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INDIA SOLAR COMPASS 2019 Q3

Dire straits

Sentiment gets worse as policy uncertainty and financing woes mount

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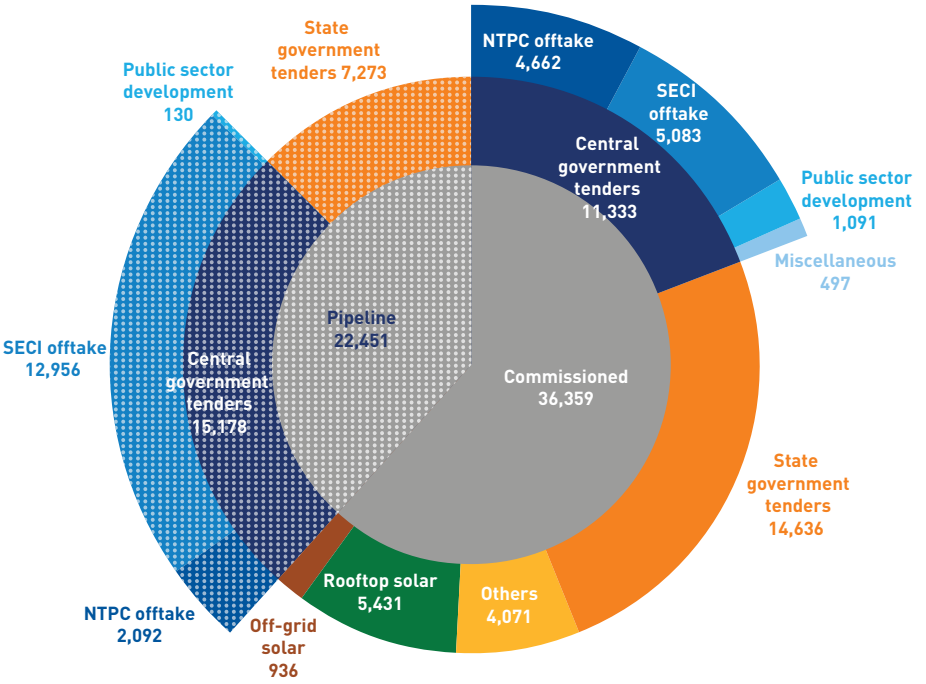
India's total solar capacity grew to 36,359 MW by September 2019

India added 2,205 MW of solar power generation capacity in Q3 2019 taking total installed capacity to 36,359 MW by 30 September 2019. New capacity addition was split 79:21 between utility scale solar (1,734 MW) and rooftop solar (471 MW). Total installed capacity for utility scale projects, rooftop solar and off-grid solar has reached 29,668 MW, 5,431 MW and 935 MW respectively.

Figure: Total installed and pipeline capacity at the end of September 2019, MW

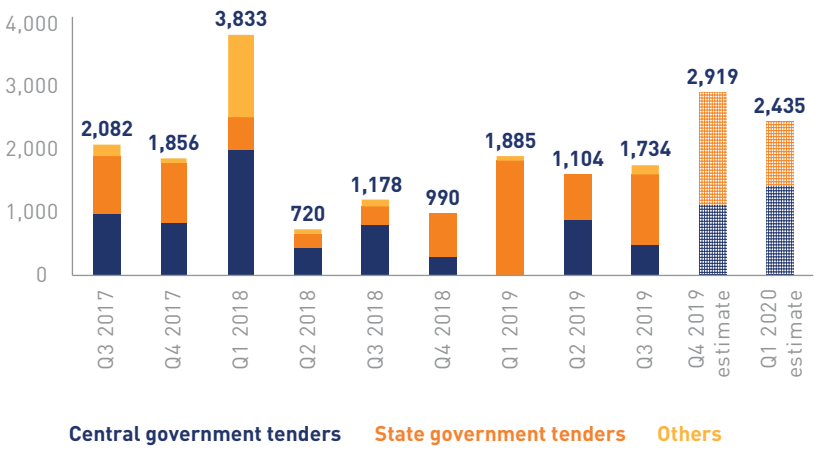


Source: BRIDGE TO INDIA research, MNRE

Notes: 'Others' include projects executed under open access, REC and other miscellaneous categories. All project capacity numbers in this report are stated in AC MW, unless noted explicitly otherwise. For solar-wind hybrid projects, entire capacity is considered as solar capacity in this report.

The trend of slow capacity addition continued in Q3 2019. Actual utility scale capacity addition was 43% below our estimate of 3,034 MW. Delay in land acquisition, transmission system availability and debt financing continue to be major bottlenecks.

Figure: Utility scale solar capacity addition, MW



Source: BRIDGE TO INDIA research

Capacity addition continued to be slow in the quarter and is likely to remain so until safeguard duty expires next year

Installation activity should pick up gradually as 12,249 MW is scheduled to be completed over the next 12 months. But developers are likely to take advantage of expiry of safeguard duty by July 2020 and we expect significant delays in project completion.

Tender issuance has remained strong with new utility scale tenders aggregating 9,807 MW issued in Q3 2019. However, many tenders are getting undersubscribed due to operational challenges, low ceiling tariffs and loss of interest from the developers. Two tenders issued by GUVNL (750 MW and 200 MW) were undersubscribed due to unsuitable site conditions. SECI's 1,200 MW ISTS tender and 2,000 MW PSU tender were also undersubscribed due to low market interest.

Rooftop solar has also slowed down considerably. A combination of unrelated factors including withdrawal of net metering from C&I consumers in many states, general elections in May 2019 and overall macro-economic weakness seem to have put off consumers. Our revised estimate for rooftop solar capacity addition during Q2 and Q3 is 986 MW, down 16% over the corresponding period last year.

Fortunately, capital costs are on the way down again. There was been a 13% reduction in costs across the value chain including modules, inverters and balance of systems (BOS) in comparison to last year.

On the policy front, the government has initiated action on pooling land to develop mega renewable parks in Gujarat and Rajasthan. Recent amendments in bidding guidelines are also favourable for the developers.

It is overall an excruciating time for the industry due to increasing policy uncertainty, delayed payments from DISCOMs and execution delays. Funding environment also remains tight and most developers are struggling to raise debt financing.

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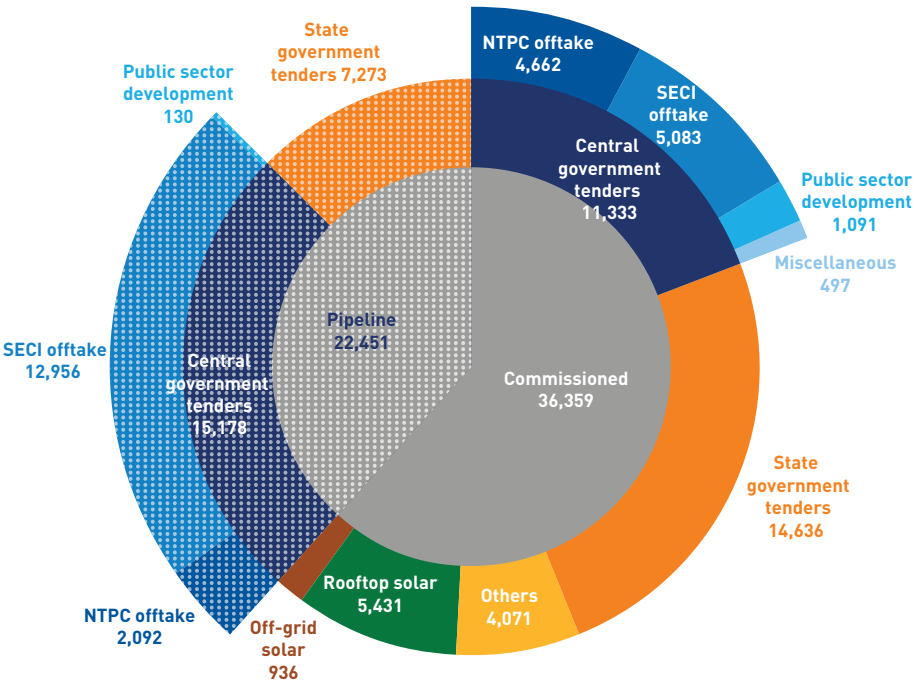
1. Commissioned and pipeline capacity

India added 2,205 MW of solar power generation capacity in Q3 2019 taking total installed capacity to 36,359 MW by 30 September 2019. New capacity addition was split 79:21 between utility scale solar (1,734 MW) and rooftop solar – 471 MW (471 MW). Total utility scale, rooftop solar and off-grid solar capacity stands at 29,668 MW, 5,431 MW and 935 MW respectively.

Total project pipeline – projects allocated to project developers and at various stages of development – stood at 22,451 MW as on 30 September 2019.

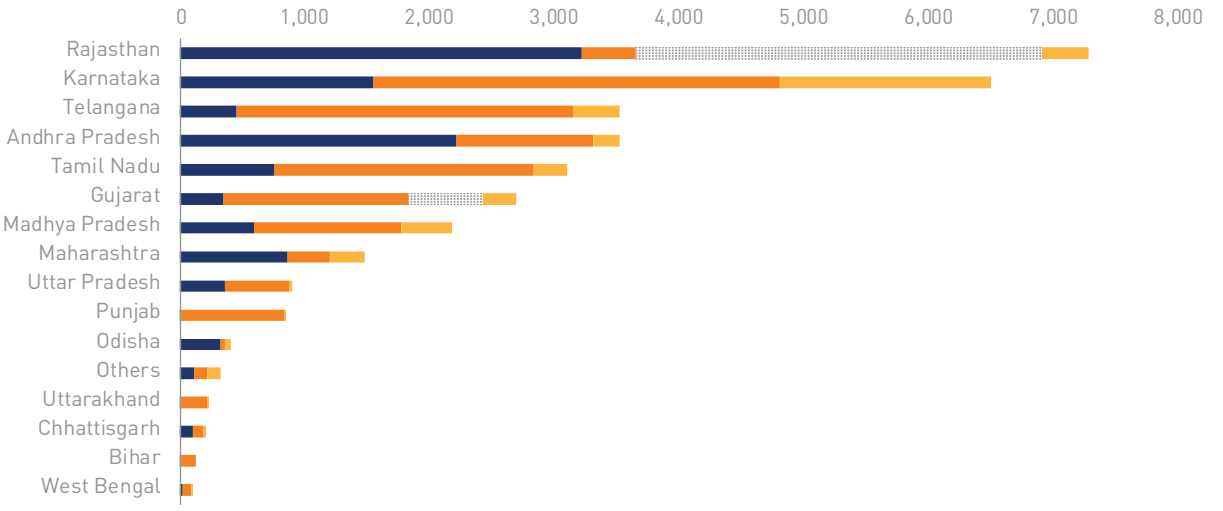
Figure 1.1: Total installed and pipeline capacity as on 30 September 2019, MW



Source: BRIDGE TO INDIA research, MNRE
Notes: 'Others' include projects executed under open access, REC and other miscellaneous categories. All project capacity numbers in this report are stated in AC MW, unless noted explicitly otherwise. For solar-wind hybrid projects, entire capacity is considered as solar capacity in this report.

India added 2,205 MW of solar power generation capacity in Q3 2019 taking total installed capacity to 36,359 MW by 30 September 2019. New capacity addition was split 79:21 between utility scale solar (1,734 MW) and rooftop solar – 471 MW (471 MW). Total utility scale, rooftop solar and off-grid solar capacity stands at 29,668 MW, 5,431 MW and 935 MW respectively.
Total project pipeline – projects allocated to project developers and at various stages of development – stood at 22,451 MW as on 30 September 2019.

