

Solar Energy Corporation of India Limited

(A Government of India Enterprise)

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**1st Floor, Prius Platinum Building
D-3 District Centre, Saket, New Delhi-110017**



Competitive Bidding for Renewable Energy

Solar Market and Business Opportunities in India

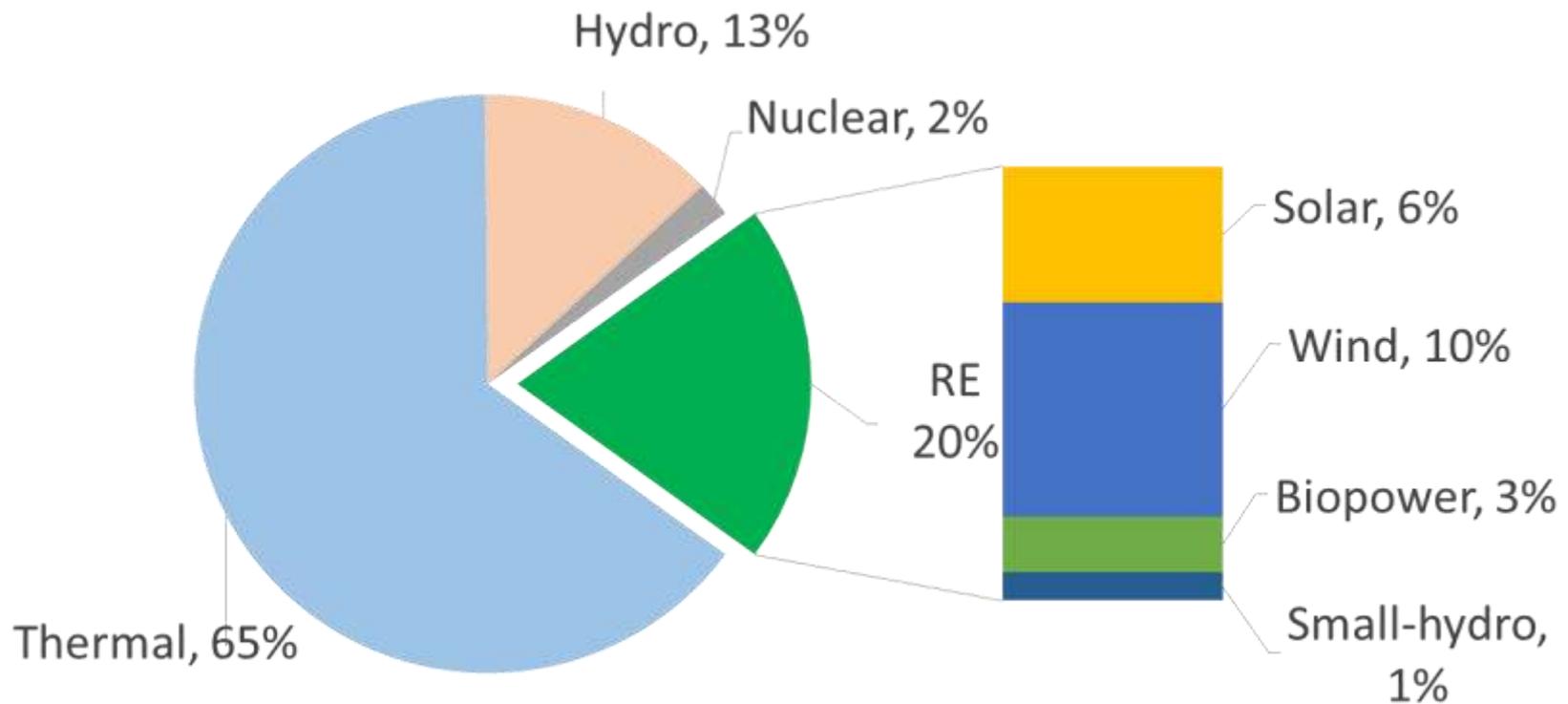
By

Solar Energy Corporation of India Limited



Renewable Energy Sector in India

- Total Installed Power Generation Capacity: 344 GW
- Renewable Source share 20% of total capacity

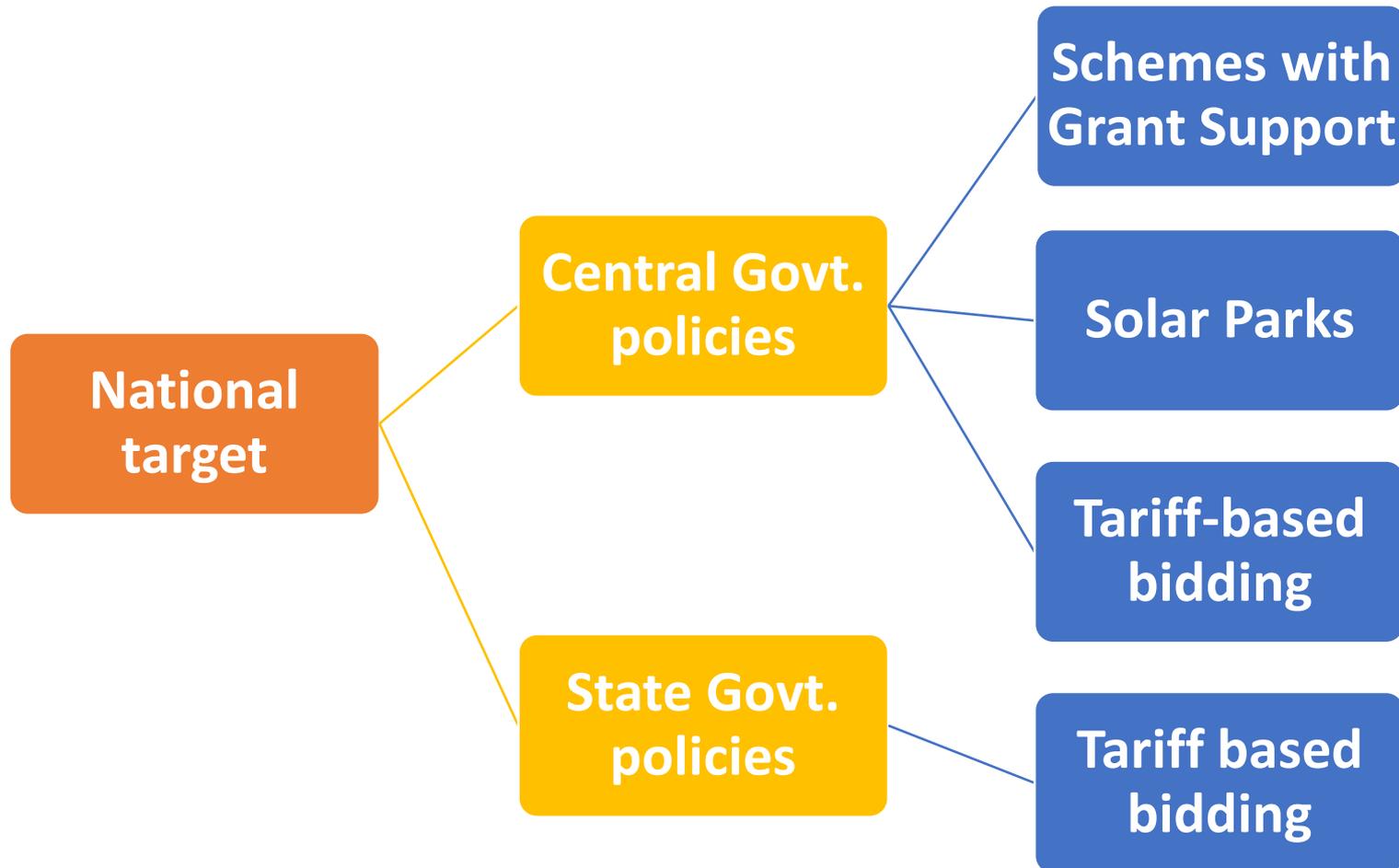


- Solar capacity Installed: 25.18 GW (as on Dec, 2018)

