

Buy when invention correction is fully priced in

November 2, 2023

INVESTMENT SUMMARY

- We initiate Sungrow Power Supply (Sungrow) with a BUY rating and TP of Rmb120 because we believe the ongoing inventory correction in Europe is fully priced in;
- C3Q23 result showed Sungrow is able to weather (1) price war and (2) overcapacity by focusing on profit margin and opportunities of electricity reform in China. We believe Sungrow can capture overseas markets when the rebound occurs;
- A positive that has likely been overlooked is the fact that Huawei's competitive entry has already occurred and Huawei is unlikely to make any further moves. We believe this removes a major overhang for Sungrow.

Research Team



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Sungrow Power Supply (SESZ: 300274)

A good time to enter a strategic renewable market

- With sharp export downturns and downward earning revisions of US competitors, solar PV's price war and overcapacity issues are fully digested;
- Sungrow's C3Q23 and C1H23 results showed it has managed the industry headwinds. It also increasingly participates in China's electricity reform;
- We believe solar PV inverter's superior strategic position in renewable energy's supply chain is intact. Further, Huawei's intrusion is not an outstanding risk.

Has the bad news been fully priced in?

Export growth of solar PV inverter has been decelerating since April and starting entered negative territory from July (Exhibit 8). US competitors SolarEdge and Enphase guided down demand, bringing inventory correction in Europe to surface. The headwinds also showed in Sungrow's C3Q23 as inventory days spiked up. But overall we consider Sungrow to manage its earning well by acquiring solar station operations in China, achieving higher gross margins and managing OPEX well.

Two major positives to consider

We expect Huawei to make a great impact across the renewable supply chain as the company leverages its full-digital, full-supply-chain capability. We suspect Huawei may even play a role in energy storage. But in solar PV inverter this impact has already happened. Further, China's electricity regime is about to undergo reform to allow more granular match of supply and demand and independent pricing. We believe Sungrow can participate to benefit.

Solar PV inverter's strategic position in renewable is still valid

Solar PV inverter connects solar PV panels to the power grid by converting DC current generated from solar to AC current for use. As renewable energy evolving from a peripheral solution to the mainstay, grid connection rises in importance, which gives inverter makers great product expandability.

Solar PV inverter has barriers to entry

Entry barriers are mainly three: (1) efficiency, (2) safety and (3) system. Solar PV inverter has brands as Huawei and Sungrow both show. Inverter faces fragmented upstream and partially fragmented downstream.

Summary financial data

Highlights	2021A	2022A	2023E	2024E	2025E
Revenues (RMB mn)	24,137	40,257	81,488	103,273	145,736
Non-IFRS operating profit (RMB)	2,054	4,265	17,660	12,951	16,611
IFRS EPS (RMB)	1.08	2.42	10.63	7.30	8.43
EBITDA margin	8.2%	10.1%	20.6%	11.6%	9.7%
P/E (IFRS)	NM	NM	7.7	11	10
Free cash flow yield (%)	(1.00%)	0.63%	8.86%	8.88%	9.62%

Source: Bloomberg, Blue Lotus (as of November 2, 2023)

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Blue Lotus Capital Advisors Limited

BUY

UR

SELL

Target Price: RMB 120	Current Price: RMB 82.12
RIC: (SESZ: 300274)	BBG: 300274 CH
Market cap (RMB mn)	121,960.6
Average daily volume (RMB mn)	2,280.7
Shares out/float (m)	1,485.2/955.5

Source: Bloomberg, Blue Lotus (as of November 2, 2023)

Key Changes

	New	Old	Diff
BLRI Recommendation	BUY	-	-
BLRI Target Price	120	-	-
2023E EPS (RMB)	10.63	-	-
2024E EPS (RMB)	7.30	-	-
2025E EPS (RMB)	8.43	-	-

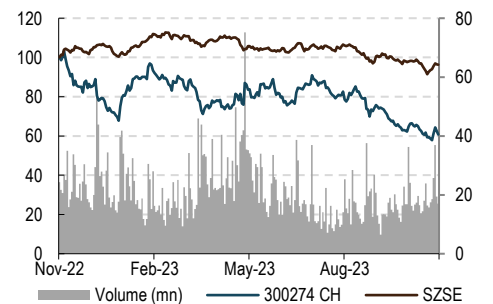
Source: Blue Lotus (as of November 2, 2023)

BLRI vs. The Street

No. of Bloomberg Recommendations	34
Target price vs. Bloomberg mean	(7.4%)
1-year-fwd EPS vs. Bloomberg mean	83%
Bloomberg recommendation	4.6

Source: Bloomberg Recommendation, Blue Lotus (1=SELL,5=BUY) (as of November 2, 2023)

Price performance and volume data



Source: Bloomberg, Blue Lotus (as of November 2, 2023)

Research team



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Sungrow Power Supply: Financial Summary

Fiscal year ends-December 31

Exhibit 1. Income statement

(RMB mn)	2022A	2023E	2024E
Total revenue	40,257	81,488	103,273
Cost of revenues	(30,376)	(54,527)	(77,145)
Business surcharge and tax	(143)	(245)	(310)
Gross profit	9,739	26,716	25,818
Selling expense	(3,169)	(5,548)	(8,109)
Administrative expenses	(612)	(851)	(1,144)
R&D expense	(1,692)	(2,657)	(3,615)
Operating profit (loss), IFRS	4,265	17,660	12,951
Other income and gains	239	131	100
Other expenses	(370)	(174)	(350)
Profit before tax	4,134	17,617	12,701
Income tax expense	(439)	(1,170)	(1,270)
Net profits	3,695	16,448	11,431
EPS, diluted(RMB)	2.42	10.63	7.30
Gross margin	24.2%	32.8%	25.0%
Operating margin, IFRS	10.6%	21.7%	12.5%

