

PGENERAL UNDERSTANDING OF THE BROAD SCOPE

1. ABOUT VEDANTA LIMITED, JHARSUGUDA, ODISHA, INDIA

Vedanta Limited, a subsidiary of Vedanta Resources Limited, is one of the world's leading diversified natural resource companies with business operations in India, South Africa, Namibia, and Australia. Vedanta is a leading producer of Oil & Gas, Zinc, Lead, Silver, Copper, Iron Ore, Steel, Aluminium & Power.

Good governance and sustainable development are at the core of Vedanta's strategy, with a strong focus on health, safety and environment, and on enhancing the lives of local communities. The company has been conferred with the CII-ITC Sustainability Award, a FICCI CSR Award, Dun & Bradstreet Awards in Metals & Mining, and The Great Place to Work Award.

For two decades, Vedanta has been contributing to India's growth story. The company is among top private sector contributors to the exchequer with the highest ever contribution of INR 42,560 Crore in FY 2019. Vedanta's operations contribute 1 per cent to India's GDP as per the IFC report.

Vedanta Limited is listed on the Bombay Stock Exchange and the National Stock Exchange in India and has ADRs listed on the New York Stock Exchange.

Vedanta Limited is a premier manufacturer of metallurgical grade alumina and other high-quality aluminium products, which are used by a wide gamut of industries. The company traces its origins to the early years of the current decade when Vedanta Resources, the parent company, was increasingly diversifying its operations and expanding its presence in the domestic and global aluminium market. Driven by the endeavour to establish a subsidiary that would have a significant presence in the aluminium sector, Sterlite Transmission Ltd was incorporated on 18th January 2001. Subsequently, the name of the company was changed to Vedanta Alumina Ltd on 20th January 2004 to rebrand the firm in consonance with its operations and then renamed as Vedanta Limited on 25th August 2007. This heralded the beginning of the firm's journey towards operational excellence based on technological advancements coupled with a keen focus on sustainable development.

In 2007, Vedanta Limited began the progressive commissioning of its 1 MTPA state-of-the-art Greenfield alumina refinery project and an associated 75 MW captive power plant at Lanjigarh, Odisha. Subsequently, the firm charted out plans for a Greenfield 0.5 MTPA aluminium smelter and a 1215 MW captive power plant at Jharsuguda, Odisha; the first phase of the aluminium smelter project was commissioned in June 2008.

The Greenfield refinery at Lanjigarh became operational in 2008 and has carved out a niche for itself as one of the world's premier alumina refining complex. In January 2009, VL was awarded the ISO 9001:2008, ISO 14001:2004 and OHSAS 18001 - 2007 certificates for adopting global standards in quality, environment and health and safety systems. The certificates were awarded after a five-day audit by British Standard Institute (BSI) covering quality, environment and safety standards.

Jharsuguda is the site for our Aluminium Smelter, Captive Power Plant and an Independent Power Plant. Jharsuguda is situated in the western part of Odisha. National Highway no-69 and State Highway No-10 passes through this place. Jharsuguda is situated at 335 km from Bhubaneswar, 310 km from Raipur and 619 km from Kolkata. It is well connected to major cities of India through the rail network and Airport "Veer Surendra Sai". The details of these projects are given below.

- 1- 1.6 MTPA Aluminium Smelter.
- 2- Two power plants with a combined capacity of 3615 MW.
- 3- Rail infrastructure for Coal, Aluminium & finished product.
- 4- A state-of-the-art modern township

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2. ABOUT THE SITE WHICH IS COVERED UNDER THE SCOPE OF THIS EOI



Aluminium Smelter-1 plant is GP320 state of the art prebake technology pot featured with high efficiency & centre point feeding technology supplied by GAMI China having a total designed capacity of 0.5 Million Ton Per Annum of Aluminium Production. The plant consists of two Potlines e.g. Potline number 1 & 2 which consist of 608 pots. To serve these two Potlines, one carbon plant (comprising of two GAP of capacity 35 MT/Hr each, two Bake Ovens with total 986 anodes per day in 28 hours fire cycle and one Rodding plant with capacity of 68 anodes per hour with two shift operations), one cast house (comprising of three Ingot Casting Machine of capacity 25 MT/Hr each, two wire rod mills of capacity 8 MT/Hr each, one billet casting facility having one casting pits of capacity 120kT/annum and one Slab casting m/c with capacity 100 kT/annum), one Switchyard & Rectifier 400/220/33 kV, Utilities (water, compressed air etc.) and technological vehicles (ATV,LTV,LTTV etc.) are there with other assets and facilities.