Mission 175 GW RE by 2022

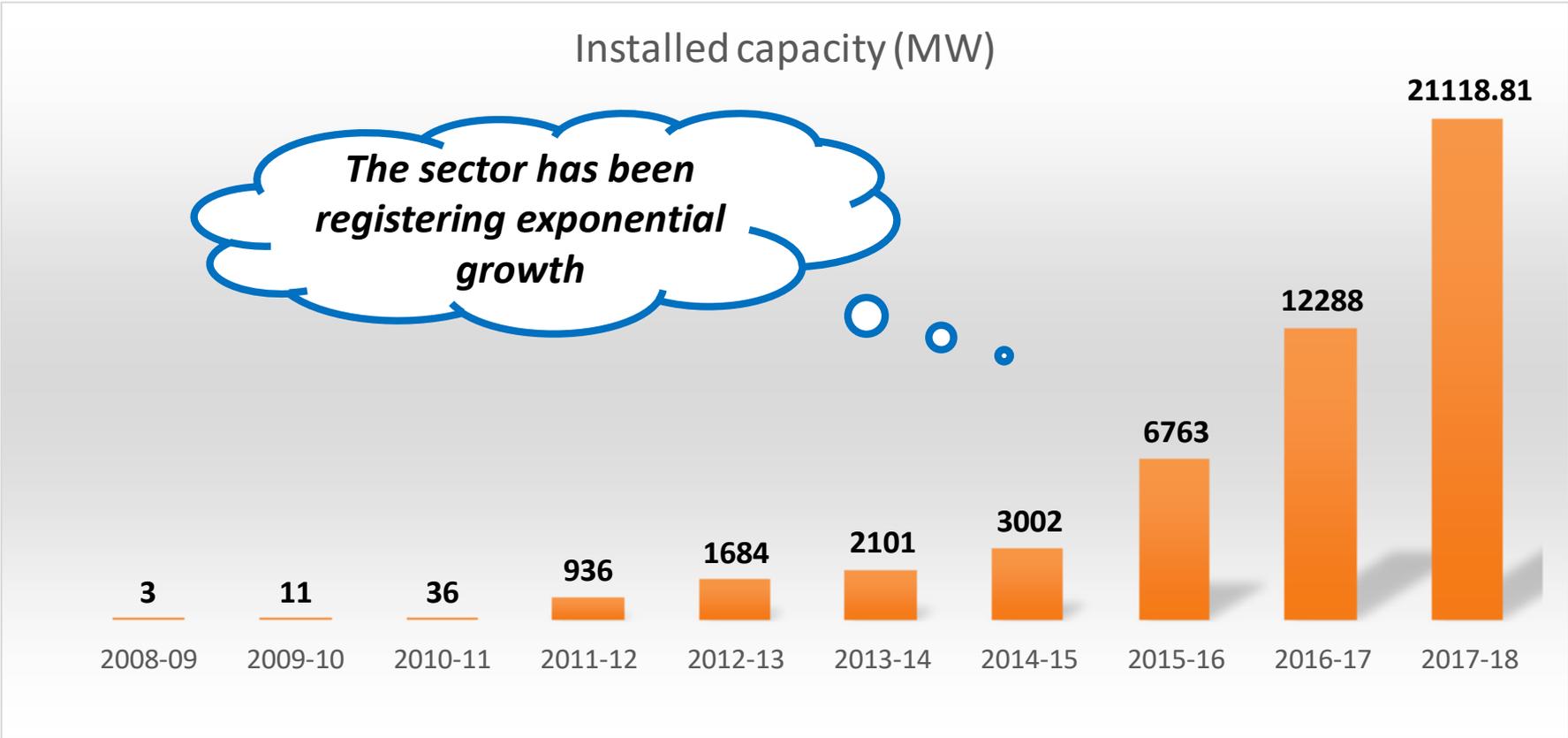
- India's commitment in Paris Climate Agreement (COP21)
 - to reduce emission intensity of the economy by one-third
 - to have at least 40% of the electric power generation capacity from clean energy sources by the year 2030
- Towards this a target of 175 GW by 2022 announced in 2015:
 - Solar: 100 GW
 - Wind: 60 GW
 - Biomass: 10 GW
 - Small Hydro: 5 GW

Enhancing to Achieve 225 GW by 2022



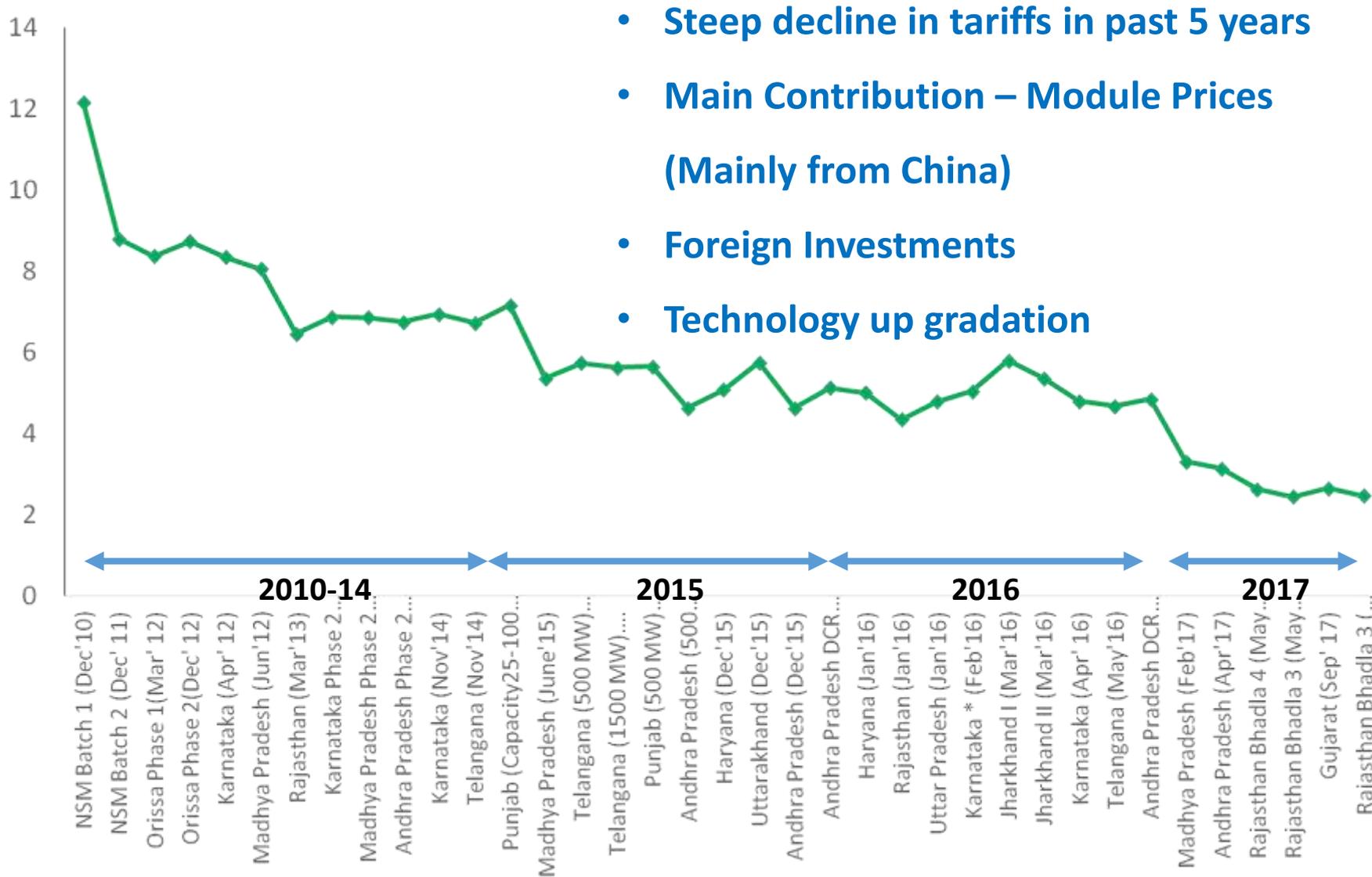
SECI administer Projects under Central Govt. Policies

Growth of Solar Capacity in India



Current installed capacity crossed 22 GW

Tariff Trend in Solar Energy



- Steep decline in tariffs in past 5 years
- Main Contribution – Module Prices (Mainly from China)
- Foreign Investments
- Technology up gradation



SOLAR ENERGY CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

- Incorporated in year 2011 for implementation of National Solar mission
- 100% owned by Government of India.
- Scope widened to cover all Renewable Energy Resources
- Rated as AA+ (Outlook positive) by ICRA
- Debt – free Company
- Category–I Power Trading Company

Business Areas

- 160 MW under development
- 2000 MW in Pipeline

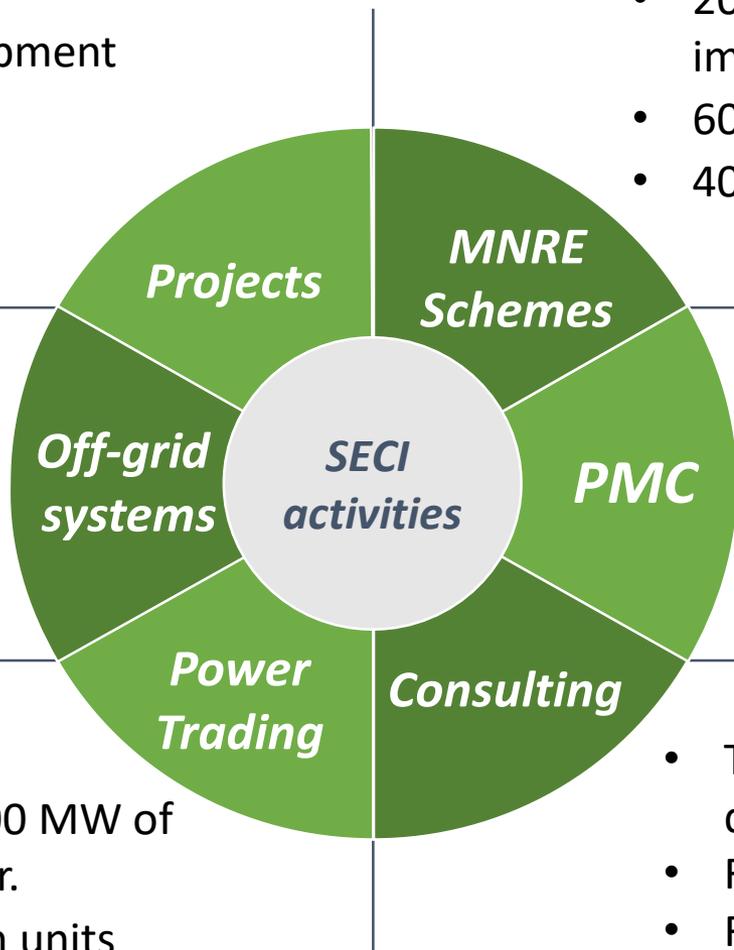
- 20000 MW projects under implementation
- 60000 MW in pipeline
- 40000 MW Solar parks

