ring wall thickness, and the different heights of the ring, it requires each node in the rolling process to use different Axial rolling forces, radial rolling forces and rotational speeds, which are controlled by computer and actively measured; this not only ensures the geometric accuracy of the parts, but also ensures the dimensional accuracy.

XQL also has automatic quenching and tempering technology for extra large ring forgings. This technology uses a manipulator to control the quenching process, which ensures the duration time of the parts from the furnace to the quenching, ensures the water temperature, and stabilizes the product quality. During quenching, the manipulator is used to ensure different parts are cooled evenly. At the same time, the coolant is circulated, so that the piece can be cooled evenly, so as to ensure the uniform structure of the piece. Currently all products of the company adopt this quenching technology. Quenching cooling systems and quenching cooling method technology have also obtained invention patents.

Lock Plate

XQL acquired 55% of Luoyang Haozhi Machinery in 2021 Dec. Haozhi Machinery's main product is the wind power lock plate, which is one of the core components of wind turbines. Wind power lock plates connect the main shaft and the high-speed gearbox. We believe Haozhi's experience and capabilities in R&D of wind power locking plates and attractive client portfolio could help Xinqianglian to provide a more complete product

offering and enhance its competitive advantage along the wind supply chain.

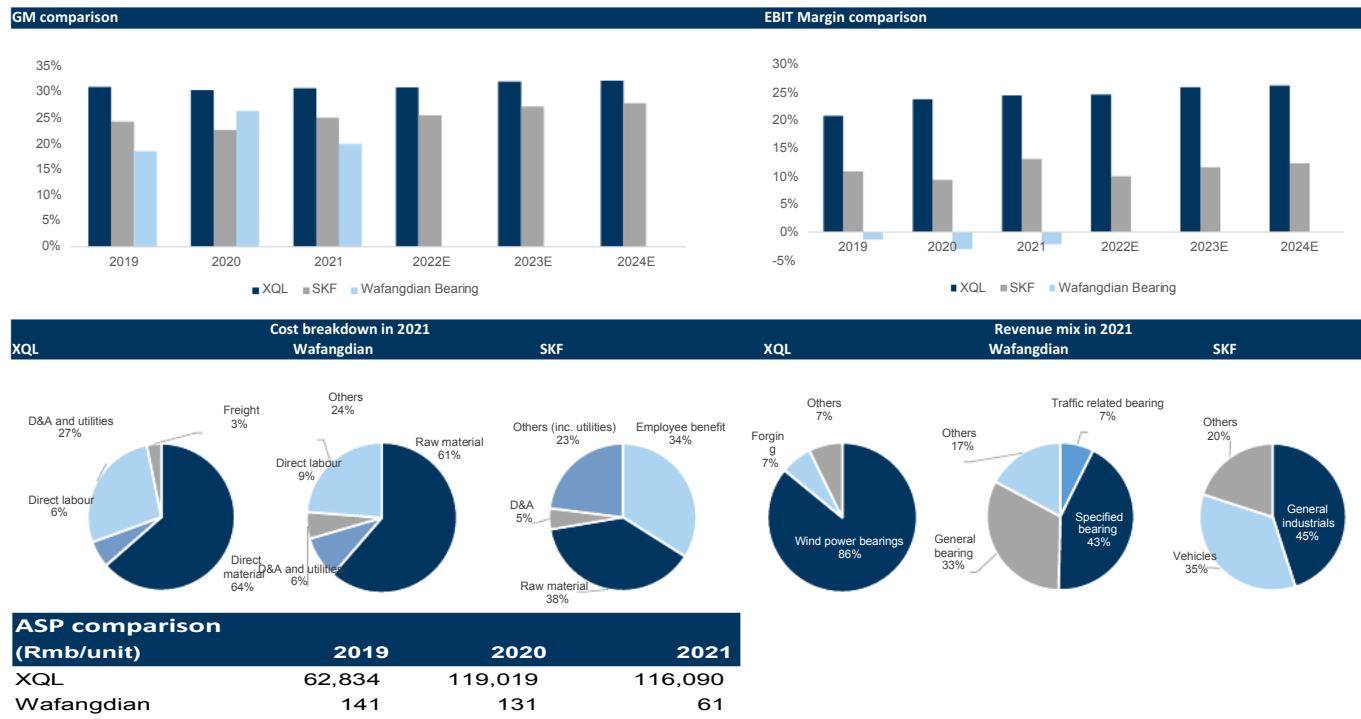
Resilient margin on strong product offerings with high cost performance

XQL's slewing bearing business recorded 31.8% to 35.1% gross margin from 2017 to 2021, which was consistently higher than its major China and international peers in the past 3-5 years (same on the EBIT margin level); we think is mainly driven by higher revenue contribution from its main shaft bearing products and its vertically integrated production model. XQL has 85% of revenue from high-end wind bearings while Wafangdian and SKF only have 43% and 8%; as of 2021, we have also found that XQL's bearing ASP was much higher than Wafangdian due to more high-end offerings. For the cost breakdown, XQL has the highest cost contribution from raw material at 64% vs 61% and 38% for Wafangdian and SKF; we believe this mainly due to XQL's more integrated model (produce forging piece internally) and higher energy and labor cost of SKF.

As the sector enters a grid-parity era, we expect XQL to deliver a resilient overall gross margin of 31-32% over 2022E to 2025E, on the back of: **1)** Wind power bearings, especially main shaft bearings which possess high entry barriers. **2)** As a bearing domestic substitute player, XQL's product helps downstream turbine makers to drive cost-reduction on the back of its higher cost performance as XQL's pricing was already lower than international competitors; thus the company faces less ASP downward pressure compared to other segments in the wind supply chain. **3)** Improved product mix towards main bearings and bearings for large size turbines (mentioned above); **4)** Vertical integration into upstream forging production.

Exhibit 102: XQL's GM has been consistently higher than its China and international peers, we expect the company to deliver a resilient gross margin of 31-32% over 2022E to 2025E

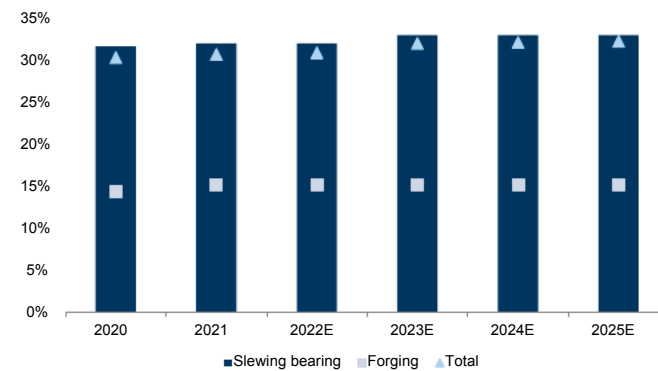
Key numbers comparison between peers



Source: Gao Hua Securities Research, Company data

Exhibit 103: We expect Xinqianglian's gross margin of slewing bearing business to reach 33% in 2025E

Historical and forecast gross margin



Source: Company data, Gao Hua Securities Research

Our sensitivity analysis shows that a 5% increase of wind bearing ASP, or a 5% increase of wind bearing unit cost, would result in a 19%/-14% increase/decrease in net income. Forging is a main raw material for slewing bearings. To better secure the supply of forging, Xinqianglian set up Luoyang Shengjiu Forging Company in 2011 to vertically integrate in the supply chain. In 2021 January, XQL has invested Rmb670mn to add 240k ton forging capacity by 2022E end through Shengjiu. The set up of Shengjiu has benefited XQL in that: **1)** it reduces the impact from volatility in upstream forging supply; **2)** it better supports R&D as the production process of forging determines characteristics of slewing bearing; **3)** the company can generate extra revenue from

upstream forging sale.

Raw material accounted for 69% of bearing production cost in 2021. Of which c.60% is iron ingot, and the rest is forging. We note that raw material price is a key factor determining bearing margin. XQL's bearing margin was down 3ppt yoy to 31.8% in 2020, which we think was mainly due to a 4.5ppt increase in raw material price.

Exhibit 104: Our sensitivity analysis shows that a 5% increase of wind bearing ASP, or a 5% increase of wind bearing unit cost, would result in a 19%/-14% increase/decrease in net income.

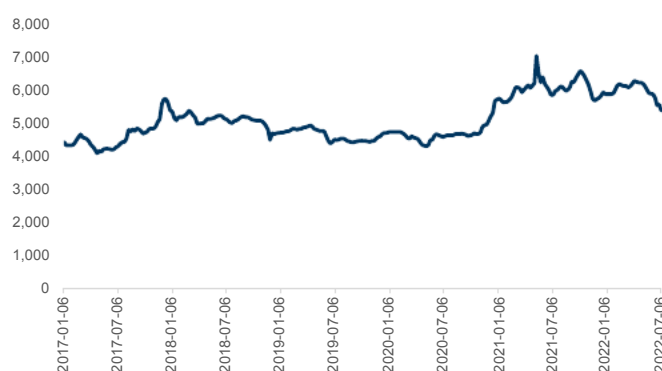
Sensitivity analysis of wind bearing ASP and wind bearing unit cost on net income

	Bearing ASP (k Rmb/unit)					
	-10%	-5%	0%	5%	10%	
Bearing unit cost (k Rmb/unit)	-10%	-10.8%	8.6%	27.9%	47.3%	66.6%
	-5%	-24.7%	-5.4%	14.0%	33.3%	52.6%
	0%	-38.7%	-19.3%	0.0%	19.3%	38.7%
	5%	-52.6%	-33.3%	-14.0%	5.4%	24.7%
	10%	-66.6%	-47.3%	-27.9%	-8.6%	10.8%

Source: Gao Hua Securities Research

Exhibit 105: We note that gear steel price was up 2% in 2021, which has weighed on XQL's gross margin

Gear steel price trend



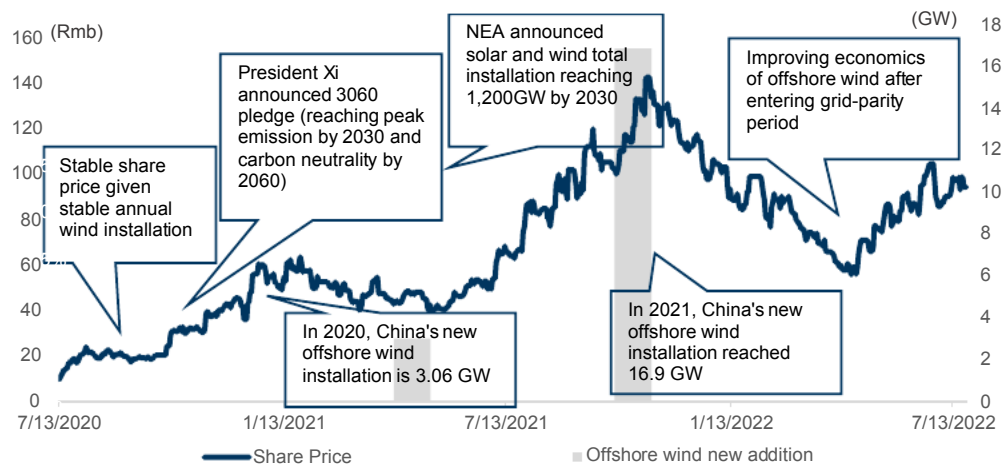
Source: Wind

Driving high-end main bearing import substitution; initiate at Buy

China offshore wind installation, clean energy development in China and improving economics of offshore wind show a relatively strong correlation with XQL's historical share price fluctuations. When XQL went public, its share price was relatively stable due to mild offshore wind installation. Starting from 2H20, the Chinese government released numerous policies and announcements supporting the development of solar installation. China's '3060' pledge, announced in September 2020, signaled a commitment to reach peak carbon emissions by 2030 and carbon net zero by 2060. Then in April 2021, the National Energy Administration (NEA) published a revised document noting that non fossil fuel sources are to reach 25% of primary energy consumption by 2030, with solar and wind total installation reaching 1,200GW. In 2021, China's new offshore wind installation reached 16.9GW, up 452% yoy. Thus, we can see the reasons for the strong performance of XQL's share price in 2021. After entering grid-parity in 2022 for offshore wind, we expect improving economics due to technological advancement and cost-saving methods from the whole supply chain, which should result in improving share price performance.

Exhibit 106: China offshore wind installation shows a relatively strong correlation with fluctuations in XQL's share price

Historical share price performance with influencing factors



NEA is National Energy Administration

Source: Company data, Gao Hua Securities Research, Wind, Bloomberg

Valuation

We adopt EV/EBITDA as the primary valuation methodology for our solar and wind coverage, as we have found that historical share prices are highly correlated to EBITDA growth, giving us a reliable and measurable benchmark across the sectors. We select the comparable peer group as a valuation reference based on the nature of each company's business. Our peer group consists of NTN, SKF, Hengrun, Riyue and Goldwind, which are close peers in the wind supply chain. We believe these companies represent an appropriate peer group for XQL given their similar business models and industry growth outlooks.

XQL is trading at 21x 2023E EV/EBITDA and at its peer group's historical average since IPO of 18x. We use 18x 2025E EV/EBITDA (in line with the historical average of XQL's peer group), discounted back to 2023E at 8.5% COE (in line with coverage), to derive our 12m TP of Rmb 118. As the company's historical share price tends to move broadly in line with its EBITDA growth, we believe the historical average EV/EBITDA multiple of XQL's peer group offers an appropriate valuation reference, as this period represents China's wind sector transition from being subsidy driven to cost driven. We expect XQL's EBITDA margin will improve from 29% to 30% from 2022E to 2025E. Our target price implies 44% potential upside, vs. average 30% upside for our Neutral rated A-share wind coverage.

Exhibit 107: Rating and TP summary

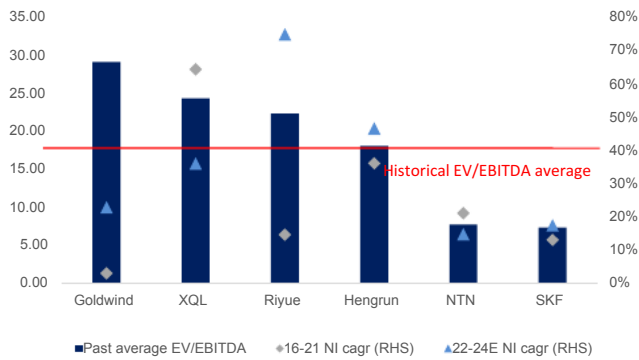
Company	Rating	Price currency	Current price	Target price	Upside/downside (%)	Past average EV/EBITDA	Target multiple (x)	Benchmark
Xinqianglian	Buy	CNY	82.2	118.0	44%	2025 EV/EBITDA (discount back to 2023 at 8.5% COE)	18	Peer group's historical avg

Price as of 2022/10/10

TPs are on a 12-month time frame.

Source: Gao Hua Securities Research, Wind

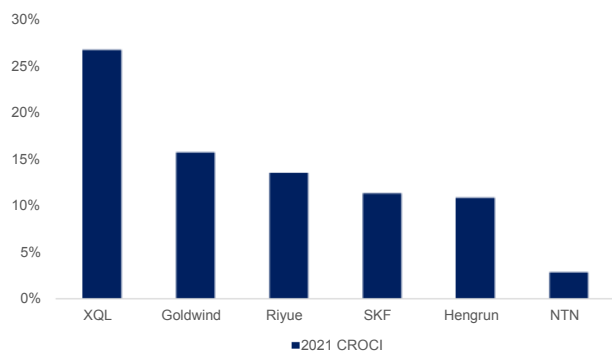
Exhibit 108: We adopt 18x 2025E EV/EBITDA to calculate our TP for XQL based on historical average of comparable peers



Goldwind, XQL, Riyue, NTN and SKF data are based on GHe and GSe, using net income CAGR; Hengrun data are based on Wind consensus and use net income CAGR

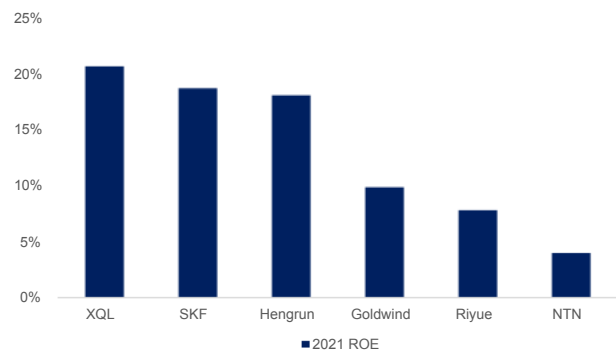
Source: Company data, Wind, Gao Hua Securities Research

Exhibit 110: XQL had highest CROCI in 2021
2021 CROCI



Source: Gao Hua Securities Research

Exhibit 109: XQL had highest ROE in 2021
Peers' 2021 ROE



Source: Company data, Wind

Exhibit 111: Rolling EV/EBITDA



Source: Wind, Gao Hua Securities Research

Exhibit 112: Rolling P/E



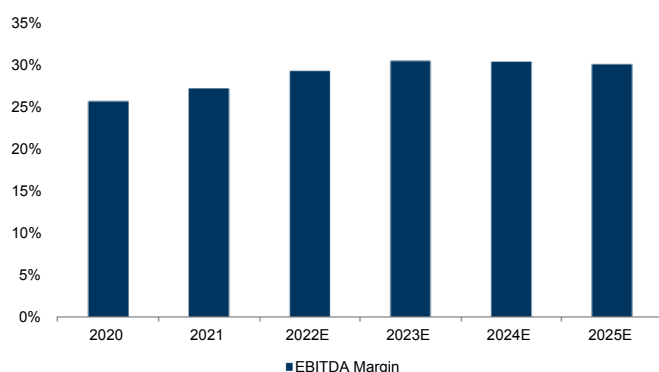
Source: Wind, Gao Hua Securities Research

Exhibit 113: Rolling P/B



Source: Wind, Gao Hua Securities Research

Exhibit 114: We expect XQL's EBITDA margin will improve from 29% to 30% from 2022E to 2025E



Source: Company data, Gao Hua Securities Research

GHe vs. consensus

Our net income and EPS estimates are 7-17% higher compared with Wind consensus for 2023-24E, considering our expectations for improving product mix. We expect strong downstream wind installation, and improved margin in the LT on the back of XQL's R&D experience and product mix.

