

Renewable Power Sector

Solar demands to normalize in 2022, polysilicon price likely to remain high

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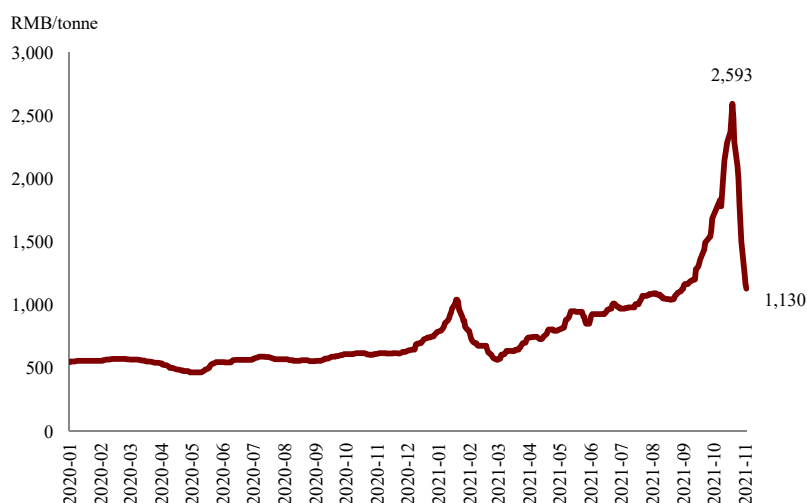
The power shortage emerged in 2H21 has significantly impacted China's various energy-intensive manufacturing sectors, and ultimately led to general material price hike in the short term. That being said, we do not think power shortage to be a recurring issue considering the government has been announcing various measures as to accelerating the coal-fire tariffs reforms as well as enhancing the coal supply to counteract against the coal price hike, which we think is the main reason for limited power supply in recent months as coal-fire power generators lowered their output in order to minimize their loss-makings amid the significant coal cost rally. On the other hand, solar supply chain also witnessed disruption on mandatory utilization control and raw material price hike, which eventually led to module price increase above critical level at RMB 1.8/W which most developers could tolerate. On this backdrop, we estimate majority of solar demands is set to delay to 1H22E pending when the reversion of module price reverts to normalized level. Along the supply chain, we remain positive on the polysilicon segment considering its supply growth is estimated to be comparatively balanced than other segments, implying the bottleneck for solar supply chain will still emerge at the upstream polysilicon segment in 2022E, laying solid ground for polysilicon players' profitability in 2022, in our view.

Short-term power crunch on coal price hike and national power control

Towards the end of 3Q21, China has experienced widespread power shortage as many provinces implemented power cut and power rationing in order to meet various energy intensity control targets set by the central government and enhanced power demands after pandemic containment in China (1H21: +16% YoY). More importantly, majority of coal-fire power generators also chose to reduce their coal-fire power output to minimize their loss amid the recent coal price rally (Qinghuangdao Q5000) which has surged by 225% to a record-high at RMB 2,593/tonne Jan-Oct (See Exhibit 1). Currently coal-fire power is still making the largest contribution to China power supply at 70%, though the country has been accelerating the development of renewable energy in recent years.

Even the coal price has dropped by over 50% from its peak in recent weeks after the NDRC mentioned plan to cap the coal price, we think the current level is still not very profitable from coal-fire IPP's perspective – Based on our calculation, the cost-plus breakeven point for coal price will be ~RMB 800/t. Any level above that would incur loss on major coal-fired power plants. We expect more intervention by the Chinese government to stabilize and normalize the coal price in the coming months.

Exhibit 1: Thermal coal price trend (Qinghuangdao Q5500)



Source: Wind, ICBCI

Underutilization of factories may last till year end to meet power intensity targets

Amid the widespread power shortage, many manufacturing factories located in energy-intensive provinces needed to reduce and even halt their productions. Many manufacturers in various sectors indicated that their operations have been reduced for at least 2 weeks since Sep after the central government reiterated the importance of energy intensity control by rolling out the progress of various provinces in achieving the targets for reducing energy intensity in August (See Exhibit 2).

