



VEDANTA RESOURCES

This is a proposed diversification strategy for Vedanta into the Solar Energy sector in the background of 'Make in India'

Finalist – ***Metamorphosis competition***

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Tejas is proud to present the award-winning articles of its flagship whitepaper competition ***Metamorphosis***, conducted during IIMB's 3-day business fest ***Vista*** (2015). Tejas congratulates the winning teams for their outstanding performance and thanks all participants for their dedicated efforts.

The *Metamorphosis* challenge: The vision of '*Make In India*' is holistic development in infrastructure, manufacturing, renewable energy, and other key sectors. Large conglomerates are in a position to provide strategic impetus to drive domestic growth, as they have huge capital outlay and managerial talent. At '*Metamorphosis*', Tejas challenges participants to develop expansion and diversification strategies for a specific company, by capitalizing on *Make in India* initiatives. The strategy should consider regulatory framework, government involvement and subsidies, resource outlay, and potential challenges in implementation.

Disclaimer: These articles are participant entries submitted in the ***Metamorphosis*** competition. These have not been edited by Tejas, nor does Tejas endorse the views expressed in these articles. All articles have been published with the express permission of the participants.

Vedanta's foray into energy of the future

Company profile

Vedanta Resources plc is a global diversified metals and mining company headquartered in London, United Kingdom. It is the largest mining and non-ferrous metals company in India and has mining operations in Australia and Zambia and oil and gas operations in three countries. Its main products are copper, zinc, aluminium, lead, iron ore and petroleum. The company is principally owned by Indian billionaire Anil Agarwal with a 61.7% stake in the business.

Portfolio of large, structurally low cost, long life Tier-I assets.

Significant near term growth with well invested asset base not requiring large capex

Well positioned to capitalize on India's and Africa's growth and natural resource potential

Operations across India, Africa, Australia and Europe

FY2015 EBITDA of Rs. 22,226 crore

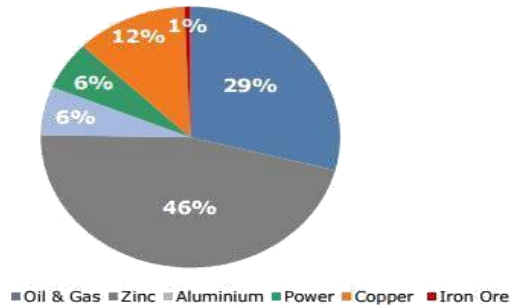
Focus on disciplined capital allocation and balance sheet management

Positively contributing to India.

- Contribution of Rs. 27,900 crores to Indian Exchequer
- Direct and indirect employment to c.69,000 people
- Community investment of c. Rs. 170 crore benefiting 2.8mn people globally

Product Portfolio in India

Diversified Business Model....
EBITDA Mix² for Q1 FY2016



Zinc

India's largest and world's second largest zinc miner- holds 78% market share in India's Zinc industry.

Owns 64.9% stake in Hindustan Zinc Limited (HZL), while the GOI retains a 29.5 % stake. HZL has facilities in Rajasthan & Zinc, lead & silver processing and refining facilities in Uttarakhand.

Oil and Gas

Comprises the assets of Cairn India (now merged with Vedanta) contributing over 25% of India's annual production, as India's largest private sector crude oil producer.

Iron

Major supplier to the domestic market with the Goa iron ore mine also serving the Chinese and Japanese export markets

Have large iron ore mines and pig iron plants in Goa and Karnataka

Copper

34% market share in India's Copper industry

Serve over 800 small and medium enterprises (SMEs) in the downstream industry for the critical electrical sector and defence sector

3 captive power plants located in Thoothukudi, southern India, & a refinery and two copper rod plants operating in Silvassa,

Aluminium

Largest aluminium producer in India with a capacity of 2.3 mtpa and a 48% market share in India's Aluminium industry

Include a refinery and a 90 MW captive power plant and a smelter and a 1,215 MW captive power plant at Odisha

Power

Four units of 600 MW each) thermal coal-based commercial power facility at Jharsuguda and Talwandi Sabo Power Limited (TSPL), a wholly owned subsidiary of the Vedanta Ltd

Leading wind power producers in India with a capacity of 273.5 MW, commissioned by HZL, and 100 MW power plant at MALCO Energy Limited situated in Tamil Nadu in Southern India