Exhibit 115: We are 7% to 17% compared to Wind consensus for 2023-24E net income

Company Name	Sales			Net Income			EPS			Net Margin		
	GHe vs. cons			GHe vs. cons			GHe vs. cons			GHe vs. cons		
	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3
Xinqianglian	8%	8%	15%	0%	7%	17%	0%	7%	17%	-2%	0%	0%
Differences	8%	8%	15%	0%	7%	17%	0%	7%	17%	-2%	0%	0%

Source: Wind, Gao Hua Securities Research

Financial analysis

P&L: We forecast a 34% revenue CAGR in 2022-25E driven by a 35% CAGR in shipments of bearings. We expect gross margins to steadily expand to 32% by 2025E

(from 31% in 2022E) driven by ASP expansion, better product mix (higher proportion of bearing), and continuous cost control measures. We expect SG&A to slightly decline to 5.8% in 2025E (from 6.0% in 2022E) from better sales efficiency. We expect EBIT margin to rise to 26.4% in 2025E (from 24.7% in 2022E) and EBITDA margin to reach 30.2% in 2025E (from 29.4% in 2022E) as we believe its continuous R&D will help to improve its margin. We look for the company to post a net profit of Rmb 1,763mn in 2025E compared to Rmb666mn in 2022E, with a 38% net income CAGR in 2022-25E.

Balance sheet: As at 2021, the cash balance was Rmb483mn and net receivable days at 166. In 2025E we forecast receivable days to decrease to 130 due to its stable client portfolio and stronger AR management ability. Inventory turnover days was 114 in 2021, which we expect to improve to 95 in 2025E. We also expect improving net working capital to increase from Rmb2,076mn in 2022E to Rmb6,563mn in 2025E. Meanwhile, we expect its cash to grow from Rmb880mn in 2022E to Rmb2,982mn in 2025E, and inventory to grow from Rmb704mn in 2022E to Rmb1,449mn in 2025E driven by a 34% revenue CAGR over the same period.

Statement of cash flows: We forecast capex of Rmb500mn p.a. from 2022-25E, mainly to support building more bearing manufacture ring capacity. We estimate total cash flow of Rmb791mn by 2025E (from 397mn in 2022E), of which we forecast operating cash flow to improve significantly from Rmb649mn in 2022E to Rmb1,121mn in 2025E, driven by a 38% net income CAGR over the same period. We also forecast ROE to improve to 22.4% (from 16.1%) over the same period due to increasing net income.

Risks

Lower-than-expected market demand. As 2022 marks the beginning of a grid parity era for offshore wind and newly approved wind projects will no longer be eligible for the national subsidy, the return rate for wind power projects might be affected in the short term and thus influence market demand. A prolonged disruption in activities due to COVID-19 could lead to suspension of production, transportation and demand in the underlying markets and thus impact the installation of wind power equipment.

Higher-than-expected raw material costs: Wind bearing makers have limited control over raw material suppliers. Any unfavorable change in steel prices may increase production costs, resulting in lower-than-expected gross margin and higher pressure on capital turnover. High prices of major raw materials could influence XQL's working capital unless the increasing cost of raw materials can gradually transfer to downstream participants. If XQL can transfer increasing raw material prices to downstream participants, there could still be risks of higher supply chain prices hurting downstream installation demand.

Lower-than-expected wind power castings ASP. In spite of uncertainty in steel prices, declining wind bearing ASP and fierce competition in wind bearing still put pressure on ASP. As the wind sector is shifting towards cost driven and turbine ASP in the public tender market continues declining, bearing ASP could be affected at the upstream player. In addition, many new companies have entered the market attracted by the significant wind power installation growth in recent years, which makes the competition more intense and could give rise to price wars.

Slower-than-expected capacity expansion. If XQL cannot expand capacity as expected, the company may lose its current market share amid the fierce competition, thus delivering lower-than-expected sales volume and may also potentially lose pricing power.

Ningbo Orient Wires & Cables Co. (603606.SS) - Riding on rising off-shore demand; initiate at Buy

603606.SS	12m Price Target: Rmb107	Price: Rmb69.34	Upside: 54.3%
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Buy		GS Forecast			
		12/21	12/22E	12/23E	12/24E
Market cap: Rmb47.7bn / \$6.7bn	Revenue (Rmb mn) New	7,932.2	9,114.3	12,840.4	16,525.5
Enterprise value: Rmb46.5bn / \$6.5bn	Revenue (Rmb mn) Old	--	--	--	--
3m ADTV :Rmb839.2mn/ \$122.7mn	EBITDA (Rmb mn)	1,478.7	1,530.0	2,405.6	3,304.6
China	EPS (Rmb) New	1.81	1.72	2.73	3.77
China Clean Energy	EPS (Rmb) Old	--	--	--	--
	P/E (X)	16.2	40.3	25.4	18.4
M&A Rank: 3	P/B (X)	4.0	8.2	6.4	4.9
Leases incl. in net debt & EV?: No	Dividend yield (%)	1.2	0.5	0.8	1.1
	CROCI (%)	44.3	36.6	41.0	42.5
		3/22	6/22	9/22E	12/22E
	EPS (Rmb)	0.40	0.36	0.42	0.54

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10 Oct 2022 close.

The largest submarine cable maker in China. Established in 1998, Ningbo Orient Wires & Cables (“Orient Cable”) is one of the largest Chinese land & submarine cable solutions providers in China. Amid entry into a grid-parity era, removal of China’s subsidy support for offshore wind installation, and wind projects expanding further into other offshore applications (e.g. over 70km), we expect Orient Cable’s submarine cable and land cable shipments to grow at 46% and 23% CAGRs respectively over 2022E-25E, which should drive revenue to grow at a 33% CAGR over the same period. We expect revenue contribution from submarine cables to rise from 34% in 2022E to 45% in 2025E, which should help overall gross margin reach 27% in 2025E (from 22% in 2022E) driven by ASP expansion, better product mix, and continuous cost control measures. With 54% upside implied by our 12m TP of Rmb107, we initiate on Orient Cable with a Buy rating.

Key debates and how we differ

■ Can Orient Cable sustain its gross margin as off-shore wind enters the grid-parity era?

Entering 2022E, we thought the auction price for submarine cable would start to moderate given the exit of the national subsidy and also decreasing raw material price (we note that copper price has moderated 12% since April). However, we still see leaders such as Orient Cable sustaining its ASP with gross margin at 40-41% of submarine cable over 2022E to 2025E, on the back of: 1) Its strong R&D capability and years of production know-how which should help the company continue to drive cost reductions; 2) Post a 26% decline of wind turbine auction price in 2021 and

decreasing cable installation fees, we see recovering IRR from wind farm operators, which should make them more willing to pay a price premium for higher-quality products that play a critical role in off-shore projects such as submarine cables; 3) As off-shore wind installation moves to further offshore areas/applications, we expect to see more demand for high-end 220kv and 500kv cables. While the current mainstream products are 220kv cables, Orient Cable is one of the very few domestic leaders who are capable of producing 500kv, more premium products. With a pioneer advantage in high-end cables (c.49% market share by sales in high-end 110kv+ markets), we expect the company to see better product mix vs. peers and history.

■ **Is off-shore submarine cable order backlog peaking out and are all the positives in the price?**

We expect China's off-shore wind installation to start a new cycle in 2023E as grid parity sets in. As the largest submarine cable provider in China, Orient Cable has c.30% market share in submarine cable and c.49% in the high-end 110kv+ cable market. We expect the company to be best-positioned to ride on this trend of accelerated wind installation and to record 46% submarine cable shipment CAGR over 2022-25E on the back of its sector-leading product quality and R&D strength. In addition, as off-shore wind installation moves to further offshore areas/applications, we expect to see more demand for high-end 220kv and 500kv cables, where Orient Cable has pioneer advantages to drive revenue growth of 33% CAGR over 2023E to 2025E. Orient Cable has a total Rmb6.3bn of submarine cable orders on hand as of 1H22, vs. our expectations of a total of Rmb100bn offshore submarine cable TAM over 2022-25. We see ample growth opportunities going forward on offshore wind. While Orient Cable is trading at 20x 2023 EV/EBITDA, 1sd above historical average, we expect the company to record a 46% net income CAGR over 2022-25E on rapid offshore wind capacity expansion on the following future catalysts: more off-shore orders, and favorable off-shore policies.

Premiumization and efficient inventory management to sustain gross margin. On the back of its strong R&D, Orient Cable has been delivering a sector-leading gross margin over 2017-21 due to better product mix and efficient raw materials management (Exhibit 131). That said, Orient Cable's gross margin for submarine cable was down 10ppt in 2021 to 44% due to weak demand and higher raw material price. We expect its submarine cable margin to sustain at 40-41% over 2022E to 2025E as off-shore wind enters a new cycle, but still remain the highest margin vs. other off-shore components.

Best-positioned to ride on rising off-shore wind installation. We expect Orient Cable to be best-positioned to ride on rising off-shore wind installation on the back of its sector-leading product offerings and record a 46% net income CAGR over 2022-25E. We use 18x 2025E EV/EBITDA (in line with the historical average of Orient Cable's peer group), discounted back to 2023E at 8.5% COE, to derive our 12m TP of Rmb 107.

We expect China's off-shore wind installation to start a new cycle in 2023. As the largest submarine cable provider in China, Orient Cable has more than 30% market share in submarine cable and c.49% in high-end 110kv+ cable market. We expect the company

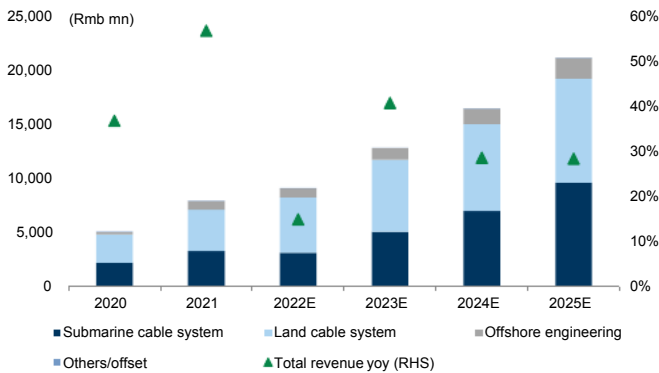
to be best-positioned to ride on this trend and to record 46% submarine cable shipment CAGR over 2022-25E. In addition, as the off-shore wind installation to move to further offshore area, we expect to see more demand for high-end 220kv and 500kv cables, where Orient Cable has pioneer advantage in to drive its submarine cable revenue grow at 38% CAGR over 2023E to 2025E.

The largest submarine cable maker in China best positioned for the off-shore tailwind

Ningbo Orient Wires & Cables is a one of the largest Chinese land & submarine cable solutions providers. Their main products include HVAC land & submarine cables (up to 500 kv), HVDC land/submarine cables (up to ± 535kv) and umbilical and dynamic cables.

Exhibit 117: We expect Ningbo Orient Cable to post a revenue CAGR of 33% over 2022-25E

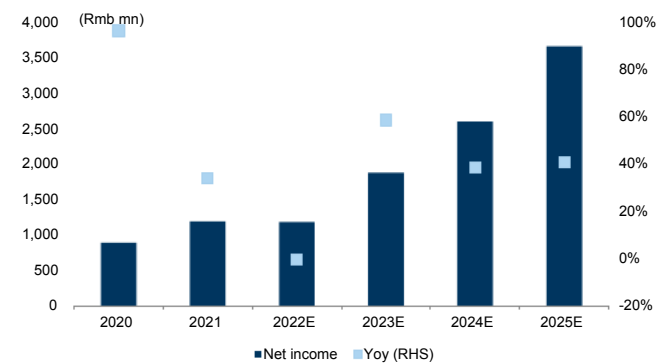
Historical and forecast revenue



Source: Company data, Gao Hua Securities Research

Exhibit 118: We expect Ningbo Orient Cable to record a 46% net income CAGR in 2022-25E

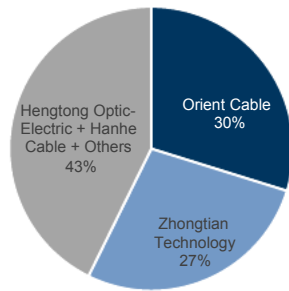
Historical and forecast net income



Source: Company data, Gao Hua Securities Research

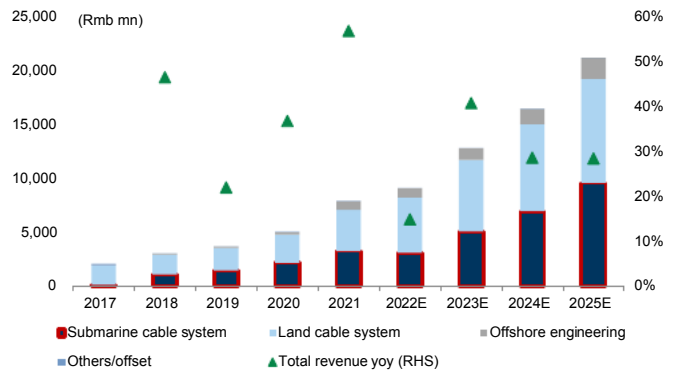
Ningbo Orient Cable started with land cable products, and gradually tapped into the marine cable market in 2005, by developing the 35kv photoelectric composite submarine cable and submarine cross-linked cable. The company is a leader in the domestic submarine market, and provided China’s first self-produced 220kv submarine cable, and China’s first self-produced dynamic umbilical cable. As of 2021, the company’s R&D and production capacity includes 500kv alternate current cable, and ±535kv direct current submarine and land cables. Orient Cable’s submarine cable revenue contribution has increased from 7% in 2017 to 41% 2021. As the largest submarine cable provider in China, Orient Cable has more than 30% market share in submarine cable and c.49% in high-end 110kv+ cable market. We expect the company to be best-positioned to ride on the rising offshore applications tailwind and to record a 46% submarine cable shipment CAGR over 2022-25E (from a 38% CAGR during 2019-21).

Exhibit 119: Orient Cable accounts for around 30% of subsea market share as of 3Q21
Submarine cable market share



Source: Company data, Huaon Industry Research

Exhibit 120: Orient Cable’s submarine cable revenue contribution has increased strongly from 2017 to 2021
Orient Cable’s submarine cable revenue

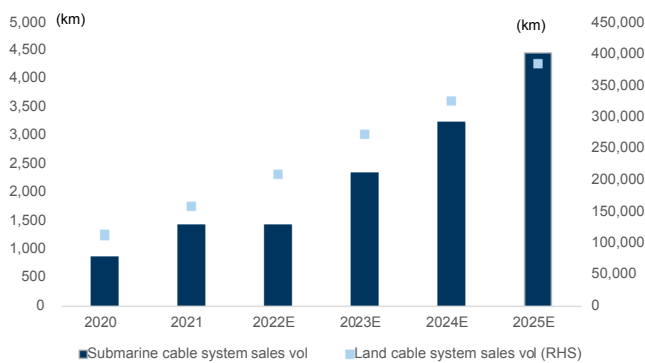


Source: Company data

On the back of a strong rush of installations of offshore wind (due to the exit of the national subsidy in 2021), we see rising winning bids from the company’s submarine cable products in 2020, which has driven Orient Cable’s submarine cable revenue to grow at 50% in 2021, compared to 37%/48% in 2019 and 2020. While we expect 2022E might see a dip in its revenue growth (we forecast -5% yoy as most auctions were concentrated in onshore wind products in 2021), post the installation spike, we think its submarine cable revenue will gradually recover in 2023E, and record a 38% CAGR over 2023E to 2025E on the back of its sector-leading product quality and R&D strength. In addition, as off-shore wind installation expands further into other offshore areas, we expect to see more demand for high-end 220kv and 500kv cables, where Orient Cable has a pioneer advantage.

Exhibit 121: We expect Ningbo Orient Cable’s submarine cable system sales volume will increase at a CAGR of 46% from 2022 to 25E

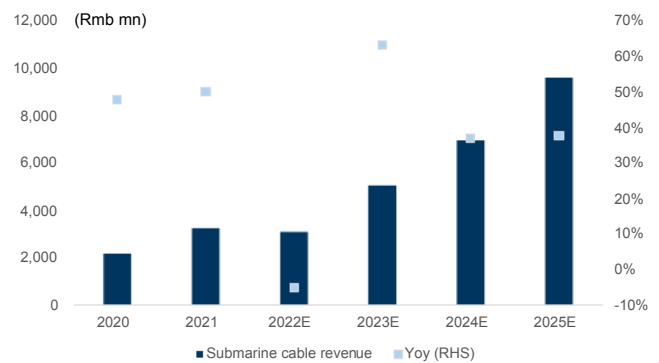
Sales volume breakdown



Source: Company data, Gao Hua Securities Research

Exhibit 122: We expect Orient Cable’s submarine cable revenue to grow at 38% CAGR over 2023E to 2025E.

Historical and forecast submarine revenue



Source: Company data, Gao Hua Securities Research

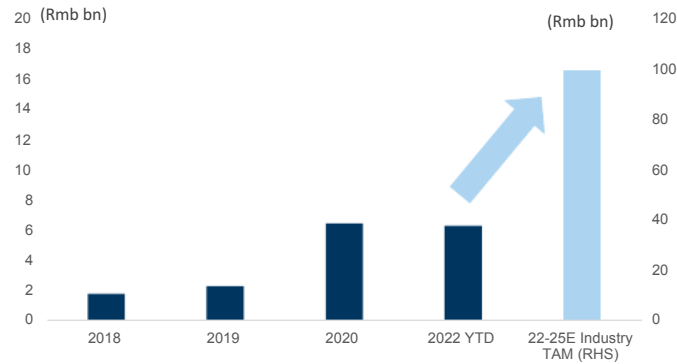
Off-shore wind projects have a very high quality requirement for submarine cables as the cables need to be placed undersea with high water pressure for 20 years. In addition, the cables need to have strong resilience, be erosion-proof, water-proof and ideally have as maximum a length as possible of single joint free cables. Orient Cable is a leading manufacturer that can produce a 17km single knots free photoelectric

composite submarine cable with a voltage level of 220kv, and a cross-section of 2,500 square millimeters. It also has R&D and production capacity to deliver up to 500kv AC submarine and land cables, and up to ±535kv DC submarine and land cables according to the latest annual report.

Orient Cable has a total of Rmb6.3bn submarine cable orders on hand as of 1H22, vs. our expectations of a total of Rmb100bn offshore submarine cable TAM over 2022E-25E. We see ample growth opportunities going forward.