Source: Sungrow Power Supply, Blue Lotus (as of November 2, 2023)

Exhibit 2. Balance sheet

(RMB mn)	2022A	2023E	2024E
Cash and cash equivalents	11,667	23,725	36,654
Financial assets at FVPL	1,490	3,827	4,850
Prepayments, other receivables and other assets	4,886	8,497	11,636
Trade and bills receivables	14,891	29,734	37,167
Inventories	19,060	33,669	46,863
Total current asset	51,994	99,452	137,171
Property and equipment	4,544	6,605	9,674
Construction in process	1,189	1,850	2,173
Investments in joint ventures and associates	228	462	586
Right-of-use assets	560	1,133	1,436
Deferred tax asset	1,025	2,074	2,629
Total non-current asset	9,632	14,885	20,433
TOTAL ASSETS	61,626	114,337	157,604
Interest-bearing borrowings	2,232	5,004	7,777
Trade and bills payables	25,926	45,994	64,300
Other payables and accruals	760	1,365	1,931
Contract liabilities	3,788	8,149	10,327
Total current liabilities	35,469	65,072	91,496
Interest-bearing bank loans	4,162	4,162	4,162
Total non-current liabilities	6,421	4,658	5,268
Share capital	1,485	1,488	1,490
Reserves	17,732	34,180	45,611
Total shareholders' equity	19,737	44,608	60,840
Total liabilities and shareholders' equity	61,626	114,337	157,604

Source: Sungrow Power Supply, Blue Lotus (as of November 2, 2023)

Company Description

Sungrow is the world's 2nd largest solar PV inverter, which converts renewable energy's direct current (DC) to power grid's alternative current (AC), producer after Huawei with a 23% market share. Leveraging on PV inverter, Sungrow also achieved ~10% global market share in wind converter and is a major player in energy storage and hydrogen in China.

Industry View

We expect China's energy consumption per capita to rise from 114 GJ in 2022 to 147 GJ in 2030. Electricity as percentage of energy consumption to rise from 20% to 23%. Solar and wind as electricity to rise from 4.9% and 7.7% to 12% and 13% over the above period. This will result solar and wind electricity generation to grow from 433 and 760 TWh in 2022 to 1,537 and 1,749 TWh in 2030. We expect energy storage capacity as renewable installed capacity to rise from 2% in 2022 to 15% by 2030.

Exhibit 3. Cash flow statement

(RMB mn)	2022A	2023E	2024E
Net income	3,695	16,448	11,431
Adjustments for:			
Impairment of assets	831	620	600
Fixed asset depreciation	351	361	505
Intangible amortization	17	30	56
Adjustments for balance sheet items	(3,105)	(5,122)	(79)
Cash generated from/(used in) operations	1,805	12,308	12,491
Net cash flows generated from/(used in) operating activities	1,505	12,906	13,411
Purchases of items of property and equipment	(712)	(1,793)	(2,272)
Purchase of items of other intangible assets	(185)	(374)	(473)
Net cash flows used in investing activities	1,951	(4,079)	(3,504)
Borrowing and repayment of loans	2,772	2,772	2,772
Net cash flows generated from financing activities	3,250	3,231	3,022
Balance b/f	7,790	11,667	23,725
Balance c/f	11,667	23,725	36,654

Source: Sungrow Power Supply, Blue Lotus (as of November 2, 2023)

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Recent Reports

October 27th, 2023: [Li Auto (LI US, BUY, TP US\$40) Target Price Change]:

Can Li do better than Mi?;

October 27th, 2023: [Atour Lifestyle (ATAT US, BUY, TP US\$36.5) Earnings Preview]: **Enlarging hotel network support revenue growth;**

October 25th, 2023: [Bilibili Inc. (BILI US, SELL, TP US\$12.3) Target Price Change]: **Strong advertising revenue masks deeper problems;**

October 23rd, 2023: [NIO Inc. (NIO US, SELL, TP US\$4.5) Rating Change]: **1st casualty of Huawei's edge out effect...DG to SELL;**

October 23rd, 2023: [Miniso Group (MNSO US, BUY, TP US\$31) Target Price Change]: **Overseas business is still undervalued;**

October 20th, 2023: [PDD Holdings (PDD US, BUY, TP US\$128) Target Price Change]: **Consumption downgrade continues to benefit PDD;**

October 19th, 2023: [Blue Lotus Hardware Sector Update]: **Export controls grow monopoly on domestic IC demand;**

October 19th, 2023: [Kuaishou (1024 HK, BUY, TP HK\$62) Rating Change]: **Beneficiary of upcoming consumption downgrade;**

October 18th, 2023: [Blue Lotus Sector Update]: **Chinese LLM will be a verticalized sovereign market;**

October 17th, 2023: [Luckin Coffee (LKNCY US, BUY, TP US\$44) Earnings Preview]: **Monetizing traffic becomes the latest driver;**

October 16th, 2023: [Alibaba (BABA US, BUY, TP US\$127) Earnings Preview]: **Jiang Fan must return;**

