

Approach to Energy Security

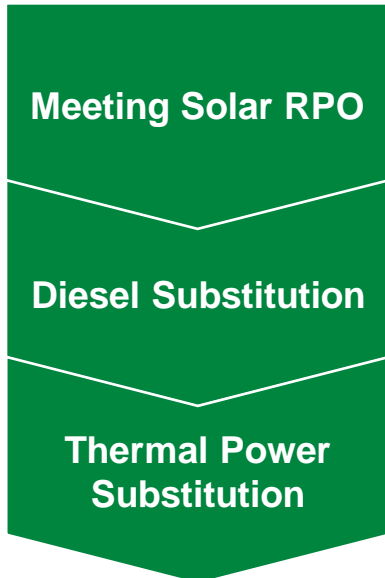
Tata Steel

July 2011



Executive Summary

- Extreme competition for coal reserves and fossil fuel, driven by both developed nations and BRICs is driving prices and volatility at an unprecedented pace
- Renewable energy and in particular solar with its declining cost of power generation (lower than diesel) is increasingly seen as a solution to address energy self sufficiency
- India faces extreme challenges with fuel linkages given the nature of its natural coal reserves and the need to increase its power capacity in the next 20 years
- Large scale solar power generation will not only create a local manufacturing and services value chain that would support over 66,000 people it will also help to preserve the coal mines and ecological security
- As Tata Steel looks to increase its domestic steel production capacity will increase from 6.9MTPA to 23.7 MTPA and its energy and coal reserve requirements will increase 3x
- Solar provides cost saving on three fronts:



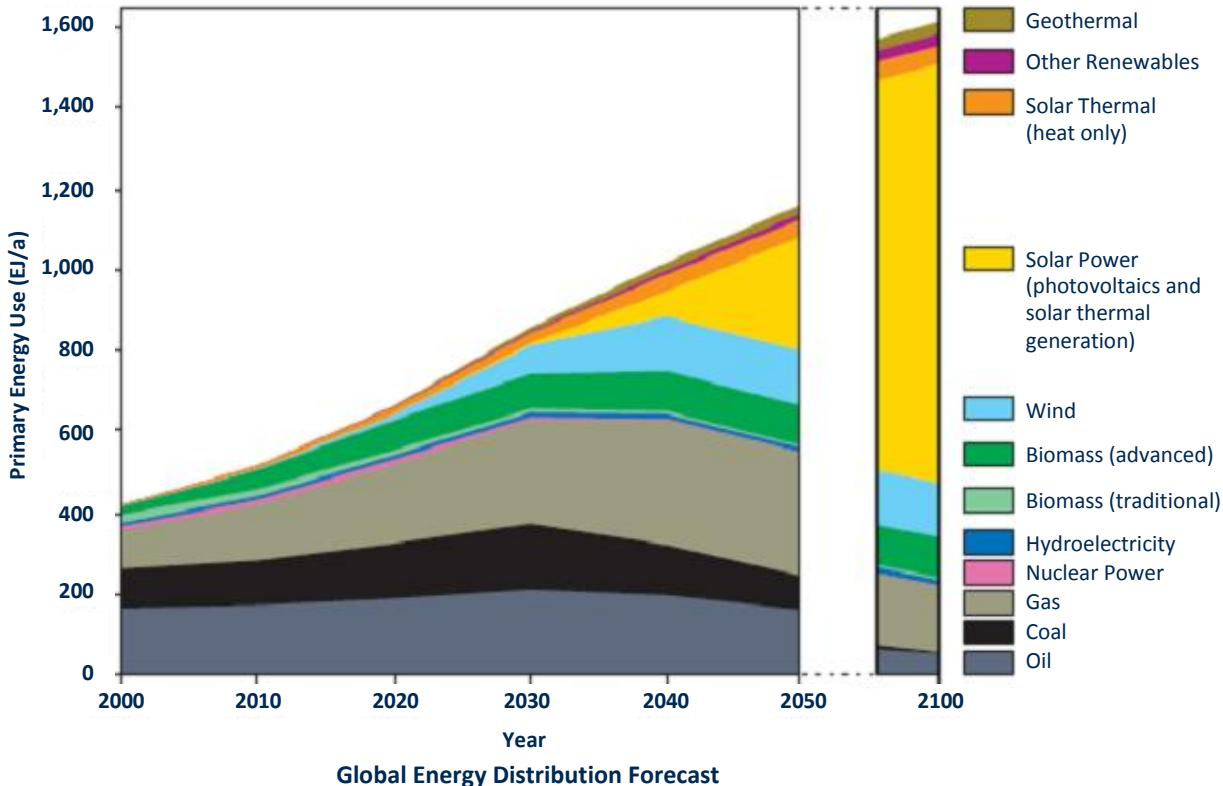
- Solar RPO is a statutory obligation of 0.25% increasing to 3% on captive power and power sourced through open access
- RPO requirements are estimated at 11MW in 2011 to 232MW by 2022
- Today solar power generation is cheaper than subsidized diesel
- Cost savings of Rs 15 crore per MW over 25 years or 60 crores for 4MW
- Solar power is estimated to achieve parity with Tata Steel's thermal power generation by 2016 – 2017
- Cost savings conservatively estimated to exceed Rs 1600 crores over 25 years

Agenda

❖ Why Solar

- ❖ Implications of Tata Steel Growth Plans & Solar
- ❖ Introduction to Astonfield

Fossil Fuels Price Increases and Declining Cost of Renewables Makes it the Perfect Solution for Energy Security

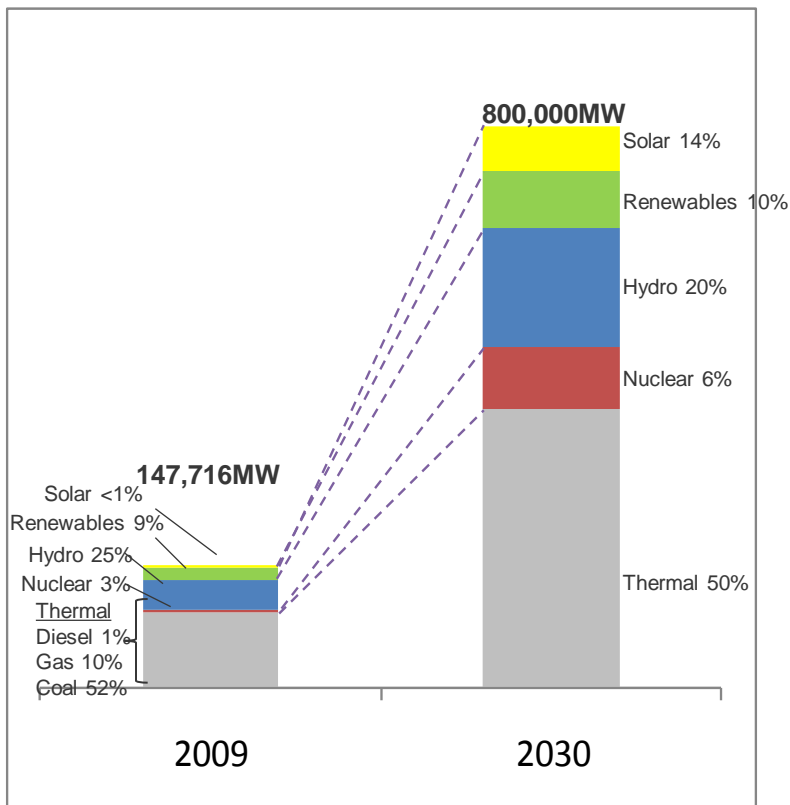


Source: *Climate Change and India*

- Extreme competition for finite coal, gas and oil reserves from developed and BRIC countries is driving volatility prices up at an unprecedented pace
- All fossil fuel sources are vulnerable to price shock and geo location war
- Energy self-sufficiency has become a national priority to prevent over reliance on supply country
- Renewable power capacity represents approximately 5 % and increasing as cost of power generation is increasing
- Renewable resources like wind and solar power are increasingly seen as a solution to address the energy gap and energy security issues in developing countries