Government priorities that has an impact on Vedanta

Housing for all by 2022: 60 million houses in urban and rural areas

Make in India: Import substitution and employment generation

Digital India: Digitally empowered society and knowledge economy

Smart cities: Large investment on urban infrastructure

Power for all by 2019: Focus on energy efficiency, smart grids, coal and gas availability and renewable energy

Regulatory Updates

Iron Ore: Mining leases renewed at Goa, operations resumed at Karnataka and Goa, export duty reduced, supportive state government

MMRDA Act passed: Provides for auction of natural resources; strong incentive for state government given auction revenue + DMF + 80% Royalty goes to the state's kitty

O&G: Revenue sharing regime replacing production sharing model for auctioning marginal fields

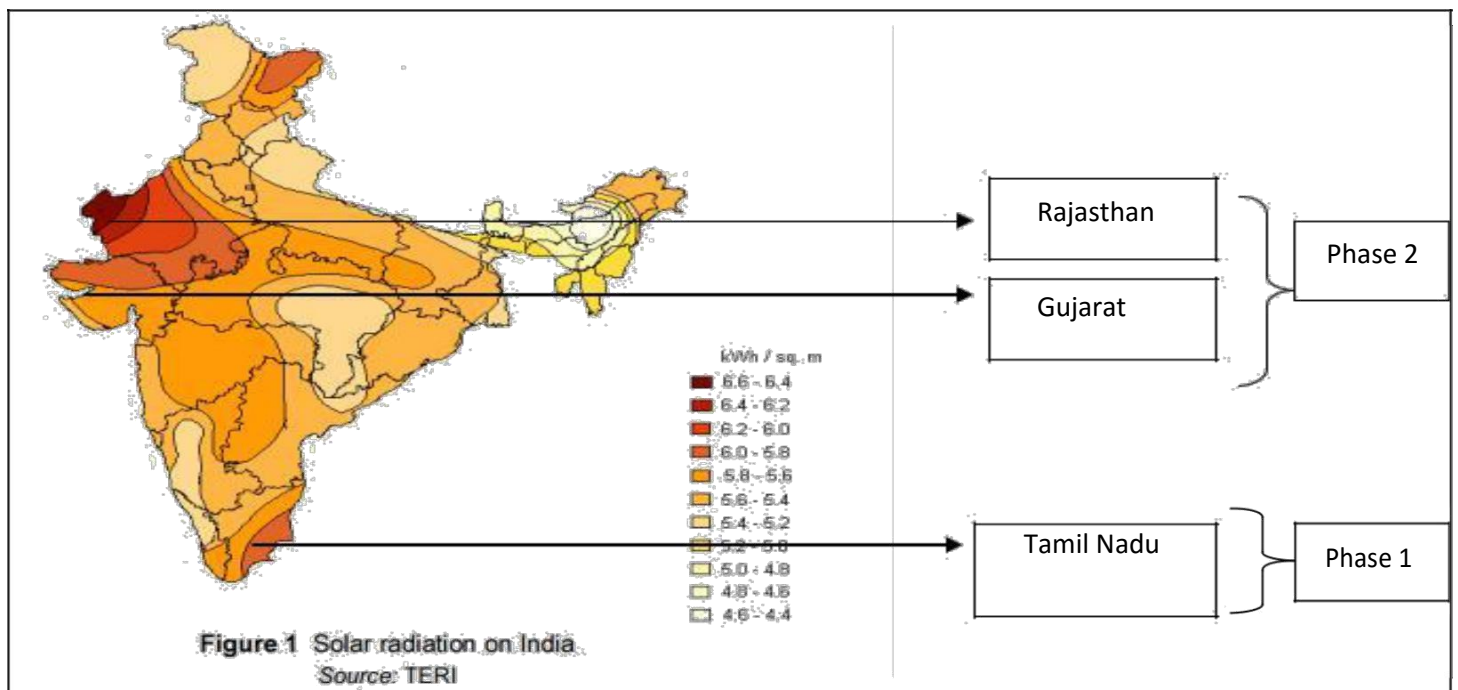
Coal block auctions initiated

Proposed diversification

We propose a diversification into solar sector. Currently, the company is having only 3 power plants in India none of which are solar. Solar power is going to play a crucial role in India's Energy portfolio though there are only a few players now. The company is a strong player in natural resources and has refineries and factories across the country. The proposed entry into solar power will be in line with the core strategies of the company that is sustainable development, long term perspective and growth. The company can make use of its resources and its capabilities in power generation to enter into the new sector. Being a cash rich company, it will be able to invest in the development of solar power generation.