Investment Cases at a Glance

Why is it a Buy

- **Inverter and converter are at the nexus of the renewable ecosystem:** Solar PV inverter and wind converter connect renewable energy generation, which is direct current (DC) and unstable, to the electrical power grid, which is alternative current (AC) and stable. This nexus position allows inverter/converter to act as a network hub/router/switch for the electricity grid. As renewable energy rising in proportion, connecting it to the main grid becomes an ever-pressing issue, which gives PV inverter makers, who historically work in the interface between renewable equipment and power grid, great opportunity to expand their products;
- **Energy storage will be a long-term driver for inverter and converter companies:** Sungrow's storage business started in C1H17 and by C1H23 has grown to 30% of total revenues. Adding storage adds an additional inverter, along with management and safety features. Long managing the interface of renewable and grid, inverter/converter companies have a natural advantage in managing storage;
- **Residential Energy Storage System (ESS) can experience substantial growth ahead in US and Europe:** The US Inflation Reduction Act (IRA) provides tax credit of 30% of the cost for purchasing residential solar systems from 2022 to 2032. Installing ESS together with home solar system qualifies for this tax credit. A residential ESS allows the homeowner to make full use of solar electricity generated, reselling unused electricity to the grid if needed. In December 2022, California passed NEM 3.0 legislation which aimed at encouraging homeowners to install ESS to reduce the industry's reliance for government subsidies. Rapid price falls in lithium battery has made residential energy storage price attractive. Between 2017 and 2022, US residential ESS capacity grew at CAGR of 123%. We believe overcapacity in lithium battery is here to stay. ESS acts as a great demand buffer for the lithium battery industry;
- **Adding storage to residential solar increases system complexity and average selling price (ASP), lowering breakeven point for vendors:** An ESS include a power conversion system (PCS) which must convert electricity bidirectionally from DC to AC (battery to grid) and AC to DC (grid to battery), generating additional demand for inverters. An ESS also needs the safety features to prevent battery fire in addition to inverter fire. The battery array needs its own management system. By adding ESS, NREL calculated that total cost of residential solar system can increase by 49% to 86%. This is great news for low priced Chinese vendors;
- **Higher ASP resulted from ESS can make residential more attractive to Chinese vendors:** Residential solar has a substantial channel margin problem as installation must take place locally with local labour. Roughly half of residential solar's total costs are installation labour and soft costs like design, permitting and inspection (*Source: NREL*). The highly distributed solar installer market (Exhibit

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October 16th, 2023: [JD.com (JD US, BUY, TP US\$29) Rating Change]: **Short-term demand doesn't indicate a long-term trend;**

October 11th, 2023: [Blue Lotus Entertainment Sector Update]: **Increasing marginalization of middle-sized companies;**

October 10th, 2023: [Blue Lotus Sector Update]: **Why China tech is a better option than US tech, for now;**

September 25th, 2023: [Blue Lotus Sector Update]: **Chinese renewable energy comes to crossroads;**

September 21st, 2023: [Blue Lotus Hardware Sector Update]: **SMIC 7nm and 5nm sufficient for Huawei rejuvenation;**

September 21st, 2023: [Blue Lotus Entertainment Sector Update]: **What change can Mate 60 bring to games and apps;**

September 20th, 2023: [Miniso Group (MNSO US, BUY, TP US\$30.5) Target Price Change]: **Progress in America bodes well for international;**

September 14th, 2023: [Blue Lotus Entertainment Sector Update]: **Game cannot break the tie of hardware but AI can;**

September 12th, 2023: [KE Holdings (BEKE US, BUY, TP US\$24) Company Update]: **Our view of gradual property recovery into 2024;**

September 7th, 2023: [Blue Lotus Transportation Sector Update]: **German cars' EV push belies issue of standardization;**

September 5th, 2023: [Luckin Coffee (LKNCY US, BUY, TP US\$44) Target Price Change]: **Moutai latte is not just a blockbuster;**

6) is a hindrance for Chinese firm to do business in US as they have little margin to spare. Higher ASP leads to more profit margins for everyone along the supply chain. We expect Sungrow to make a major push to US and Europe, especially given Huawei is restricted in the US market;

- **Inverter modulation can be an alternative to microinverter:** Before Huawei exiting the US market in 2019, it held ~4% of the market share (*Source: Greentech Media*). Since Huawei's exit, Israel inverter leader SolarEdge (SEDG US, NR) and US local vendor Enphase (ENPH US, NR) control ~80% of the US market, mainly due to regulatory requirement to put shutdown circuit behind each solar panel. In our view, microinverter as practiced by Enphase and others has no real technical barrier as SolarEdge's modular solution of connecting a string inverter with a power optimizer also sells in US and is similar to Sungrow's and Huawei's. Enphase's microinverter route is practiced by several smaller Chinese vendors like AP Systems (688348 CH, NR), Hoymiles (688032 CH, NR) and Deye (605117 CH, NR). In our view, the two solutions differ only in configuration and not in technology. With ESS, we expect Sungrow to have a renew opportunity to break into the US market;
- **US/Europe reshoring offers both opportunities and challenges:** Our analysis shows there is a capacity shortage in the short-run as US legislators try to shut or delay solar imports from China. But replicating the technology and capacity of China's solar industry in US isn't easy, which means US/Europe also welcomes capacities from China to relocate. Companies who can manage their technology migration and local labour relations can reap the reward of reshoring, in our view. Currently, Sungrow has production facilities in India and Thailand, which satisfies US/Europe reshoring needs because components of inverter/converter are readily sourced in the global market;
- **Renewable demand from China will continue to be very robust:** Because China has a vested self-interest to substitute polluting coal and insecure oil as energy sources (Exhibit 10-19), we foresee renewable energy demand in China to continue to be very robust. Also, because wind has spacing issues, we see solar taking an increasingly large share of renewable. Our forecast is for solar electricity generation to grow from 4.8% of electricity in 2022 to 11.6% in 2030 and capacity from 393 GW in 2022 to 1,296 GW in 2030 (Exhibit 9);
- **Electricity reform presents Sungrow with opportunities to operate virtual power plants (VPP):** Renewable's unstable nature and electricity's perishableness now come to a conflicting point that renewable electricity will likely have to be locally consumed. The rise of microgrid signifies this trend which will likely result in liberalization of electricity pricing in China. Inverter vendors as the frontline participants are the likely candidate to own and operate microgrids or VPP's. We believe Sungrow's ramp up of solar station operation business signifies a trend, which can offset the possible slowdown in China market and export restrictions in Europe in 2024;