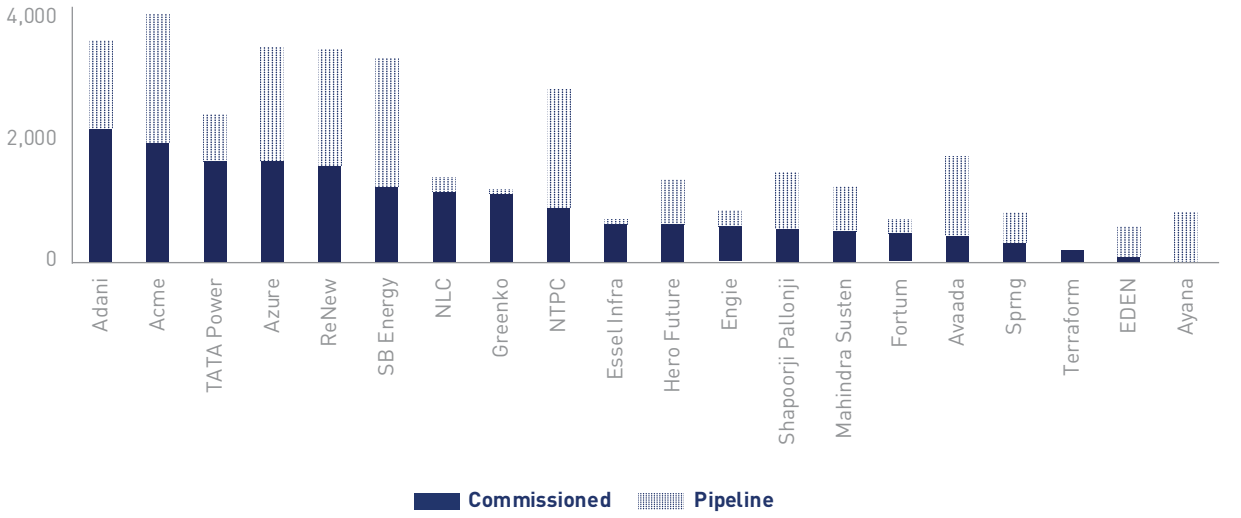
Figure 1.2: State-wise utility scale solar commissioned and pipeline capacity, MW



Source: BRIDGE TO INDIA research
Notes: 'Inter State Transmission System (ISTS)' projects are connected to national grid. These projects are located mainly in Rajasthan and Gujarat, but power would be sold to other states.

Top 20 developers account for 61% of total commissioned capacity and 88% (75% in Q1 2019) of pipeline capacity. Adani is the largest developer with a commissioned capacity of 2,158 MW, closely followed by Acme (1,951) and Tata Power (1,654). SB Energy (2,130 MW), Acme (2,105 MW), ReNew (1,945 MW) and NTPC (1,933 MW) have the largest pipelines of all developers.

Figure 1.3: Top 20 developers by commissioned capacity, MW

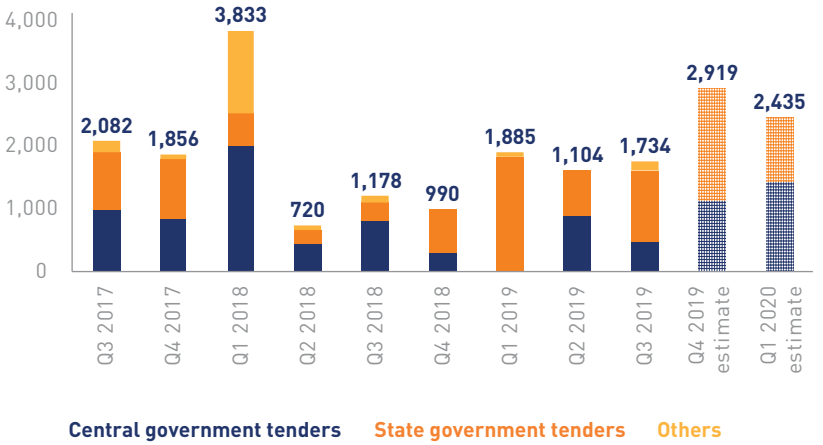


Source: BRIDGE TO INDIA research
Note: Projects are assigned to developers based on current ownership.

2. Capacity addition

1,734 MW of utility scale solar capacity was commissioned across 31 projects in Q3 2019, against our estimate of 3,134 MW. Capacity addition was split between state government tenders (1,159 MW, 67%), central government tenders (473 MW, 27%) and others (102 MW, 6%).

Figure 2.1: Utility scale solar capacity addition by type of tenders, MW

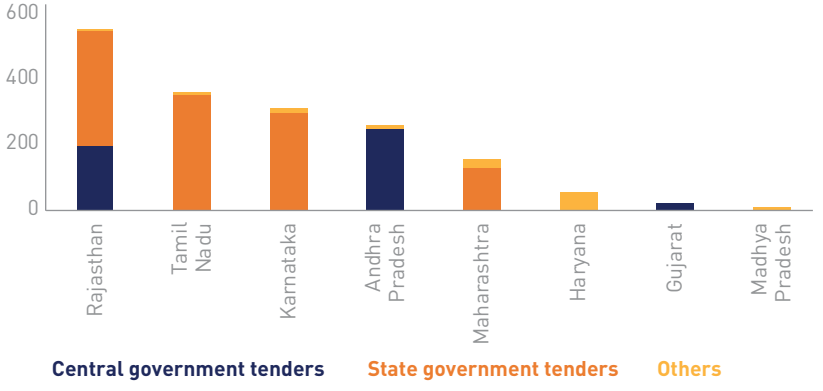


Source: BRIDGE TO INDIA research

2.1 Performance of states

Rajasthan (553 MW) added the highest capacity, followed by Tamil Nadu (363 MW) and Karnataka (313 MW). Andhra Pradesh was a close fourth with 260 MW in the quarter.

Figure 2.2: State-wise utility scale solar capacity addition in Q3 2019, MW



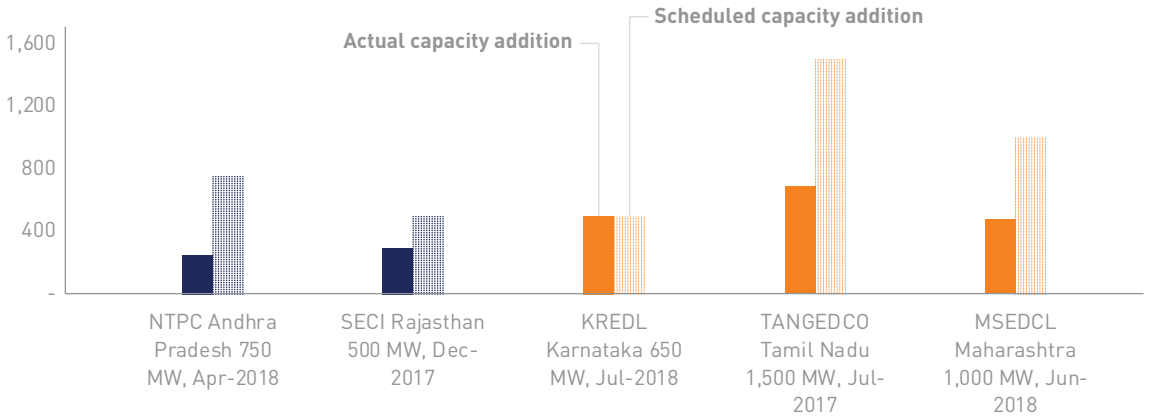
Source: BRIDGE TO INDIA research

2.2 Progress on key projects

Based on commissioning of schedules under different tenders and slippages from previous quarters, 3,134 MW of utility scale solar capacity was scheduled to be commissioned in Q3 2019.

However, due to problems in land acquisition and transmission connectivity, projects were not completed on schedule. Prominent tenders that missed target completion dates include TANGEDCO's 1,500 MW Tamil Nadu tender (59% incomplete), MSEDCL 1,000 MW Maharastra tender (27% incomplete).

Figure 2.3: Capacity addition in Q3 2019 for key tenders, MW



Source: BRIDGE TO INDIA research

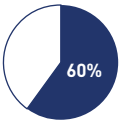
We understand that NLC's 709 MW project under TANGEDCO's 1,500 MW tender (issued in May 2017) was physically complete, but only 358 MW was declared as commissioned by end September 2019.

Commissioning progress

Details of key projects commissioned in the quarter are given below.

NTPC Andhra Pradesh 750 MW, Apr-2018 (Ananthapuram solar park: auction – Apr 2018, COD target – Aug 2019)

SB Energy commissioned 250 MW in September 2019. Remaining 500 MW (Ayana and Sprng, 250 MW each) is expected to be commissioned in Q4 2019.

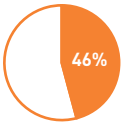


SECI Rajasthan 500 MW tender (Bhadla solar park: auction – Dec 2017, COD target – Aug 2019)

100 MW had been commissioned by SB Energy in Q2 2019. SB Energy and Hero Future each commissioned 100 MW in Q3 2019 on schedule. Hero Future's 200 MW capacity is delayed and is expected to be commissioned in Q4 2019.

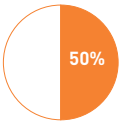
KREDL Karnataka 650 MW tender (Pavagada solar park: auction – July 2018, COD target – Jun 2019)

Only 500 MW capacity was allocated under this tender (Tata Power and Fortum 250 MW capacity each). Fortum commissioned remaining 250 MW in Q3 2019. Tata Power commissioned 250 MW in Q2 2019.



TANGEDCO Tamil Nadu 1,500 MW tender (auction – Jul 2017, COD target – Aug 2019)

330 MW capacity had been commissioned until June 2019. NLC India commissioned 159 MW in Q3 2019 (200 MW in Q2 2019). Remaining capacity (811 MW – ReNew, NLC, Atha group, and Hindustan Clean Power) is expected to be commissioned in next six months.



MSEDCL Maharashtra 1,000 MW tender (auction – Jun 2018, COD target – Aug 2019)

Adani, Azure, Tata Power and JLTM Energy commissioned 200 MW, 130 MW, 150 MW and 20 MW respectively in Q3 2019. Remaining 500 MW (ReNew 250 MW, Acme 250 MW) is expected to be commissioned in Q4 2019.

Other projects

Amplus commissioned a 58 MW open access project in Haryana in Q3 2019.

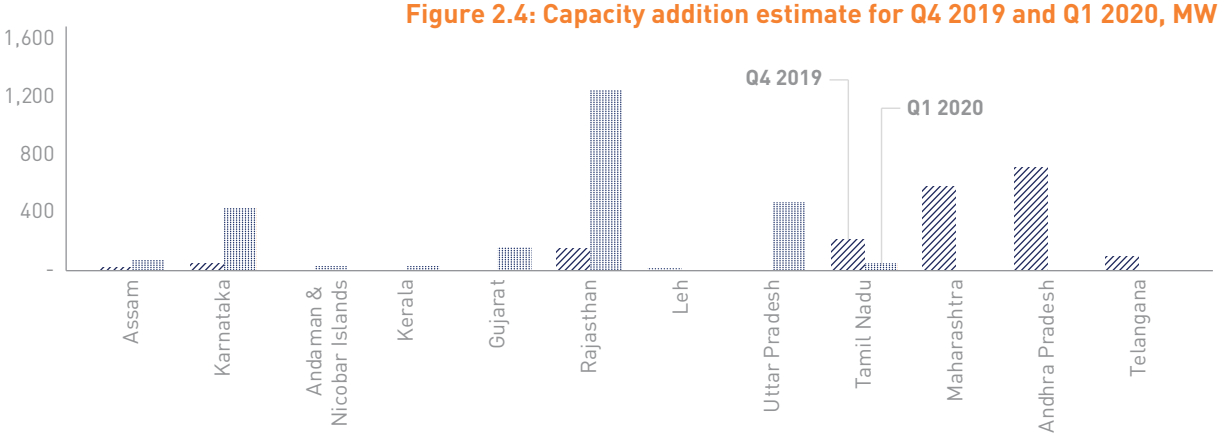
Rooftop solar

We estimate rooftop solar capacity addition of 471 MW in Q3 2019.

2.3 Estimate for next two quarters

Utility scale solar capacity of 2,919 MW and 2,435 MW is due for completion in Q3 and Q4 2019 respectively. We expect significant slippages due to ongoing challenges related to financing land and transmission. Plus, developers are likely to go slow on project execution until after safeguard duty expires in Q2 2020. Maximum capacity addition is expected in Rajasthan (ISTS tenders), Maharashtra and Andhra Pradesh.

Figure 2.4: Capacity addition estimate for Q4 2019 and Q1 2020, MW



Source: BRIDGE TO INDIA research

Rooftop solar

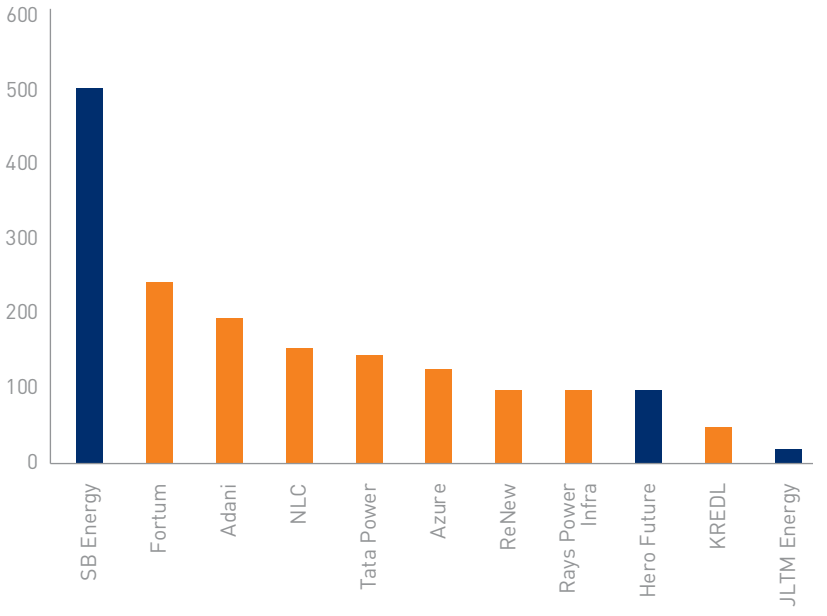
We expect about 350 MW and 520 MW of capacity to be added in Q4 2019 and Q1 2020 respectively.