India's Power Generating Capacity Will Need to Increase By 5 to 6 Times in Next 20 Years Exacerbating Fuel Linkage Issues

Power Demand to Increase Considerably by 2030, Driving Greater Emphasis on Renewable Energy

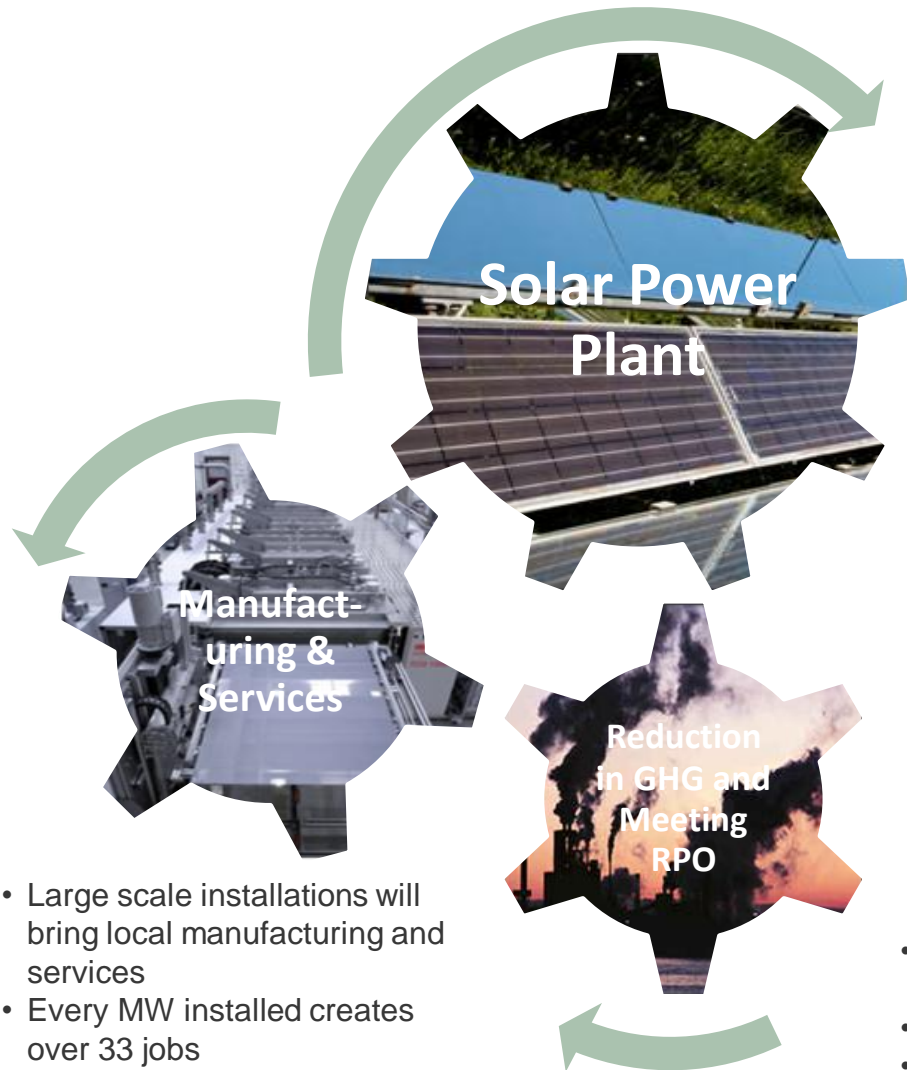


India's Key Energy Challenges

Meeting rising power demand	<p>Current 10GW shortage is expected to increase to 25GW over next 5 years</p> <p>Extreme pressure on coal and fossil fuel sourcing</p> <p>Legacy of missing budget by over 30%</p>
Strengthening energy security	<p>India is the 5th largest emitter of GHG</p> <p>Diminishing supply of domestic coal and lignite fuel sources – expected 45-year lifetime of currently extractable reserves</p> <p>25GW of captive diesel generation has sprung up to support industrial growth – 90+% of fuel is imported</p>
Electrifying the masses	<p>42% of India's population (over 90 million households) have no access to electricity</p>
T&D Losses	<p>High T&D losses from centralized (and often remote) power generation of over 27%</p>

If we do not meet these renewable targets, captive diesel power generation will fill the gap of over 150GW

Solar is the Most Secure Energy Source



- Large scale installations will bring local manufacturing and services
- Every MW installed creates over 33 jobs
- Developing capacity and capabilities in a sunrise industry