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September 1st, 2023: [KE Holdings (BEKE US, BUY, TP US\$24) Target Price Change]: **Silver lining appear in industry cycle, maintain BUY;**

September 1st, 2023: [Blue Lotus Hardware Sector Update]: **Huawei Mate 60 is a win-win for both US and China;**

August 31st, 2023: [Xiaomi Inc. (1810 HK, SELL, TP HK\$8.2) Company Update]: **Huawei's impact on Xiaomi will be meaningful in 2024;**

August 30th, 2023: [PDD Holdings (PDD US, BUY, TP US\$107) Target Price Change]: **Raise TP for GMV, take rate, Temu and Kuaishou;**

August 29th, 2023: [Blue Lotus Entertainment Sector Update]: **NetEase has better pipeline in Gamescom-Cologne;**

August 28th, 2023: [Blue Lotus Sector Update]: **In solar PV winners go to one who count the pennies;**

August 25th, 2023: [Meituan (3690 HK, BUY, TP HK\$165) Earnings Review]: **Counterstrike remains effective... maintain BUY;**

August 25th, 2023: [Futu Holdings (FUTU US, BUY, TP US\$55) Earnings Review]: **Short term peaking but momentum remains;**

August 25th, 2023: [NetEase (NTES US, BUY, TP US\$105) Target Price Change]: **Raise TP for <Justice Mobile> and upcoming pipeline;**

August 24th, 2023: [iQIYI, Inc. (IQ US, BUY, TP US\$6.25) Earnings Review]: **Ads revenue will continue to have fair growth;**

August 23rd, 2023: [Kuaishou (1024 HK, SELL, TP HK\$50) Earnings Review]: **Fair numbers hide risks;**

- **Sungrow is a global market leader with increasing shares:** According to Wood Mackenzie, Sungrow is the world 2nd largest solar PV inverter vendor, after Huawei, with market share in GW almost three times of the 3rd player Ginlong Solis (300763 CH, NR) in 2022. Sungrow's market share rose from 17% in 2017 to 23% in 2022 (Exhibit 5);
- **Solar PV inverter has brands, and thus entry barrier:** We believe this stems from the fact that inverter's key attributes are (1) safety and compliance, as it deals with high voltage, (2) quality benchmarks, as it converts DC to AC with a conversion ratio, (3) durability and cost, as it supposes to last decades and generate positive ROI ex-subsidy. Inverters achieve these through an integration of hardware, software and service, which makes reshoring less an issue;
- **Solar PV inverter has fragmented up and partially fragmented downstream:** Battery has concentrated upstream of critical miners and concentrated (but diversifying) downstream of automakers. Solar PV panel has concentrated polysilicon makers as upstream but distributed installers as downstream. Solar PV inverter has the standardized power semiconductor components industry (IGBT/SiC, passive components, PCB etc.) as upstream and fragmented installer industry as downstream. Inverter has the best industry attractiveness;
- **Solar PV inverter has shorter life span than panel:** Inverter warranty is typically half of panels which means each year there are ~10% additional PV inverter demand over panel demand.

What are the key catalysts for the next 3-6 months

- **Solar PV inverter export hitting bottom (-):** Solar PV inverter exports started decelerating in April and registered negative YoY growth in July, August and September, mainly due to inventory corrections in Europe. We expect it to hit bottom in C4Q23 and return to positive growth in C1Q24;
- **Solar PV capacity installation slowing down (-):** China's solar PV capacity addition started off very strong in C1Q23, up 155% YoY. It stayed strong at 153% YoY in C2Q23 and continued strong pace in C3Q23 but started tapering off in October (Exhibit 7). We currently estimate China's solar capacity will grow 44% YoY in 2023 (100% YoY addition), after growing 28% YoY (60% YoY addition) in 2022. We expect growth to slowdown to 14% YoY (capacity) and (54%) YoY (addition) in 2024. In C2Q23, a number of provincial authorities issued decrees to call off solar capacity addition as the pace has exceeded grid connection abilities at the local level;
- **US solar capacity addition recovering (+):** After a strong C1Q23, US solar capacity installation slowed down from 47% YoY to 20% in C2Q23. After US government clarified IRA provisions on domestic content, project size and commercial installations, we expect installation to pickup in C2H23;
- **Protectionism measures in Europe increasing (-):** On September 12, Solar Power Europe wrote to EU Commission warning against excessive price drop of solar PV panels in 2023. On August 25, Europe's leading wafer and ingot

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August 23rd, 2023: [Miniso Group (MNSO US, BUY, TP US\$26) Earnings Review]:

Strong demand support further store openings;

