



## Corporate overview

# The Tata Group

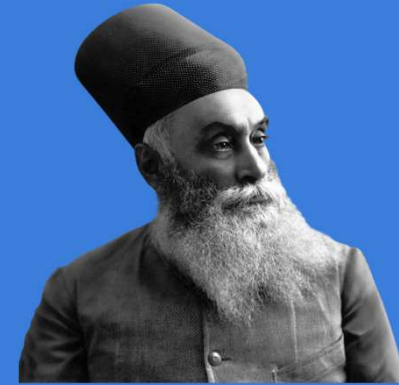
A global business group with revenues of \$103+ billion and products and services in over 150 countries

Over half a million employees and operations in over 150 countries

Group revenue of over 67% generated in geographies other than India

Global leader in several sectors

2/3rd shares of Tata Sons held by charitable trusts



Jamsetji N Tata  
Founder

MATERIALS



ENGINEERING



IT & COMMUNICATION



ENERGY



SERVICES



CONSUMER PRODUCTS



CHEMICALS



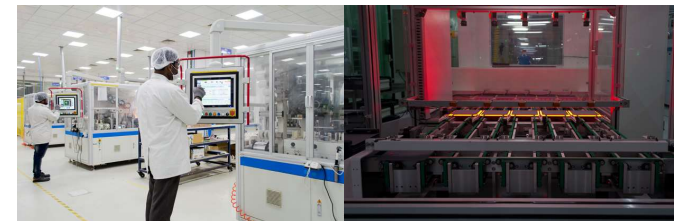
# Parent Organization - Tata Power

- Legacy of over 100 years
- Largest integrated power company in India
- Installed generation capacity of 10,757 MW
- Largest producer of clean and green energy (renewables)
  - Hydro - 693 MW
  - Waste Heat Recovery - 375 MW
  - Solar - 3.8 GW
  - Wind - 1,161 MW



# Tata Power Solar

- Over two decades of pioneering excellence in solar
- Established in 1989, Tata Power Solar (formerly Tata BP Solar) was a joint venture between Tata Power and BP Solar
- As of August 2012, it is a wholly owned subsidiary of Tata Power, India's largest integrated power utility
- Utility projects: 5.4 GW | Rooftop projects: 425 MW | Pumps: 25000
- 1.8 GW of modules shipped globally
- Tier-1 bankable modules backed by high quality materials, best-in-class machinery and specialized workforce



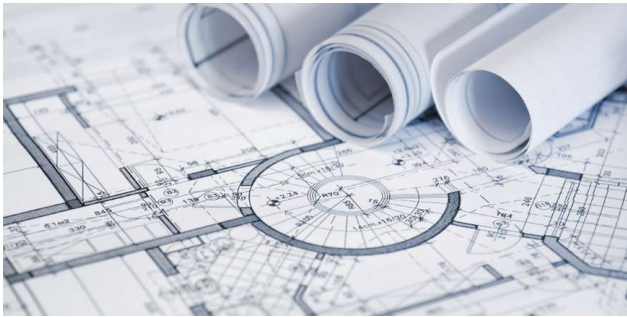
# Key offerings

MANUFACTURING	LARGE PROJECTS	ROOFTOP	PRODUCTS	INTERNATIONAL
<ul style="list-style-type: none"><li>400MW module manufacturing capacity</li><li>Standard (72 cell) and specialty modules (2W-100W)</li><li>Over 1.8GW of modules shipped worldwide</li><li>Both mono and multi modules</li><li>300MW of cell manufacturing capacity with market leading efficiency</li></ul>	<ul style="list-style-type: none"><li>Solar EPC projects with power producers</li><li>5.4 GW of projects commissioned and more under execution</li><li>Wealth of experience in managing utility scale projects</li><li>Strong in-house engineering team with experience of working on global projects</li></ul>	<ul style="list-style-type: none"><li>Over 425MW of rooftop and distributed projects executed</li><li>Rooftop systems in the ranging from &gt; 1kW to multiple MW</li><li>Strong in-house engineering team</li><li>Several financing option available to suit customer requirements</li></ul>	<ul style="list-style-type: none"><li>Solar pumps for agricultural purpose</li><li>25,000 acres of land irrigated till date</li><li>Over 25,000 farmers benefitted across India</li><li>60,000 people get un-interrupted potable water across 200 villages</li></ul>	<ul style="list-style-type: none"><li>Over 1.8 GW modules shipped till date</li><li>Supplies / services in Denmark, United States of America, Canada, Germany, Netherlands, United Kingdom, Malta, Vietnam, Bahrain, Bangladesh, Myanmar and many more</li></ul>