- Home lighting systems
- Mini Micro grids

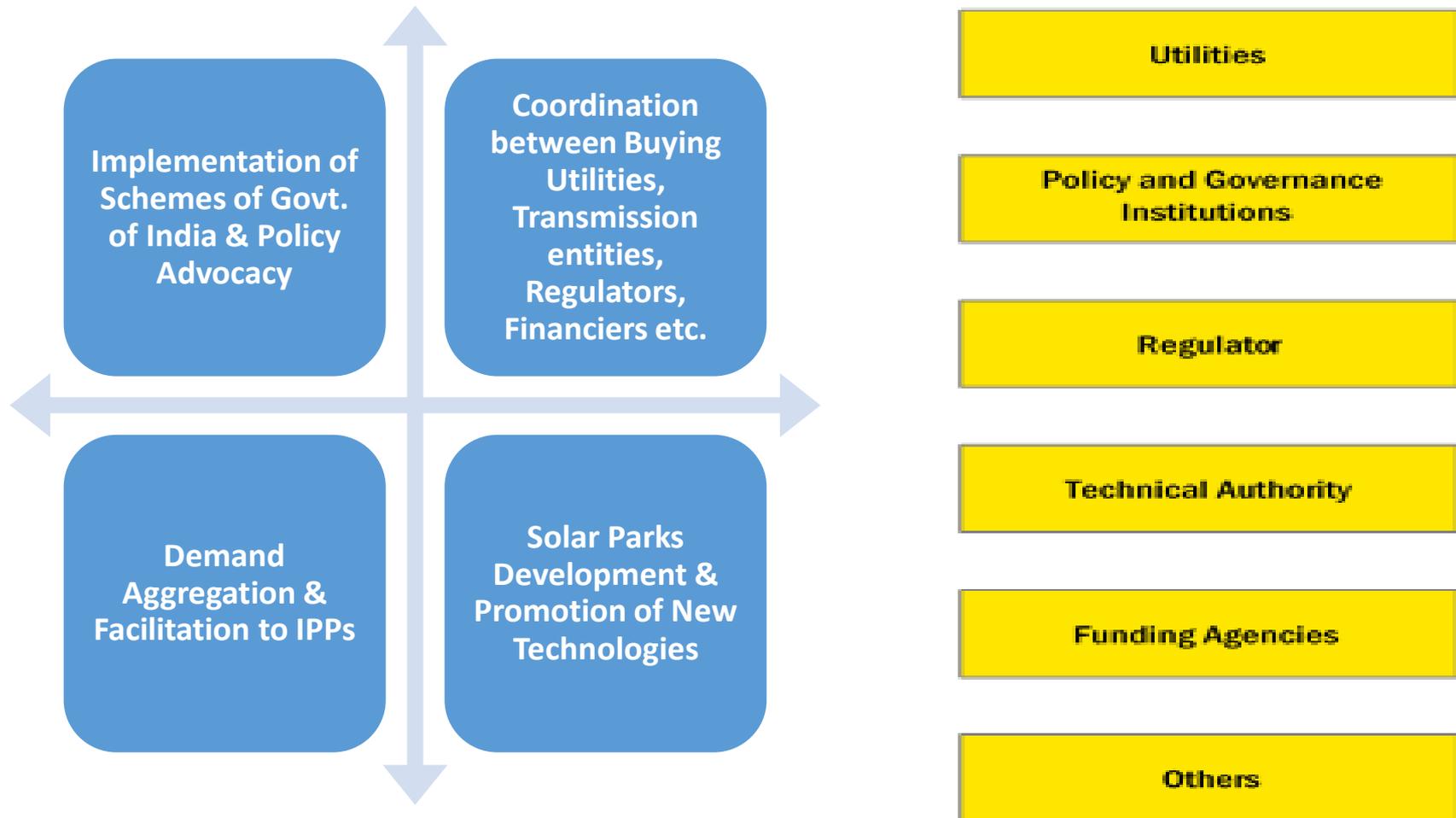
- Completed 200 MW
- Under implementation 400 MW
- Pipeline 1000MW

- Trading around 20,000 MW of Solar and wind power.
- Traded > 4000 million units

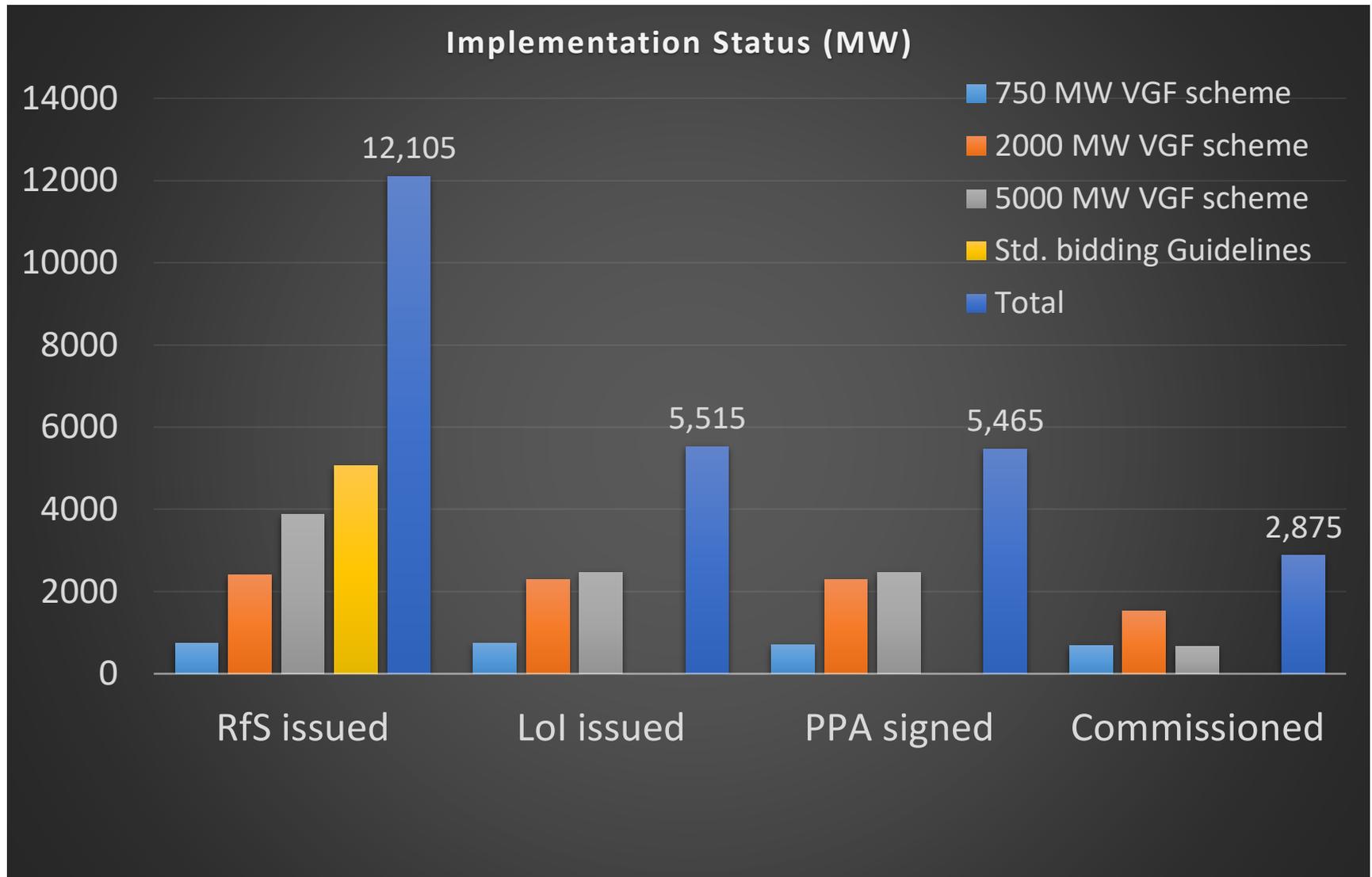
- Technical and financial due diligence.
- Feasibility studies, DPR
- Resource assessment etc.
- Bid Advisory Services