August 23rd, 2023: [Baidu (BIDU US, BUY, TP US\$162) Earnings Review]:

Online ads growth will remain robust;

August 22nd, 2023: [Blue Lotus Sector Update]: **Is there a good capacity war from China?**

August 21st, 2023: [Alibaba (BABA US, BUY, TP US\$127) Target Price Change]:

The New Wanxiangtai will enhance the take rate;

August 18th, 2023: [Bilibili Inc. (BILI US, SELL, TP US\$12.3) Earnings Review]:

E-commerce ads aren't sufficient to hide other issues;

August 18th, 2023: [Atour Lifestyle (ATAT US, BUY, TP US\$36.5) Target Price Change]:

Demand supply imbalance to sustain...maintain BUY;

August 17th, 2023: [JD.com (JD US, SELL, TP US\$32) Earnings Review]:

Slowing 3C sales will impact 2H, maintain SELL;
August 17th, 2023: [Futu Holdings (FUTU US, BUY, TP US\$55) Target Price Change]:

Better outlook in both domestic and overseas;
August 17th, 2023: [JD Health (6618 HK, BUY, TP HK\$65) Target Price Change]:

Benefit of alternative channel starts to show;
August 17th, 2023: [Tencent (700 HK, BUY, TP HK\$402) Target Price Change]:

Cut TP to HK\$ 402 to reflect weakness in gaming;
August 16th, 2023: [Tencent Music (TME US, SELL, TP US\$5.7) Target Price Change]:

Competition remains the biggest downward factor;

manufacturer Norwegian Crystal filed for bankruptcy. The PERC to TopCon migration in China's solar industry has unleashed a massive capacity expansion, which will likely result in incremental protectionism measures. Solar PV inverter sales as closely correlated with panel sales will be negatively impacted.

Where can we be wrong?

- **The European inventory correction lasts longer than expected:** The global solar industry is undergoing a transition from PERC to TopCon/IBC and Chinese vendors have taken the first steps towards the migration. We believe this is the wrong time to localize the supply chain as localized output may soon be obsolete. We current expect Europe to work out its excess inventory by C2Q24 but Chinese export of TopCon/IBC solar panel might pick up earlier than that. Our hypotheses are (1) European solar reshoring will be restrained in capacity in the near term, allowing demand to work out of excess supply, (2) TopCon/IBC export will recover earlier than PERC, allowing demand to resume before excess inventory is worked out. If our hypotheses are wrong, inventory correction might persist into 2025;
- **Microinverter maintains its market share over string+optimizer:** In our view the success of microinverter in the US mainly stems from local regulation, and thus microinverter can be replaced by module-level-power-electronics (MLPE) of string+optimizer when sufficient channel margin incentive is given, as SolarEdge has shown. If Sungrow fails to grow US market by taking advantage the addition of residential ESS, slowdown in domestic market might drag down Sungrow's growth beyond 2024, which will delay our BUY case by a year;

What can change our view?

- **Hydrogen took off earlier than we expected:** We current expect mass adoption of hydrogen fuel cell to be around 2030, mainly due to the cost barrier at the vehicle side. If adoption is materially accelerated, it will substitute a substantial share of battery as an energy storage medium. Sungrow's nascent hydrogen development initiative will not suffice to hedge this risk, in our opinion.

August 16th, 2023: [Sea Limited (SE US, SELL, TP US\$35) Target Price Change]:

Long-term headwinds amid upsides in 3Q;

Operating Metrics

Exhibit 4. Interim revenue table

Rmb mn	C2H21	C1H22	C2H22	C1H23	C2H23E	C1H24E
Power conversion equipment	4,067	6,161	6,334	10,845	11,624	23,039
Solar PV inverter	3,591	5,460	5,933	9,784	10,979	12,566
Wind convertor	476	701	401	1,060	645	815
Energy storage	920	2,218	2,386	7,741	8,523	11,611
Solar station operation	2,689	6,990	2,877	8,727	7,560	10,472
Power generation	224	262	289	336	329	421
Others	310	297	396	327	585	408
Total revenues	8,210	15,927	12,281	27,976	28,621	45,951

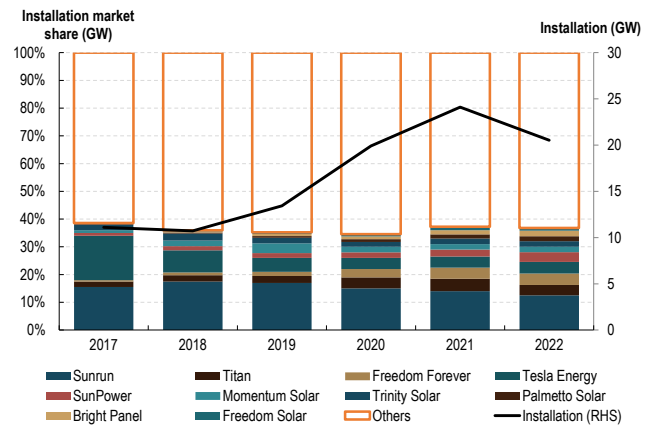
Source: Blue Lotus (as of November 2, 2023)