From Make in India perspective - India has the fifth largest power generation portfolio worldwide with a power generation capacity of 245 GW. Economic growth, high, urbanization and rising per capita energy consumption has widened access to energy in the country. The Jawaharlal Nehru National Solar Mission aims to generate 20,000 MW of solar power by 2022, creating a positive environment among investors keen to tap into the solar photovoltaic industry. The mandate of the Solar Energy Corporation of India (SECI) facilitate the implementation of the National Solar Mission and the achievement of targets set therein like developing solar technologies and ensuring inclusive solar power development throughout India.

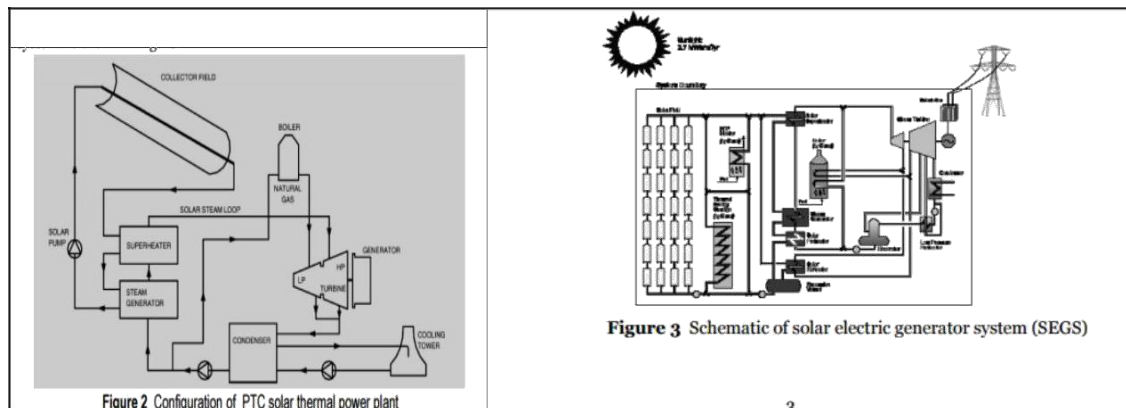
Comprehensive implementation strategy and resource outlay



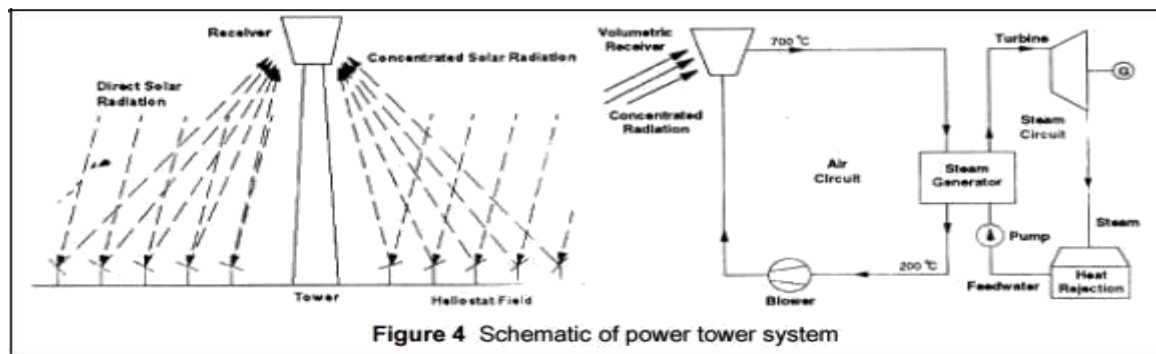
As Vedanta has a strong foothold in Tamil Nadu, which also happens to be a suitable place to harness solar energy, the strategy should be to develop a solar power plant in this state. They are one of the leading wind power producers in India with a capacity of 273.5 MW, in Tamil Nadu. They can channelize the investments in expansions at their current nacelle and blade facility in Tamil Nadu. Development of tools for construction and erection activity and moulds for existing and new models for India will be the other investments. If they are using CSP (Concentrated solar power technology) hybridization is possible where coal, gas or biomass-based power plants already exist such as in Rajasthan and Tamil Nadu with sufficient land for commissioning CSP plants. It helps CSP integrate with other thermal-power-generating sources very easily and allows availability of solar power on demand even when there is no sunlight. It helps accommodate infirm powers like wind or solar PV into the grid. Hybrid CSP plants enhance grid flexibility and have positive consequences on CSP's like cost reduction and improved performance.