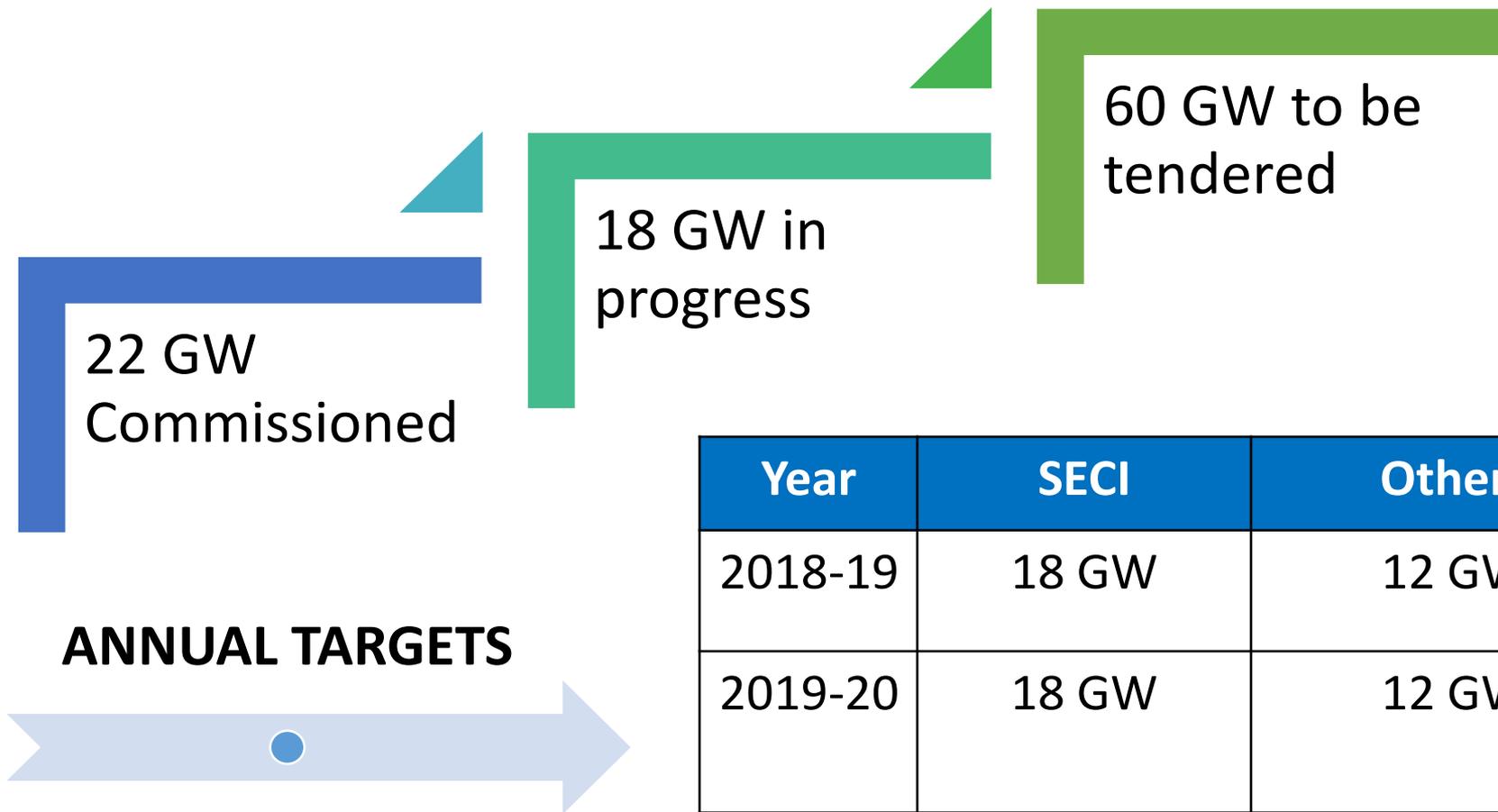
SECI's contributions in RE Sector



Tenders by SECI for solar projects



Way Forward to Reach 100 GW in Solar



Year	SECI	Others
2018-19	18 GW	12 GW
2019-20	18 GW	12 GW
Total	36 GW	24 GW

Solar Park scheme

- Infrastructure support to project developers.
 - Land Development
 - Power evacuation
 - Ancillary Facilities
 - Approvals.
- Scheme Capacity- 40,000 MW
- 40 solar parks totaling **26,144 MW** capacity under development.
- Grant Support: INR 2 million/ MW

Capacity approved (Total)	26,144 MW
Project Commissioned	2,395 MW
Under Implementation	4,300 MW
Under Tendering	2,475 MW
DPR stage	16,974 MW



1000 MW solar park at Kurnool, AP, India

Initiatives for Rooftop Solar

- Target: 40 GW
- Implementation Modes:
 - RESCO
 - CAPEX
- Selection : E-Bidding on CAPEX/Tariff
- Grant Support upto 25%
- Priority sector lending
- Enabling policies
 - Net Metering
 - Open Access
 - Building Codes



Tenders by SECI for Wind projects



- **Target: 60 GW**
- Selection of Projects - Tariff based e-reverse auction.
- Procurement of Power by SECI.
- Projects can be located in any part of the Country
- Off shore wind under pipeline

S. No.	Tranche	RfS issued (MW)	LoA issued (MW)
1	Tranche-I	1000	1049.90
2	Tranche-II	1000	1000
3	Tranche-III	2000	2000
4	Tranche-IV	2000	2000
5	Tranche-V	2000	Under Bidding
	Total	8000	6049.90

Transparent e - Bidding

- Transparency and ease of bidding being ensured through e-bidding
- E- bidding platform: <https://www.tcil-india-electrionictender.com>
- Information continuously updated through SECI website.

S#	Bidder's Name	VGF	Tariff	Date/Time of Bidding	Bidder's Quantity
1	ACME SOLAR HOLDINGS LIMITED	0.00	2.44	02-Jul-2018 10:29:40 RTZ	600.00
2	SHAPOORJI PALLONJI INFRASTRUCTURE CAPITAL COMPANY PRIVATE LIMITED	0.00	2.52	02-Jul-2018 20:36:01 RTZ	250.00
3	Hero Solar Energy Private Limited	0.00	2.53	02-Jul-2018 20:33:16 RTZ	250.00
4	Mahindra Susten Private Limited	0.00	2.53	02-Jul-2018 20:33:40 RTZ	250.00
5	Azure Power India Private Limited	0.00	2.53	02-Jul-2018 20:35:00 RTZ	600.00
6	Mahoba Solar (UP) Private Limited	0.00	2.54	02-Jul-2018 20:09:24 RTZ	500.00
7	ReNew Solar Power Private Limited	0.00	2.56	02-Jul-2018 19:22:27 RTZ	250.00
8	Fortum Solar India Private Limited	0.00	2.76	02-Jul-2018 10:29:40 RTZ	250.00

Recently concluded 2000 MW ISTS Bids

- Procurement Strategy - A planned approach of cost-effectively purchasing a company's required supplies or services

- It takes into consideration several elements and factors such as the timeline for procurement, the funding and budget, the projected risks and opportunities, among others.