Exhibit 2: Energy intensity progress of different provinces

	9M20		1Q21		1H21	
	Warning level regarding energy intensity reduction	Warning level regarding total energy consumption control	Warning level regarding energy intensity reduction	Warning level regarding total energy consumption control	Warning level regarding energy intensity reduction	Warning level regarding total energy consumption control
Qinghai	●	●	●	●	●	●
Ningxia	●	●	●	●	●	●
Guangxi	●	●	●	●	●	●
Guangdong	●	●	●	●	●	●
Fujian	●	●	●	●	●	●
Xinjiang	●	●	●	●	●	●
Yunnan	●	●	●	●	●	●
Shannxi	●	●	●	●	●	●
Jiangsu	●	●	●	●	●	●
Zhejiang	●	●	●	●	●	●
Henan	●	●	●	●	●	●
Gansu	●	●	●	●	●	●
Sichuan	●	●	●	●	●	●
Anhui	●	●	●	●	●	●
Guizhou	●	●	●	●	●	●
Shanxi	●	●	●	●	●	●
Heilongjiang	●	●	●	●	●	●
Liaoning	●	●	●	●	●	●
Jiangxi	●	●	●	●	●	●
Shanghai	●	●	●	●	●	●
Chongqing	●	●	●	●	●	●
Beijing	●	●	●	●	●	●
Tianjin	●	●	●	●	●	●
Hunan	●	●	●	●	●	●
Shandong	●	●	●	●	●	●
Jilin	●	●	●	●	●	●
Hainan	●	●	●	●	●	●
Hubei	●	●	●	●	●	●
Hebei	●	●	●	●	●	●
Inner Mongolia	●	●	●	●	●	●

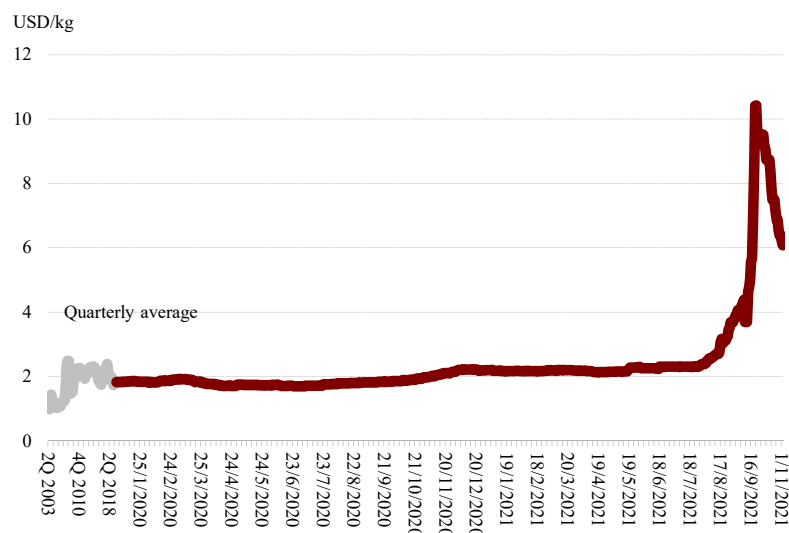
Source: NDRC, ICBCI

*Red: energy intensity showed increase instead of decrease in 1H21; Yellow: energy intensity reduction progress falls far behind target in 1H21

