China Solar Sector

14th FYP preview: lifting non-fossil energy mix will boost 2021-25E PV installation

OUTPERFORM (Up)

Recent market sentiment has turned thrilling on China Solar Sector for the discussion of the 14th Five-Year Plan (FYP), as market info says China has intention to raise non-fossil energy mix. We established estimates for solar capacity addition room based on different non-fossil energy mix scenarios. At 18% non-fossil energy mix, we believe China will have ample room to install 55GW solar capacity per year in 2021-25E, and has 21GW additional room if China is determined to lift 2025E non-fossil energy mix target to 20%. We also suggest investors not to overlook other boundary conditions such as the grids and UHV transmission capability to absorb rapid renewables capacity growth. Overall, we think the sector is in a promising up cycle, with poly-si and PV glass players to benefit the most in near term. Our sector top pick remains Xinyi Solar (968 HK, BUY, TP: HK$11.70). We also prefer Flat Glass (6865 HK, NR), Tongwei (600438 CH, NR) and LONGi (601012 CH, BUY, TP: RMB72.40).

- **Non-fossil energy mix likely to reach above 18% in 14th FYP.** As non-fossil energy mix in China is likely to reach 16% in 2020E, we think setting a 17% non-fossil consumption mix target for 14th FYP would be too conservative, given that the non-fossil energy mix is likely to reach above 16% in 2020E, while setting 20% non-fossil mix target will represent moving the 2030 target ahead by five years. We think 18% would be ample level to promote renewables development. We see any further addition on top of 18% would be strong catalyst to boost wind/solar installation in 2021-25E.
- **Other boundary conditions are also critical.** We think the non-fossil mix target only is not decisive to outline to picture of China PV installation in 2021-25E. We also suggest investors not to overlook other boundary conditions such as power grids' capacity for renewable electricity consumption and UHV transmission capability. We think potential infrastructure investments and market-oriented reform for distributed electricity sales to support power storage business model will also be the highlights in the coming 14th FYP.
- **Entering into promising up cycle.** Though recent module price fluctuation has brought some uncertainties to tariff bidding and grid-parity projects, we still observed SOE developers has not slowed down project tender pace. We expect China PV installation to reach 40GW in 2020E, and capacity room will be gradually released with enhanced infrastructure and power storage development. For overseas PV installation, supported by substantially increased competitiveness and low interest rate environment, we believe solar farm investments is becoming increasingly attractive. In our base case estimates, we expect global annual PV installation to cross the line of 200GW in 2024E. If 14th FYP in China would give a push from raising the non-fossil energy mix target, global PV installation will hit the 200GW milestone earlier in 2023E.

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14th FYP Preview

Policy review: what goals direct China's mid-long term energy transition?

We think three major policies/commitments constitute direction of China's long-term energy transition path, namely

1) China's commitment for carbon emission control in COP21;
2) Energy production and consumption revolution strategy 2016-2030 (《能源生产与消费革命战略 2016-2030》) released in Dec 2016; and
3) The Five-Year Plans for Energy development.

According to the policies/commitment listed above, we outline several key goals set forth China's long-term energy transition (Figure 1). We think there are three major elements in Chinese Government's long term plan that influence each other, including 1) carbon emission to reach peak level by 2030; 2) total energy consumption to control below 6bn tce by 2030 with significant decline in unit GDP energy consumption level; and 3) proportion of non-fossil energy consumption to lift to 20% by 2030.