## A recognized market leader



# Our EPC offerings



**Design and EPC services**



**Turnkey solutions**



**Bid advisory**



**End-to-end project management**



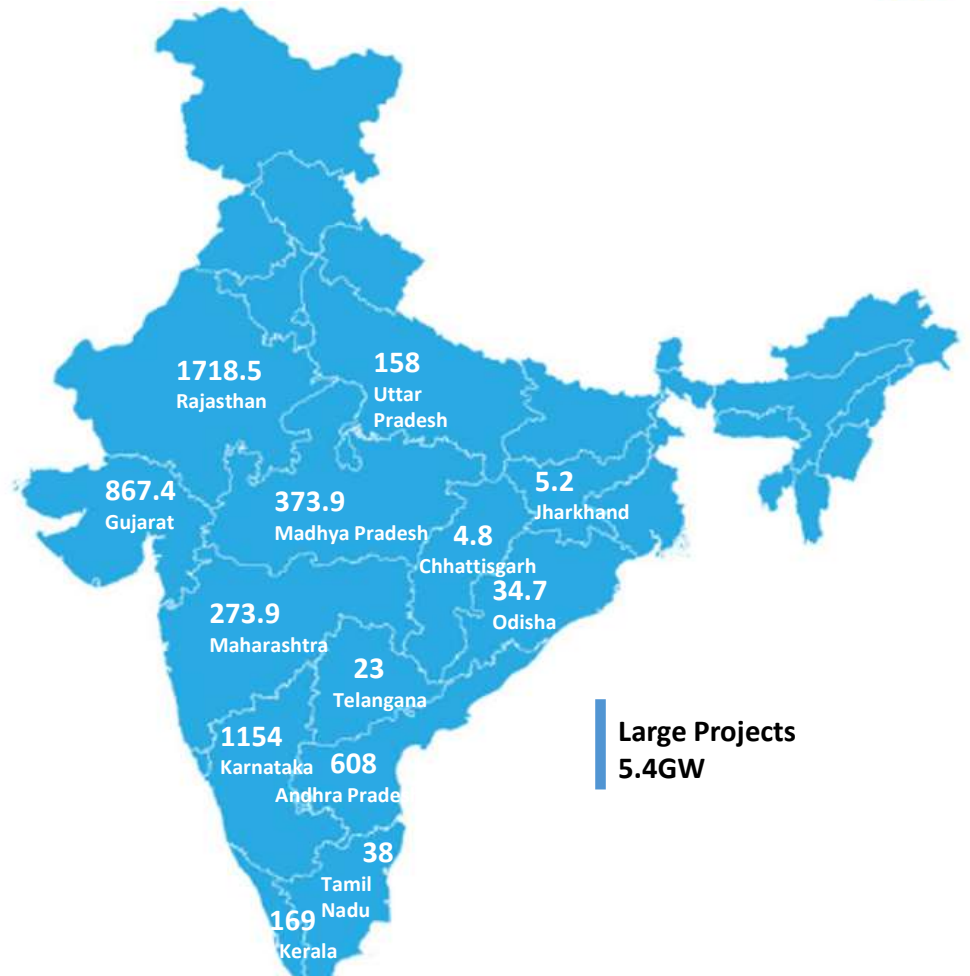
**Lifecycle asset management**



**Mid-life upgrades**

# Large projects portfolio

CLIENT	CAPACITY	LOCATION
NTPC	65 MW	Bhadla, Rajasthan
NTPC	50 MW	Mandsaur, Madhya Pradesh
NTPC	100 MW	Anantapur, Andhra Pradesh
Fortum	87.5 MW	Bhadla, Rajasthan
Solar Arise	67.5 MW	Beed, Maharashtra
TPREL	130 MW	Anantapur, Andhra Pradesh
TPREL	130 MW	Pavagada, Karnataka
TPREL (DCR)	67.5 MW	Pavagada, Karnataka
KREDL	53 MW	Karnataka
Rattan India	54 MW	Katol, Maharashtra
Rattan India	67.5 MW	Pavagada, Karnataka
TPREL	32 MW	Charanka, Gujarat
TPREL	38 MW	Palaswadi, Maharashtra
BPCL	33.5 MW	Bhoruka, Karnataka





# Rooftop projects portfolio

CLIENT	CAPACITY	LOCATION
RSSB-EES	16 MW	Amritsar, Punjab
MRPL	6 MW	Mangalore, Karnataka
CIAL	2.6 MW	Cochin, Kerala
Akshara Textiles	2.9 MW	Sathyamangal, Tamil Nadu
Asian Paints	10 MW	Distributed Locations
Siechem	937 kW	Pondicherry
Best Lan Spintex	2.27 MW	Palani, Tamil Nadu
HP	955 kW	Distributed Locations
IIT Roorkee	1.8 MW	Roorkee, Uttarakhand
RNSIT	200 kW	Bengaluru, Karnataka
Murugan Textiles	2 MW	Palladam, Tamil Nadu
Dell (BIPV)	120 kW	Bengaluru, Karnataka
CCI Brabourne Stadium	820 kW	Mumbai, Maharashtra

\*Capacities in DC



# Over 1.8GW modules shipped globally



## Key clients



## Key installations - Domestic



### **NTPC 100 MW [Anantapur, Andhra Pradesh]**

- | One of India's largest solar project under DCR module
- | Ideal space utilization, keeping 10-15 % space for future expansion
- | Project delivered in record 80% of stipulated timelines, and nearly 3 months ahead of the stringent schedule
- | Optimized BoS leading to cost optimization and reduced timelines



### **RSSB-EES 16 MW [Amritsar, Punjab]**

- | World's largest solar rooftop plant, set up in a single phase on multiple roofs
- | Varying roof profiles, roof types and truss frames
- | Followed world-class safety standard with zero safety incidents, though working on heights with delicate roof material

## Key installations - Domestic



### **Cochin International Airport 2.69 MW**

- | India's largest car port installation
- | Located in Cochin, Kerala
- | The project is a benchmark in terms of engineering expertise utilized in terms of complexities encountered considering the high water levels in backfilled lands.



### **The Cricket Club of India, 820kWp**

- | World's largest rooftop installation atop a cricket stadium
- | Located in Mumbai, Maharashtra
- | Plant will generate over 1.12 million units electricity per year and curb the emission of over 840 tons of carbon dioxide annually

