

#### **Solar Energy Corporation of India Limited**

(A Government of India Enterprise)



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Chariot Wheel – Konark Sun Temple, Odisha Konark Sun Temple is a 13<sup>th</sup> Century Sun Temple

> IIT Kanpur, UP 13<sup>th</sup> Feb 2019

#### 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

- सेवी ECI सर्व स्टेव SUN FOR EVER
- 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

#### **Implementation Frame work**





#### **SECI administer Projects under Central Govt. Policies**

#### **Growth of Solar Capacity in India**





#### **Current installed capacity crossed 22 GW**

#### **Tariff Trend in Solar Energy**







#### 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**





### **SECI's contributions in RE Sector**





### **Tenders by SECI for solar projects**





#### Way Forward to Reach 100 GW in Solar





### **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.	Tranche	RfS	LoA	
No.		issued	issued	
		(MW)	(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	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
-	Mahoha Solar (IIP) Private Limited	0.00	2.54	02-Jul-2018 20:09:24 RTZ	500.00
2 17	D-New Salar Power Private Limited	0.00	2.56	02-Jul-2018 19:22:27 RTZ	250.00
-	Fertew Solar Todia 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 MARKETINA PERFORMANCE INNOVATION several elements and factors GOALS PLAN such as the timeline for EGY procurement, the funding efficiency EFFICIENCY and budget, the projected TESTING MANAGEMENT DEVELOPME 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.

#### 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 <u>reducing negative impacts on the environment</u>" (UNEP)

- Life-cycle thinking, wholelife 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-VI).
- 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.

- 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:

Fall in solar tariffs is the result of combination of various factors, most important being the decision of the Government of India to cover solar power procurement by SECI under the ambit of Tripartite Agreement for payment security against defaults by State distribution companies.

Other factors contributing are - higher yield in Rajasthan due to better solar radiation conditions resulting in increasing the capacity utilization factor of the plants, drop in module prices in international market, and strengthening of Indian rupee against US dollar, supported by innovative financing methods adopted by successful bidders.

The Project structure and agreements are acknowledged by international lending agencies as bankable-thus laying the foundation for low cost, long tenure capital flow and to attract large investment in the solar sector.

Though the bids are designed based on the capacity offered, number of market players, business environment of the country, order booking position of the key players along with extensive market research, however, there is every possibility of such success getting replicated elsewhere in other countries with slight modification, if innovative approach as above is followed.



# **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.
   2/19/2019





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## **Floating Solar projects**

- Potential for FSPV: 700 GW
- Target: 10 GW.
- Eol issued for market sensitisation good response received.
- Project Identified for 2.5 GW
  - Rihand- 500 MW, ٠
  - Omkareshwar- 500 MW, ٠
  - Indira Sagar- 1000 MW, ٠
  - Hirakud- 500 MW etc. ٠
- 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 caoacity 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 31<sup>st</sup> 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. 2/19/2019





#### **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	ш	Receipt of Equipment	30	
4	IV.a 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 LOL				



2/19/2019

### **Solar Power Projects - Timeline**



SI. 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 <sup>st</sup> Day of 27 <sup>th</sup> Month	12 months from Date of PPAs	31 <sup>st</sup> March 2022	31 <sup>st</sup> March 2022







#### 20-June-2018

Solar Energy Corporation of India Ltd.

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### **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<sup>®</sup>.





e-TENDERING



#### 20-June-2018

### **E-tendering and Reverse Auction**

#### • Broad Outline of Activities :

- Procure a Digital Signing Certificate (DSC)-Class
   II and above.
- Register on Electronic Tendering System<sup>®</sup> (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 (≤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**