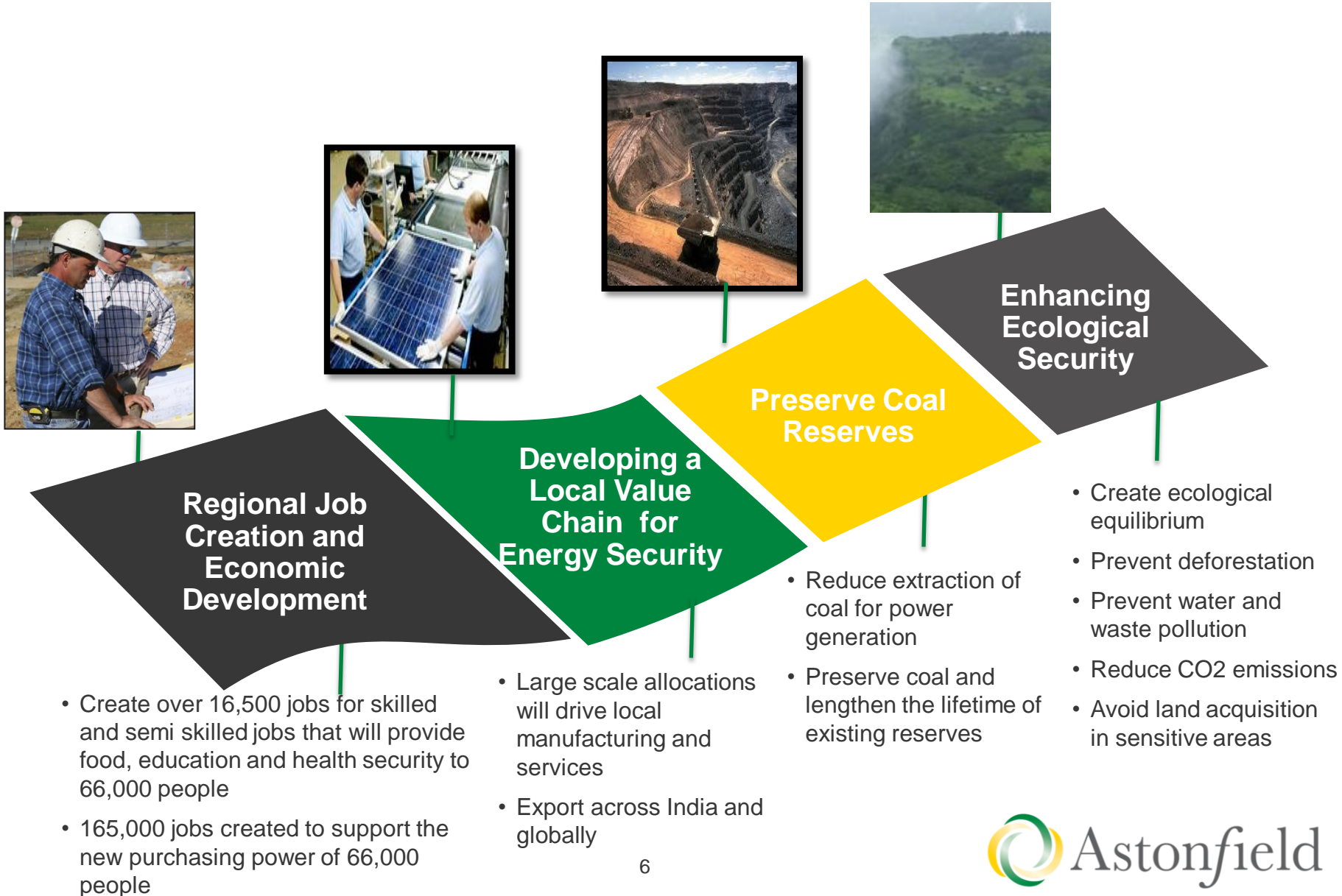
- Abundant sunlight in India blessed with 300+ days of sunshine
- Decreasing cost of power generation
- Tracking to achieving grid parity
- Installations are modular and can suited for distributed or central power generation
- Plants can be built in less than 6 months

Solar is Hassle Free

- Securing allocations for captive coal mines
- Environmental permits 2-3 years
- Land acquisition 3-4 years
- Threat of deallocation
- Mines in India are in tribal areas
- New mining bill - 26% royalty payment

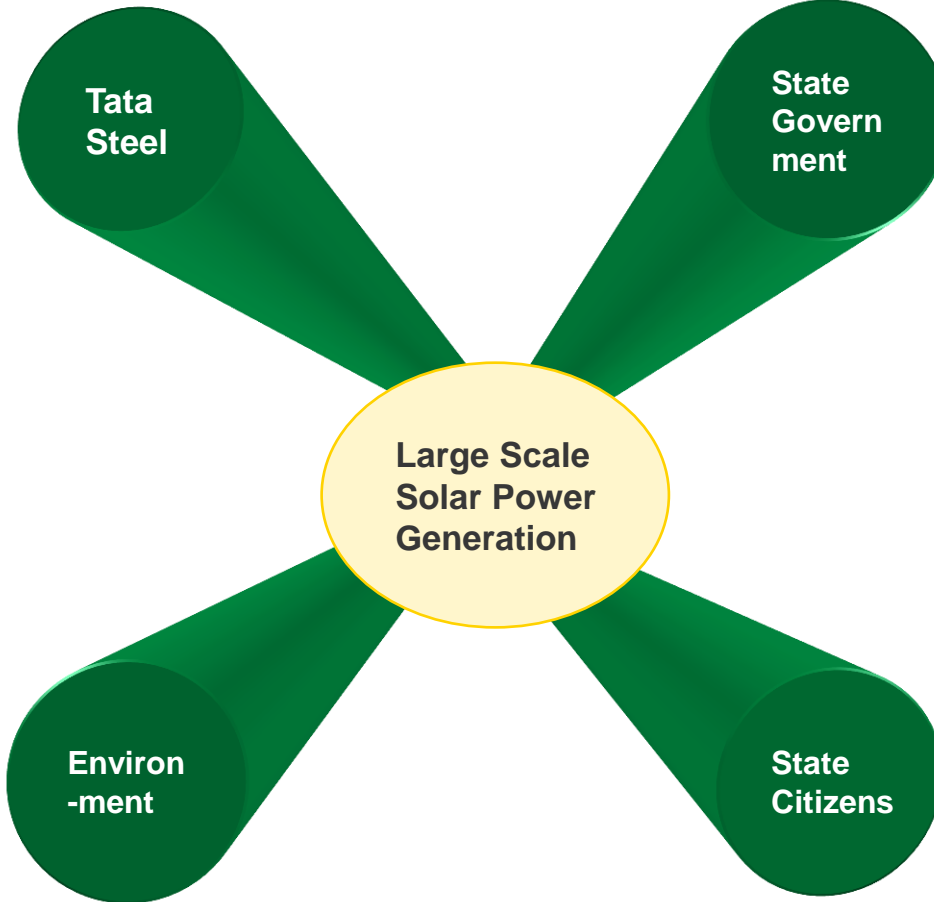
- Solar reduces GHG emissions
- Reduces carbon footprint
- Addresses RPO obligations
- Carbon credit revenues

Large Scale Solar Program will Drive Tremendous Sustainable Development in the Region



Furthermore Solar Creates a Win-Win with all Stakeholders

- Enhance energy security and reducing reliance on coal and diesel
- Meet solar statutory RPO obligations
- Cost savings vs diesel and thermal power generation
- Reduce carbon footprint
- Secure carbon credit revenue



- Preserving and lengthening lifetime of coal reserves
- Creating a local value chain of solar manufacturing and services
- Avoiding land acquisition in environmentally sensitive areas

- Reduction in coal mining would lead to:
 - Less deforestation
 - Less water pollution
 - Less GHG emissions
- Improve ecological sustainability

- Create jobs in a globally emerging sector
- Create food, education and health security for 221,000 citizens