Supply chain disruption persists amid power crunch

While some factories have already resumed operation after the mandatory power rationing expired, for instance GCL-Poly revealed that their 36,000 tonnes polysilicon factory has already restarted production after making use of the 2-week suspension period to undergo repair and maintenance, most solar materials have also witnessed significant price increase under the adverse effect of supply reduction. One of the clear examples is the sharp price rally of silicon raw material, which is the major material for making polysilicon and on average account for 40% of polysilicon’s production cost. The silicon raw material price rose sharply from USD 2.4/kg in Aug-21 to the peak of USD 10.4/kg in late Sep-21, before gradually normalizing to USD 6/kg in Nov (See Exhibit 3), especially after the Yunnan government decided to restrict the utilization of most energy-intensive production, including silicon raw material, by 90% starting from Sep in 2021. It is noteworthy that Yunnan accounts for 20% of total silicon raw material production in China, while Xinjiang and Sichuan’s market shares are 40% and 15% respectively. In our view, the cost pressure originated from silicon raw material price rally would gradually pass down the supply chain, implying subsequent solar material price hike would continue to emerge in other segments.

Exhibit 3: Silicon raw material price trend

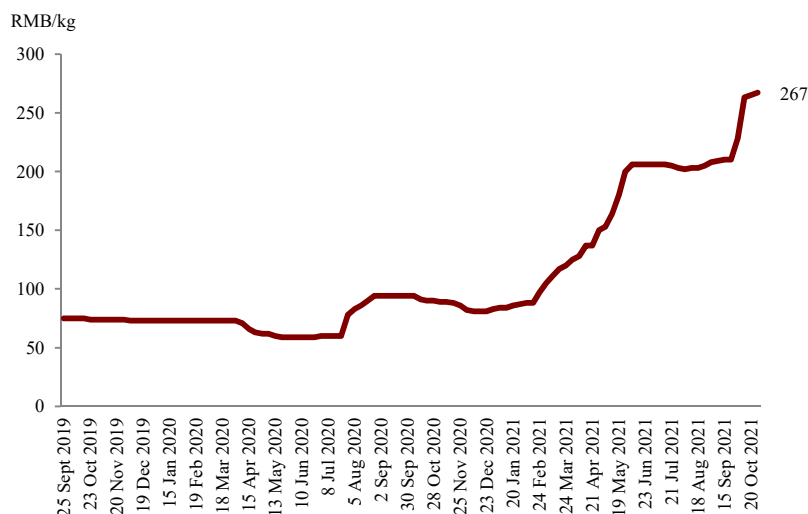


Source: Bloomberg, ICBCI

Demand is set to be hit by solar materials price hike

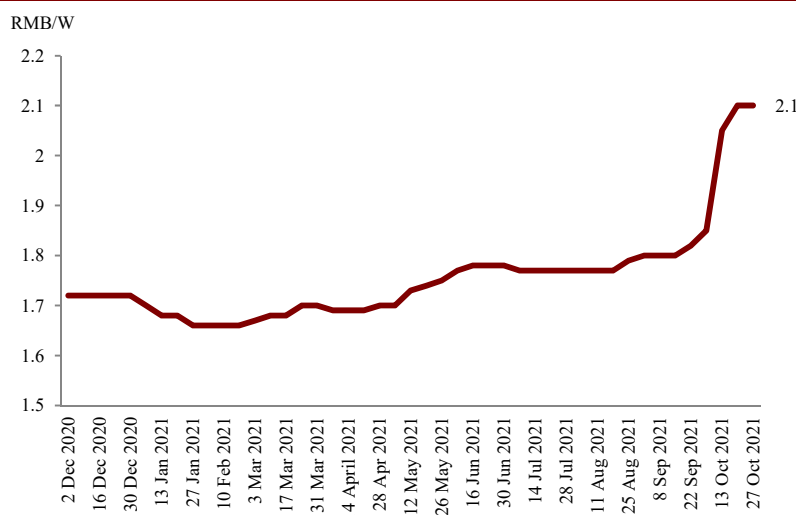
Polysilicon price has risen rapidly by ~30% to historical-high at RMB ~270/kg since mid-Sep in three weeks amid silicon raw material supply reduction and polysilicon production suspension (See Exhibit 4). While major polysilicon manufacturers have been enjoying sound profitability this year – The surge in silicon metal price in 3Q21 will lead to ~USD 8/kg, or +130% increase in polysilicon cost, we expect Tier-1 manufacturers can still maintain over 50% GPM - the cost pressure has quickly passed down the supply chain to the downstream module segment. The mainstream solar module price has also increased by 17% and reached RMB 2.1/w since mid-Sep in three weeks (See Exhibit 5).