Figure 1: Energy mix and key measures in the 13th FYP period

	2015	2016	2017	2018	2019	2020E*	13th-FYP Target	Implementation Status
Total Energy Consumption - bn tce	4.30	4.36	4.49	4.64	4.86	4.94	<5.0	Achieved
YoY %	1.0%	1.4%	2.9%	3.4%	4.7%	1.7%	CAGR <3%	Achieved
GDP - 0.1bn RMB	688,858	746,395	832,036	919,281	990,865	1,014,646		
YoY %	7.0%	8.4%	11.5%	10.5%	7.8%	2.4%		
Unit GDP energy consumption-tce/10k RMB*	0.62	0.58	0.54	0.50	0.49	0.49	-15% compared to 2015	Achieved
YoY %	-5.7%	-6.4%	-7.7%	-6.4%	-2.8%	-0.7%		
Coal consumption - bn tce	2.74	2.70	2.71	2.74	2.80	2.76		
YoY %	-2.0%	-1.3%	0.3%	1.1%	2.4%	-1.5%		
Coal consumption mix	63.7%	62.0%	60.4%	59.0%	57.7%	55.9%	<58%	Achieved
Unit GDP coal consumption-tce/10k RMB*	0.40	0.36	0.33	0.30	0.28	0.27		
YoY %	**-8.4%**	**-8.9%**	**-10.1%**	**-8.5%**	**-5.0%**	**-3.8%**		
Petroleum consumption - bn tce	0.79	0.81	0.84	0.88	0.92	0.87		
Petroleum consumption mix	18.3%	18.5%	18.8%	18.9%	18.9%	17.7%		
YoY %	6.2%	2.5%	4.6%	4.0%	4.7%	-5.0%		
Unit GDP oil consumption-tce/10k RMB*	0.11	0.11	0.10	0.10	0.09	0.09		
YoY %	-0.8%	-5.4%	-6.2%	-5.9%	-2.8%	-7.2%		
Natural gas consumption - bn tce	0.25	0.27	0.31	0.36	0.39	0.42		
Natural gas consumption mix	5.9%	6.2%	7.0%	7.8%	8.1%	8.5%	10%	miss
YoY %	4.5%	6.5%	16.2%	15.3%	8.8%	7.0%		
Non-fossil energy consumption - bn tce	0.52	0.58	0.62	0.66	0.74	0.80		
Non-fossil energy consumption mix	**12.1%**	**13.3%**	**13.8%**	**14.3%**	**15.3%**	**16.2%**	**15.0%**	**Achieved**
YoY %	8.1%	11.4%	6.8%	7.2%	12.1%	8.0%		

Source: NBS China, CMBIS estimates
Note: * represents data estimates by CMBIS

14th FYP projection: non-fossil energy mix likely to reach above 18% by 2025

Non-fossil energy consumption includes hydro, nuclear, wind, solar and other renewables energy consumption in China. Non-fossil energy consumption penetration rate had reached 15.3% in 2019, achieving Chinese government's 13th FYP (15% by 2020) one year ahead. In 2020, despite the fact that total energy consumption suffered impacts from the pandemic, we still observed 1.9% output growth from non-fossil power generation, while thermal power generation exhibited slight decline during 1H20. For 2020E, we expect non-fossil energy to expand further to above 16% in energy mix, laying a solid foundation for the next five years.

Looking ahead into the 14th FYP period, we assume energy consumption growth will decline to ~2.4% CAGR with slower GDP growth as well as increasing energy efficiency for each unit of GDP growth. We also expect that petroleum and natural gas consumption will be relatively independent, while increasing non-fossil consumption in energy mix will represent a squeeze in coal consumption. In 2021-25, we think most of non-fossil energy consumption growth will be met by wind and solar capacity addition, since hydropower development is approaching saturation and there will be limited nuclear capacity addition in the coming five years.

With reference to the assumptions above, we've developed a scenario analysis based on non-fossil energy consumption mix at 17.3%/18.4%/19.9%, and in those scenarios, coal consumption density for each unit of GDP growth will decline 2.8%/3.3%/4% respectively. Based on 45%/55% wind/solar capacity composition for the additional non-fossil energy required, we estimate a rough capacity addition needs for wind and solar energy in different scenarios.

- **Base case: non-fossil energy mix at 18.4%** will bring along average 55.2GW/23.7GW solar/wind capacity addition per year, with 276GW/118GW total capacity potential in the next five years;

- **Bear case: non-fossil energy mix at 17.3%** will bring along average 40.0GW/17.2GW solar/wind capacity addition per year, with 200GW/86GW total capacity potential in the next five years;

- **Bull case: non-fossil energy mix at 19.9%** will bring along average 76.2GW/32.6GW solar/wind capacity addition per year, with 380GW/163GW total capacity potential in the next five years;

We think setting a 17% non-fossil consumption mix target for 14th FYP would be too conservative, given that the non-fossil energy mix is likely to reach above 16% in 2020E, while setting 20% non-fossil mix target will represent moving the 2030 target ahead by five years. We think 18% would be ample level to promote renewables development. We see any further addition on top of 18% would be strong catalyst to boost wind/solar installation in 2021-25E.