Agenda

❖ Why Solar

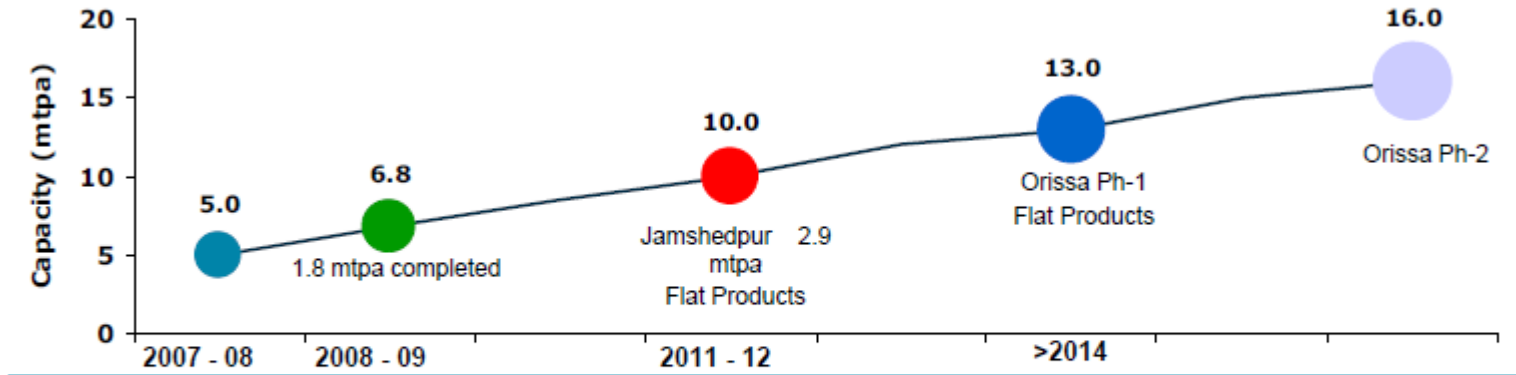
❖ Implications of Tata Steel Growth Plans & Solar

❖ Introduction to Astonfield

Tata Steel Energy Requirements – As We Know It

- Tata Steel – Fortune 500 Company
- World's seventh largest steel company
- Looking to expand capacity from 6.8MTPA to 23.7 MTPA over the next 10-15 years
- Tata Steel derives much of its advantage as a low cost producer from the quality and yield of its raw material sources
- Current expansion plans are based on brownfield and greenfield expansions

Expansion Projects



Expansion projects in pipeline:

- Chattisgarh (5mtpa) and Karnataka (3mtpa) under active review


Expansion plans are putting significant pressure on sourcing coal and iron ore and ensuring there is raw material security

Assumptions – Tata Steel Expansion Plans & Status

Project	Planned Capacity Expansion	Energy Linkage & Security	Year of Commissioning
Jamshedpur	2.9 mtpa	100% Secure with captive West Bokaro coal mines + 2,500 MUs supply agreement with Tata Power; Additional Coal mine at Karanpura applied for	2012
Orissa	6.0 mtpa (in phases of 3.0 mtpa each)	2 coal mines applied for (Talcher & Ib River)	Assumed 2015 – Ph 1 Assumed 2017 – Ph 2
Chhatisgarh	5.0 mtpa	1 coal mines applied for (Raigarh)	Assumed as 2020
Karnataka	3.0 mtpa	Coal mines to be applied for	Assumed as 2023

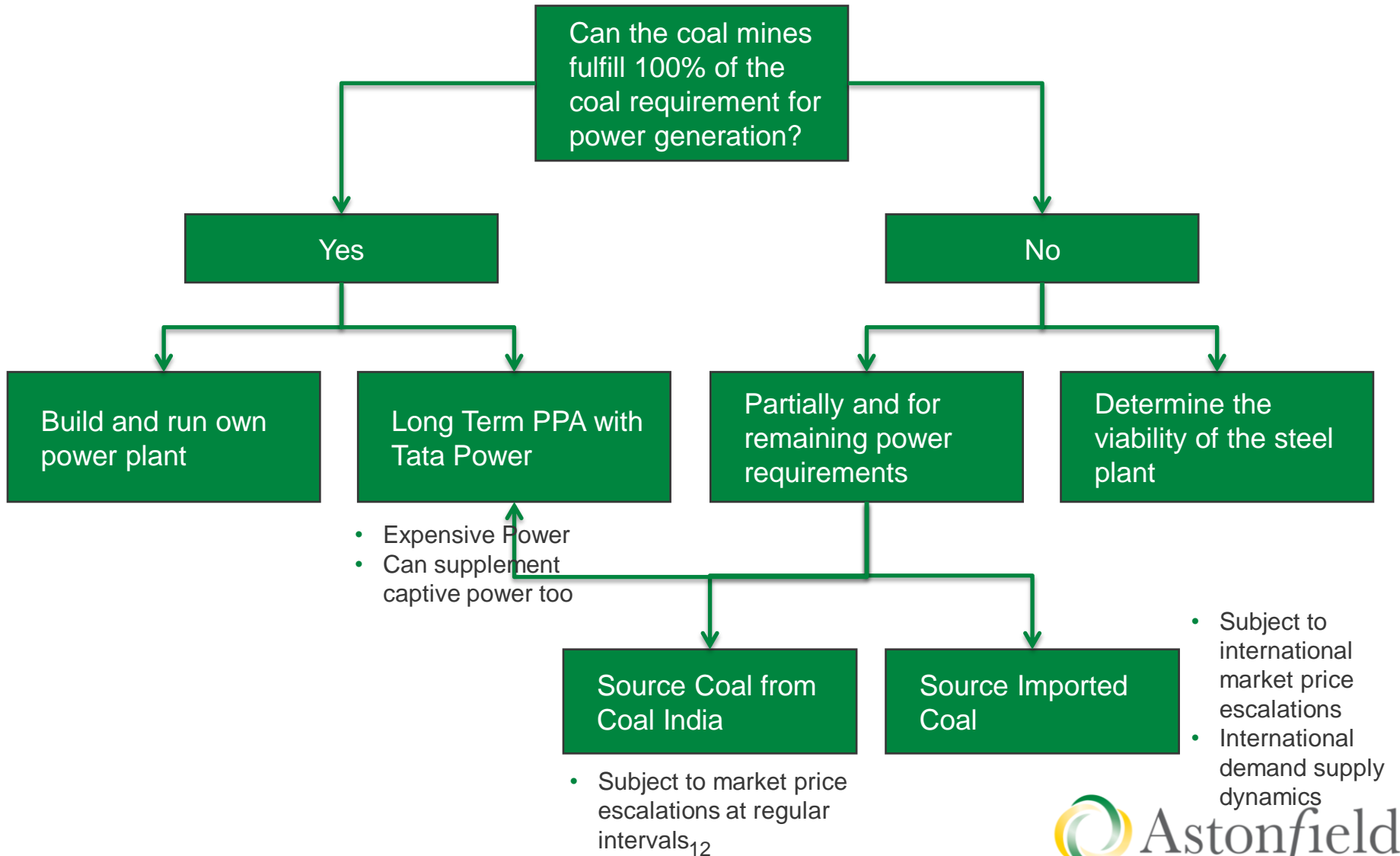
- Critical to have sufficient iron ore and coal reserves
- To date, based on publically available information, no PPAs have been signed or power plants planned for growth beyond Jamshedpur brownfield expansion
- Coal linkage from captive, domestic or imported sources – A definite must-have