Exhibit 123: Orient Cable’s submarine cable orders have good momentum in 2022 YTD

Orient Cable’s submarine cable order amount summary



Source: Gao Hua Securities Research

Exhibit 124: There is a rising share of Orient Cable winning bids in high voltage products

Summary of Orient Cable's submarine cable auction

Time		Amount (Rmb mn)
2018		
1/4/2018	Huaneng Jiangsu Dafeng Expanded 300MW Offshore Wind Power Project (220kV)	479
2/6/2018	Fujian Putian Nanri Island Offshore Wind Farm Phase I Project	110
7/5/2018	Three Gorges Renewables Yangxi (300MW) 220kV Project	590
7/19/2018	Three Gorges Renewables Yangxi (300MW) 35kV Project	180
9/11/2018	Yangjiang Nanpeng Island Offshore Wind Power Project	68
12/11/2018	Huaneng Jiangsu Dafeng Expanded 300MW Offshore Wind Power Project (35kV)	346
2019		
3/19/2019	Yuedian Yangjiang Offshore Wind Power Project	427
3/20/2019	Huaneng Guanyun Offshore Wind Power Project	121
	Huaneng Jiangsu Dafeng Expanded 100MW Offshore Wind Power Project	46
3/28/2019	CNG Daishan 4# Offshore Wind Farm Project	184
3/30/2019	Yangjiang Nanpeng Island Offshore Wind Power Project (II)	195
6/6/2019	China Best Group Holding Limited 2019 Submarine Cable Procurement Project	330
9/5/2019	Longyuan Sheyang Offshore Wind Power Project (220kV)	369
11/7/2019	Longyuan Sheyang Offshore Wind Power Project (35kV)	162
12/21/2019	Zhejiang Shengsi 5#, 6# Offshore Wind Power Project	450
2020		
1/21/2020	Three Gorges Renewables Yangxi Phase II (400MW) 220kV Project	404
	Three Gorges Renewables Yangxi Phase II (400MW) 35kV Project	292
2/4/2020	Putian Pinghai Bay Offshore Wind Farm Project	373
3/10/2020	Three Gorges Renewables Yangxi Phase III, IV And V 220kV Project	892
	Three Gorges Renewables Yangxi Phase III, IV And V 35kV Project	825
4/10/2020	Power Construction Corporation of China Jiangsu Qidong H1, H2 Offshore Wind Power Project	510
	Power Construction Corporation of China Jiangsu Qidong H3 Offshore Wind Power Project	198
	CECEP Yangjiang Nanpeng Island 300MW Offshore Wind Power Project	166
	SPIC Guangdong 600MW Offshore Wind Power Project	309
5/28/2020	Zhejiang Shengsi 5#, 6# Offshore Wind Power Project	141
8/26/2020	Huadian Yangjiang Qingzhou 3# Offshore Wind Power Project	1,297
	Huadian Yuhuan No. 1 Offshore Wind Farm Project	260
	Huadong Engineering Co., Ltd. Vietnam Binh Dai Offshore Wind Power Project	299
9/9/2020	Huaneng Cangnan No. 4 Offshore Wind Power Project	338
12/1/2020	Guodian Xiangshan 1# Offshore Wind Farm (Phase I) Project	144
2022YTD		
2/16/2022	Mingyang Yangjiang Qingzhou Offshore Wind Farm	1,390
3/16/2022	CGN Zhejiang Xiangshan Offshore Wind Project	239
3/23/2022	Guangdong Yangjiang Qingzhou I And II Offshore Wind Farm Project	1,700
3/25/2022	Hollandse Kust West Beta Offshore Wind Project	530
4/8/2022	Yuedian Yangjiang Qingzhou I And II Offshore Wind Farm Project	298

Source: Company data

We believe Orient Cable's consistent focus and investment in R&D are the key drivers for its sector-leading product quality and market share:

- **Improved water-proof ability:** The company adopts basis of IEC60502 and IEC60840 standards on its submarine cables. The metal shield adopts alloy lead sheath, and the metal shield is wrapped with semiconducting resistance water tape, which improves the corrosion resistance of the cable under the sea.
- **Leading erosion-proof performance:** Orient Cable adopts a three-layer co-extrusion process (dry cross-linking) for the conductor shielding, insulation, and insulating shielding of its cable products, and are equipped with a purification feeding device and polarimeter, which extends the lifespan and increases safety of the cable.
- **Improved cable resilience:** The company selected the ultra-clean and ultra-smooth insulating materials produced by Borealis. The cable materials have excellent performance, including thermal extension properties: the maximum elongation under load is $\leq 120\%$ (the national standard is 175%), cooling post permanent elongation $\leq 10\%$ (15% specified by the national standard), ensuring the cable is not affected by high temperature during a short circuit. In addition, the lead pressing process is continuously monitored with an accurate lead jacket thickness gauge to ensure the uniformity and quality of the lead layer.

Exhibit 125: Orient Cable has continuously improved and strengthened its production techniques and services, and gradually closed the gap with foreign leading companies

Orient Cable technical standards comparison with foreign products

Dimension	International standard	Foreign products	Orient Cable	Additional information
Pressure resistance	318 kV/30 min without breakdown	Pass	Pass	
Partial discharge	No detectable partial discharge at device sensitivity ≤ 5 pC at 190 kV	Pass	Pass	
Insulation eccentricity	≤ 8.0	≤ 5.0	≤ 2.3	
Photoelectric composite	No requirement	Using bundled photoelectric composite	Photoelectric composite in the inner lining of armored cable	Photoelectric composite in the inner lining can better protect the optical fiber, and the temperature control is also more accurate
Anti-corrosion layer	No requirement	Yes	Yes	
Early warning system	No requirement	No	Yes	
Temperature control	No requirement	Yes	Yes	
Length without joint	No requirement	10km	17km	
Soft joint	No requirement	Long production cycle	Short production cycle	

Source: Company data

We believe the key driver of the above-mentioned superior quality and performance metrics is the company's sector-leading R&D strength and its continued efforts in optimizing its production process, product quality:

- **Utilizing vertical cabling equipment to improve productivity of long-length submarine cables formation**

The company has independently designed a tray-type vertical cabling equipment that can simultaneously composite three cables and three optical cables, and has obtained a national invention patent. This equipment ensures the roundness of the cable during cable formation, eliminates the stress generated on the wire core after the cable is stranded, and ensures the stability of the mechanical and electrical properties of the submarine cable. The successful development of this equipment has improved the production efficiency of submarine cables. Moreover, the

equipment realizes the simultaneous production of each process, greatly improves the production efficiency, simplifies the equipment requirement, reduces the production cost, and shortens the production cycle.

■ **Self-developed soft joints to extend the length of cables (with joints) to exceed 30km and ensure product performance**

Continuous length is one of the basic requirements of submarine cables. If the limitation of manufacturing equipment makes the length of a single submarine cable unable to meet the needs, the soft joint technology can ensure that the performance of the submarine cable at the joint has similar functionality as that of the normal submarine cable. By adopting the copper wire welding process for connecting cable joint conductors, resistance performance of the joint can be ensured. In the R&D of the special cross-linked insulating material injection molding machine for cable joints, the company has designed and manufactured cross-linked polyethylene material extruding machines, which can change the material quickly, ensure no stagnation in providing materials, and the screw is easy to disassemble and clean.

■ **Flawless extrusion of the inner and outer shielding and insulation of long-length submarine cables**

To reduce the old rubber generated by cross-linked polyethylene under high temperature and high pressure and improve service time of the cross-linked submarine cable production, the company discussed and cooperated with German TROESTER, and adopted the following two measures which doubled continuous service time and increased production speed by 40%:

- Lowering the heating temperature, increasing the glue output and increasing the screw diameter by one third
- Reducing the generation of powder in the feeding process of cross-linked polyethylene material

■ **Continuous flawless extrusion of lead and sheath of long-length submarine cables**

The metal sheath of the submarine cable is made of alloy lead, and the long-length submarine cable is continuously extruded with flawless lead and flawless sheath. To ensure good water-blocking effect, it is also necessary to ensure that the metal sleeve does not burst due to insulation expansion at operating temperature. To achieve this, the company has renovated the lead press and the cooling system, and cooperated to develop the first lead sheath online polarimeter in China.

Continuous R&D of optical fiber communication composite

Since the optoelectronic composite submarine cable integrates the functions of optical fiber communication and power transmission, it is recognized as a complex high-tech product in the world. Considering the high cost of submarine cables and the difficulty of laying out undersea, the use of photoelectric composite submarine cables can save a lot of energy and raw materials. Using this technology can also shorten the construction period, reduce engineering costs, and reduce very complex installation and laying time

and costs. Orient Cable's optoelectronic composite submarine cable has been widely used in many projects, which greatly reduces the laying cost and laying risk caused by the repeated laying of the cable.

Exhibit 126: Orient Cable has various leading technologies in cable design and manufacturing

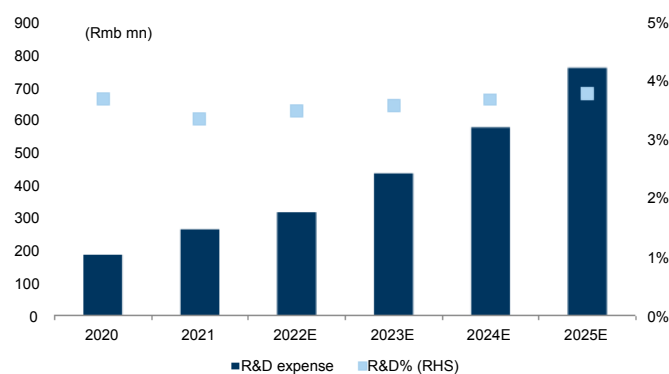
Orient Cable's leading technologies

Name of the technology	Source of the technology	Features of the technology	Level of the technology
Conductor stranding pre-twist forming technology	Independent research and development	The armored pre-twisting technology is applied to the stranding of the conductor, and the pre-twisting device is independently designed to reduce the internal stress of the large-section compacted conductor and solve the rebound and loose strands of the large-section compacted superconductor.	Leading position in China
CCV high-voltage cable insulation concentricity control technology	Independent research and development	Reasonable design of mold, improvement of semi-conductive tape material, precise control of vulcanization temperature, line speed and upper and lower traction rotation speed to ensure roundness and concentricity of high-voltage insulating layer.	Leading position internationally
Insulation stress relaxation technology for medium and high voltage cables	Independent research and development	For medium-high pressure and large-length cross-linked cores, a movable special degassing room is designed, with precise temperature control and excellent degassing effect.	No.1 in China
Double-layer extrusion technology of cable insulation for nuclear power plants	Independent research and development	Design automatic core-fixing double-layer co-extrusion head and ensure the extrusion of 0.15mm thin insulation in the inner layer, improve production efficiency and greatly reduce material waste.	Leading position in China
Special cable structure design technology	Independent research and development	For cables used in special occasions (such as cables for rail transit, cables for nuclear power plants, fire protection requirements in high buildings, etc.), specially designed cables and cables with special requirements such as anti-rodent and anti-ants in various places, with excellent performance are designed to ensure the safe and normal operation of special cables under various environmental conditions.	Leading position in China
Photoelectric composite low-voltage cable (OPLC) design and manufacturing technology	Independent research and development	To achieve photoelectric integration, according to the different core numbers and structures of low-voltage cables, a reasonable optical unit structure is specially designed.	Leading position in China

Source: Company data

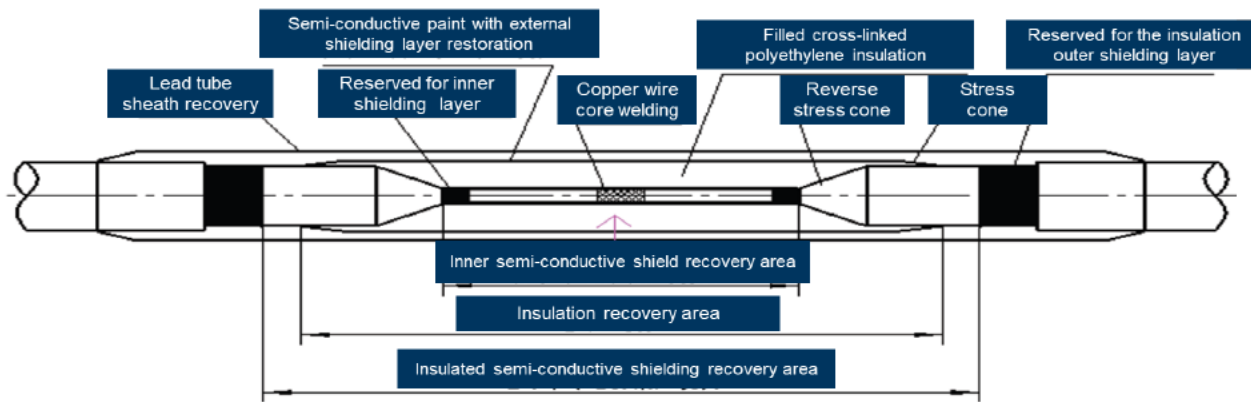
Exhibit 127: We believe Orient Cable's R&D % of sales will be 3.5%-3.8% over 2022-25E

Orient Cable's R&D and R&D %



Source: Company data, Gao Hua Securities Research

Exhibit 128: Demonstration of soft joint structure



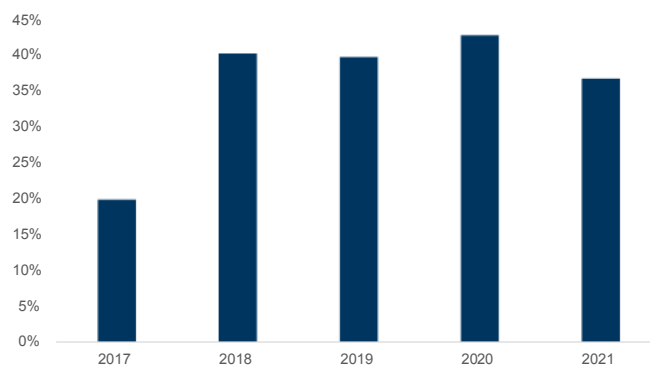
Source: Company data

Strong client portfolio with abundant harbor resources

Orient Cable established three marketing departments focused on the power grid, new energy, petrochemical and other industries as well as the major customers of submarine cable projects. The company has also established long-term and stable business alliances with the State Grid Corporation of China and China Southern Power Grid and their subordinate power companies. In addition, the company has cooperated with Huaneng New Energy, Yangtze New Energy, China Guangdong Nuclear Power Co., Ltd. on long term submarine cable cooperation. We believe this robust portfolio of high-profile clients and active relationship with clients can effectively help the company to sustain its sector-leading position and profitability amid the grid-parity era.

Exhibit 129: Top 5 clients account for more than 35% of the company's revenue from 2018

Top 5 clients' revenue contribution



Source: Company data

Another key advantage of Orient Cable is its harbor resources. The maximum length of a single cable can reach tens of kilometers, and the maximum weight can reach thousands of tons, so shipping of the submarine cable is extremely difficult, and the cable must be directly installed on the laying vessel with the help of special hoisting, transportation equipment and submarine cable boarding devices. Due to these limits,

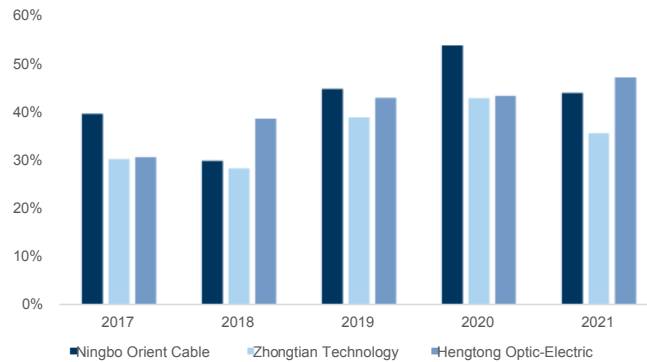
submarine cable manufacturers must be close to the waterside. Orient Cable's submarine cable production base is adjacent to Beilun Port, a deep-water port. The products can be directly loaded onto the laying vessel through the submarine cable boarding device, and directly launched into the sea through the company's own dedicated submarine cable dock and sea area, which is necessary for the production of long-length submarine cables. If the submarine cable product fails, the company can arrange after-sales service personnel within 12 hours in the province and 24 hours outside the province, and the response speed is much faster than that of foreign manufacturers.

Premiumization and efficient inventory management to sustain gross margin

Submarine cable production requires high technology innovation and is capex heavy, and undergoes a sophisticated process. As a leader in the submarine cable industry, Orient Cable has strong R&D capability to support the continuous improvement of its products. As of 2021, the company has undertaken and participated in 21 major national scientific research projects, and won awards such as "Top 10 Most Competitive Enterprises in Global Submarine Cables" and "Top 10 Most Competitive Enterprises in China's Cable Industry". On the back of its strong R&D, Orient Cable recorded 30-54% gross margin for its submarine products in 2017-2021, similar to international peer Prysmian, and higher than its China and international peers - Zhongtian Tech and Nexans. We believe this is mainly due to better product mix and productivity. Orient has 41% revenue from submarine cables in 2021 vs. 8%, 20% and 10% for Prysmian, Zhongtian Tech and Nexans. Submarine ASP was 95 times higher than land cable for Orient Cable in 2021. Gross margin was higher by 34ppt for submarine vs. land and 5ppt higher than domestic peers due to higher technical barrier and a more concentrated competitive landscape. For the cost breakdown, 95% of costs for Orient Cable came from raw materials vs. 73% and 86% for Prysmian and Zhongtian Tech, respectively. We believe this is mainly due to higher production efficiency at Orient Cable and higher labor and energy costs for Prysmian.