3. Leading players

3.1 Project developers

SB Energy (350 MW), Fortum (250 MW) and Adani (200 MW) were the leading project developers by capacity commissioned Q3 2019.

Figure 3.1: Leading developers by capacity commissioned in Q3 2019, MW

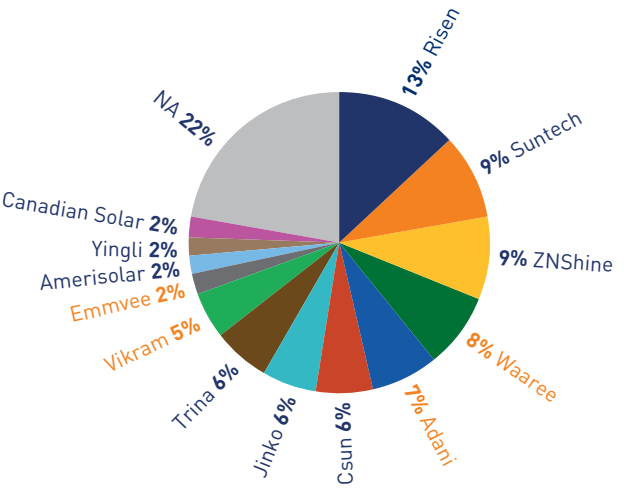


Source: BRIDGE TO INDIA research

3.2 Module suppliers

Risen (300 MW) was the leading module supplier for projects commissioned in Q3 2019. Suntech (210 MW) and ZNShine (195 MW) are the other leading players. Based on the data available, 56% of the modules were supplied by Chinese companies, while 22% were sourced from domestic manufacturers. Domestic module manufacturers' share has been rising steadily, starting from just 6% in Q3 2018 due to safeguard duty and completion of projects with mandatory use of domestically manufactured modules produced panels.

Figure 3.2: Market share of module suppliers for projects commissioned in Q3 2019



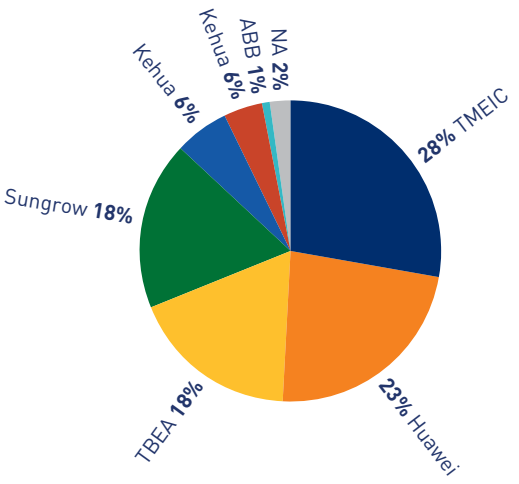
Domestic manufacturer

Source: BRIDGE TO INDIA research
Note: Module market share is calculated for 2,272 MW of DC capacity. Where exact DC capacity is not available, it is assumed to be 1.30 times AC capacity.

3.3 Inverter suppliers

TMEIC was the leading inverter supplier for projects commissioned in Q3 2019 with total share of 487 MW. It was followed by Huawei (400 MW) and TBEA (313 MW).

Figure 3.3: Market share of inverter suppliers for projects commissioned in Q3 2019

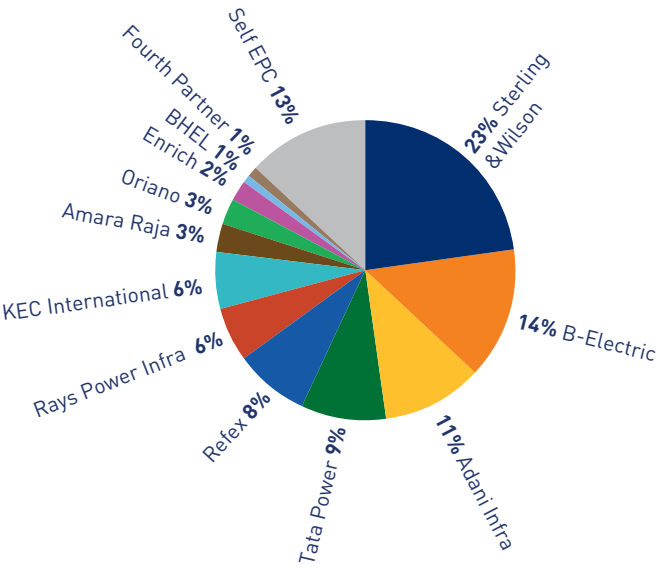


Source: BRIDGE TO INDIA research

3.4 EPC contractors

Sterling & Wilson was the largest EPC contractor (408 MW) by capacity commissioned in Q3 2019. It has maintained its leadership position over the last few quarters. B-Electric (250 MW), Adani (200 MW) and Tata Power (150 MW) were the other leaders in the EPC segment.

Figure 3.4: Market share of EPC contractors in Q1 2019

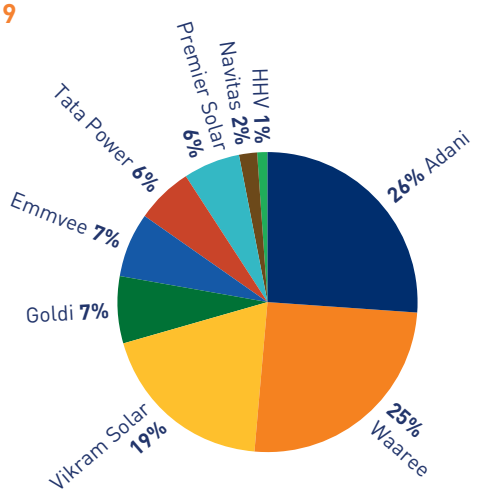


Source: BRIDGE TO INDIA research
Notes: Market share is calculated for 1,734 MW of AC capacity.
Self-EPC denotes projects where EPC work is completed by developers (or their sister companies in-house) that do not undertake any third-party EPC work.

3.5 Domestic manufacturers

Total module production by domestic manufacturers is estimated at 1,077 MW in Q3 2019 (718 MW in Q2 2019). Adani (290 MW), Waaree (276) and Vikram Solar (212) were the largest domestic manufacturers.

Figure 3.5: Market share of domestic module manufacturers in Q3 2019



Source: BRIDGE TO INDIA research

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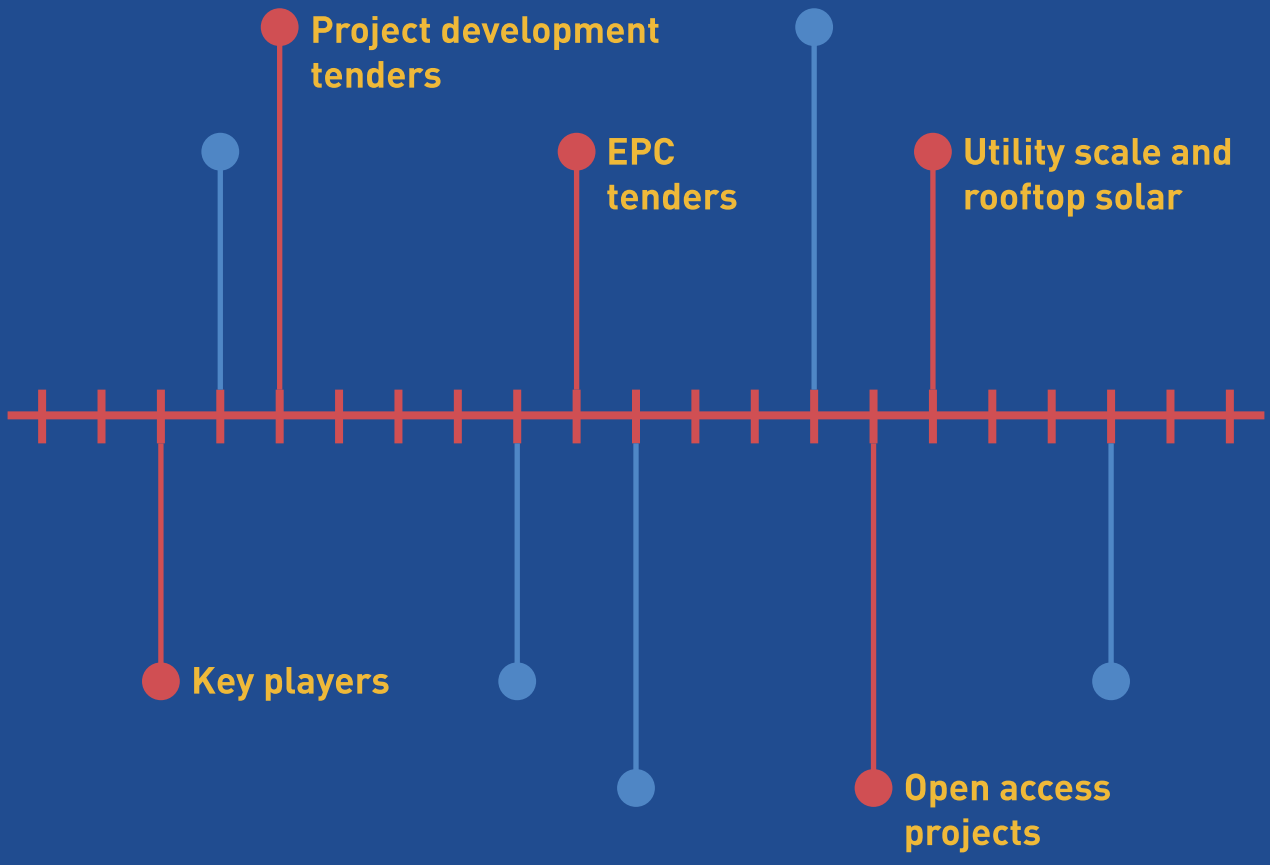

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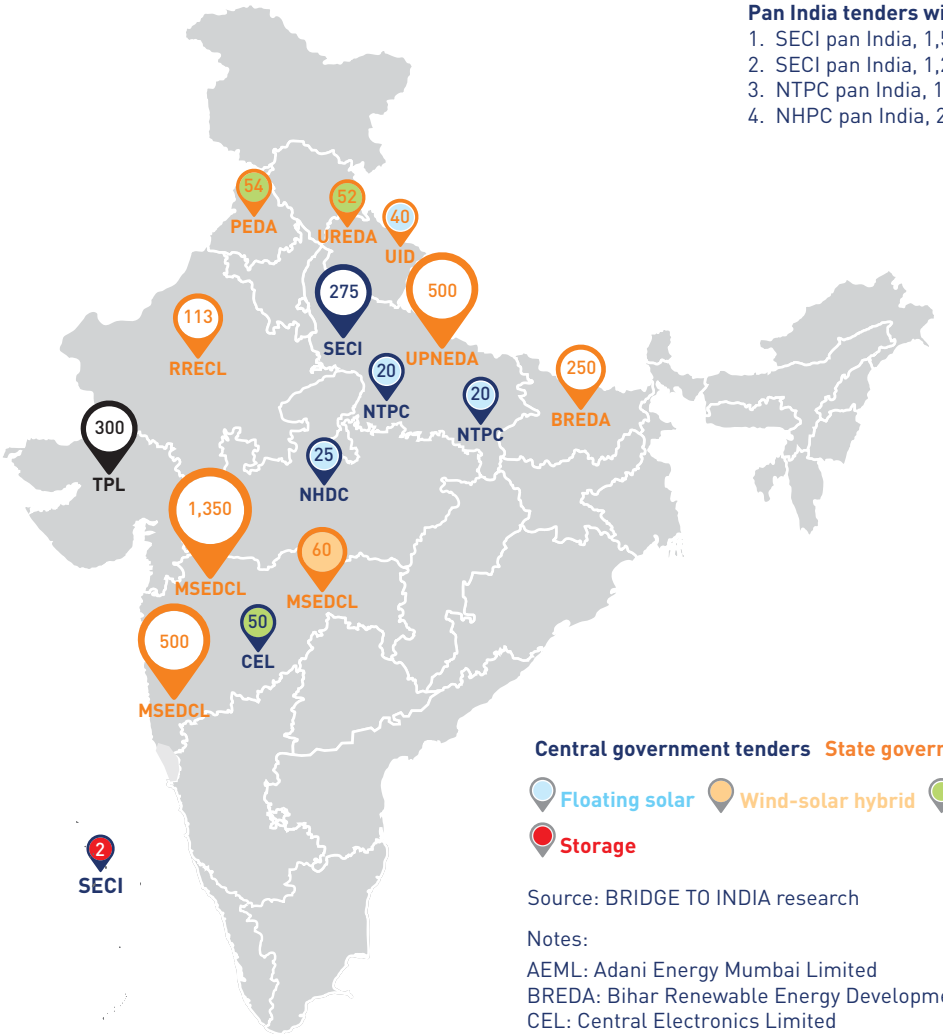
4. Tender progress

4.1 New tender issuance

Utility scale solar

Twenty utility scale solar tenders including 13 ground-mounted PV, 4 floating solar, 2 wind-solar hybrid and one solar-storage hybrid aggregating 9,807 MW capacity were issued in Q3 2019 (down 5% over Q2 2019). Three EPC tenders including 2 ground-mounted PV (45 MW) and one solar-storage tender (1.95 MW + 2.15 MWh storage) were also issued during the quarter.