Exhibit 5. Vendor and country market share, solar PV inverter

GW	2017	2018	2019	2020	2021	2022
Huawei (China) (华为)	27%	23%	23%	23%	24%	29%
Sungrow (China) (阳光电源)	17%	16%	14%	19%	21%	23%
Ginlong Solis (China) (锦浪)	2.5%	2.8%	3.5%	4.8%	6.3%	8.1%
Growatt (China) (古瑞瓦特)	2.6%	1.4%	4.5%	5.3%	6.5%	5.7%
Goodwe (China) (固德威)	5.1%	4.0%	2.4%	3.8%	6.2%	5.1%
SMA Solar (Germany)	8.8%	8.1%	8.8%	7.1%	5.6%	3.4%
SolarEdge (US)	3.4%	3.7%	4.7%	3.3%	3.2%	3.2%
Power Electronics (US)	3.0%	6.1%	6.6%	5.4%	5.0%	3.3%
SINENG (China) (上能电气)	4.7%	5.2%	5.3%	4.0%	3.8%	3.1%
Others	53%	53%	50%	47%	43%	45%
Total (GW)	97	104	120	185	225	330
Chinese vendor market share*	80%	73%	73%	78%	84%	93%
China country market share	55%	42%	25%	33%	31%	39%

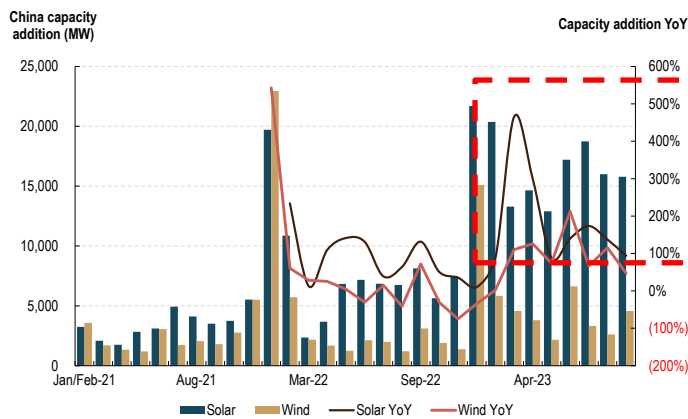
Source: Wood Mackenzie, Blue Lotus (as of November 2, 2023)

Exhibit 6. US solar PV installation service market share



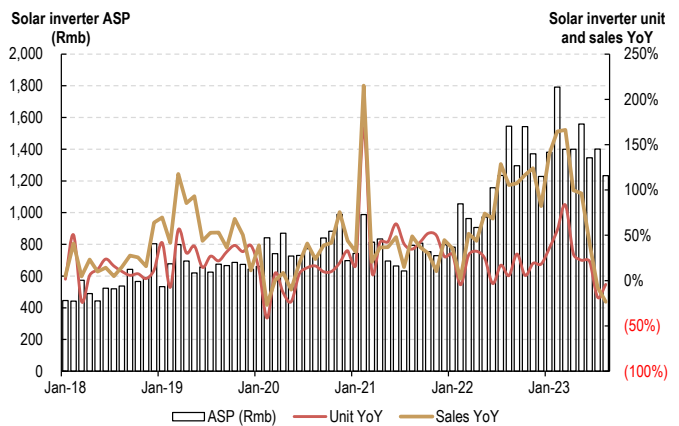
Source: Wood Mackenzie, SEIA (as of November 2, 2023)

Exhibit 7. China's renewable capacity addition



Source: CEA, Blue Lotus (as of November 2, 2023)

Exhibit 8. China's inverter export YoY and ASP trend



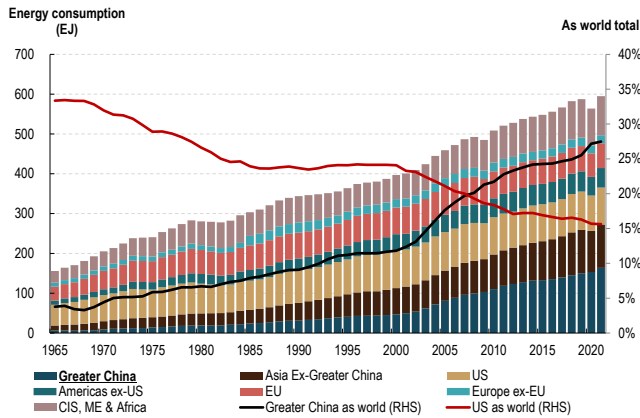
Source: China Customs, Blue Lotus (as of November 2, 2023)

Exhibit 9. China's renewable energy capacity forecast model

	1995	2005	2015	2020	2021	2022	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E
Energy consumption (EJ)	37	76	127	148	158	159	161	164	169	176	182	189	197	204
Energy per capita (GJ)	31	58	91	104	111	112	113	115	119	123	128	133	139	144
Electricity generated (TWh)	5,432	5,794	5,815	7,779	8,534	8,849	9,159	9,566	10,082	10,646	11,238	11,854	12,501	13,173
Electricity as total energy	52%	28%	16%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%	23%
Solar electricity generation (TWh)	0	0.1	39	261	327	428	580	678	790	914	1,049	1,195	1,354	1,526
Wind electricity generation (TWh)	0.6	1.9	186	467	656	763	962	1,076	1,185	1,304	1,433	1,571	1,719	1,877
Solar as electricity	0.0%	0.0%	0.7%	3.4%	3.8%	4.8%	6.3%	7.1%	7.8%	8.6%	9.3%	10.1%	10.8%	11.6%
Wind as electricity	0.0%	0.0%	0.0%	5.4%	6.0%	7.7%	8.6%	10.5%	11.3%	11.8%	12%	13%	13%	14%
Solar capacity (GW)	0	0	44	253	306	393	567	648	740	839	944	1,055	1,172	1,296
Wind capacity (GW)	0	1.1	131	282	329	366	439	472	501	532	564	598	633	670
Solar capacity utilization	0.0%	0.0%	41%	47%	49%	50%	47%	48%	49%	50%	51%	52%	53%	54%
Wind capacity utilization	0.0%	21%	16%	19%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%
Solar capacity growth		64%	77%	24%	21%	28%	44%	14%	14%	13%	13%	12%	11%	11%
Wind capacity growth		NA	62%	35%	17%	11%	20%	7.6%	6.0%	6.2%	6.1%	6.0%	5.9%	5.8%
Reference														
US energy per capita	330	326	286	264	276	284	288	291	292	295	296	299	301	304
Japan energy per capita	171	176	150	137	142	144	145	146	146	147	148	148	149	149
US electricity as total energy	18%	16%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%
Japan electricity as total energy	18%	17%	19%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%