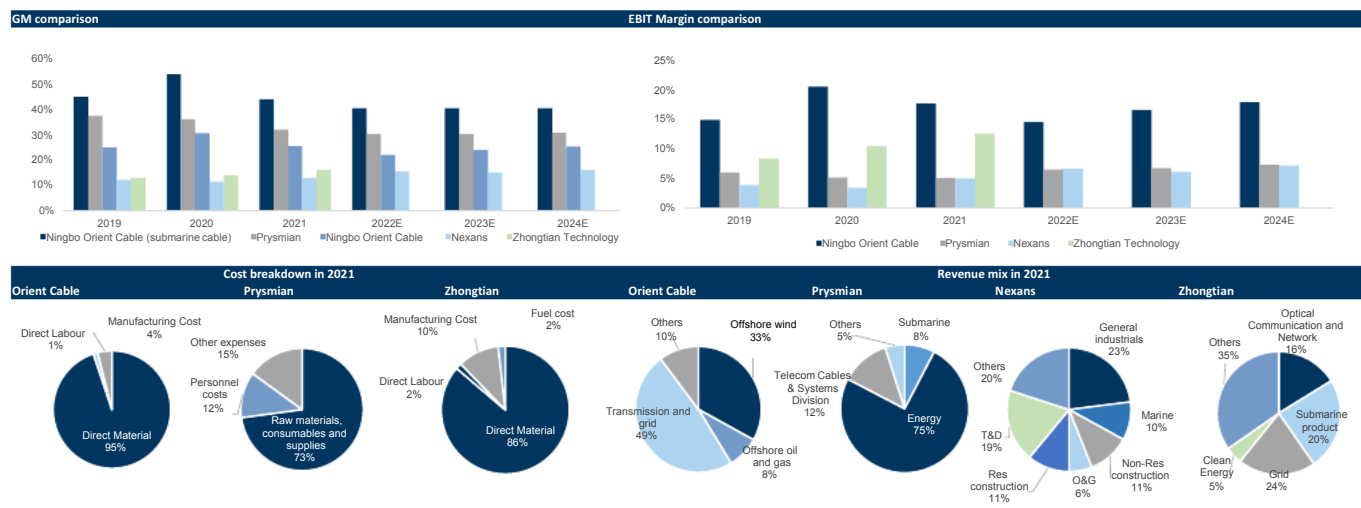
Exhibit 130: Orient Cable recorded 30-54% gross margin for its submarine products in 2017-2021, 5 ppt higher than its peers on average

Orient Cable and peers submarine products margin



Source: Company data, Wind

Exhibit 131: Orient Cable recorded 30-54% gross margin for its submarine products in 2017-2021, 5ppt higher than its peers on average
Key numbers comparison between peers



Source: Gao Hua Securities Research, Company data, Goldman Sachs Global Investment Research

Driven by rush installations before 2021, submarine cables saw a heated auction market in 2020, which has benefited Orient Cable’s submarine cable gross margin, marking a record high at 53.7% in 2020. However, demand has weakened post the rush installation and with an 18% rise in copper price in 2021, Orient Cable’s gross margin for submarine cable was down 10ppt in 2021 to 44%. From 2022E, we expect its submarine cable margin to moderate to 40-41% over 2022E to 2025E as off-shore wind enters grid-parity, but still remain the highest margin vs. other off-shore components on the back of:

- Orient Cable’s strong R&D capability and years of production know-how which helps the company to continue to drive cost reduction;
- Post a 26% decline in wind turbine auction price in 2021 and decreasing cable installation fees, we see recovering IRR from wind farm operators, which should make them more willing to pay a price premium for a higher-quality product that

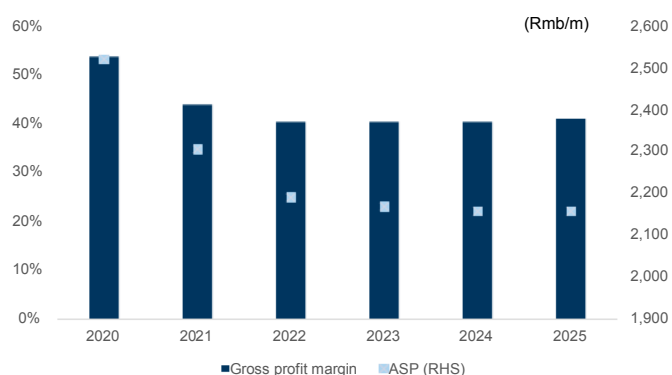
plays a critical role in off-shore projects such as submarine cables.

- As the off-shore wind installation moves to further offshore areas, we expect to see more demand for high-end 220kv and 500kv cables. While the current mainstream products are 220kv cables, Orient Cable is one of the very few domestic leaders that is capable of producing 500kv, more premium products. With a pioneer advantage in high-end cables (49% market share in high-end 110kv+ markets), we expect the company to see better product mix.

We examined the company's submarine cable auctions since 2019, and note that there is a rising share of it winning bids in high voltage products, such as the 500kv submarine cable.

Exhibit 132: We think leaders such as Orient Cable can sustain its gross margin at 40-41% over 2022E to 2025E

Historical and forecast submarine cable ASP and gross margin



Source: Company data, Gao Hua Securities Research

Exhibit 133: We notice in auctions there is a rising share of Orient Cable's winning bid in high voltage products

Analysis of Orient Cable's winning bid in high voltage products

	2020	2022 YTD
Total bidding amount (Rmb mn)	6,446	4,157
% of total amount with 220 KV	64%	46%
% of total amount with 500 KV	0%	41%

Source: Company data

Raw material accounts for over 90% of product cost, and copper accounts for on average 75% of the cost, which is a key factor impacting Orient Cable's gross margin. An 18% rise in copper price in 2021 weighed on Orient Cable's submarine cable gross margin by 10 ppt in 2021 compared to the 2020 level. Entering into 2022, we note that copper price has moderated since April, which in our view, will help Orient Cable's gross margin to recover. Our commodity team forecasts that higher copper prices are an inevitability due to a supply deficit. They retain bullish price forecasts for 2024 (\$14,000/t) and 2025 (\$15,000/t). **To hedge raw material cost, we note that the company uses spot and forward orders to lock the copper price to better manage its cost control.**

Our sensitivity analysis shows that a 5% increase in submarine cable ASP, or a 5% increase in submarine unit cost, would result in a 10.2% increase / 6.5% decrease in net income, all else equal.

Exhibit 134: Our sensitivity analysis shows that a 5% increase in submarine cable ASP, or a 5% increase in submarine unit cost, would result in a 10.2% increase / 6.5% decrease in net income, all else equal
Sensitivity analysis of submarine cable ASP and unit cost on net income

	Submarine cable ASP (Rmb/m)				
	-10%	-5%	0%	5%	10%
Submarine cable unit cost (Rmb/m)	-10%	-7.5%	2.7%	23.2%	33.4%
	-5%	-14.0%	-3.8%	16.7%	27.0%
	0%	-20.5%	-10.2%	10.2%	20.5%
	5%	-27.0%	-16.7%	3.8%	14.0%
	10%	-33.4%	-23.2%	-13.0%	-2.7%

Source: Gao Hua Securities Research

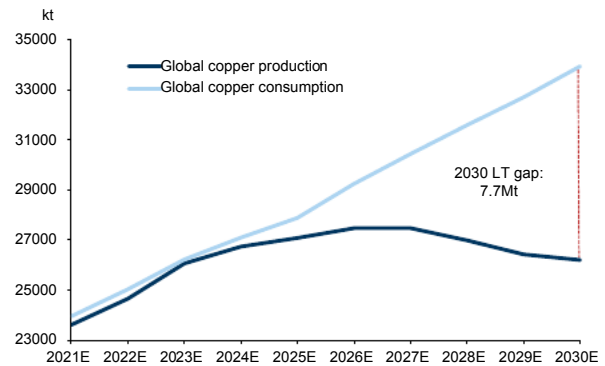
Exhibit 135: Market price of electrolytic copper in China shows an increasing trend recently

Market price of electrolytic copper in China



Source: Wind

Exhibit 136: Long-term supply gap remains unsolved, with widening mid-term deficits



Source: Woodmac, Goldman Sachs Global Investment Research

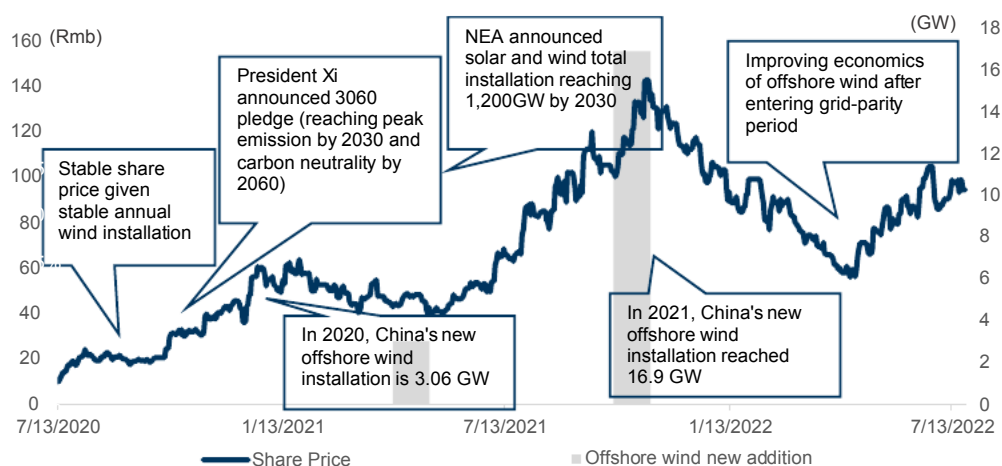
Well-positioned to ride the rising off-shore wind installation tailwind; initiate at Buy

China wind installation, clean energy development in China and improving economics of offshore wind show a relatively strong correlation with Orient Cable’s historical share price. When Orient Cable went public, its share price increased in 2015 when China’s new wind installation reached 33GW in 2015, up 66% yoy. Then, Orient Cable’s share price was relatively stable due to mild offshore wind installation. Starting from 2H20, the government released numerous policies and announcements supporting the development of solar installation in China. China’s ‘3060’ pledge, announced in September 2020, signaled a commitment to reach peak carbon emissions by 2030 and carbon net zero by 2060. Then in April 2021, the National Energy Administration (NEA) published a revised document noting that non-fossil fuel sources are to reach 25% of primary energy consumption by 2030, with solar and wind total installation reaching 1,200GW. These policies partly supported the share price increase for Orient Cable. In 2021, new offshore wind installation reached 16.9 GW (up 452% yoy), which further supported Orient Cable’s share price growth. After entering grid-parity in 2022 for offshore wind, we see improving economics due to technological advancement and cost-saving methods from the whole supply chain, which we think Orient Cable is

poised to benefit from; initiate at Buy with 54% upside implied by our 12m TP of Rmb107.

Exhibit 137: China wind installation shows a relatively strong correlation with fluctuations in Orient Cable's share price

Historical share price performance with influencing factors



NEA is National Energy Administration

Source: Company data, Gao Hua Securities Research, Wind, Bloomberg

Valuation

We adopt an EV/EBITDA valuation methodology for our solar and wind coverage, as we have found that historical share prices are highly correlated to EBITDA growth, giving us a reliable and measurable benchmark across the sectors. We select the comparable peer group as a valuation reference based on the nature of each company's business. Our peer group consists of Goldwind, Qingdao Hanhe, Jiangsu Zhongtian, Prysmian and Nexans, which are close peers in the wind supply chain. We believe these companies represent an appropriate peer group for Orient Cable given their similar business models and industry growth outlooks.

Orient Cable is trading at 20x 2023E EV/EBITDA and at its peer group's historical average since IPO of 18x. We use an 18x 2025E EV/EBITDA (in line with the historical average of Orient Cable's peer group), discounted back to 2023E at 8.5% COE, to derive our 12m TP of Rmb107. We chose its peer group to include close peers in the wind supply chain as mentioned above. As the company's historical share price tends to move broadly in line with its EBITDA growth, we believe the historical average EV/EBITDA multiple of Orient Cable's peer group offers an appropriate valuation reference, as this period represents China's wind sector transition from being subsidy driven to cost driven. We forecast Orient Cable's EBITDA margin will improve from 17% to 22% from 2022E to 2025E. Our target price implies 54% potential upside.

Exhibit 138: Rating and TP summary

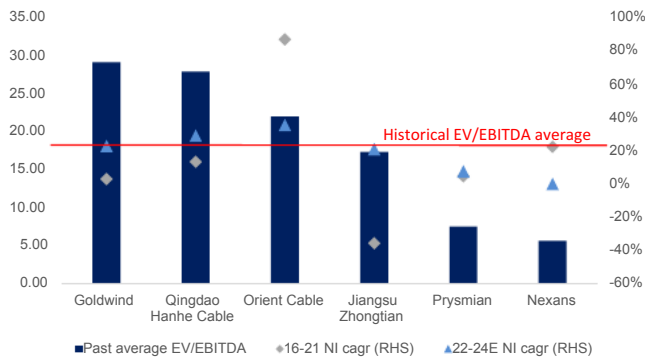
Company	Rating	Price currency	Current price	Target price	Upside/downside (%)	Valuation methodology	Target multiple (x)	Benchmark
Orient Cable	Buy	CNY	69.3	107.0	54%	2025 EV/EBITDA (discount back to 2023 at 8.5% COE)	18	Peer group's historical avg

Price as of 2022/10/10

TP is based on a 12-month time frame.

Source: Gao Hua Securities Research, Wind

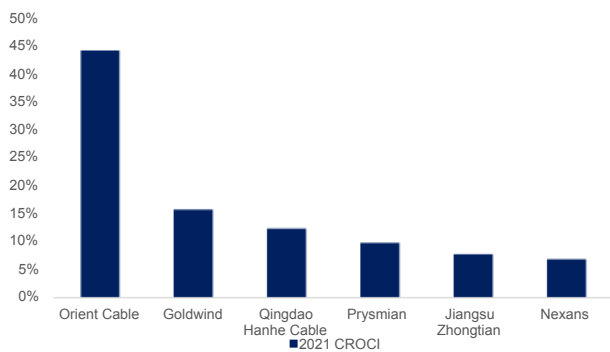
Exhibit 139: We adopt 18x 2025E EV/EBITDA to calculate our TP for Orient Cable based on the historical average of comparable peers



Orient Cable, Goldwind, Prysmian and Nexans are based on GHe and GSe, using net income CAGR. Qingdao Hanhe and Jiangsu Zhongtian are based on Wind consensus and use net income CAGR.

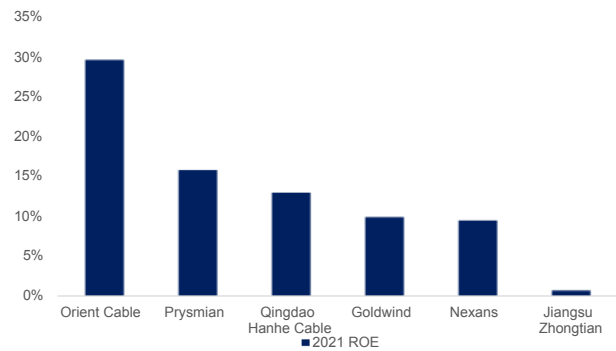
Source: Company data, Wind, Gao Hua Securities Research

Exhibit 141: Orient Cable has the highest CROCI in 2021
Peers' 2021 CROCI



Source: Gao Hua Securities Research

Exhibit 140: Orient Cable has the highest ROE in 2021
Peers' 2021 ROE



Source: Company data

Exhibit 142: 1-year fwd EV/EBITDA



Source: Wind, Gao Hua Securities Research

Exhibit 143: 1-year fwd P/E



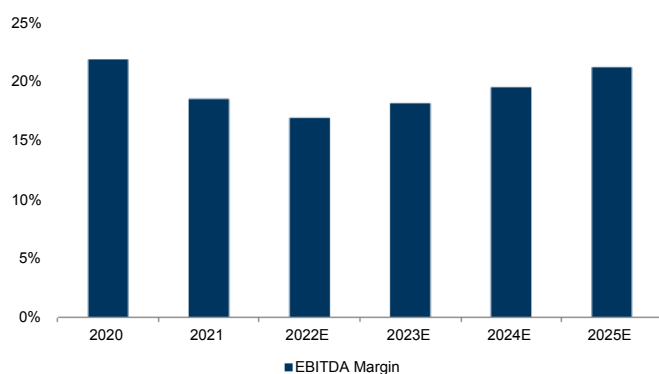
Source: Wind, Gao Hua Securities Research

Exhibit 144: 1-year fwd P/B



Source: Wind, Gao Hua Securities Research

Exhibit 145: We expect Orient Cable’s EBITDA margin to improve from 17% to 22% from 2022E to 2025E



Source: Company data, Gao Hua Securities Research

GHe vs. consensus

Our net income and EPS estimates are 17% higher compared with Wind consensus for 2024E, considering our expectations for improving gross margin and higher operational efficiency. We expect strong downstream wind installation, and improved margin in the LT on the back of Orient Cable’s R&D experience and product mix.

Exhibit 146: We are -4% to 17% compared to Wind consensus for 2022E-24E net income

Company Name	Sales			Net Income			EPS			Net Margin		
	GHe vs. cons			GHe vs. cons			GHe vs. cons			GHe vs. cons		
	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3
Orient Cable												
Differences	3%	11%	18%	-4%	7%	17%	-4%	7%	17%	-1%	0%	0%

Source: Wind, Gao Hua Securities Research

Financial analysis

P&L: We forecast a 33% revenue CAGR in 2022-25E driven by a 46% CAGR in shipments of submarine cable. We expect gross margins to steadily expand to 27% by 2025E (from 22% in 2022E) driven by ASP expansion, better product mix (higher proportion of submarine cable), and continuous cost control measures. We expect

SG&A to slightly decline to 6.8% in 2025E (from 7.0% in 2022E) from better sales efficiency. We expect EBIT margin to rise to 19.7% in 2025E (from 14.6% in 2022E) and EBITDA margin to reach 22% in 2025E (from 17% in 2022E) as we believe Orient Cable's continuous R&D will help to improve its margin. We look for the company to post a net profit of Rmb3,654mn in 2025E compared to Rmb1,183mn in 2022E, with a 46% net income CAGR in 2022-25E.

Balance sheet: As at 2021, Orient Cable's cash balance was Rmb1,495mn and net receivable days at 113. In 2025E, we forecast receivable days to decrease to 90 due to its stable client portfolio and stronger AR management. Inventory turnover days was 94 in 2021, which we expect to improve to 80 in 2025E due to better inventory management. We also expect improving net working capital to increase from Rmb3,658mn in 2022E to Rmb9,868mn in 2025E. Meanwhile, we expect Orient Cable's cash to grow from Rmb1,764mn in 2022E to Rmb5,348mn in 2025E, and inventory to grow from Rmb1,812mn in 2022E to Rmb3,414mn in 2025E driven by a 33% revenue CAGR over the same period.

Statement of cash flows: We forecast capex of Rmb700mn p.a. from 2022-25E, mainly to support building more cable manufacturing capacity. We estimate total cash flow of Rmb2,180mn by 2025E (from 269mn in 2022E), of which we forecast operating cash flow to improve significantly from Rmb910mn in 2022E to Rmb3,399mn in 2025E, driven by a 46% net income CAGR over the same period. We also forecast ROE to improve to 28.5% (from 20.3%) over the same period due to increasing net income.