Figure 4.1: Utility scale solar tenders issued in Q3 2019, MW



Pan India tenders with ISTS connectivity

1. SECI pan India, 1,500 MW
2. SECI pan India, 1,200 MW (storage)
3. NTPC pan India, 1,200 MW
4. NHPC pan India, 2,000 MW

Central government tenders **State government tenders** **Others**

Floating solar Wind-solar hybrid Biomass-solar hybrid

Storage

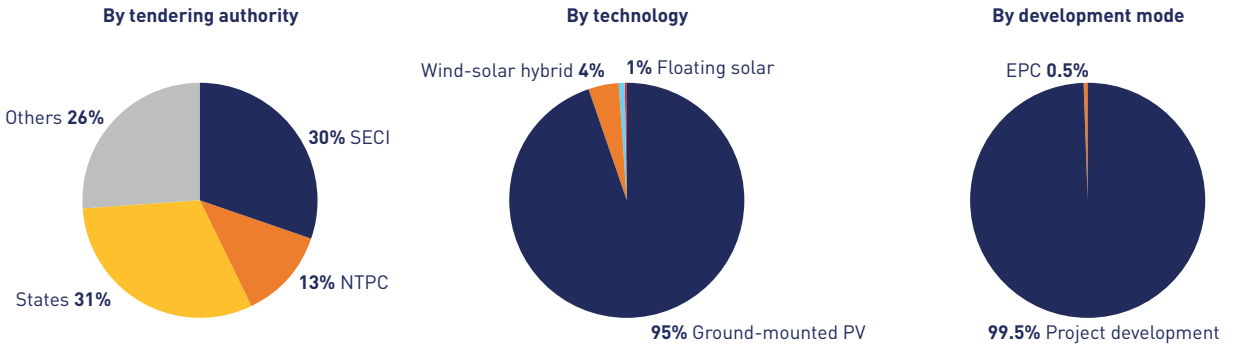
Source: BRIDGE TO INDIA research

Notes:

AEML: Adani Energy Mumbai Limited
BREDA: Bihar Renewable Energy Development Agency
CEL: Central Electronics Limited
MSEDCL: Maharashtra State Electricity Distribution Company Limited
NHDCL: Narmada Hydroelectric Development Corporation Limited
PEDA: Punjab Energy Development Authority
RRECL: Rajasthan Renewable Energy Corporation Limited
TPL: Torrent Power Limited
UID: Uttarakhand Irrigation Department
UPNEDA: Uttar Pradesh Non-conventional Energy Development Agency
UREDA: Uttarakhand Renewable Energy Development Agency

Figure 4.2: Capacity tendered in Q3 2019

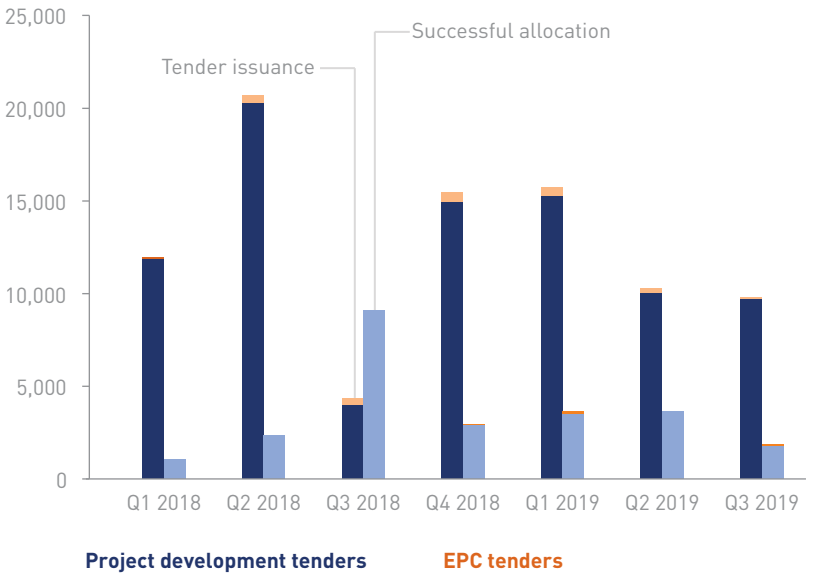
SECI was the most active central agency issuing 2,977 MW of tenders in Q3 2019. Tender issuance activity by states (3,050 MW) was up 62% compared to Q2 2019.



Source: BRIDGE TO INDIA research

Tender allocations slowed down in the quarter at 1,807 MW were down 47% compared to Q2 2019

Figure 4.3: Utility scale tender issuance and auctions, MW



Source: BRIDGE TO INDIA research

Table 4.1: Key details of tenders issued in Q3 2019

Project development tenders

	BREDA Bihar, 250 MW	AEML pan India, 350 MW (wind-solar hybrid)
Tender issue date	July 2019	July 2019
Tendering authority/ Offtaker	BREDA/ Bihar DISCOM	AEML/ AEML
Capacity	250 MW	350 MW
Location	Bihar	Pan India
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	25 – 250 MW	50 – 350 MW
Ceiling tariff	No	No
Financial criteria	1. Minimum net worth of INR 50 million 2. Minimum annual turnover of INR 750 million	Minimum net worth of INR 15 million/ MW
Deposits and bank guarantees	1. Earnest money deposit (EMD) - INR 0.4 million/ MW 2. Performance bank guarantee (PBG) - INR 20 million/ MW	1. EMD - INR 0.5 million/ MW 2. PBG - INR 2.0 million/ MW

	UREDA Uttarakhand, 52 MW	SECI Pan India, 1,500 MW
Tender issue date	July 2019	August 2019
Tendering authority/ Offtaker	UREDA/ Uttarakhand Power Corporation Limited	SECI/ Central and State PSU's
Capacity	52 MW	1,500 MW
Location	Uttarakhand	Pan India
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	VGF bidding (e-auction)
Bid size	5 – 52 MW	1 – 1,500 MW
Ceiling tariff	INR 4.73/ kWh	INR 3.50/kWh
Financial criteria	Minimum net worth of INR 15 million/ MW	1. Minimum net worth of INR 12.5 million/ MW 2. Minimum annual turnover of INR 6.0 million/ MW or PBDIT of INR 1.2 million/ MW
Deposits and bank guarantees	EMD - INR 0.5 million/ MW PBG - INR 0.5 million/ MW	EMD - INR 0.4 million/ MW PBG – 50% of total VGF amount sanctioned

	SECI pan India, 1,200 MW (storage)	TPL Gujarat, 300 MW
Tender issue date	August 2019	August 2019
Tendering authority/ Offtaker	SECI/ SECI	TPL/ TPL
Capacity	1,200 MW	300 MW
Location	Pan India	Pan India
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	50 – 600 MW	50 – 150 MW
Ceiling tariff	No	No
Financial criteria	1. Minimum net worth of INR 10.7 million/ MW 2. Minimum annual turnover of INR 10.2 million/ MW or PBDIT of INR 2.0 million/ MW or line of credit of 2.5 million/ MW	Minimum net worth of INR 15 million/ MW
Deposits and bank guarantees	EMD - INR 0.6 million/ MW PBG - INR 3.0 million/ MW	EMD - INR 1.0 million/ MW PBG - INR 2.5 million/ MW

	NTPC pan India, 1,200 MW	SECI Uttar Pradesh, 275 MW
Tender issue date	August 2019	August 2019
Tendering authority/ Offtaker	NTPC/ NTPC	SECI/ UP DISCOM
Capacity	1,200 MW	275 MW
Location	Pan India	Uttar Pradesh solar park
Solar park availability	No	Yes
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	50 – 600 MW	50 – 275 MW
Ceiling tariff	INR 2.65/ kWh	INR 2.93/ kWh
Financial criteria	1. Minimum net worth of INR 10.7 million/ MW 2. Minimum annual turnover of INR 5.0 million/ MW or PBDIT of INR 1.0 million/ MW	i. Minimum net worth of INR 10.7 million/ MW ii. Minimum annual turnover of INR 5.0 million/ MW or PBDIT of INR 1.0 million/ MW
Deposits and bank guarantees	EMD - INR 0.4 million/ MW PBG - INR 2.0 million/ MW	EMD - INR 0.4 million/ MW PBG - INR 1.6 million/ MW

	UID Uttarakhand, 40 MW (floating solar)	NHPC Pan India, 2,000 MW
Tender issue date	August 2019	August 2019
Tendering authority/ Offtaker	UID/ Uttarakhand Power Corporation Limited	NHPC/ NHPC
Capacity	40 MW	2,000 MW
Location	Uttarakhand	Pan India
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	40 – 40 MW	50 – 2,000 MW
Ceiling tariff	No	INR 2.95/ kWh
Financial criteria	1. Minimum net worth of INR 6.8 million/ MW 2. Minimum annual turnover of INR 805 million	1. Minimum net worth of INR 10 million/ MW 2. Minimum annual turnover of INR 5.0 million/ MW or PBDIT of INR 1.0 mi llion/ MW or line of credit of 1.25 million/ MW
Deposits and bank guarantees	EMD - INR 0.8 million/ MW PBG - INR 0.8 million/ MW	EMD - INR 1.0 million/ MW PBG - INR 2.5 million/ MW

	MSEDCL Maharashtra, 500 MW	MSEDCL Maharashtra, 1,350 MW
Tender issue date	August 2019	August 2019
Tendering authority/ Offtaker	MSEDCL/ Maharashtra DISCOM	MSEDCL/ Maharashtra DISCOM
Capacity	500 MW	1,350 MW
Location	Pan India	Various sub stations in Maharashtra
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	5 – 500 MW	25 – 50 MW
Ceiling tariff	INR 2.80/ kWh	INR 3.15/ kWh
Financial criteria	1. Minimum net worth of INR 5.5 million/ MW 2. Minimum annual turnover of INR 2.5 million/ MW or PBDIT of INR 1 million/ MW or line of credit of 1.25 million/ MW	1. Minimum net worth of INR 5.2 million/ MW 2. Minimum annual turnover of INR 2.5 million/ MW or PBDIT of INR 1.0 million/ MW or line of credit of 1.25 million/ MW
Deposits and bank guarantees	EMD - INR 0.5 million/ MW PBG - INR 1.4 million/ MW	EMD - INR 0.5 million/ MW PBG - INR 2.0 million/ MW

	MSEDCL Maharashtra, 60 MW (wind solar hybrid)	RRECL Rajasthan, 113.5 MW
Tender issue date	August 2019	September 2019
Tendering authority/ Offtaker	MSEDCL/ Maharashtra DISCOM	RRECL/ Rajasthan DISCOM
Capacity	60 MW	113.5 MW
Location	Beed district, Maharashtra	Various sub stations within Maharashtra
Solar park availability	No	No
Allocation basis	Tariff bidding (e-auction)	Tariff bidding (e-auction)
Bid size	5 – 60 MW	0.5 – 2 MW
Ceiling tariff	INR 2.80/ kWh	No
Financial criteria	Minimum net worth of INR 9.5 million/ MW	Minimum net worth of INR 10.0 million/ MW
Deposits and bank guarantees	EMD - INR 1.0 million/ MW PBG - INR 2.0 million/ MW	EMD - INR 0.5 million/ MW PBG - INR 1.0 million / MW