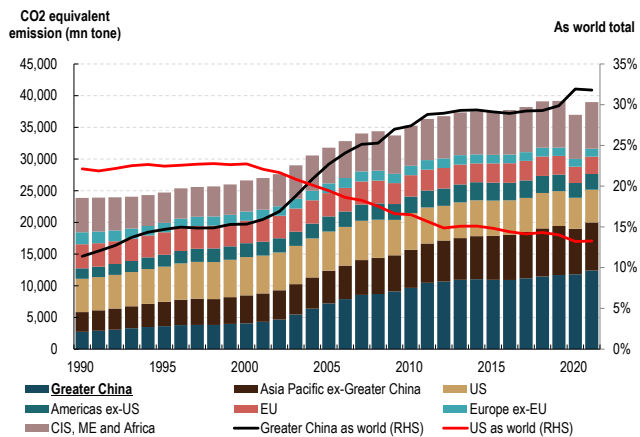
Source: BP, Blue Lotus (2023/11/2), Decade and half-decade growth is per-annual CAGR

Exhibit 10. Global primary energy consumption by country



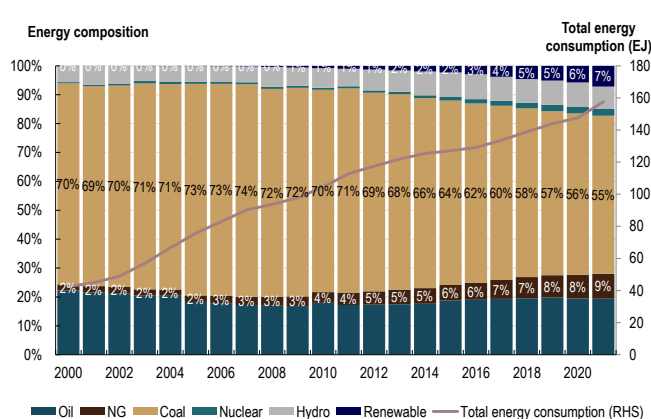
Source: BP, Blue Lotus (2023/11/2). CIS=Commonwealth of Independent States, ME=Middle East, EU=European Union

Exhibit 12. CO₂ equivalent emission by country



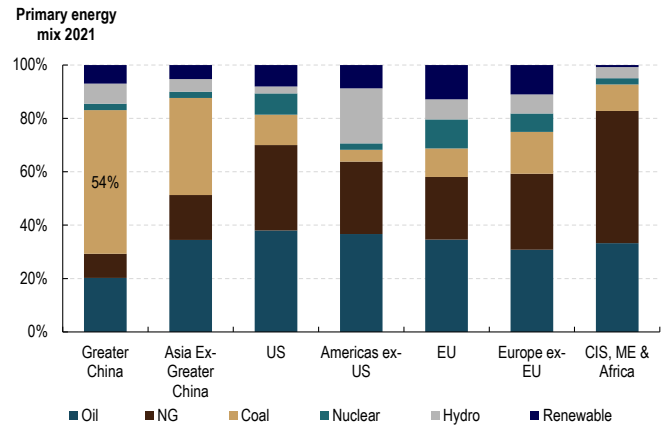
Source: BP, Blue Lotus (2023/11/2). CIS=Commonwealth of Independent States, ME=Middle East, EU=European Union

Exhibit 14. China energy consumption mix evolution



Source: BP, Blue Lotus (2023/11/2)

Exhibit 11. Primary energy mix by geographies, 2021



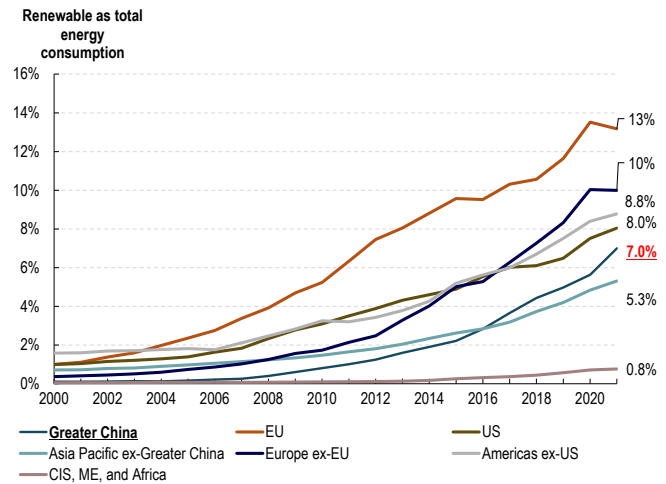
Source: BP, Blue Lotus (2023/11/2), NG=Natural Gas, EJ=Exajoules=10¹⁸ joules