Assumptions – Energy & Coal Requirements Roadmap

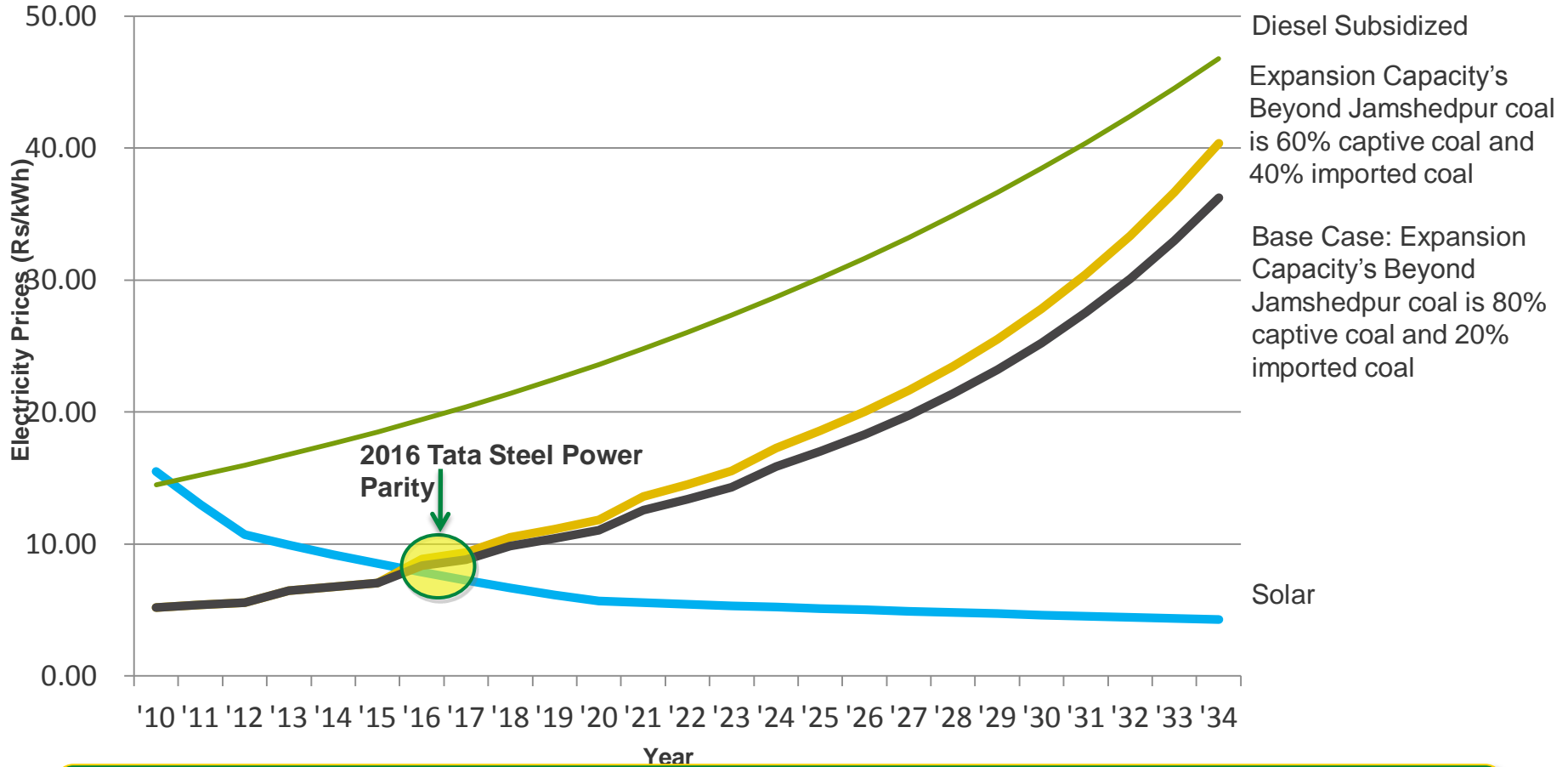
Key Expansions 	Existing Tata Steel Capacity at Jamshedpur	Tata Steel Expansion at Jamshedpur	Orissa	Chattisgarh	Karnataka
Cumulative Steel Processing Capacity (mtpa)	6.8	9.7	15.7	20.7	23.7
Expected Commissioning	Existing	2012	2015 & 2017 (in two phases)	2020	2023
Energy Requirement (mupa)	3,450	5,000	8,000	10,500	12,000
Coal Requirement for power (mtpa)	1.7	2.5	4.0	5.2	6.0
Desired Reliance on Captive Coal	100%	100%	80%	80%	80%

- It is assumed that beyond Jamshedpur expansion, up to 80% of coal needs will be addressed from captive coal mines
- Remaining coal linkage to be obtained from domestic or imported coal markets

Current Approaches to Addressing Increasing Need For Coal – Coal Reserves are Mission Critical



Solar is already cheaper than Diesel and will achieve price parity with Tata Steel power by 2016-17



- Solar is cheaper than diesel - savings of Rs 15 crores per MW over 25 years
- Solar tracking rapidly to parity with Tata Steel power

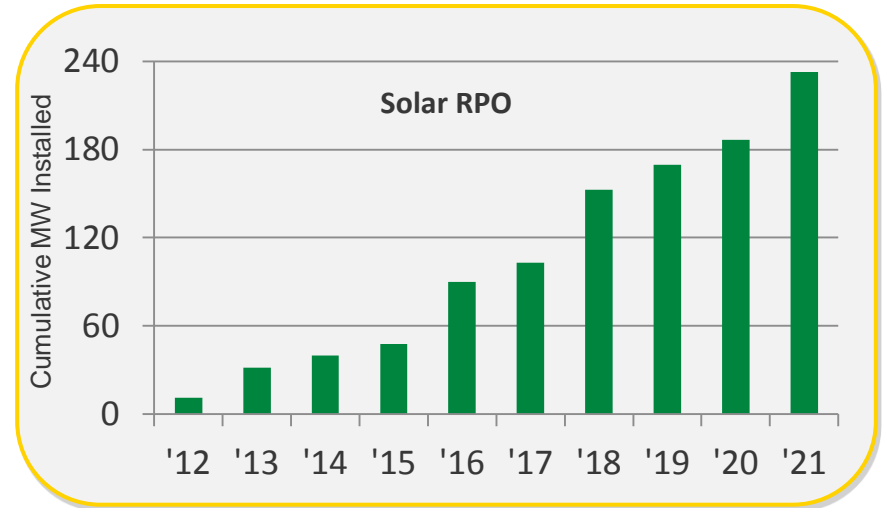
Note: Assumes that diesel power escalates at 5% and captive coal at 6.6%; Solar tariff based on what we expect to deliver