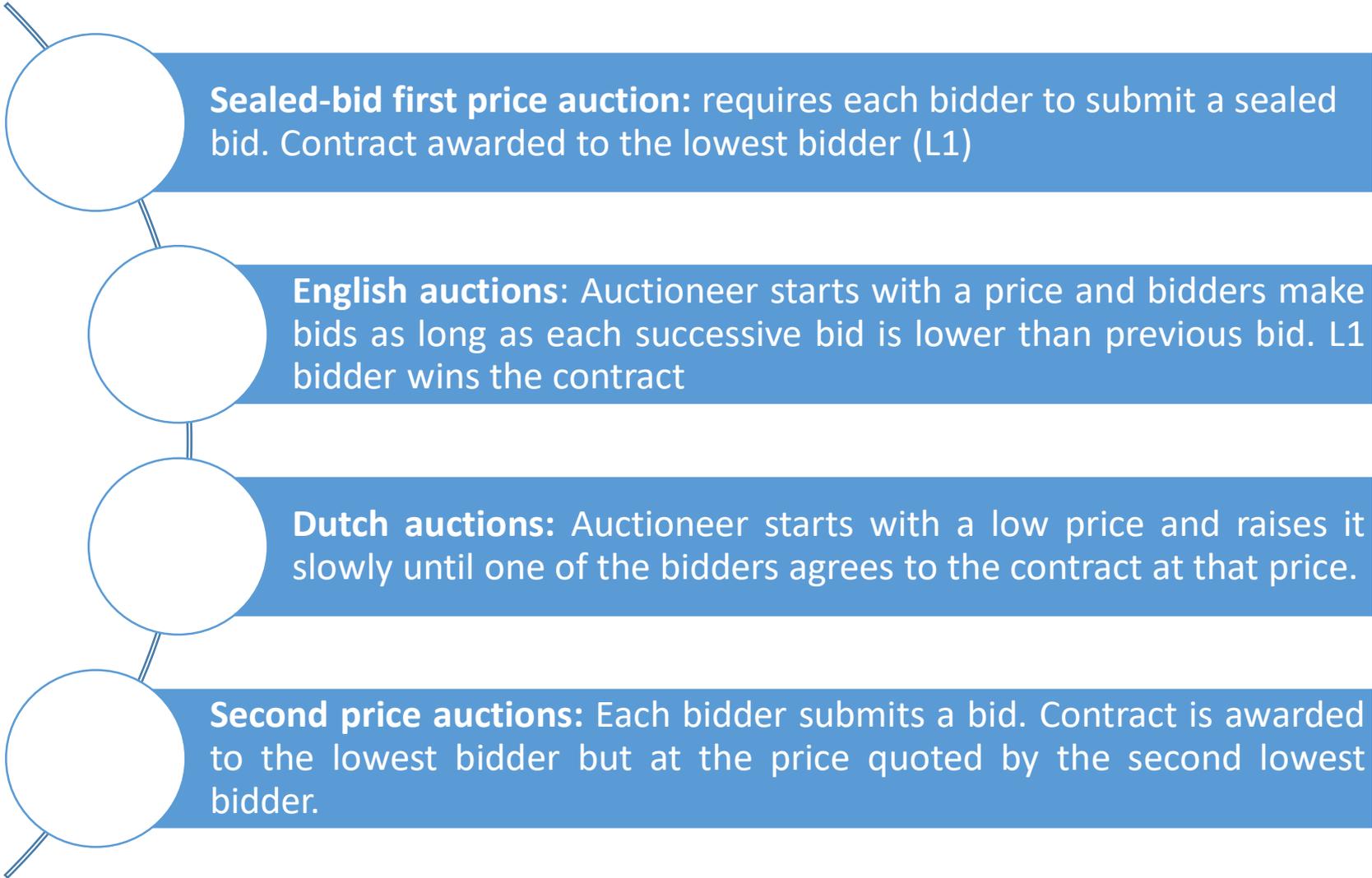
Some of the Best Practices

- **Creating a pre-qualified supplier pool** in which all suppliers are uniformly and objectively evaluated. This allows the buyer to hand pick suppliers and limit the pool to just those with which it has done business. Of course, others can be added, but the key is knowing the suppliers in the pool as a first level of quality control. You only want suppliers bidding on your projects that have proven that they can deliver quality work, on time.
- **Creating thorough bid specifications** with full details before an invitation for bids is sent to the suppliers in the supplier pool. Being complete so changes are avoided later allows suppliers to price accurately and best determine when there will be an opening for doing the job.
- **Creating a fair bidding environment** in which the system matches buyer project specifications only with suppliers capable of doing the work. With detailed project and supplier data, the system will automatically match each project up for bid with only those suppliers with matching capabilities. This levels the playing field.
- **Creating efficiencies to save time and money.** Since critical data already is in the system, the buyer does not have to "reinvent the wheel" each time it wants to put a project out for bid.
- **Creating mutual acceptance of the process** whereby every supplier in the pool knows that it can bid low on any project. Bidding low with traditional procurement methods can handicap a supplier because the buyer more than likely will expect that same low price going forward. Not with the latest methodology. With the newest approach, all know that success is based upon bidding low to fill production downtime. The suppliers with open production time to fill will vary from project to project.

Best Practices.....

- **Calling for and awarding bids in a timely manner** so the winning supplier will hold a slot for the project, schedule staff, prepare equipment, order materials and make other preparations required to do the work. Suppliers learn that **performance** is required to receive opportunities, while **price** is the criteria to win projects.
- **Establishing full transparency** by sending bid results to all suppliers that submitted a bid. This not only creates greater credibility for the buyer/sourcing consultant among suppliers, it also promotes improved competition.
- **Monitoring every step of the workflow process** to ensure clear communications, attention to every detail and a deliverable end product. This must begin with the conceptualization of the project and continue through edits, changes, reporting, production, packaging and delivery. The project manager will determine who has access to the system and when so input is transparent and thoroughly documented.
- **Ensuring that work is performed per specifications and on time.** By establishing full accountability, the buyer is protecting itself against delays that could cause artificial pricing hedges in future bids from the winning supplier.
- **Completing the project with accurate invoicing.** By making sure the invoice is complete, correct, agreed upon and reconciled, both the supplier and the buyer successfully end the project.

Auctions-types



Sealed-bid first price auction: requires each bidder to submit a sealed bid. Contract awarded to the lowest bidder (L1)

English auctions: Auctioneer starts with a price and bidders make bids as long as each successive bid is lower than previous bid. L1 bidder wins the contract

Dutch auctions: Auctioneer starts with a low price and raises it slowly until one of the bidders agrees to the contract at that price.

Second price auctions: Each bidder submits a bid. Contract is awarded to the lowest bidder but at the price quoted by the second lowest bidder.

Principles of Negotiation

- Negotiation likely to result in a positive outcome only if buyer's value on outsourcing the supply chain function to this supplier is at least as large as the value the supplier places on performing the function for the buyer.

- Difference between the values of the buyer and seller is referred to as the bargaining surplus

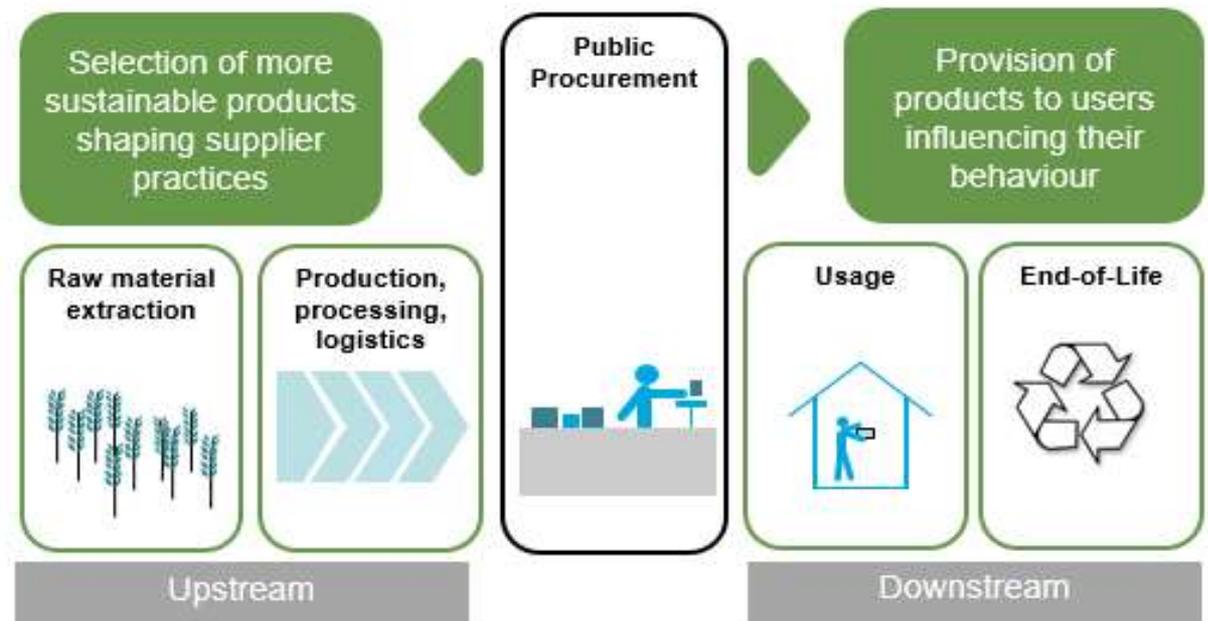
- Goal of each negotiating party is to capture as much of bargaining surplus as possible.
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Sustainable Procurement

Sustainability: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Sustainable Procurement: “a process whereby public organizations meet their needs for goods, services, works and utilities in a way that achieves **value for money** on a **whole life-cycle** basis in terms of generating **benefits** not only to the organization, but also to **society and the economy**, whilst significantly **reducing negative impacts on the environment**” (UNEP)

- Life-cycle thinking, whole-life costs
- Benefits to society and economy
- Reduced environmental impact



Case study: India's Bhadla Solar Projects

Auction results in the most competitive Fixed tariff of **INR 2.44/kWh** (US Cents 3.78/kWh)

- Total capacity of 750 MW divided into 2 Solar Parks, of 500 MW (Phase-III) and 250 MW (Phase-IV) capacities. Each Park divided into 5 Projects: 5X100 MW (Phase-III) and 5X50 MW (Phase-IV).
- Provided opportunities to everyone-'large' companies as well as 'smaller' players, they could quote for a single Project or for the entire Parks: Resulted into aggressive bidding
- The e-RA for 250 MW was held before that for 500 MW. The period between above 2 auctions was kept just sufficient to give bidders time to analyze and rework based on the discovered tariff. The limited time period between the two auctions effectively ruled out the possibility of cartelization.
- The speediness in evaluation of bids was just perfect. Bids that were submitted on 19/04/2017 had their e-RA conducted on 09/05/2017 (in just 19 days), which created ripples in the market.

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- The e-RA for 250 MW Bhadla Phase-IV Park began at a tariff of INR 3.93/kWh at 14:00 Hrs on 09/05/2017 and after a continuous non-stop 9.5 hours-session, closed at 23:30 PM on 09/05/2017, achieving a record low fixed tariff of **INR 2.62/kWh** (US Cents 4.05/kWh) over the term of 25 years.