## Key installations - International



**BNRG, UK:** Supplied 20 MW i.e. 78,000 modules for 4 locations



**British Gas Toyota, UK:** 13,000 modules shipped



**Better Energy, Denmark:** 60MW over multiple projects

## Key installations - International



### **F&S Solar, Germany**

| 3.8MW of modules for converting extraction wasteland to a solar plant

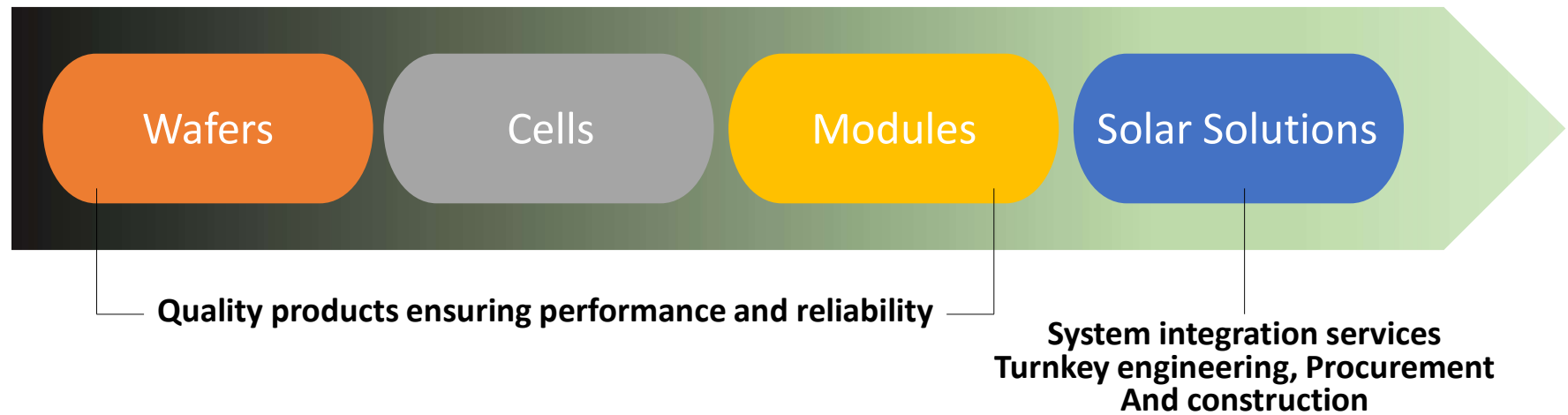


### **Tatweer Petroleum, Bahrain**

| Engineering and module supply for 1MW plant

# Value Chain

Solar cells to solar systems

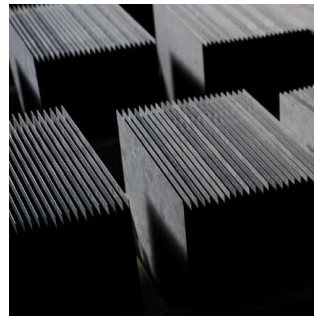


# Manufacturing excellence

Third-party audits and endorsements

## HIGH QUALITY MATERIALS

- | Only carefully selected and high quality raw materials and components go in to our modules
- | Stringent incoming quality checks and vendor evaluations
- | Certified modules i.e. IEC62716 (PID test for 85%/85C for 200 hrs), IEC61701 Salt Mist test(Severity 6) and IEC62804 Ammonia Corrosion test



## BEST-IN-CLASS EQUIPMENT

- | High quality best-in-class equipment and automation
- | Advanced auto-tabber and stringer (closed loop soldering; 1800cells/hr and above)
- | Critical equipment from Europe, Japan and USA

## EXCELLENT WORKMANSHIP

- | Processes established with BP Solar, pioneer in the industry
- | Use of L-bend output busbar - advantageous in terms of protection against hotspot failure
- | Most workers have years of experience in manufacturing modules
- | Extreme focus on quality - Designed to deliver beyond the lab tests



## ASSURED BANKABILITY

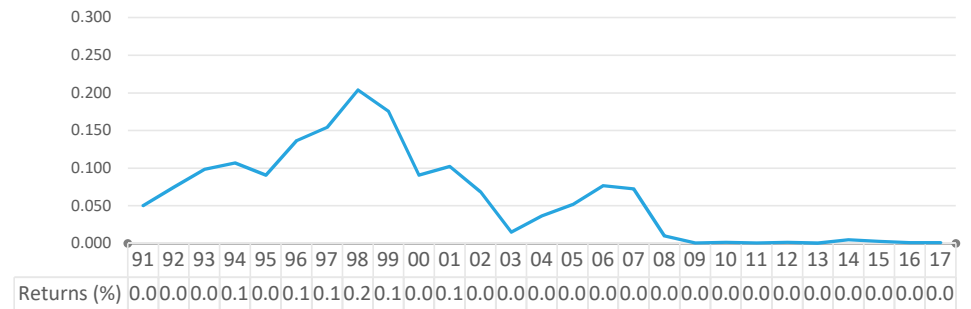
- | Backed by India's largest and most trusted business house - \$103+ billion Tata Group
- | One of the few companies globally with 27+ years of industry experience
- | Tier-1 and bankable player as rated by several rating agencies such as GTM, BNEF