Exhibit 147: Financial summary

Profit model (Rmb mn)	12/21	12/22E	12/23E	12/24E	Balance sheet (Rmb mn)	12/21	12/22E	12/23E	12/24E
Total revenue	7,932.2	9,114.3	12,840.4	16,525.5	Cash & equivalents	1,495.1	1,764.0	2,187.9	3,167.9
Cost of goods sold	(5,922.3)	(7,109.7)	(9,767.5)	(12,363.7)	Accounts receivable	2,455.2	2,746.8	3,693.8	4,301.2
SG&A	(306.4)	(319.0)	(436.6)	(545.3)	Inventory	1,517.7	1,811.5	2,408.4	2,980.8
R&D	(266.5)	(319.0)	(462.3)	(611.4)	Other current assets	861.7	861.7	861.7	861.7
Other operating profit/(expense)	(34.1)	(35.8)	(37.6)	(39.5)	Total current assets	6,329.7	7,184.0	9,151.8	11,311.6
EBITDA	1,478.7	1,530.0	2,405.6	3,304.6	Net PP&E	756.6	1,267.6	1,708.6	2,079.6
Depreciation & amortization	(75.8)	(199.2)	(269.2)	(339.2)	Net intangibles	280.3	270.2	260.0	249.9
EBIT	1,402.9	1,330.8	2,136.5	2,965.5	Total investments	10.7	10.7	10.7	10.7
Interest income	11.8	15.0	17.6	21.9	Other long-term assets	1,006.5	1,006.5	1,006.5	1,006.5
Interest expense	(20.7)	(15.9)	(29.2)	(35.5)	Total assets	8,384.0	9,739.0	12,137.6	14,658.3
Income/(loss) from uncons. subs.	25.5				Accounts payable	1,835.3	1,947.9	2,408.4	2,709.9
Others	(47.2)	30.0	30.0	30.0	Short-term loans	246.4	246.4	246.4	246.4
Pretax profits	1,370.3	1,359.9	2,154.8	2,981.8	Other current liabilities	1,331.4	1,331.4	1,331.4	1,331.4
Income tax	(181.4)	(176.8)	(280.1)	(387.6)	Total current liabilities	3,413.0	3,525.6	3,986.2	4,287.6
Minorities	(0.1)	0.0	0.1	0.1	Long-term debt		300.0	600.0	600.0
					Other long-term liabilities	85.2	85.2	85.2	85.2
Net income pre-preferred	1,188.8	1,183.2	1,874.8	2,594.3	Total long-term liabilities	85.2	385.2	685.2	685.2
Preferred dividends					Total liabilities	3,498.2	3,910.8	4,671.4	4,972.8
Net income (pre-exceptionals)	1,188.8	1,183.2	1,874.8	2,594.3	Preferred shares				
Post tax exceptionals					Total common equity	4,881.6	5,824.1	7,462.2	9,681.5
Net income	1,188.8	1,183.2	1,874.8	2,594.3	Minority interest	4.1	4.1	4.0	3.9
					Total liabilities & equity	8,384.0	9,739.0	12,137.6	14,658.3
EPS (basic, pre-exception) (Rmb)	1.8	1.7	2.7	3.8	BVPS (Rmb)	7.4	8.5	10.9	14.1
EPS (basic, post-exception) (Rmb)	1.8	1.7	2.7	3.8					
EPS (diluted, post-exception) (Rmb)	1.8	1.7	2.7	3.8					
DPS (Rmb)	0.4	0.3	0.5	0.8					
Dividend payout ratio (%)	19%	20%	20%	20%					
Free cash flow yield (%)	-1%	0%	1%	3%					
Growth & margins (%)	12/21	12/22E	12/23E	12/24E	Ratios	12/21	12/22E	12/23E	12/24E
Sales growth	57%	15%	41%	29%	CROCI (%)	44%	37%	41%	42%
EBITDA growth	33%	3%	57%	37%	ROE (%)	30%	22%	28%	30%
EBIT growth	35%	-5%	61%	39%	ROA (%)	16%	13%	17%	19%
Net income growth	34%	0%	58%	38%	Inventory days	76.0	85.5	78.8	79.6
EPS growth	33%	-5%	58%	38%	Receivables days	98.1	104.2	91.5	88.3
Gross margin	25%	22%	24%	25%	Payable days	86.6	97.1	81.4	75.6
EBITDA margin	19%	17%	19%	20%	Net debt/equity (%)	-26%	-21%	-18%	-24%
EBIT margin	18%	15%	17%	18%	Interest cover - EBIT (X)	129.5		184.1	216.9
					Valuation	12/21	12/22E	12/23E	12/24E
Cash flow statement (Rmb mn)	12/21	12/22E	12/23E	12/24E	P/E basic (X)	16.2	43.5	27.4	19.8
Net income pre-preferred dividends	1,188.8	1,183.2	1,874.8	2,594.3	P/B (X)	4.0	8.8	6.9	5.3
D&A add-back	75.8	199.2	269.2	339.2	EV/EBITDA (X)	12.2	32.8	20.8	14.9
Minorities interests add-back	0.1	(0.0)	(0.1)	(0.1)	EV/GCI (X)	5.7	11.5	8.1	6.4
Net (inc)/dec working capital	(728.9)	(472.8)	(1,083.4)	(878.3)	Dividend yield (%)	1%	0%	1%	1%
Other operating cash flow	50.4								
Cash flow from operations	586.1	909.6	1,060.5	2,055.0					
Capital expenditures	(708.1)	(700.0)	(700.0)	(700.0)					
Acquisitions									
Divestitures									
Others	243.7								
Cash flow from investments	(464.4)	(700.0)	(700.0)	(700.0)					
Dividends paid (common & pref)	(163.6)	(240.7)	(236.6)	(375.0)					
Inc/(dec) in debt	(455.8)	300.0	300.0						
Common stock issuance (repurchase)	935.7								
Other financing cash flows	95.9								
Cash flow from financing	412.2	59.3	63.4	(375.0)					
Total cash flow	534.1	268.9	423.9	980.1					

Note: Last actual year may include reported and estimated data.
Source: Company data, Goldman Sachs Research estimates.

Source: Company data, Gao Hua Securities Research

Risks

Lower-than-expected market demand: As 2022 marks the beginning of the grid parity era for offshore wind and newly approved wind projects will no longer be eligible for the national subsidy, the return rate for wind power projects might be affected in the short term and thus influence market demand. A prolonged disruption in activities due to COVID-19 could lead to suspension of production, transportation and demand in the underlying markets and thus impact the installation of wind power equipment.

Higher-than-expected raw material costs: Cable makers have limited control over raw material suppliers. Any unfavorable change in copper may increase production costs, resulting in lower-than-expected gross margin and higher pressure on capital turnover. High prices of major raw materials (especially the price of copper) could influence Orient Cable's working capital unless the increasing cost of raw materials can gradually transfer to downstream participants. If Orient Cable can transfer increasing raw material price to downstream participants, there could still be risks of higher supply chain price hurting downstream installation demand.

Lower-than-expected wind power castings ASP: In spite of uncertainty in copper prices, declining wind turbine ASP and fierce competition in submarine cable still put pressure on ASP. As the wind sector is shifting towards being cost driven (from subsidy driven) and turbine ASP in the public tender market continues declining, cable ASP could be affected for the upstream player. In addition, many new companies have entered the market attracted by the significant wind power installation growth in recent years, which makes the competition more intense and could give rise to price wars.

Slower-than-expected capacity expansion: If Orient Cable cannot expand capacity as expected, the company may lose its current market share amid the fierce competition, thus delivering lower-than-expected sales volume and may also potentially lose pricing power.

China Three Gorges Renewables (600905.SS): The largest listed offshore wind operator; initiate at Neutral

600905.SS	12m Price Target: Rmb6.65	Price: Rmb5.63	Upside: 18.1%		
Neutral	GS Forecast				
		12/21	12/22E	12/23E	12/24E
Market cap: Rmb161.1bn / \$22.6bn	Revenue (Rmb mn) New	15,484.1	23,688.2	28,755.2	33,730.1
Enterprise value: Rmb276.7bn / \$38.7bn	Revenue (Rmb mn) Old	--	--	--	--
3m ADTV :Rmb1.1bn/ \$156.1mn	EBITDA (Rmb mn)	13,094.1	20,454.5	24,073.9	27,737.1
China	EPS (Rmb) New	0.23	0.30	0.35	0.42
China Clean Energy	EPS (Rmb) Old	--	--	--	--
	P/E (X)	28.8	18.8	16.3	13.3
M&A Rank: 3	P/B (X)	2.3	2.1	1.8	1.6
Leases incl. in net debt & EV?: Yes	Dividend yield (%)	0.4	0.5	0.6	0.8
	CROCI (%)	14.6	13.9	12.7	12.3
		3/22	6/22E	9/22E	12/22E
	EPS (Rmb)	0.09	0.09	0.04	0.08

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10 Oct 2022 close.

Key debates and how we differ

■ How does Three Gorges Renewables to support its capacity expansion?

Riding on China's rapid development of renewable energy and the company's sector-leading operating efficiency, we expect the installed capacity of China Three Gorges Renewables to grow from 23GW in 2021 to 48GW in 2025E. As of 2021-end, the company has 11GW installation under construction and 15GW pipeline project. We expect the company to add 6.9GW solar and 18.5GW wind over 2022-25, driving a 13% and 19% growth for solar and wind installation, respectively, and 20% CAGR and 16% CAGR in generation and revenue. We expect these new installations to require Rmb113bn capex over 2022E to 2025E. The company generated Rmb 9bn operating cash flow in 2021, and we expect the company to generate Rmb 7-29bn operating cash flow over 2022-25. As of 2021, we observe that Three Gorges has Rmb 84bn long-term borrowing. Its average debt to asset ratio was 40% in the past 5 years. Management targets to maintain this ratio, and we also expect TGR to start to repay its long term debt from 2025E, as we estimate that its improved operating cash flow will exceed its capex needs from that point.

■ What would make us more positive/negative?

More positive: Faster-than-expected new capacity ramp up, and/or higher than expected offshore wind exposure, would make us more positive on the company's revenue growth and margin improvement. Currently we are forecasting a 19% CAGR in wind capacity expansion, with a 16% CAGR in revenue growth over 2022E to 2025E. We expect its offshore wind new addition mix to rise from 5% in 2023E to

15% in 2025E, and we expect its operating margin to sustain at 53.1%-55.6% over 2022 to 2025E, on the back of: 1) lower capex cost from turbine and potential solar module price reduction; 2) Higher exposure to offshore wind; 3) Improvement in utilization hours; 4) Potential premium power price through market-driven trade.

More negative: We think a higher than expected turbine price will weigh on Three Gorges Renewables' margin. Any unfavorable move of upstream raw material prices would make Three Gorges Renewables record a lower than expected margin. In addition, we see some offshore wind projects have set a low FiT during the auction (however the tariff was canceled and reset later); we think this is a one-time event, but any lower than expected FiT would also cause a lower than expected revenue.

Rapid capacity expansion with a balanced solar and wind portfolio: Three Gorges Renewables intends to establish a balanced portfolio of renewable installations. As of 2021-end, the company has 11GW installation under construction and 15GW pipeline project. Among China's first batch of over 100GW large-scale wind and solar based projects, the company has obtained 6.85GW of base projects. Three Gorges has also started the construction of the largest single photovoltaic desertification control project in the world: the 2GW demonstration project in Kubuqi. The company has also focused in solar "Top-runner" bases and areas with dense UHV transmission channels to best utilize generation capacity. We expect the company to add 6.9GW solar and 18.5GW wind over 2022-25, drive a 13% and 19% growth for solar and wind installation, and 20% CAGR and 16% CAGR in generation and revenue, while we expect the largest China wind operator Longyuan to add 15GW wind installation over the same period.

Sector-leading profitability to sustain on multiple drivers: Three Gorges Renewables has recorded an average of 50.1% operating profit margin from 2017 to 2021, and we expect its operating/net margin to sustain at 52-54%/36-37% over 2022 to 2025E despite a lower power tariff amid grid-parity era, on the back of: 1) lower capex cost from turbine and potential solar module price reduction; 2) Higher exposure to offshore wind; 3) Improvement in utilization hours; 4) Potential premium power price through market-driven trade. We also perform a sensitivity analysis, and see that 2022E net income will increase by 8% given a 5% increase in FiT with fixed utilization hours.

Cash flow to improve from subsidy payment acceleration: As offshore wind enjoys higher subsidy than onshore wind, and Three Gorges Renewables, as a younger operator, got a portfolio of more recent projects (which will be in the later batch when receiving renewables subsidies), we believe the potential accelerating renewable energy subsidy payments will benefit China Three Gorges Renewables (more than other large operators) to improve the company's cash flow. In addition, we think future acquisition of grid-parity projects (which do not receive national subsidies) will mitigate the impact of delayed subsidy payment. We expect the company's receivable days will be shortened from 450 days in 2021 to 200 days in 2025E. We also expect the company's net operating cash flow to grow 61% CAGR in 2022E to 2025E, compared to 20% CAGR from 2018 to 2021.

Initiate at Neutral. We use average of DCF and EV/EBITDA: **10-year DCF model:** 1) 2023E-2032E net operating profits with unlevered free cash flow, 2) terminal growth

rate of 2%, and 3) WACC of 6.2% to derive a 12m valuation of Rmb6.3/sh; and 12X 2025E EV/EBITDA (in line with the historical average of Three Gorges Renewables' peer group), discounted back to 2023E at 8.5% COE, to derive a 12m valuation of Rmb7/sh. We take average of the two to arrive at our 12m TP of Rmb6.65, which implies 18% potential upside.

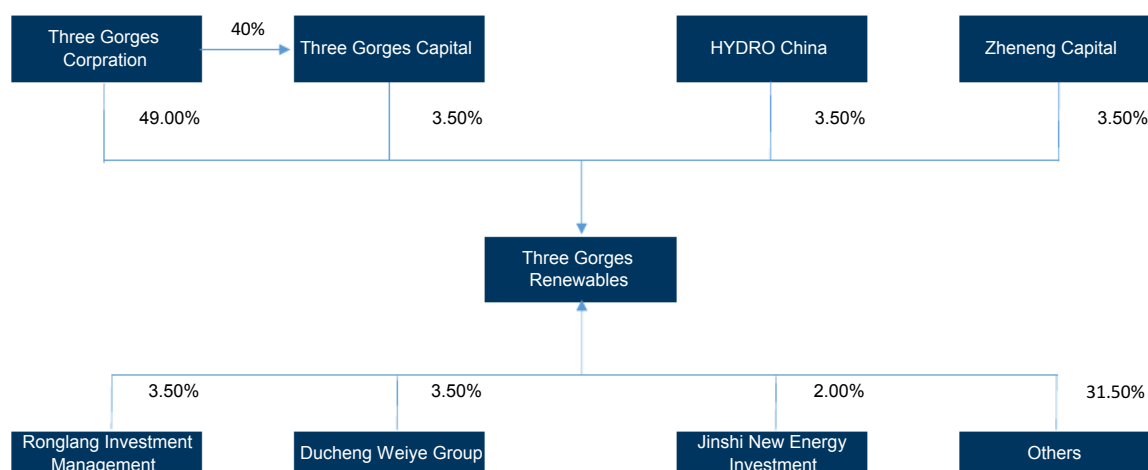
The largest listed offshore wind operator

China Three Gorges Renewables, founded in 1985, is China Three Gorges Corporation's alternative energy group which specializes in new energy and related power generation business. As of 2021-end, China Three Gorges Renewables had 22.9GW accumulative installed capacity, with 14.27GW from wind installation and 8.4GW from solar installation, of which offshore wind installation reached 4.57GW, making Three Gorges Renewables the largest listed offshore wind operator in China.

Three Gorges Renewables was originally affiliated to the Ministry of Water Resources, and was later placed under the unified management of state-owned assets. At the end of 2008, it was integrated into the Three Gorges Corporation. As of 2021, Three Gorges Corporation holds a 49% stake in China Three Gorges Renewables. Three Gorges Corporation, the 6th largest IPP in China, with a high exposure to renewable energy installation, possesses strong ability in project acquisition and years of know how in project operation.

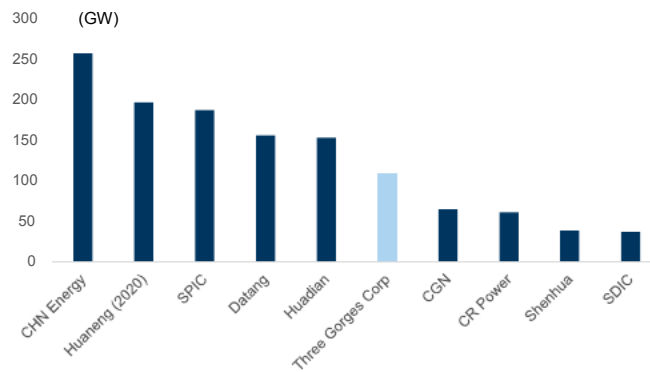
Riding on China's rapid development of renewable energy and the company's sector-leading operating efficiency, we expect the installed capacity of China Three Gorges Renewable to grow from 23GW in 2021 to 48GW in 2025E. We expect the company's revenue to grow at 16% CAGR over 2022 to 2025E, on the back of a 20% CAGR in power generation growth. We also expect its gross margin to sustain at 59-61% level over 2022 to 2025E (vs. 58% in 2021) with net income growing at an 18% CAGR over the same period.