Exhibit 4: Polysilicon price trend



Source: PvInfolink, ICBCI

Exhibit 5: Mainstream solar module (182mm PERC) price trend



Source: PvInfolink, ICBCI

Solar demand will normalize in 1H22

We estimate that most developers could hardly command reasonable project IRR at 7%-8% with solar module price quoted high at RMB 2.1/w – For every RMB 0.1/w increase in module cost, project IRR will reduce by 0.3ppt, based on our estimate.

On this backdrop, we expect most project developers are unwilling to procure module at such high prices, and many of them choose to wait for price correction in the near term, according to our channel check. All in all, as we previously indicated that the power shortage would not be a recurring issue (for more details, pls refer to our previous report: *Power shortage may last in near term, but not a recurring issue*). Especially after the recent rollout of a series of measures to counteract the coal price rally, we expect the situation will gradually normalize heading into 4Q21. That being said, most solar demands are set to orderly delay to 1H22 when the solar module price reverts to RMB 1.7-1.8/W, which are the maximum module prices that most solar developers can tolerate to meet the project IRR requirement at 7%-8%, according to our estimates. The solar demand in 2021E is set to be close to our conservative estimates at 170GW (See Exhibit 7).

Moderate polysilicon supply growth in 2022

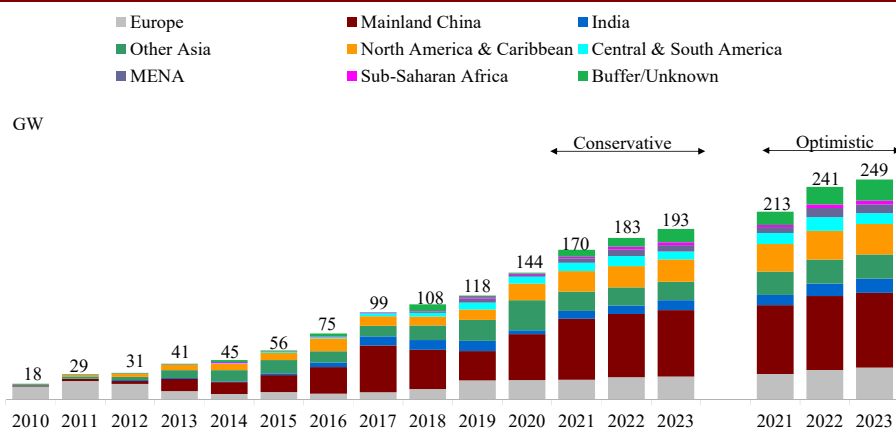
According to our database, total effective polysilicon supply is estimated to be 588,500 tonnes (See Exhibit 6) in 2021, which could support total solar demand of 207GW, assuming average 2.8g of polysilicon is needed to produce each watt of solar material and silicon module accounted for 96% of global solar market. With reference to solar demand forecasts for 2021E ranging from 170GW-213GW (See Exhibit 7), the tight polysilicon supply is set to support its price to hover at high level above RMB 200/kg at least until end-2021E, supporting sound profitability of polysilicon players, in our view.