Sources: CERC, India Energy Exchange, MNRE, Astonfield Analysis

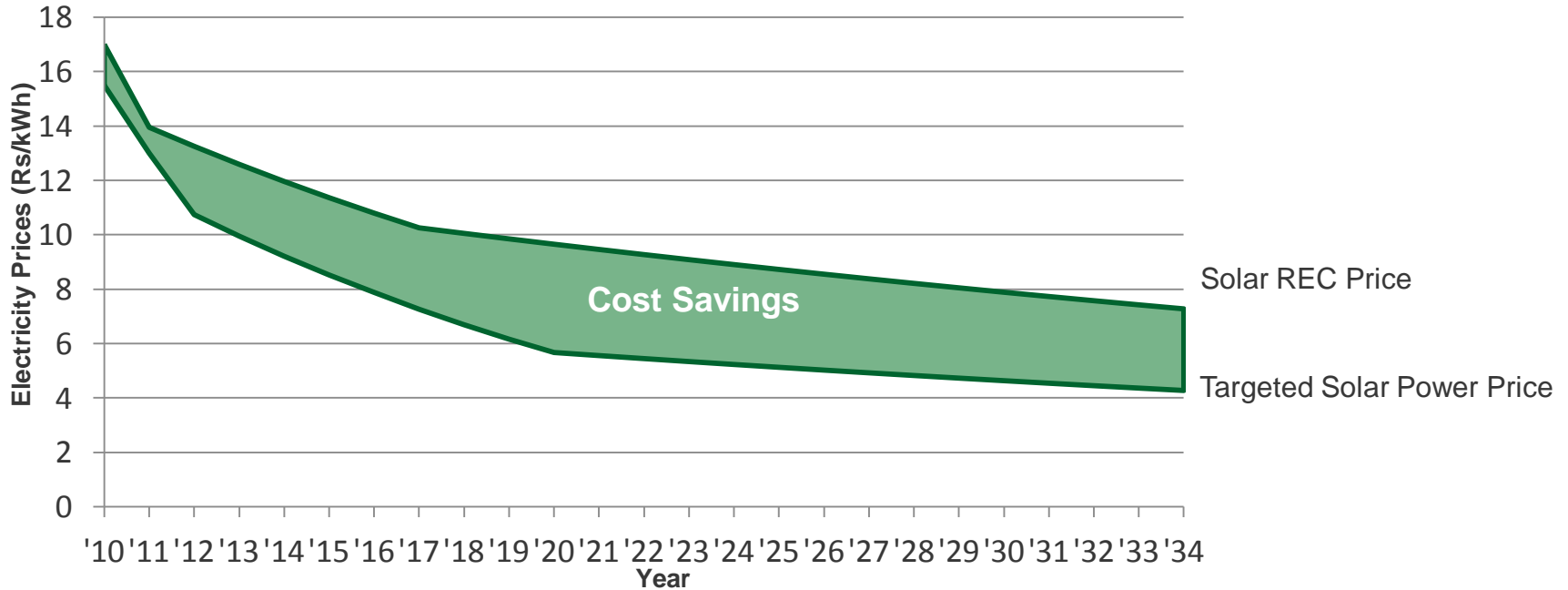


Solar RPO Targets for Tata Steel Given Projected Growth

- Procuring Solar power is a must for all captive and open access consumers like Tata Steel
- **Today, Tata Steel India consumes 3,450 MUs of electricity, which is expected to increase to ~12,000 MUs by 2022, as per its growth expansion plans**
- As per legislation, Tata Steel has Solar RPO obligation
 - 11 MW Solar installed in 2012
 - 232 MW Solar installed in 2022
- In case of failure to buy Solar Power to fulfill its Solar RPO, Tata Steel will have to buy expensive Solar RECs on Power Exchanges to fulfill the obligation, with forbearance price of **Rs. 13.95 per kWh** consumed

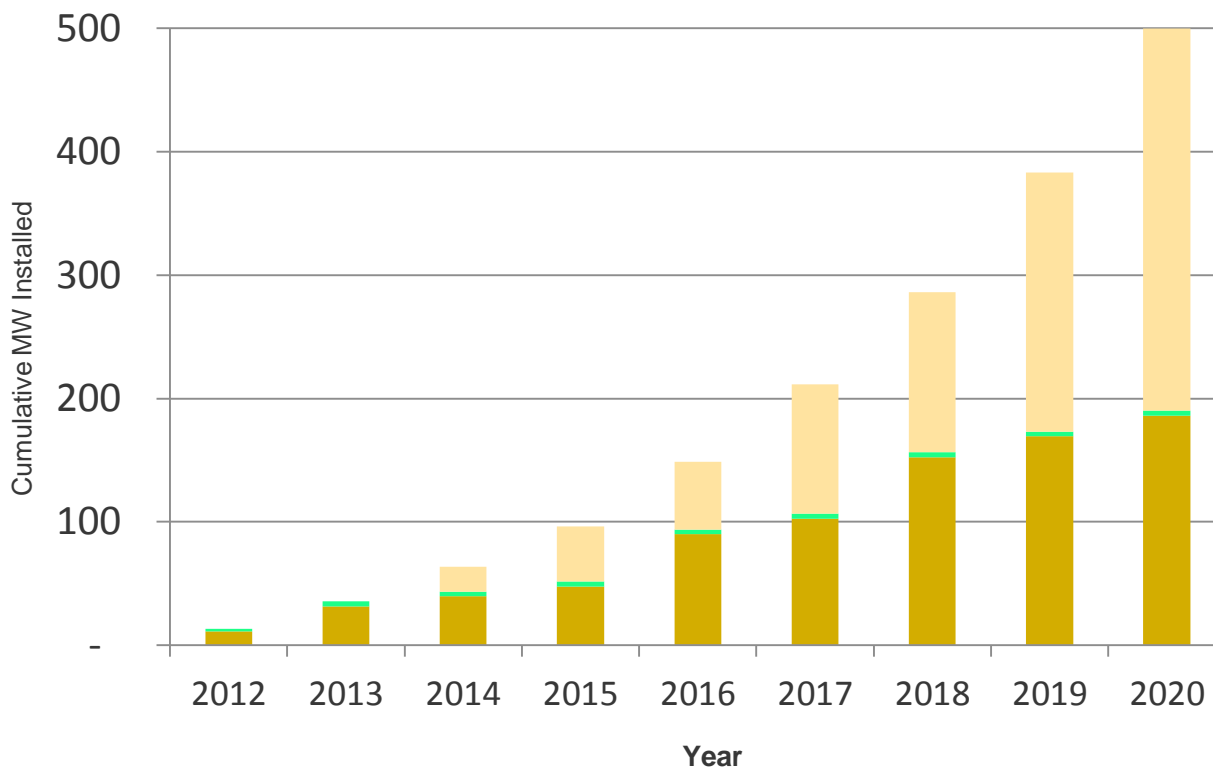


Benefits of Purchasing Solar Power vs Buying REC



- With highly unpredictable REC market and shortage of Solar RECs on power exchanges, RECs are becoming a risky proposition for its buyers
- To fulfill Solar RPO, power from the Solar Program will result in **savings to the order of Rs 400 Crores** in 25 years (discounted cashflow basis), as compared to buying RECs
- Buying Solar will also secure supply of dedicated clean energy ~500 MW

Solar Ramp Up Against RPO, Diesel Replacement & Coal Savings Will Provide Phased Approach to Energy Security