Exhibit 148: Three Gorges Corporation holds a 49% stake in China Three Gorges Renewables (as of 2021)
Shareholding structure of Three Gorges Renewables



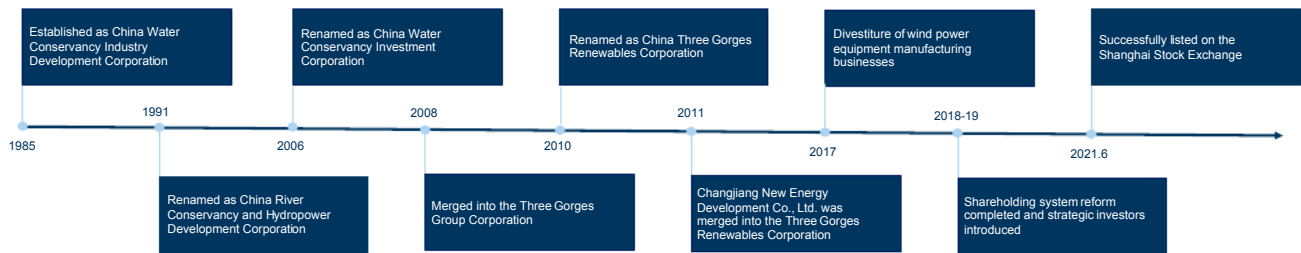
Source: Company data

Exhibit 149: Three Gorges Corporation is the 6th largest IPP in China
Total installation of IPP as of 2021



Source: Company data

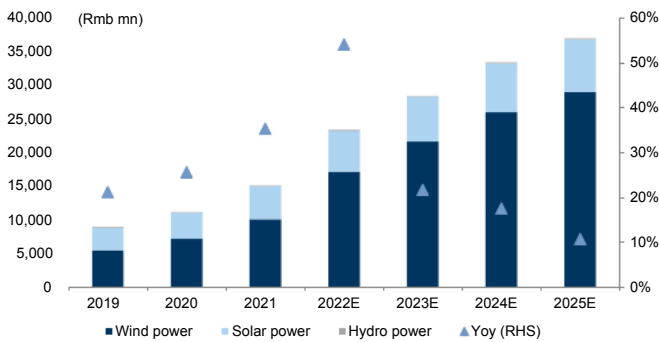
Exhibit 150: The company was integrated into the Three Gorges Corporation in 2008
History of the company



Source: Company data

Exhibit 151: We expect the company's revenue to grow at a 16% CAGR over 2022E to 2025E

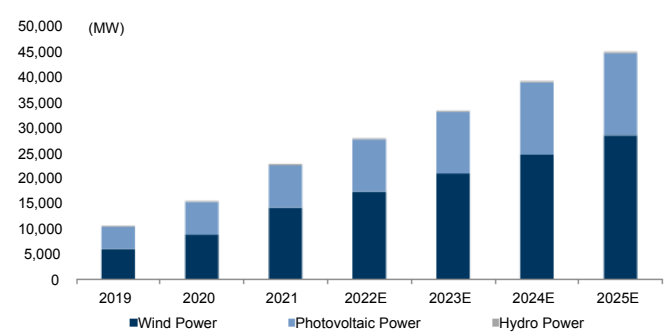
Historical and forecast revenue



Source: Company data, Gao Hua Securities Research

Exhibit 152: We expect the company's capacity to reach 48GW in 2025E

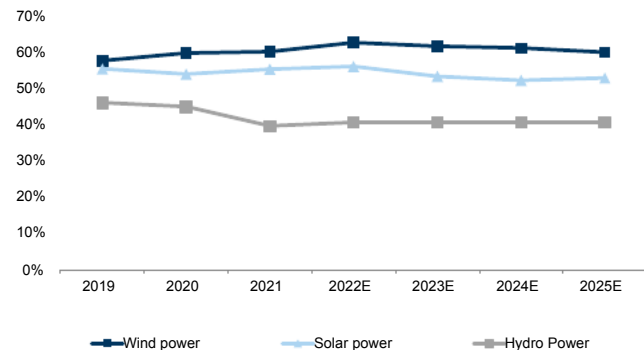
Historical and forecast capacity



Source: Company data, Gao Hua Securities Research

Exhibit 153: We expect the company's gross margin to reach 59-61% over 2022E to 2025E

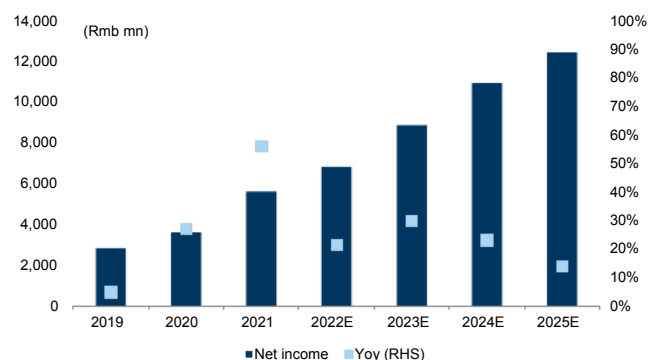
Historical and forecast gross margin



Source: Company data, Gao Hua Securities Research

Exhibit 154: We expect the company's net income to grow at an 18% CAGR over 2022E to 2025E

Historical and forecast net income



Source: Company data, Gao Hua Securities Research

Rapid capacity addition with a balanced wind and solar portfolio

The installed capacity of China Three Gorges Renewables expanded from 143MW in 2008 to 22GW in 2021 with a CAGR of 47%, making the company one of the fastest growing renewable energy operators in China. As of 2021, the company has 14.27GW wind and 8.4GW solar installation; on-shore wind, off-shore wind and solar accounted for 42%, 20%, and 37% of cumulative installation respectively.

As a leader in off-shore wind power, 32% of company's wind installation is off-shore and total off-shore wind installation accounted for 17.34% of China's total offshore installation as of 2021. The company has major presence in Guangdong, Fujian, Jiangsu, and Shandong provinces, which have solid off-shore wind resources. In 2021, the company completed a number of landmark off-shore projects before the subsidy expired at the end of the year, ie: Guangdong Yangjiang Shapa Offshore Wind Power Project is the first MW level offshore wind power base in China; Jiangsu Rudonghai Wind Power Project is the first offshore wind power project in Asia to adopt flexible HVDC transmission technology, and Jiangsu Dafeng Offshore Wind Power Phase II Project is currently the furthest offshore wind power project in China.

Three Gorges Renewables adopts a rolling development approach to continuously construct, approve, reserve and ramp up new projects. It has gained strong expertise in developing and operating wind farms, from 1) Location selection and wind resources assessment; 2) Obtaining government approval; 3) Design, build and maintain wind farms.

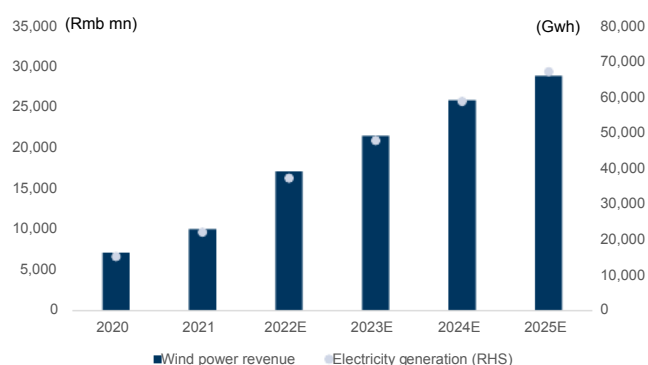
Going forward, the company intends to establish a balanced portfolio of renewable installations. As of 2021-end, the company had 11GW installation under construction and 15GW in the pipeline. Among China's first batch of over 100GW large-scale wind and solar base projects, the company has obtained 6.85GW of base projects. Three Gorges has also started the construction of the largest single photovoltaic desertification control project in the world: the 2GW demonstration project in Kubuqi. The company has also focused on solar "Top-runner" bases and areas with dense UHV transmission channels to best utilize the generation capacity. We expect the company to add 6.9GW solar and

18.5GW wind over 2022-25, drive a 13% and 19% growth for solar and wind installation, and 20% CAGR and 16% CAGR in generation and revenue, while we expect the largest China wind operator Longyuan to add 15GW wind installation over the same period. We also expect an increased offshore wind exposure from the company. In 2021, Three Gorges’ cumulative offshore wind capacity reached 4.57GW, accounting for 32% of its wind capacity, rising from 15% in 2020. Newly added offshore wind installation accounted for 60% of total capacity in 2021, thanks to the rush of installations before subsidy expiry in 2021. While we forecast a dip in offshore wind installation following the rush of installations, we expect the company’s offshore wind installation to gradually pick up in 2023E, with the mix to rise from 5% to 15% by 2025E.

We expect these new installations to require Rmb113bn capex over 2022E to 2025E. The company generated Rmb 9bn operating cash flow in 2021, and we expect the company to generate Rmb7-29bn operating cash flow over 2022-25. As of 2021, we observe that Three Gorges Renewables has Rmb84bn long-term borrowing. Its average debt to asset ratio was 40% in the past 5 years. Management targets to maintain this ratio, and we also expect Three Gorges Renewables to start to repay its long term debt from 2025E, as we project that its improved operating cash flow will exceed its capex needs.

Exhibit 155: We expect Three Gorges Renewables to record a 22% CAGR in wind power generation over 2022 to 2025E

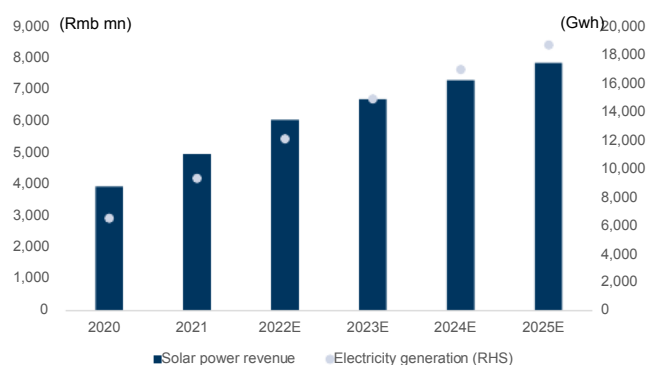
Historical and forecast wind revenue and generation



Source: Company data, Gao Hua Securities Research

Exhibit 156: We expect Three Gorges Renewables to record a 16% CAGR in solar power generation over 2022 to 2025E

Historical and forecast solar revenue and generation



Source: Company data, Gao Hua Securities Research

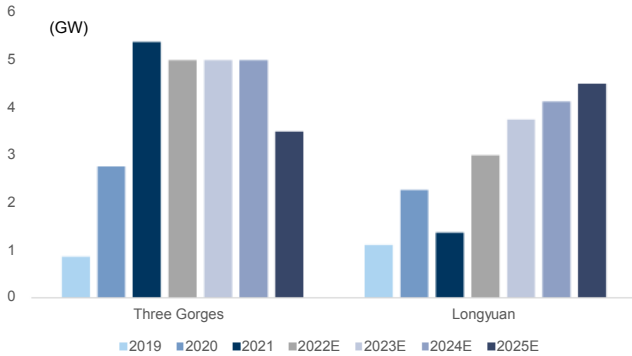
Exhibit 157: China Three Gorges Renewables raised Rmb20bn through the Shanghai Stock Exchange listing in June 2021, to fund seven offshore wind projects

Details of funded projects

Project name
Three Gorges New Energy Yangxisha Grill 300MW Offshore Wind Farm Project
Changyi Marine Ranch and Three Gorges 300MW Offshore Wind Power Fusion Test Demonstration Project
Three Gorges New Energy YangxiShapu Phase II 400MW Offshore Wind Farm Project
Zhangpu Liuaio Offshore Wind Farm Zone D Project
Changle Offshore Offshore Wind Farm Area A Project
Three Gorges New Energy Jiangsu Rudong H6 (400MW) offshore wind farm project
Three Gorges New Energy Jiangsu Rudong H10 (400MW) offshore wind farm project
Replenish working capital

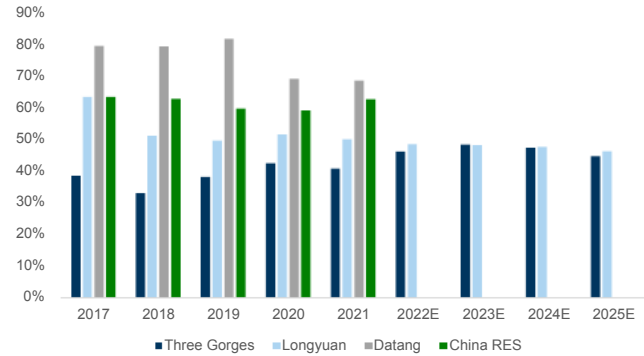
Source: Company data

Exhibit 158: We expect Three Gorges Renewables to add 18GW wind installation vs 15GW from Longyuan over 2022 to 2025E
Historical and future wind installation



Source: Company data, Gao Hua Securities Research

Exhibit 159: Three Gorges Renewables' average debt to asset ratio was 40% in the past 5 years, and management targets to maintain this ratio
Historical and forecast debt to asset ratio

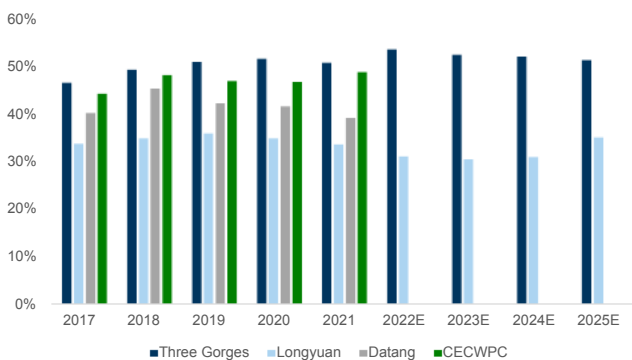


Source: Company data, Gao Hua Securities Research

Sector-leading profitability to sustain on multiple drivers

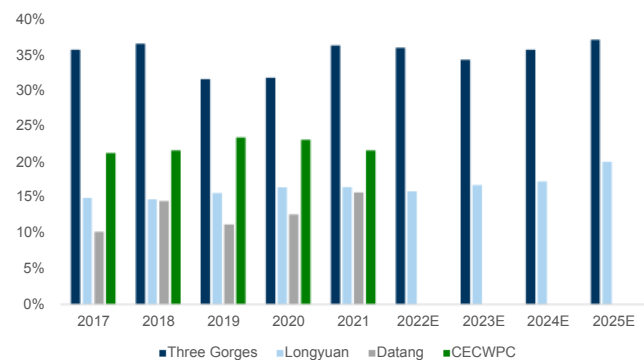
Three Gorges Renewables has recorded an average of 50.1% operating profit margin from 2017 to 2021, and we expect its operating/net margin to sustain at 52-54%/36-37% over 2022 to 2025E despite a lower power tariff amid grid-parity era, on the back of: 1) lower capex cost from turbine and potential solar module price reduction; 2) Higher exposure to offshore wind; 3) Improvement in utilization hours; 4) Potential premium power price through market-driven trade. We also perform a sensitivity analysis, and see that 2022E net income will increase by 8% given a 5% increase in FiT with fixed utilization hours. We expand in detail on the four main drivers:

Exhibit 160: We expect Three Gorges Renewables operating margin to improve from 51% in 2021 to 52% in 2025E
Historical and forecast operating margin



Source: Company data, Gao Hua Securities Research

Exhibit 161: We also see Three Gorges Renewables net margin to improve from 36% in 2021 to 37% in 2025E
Historical and forecast net margin



Source: Company data, Gao Hua Securities Research

Exhibit 162: 2022E net income will increase by 8% given a 5% increase in FiT with fixed utilization hours
Sensitivity analysis of FiT and utilization hours

		FiT (Rmb/kwh)				
		-10%	-5%	0%	5%	10%
Utilization hours	-10%	-30%	-23%	-16%	-9%	-2%
	-5%	-23%	-16%	-8%	0%	7%
	0%	-16%	-8%	0%	8%	16%
	5%	-9%	0%	8%	16%	25%
	10%	-2%	7%	16%	25%	33%

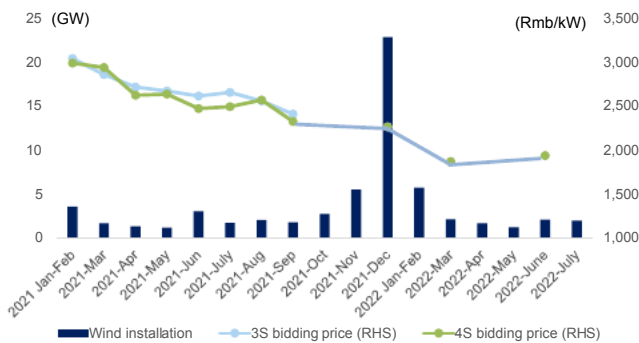
Source: Company data, Gao Hua Securities Research

Lower turbine price and potentially lower module cost to increase IRR

Entering 2022, we expect Three Gorges Renewables to benefit following a 26% decline of turbine bidding price in 2021. A slower demand in 2021 post installation spike, together with intensifying competition among turbine makers has put pricing pressure on wind turbines. We believe this lower turbine price could drive the company’s wind project returns higher, especially for on-shore wind this year.

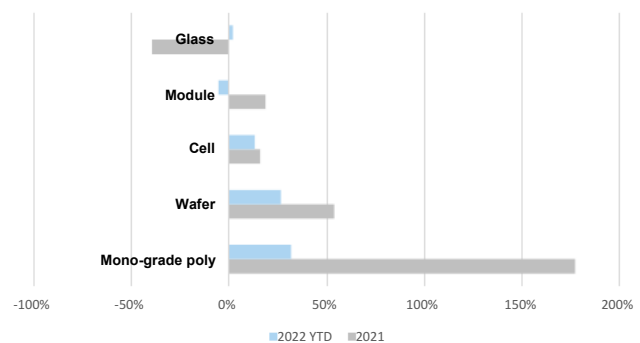
For solar power, we believe the large poly/module price hike has pressured the project return of utility-scale projects in 2021. While poly price was up 26% YTD, we think new capacity ramp up in solar supply chain in 4Q22E will gradually ease the supply tightness and moderate poly price, which should help to normalize the solar supply chain price. With a potential lower module price, we think this will improve the IRR of Three Gorges Renewable’s solar projects. We think the improved IRR will help to drive its margin improvement.

Exhibit 163: Turbine prices were down 26% in 2021
Historical installation and turbine auction prices



Source: Company data

Exhibit 164: We expect a potential lower solar supply chain price to improve solar project IRR in 2022E
2021 and 2022 YTD solar pricing



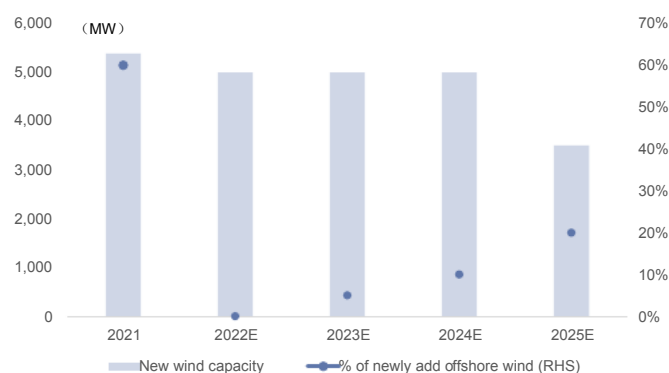
Source: PV Infolink

High exposure to offshore wind

In 2021, Three Gorges Renewables’ cumulative offshore wind capacity reached 4.57GW, accounting for 32% of its wind capacity, rising from 15% in 2020. Newly added offshore wind installation accounted for 60% of total capacity in 2021, thanks to the rush installation before subsidy expiry in 2021. While we forecast a dip in offshore wind installation following the rush installation, we expect the company’s offshore wind installation to gradually pick up in 2023E, with mix to increase from 5% in 2023E to 15%

in 2025E. Offshore usually offer higher tariffs and utilization rates despite higher capex. According to the 2021 annual report of Funeng (600483.SS; Not Covered), the offshore wind tariff was 43% higher than onshore wind, and the company recorded a 6% higher gross margin for its offshore wind. Our channel checks show that, compared to onshore wind (average 2,200 utilization hours per year, offshore wind has higher utilization hours. Fujian province had around 3,750 hours in 2021, while Shanghai, Zhejiang, and Guangdong's utilization hours were around 3,150. Non-coastal areas recorded around 2,600-2,850 hours. With Three Gorges Renewables' 4.57GW offshore project completed in 2021 before the subsidy expired, we expect this 4.57GW project to help drive effective tariffs and margins for 2022 and beyond. We expect the company's gross margin to sustain at 59% to 61% over 2022E to 2025E.