Exhibit 6: Polysilicon total capacity in 2021

	Country	Variable cost (USD/kg, including SG&A)	Potential production in 2021 (metric tons)
East Hope	China	4.9	65,000
Yongxiang/Tongwei (new)	China	5.0	75,000
GCL FBR	China	5.9	15,000
DAQO	China	5.9	84,000
GCL Siemens (Xinjiang)	China	5.9	60,000
Yongxiang/Tongwei (old)	China	6.0	20,000
Asia Silicon	China	6.5	22,000
Xinte	China	7.0	70,000
GCL Siemens (Xuzhou factory)	China	8.2	35,000
Other Chinese companies	China	8.5	40,500
OCI	Malaysia	8.5	30,000
Wacker (solar grade)	Germany	9.0	60,000
Others	U.S., Norway	10.0	12,000
Total			588,500

Source: Bloomberg, ICBCI

Exhibit 7: Global demand forecast in 2021E-2023E



Source: Bloomberg, ICBCI

We estimate the polysilicon supply to increase moderately by 28% YoY to 751,200 tonnes in 2022E, mainly led by Tongwei (600438.CH), Daqo (DQ.US), Xinte Energy (1799.HK) and East Hope with new capacity of 100,000/40,000/34,000/30,000 tonnes respectively (See Exhibit 8). This amount is equivalent to ~270GW which should be enough to meet the global demand in 2022, assuming an average consumption ratio of 2.8g/w. We expect an average polysilicon price of ~RMB 180-200/kg next year, laying solid ground for polysilicon makers' profitability in 2022.

Exhibit 8: Polysilicon new supply in 2022E-2023E

	2021E	2022E	2023E
	metric tons	metric tons	metric tons
Tongwei	90,000	165,000	240,000
GCL-Poly	110,000	120,000	110,000
Daqo	82,000	122,000	222,000
Xinte	70,000	80,200	200,200
East Hope	65,000	80,000	185,000
Wacker	60,000	60,000	60,000
Asia Silicon	22,000	32,000	62,000
OCI	30,000	30,000	35,000
Others	51,500	62,000	62,000
	2021E	2022E	2023E
Polysilicon supply	588,500	751,200	1,176,200
YoY		28%	57%
Unit polysilicon consumption per watt (g)	2.8	2.8	2.7
GW	207.2	269.9	431.2

Source: Bloomberg, ICBCI

On the other hand, the supply increase for solar ingot, cell and module are more aggressive with reference to the new capacity under construction and announced by respective companies tracked by our database (See Exhibit 9), not to mention the involved capacity of these segments are much larger than the solar demand, implying the respective existing oversupplies are set to become more serious and potentially continue to impact their profitability with certain high-cost capacity being unable to run at high utilization. Therefore, we expect the bottleneck for solar supply chain will still emerge at the upstream polysilicon segment in 2022.

Exhibit 9: Solar ingot, wafer, cell and module capacity and expansion

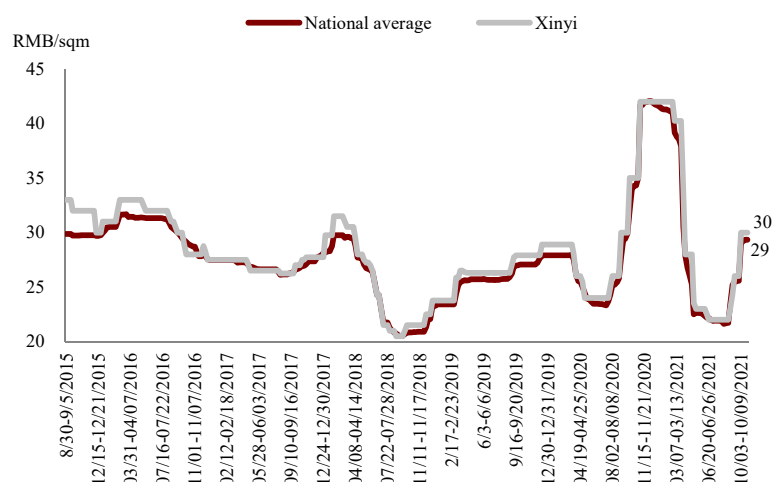
(GW)	Commissioned	Under construction	Announced
Mono ingot capacity	250.2	153.6	94.0
Multi ingot capacity	75.8	0.0	0.4
Wafer sliding capacity	335.9	74.0	102.2
Silicon cell capacity	314.6	81.9	168.1
Silicon module capacity	395.5	69.2	162.2