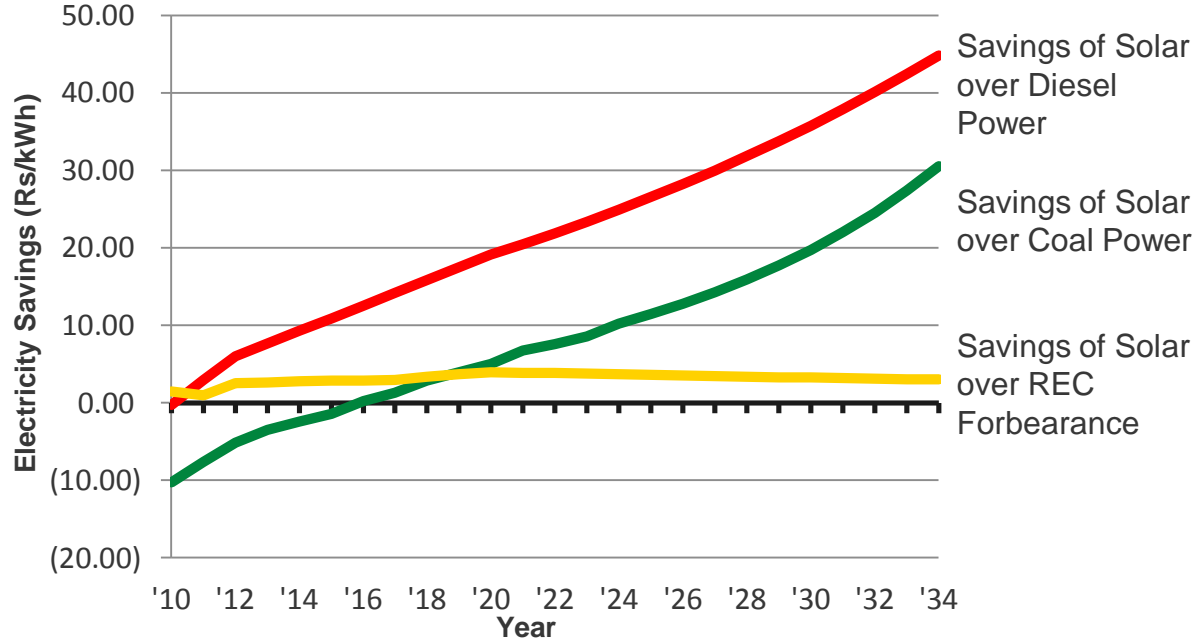


- Rampup against coal
- Diesel replacement
- Solar RPO

- Adopting Solar will decrease the Company's Carbon Footprint, which is one of the key features of Tata Group's Legacy
- Solar will be free from pollution and other health hazards associated with Coal
- In the process, Tata Steel will also progress towards its goal of energy security

Cumulative Solar MW Installed	13	36	64	96	149	212	286	383	500
Energy * Addition in Million Units	20	55	99	150	231	328	444	594	775

Aggregate Cost Savings from Using Solar on a Per Unit Basis



Cumulative Cost Savings Over 25 Years

RPO Cost Savings	Rs 400 Crores
Thermal Power Cost Savings	Rs 1,600 Crores
Diesel Cost Savings	Rs 100 Crores
Total	Rs 2,100 Crores

- Solar results in positive cashflows as compared to diesel power and REC forbearance price, making it an obvious choice for cash savings
- Though coal based power is cheaper than solar in first few years, once they hit parity in 2016, it leads to substantial cost savings from Solar, over the life of the project

Tata Steel Can Decide From Variety of Possible Models

Long Term PPA	Build-Own-Operate-Transfer (BOOT) Model	Private Public Partnership (PPP) Model
<ol style="list-style-type: none"> 1. Tata Steel does not bear any development, execution & operational risk for 25 years 2. For 25 years, the solar energy thus generated is purchased by Tata Steel at agreed price 3. Tata Steel gets energy security and it alongside supports its carbon abatement & clean energy procurement agenda 	<ol style="list-style-type: none"> 1. Tata Steel does not bear any development, execution & operational risk for XX years 2. For XX years, the solar energy thus generated is purchased by Tata Steel at agreed price 3. Asset ownership transferred to Tata Steel at pre-agreed residual value after XX years 	<ol style="list-style-type: none"> 1. Under PPP model, Tata Steel & Astonfield co-develop the solar energy plants, and bear all development, execution & operational risk 2. For 25 years, the solar energy thus generated is purchased by the state of Jharkhand at agreed price, thereby addressing its RPO 3. After 25 years, the ownership of plants is transferred to GoJ

Note: Number of years after which the asset will be transferred (XX) can be discussed and finalized mutually by Tata Steel and Astonfield



Path Forward

Partnering together to address key questions

Astonfield	Tata Steel
•How will complete confidentiality of the concept be maintained as we work together?	•Is Astonfield the partner of choice to provide best in class solar solution to Tata Steel?
•How can we develop a deeper understanding of Tata Steel's energy needs and energy insecurities?	•What is the upside and downside of Tata Steel pushing forward with a large scale solar program?
•How can we develop an operating model that creates a win-win for both companies in the short term and long term?	•Will the RPOs be reinforced in the short term and long term?



- Sign NDA
- Engage in a consultative dialogue to understand requirements and benefits
- Appoint working teams

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Introduction to Astonfield

- Privately-owned multinational company with one of the largest executable portfolios of solar assets in India approaching 800MW's through 2015
- First company in India to secure non-recourse, 14 year project finance from State Bank of India and EXIM Bank of India for solar PV projects
- Established strategic partnership with T-SOLAR of Spain, a top 3 global solar IPP with USD 2 Bln of Capex already executed and operational assets exceeding 170MW's in Europe
- Headquartered in Malta; operational offices in Mumbai, Delhi, Calcutta & New York
- 40+ professional staff (36 in India); core competencies centered around:
 - government relations
 - business development
 - procurement & engineering
 - finance

THE WALL STREET JOURNAL.

Recognized for their leadership in the Renewable Energy marketplace, Ameet Shah and Sourabh Sen, Co-Chairmen of Astonfield, have been featured as guest columnists on the Wall Street Journal Blog, India Chief Mentor.

The Formula to Fuel Energy Growth: Sun and Scale

By Ameet Shah and Sourabh Sen



NEW ENERGY FINANCE

KEY PLAYER PROFILE

VOL. V | ISSUE 25 | MAY 2008

ASTONFIELD CO-FOUNDER BETS BIG ON SOLAR IN INDIA

Astonfield co-founder Sourabh Sen is riding high on his \$2bn plan for renewable energy in India, having already secured approval for 328MW, but he wishes the government would do more to help.

- By Kavita Kaur

Besides solar, Astonfield is investing in biomass projects. The firm has secured approval for plants with 110MW of capacity, mainly in Bihar, and has submitted applications for a further 54MW. (See map for location of Astonfield's permitted solar and biomass projects).

Astonfield has partnered with global technology leaders to deliver world-class solar energy solutions at scale



EPC & O&M Service Provider

- One of largest system installers in the world – known for rapid and low-cost installation
- Likely to be first to indigenize balance of system manufacturing in India
- Schneider Electric built one of the first MW scale solar PV projects in the country at Pune, Maharashtra



• Strategic Partner for 200MW in India for Next 3 Years

- T-Solar's installed capacity of 168MW makes it a leader in the generation of photovoltaic power worldwide
- To the end of 2010, the company had invested more than €1.16bn in its business plan
- Has its own manufacturing plant in Orense (Galicia)
- T-Solar produces the largest modules (5.7m²) available on the market, using amorphous silicon thin-film technology.