# Quality Strengths

- | EVA - High durability against PID degradation, Snail and UV yellowing
- | 3-layer backsheet ensures excellent resistance against harsh environment and low water vapour permeation
- | Junction box sourced from reputable tier 1 manufacturers to reduce hot spot risks
- | Potted J-Box with IP 67 rating ensures excellent ingress protection performance
- | AR-coating ensures excellent reliability performance
- | Anodized aluminum frame with higher line density ensures strong corrosion resistance and mechanical strength
- | Salt and ammonia resistant frame

27 YEAR EXPERIENCE WITH AVERAGE FIELD RETURNS OF LESS THAN 0.07%.



# Third-party plant audits

## OST ENERGY

TPS panels have a range of certifications which we consider to be in-line with market standards and appropriate for use in the EU and UK  
TPS has provided further data for returns in 2014 which outlines in a satisfactory manner the processes and timings of addressing the warranty claims  
In-house test facilities of TPS is appropriate and they have the expected equipment for development and pre-qualification testing

## B&V

The average change in power for LID was -0.83%. We believe that this a low degradation value for a commercially available multi-crystalline PV module  
We believe in TPS module design and high quality of component solar cells  
All modules undergo an electrical safety test (dry Hipot test)  
TPS uses high quality materials in their module construction  
TPS uses a combination of scrim EVA along with polyester as backsheet which improves longevity and reduces module failures

## LARGE EUROPEAN UTILITY COMPANY

TPS team is very competent with 25 years of experience and very transparent  
Material and supplier management are TPS strengths. TPS has a good laboratory to perform IEC tests and to improve products and processes



# Our modules



60-cell  
multi-crystalline  
modules



72-cell  
multi-crystalline  
modules

## CHARACTERISTICS

- | Range from 230 - 320 Wp
- | Certified internationally by TUV, IEC, UL
- | Positive power tolerance of 0 ~ +5W
- | Torsion & corrosion resistant anodized aluminium frame
- | High energy yield ARC glass
- | Optimized edge clearance for high quality rugged design
- | Ability to withstand high wind pressure and snow loads

## UNIQUE FEATURES

- | Anti-reflective glass [ARC glass]
- | High fill factor cells and modules
- | Ultra-soft interconnect with stress relief
- | Unique output termination using spot soldering
- | Unique backsheet design

## BENEFITS

- | High energy yield
- | Improved energy conversion efficiency
- | Improved product longevity and reliability
- | Use even under corrosive environments

# Pumps Portfolio

STATE PROGRAM	Portfolio (QUANTITY)
RHDS	3842
OREDA	1183
UPNEDA	1650
CREDA	2224
BREDA	809
WB	26
PEDA	1121
Uttarakhand	17
Gujarat	541
Assam	1477
Telangana	23
Jharkhand	59
Andhra Pradesh	391
Maharashtra	10900
Karnataka	51
Total	24,315



# Versatile segments and applications



**Corporates**



**Institutes**



**Industries**

# Versatile segments and applications



**Building-Integrated PV**

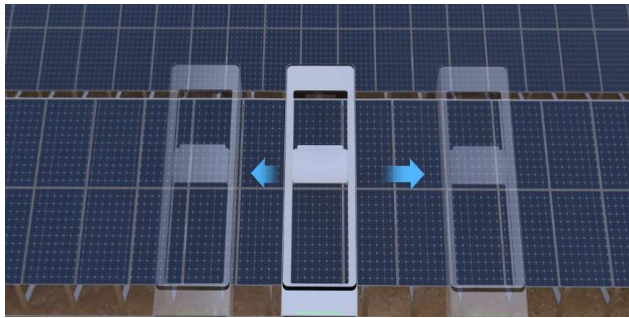


**Carports**



**Offshore Platforms**

# Innovations across portfolio



Solar module cleaning bot



Solar water ATMs



Single/dual axis trackers



Drone-based site surveys



Metal-integrated backsheet



Intelligent Network Operations Center

# Key clients





THANKS

Tata Power Solar is committed to enabling solar everywhere and bringing the power of the Sun to people in the most efficient and cost effective way possible

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