Source: Bloomberg, ICBCI

Sizable new glass supply to release in 2022E may put pressure on ASP

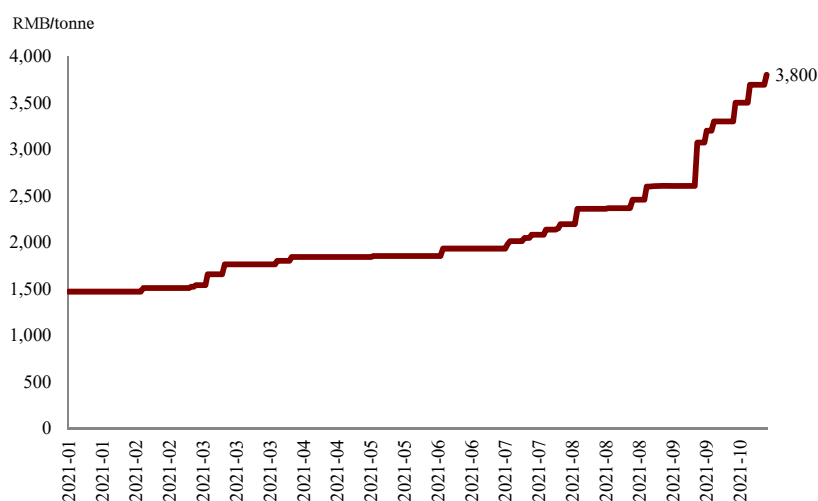
Solar glass price witnessed uptick from the recent trough at RMB 22/sqm to RMB 30/sqm in Oct-21 (See Exhibit 10) mainly driven by the production cost increase resulting from restricted transportation and power shortage. In particular, in addition to the energy cost hike, the soda ash price which accounts for 15% of solar glass total production cost, rose by 158% or 97% to RMB 3,800/tonne as compared to end-2020 and end-1H21 respectively (See Exhibit 11). On this backdrop, we expect the solar glass price uptick could effectively offset the production cost hike without significantly impacting solar glass manufacturers' profitability.

Exhibit 10: Solar glass price trend



Source: Chem99, ICBCI

Exhibit 11: Soda ash price trend



Source: Wind, ICBCI

While the solar glass price is likely to remain stable at RMB 30/sqm in the remaining months of 2021, we are expecting increasing pressure is set to act on the solar glass price in 2022E as the solar glass effective supply is set to increase significantly from 33,812 tonnes/day in 2021E to 55,610 tonnes/day in 2022E (See Exhibit 12) as both leading solar glass manufacturers, Xinyi Solar (968.HK) and Flat Glass (6865.HK) are set to expand their production capacity scales aggressively during the year, with each company's new supply to be 8,000 tonnes/day, coupled with scalable new supply from newcomers, such as Kibing Glass (601636.CH) with new production capacity of 2,400 tonnes/day.

Exhibit 12: Solar glass production capacity in 2020-2022E

2020	2021E	2022E
New addition (tonne/day)	New addition (tonne/day)	New addition (tonne/day)
5,080	20,880	27,955
New repair(tonne/day)	New repair(tonne/day)	New repair(tonne/day)
900	900	2,500
Increase in effective capacity (tonne/day)	Increase in effective capacity (tonne/day)	Increase in effective capacity (tonne/day)
298	4,272	9,910
total effective capacity (tonne/day)	Total effective capacity (tonne/day)	Total effective capacity (tonne/day)
25,658	33,812	55,610
YoY	YoY	YoY
5%	32%	64%
Year-end operating capacity (tonne/day)	Year-end operating capacity (tonne/day)	Year-end operating capacity (tonne/day)
29,540	49,520	74,975
YoY	YoY	YoY
16%	68%	51%

Source: Chem99, ICBCI estimates

Wind & Solar cumulative capacity likely to surpass govt.'s target by 2030

While the solar installation in 2H21 may be delayed due to surge in material price, its mid-to-long term prospects remains solid. Under the backdrop of Carbon Peak and Carbon Neutrality, the Chinese govt. has already set a target that the cumulative capacity for wind and solar will reach 1,200GW by 2030, implying a 10-year CAGR of 8%.