Figure 2: Our base case path projection for 14th FYP Energy mix

	2021	2022	2023	2024	2025
Total Energy Consumption	506,174	518,373	530,865	543,659	556,761
Energy Consumption - bn tce					
YoY %	2.4%	2.4%	2.4%	2.4%	2.4%
GDP - 0.1bn RMB	1,060,305	1,108,019	1,157,879	1,209,984	1,264,433
YoY %	4.5%	4.5%	4.5%	4.5%	4.5%
Unit GDP energy consumption-tce/10k RMB*	0.48	0.47	0.46	0.45	0.44
YoY %	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%
					0.85%
Coal consumption - bn tce	2.83	2.86	2.89	2.92	2.95
YoY %	2.4%	1.1%	1.1%	1.1%	1.1%
Coal consumption mix	55.9%	55.1%	54.4%	53.7%	53.0%
Unit GDP coal consumption-tce/10k RMB*	0.27	0.26	0.25	0.24	0.23
YoY %	**-2.0%**	**-3.3%**	**-3.3%**	**-3.3%**	**-3.3%**
Petroleum consumption - bn tce	0.90	0.92	0.94	0.95	0.97
Consumption proportion	17.8%	17.7%	17.7%	17.6%	17.5%
YoY %	3.5%	1.9%	1.9%	1.9%	1.9%
Unit GDP oil consumption-tce/10k RMB*	0.085	0.083	0.081	0.079	0.077
YoY %	-1.0%	-2.5%	-2.5%	-2.5%	-2.5%
Natural gas consumption - bn tce	0.45	0.49	0.53	0.57	0.62
Natural gas consumption mix	9.0%	9.5%	10.0%	10.5%	11.1%
YoY %	8.0%	8.0%	8.0%	8.0%	8.0%
Non-fossil energy consumption - bn tce	0.88	0.91	0.95	0.99	1.03
Non-fossil energy consumption mix	**17.3%**	**17.6%**	**17.9%**	**18.2%**	**18.4%**
YoY %	9.0%	4.4%	4.2%	3.9%	3.7%

Source: CMBIS estimates

Figure 3: Wind and solar capacity space estimates in 14th FYP period

	Unit GDP coal consumption change in 2022-24E	Non-fossil energy mix	Average capacity installation room		Accumulated cpacity space in 2021-25	
	%	%	Solar	Wind	Solar	Wind
Bull case	-4	19.9	76.2	32.6	380	163
Base case	-3.3	18.4	55.2	23.7	276	118
Bear case	-2.8	17.3	40.0	17.2	200	86

Source: CMBIS estimates
Note:
1) We assume wind and solar to fulfill 45%/55% of additional non-fossil energy needs in 2021-25E;
2) Wind/solar utilization hours are set at 2,100/1,100 respectively as for estimates.

Other boundary conditions are also critical

We think market is aware of the promising future for renewables capacity addition through setting exciting non-fossil energy mix target. We think other boundary conditions are also critical, however, and we think many investors have overlooked those conditions. We believe power grids capacity for renewable electricity consumption and Ultra-High Voltage (UHV) transmission capability would be two major concerns for renewable energy's capacity growth.

Non-hydro renewable power consumption had accounted for 10.2% in total electricity consumption in China in 2019, and there were 18 province/areas had non-hydro renewable power consumption mix at above 10% level. Adding massive new renewables electricity consumption will highly rely on future power

transmission infrastructure investments, as well as the development of power storage, in our view. By far, we think both factors do not support explosive growth potential for both wind and solar capacity addition, and we suggest investors to also pay attention to the potential infrastructure investments and market-oriented reform for distributed electricity sales to support business model of power storage. We think both will also likely be highlights in the coming 14th FYP.