Exhibit 165: We expect Three Gorges' offshore wind installation to gradually pick up following the rush of installations in 2021
Historical and forecast % of offshore wind new addition



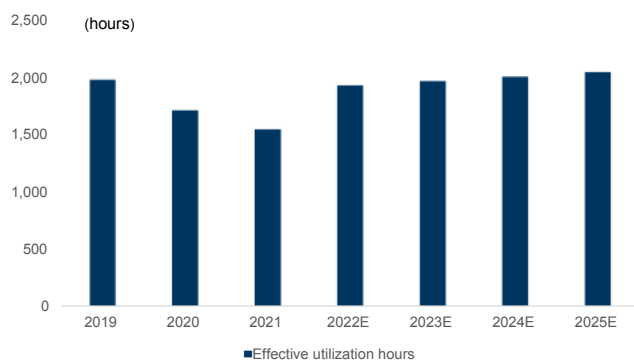
Source: Company data, Gao Hua Securities Research

Improvement in utilization hours

Compared to Longyuan (0916.HK) and Datang (1798.HK, Not Covered) who have nearly 20 years of experience as renewable operators, Three Gorges Renewables is a relatively younger player. While Longyuan and Datang have some old wind turbine projects within their current portfolios, we expect TGR's more recent projects, with higher exposure to offshore wind, to continue improve its utilization hours. We expect the company's effective utilization hours to grow from 1,551 hours in 2021 to 2,057 hours in 2025E. In addition, we note that Three Gorges Renewables offered an industry leading ROE at an average of 9% in the past 5 years, on the back of its high operating efficiency, and we expect the company to slightly improve its ROE at 10-11% over 2022E to 2025E given the ramp-up of new capacity.

Exhibit 166: We expect the company's effective utilization hours to grow from 1,551 hours in 2021 to 2,057 hours in 2025E

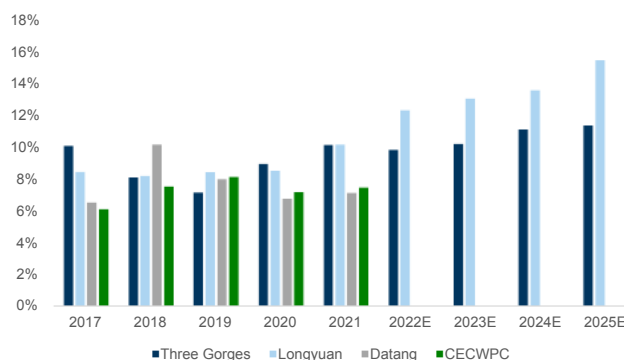
Historical wind power utilization hours



Source: NEA, Company data, Gao Hua Securities Research

Exhibit 167: We expect Three Gorges' ROE to improve from 10% in 2021 to 11% in 2025E

Historical and forecast ROE



Source: Company data, Gao Hua Securities Research

Potential price premium through market-driven trade

Three Gorges' wind tariff increased by 5% and 2% in 2019 and 2020 respectively, on the back of a higher wind power subsidy and rising offshore installation. Following the expiry of its onshore wind subsidy, its wind tariff was down 3% in 2021, but as a renewable power operator, the company has also actively participated in the power and carbon trading market. In 2021, Three Gorges participated in 363 medium- and long-term transactions in 19 power trading provinces and regions, and the settled transaction electricity amounted to 9.417 billion kWh, accounting for 29.23% of its total on-grid electricity. In the national green power trading pilot program, the company actively participated with a total turnover of over 200 million kWh. In the carbon market, the company achieved carbon emission reduction related revenue of over Rmb42 million. The average market-driven trade tariff was up 134% from Dec 2021 to July 2022. We expect robust demand for green power to continue to drive the price premium.

Cash flow to improve as a result of subsidy payment acceleration

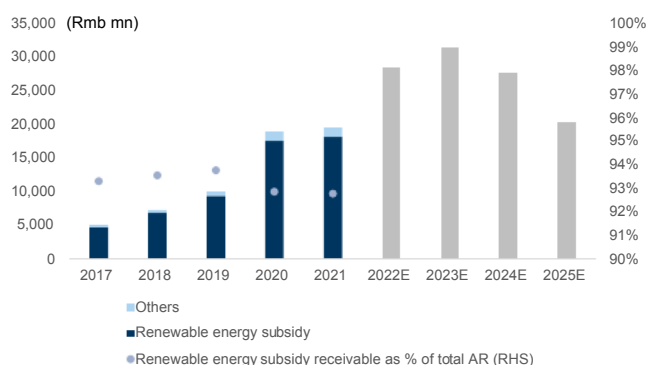
Three Gorges had Rmb19.6bn of accounts receivable as of end-2021, of which 93% were subsidy receivables, and AR days reached 450 in 2021. This was mainly due to a delay in subsidy payments.

On March 13 2022, the Chinese government published the [Ministry of Finance's report on "2021 central and local budget implementation and 2022 draft budget,"](#) which was submitted at the Fifth Session of the Thirteenth National People's Congress. The document identified the need to resolve the funding gap for renewable energy subsidies. A [news report](#) published on March 27 reported that relevant departments were working on resolving the delayed payment of renewable energy subsidies, noting that authorities were conducting a systematic check on the circumstances of the delayed renewable energy subsidies and that a self-check by related enterprises would be completed before the end of March 2022. According to the news report, the state was expected to issue a one-off payment of historical delayed renewable energy subsidies within a quarter (by end-June) at the earliest.

As offshore wind enjoys a higher subsidy than onshore wind, and as Three Gorges Renewables, as a younger operator, has a portfolio of more recent projects (whose renewable subsidies will expire later), we believe the potential acceleration in renewable energy subsidy payments will benefit the company more than other large operators and improve its cash flow. In addition, we think future acquisitions of grid-parity projects (which do not receive national subsidies) will mitigate the impact of delayed subsidy payments. We expect the company's receivable days will be shortened from 450 days in 2021 to 200 days in 2025E. We also expect the company's net operating cash flow to grow 61% CAGR in 2022E to 2025E, compared to a 20% CAGR from 2018 to 2021.

Exhibit 168: We expect the company's AR will decrease from Rmb28,556mn in 2022E to Rmb20,439mn in 2025E

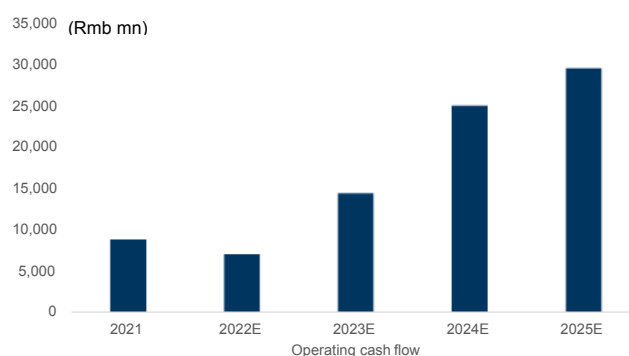
Historical and forecast ARs



Source: Company data, Gao Hua Securities Research

Exhibit 169: We expect the company's net operating cash flow to grow at a 61% CAGR in 2022E-25E

Historical and forecast cash flow



Source: Company data, Gao Hua Securities Research

Stable growth outlook; initiate at Neutral

Three Gorges Renewables was listed on June 10, 2021. As a leading offshore wind operator, in 2021 the company completed a number of landmark offshore projects before the subsidy expired at the end of that year. We expect the company to add 6.9GW solar and 18.5GW wind over 2022-25, driving 13% and 19% growth for solar and wind installation respectively, and a 20% CAGR and 16% CAGR in generation and revenue.

In addition, as we mentioned previously, we believe many enterprises are willing to incur extra costs to utilize green power based on their low-carbon and ESG goals and potential economics after implementing green power trading, and local governments have also started in-depth research and finished fundamental preparations to support the green power trade. We think solar and wind operators, such as Three Gorges Renewables, stand to benefit from both carbon and green power trading.

Valuation

We derive our 12M TP of Rmb6.65 using an average of DCF and EV/EBITDA valuation methodologies. Our DCF valuation of Rmb6.3 is derived using a 10-year DCF model: 1) 2023E-2032E net operating profits with unlevered free cash flow, 2) terminal growth rate of 2%, and 3) WACC of 6.2%, in line with the assumptions for our China Clean Energy coverage (see our January 22, 2021 [industry report](#)). We believe DCF is an

appropriate methodology to value Three Gorges Renewables given the company's growth outlook and limited operational history.

Exhibit 170: Three Gorges Renewables' DCF valuation

Three Gorges Renewables		2021	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
RMB mn	Revenue	15,484	23,688	28,755	33,730	37,301	40,664	43,142	45,854	49,560	53,442	57,449	61,006
	Year-over-year % change	36.8%	53.0%	21.4%	17.3%	10.6%	9.0%	6.1%	6.3%	8.1%	7.8%	7.5%	6.2%
Wind	New capacity (MW)	5,389	5,000	5,000	5,000	3,500	3,000	2,000	2,000	2,000	2,000	2,000	1,500
	FIT (Rmb/kwh)	0.45	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.40	0.40	0.40	0.40
	Utilization Hours	1,551	1,938	1,977	2,017	2,057	2,119	2,182	2,248	2,315	2,385	2,456	2,530
Solar	New capacity (MW)	1,911	2,200	2,200	1,500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	FIT (Rmb/kwh)	0.53	0.50	0.45	0.43	0.42	0.41	0.40	0.40	0.40	0.40	0.40	0.40
	Utilization Hours	1,108	1,141	1,164	1,187	1,222	1,253	1,284	1,316	1,349	1,383	1,411	1,425
	Operating profit	7,904	12,746	15,154	17,641	19,258	21,737	23,270	25,101	27,822	30,862	33,915	36,609
	% operating margin	51.0%	53.8%	52.7%	52.3%	51.6%	53.5%	53.9%	54.7%	56.1%	57.7%	59.0%	60.0%
	% effective tax rate	8%	8%	9%	9%	10%	10%	11%	11%	11%	11%	11%	11%
	After-tax operating profit	7,245	11,726	13,865	16,053	17,429	19,563	20,710	22,340	24,761	27,468	30,185	32,582
	Depreciation & amortization	5,113	7,632	8,843	10,019	10,968	11,795	12,375	12,945	13,488	14,021	14,533	14,933
	% of revenues	33.0%	32.2%	30.8%	29.7%	29.4%	29.0%	28.7%	28.2%	27.2%	26.2%	25.3%	24.5%
	Capex	(29,906)	(33,180)	(31,864)	(28,525)	(19,460)	(16,940)	(11,900)	(11,690)	(11,130)	(10,920)	(10,500)	(8,190)
	Working capital changes	(3,941)	(8,547)	(3,622)	4,119	5,834	1,846	(4,717)	958	(482)	858	(470)	1,753
	Free cash flow (FCF)	(21,489)	(22,369)	(12,777)	1,666	14,771	16,264	16,468	24,554	26,638	31,427	33,748	41,077
	Year-over-year % change	NM	NM	NM	NM	786.5%	10.1%	1.3%	49.1%	8.5%	18.0%	7.4%	21.7%
	Share count	24,758	28,621	28,621	28,621	28,621	28,621	28,621	28,621	28,621	28,621	28,621	28,621
	PV of annual cash flows to equity			(12,032)	1,477	12,332	12,786	12,190	17,115	17,483	19,423	19,639	22,509

Source: Company data, Gao Hua Securities Research

Exhibit 171: DCF implied valuation of Rmb6.29/sh

VALUATION (Rmb mn)	
Present value of cash flows (2023E-2032E)	1,778
Present value of terminal value	299,544
Enterprise value	301,322
Less: 2023E net debt	121,186
Implied equity value	180,136
Implied value per share (Rmb)	6.29

Source: Gao Hua Securities Research

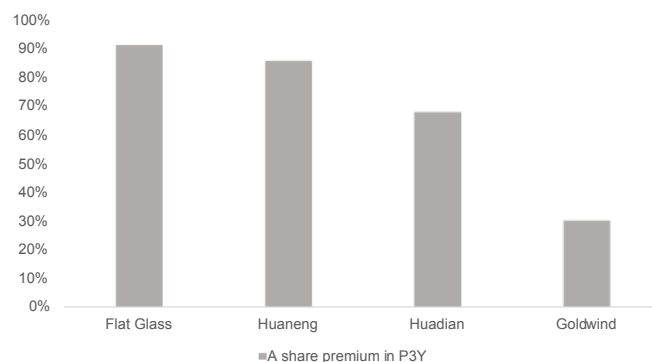
Exhibit 172: Assumptions for DCF calculation

ASSUMPTIONS	WACC CALCULATION	
Cost of equity (COE)	9.0% Risk free rate	3.0%
FCF perpetuity growth rate	2.0% Beta	1.0
Terminal multiple	23.8x Equity risk premium	6.0%
Capital structure:	Cost of equity (CAPM)	9.0%
% equity	Cost of debt	4.0%
	Tax rate	15%
% debt	50.0% After tax cost of debt	3.4%
	WACC	6.2%

Source: Gao Hua Securities Research

We adopt EV/EBITDA as the primary valuation methodology for the rest of our solar and wind coverage as we have found that historical stock prices are highly correlated to EBITDA growth, giving us a reliable and measurable benchmark across the sectors. We select the comparable peer group as a valuation reference based on the nature of each company's business. Our peer group for Three Gorges Renewables consists of major wind operators listed in the A share market (Longyuan-H, 0916.HK; Longyuan-A, 001289.SZ; CECEP Wind, 601016.SS, Not Covered; Titan Wind, 002531.SZ, Not Covered). We believe these companies represent an appropriate peer group for Three Gorges Renewables given similar business models and industry growth outlooks. We look at some A/H dual-listed renewable stocks, and find that the A shares have tended to trade at a premium to the H shares, which supports our thesis, and thus we include most A share wind names as peers to better reflect the valuation for Three Gorges Renewables.

Exhibit 173: We look at some A/H dual-listed renewable stocks, and find that A shares have tended to trade at a premium to the H shares
 P3Y A share trading premium for renewable names



Source: Wind

Three Gorges Renewables is trading at 12.3x 2023E EV/EBITDA, and its peer group's 3-year historical mean is 12x and median is 13x. We use 12x 2025E EV/EBITDA (in line with the historical average of Three Gorges' peer-group EV/EBITDA), discounted back to 2023E at an 8.5% COE, to derive a 12m valuation of Rmb7.0/sh. As the company's historical stock price has tended to move broadly in line with its EBITDA growth, we believe the 3Y historical average EV/EBITDA multiple of Three Gorges Renewables' peers offers an appropriate valuation reference as this period represents China's solar sector transition from being subsidy driven to cost driven. Our 12m TP (average of DCF and EV/EBITDA) of Rmb6.65 implies 18% upside, vs. average upside for our coverage companies of 117%). Accordingly, we initiate coverage with a Neutral rating on a sector-relative basis.

Exhibit 174: Rating and TP summary

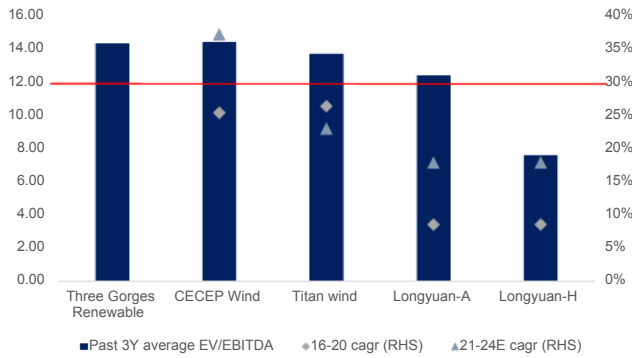
Company	Rating	Price currency	Current price	Price target	Upside/downside (%)	Valuation methodology	Terminal growth rate	WACC
Three Gorges Renewables	Neutral	Rmb/sh	5.63	6.65	18%	DCF and EV/EBITDA	2.0%	6.2%

Price as of 2022/10/10

Price target is based on a 12-month period

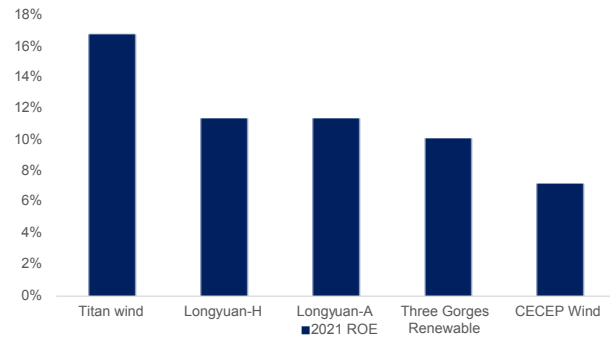
Source: Gao Hua Securities Research

Exhibit 175: We adopt 12x 2025E EV/EBITDA based on historical average of comparable peers for Three Gorges Renewables



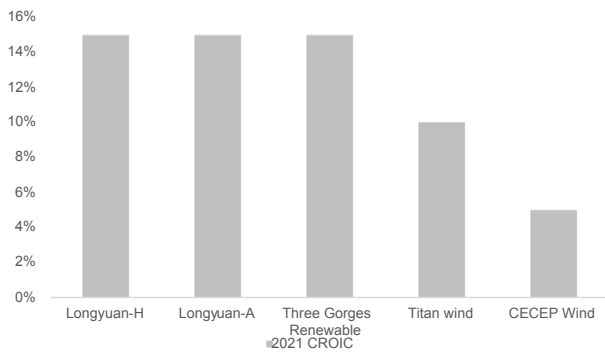
Source: Company data, Gao Hua Securities Research, Wind

Exhibit 176: 2021 peer ROE



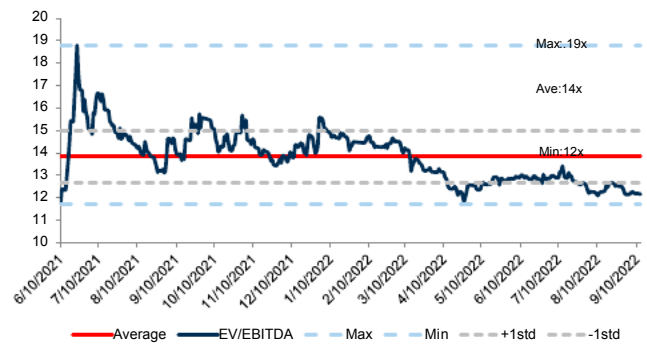
Source: Company data

Exhibit 177: 2021 peers CROIC



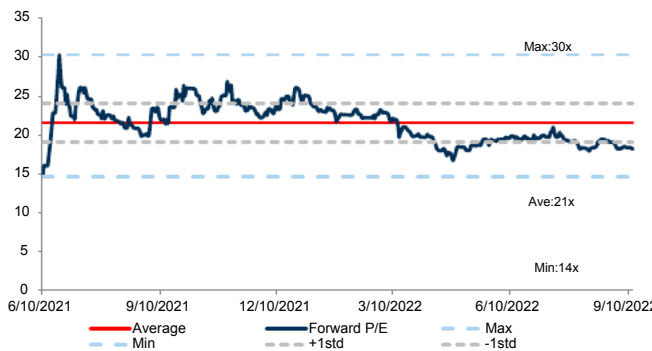
Source: Company data

Exhibit 178: Three Gorges Renewables is trading at 12.3x forward EV/EBITDA Rolling EV/EBITDA



Source: Wind, Gao Hua Securities Research

Exhibit 179: Three Gorges Renewables is trading at 18x forward P/E Rolling PE



Source: Wind, Gao Hua Securities Research

Exhibit 180: Three Gorges Renewables is trading at 2.2x forward P/B Rolling P/B



Source: Wind, Gao Hua Securities Research

We compare TGR with our covered operators Xinyi Energy and Longyuan on key fundamental and return metrics to contextualize our thesis. As of 2021, the company has a total wind capacity of 14GW (of which c.30% is offshore wind), compared to the

largest domestic wind operator Longyuan (0916.HK; Neutral), whose total wind capacity reached 23.6GW in 2021 (of which c.10% is offshore wind). Over 2022E to 2025E, we expect Three Gorges Renewables to record 17% CAGR in capacity expansion, which should drive a 16% CAGR in revenue growth, compared to our forecast for Longyuan to book a 14% capacity expansion CAGR, with an 11% CAGR in revenue growth. With higher exposure in offshore wind, we expect Three Gorges Renewables to book 15ppt higher OP margin than Longyuan over 2022E to 2025E. While Longyuan and TGR are state-owned operators, we also compare the metrics to Xinyi Energy (3868.HK, Buy, on CL), a non-SOE solar operator which, in our view, has better operating efficiency. We expect Xinyi Energy to record 15ppt higher gross margin and OP margin than TGR over 2022E to 2025E, with a faster capacity growth CAGR of 24% in capacity expansion, which drives a 19% CAGR in revenue growth during the same period. We also expect Xinyi Energy to record the highest ROE, CROIC and dividend yield among the three operators, on the back of strong execution ability, and a favorable dividend policy.