We are actually more bullish than that - Based on 1) The central govt's public pledge in the Climate Ambition Summit last year; 2) China's renewable portfolio standard plan for 2020-2030; and 3) the target to have 25% non-fossil fuel in primary energy consumption by 2030, we expect China's cumulative capacity for wind and solar will grow at least 11% CAGR in 2020-2030, and reach ~1,484GW by 2030E.

In particular, we expect solar to witness the fastest capacity growth among different renewable energies in 2020-2030, with CAGR of 12% during the period, followed by wind (9%), biomass and nuclear (7%), and hydro (3%). The rapid growth of solar was a result of 1) lower LCOE that leads to higher feasibility for grid-parity projects; and 2) less geographic limitation for installation. Overall, we expect non-hydro renewable power, incl. solar, wind and biomass, to account for ~25% of the country's total power generation in 2030, which is consistent with the target in the RPS (2020-2030 plan).

Exhibit 13: Increase in wind and solar capacity under different scenarios

	2030 Cumulative capacity, wind & solar (GW)	Implied increase in capacity p.a. 2020-2030 (GW)	Implied 2020-2030 CAGR
Central govt's target	1,200	67	8.4%
China's RPS (2021-2030)	1,580	105	11.4%
25% non-fossil fuel ratio by 2030	1,673	114	12.1%
Average	1,484	95	10.6%

Source: Bloomberg, ICBCI estimates

Exhibit 14: China's clean energy cumulative capacity and power generation growth

	Cumulative Capacity (GW)			Power generation (TWh)			Proportion in power generation mix (%)		
	2020	2030E	CAGR	2020	2030E	CAGR	2020	2030E	Change (ppt)
Solar	253	816	12%	261	946	14%	4%	9%	5
Wind	282	668	9%	467	1,514	12%	6%	14%	7
Biomass	28	54	7%	133	250	7%	2%	2%	0
Nuclear	50	100	7%	366	676	6%	5%	6%	1
Hydro	370	500	3%	1,355	1,985	4%	18%	18%	0

Source: Bloomberg, ICBCI estimates

Exhibit 15: Wind valuation table*

Company	Ticker	Currency	Price	P/E (x)		P/B (x)		ROE (%)		Dividend yield (%)	
				FY21E	FY22E	FY21E	FY22E	FY21E	FY22E	FY21E	FY22E
HK listed											
Turbine and equipment manufacturer											
Goldwind - H	2208 HK	HKD	17.48	14.3	12.6	1.7	1.6	12.7	13.0	1.1	1.2
Wind farm operators											
Longyuan	916 HK	HKD	16.16	18.3	15.7	2.0	1.8	11.5	12.2	0.8	1.0
Datang Renewable	1798 HK	HKD	2.98	13.7	9.5	1.4	1.3	5.4	7.1	1.1	1.6
Jinneng	579 HK	HKD	2.16	5.7	4.8	0.6	0.5	9.8	10.9	4.9	5.5
China Suntien	956 HK	HKD	5.8	8.7	8.0	1.1	1.0	14.6	14.2	4.1	4.5
Average				11.6	9.5	1.3	1.1	10.3	11.1	2.7	3.2
Total average - HK-listed				12.0	10.0	1.4	1.2	10.7	11.4	2.5	2.8
A-Share											
Turbine and equipment manufacturer											
Goldwind-A	002202 CH	CNY	18.15	19.6	17.7	2.1	1.9	10.7	10.8	1.8	1.9
Shanghai Electric	601727 CH	CNY	4.76	366.2	23.8	1.1	1.1	3.8	4.5	0.9	1.4
Dongfang Electric	600875 CH	CNY	17.18	21.4	19.5	1.6	1.5	7.3	7.6	1.4	1.6
Average				135.7	20.3	1.6	1.5	7.3	7.6	1.4	1.6
Wind farm operators											
Beijing Jingneng Power	600578 CH	CNY	2.85	57.0	28.5	0.8	0.7	1.3	2.6	-	-
GD Power	600795 CH	CNY	2.45	18.8	15.3	-	-	4.9	5.7	-	-
Average				37.9	21.9	0.8	0.7	3.1	4.1	-	-
Total average - A share				96.6	21.0	1.4	1.3	5.6	6.2	1.4	1.6