Figure 4: Non-hydro renewable electricity consumption mix in 2019

Province/area	Renewables Power consumption volume （TWh）	As % of total power consumption %
Ningxia	23.1	21.3%
Tibet	1.6	20.9%
Heilongjiang	20.2	20.2%
Qinghai	14.2	19.7%
Jilin	14.7	18.8%
Gansu	21.9	16.9%
Inner Mongolia	61.1	16.7%
Yunnan	29.6	16.3%
Jiangxi	36.8	16.2%
Henan	44.4	13.1%
Hebei	50.5	13.0%
Liaoning	30.2	12.5%
Anhui	28.4	12.3%
Beijing	14.1	12.0%
Tianjin	10.6	12.0%
Shaanxi	19.7	11.7%
Xinjiang	31.9	11.1%
Shandong	69.2	11.1%
Jiangxi	13.5	8.7%
Hunan	16.1	8.6%
Hubei	17.4	7.8%
Jiangsu	46.7	7.4%
Hainan	2.4	6.8%
Zhejiang	31.9	6.7%
Guangxi	12.6	6.5%
Sichuan	14.8	5.6%
Fujian	13.5	5.6%
Guizhou	8.1	5.2%
Shanghai	6.6	4.2%
Guangdong	28.6	4.2%
Chongqing	4.7	4.0%
Nationwide	**738.8**	**10.2%**

Source: NEA, CMBIS

PV installation projection in 2020-25E

China to have moderate PV installation growth

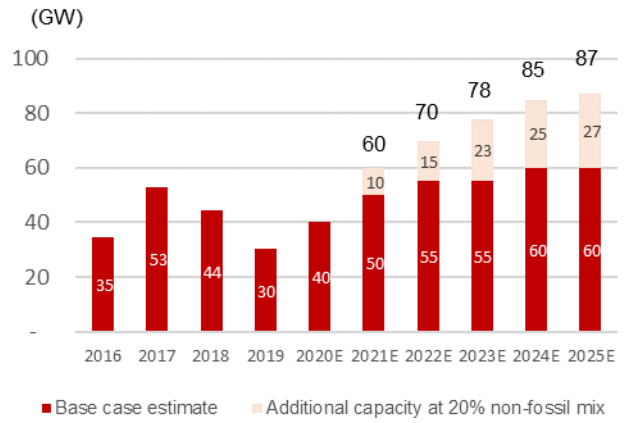
In China, though recent module price fluctuation had brought some uncertainties to tariff bidding and grid-parity projects, we still observed SOE developers has not slowed down project tender pace. We think PV installation in China will likely reach 40GW in 2020E. For 2021E, since we expect 14th FYP and related policy to be released late by 1H21, we don't expect PV installation to have significant jump above 50GW. For 2022-25E, with reference to our base case estimates in our 14th FYP project with consideration to boundary condition from power transmission infrastructure and power storage development, we expect PV installation to have moderate growth to 55GW in 2022-23E and 60GW in 2024-25E.

However, if Chinese government is determined to lift non-fossil energy mix to 20% by 2025 and willing to accelerate infrastructure development as well as market reform in the power reserve market, we expect there would be an average of 21GW additional capacity room per annum.

Overseas PV installation will expand at rapid pace

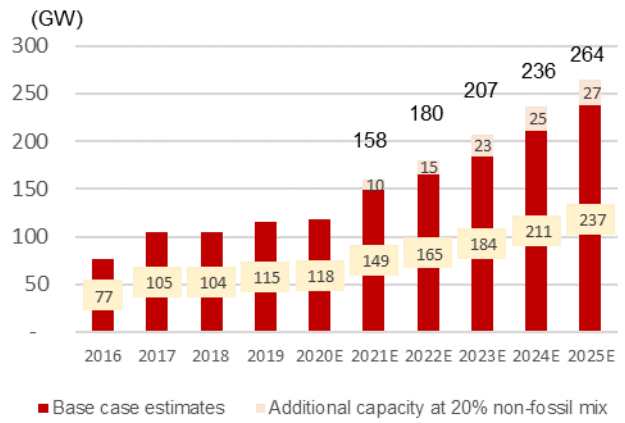
We project a strong hike of global PV installation in 2021E to 149.4GW although COVID-19 may still have continued impact into 2021E. Supported by substantially increased competitiveness and low interest rate environment, we believe solar PV energy can reach grid-parity or even lower tariff in many places in the world (especially in Europe and Middle East areas), which make PV investments attractive for both ground-mounted and distributed projects. We expect global annual PV installation to cross the line of 200GW in 2024E. If 14th FYP in China would give a push from raising the non-fossil energy mix target, global PV installation will hit the 200GW milestone earlier in 2023E.