Exhibit 181: We expect Three Gorges Renewables to record a modest growth outlook

Comparison of operator metrics

	2019	2020	2021	2022E	2023E	2024E	2025E
ROE							
Xinyi Energy	11%	8%	10%	12%	16%	19%	21%
Three Gorges	7%	9%	10%	10%	10%	11%	11%
Longyuan	8%	9%	10%	12%	13%	14%	16%
Dividend yield							
Xinyi Energy	7%	5%	4%	8%	10%	13%	14%
Three Gorges			0%	1%	1%	1%	1%
Longyuan	3%	3%	1%	2%	2%	3%	3%
Gross margin							
Xinyi Energy	76%	72%	73%	75%	76%	76%	75%
Three Gorges	57%	58%	58%	61%	60%	59%	59%
Longyuan	78%	79%	70%	66%	69%	72%	75%
OP margin							
Xinyi Energy	73%	70%	71%	72%	73%	73%	73%
Three Gorges	51%	52%	51%	54%	53%	52%	52%
Longyuan	36%	35%	34%	31%	31%	31%	35%
CROIC							
Xinyi Energy	14%	11%	12%	12%	14%	15%	16%
Three Gorges	13%	14%	15%	14%	13%	12%	12%
Longyuan	12%	14%	15%	15%	15%	15%	15%
2022E-2025E capacity growth cagr							
Xinyi Energy				24%			
Three Gorges				17%			
Longyuan				14%			
2022E-2025E revenue growth cagr							
Xinyi Energy				19%			
Three Gorges				16%			
Longyuan				11%			

Source: Company data, Gao Hua Securities Research

GHe vs. consensus

Our net income estimates are comparatively in line with Wind consensus, as we expect Three Gorges Renewables' capacity expansion and offshore wind exposure to drive its growth. We also think moderating upstream solar costs could drive solar installation recovery in 2023-2024E.

Exhibit 182: We are 1/-4/-1% compared to consensus for 2022-2024E net income

Company Name	Sales			Net Income			EPS			Net Margin		
	GHe vs. cons			GHe vs. cons			GHe vs. cons			GHe vs. cons		
	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3	FY1	FY2	FY3
Three Gorges Renewables												
Differences	-2%	-4%	-6%	1%	-4%	-1%	1%	-4%	-1%	1%	0%	2%

Source: Wind, Gao Hua Securities Research

Financial analysis

P&L: We forecast 21% revenue CAGR in 2022E-25E driven by 20% CAGR in growth of approved capacity. We expect the gross margin to steadily expand to 62% by 2025E (from 61% in 2022E) driven by continuous cost control measures. We expect the SG&A ratio to decline to 6.0% in 2025E (from 6.5% in 2022E) on better operating efficiency. We expect EBIT margin to rise to 55.2% in 2025E (from 53.8% in 2022E) and EBITDA margin to reach 92.6% in 2025E (from 90% in 2022E). We expect the operating expense ratio to decline from 7.1% in 2022E to 6.4% in 2025E and look for the company to post a net profit of Rmb13.9bn in 2025E compared to Rmb8.6bn in 2022E.

Balance sheet: As of end-2021, Three Gorges Renewables' cash balance was Rmb13bn and net receivable days were 450. In 2025E, we forecast receivable days to be 200 on the back of accelerated receipt of the FiT subsidy. Meanwhile, we expect Three Gorges Renewables' cash balance to grow from Rmb13bn in 2021 to Rmb17bn in 2025E. Historically Three Gorges Renewables' average debt to asset ratio was 40%, and management targets to maintain this capital ratio. We also expect TGR to start to repay its long-term debt from 2025E, as its improved operating cash flow exceeds its capex needs.

Statement of cash flow: We forecast capex of Rmb46.9bn on average for 2022-25E, mainly to support increasing approved capacity. We estimate total cash flow of Rmb10.2bn by 2025E (compared to Rmb-7.5bn in 2022E), of which we forecast operating cash flow to improve from Rmb15.5bn in 2022E to Rmb39bn in 2025E, driven by 22% CAGR in net income over the same period. We also forecast ROE to improve to 12.7% (from 12%) over the same period due to increasing net income.

Exhibit 183: Financial summary

Profit model (Rmb mn)	12/22E	12/23E	12/24E	12/25E	Balance sheet (Rmb mn)	12/22E	12/23E	12/24E	12/25E
Total revenue	23,688.2	28,755.2	33,730.1	37,301.0	Cash & equivalents	16,290.7	18,015.0	18,582.2	22,578.1
Cost of goods sold	(9,263.5)	(11,586.5)	(13,743.2)	(15,457.0)	Accounts receivable	28,555.7	31,512.6	27,723.4	20,438.9
SG&A	(1,539.7)	(1,869.1)	(2,192.5)	(2,424.6)	Inventory	177.7	222.2	263.6	296.4
R&D					Other current assets	1,302.0	1,302.0	1,302.0	1,302.0
Other operating profit/(expense)	(139.2)	(146.2)	(153.5)	(161.1)	Total current assets	46,326.0	51,051.7	47,871.1	44,615.4
EBITDA	20,454.5	24,073.9	27,737.1	30,303.7	Net PP&E	113,412.5	136,433.2	154,939.1	163,430.7
Depreciation & amortization	(7,708.7)	(8,920.3)	(10,096.1)	(11,045.4)	Net intangibles	1,660.8	1,583.8	1,506.8	1,429.8
EBIT	12,745.8	15,153.5	17,641.0	19,258.3	Total investments	17,185.4	18,685.4	20,685.4	22,685.4
Interest income	325.5	407.3	450.4	464.6	Other long-term assets	79,821.0	79,821.0	79,821.0	79,821.0
Interest expense	(4,376.4)	(5,426.4)	(5,951.4)	(5,384.6)	Total assets	258,405.7	287,575.1	304,823.4	311,982.3
Income/(loss) from uncons. subs.	1,000.0	1,000.0	1,500.0	1,500.0	Accounts payable	22,841.5	22,220.6	22,591.6	21,173.9
Others	300.0	500.0	500.0	500.0	Short-term loans	5,524.2	5,524.2	5,524.2	5,524.2
Pretax profits	9,994.9	11,634.3	14,139.9	16,338.3	Other current liabilities	10,994.6	10,994.6	10,994.6	10,994.6
Income tax	(799.6)	(988.9)	(1,272.6)	(1,552.1)	Total current liabilities	39,360.2	38,739.4	39,110.4	37,692.7
Minorities	(643.7)	(745.2)	(772.0)	(887.2)	Long-term debt	113,677.0	133,677.0	138,677.0	133,677.0
Net income pre-preferred	8,551.6	9,900.2	12,095.3	13,899.0	Other long-term liabilities	14,623.6	14,623.6	14,623.6	14,623.6
Preferred dividends					Total long-term liabilities	132,390.4	152,390.4	157,390.4	152,390.4
Net income (pre-exceptionals)	8,551.6	9,900.2	12,095.3	13,899.0	Total liabilities	171,750.6	191,129.8	196,500.8	190,083.1
Post tax exceptionals					Preferred shares				
Net income	8,551.6	9,900.2	12,095.3	13,899.0	Total common equity	78,123.9	87,169.0	98,274.2	110,963.6
EPS (basic, pre-exception) (Rmb)	0.30	0.35	0.42	0.49	Minority interest	8,531.2	9,276.3	10,048.4	10,935.5
EPS (basic, post-exception) (Rmb)	0.30	0.35	0.42	0.49	Total liabilities & equity	258,405.7	287,575.1	304,823.4	311,982.3
EPS (diluted, post-exception) (Rmb)	0.30	0.35	0.42	0.49	BVPS (Rmb)	2.7	3.0	3.4	3.9
DPS (Rmb)	0.03	0.03	0.04	0.05					
Dividend payout ratio (%)	10%	10%	10%	10%	Ratios	12/22E	12/23E	12/24E	12/25E
Free cash flow yield (%)	-15%	-10%	-2%	6%	CROCI (%)	14%	13%	12%	12%
					ROE (%)	12%	12%	13%	13%
Growth & margins (%)	12/22E	12/23E	12/24E	12/25E	ROA (%)	4%	4%	4%	5%
Sales growth	53%	21%	17%	11%	Inventory days	6.1	6.3	6.5	6.6
EBITDA growth	56%	18%	15%	9%	Receivables days	367.1	381.2	320.5	235.6
EBIT growth	61%	19%	16%	9%	Payable days	880.9	709.8	595.1	516.7
Net income growth	52%	16%	22%	15%	Net debt/equity (%)	123%	130%	120%	99%
EPS growth	31%	16%	22%	15%	Interest cover - EBIT (X)	3.1	3.0	3.2	3.9
Gross margin	61%	60%	59%	59%					
EBITDA margin	86%	84%	82%	81%	Valuation	12/22E	12/23E	12/24E	12/25E
EBIT margin	54%	53%	52%	52%	P/E basic (X)	18.8	16.3	13.3	11.6
					P/B (X)	2.1	1.8	1.6	1.5
Cash flow statement (Rmb mn)	12/22E	12/23E	12/24E	12/25E	EV/EBITDA (X)	13.5	12.3	10.8	9.7
Net income pre-preferred dividends	8,551.6	9,900.2	12,095.3	13,899.0	EV/GCI (X)	1.7	1.5	1.3	1.2
D&A add-back	7,708.7	8,920.3	10,096.1	11,045.4	Dividend yield (%)	1%	1%	1%	1%
Minorities interests add-back	643.7	745.2	772.0	887.2					
Net (inc)/dec working capital	(8,547.1)	(3,622.3)	4,118.8	5,833.9					
Other operating cash flow	(1,300.0)	(1,500.0)	(2,000.0)	(2,000.0)					
Cash flow from operations	7,056.9	14,443.5	25,082.2	29,665.4					
Capital expenditures	(33,180.0)	(31,864.0)	(28,525.0)	(19,460.0)					
Acquisitions									
Divestitures									
Others									
Cash flow from investments	(33,180.0)	(31,864.0)	(28,525.0)	(19,460.0)					
Dividends paid (common & pref)	(607.3)	(855.2)	(990.0)	(1,209.5)					
Inc/(dec) in debt	30,000.0	20,000.0	5,000.0	(5,000.0)					
Common stock issuance (repurchase)									
Other financing cash flows									
Cash flow from financing	29,392.7	19,144.8	4,010.0	(6,209.5)					
Total cash flow	3,269.6	1,724.3	567.2	3,995.9					

Note: Last actual year may include reported and estimated data.
Source: Company data, Goldman Sachs Research estimates.

Source: Company data, Gao Hua Securities Research

Risks and what could make us revisit our thesis

We think three key factors could make us be more positive/negative on our view on Three Gorges Renewables: Higher/lower-than-expected on-grid electricity price; Faster/slower-than-expected capacity expansion and Lower/higher supply chain ASP could benefit/hurt company's profitability:

Higher/lower-than-expected on-grid electricity price. The National Development and Reform Commission (NDRC) announced on June 11, 2021 an official [document](#) about

solar and wind on-grid tariffs, which have been effective since August 1, 2021. The document specifies that newly cataloged centralized and distributed solar projects and newly approved onshore wind projects are no longer eligible for a national subsidy from that date. On-grid tariffs for newly approved projects are now implemented according to the local coal-fired power generation benchmark price, which is set by local provincial-level price authorities. Previously, the tariffs were based on solar FiT. Coal-fired FiTs are lower than the solar FiT and therefore could lead to lower-than-expected on-grid electricity prices, which could negatively impact Three Gorges Renewables' revenue and net income for newly approved projects. However, green trading could potentially lead to a higher FiT, which would positively impact Three Gorges Renewables' net income.

Faster/slower-than-expected capacity expansion. While Three Gorges Renewables can leverage on its parent group to source new projects, the progress of actual project acquisition could be a risk factor. If Three Gorges Renewables fails to expand capacity as it plans, the company could lose its current market share and deliver lower-than-expected revenue. However, if there is an acceleration of government approvals of solar and wind projects, Three Gorges Renewables could potentially expand its capacity at a faster pace.

Higher/lower supply chain ASP could hurt/benefit company's profitability.

Wafer/cell prices have seen 26%/14% increases YTD due to higher poly ASP (up 32% YTD). Higher prices for modules, which are made of glass, cells, and wafers, have hurt solar farms' IRR, and therefore may result in slower-than-expected installation, which could in turn negatively impact Three Gorges Renewables' revenue and net income. However, more poly capacity ramp-up would help to moderate solar supply chain prices, and thus drive more downstream demand recovery, which helps the company's profitability.

M&A framework: Rank of 3 for all

Mingyang: We assign an M&A rank of 3 to Mingyang, which denotes a low probability of it being acquired. Mingyang Smart Energy is the third largest wind turbine manufacturer in China. The key factor in our M&A rank is that we believe management would have low willingness to sell the company given it is in a highly promising industry with strong R&D and pricing power.

Xinqianglian: We assign an M&A rank of 3 to Xinqianglian, which denotes a low probability of it being acquired. Xinqianglian is the leading wind bearing manufacturer in China with continued penetration into the high end market. The key factor in our M&A rank is that we believe management would have low willingness to sell the company given founders own c.40% of voting rights. Moreover, valuation is rich at an FY23E EV/EBITDA of 21X, which makes it less likely to be an M&A target.

Orient Cable: We assign an M&A rank of 3 to Orient Cable, which denotes a low probability of it being acquired. Orient Cable is one of the largest Chinese land & submarine cable solutions providers. The key factor in our M&A rank is that we believe management would have low willingness to sell the company given it is in a highly promising industry and Ningbo Orient Corp holds c.32% of shares. Moreover, valuation is rich at an FY23E EV/EBITDA of 20X, which makes it less likely to be an M&A target.

Three Gorges Renewables: We assign an M&A rank of 3 to Three Gorges Renewables, which denotes a low probability of it being acquired. The market cap of the stock is close to Rmb161bn, and its parent company Three Gorges Group holds 49% of the company as of 2021. Three Gorges Renewables is its parent company's strategic and important renewable subsidiary. We believe a take over by other companies is unlikely.

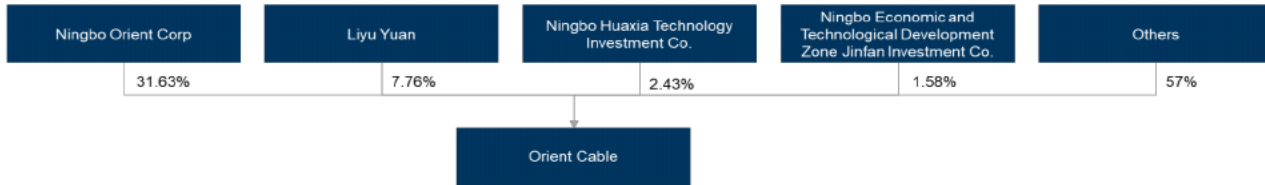
Exhibit 184: We assign an M&A rank of 3 for Mingyang Smart Energy, Luoyang Xinqianglian, Ningbo Orient Cable and China Three Gorges Renewables

Company Name	Ticker	M&A Rank	Regulation on ownership	Regulatory risks	Management stance	Strategic assets	Industry attractiveness
Wind							
Mingyang Smart Energy	601615.SS	3	3	2	3	3	2
Luoyang Xinqianglian	300850.SZ	3	3	2	3	3	2
Ningbo Orient Cable	603606.SS	3	3	2	3	3	2
China Three Gorges Renewables	600905.SS	3	3	2	3	3	2

Source: Gao Hua Securities Research, Goldman Sachs Global Investment Research

Appendix

Exhibit 185: Shareholding structure of Orient Cable (as of 1H22)



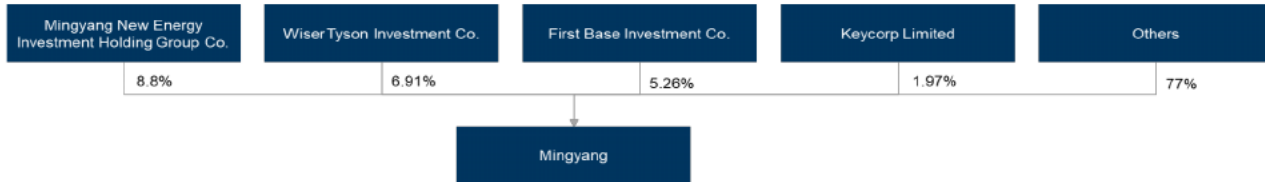
Source: Company data

Exhibit 186: Shareholding structure of XQL (as of 1H22)



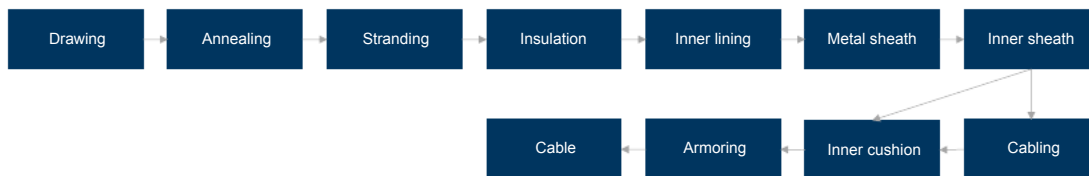
Source: Company data

Exhibit 187: Shareholding structure of Mingyang (as of 1H22)



Source: Company data

Exhibit 188: Manufacturing process of submarine cables



Source: Company data

Disclosure Appendix

Reg AC

We, Chao Ji, Chelsea Zhai, CFA and Yawen Wang, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

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