- The e-RA for 500 MW Bhadla Phase-III Park began at a tariff of INR 3.93/kWh at 14:00 Hrs on 11/05/2017, and after a continuous non-stop 20 hours' marathon session, closed at 10:00 Hrs. on 12/05/2017, achieving a record low fixed tariff of **INR 2.44/kWh** (US Cents 3.78/kWh) over the term of 25 years

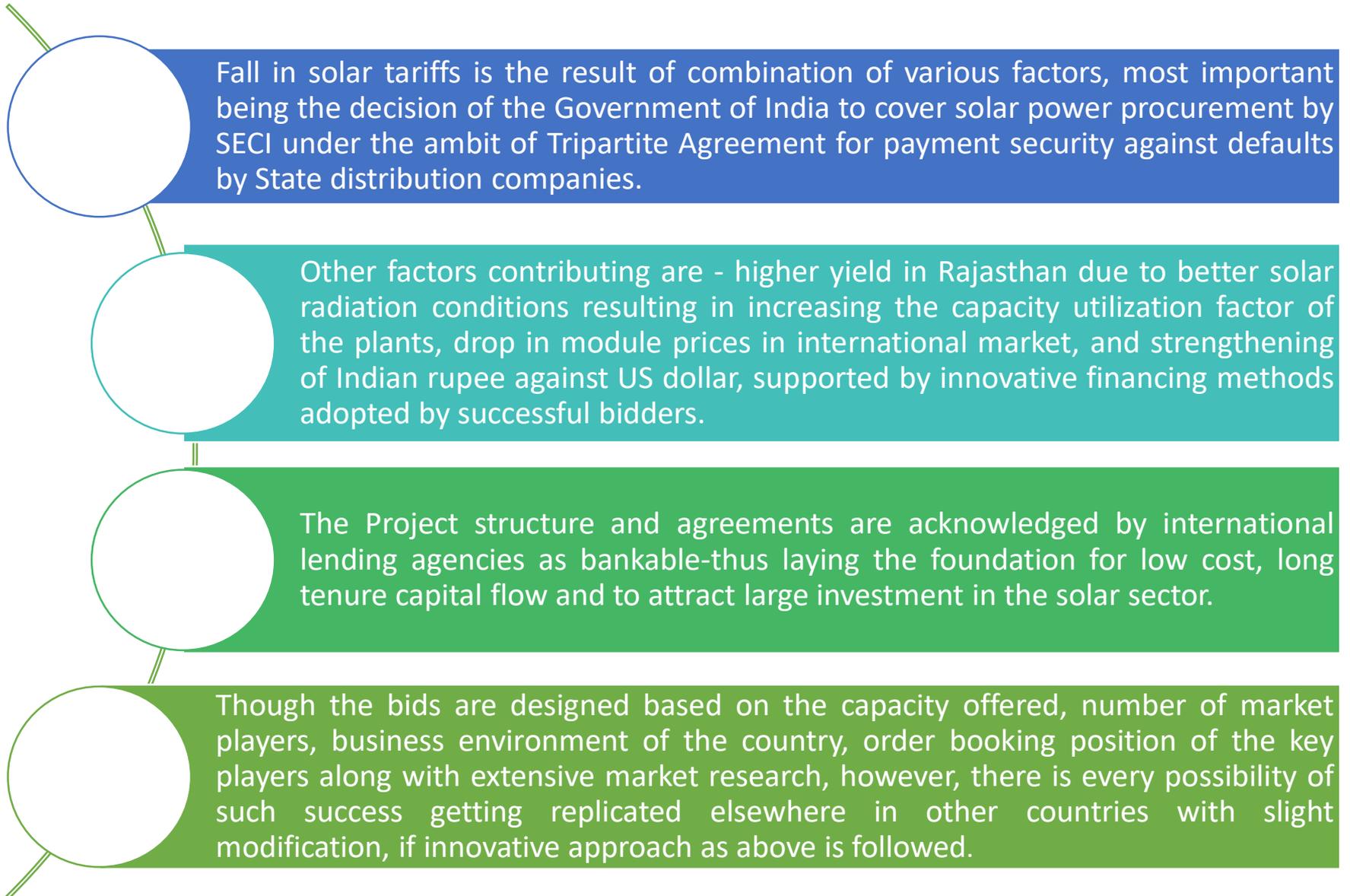
- This achievement is all the more remarkable since no bidder eligible for auctions opted for Viability Gap Funding or any kind of subsidy support for both the tenders. The developers will directly sign 25- year Power Purchase Agreement (PPA) with Solar Energy Corporation of India Ltd.

- SECI's e-bidding attracted unprecedented market response - 27 bidders in 250 MW Park with 3250 MW bid capacity received (13 times the tendered capacity) and 24 bidders in 500 MW Park with 5500 MW bid capacity received (11 times the tendered capacity) from ten international players viz. SoftBank (Japan), Phelan Energy (South Africa), EDF Energy (UK), Solairedirect(France), Trina Solar (China), Sembcorp (Singapore), Canadian Solar (Canada), Alfanar (Saudi Arabia), Fortum Amrit (Finland), FRV Solar (Spain), Actis-backed Ostro Energy.

L1 Winners for each Park

- Against Bhadla Phase III tender, Acme Solar Holdings Pvt. Ltd placed winning bids of Rs. 2.44 per kilowatt-hour (kWh) tariff for 200 MW and SBG Cleantech One Ltd (a joint venture between Japan's SoftBank Group Corp., India's Bharti Enterprises Ltd and Taiwan's Foxconn Technology Co. Ltd) offered Rs. 2.45 per kWh tariff for 300 MW, to win contracts to set up plants in the park
- Against Bhadla Phase IV tender, Phelan Energy Group Ltd. (South Africa based company) placed bid of Rs. 2.62 per kilowatt-hour (kWh) tariff for 50 MW, Avaada Power Pvt. Ltd. offered Rs. 2.62 per kilowatt-hour (kWh) tariff for 100 MW and SBG Cleantech Three Ltd (a joint venture between Japan's SoftBank Group Corp., India's Bharti Enterprises Ltd and Taiwan's Foxconn Technology Co. Ltd), offered Rs. 2.63 per kWh tariff for 100 MW, to win contracts to set up plants in the park being developed by Adani Renewable Energy Park Rajasthan Limited (JV of Adani Group and Govt. of Rajasthan).

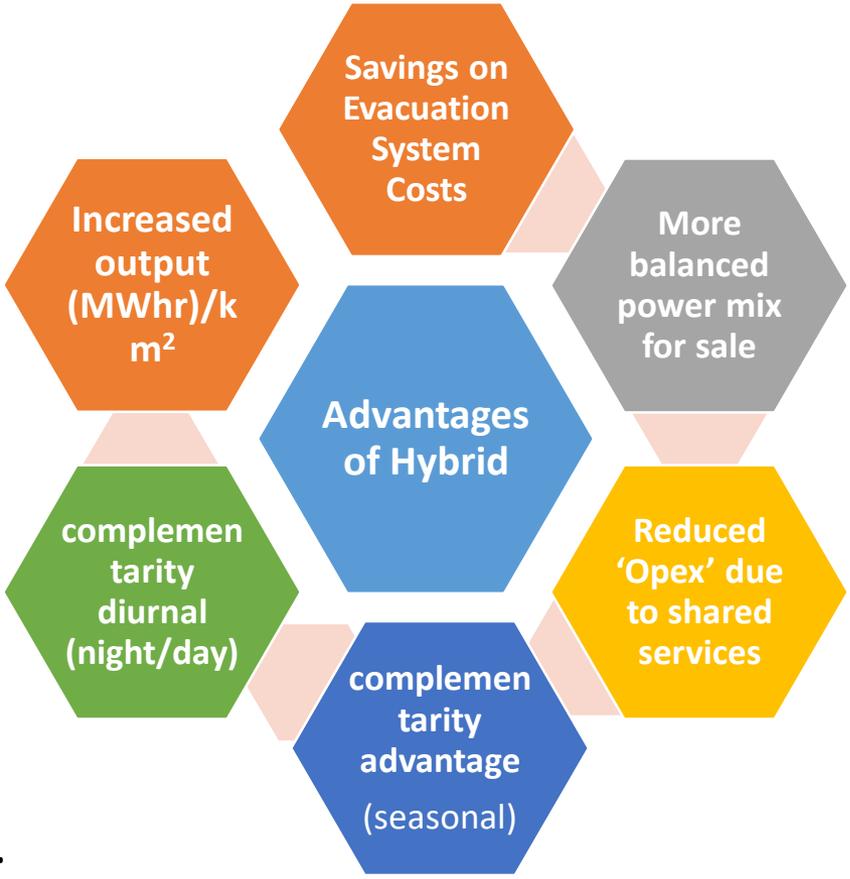
Key highlights/Learning:



New Initiatives

Solar -Wind Hybrid projects

- Concept of co-locating Wind and Solar capacities for land and transmission optimization
- MNRE Released guidelines for Hybrid projects.
- **Brownfield Hybrid projects**
 - Capacity addition in existing solar/wind projects
- **Greenfield hybrid projects**
 - Development of new solar-wind hybrids
- NIT issued on 26.04.2018 for 2500 MW.
- Further bids in future depending on its success.