	UPNEDA Uttar Pradesh, 500 MW
Tender issue date	September 2019
Tendering authority/ Offtaker	UPNEDA/ UPPCL
Capacity	500 MW
Location	Uttar Pradesh
Solar park availability	No
Allocation basis	Tariff bidding (e-auction)
Bid size	5 – 500 MW
Ceiling tariff	INR 3.25/ kWh
Financial criteria	Minimum net worth of INR 6.8 million/ MW
Deposits and bank guarantees	EMD - INR 0.7 million/ MW PBG - INR 1.7 million/ MW

EPC tenders

	NTPC Uttar Pradesh, 20 MW (floating solar)	NHDCL Madhya Pradesh, 25 MW (floating solar)
Tender issue date	July 2019	July 2019
Tendering authority/ Offtaker	NTPC/ NTPC	NHDCL/ UPPCL
Capacity	20 MW	25 MW
Location	Rihand dam, Uttar Pradesh	Omkareshwar reservoir in Madhya Pradesh
Tender scope	EPC and O&M	EPC and O&M for five years
Allocation basis	EPC and O&M price bid	EPC and O&M price bid
Solar park availability	No	No
Bid size	20 MW	25 MW
Benchmark cost	No	No
Financial criteria	NA	Minimum annual turnover of INR 2.6 billion
Deposits and bank guarantees	NA	EMD - INR 15 million PBG - 5% of contract value

	SECI Lakshadweep, 1.95 MW (with 2.15 MWh storage)	CEL Maharashtra, 50 MW
Tender issue date	September 2019	September 2019
Tendering authority/ Offtaker	SECI/ Lakshadweep DISCOM	CEL/ Maharashtra DISCOM
Capacity	1.95 MW	50 MW
Location	Lakshadweep	
Tender scope	EPC and O&M for ten years	EPC and O&M for ten years
Allocation basis	EPC and O&M price bid	EPC and O&M price bid
Solar park availability	No	No
Bid size	1.95 MW	1 – 10 MW
Benchmark cost	No	No
Financial criteria	1. Positive net worth 2. Minimum annual turnover of INR 76.8 million or working capital of INR 49.1 million	Minimum cumulative turnover of INR 120 million in last 3 financial years
Deposits and bank guarantees	EMD - INR 3.9 million	EMD - INR 1.0 million/ MW PBG - 10% of contract value

Rooftop solar tenders (capacity > 5 MW)

Seven rooftop tenders (total 126 MW) were issued in Q3 2019 (21.5 MW in Q2 2019).

Table 4.2: Rooftop solar tenders issued in Q3 2019

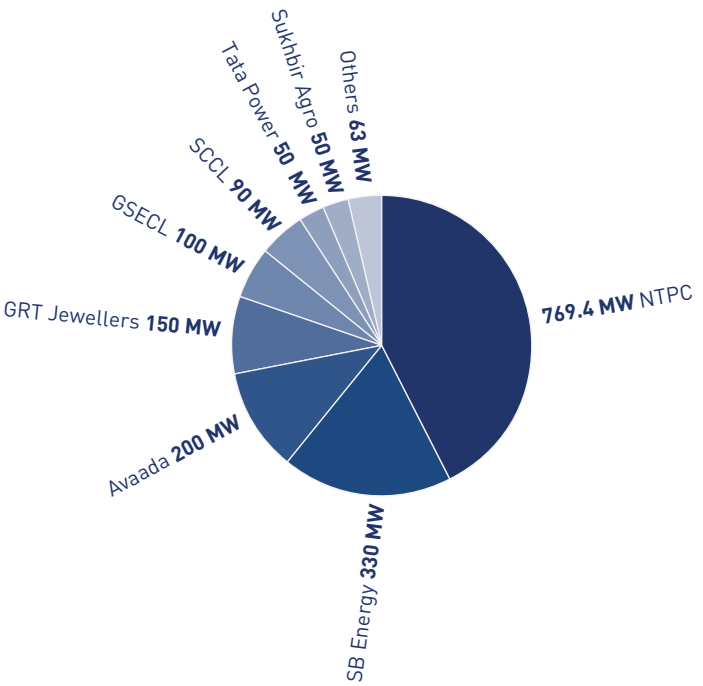
Issuing authority	State	Capacity (MW)	Project type
RRECL	Rajasthan	50	OPEX
UPNEDA	Uttar Pradesh	25	OPEX
MPUVNL	Madhya Pradesh	18	OPEX
NREDCAP	Andhra Pradesh	15	OPEX
AEDA	Assam	8	CAPEX
TSREDCL	Telangana	5	CAPEX
APDCL	Assam	5	CAPEX

Source: BRIDGE TO INDIA research

4.2 Auction results

Successful auctions were held for five project development tenders and two EPC tenders (total capacity 1,897 MW, down 48% over Q2 2019) in Q3 2019. NTPC, SB Energy, and Avaada together won 72% of the awarded capacity.

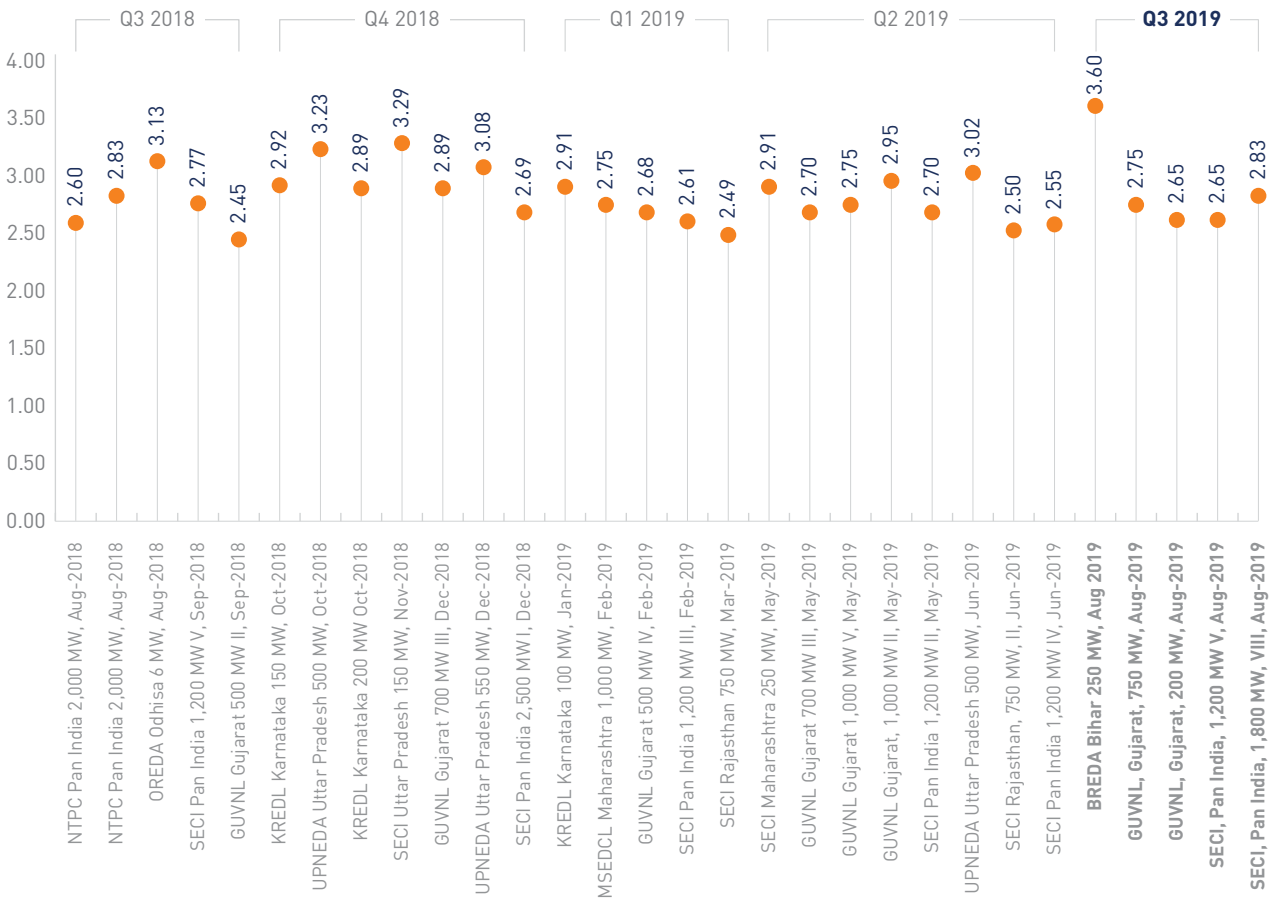
Figure 4.4: Project development capacity allocation, MW



Source: BRIDGE TO INDIA research

Tenders are undersubscribed due to various issues related to connectivity, land availability and low ceiling tariff. Tenders issued by GUVNL (750 MW and 200 MW) were undersubscribed due to unsuitable land. SECI's 1,200 MW ISTS and 2,000 MW PSU tenders were also undersubscribed due to low market interest.

Figure 4.5: Auction results, INR/ kWh



Source: BRIDGE TO INDIA research

BREDA Bihar 250 MW tender (auction date: 19 August 2019)

The projects were successfully bid by Sukhbir Agro (50 MW, INR 3.58/ kWh), and Avaada (200, 3.60) but tariff was reduced to INR 3.45/ kWh after post-auction negotiations.

GUVNL Gujarat 750 MW tender (Dholera solar park, auction date: 21 August 2019)

The tender was undersubscribed with only 50 MW of capacity awarded to Tata Power at INR 2.75/ kWh. This was despite GUVNL reducing solar park charges by 47% as the ceiling tariff (INR 2.75/ kWh) was perceived to be too low by developers.

GUVNL Gujarat 200 MW tender (Raghanesda solar park, auction date: 21 August 2019)

The tender was undersubscribed and only 100 MW capacity was awarded to Gujarat State Electricity Corporation Limited (GSECL) at INR 2.65/ kWh. Solar park charges for this tender were also lowered by 47%, but developer interest was subdued due to low ceiling tariff (INR 2.65/ kWh).

SECI pan India 1,200 MW tender (auction date: 28 August 2019)

Bids were submitted for only 600 MW capacity and the auction was conducted for 480 MW. The projects were allocated to SB Energy (330 MW, INR 2.65/ kWh) and GRT Jewellers (150, 2.53).

SECI pan India 2,000 MW tender, (PSU scheme) (auction date: 26 September 2019)

Auction was conducted for only 922 MW. The projects were allocated to NTPC (769 MW, VGF of INR 7.00 million/ MW), SCCL (90, 6.00), Assam Power Distribution (30, 6.80), NHDC (25, 5.50), Nalanda University (5, 6.99) and DMRC (3, 6.97).

NTPC floating solar EPC tenders

TATA Power (70 MW) and BHEL (25 MW) won EPC contracts in Kerala and Andhra Pradesh respectively under two separate tenders.

4.3 Tenders pending allocation

58 utility scale tenders with a total capacity of 29,952 MW were pending allocation as on 30 September 2019.