Astonfield has partnered with global technology leaders to deliver world-class biomass and waste to energy solutions



- **Strategic Partner and Turnkey Project Implementation**
- Over 2,900MW of installed biomass capacity in 100 plants worldwide
- Proven track record in India with execution across multiple sites and established Indian office
- Heavily invested in Astonfield partnership via 40% equity stake in projects
- Partnership's first project is 10MW biomass plant in West Bengal, which will begin construction in 2010

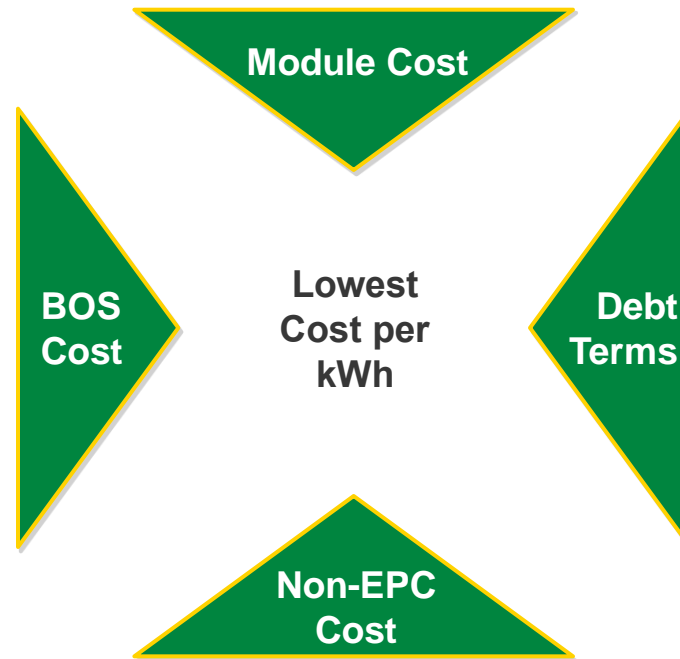


- **Site Design and Full Operations & Maintenance Services**
- Second largest waste management company in the world, with over 100,000 employees across more than 70 countries
- The only company that handles all forms of waste at every step in the waste management process
- A global business with French Headquarters and 8 offices across Asia
- Partnership's first project is 57MW Municipal Waste-to-Energy project at Dhapa, Kolkata

Astonfield Maintains Cost Leadership and Delivers Profitable and Fully Financeable Projects

- Technology choice
- Seasonal timing of procurement
- Strategic partnerships with suppliers
- Exploring newly commercialized technologies

- Optimize scope (Astonfield vs. EPC)
- Strategic inverter sourcing
- Standardized design
- Higher efficiency modules



- Increase debt tenor through export-assisted financing or multi-lateral support
- Reduce cost of hedging international debt
- Proven track record will reduce cost of Indian debt after first projects

- Lease land where possible
- Reduce IDC and DSRA costs after first few projects
- Minimize contingency through predictable execution plan

Astonfield Targets Commissioning 31.5MW of Solar PV by March 31 2012 in Phase I of Its Capacity Rollout

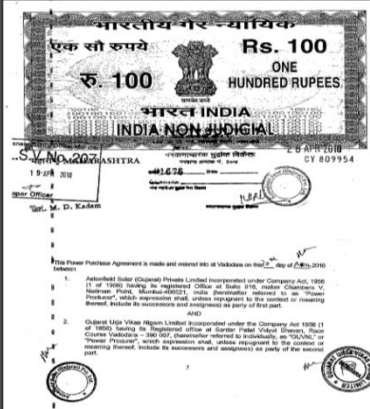
Osiyan, Rajasthan:
5MW Solar PV



National Solar Mission
Migration MOU Executed

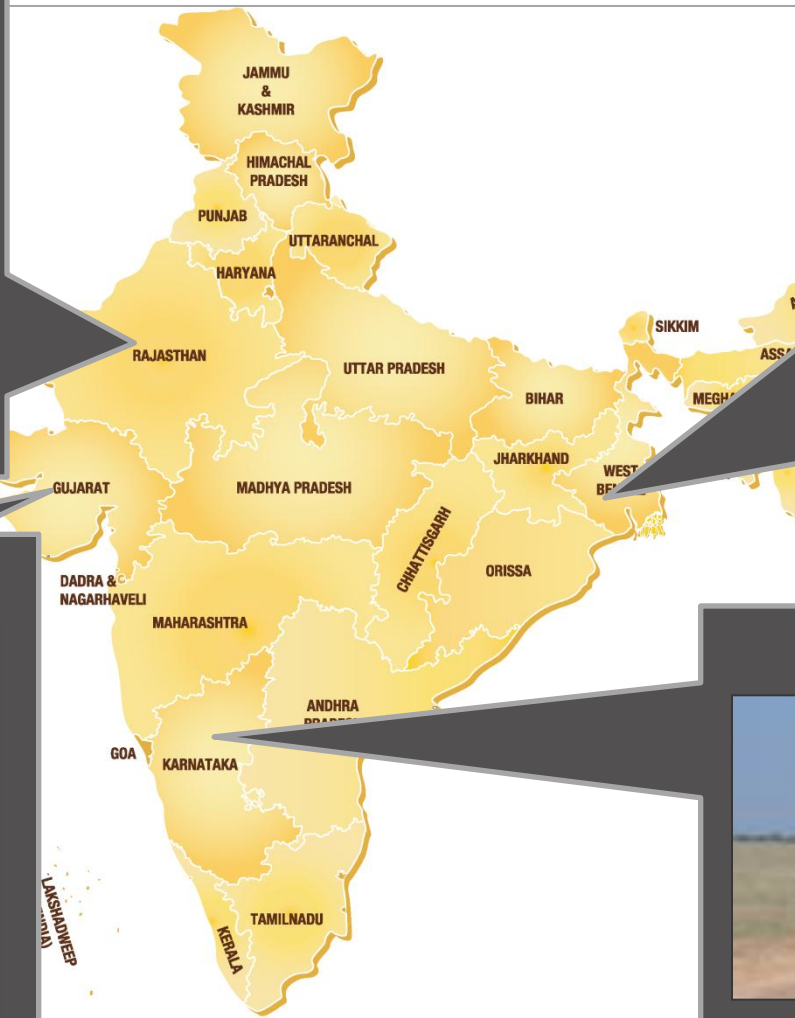
185 acres land acquired

Patan, Gujarat:
11.5MW Solar PV

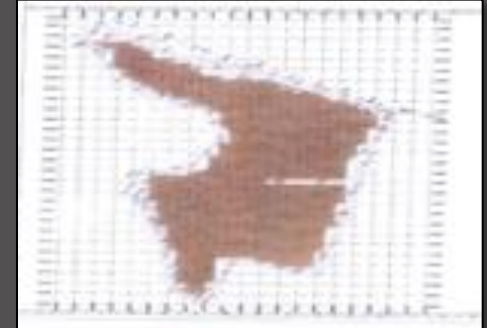


State Program PPA Executed

150 acres land being finalized



Bankura, West Bengal:
5MW Solar PV



35 acres land acquired

Belgaum, Karnataka:
10MW Solar PV



74 acres land acquired