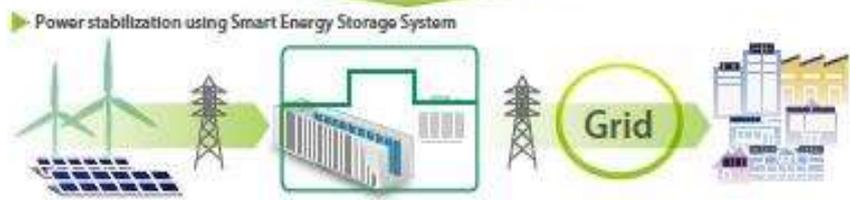
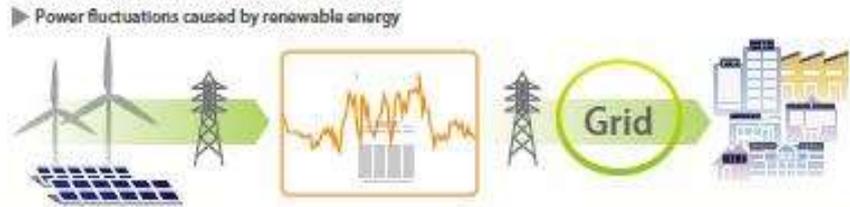
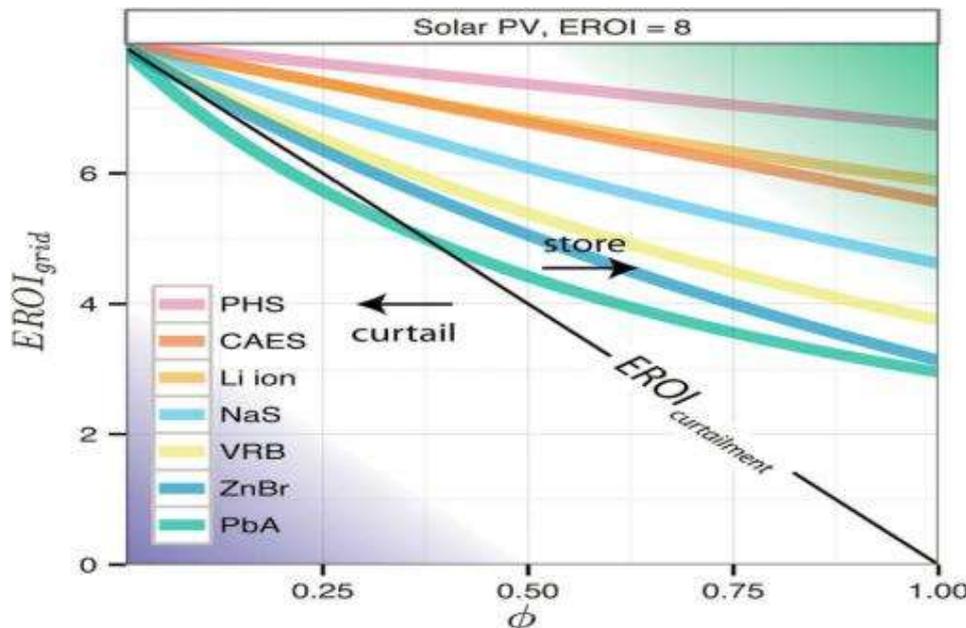
Floating Solar projects

- Potential for FSPV: 700 GW
- Target: 10 GW.
- EoI issued for market sensitisation - good response received.
- Project Identified for 2.5 GW
 - Rihand- 500 MW,
 - Omkareshwar- 500 MW,
 - Indira Sagar- 1000 MW,
 - Hirakud- 500 MW etc.
- Tender for initial 150 MW (Rihand) issued.
- Opportunity for Float manufacturers



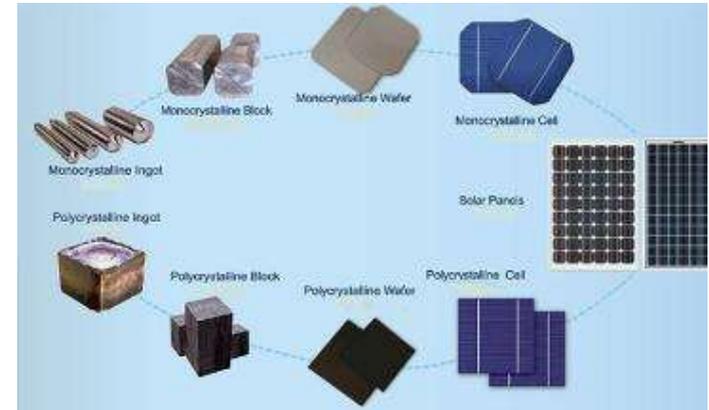
Solar Projects with Storage

- Exponential RE Growth leads to
 - Curtailment
 - Grid stability
 - Intermittent generation.
 - Fluctuations in generation.
- Energy Storage is inevitable
- SECI is developing 160 MW Solar Wind hybrid project with 20 MWh Battery Energy Storage.
- National Storage Mission is under drafting.



Manufacturing linked Solar projects

- Companies encouraged to set up Integrated solar module manufacturing facilities (From Ingot to module) in India.
- Off-take assurance provided in the form of PPAs with SECI for double the capacity of manufacturing.
- The manufacturing plant and the solar projects to be developed in the time frame of 4 years.
- RfS issued on 25.05.2018 for 10 GW solar projects coupled with 5 GW manufacturing.



Future Tenders

- So far Tenders are issued in 2-3 GW range.
- First time SECI released 10 GW tender Linked with manufacturing.
- Next 50 GW tender for Solar PV Projects is under planning.
- Up to 30% of the capacity of manufacturing will be made mandatory.
- 50% of the capacity will be with Energy Storage for up to 4 hours along with setting up of manufacturing capacity for storage.
- Manufacturing Capacity planned in the 10 GW tender with manufacturing will have Early mover advantage and may be allowed to participate with capacity expansion.

2/19/2019





Thank You



Request for Selection (RfS) Document
for
**Development of 10 GW Solar PV Projects
along with
5 GW Solar Manufacturing Capacity**

RfS No. SECI/C&P/RfS/5GW MANUFACTURING/P-1/052018 dated 25.05.2018

Tender Search Code (TSC) for the NIT: SECI-2018-TN000018

Projects Brief

- “PROJECT” shall mean the cumulative capacity comprising of 2GW of Solar Solar PV Power Plant along with 1GW Manufacturing Plant.
- Min. Bid : 2GW, Max: No limit, Multiples of 2GW
- **Scope of Bidder:**
- Development of the Solar Projects including
 - Possession of Land
 - Design, EPC & Development of Project
 - Transmission line up to the Delivery substation
 - Inter-connection with the Grid
- Development of manufacturing facilities :
 - Ingots & Wafers Cells and Modules in case of crystalline Silicon technology
 - Integrated module manufacturing in case of thin film technologies.



Projects Brief

- Can be developed in Multiple Locations
- Minimum capacity at one location: **50 MW**
- Connectivity at 132 kV or above
- PPA to be signed within 90 days
- Financial Closure: within **12 months**
- Commissioning Timelines:
 - Solar Power Projects:
 - Min. 40% allocated capacity with 24 months
 - Balance capacity by 31st March, 2022.
 - Solar Manufacturing
 - Complete capacity within 3 years from LOI.
- Ceiling tariff for offered: **INR 2.93/Unit (\$0.041/Unit)**.
- E-Reverse Auctioning on the ceiling tariff quoted by bidders.



Manufacturing Facilities Requirements

- The manufacturing facilities shall be of the latest technology.
- The average efficiency of produced modules from Manufacturing Plant shall be as under :
 - For Crystalline - 18%
 - For Thin Film - 17%
- The raw materials such as encapsulate, glass, frame, junction box, Polysilicon, back sheet, chemicals, gases, paste, etc. used in the process can be sourced from anywhere in the world



SPV Power Projects - Performance

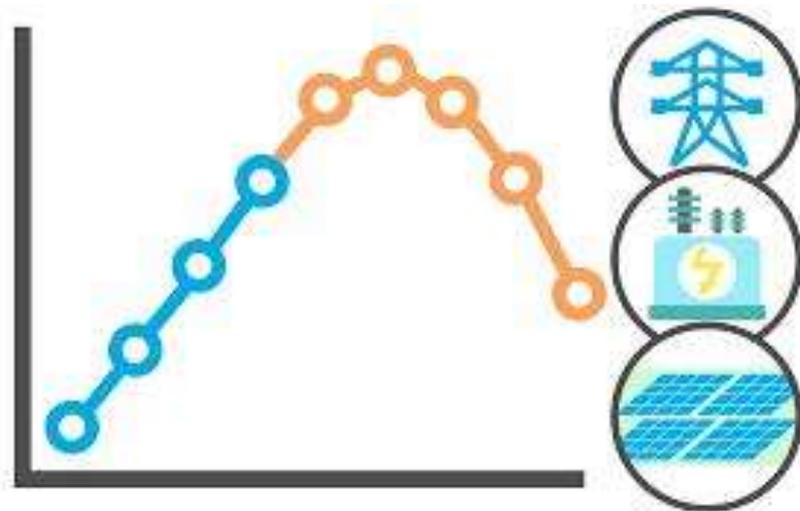
- **Capacity Utilisation Factor (CUF)**

declaration

- To be declared at the time of signing of PPA
- Minimum CUF should be 17%

- **Performance criteria**

- Within + 10% and -15% of the declared CUF value till end of 10 years from Commercial Operation Date (COD), subject to the annual CUF remaining minimum of 15%,
- Within +10% and -20% of the declared CUF value of the annual CUF thereafter till the end of the PPA duration of 25 years.



SPV Power Projects - Payments

- **Shortfall in generation**
 - Compensation to be paid by Bidder, as payable to Buying Utilities of SECI
- **Generation Compensation**
 - Provision for compensation to the Bidder in evacuation constraints due to Transmission and Back down
- **Excess Generation**
 - Excess Generation shall be paid for by SECI @ 75% of the PPA tariff.
 - Bidder cannot sell excess generation to any other party (unless refused by SECI)



Manufacturing Setup Timelines

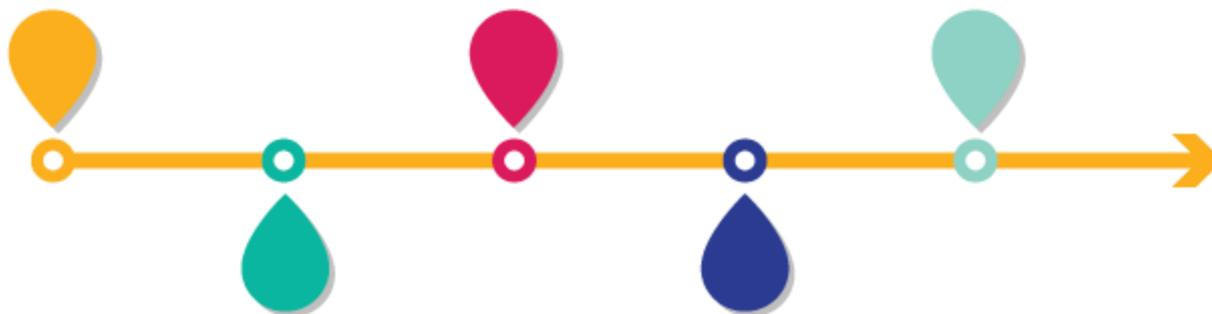
Sr No	Milestone	Details	Duration* (Months)
1	I	Land Acquisition, Order for Plant and Equipment,	15
2	II	Readiness of Major Civil and Infrastructure	27
3	III	Receipt of Equipment	30
4	IV.a	Manufacturing Plant Commercial Operation Date (MCOD)	36
5	IV.b	MCOD (With Penalty/ Liquidated Damage)	42
6	IV.c	MCOD (With Tariff Reduction)	48

*The duration in months mentioned above shall be calculated from the date of issuance of LOI.