Table 4.3: Tenders pending allocation

Tendering authority	Capacity, MW	Date of tender issuance	Location	Solar park availability
Project development tenders				
SECI	7,500	Q4 2018	Jammu & Kashmir	No
	6,000 (Manufacturing-linked)	Q2 2019	Pan India (ISTS)	No
	1,200	Q2 2019	Pan India (ISTS)	No
	500	Q2 2019	Tamil Nadu	No
	2	Q2 2019	Jammu & Kashmir	No
	1,500	Q3 2019	Pan India (ISTS)	No
	1,200	Q3 2019	Pan India (ISTS)	No
	275	Q3 2019	Uttar Pradesh	Yes
NTPC	8	Q1 2018	Andaman & Nicobar Islands	No
	1,200	Q4 2018	Pan India (ISTS)	No
	1,200	Q3 2019	Pan India (ISTS)	No
	20	Q3 2019	Uttar Pradesh	No
MAHAGENCO	750	Q2 2018	Maharashtra	No
	100	Q4 2018	Maharashtra	No
MSEDCL	100	Q1 2019	Maharashtra	No
	1,350	Q3 2019	Maharashtra	No
	500	Q3 2019	Maharashtra	No
	60	Q3 2019	Maharashtra	No
REMCL	50	Q3 2018	Chhattisgarh	No
	140	Q2 2019	Gujarat, Karnataka and Madhya Pradesh	No

Tendering authority	Capacity, MW	Date of tender issuance	Location	Solar park availability
NHPC	2,000	Q3 2019	Pan India (ISTS)	No
Railway Energy Management Company Limited	113.5	Q3 2019	Rajasthan	No
AEML	350	Q1 2019	Maharashtra	No
	350	Q3 2019	Maharashtra	No
UID	40	Q1 2019	Uttarakhand	No
	40	Q3 2019	Uttarakhand	No
Haryana Power Generation Corporation Limited	10	Q1 2019	Haryana	No
UREDA	200	Q1 2019	Uttarakhand	No
MAHAGENCO	184	Q1 2019	Maharashtra	No
PEDA	54	Q2 2019	Punjab	No
APGENCO	10	Q2 2019	Andhra Pradesh	No
TPL	300	Q3 2019	Gujarat	No
UPNEDA	500	Q3 2019	Uttar Pradesh	No
UREDA	52	Q3 2019	Uttarakhand	No
Sub-total	**28,859**			

Tendering authority	Capacity, MW	Date of tender issuance	Location	Solar park availability
EPC tenders				
SECI	10	Q2 2018	Karnataka	No
	50	Q1 2019	Kerala	Yes
	1.95	Q3 2019	Lakshadweep	No
NTPC	22	Q2 2018	Uttar Pradesh	No
	21	Q2 2018	Gujarat	No
	15	Q2 2018	Telangana	No
	174	Q4 2018	Karnataka	No
	100	Q4 2018	Telangana	No
	20	Q4 2018	Uttar Pradesh	No
	20	Q1 2019	Rajasthan	No
	15	Q1 2019	Himachal Pradesh	No
CEL	100	Q2 2018	Maharashtra	No
	50	Q3 2018	Maharashtra	No
	11	Q1 2019	Maharashtra	No
	50	Q3 2019	Maharashtra	No
Indian Oil Corporation	5	Q3 2018	Rajasthan	No
Tirupati Smart City Corporation	4	Q3 2018	Andhra Pradesh	No
Greater Visakhapatnam Smart City Corporation	15	Q4 2018	Andhra Pradesh	No
Vijayawada Municipal Corporation	15	Q4 2018	Andhra Pradesh	No

Tendering authority	Capacity, MW	Date of tender issuance	Location	Solar park availability
KREDL	50	Q4 2018	Karnataka	Yes
NHPC	32	Q4 2018	Uttar Pradesh	No
	40	Q2 2019	Odisha	No
MAHAGENCO	138	Q1 2019	Maharashtra	No
NHDCL	25	Q3 2019	Madhya Pradesh	No
Sub-total	**1,094**			
Total	**29,952**			

Source: BRIDGE TO INDIA research

4.4 Tender cancellations

SECI's 160 MW wind-solar-storage hybrid tender by the state.

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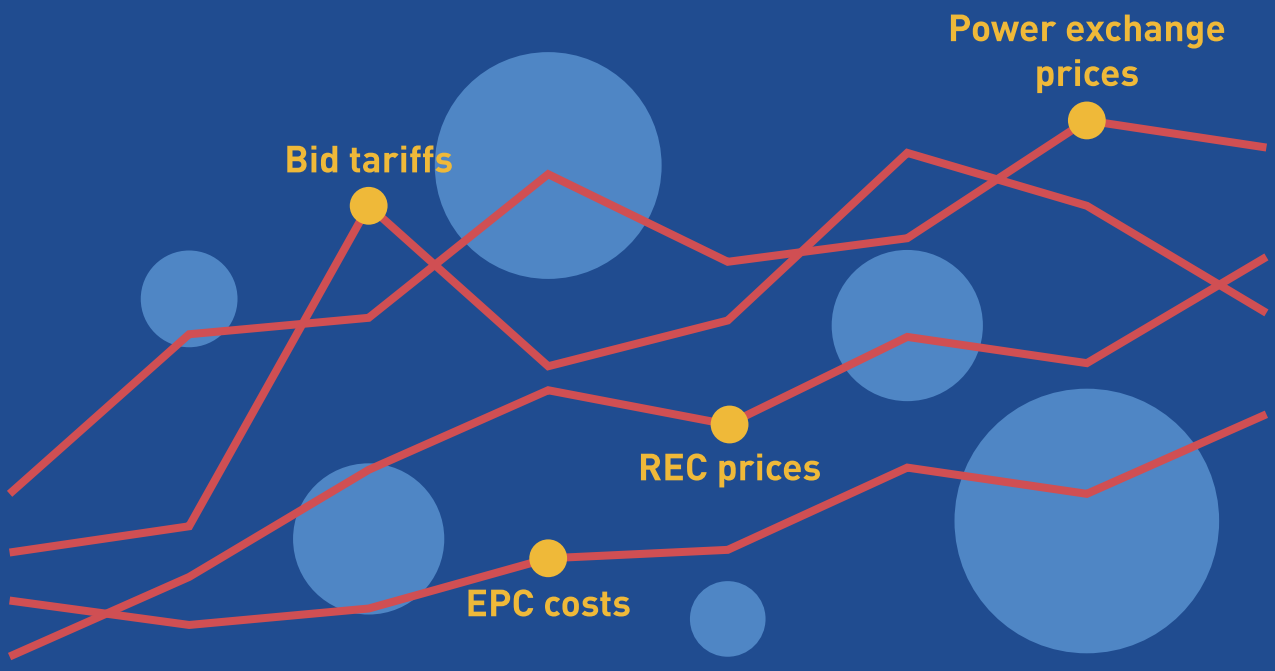

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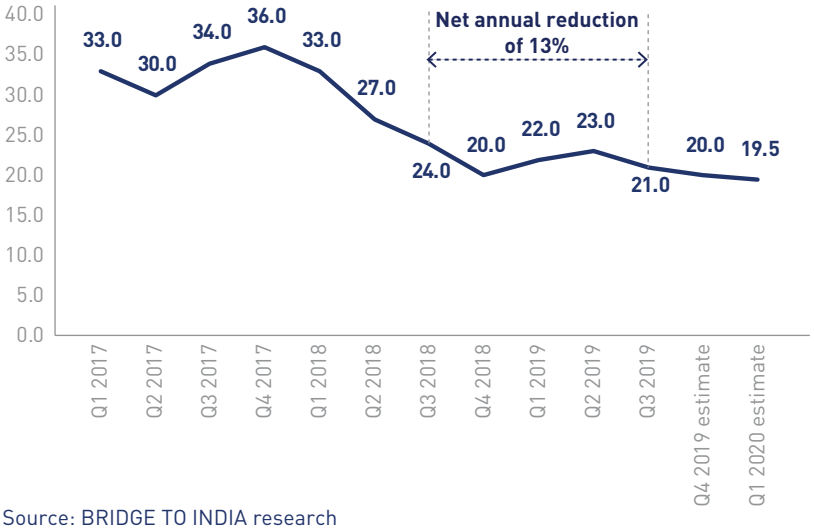
5. Pricing

5.1 Modules

Module prices dropped to USD 0.21/ Wp during the quarter, a reduction of 13% y-o-y. Slowdown in capacity addition in China has led to decline in module prices. We expect module prices to dip further over the next two quarters.

Figure 5.1: BTI India Module Price Index, US cents/ W



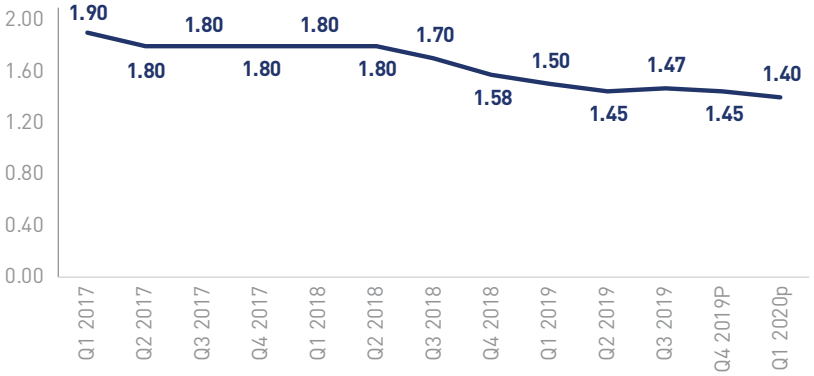
Source: BRIDGE TO INDIA research

Note: These prices are for imported multi-crystalline modules on a CIF basis before any local tax or duty.

5.2 Inverters

Inverter prices marginally rose marginally to INR 1.47/ W in Q3 2019 but are expected to reduce by 5% over the next two quarters.

Figure 5.2: BTI India Solar Inverter Price Index, INR/ W



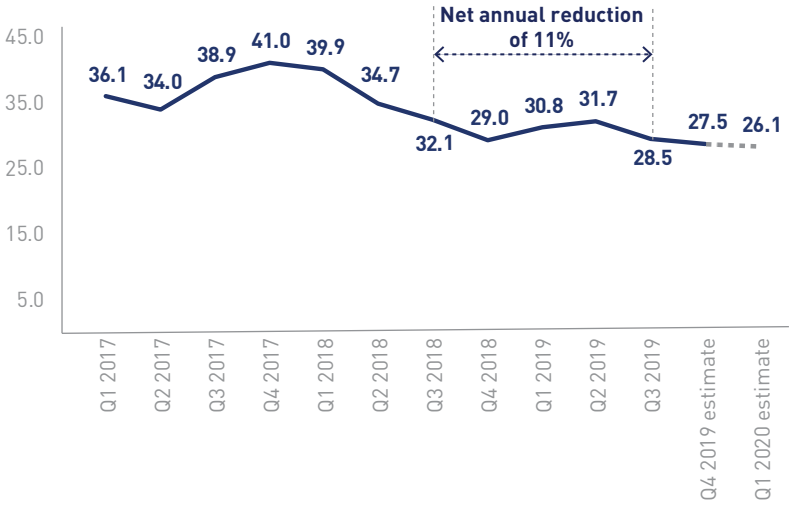
Source: BRIDGE TO INDIA research

Note: These prices are before any local tax or duties.

5.3 EPC cost

EPC cost for utility scale projects fell to INR 29/ Wp (10% drop from Q2 2019) mainly due to falling equipment cost and lower safeguard duty. Reducing safeguard duty and falling BOS prices are expected to push total EPC cost down further over the next two quarters.

Figure 5.3: BTI India Solar EPC Cost Index, INR/ Wp

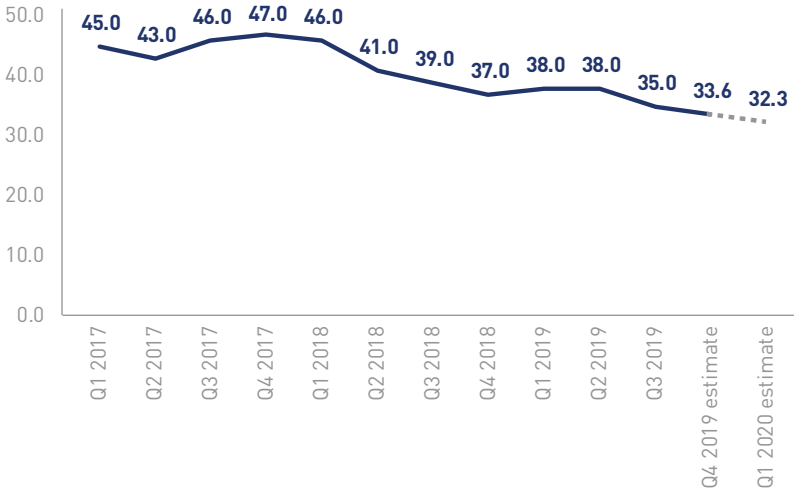


Source: BRIDGE TO INDIA research

Note: EPC cost includes GST and safeguard duty, as applicable in each quarter.

Average EPC cost for rooftop solar dipped to INR 35/ Wp (down 8% over Q2 2019). We expect EPC cost to drop over the next two quarters due to falling module and inverter prices, as well as a reduction in safeguard duty.

Figure 5.4: BTI India Rooftop Solar EPC Cost Index, INR/ Wp



Source: BRIDGE TO INDIA research

Note: EPC cost includes GST and safeguard duty, as applicable in each quarter.

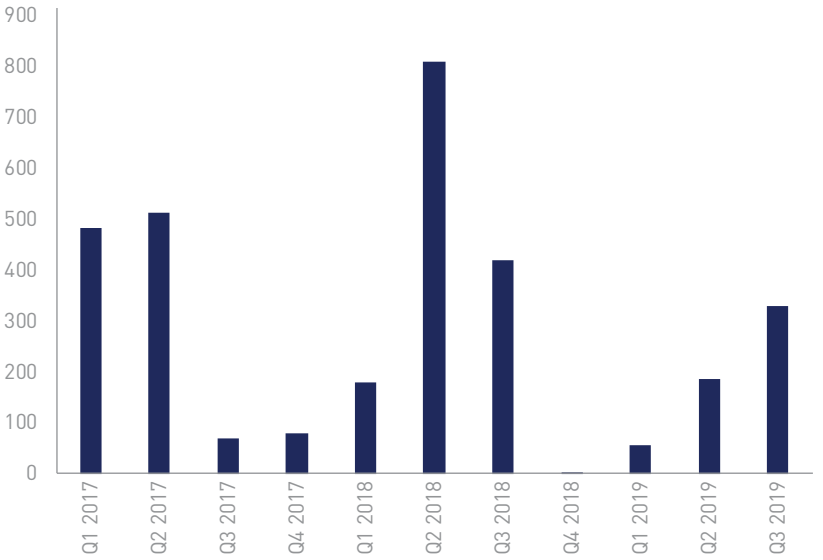
6. Funding

6.1 Equity funding

Private equity (PE)

There was only one major deal announced in the quarter. GIC and Abu Dhabi Investment Authority (ADIA) invested a further USD 329 million in Greenko, in addition to USD 495 million invested Q2 2019.