CSP are of three types:

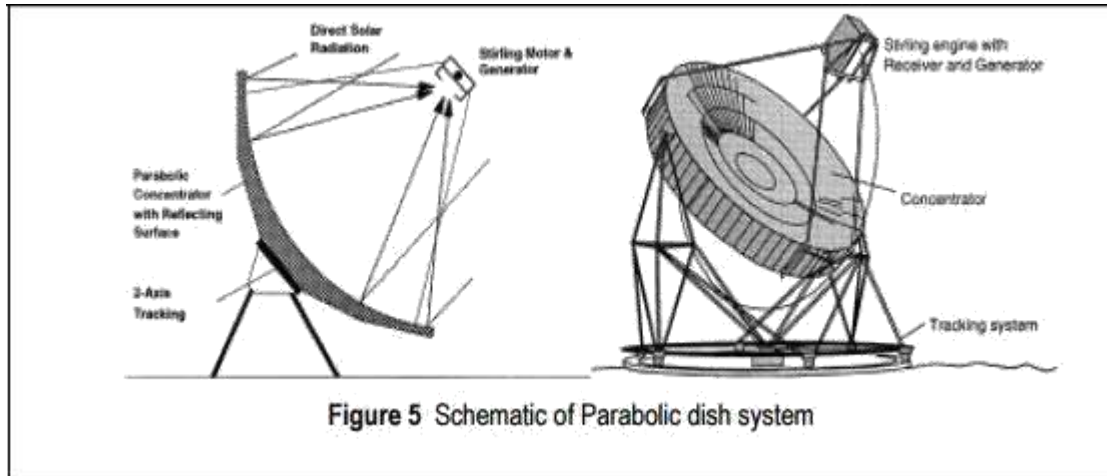
Parabolic trough system: at the receiver can reach 400° C and produce steam for generating electricity.



Power tower system: at the receiver, where temperatures well above 1000° C can be reached



Parabolic dish systems: 1000° C at the receiver, achieve the highest efficiencies for converting solar energy to electricity.



As part of make in India, there is an allocation of INR 5 Billion towards the proposed ultra-mega solar power projects in Rajasthan, Gujarat, Tamil Nadu and Ladakh. The Solar Policy of Rajasthan notified in 2011 envisages the setting up of solar manufacturing facilities at proposed solar parks. The Gujarat Solar Park also makes special provisions for encouraging on-site manufacturing facilities.

Other incentives offered by the government for the development of the sector include:

- Exemption from excise duties and concession on import duties on components and equipment required to set up a solar plant

- 10-year tax holiday for solar power projects

- Wheeling, banking and third party sales, buyback facility by states

 - Guaranteed market through solar power purchase obligation for states

 - GBI schemes for small solar projects connected to a grid below 33KV

- Reduced wheeling charges as compared to those for conventional energy

- Special incentives for exports from India in renewable energy technology under renewable sector-specific SEZ

 - Payment security mechanism to cover the risk of default by state utilities/discoms

 - Subsidy of 30% of the project cost for off-grid PV and solar thermal projects.

- Loans at concessional rates for off-grid applications

Challenges

Technology is evolving and there are frequent upgrades and improvements in the solar systems installed which means significant costs

Non-compliance with renewable purchase obligation. If the power purchase agreement (PPA) is not very stable and bankable it will make investments non-viable and reduce confidence in the ecosystem. Government issued tradable renewable energy certificates (RECs) but REC trading flopped in India

Land acquisition-both the prices and fragmentation of land (generating 1 MW of solar power requires 5 acres of land over which the photovoltaic cells, or PVs, are spread)

No national-level uniform policy framework and delay in the disbursement of the subsidy on the part of MNRE/IREDA

Foreign investment strategy

Sun Edison, renewable energy giant in California signed agreements to build 10 gigawatts of solar and wind power in Karnataka and Rajasthan by 2020. They struck a joint venture with Adani Enterprises to explore building a \$4 billion silicon solar plant in Gujarat. Tata Power Solar, a JV between Tata Power and British Petroleum (BP) Solar has commissioned a 2 MW solar power plant in Tamil Nadu, considered to be the largest rooftop facility in South India.

Vedanta can also look at such partnerships and ventures where innovative financing will create win-win situation and can drive significant upfront value for project developers. Differentiating models could include teaming with technology providers from low cost financing countries like Japan or partnering with companies which have expertise in the renewable energy domain in foreign countries and looking for a way to enter the Indian market like Sun Edison.

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