Exhibit 13. Energy mix by geographies, 2020

	Oil	Gas	Coal	Nuclear	Hydro	Renewable
In	Proven reserves			Consumptions		
Greater China	1.5%	4.5%	13%	16%	30%	29%
AP ex-GC	1.1%	4.3%	29%	10%	13%	14%
US	4.0%	6.7%	23%	29%	6.0%	19%
Americas ex-US	29%	5.5%	2.0%	4.6%	25%	11%
EU	0.6%	1.0%	9.0%	27%	13%	20%
Europe ex-EU	0.2%	0.7%	3.8%	4.7%	2.6%	5.0%
CIS, ME, Africa	64%	77%	19%	9.1%	10%	1.9%
Total World	100%	100%	100%	100%	100%	100%
Total by number	244	188	1,074	25	40	40
Physical units	bn tone	tn m ³	bn tone	EJ	EJ	EJ
Convert to EJ	10,528	6,968	32,385	25	40	40

Source: BP, Blue Lotus (2023/11/2), NG=Natural Gas, Conversion factors: 1 tone of coal=0.752 tone of oil, 1 tone of oil=860 m³ of natural gas

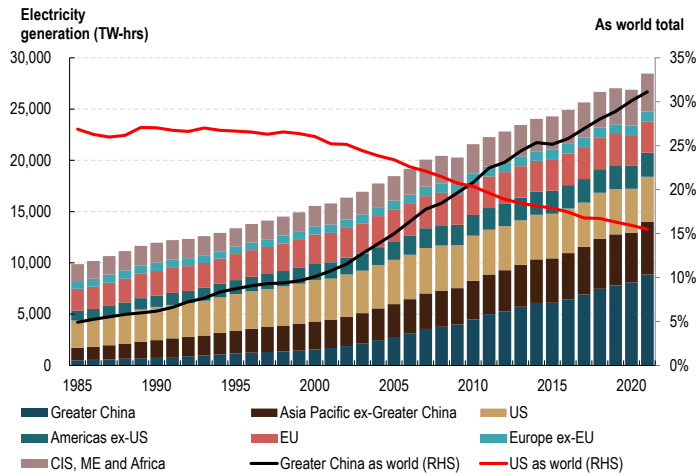
Exhibit 15. Consumption of renewable in the energy mix



Source: BP, Blue Lotus (2023/11/2)

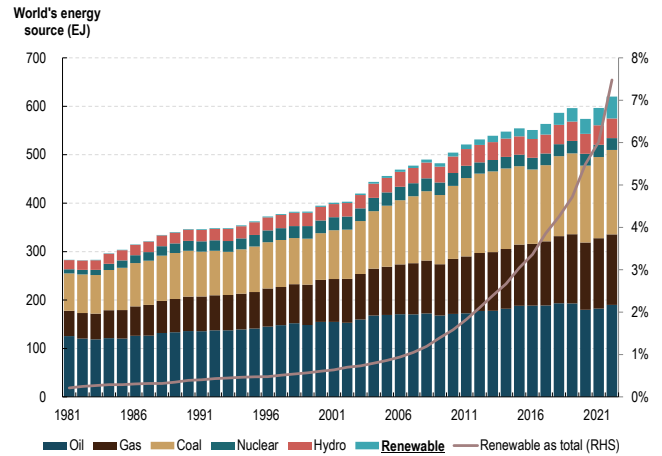
See the last page of the report for important disclosures

Exhibit 16. Electricity generation by geographies



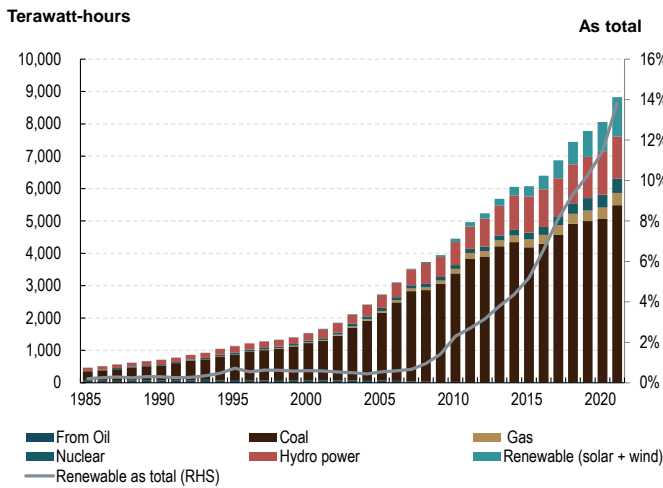
Source: BP, Blue Lotus (2023/11/2). CIS=Commonwealth of Independent States, ME=Middle East, EU=European Union

Exhibit 17. World energy source by type, renewable climbing



Source: BP, Blue Lotus (2023/11/2), NG=Natural Gas

Exhibit 18. China's electricity generation by source



Source: GE, Blue Lotus (2023/11/2)

Exhibit 19. China's capacity installation in 14th and 15th Plan

	2020	2025	2030	2020-25 CAGR	2020-30 CAGR	2015-20 CAGR
Electricity generated (PWh)	2.3	3.3		8.0%		9.4%
Solar		0.74				24%
Wind						
Biofuel & Geothermal	0.18					
Hydro	1.33					3.4%
Capacity installed (GW)	535		1,200		8.4%	25%
Solar		253				42%
Wind		282				17%

Source: NDRC, Blue Lotus (2023/11/1)

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