Figure 6.1: PE fund flow in the Indian solar sector, USD million



Source: BRIDGE TO INDIA research

Table 6.1: PE transactions in the sector

Company	Investor	Amount, USD million	Quarter
SolarArise	Thomas Lloyd	NA	Q4 2018
Freyr Energy Services Ltd.	C4D Partners	3.81	Q4 2018
Avaada Energy	ADB	50	Q1 2019
ZunRoof	Livspace, Intelle Grow	NA	Q1 2019
ZunRoof	Godrej	1.2	Q1 2019
Cleantech project SPV	Exide	2.8 (30% STAKE)	Q1 2019
Cleanmax Solar	United Kingdom Climate Investments LLP	39	Q2 2019
Avaada Energy	ADB, DEG, FMO	144	Q2 2019
AMP Solar project SPV	Cipla	1.85 (26% stake)	Q2 2019
Greenko	GIC, ADIA	329	Q3 2019

Source: BRIDGE TO INDIA research

Mezzanine capital

There was no mezzanine deal in Q3 2019.

Initial public offerings (IPO)

Sterling & Wilson launched the first major renewable energy IPO in many years. The company was intending to raise INR 31.25 billion (USD 440 million) from the markets, but the offer saw only 85% subscription due to weak market conditions, and high perceived valuation. The stock opened on a weak note and ended at INR 726 on opening day compared to its issue price of INR 780. It ended the quarter down by 10% and continues to trade below offer price.

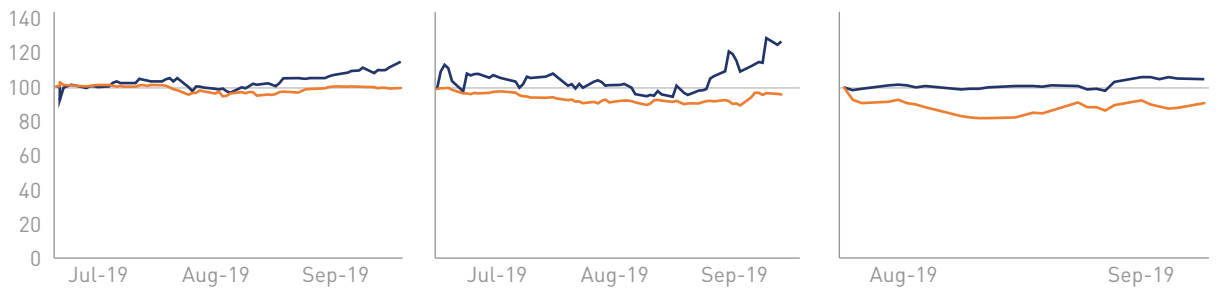
Gensol Engineering, an engineering services company, raised INR 170 million (USD 2.4 million) from the markets for a 25% stake sale. The offer was oversubscribed 1.25 times. The listing date for the stock is 15 October 2019.

Energy Efficiency Services Ltd. (EESL) is also planning to raise INR 50 billion (USD 705 million) through the IPO route in early 2020.

Capital markets

Among the listed IPPs, Azure traded broadly in line with its benchmark index but started rising above the benchmark index towards the middle of the quarter. It ended the quarter 14% higher in absolute terms. Adani Green traded above its benchmark throughout the quarter and ended the quarter 28% higher than at the beginning of the quarter.

Figure 6.2. Renewable stock trading pattern vs indices



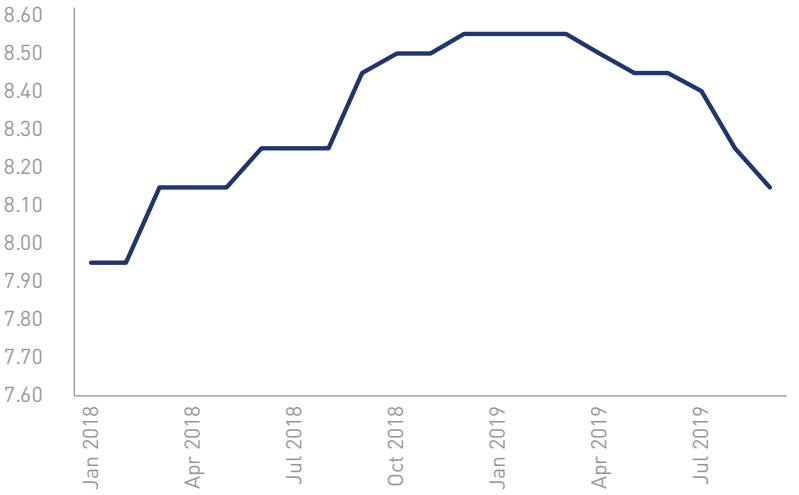
Source: BRIDGE TO INDIA research, www.investing.com

6.2 Debt funding

State Bank of India cut its marginal cost of funds-based lending rate (MCLR) thrice in the quarter, by five, fifteen and ten basis points to 8.15% by the end of the quarter.

Solar projects can raise up to 20-year INR denominated project finance debt at a cost of around 11-12% per annum. Debt funding environment remains very challenging due to tight liquidity in the financial markets and concerns over financial position of DISCOMs.

Figure 6.3: State Bank of India MCLR



Source: State Bank of India

Offshore debt funding

There were three green bond issuances by Greenko (two) and Azure (one) aggregating USD 1.65 billion. The bonds were issued at a cost of between 5.65-6.67%. The developers have been keen to tap into green bonds to free up bank lines for their pipeline projects. However, this option is available to only select developers with the necessary scale and reputation.

Table 6.2: Offshore debt funding deals

Company/ entity	Facility	Amount, USD million	Quarter
Rural Electrification Corporation	Bond offering	700	Q4 2018
Oakridge Energy	Maanaveeya Development & Finance	-	Q4 2018
ReNew	Green bonds	375	Q1 2019
Bank of Baroda	Loan from KfW	113	Q1 2019
Tata Cleantech Capital	Green bonds from FMO	26	Q1 2019
Azure Power	Debt from IFC, FMO & OeEB	135	Q2 2019
Clean Step Power (Hero Future Energies)	IFC	43.3	Q2 2019
Greenko	Green bonds	950	Q3 2019
Greenko	Green bonds	350	Q3 2019
Azure Power	Green bonds	350	Q3 2019

Source: BRIDGE TO INDIA research

6.3 Mergers and acquisitions

There was only one M&A deal in Q3 2019. Adani Green Energy acquired 100% stake in 10 projects owned by Essel Infra with a total operational capacity of 205 MW at an enterprise value of USD 183 million. The deal is expected to close by mid-October 2019. Essel Infra is also looking to sell its remaining solar portfolio of 480 MW.

Table 6.3: M&A transactions in Indian solar sector

Investor/ acquirer	Company	Capacity	Stake acquired	Deal value, USD million	Quarter
ReNew	Ostro Energy	1,100 MW	100%	1,550	Q2 2018
Hinduja National Power	Kiran Energy	85 MW	100%	136	Q2 2018
Statkraft BLP	Bharat Light & Power	35 MW	50%	-	Q2 2018
Greenko	Orange Renewable	140 MW	100%	850	Q3 2018
CLP India	Suzlon project SPV	70 MW	49%	-	Q3 2018
Canadian Solar	Suzlon project SPV	30 MW	51%	4	Q4 2018
CLP India	Suzlon project SPV	20 MW	51%	2	Q4 2018
Engie	Simpa Energy India	-	90%	-	Q4 2018
Reliance Industrial Investments	Kanoda Energy Systems	-	88%	11	Q4 2018
Sprng Energy	Shapoorji Pallonji	194 MW	100%	200	Q1 2019
CLP India	Suzlon project SPV	150 MW	51%	14	Q1 2019
AMP Solar	Suzlon project SPV	15 MW	51%	2	Q1 2019
Adani Green Energy	First Solar project SPV	20 MW	51%	0.2	Q1 2019
Petronas	Amplus Energy	500 MW	100%	392	Q2 2019
Ostro Energy (ReNew)	Suzlon project SPV	20 MW & 10 MW	49%	2	Q2 2019
Adani Green Energy	Essel Infra project SPV	205 MW	100%	183	Q3 2019

Source: BRIDGE TO INDIA research; company press releases

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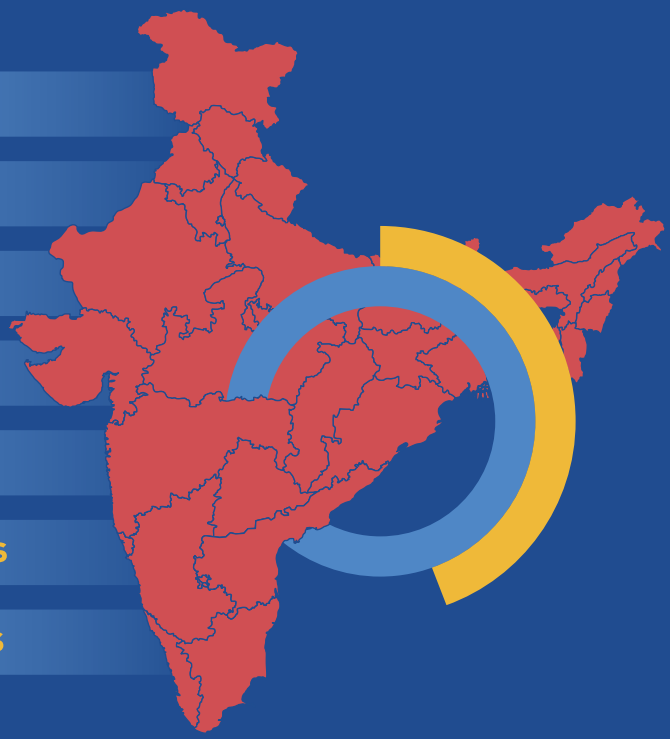

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7. Policy and regulations

This quarter witnessed slightly increased activity on policy and regulatory front in comparison to the previous quarter.

7.1 Central government

7.1.1 Amendment in guidelines for tariff-based competitive bidding process for wind power projects

The Ministry of Power has amended tariff-based bidding guidelines for wind power projects. The changes are relatively minor but positive for project developers:

- Land possession and related activities are required to be completed on or before scheduled commissioning date (as against seven months earlier);
- Declared CUF can be revised once within three years of COD (previously, one year);
- Penalty for shortfall in energy output has been fixed at 50% of PPA tariff (previously, 75% of PPA tariff);
- Commissioning deadline has been defined as 18 months from date of execution of PPA or power sale agreement, whichever is later (previously, 7 months from the date of execution of PPA);
- On early commissioning, the procurer may purchase power output at full PPA tariff (previously, 75% of full PPA tariff).

Project developers would welcome these changes as they have been grappling with extensive delays owing to challenges relating to land allocation, transmission connectivity and debt financing. Funding woes of some wind turbine manufacturers have also contributed to the execution problems.

7.1.2 Modification in scheme for development of solar parks and ultra-mega solar power projects for central public sector undertaking (CPSU) units

MNRE has modified the solar parks scheme to allow CPSUs to pool land from central or state government agencies to set up solar parks. Earlier, land had to be compulsorily owned by the CPSUs for development of any solar parks. Financial closure and issue of tender to build internal infrastructure of the solar park is required to be completed within 12 months of issue of solar park status. The move assumes significance in light of various bottlenecks faced in solar park development and the Indian government's recent initiative to restrict subsidy support to only SECI parks.

7.1.3 MNRE issues clarification on compensation by DISCOMs to RE generators in case of non-drawal of power

MNRE has clarified that if DISCOMs are not able to draw contracted power from RE projects, they will be required to compensate the projects for 100% lost revenues based on declared CUF or pro-rated

actual power output in the last 12 months. This follows a direction issued to all states to ensure 'must-run' status of wind and solar power plants in light of several instances of curtailment.

RE curtailment is legally permissible only in the event of grid safety and physical security. However, the provision has been abused by several state government agencies and the Government of India is trying to curb this practice.