Source: Bloomberg, ICBCI estimates

* Closing price and valuation as of 16 Nov 2021

Exhibit 16: Solar valuation table*

Company	Ticker	Currency	Price	P/E (x)		P/B (x)		ROE (%)		Dividend yield (%)	
				FY21E	FY22E	FY21E	FY22E	FY21E	FY22E	FY21E	FY22E
Upstream											
Polysilicon & wafer											
Tongwei	600438 CH	CNY	48.64	27.1	20.7	5.7	4.6	22.1	23.4	1.1	1.3
Xinte Energy	1799 HK	HKD	20.3	4.9	4.4	1.2	1.0	28.5	23.8	3.2	3.7
Daqo New Energy	DQ US	USD	71.13	5.9	5.9	2.4	1.7	63.5	36.7	2.3	3.9
GCL-Poly	3800 HK	HKD	3.21	11.8	11.5	2.6	2.1	25.2	20.4	0.0	0.0
Oci	010060 KS	KRW	120000	5.5	5.3	1.0	0.8	20.0	17.6	1.4	1.6
Wacker	WCH GY	EUR	168.4	10.5	13.5	3.4	2.8	35.6	18.7	3.3	3.1
Hanwha	009830 KS	KRW	36500	7.8	7.6	0.9	0.8	12.7	10.7	0.7	0.8
				10.5	9.8	2.5	2.0	29.7	21.6	1.7	2.1
Upstream											
Cells, modules and solar glass											
Canadian Solar	CSIQ US	USD	39.57	22.0	14.5	1.2	1.1	5.1	10.8	0.0	0.0
Jinkosolar	JKS US	USD	59.36	23.4	18.4	1.5	1.3	5.1	8.7	0.0	0.0
Longi	601012 CH	CNY	89.98	43.0	32.6	10.2	7.9	24.7	25.5	0.3	0.4
Zhonghuan	002129 CH	CNY	45.5	42.1	32.9	5.7	5.0	13.6	14.7	0.4	0.4
Xinyi Solar	968 HK	HKD	14.5	23.8	21.0	4.2	3.8	18.5	19.2	1.9	2.2
Flat Glass Group - A	601865 CH	CNY	45.21	43.1	33.0	9.2	7.3	24.5	23.0	0.8	1.0
Flat Glass Group - H	6865 HK	HKD	37.7	30.4	26.0	6.1	5.0	23.5	21.9	0.7	1.2
				32.5	25.5	5.4	4.5	16.4	17.7	0.6	0.7
Downstream											
Solar Farm											
GCL New Energy	451 HK	HKD	0.315	23.5	14.3	0.7	0.6	0.9	3.7	0.0	-
Xinyi Energy	3868 HK	HKD	4.14	23.0	20.5	2.4	2.3	10.5	11.5	4.3	4.8
BE Clean Energy	1250 HK	HKD	0.091	9.3	7.5	0.6	0.5	5.0	5.0	-	-
				18.6	14.1	1.2	1.2	5.5	6.7	2.2	4.8

Source: Bloomberg, ICBCI estimates

* Closing price and valuation as of 16 Nov 2021

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