Figure 5: China annual PV installation projection



Source: NEA, CMBIS estimates

Figure 6: Global annual PV installation



Source: IEA PVPS, Solarpower Europe, CMBIS estimates

Poly-Si and PV glass will benefit the most in sector up cycle

2020 is an explicitly challenging year to China Solar Sector given the impacts from COVID-19's outbreak and product pricing fluctuation caused by sudden supply disruption. Global PV installation did not cease its pace, however, indicating the sector's resilience with substantially increased competitiveness among various energy sources. Looking forward to the next few years with reference to our projection of PV installation in China the globe, we believe China Solar Sector will enter up cycle. We expect PV product demand to maintain rapid growth, while product ASP to decline at slower pace comparing with previous few years, which will likely boost PV manufacturers operating leverage and earnings growth as those companies realizing more product shipments.

Among the PV supply chain, we still prefer poly-si and PV glass for high market concentration, tight supply and strong pricing power, and relatively high entry barrier. We think both poly-si and PV glass sub-sector will benefit the most in the sector up cycle. Other than PV glass, we think wafer, cell, and module may continue to face oversupply situation but with improving outlook for market leaders with product and technology upgrade (in larger wafer size and higher efficiency). Our sector top pick remains Xinyi Solar (968 HK, BUY, TP:HK$11.70). We also prefer Flat Glass (6865 HK, NR), Tongwei (600438 CH, NR) and LONGi (601012 CH, BUY, TP: RMB72.40).

Figure 7: Peers' valuation for Chinese PV related manufacturers

		Market cap	Stock price	YTD	EPS			EPS-CAGR	PER			PBR		
Ticker	Company	(US$, mn)	(Local currency)	(%)	19A	20E	21E	19-21E	19A	20E	21E	19A	20E	21E
Poly - Si & cell														
600438 CH	TONGWEI CO-A	15,894	25.10	91.2	0.68	0.82	1.11	28.1%	19.3	30.5	22.5	5.6	4.9	4.1
DQ US	DAQO NEW ENE-ADF	1,652	118.87	132.2	2.25	10.55	15.44	162.0%	25.6	11.3	7.7	2.9	2.3	1.8
600732 CH	SHANGHAI AIKO-A	4,135	13.75	76.5	0.37	0.41	0.77	43.9%	21.1	33.5	18.0	10.3	7.3	5.2
Mono wafer														
601012 CH	LONGI GREEN EN-A	41,500	74.50	200	1.47	1.99	2.48	29.9%	16.9	37.5	30.0	11.2	8.0	6.4
002129 CH	TIANJIN ZHONG-A	10,436	23.30	97.29	0.32	0.48	0.64	40.9%	36.4	48.8	36.2	4.3	4.5	4.0
Module														
JKS US	JINKOSOLAR-ADR	1,053	23.70	5.4	21.22	26.00	21.78	1.3%	5.9	6.2	7.4	0.7	0.6	0.5
CSIQ US	CANADIAN SOLAR I	1,800	30.48	37.9	2.88	2.84	3.31	7.2%	6.4	10.7	9.2	1.3	1.1	1.0
002459 CH	JA SOLAR TECHN-A	5,807	29.10	160.3	1.27	1.05	1.37	3.9%	8.8	27.7	21.2	8.0	4.2	3.5
Solar glass														
968 HK	XINYI SOLAR HLDS	10,868	9.97	80.3	0.30	0.40	0.53	32.5%	18.3	24.9	18.7	5.6	4.9	4.1
6865 HK	FLAT GLASS GRO-H	6,529	15.70	204.9	0.37	0.55	0.83	49.9%	12.4	25.0	16.5	5.9	4.4	3.6
601865 CH	FLAT GLASS GRO-A	6,529	25.28	108.4	0.37	0.56	0.79	46.3%	12.4	44.8	31.9	11.1	7.8	6.2
Inverter														
300274 CH	SUNGROW POWER -	6,103	28.35	169.2	0.61	0.80	1.027	29.8%	17.3	35.6	27.6	4.8	4.2	3.7
300763 CH	NINGBO GINLONG-A	2,378	116.50	376.9	0.99	1.94	3.010	74.0%	24.6	60.1	38.7	37.5	13.6	10.0
EVA														
603806 CH	HANGZHOU FIRST-A	7,715	67.81	95.3	1.31	1.59	1.93	21.5%	26.6	42.6	35.1	8.1	6.9	6.0
Average									**18.0**	**31.4**	**22.9**	**8.4**	**5.3**	**4.3**

Source: Bloomberg, CMBIS

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