7.1.4 Issue of draft National Resource Efficiency Policy

Ministry of Environment, Forests and Climate Change (MOEFCC) has proposed to establish solar panel recycling infrastructure to deal with growing volume of PV waste. As in the current e-waste policy, it has proposed that module manufacturers would be held responsible for end of life recycling of panels. The policy proposes targets 85% recovery rate from recycling of modules. It also envisages establishment of 4 major recycling centres by 2020 and 8 centres by 2030.

BRIDGE TO INDIA estimates that PV waste volume in India would grow to 200,000 tonnes by 2030 and around 1.8 million tonnes by 2050. Use of potentially hazardous material in manufacturing and lack of commercially viable module recycling technologies warrant a strong regulatory approach to this problem. The policy initiative is much needed and consistent with efforts undertaken in other countries.

7.1.5 Proposal for basic customs duty (BCD) on imports of modules, cells and other components

MNRE has recommended imposition of BCD, starting at 10% in 2021 and ramping up to 30% by 2023-24, on cells and modules. 15% duty is also proposed on components such as glass, metal frames, silver paste, EVA, wafers, structures and other raw materials.

The long implementation time seems designed to give module manufacturers enough time to plan their investments and ensure no adverse impact on current project pipeline. Another potential benefit of the long implementation timeline is that if module prices fall sufficiently during the gestation period, the cost impact on solar power would not be overly negative. In the interim period, the government seems to be banking on existing PSU, KUSUM and rooftop phase II schemes to sustain demand for domestically manufactured modules.

The proposal has been submitted by MNRE to the Ministry of Finance. However, we understand that BCD may only be imposed if PV products are declassified from inclusion under IT products at the World Trade Organisation (WTO), which could be a difficult and protracted process.

7.2 State government

7.2.1 Announcement of a residential solar scheme in Gujarat

Gujarat has announced a new residential rooftop solar scheme with a target of 200,000 installations by March 2020 and 800,000

installations by March 2022. In line with phase 2 of MNRE's grid connected rooftop solar programme, the state government is proposing a capital subsidy of 40% for systems up to 3 kW in size and 20% for systems between 3-10 kW in size. Surplus power output would be purchased by DISCOMs at INR 2.25/ kWh for a contract period of 25 years.

It is encouraging to see Gujarat taking lead on residential rooftop solar. Other states are likely to follow with similar initiatives. This market has been relatively small, but we believe that there is a vast untapped potential and expect growth to pick up in the next 1-2 years.

7.2.2 New regulations for captive and renewable energy plants in Uttar Pradesh

The regulations grant the right to 'open access' to solar power projects (excluding rooftop solar plants). Key provisions include:

i 100% banking of energy is allowed, with banking charges set at 6% for solar plants;

ii No waiver for OA costs.

This is the first time UPERC has issued regulations for captive and renewable energy plants. The policy contains standard provisions and exemptions (CSS, additional surcharge) that most states follow, but does not provide targets for RE generation.

7.3 Others

7.3.1 Extention in deadline for BIS certification of solar inverters

MNRE has extended deadline for certification of solar inverters from 31 September 2019 to 31 December 2019. The extension has been necessitated by lack of certified laboratories and testing facilities – similar problems faced by module manufacturers. Earlier, the deadline for module certification was also revised several times and took nearly 2 years to come into force.

We expect similar challenges in certification of solar pumps under KUSUM and Approved List of Modules and Manufacturers (ALMM) policy for PV modules and cells.

7.3.2 Reduction in benchmark cost for rooftop solar systems

MNRE has issued benchmark costs for rooftop solar systems for FY 2019-20. The revised costs are about 13% lower in comparison to last year:

- 1-10 kW size: INR 54/ Wp (2018-19: INR 60/ Wp)
- 10-100 kW size: INR 48/ Wp (2018-19: INR 55/ Wp)
- 100-500 kW size: INR 45/ Wp (2018-19: INR 53/ Wp)

Benchmark costs are provided as a guide to procurement agencies and also used to calculate subsidy amount provided under various central or state government financial assistance schemes.

8. Market trends and developments

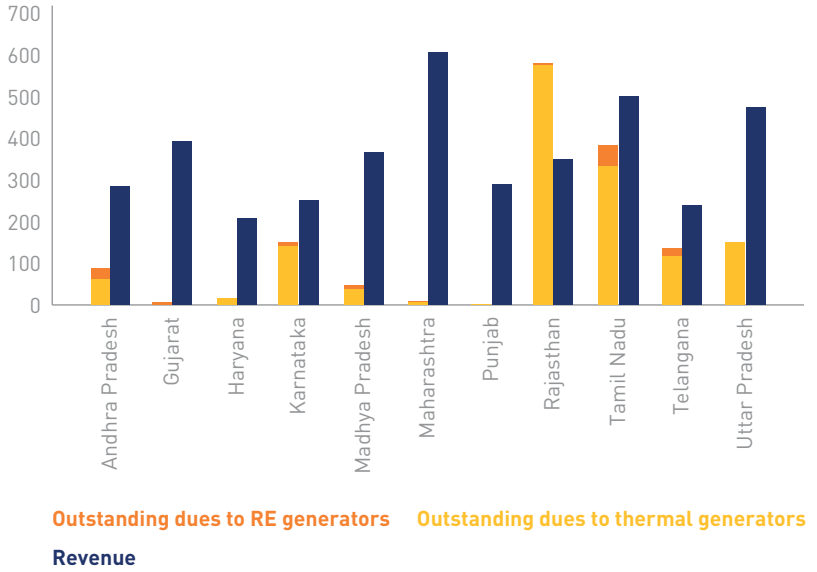
8.1 States reneging on PPAs, payment delays rising

Andhra Pradesh has persisted in its attempts to renegotiate RE PPAs aggregating 5.2 GW. The Andhra Pradesh High Court has directed the state to scrap the state renegotiation committee but more disappointingly, it has: i) referred the case to APERC for a decision within 6 months; and ii) directed DISCOMs to pay a much reduced interim tariff of INR 2.43/ kWh and INR 2.44/ kWh to wind and solar projects respectively. Meanwhile, the state government has challenged MNRE's order directing DISCOMs to provide letter of credit in advance to procure power. It continues to hold back payments to developers resulting in payment delays of more than a year in many instances. Many project developers are also complaining of rising curtailment.

In August 2019, Uttar Pradesh also stopped procuring 650 MW wind power. 440 MW of 650 MW was won by bidders in the first ever reverse auction for wind power in India. Affected developers include Sembcorp, Mytrah, ReNew and Inox Wind. These projects were stopped from supplying power citing non-approval of PPAs by CERC. The matter is due for a hearing in November.

Meanwhile, DISCOM overdues (payment delays > 60 days) to power producers continue to soar and touched INR 696 billion (USD 9.7 billion) by September 2019, an y-o-y increase of 27%. Total amount owed to RE producers has also shot up briefly to INR 97 billion at the end of July 2019, which came down to INR 48 billion by end September, indicating that the letter of credit (LC) mechanism is improving payment schedules. Worst offenders include Tamil Nadu, Andhra Pradesh, Karnataka and Telangana.

Figure 8.1: DISCOM dues to power producers, INR billion



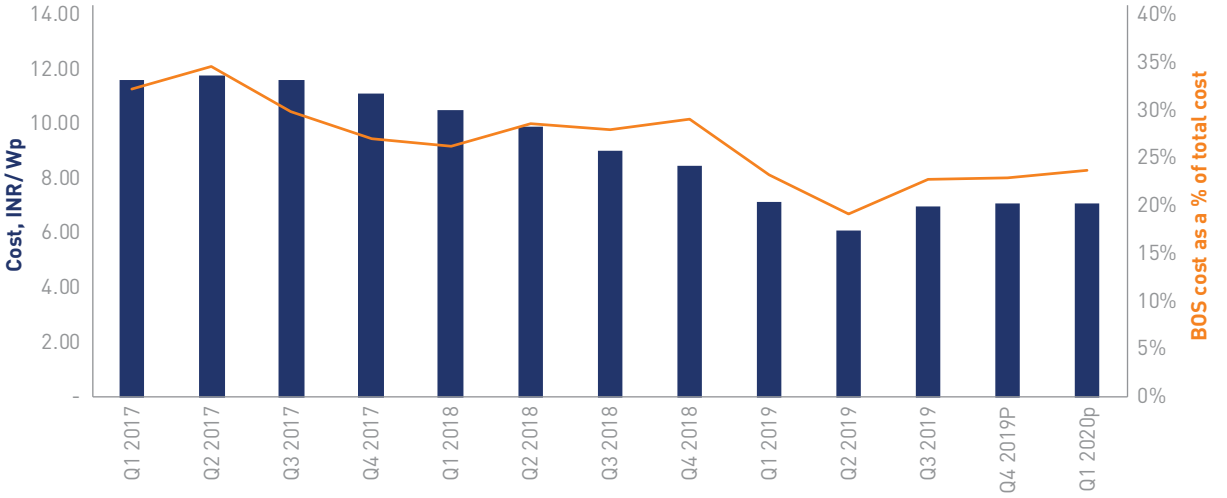
Source: PRAAPTI portal as on 14 November 2019, state tariff orders

Growing incidence of payment delays, reneging of PPAs and curtailment has hit investment sentiment badly and heightened risk perception in the sector.

8.2 Balance of system (BOS) costs drop significantly

BOS costs, accounting for up to 30% of total EPC cost, have reduced by nearly one-third in the last year. The fall owes partly to drop in aluminium and copper prices and partly due to a competitive market environment.

Figure 8.2: BOS costs for utility scale solar projects, INR/ Wp



Source: BRIDGE TO INDIA research
Note: EPC cost includes GST and duties, as applicable in each quarter.

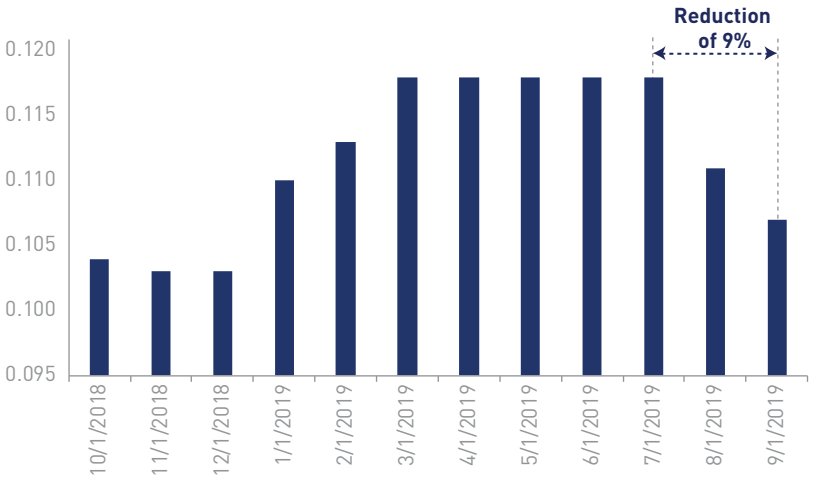
Falling BOS cost is welcome news for developers struggling with execution challenges and rising costs for land acquisition and debt financing. However, it is also again raising concerns about poor quality of execution.

8.3 Chinese solar market stays depressed

A rush of capacity expansion was expected in China in H2 2019 due to a new solar policy coming into force in August 2019. However, expectations failed to materialize mainly due to a delay in announcing the policy which reduced time available to developers to commission projects this year as well as relaxed commissioning timelines. China added only 16 GW of new solar capacity during Jan-Sep 2019, and only 4.6 GW in Q3 2019. Revised estimates suggest capacity addition of around 25 GW this year, against original estimates of 40 GW. Sharp fall in demand would be disappointing for Chinese cell and module manufacturers, who have been retooling production facilities to meet the expected surge in demand.

Global cell prices have already dropped as much as 20% between June-August 2019. Module prices have also started declining since August 2019. We expect to see a significant drop in prices in Q4 2019 and Q1 2020.

Figure 8.3: International multicrystalline cell prices, USD/ Wp



Source: www.energytrend.com

8.4 International auctions witness record low bids

Brazil's 211 MW solar auction in July 2019 saw record low bids of EUR 0.016/ kWh (USD 0.0175). In August, Spain's 1.4 GW tender received another record low bid of EUR 0.0147/ kWh by Akuo Renováveis Portugal. These are lowest ever tariffs for solar projects anywhere in the world.

Transition from government-supported FIT schemes to auction based allocation is leading to significant falls in solar tariffs across the world. There is high competitive intensity in the sector because of huge investment interest. Part of the tariff reduction could also be due to expectations of fall in module prices and long gestation period of these projects (expected COD – between 2021-2023). There is increasing pressure on equipment suppliers to drive down costs.