Solar Power Projects -Timeline

Sl. No.	Package	Effective Date/ PPA	Financial Closure (Months)	Scheduled Commissioning Date (SCD) (Months)	Maximum time allowed for commissioning with PPA Term reduction (Months)
1	Package-I (Minimum 40%)	90 days from issuance of LOI	12 months from Date of PPAs	24	36
2	Package-II (Balance Capacity)	1 st Day of 27 th Month	12 months from Date of PPAs	31 st March 2022	31 st March 2022



Selection Process

Step 1:
Techno
commercial
evaluation
of the
bidders

Step 3:
Shortlisting
of bidders
for e-
reverse
auction

Step 5:
Issuance of
LOI

Step 2:
Financial
Bid
Evaluation

Step 4:
Selection of
Bidders
after
Reverse
Auction

Step 6:
Signing of
PPA

E-tendering and Reverse Auction

- For conducting electronic tendering through TCIL portal <https://www.tcil-india-electrionictender.com>, a Government of India Undertaking.
- This portal is world's most 'secure' and 'user friendly' software from ElectronicTender®.



e-TENDERING

TCIL/ ETS Helpdesk	
Telephone/ Mobile	<p>Customer Support: +91-11-26241071, 26241072</p> <p>Emergency Mobile Numbers: +91-9868393775, 9868393717, 9868393792</p>
Email-ID	<p>ets_support@tcil-india.com</p> <p>[Please mark CC: support@electrionictender.com]</p>

Reverse
AUCTION!

- **Broad Outline of Activities :**
 - Procure a Digital Signing Certificate (DSC)-Class II and above.
 - Register on Electronic Tendering System® (ETS)
 - Create Marketing Authorities (MAs), Users and assign roles on ETS
 - View Notice Inviting Tender (NIT) on ETS
 - For this tender -- Assign Tender Search Code (TSC) to a MA
 - To participate in a tender, it is mandatory to procure official copy of Tender Documents
Clarification to Tender Documents on ETS
 - Bid-Submission on ETS
 - Respond to SECI Post-TOE queries
 - Participate in reverse auction if invited

Own Projects - Pipeline

- **10 MW at DRDO (Hyderabad)**- DPR preparation in progress.
- **2.5 MW Solar + battery hybrid R&D project (Himachal Pradesh)**- RfS has been issued and last date of bid submission is 25.10.2018
- **250 MW Floating Solar Project in Tamil Nadu** – Feasibility studies undertaken, implementation modalities under discussion
- **40 MWh Battery Storage Project in Tamil Nadu** – Under feasibility assessment.
- **100 MW Floating Solar Project in Jharkhand** – Feasibility studies completed
- **160 MW Solar Wind Hybrid Project in Rajasthan** - Feasibility studies completed
- **10 MW Floating Solar Project in Lakshadweep** - Feasibility studies completed

Project Management Consultancy

- **50 MW for IREDA** - Commissioned.
- **15 MW for Bharat Electronics Limited**- Commissioned
- **5 MW for Bharat Dynamics Limited**- Commissioned; another 5 MW under execution.
- **5.76 MW Rooftop project for GAIL**- Commissioned; another 500 MW under discussion
- **200 MW for Coal India Limited**- Site assessment is under process
- **10 MW at Vishakhapatnam Port**- Commissioned
- **4 MW at New Mangalore Port**- Commissioned
- **8 MW at Banaras Hindu University**- Under execution
- **300 MW for SCCL**- E-RA for 129 MW is on 29.10.2018. Recommendation for placement of LoA being sent by first week of November, 2018
- **3 MW MES Leh** – RfS issued and techno commercial evaluation is under process.

Solar Power to meet Traction Load of Indian Railways

- Utilize the IR owned lands on both sides of the tracks to generate solar power.
- Improves IR's land asset utilization
- Improves aesthetics for Swachha Bharat Mission



Indian Railways: Consumption

- Indian Railways is one of the largest railway networks in the world with 67,368 km of tracks and 22,550 trains, which carry 22.24 million passengers and 3.04 million tonnes of freight every day.
- Railways consume 18.5 billion units of electricity every year. With the plan for complete electrification of broad-gauge railway tracks by 2022 having been approved, power demand by Indian Railways is set to double in the next four years.
- 16 billion units meet the demand for traction power used for running trains.





RE Deployment in Lakshadweep



Project Highlights

Cumulative Project(s) Capacity is 20 MW of Floating solar PV with 60 MWh Battery storage

Project shall be developed by SECI on Design, Build, Finance, Own and Operate basis

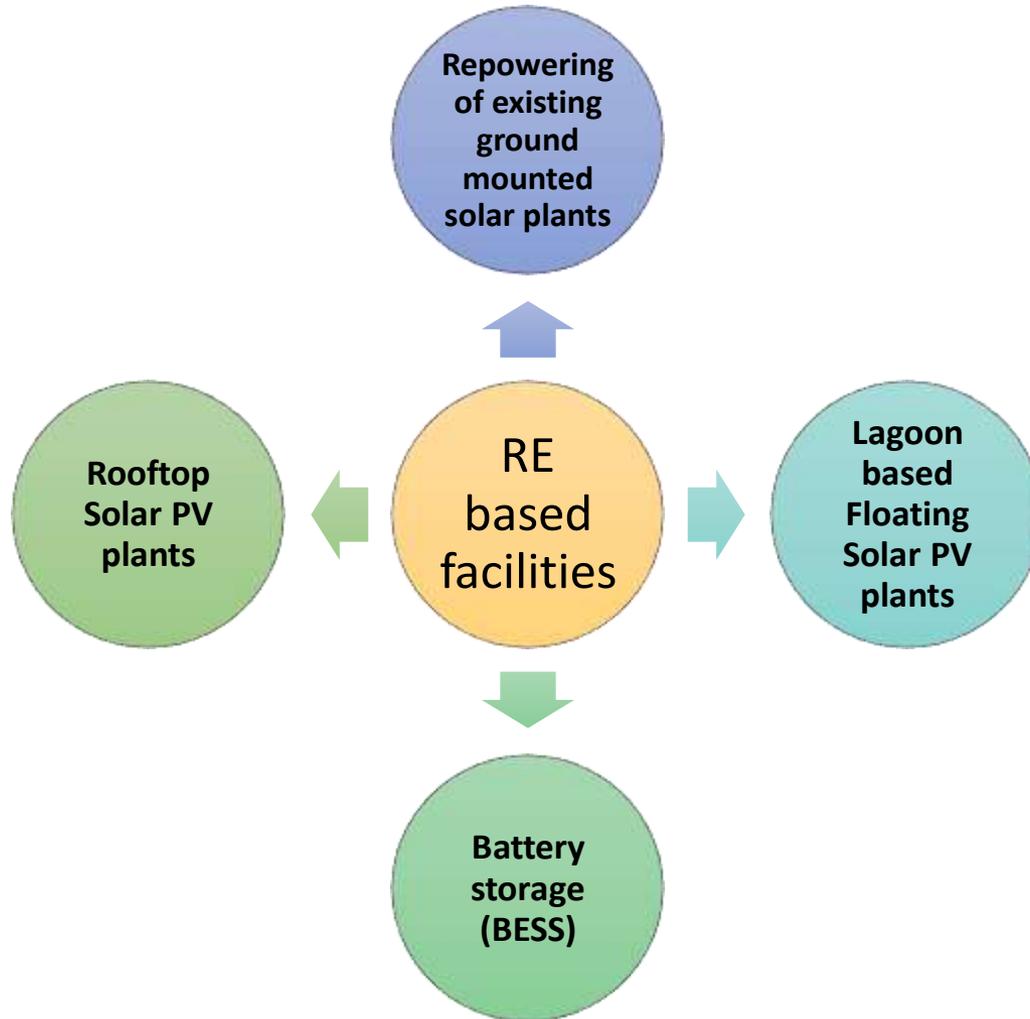
Selection of EPC contactor for the implementation of Project shall be done through e-tendering

PPA/PSA to be signed with Lakshadweep Electricity Department for sale of power on long term basis (25 years)

Tariff shall be arrived on the basis of discovered Project cost after bidding & various techno-commercial assumption considered by Joint Electricity Regulatory Commission in recent tariff order

Project aims at developing optimal system designs with RE + storage + diesel ($\leq 40\%$) at an LCOE~INR 10/kWh (~14 cents) with the option of increasing RE penetration in the near future.

Roadmap to devolve RE based facilities in Lakshadweep





Thank You