Aluminium Smelter-2 (Special Economy Zone) plant is GP340 state of the art prebake technology pot featured with high efficiency & centre point feeding technology supplied by GAMI China having a total designed capacity of 1.1 Million Ton Per Annum of Aluminium Production. The plant consists of four Potlines e.g. Potline number 3, 4, 5 & 6 which consists of 1322 pots, out of which presently 860 pots are operational and plan for ramp up in place. To serve all these four Potlines, one carbon plant (comprising of two GAP of capacity 35 MT/Hr, three Bake Ovens with total 15 fire with a capacity of 144 anodes per fire per day and one Rodding plant with capacity of 160 anodes per hour), two cast houses (comprising of four Ingot Casting Machine of capacity 30 MT/Hr each, four wire rod mills of capacity 15 MT/Hr each out of which two can be operated as Cast bar line as well with capacity 65 kT/Annum each, three billet casting facility having three casting pits of capacity 120kT/annum each, one saw casting machine with capacity 100kT/Annum), one Switchyard & Rectifier 400/220/33 kV, Utilities(water, compressed air etc.) and technological vehicles(ATV,LTV,LTTV etc.) are there with other assets and facilities.

3. POTLINE, RECTIFIER & SWITCHYARD CONFIGURATION DETAILS

Each Potline in Both the smelters consist of 2 pot rooms, each room consist of 4 sections and one section consist of 38 pots (in smelter-1) and 42 (in smelter-2, except two sections where 31 pots in each section). Each potline is having a control room equipped with the master SCADA which is further connected with each pot through local microprocessors called pot controller for pot parameters optimization & control. The pot cavity consists of twenty-seven cathode assemblies & forty single anode assemblies installed. Four collector bars got fixed to each cathode at the rate of two per side. There are two anode beams which firmly holds all the forty anodes (twenty on each side). Five Risers acts as input upstream for pot current feed. Five crust breaking & feeding system with one AIF3 feeder are installed in each pot along with one manual breaker at tapping end of the pot. The pot is completely sealed and covered with fifty-four number of aluminium hoods weighing maximum 5 Kg each. The overhead cranes also named as PTM (Pot Tending Machine) does all day-to-day activities of pot room such as anode change, anode covering, bath tapping, metal tapping, beam raising etc. Technological vehicles such as LTV (Ladle Transfer Vehicle), ATV (Anode Transfer Vehicle), LTTV (Ladle Transfer & Tilting Vehicle) etc. are being used for routine operations.

In both the Smelters Potlines have state of art fume treatment plant (Alumina dry scrubbing technology) supplied by Chalieco in smelter-1 and GE Power India (previously ALSTOM) in smelter-2. Both the smelters are having compressor houses to supply compressed air for various processes. Combination of dense phase & hyper dense phase, belt, and air slides conveying technologies are adopted for Alumina unloading, transportation, storage and distribution

Rectifier & Switchyard in Smelter-1 receives power from 9X135 MW CPP which is having generating transformers of 220KV voltage level through dedicated transmission lines. The function of rectifier units is to convert the AC power generated into DC for feeding the pot line to carry out reduction process. VAL, smelter-1 has 2 pot lines each consisting of 5 units (n+1 configuration) of 87.5 KA rectifier system. The rectifiers continuously feed current of 333KA to the pot line. Each rectifier unit consists of a regulating transformer, a rectifier transformer, and 2 diode cubicles and associated cooling systems. Each unit can deliver a maximum of 87.5 KA. As the total pot line current requirement is 333 KA.

Rectifier & Switchyard in Smelter-2 receives power from 4X600 MW TPP which is having 400 KV system through dedicated transmission line. At smelter-2 switchyard we are having 400/220 KV 750 MVA ICT's which are used to step down the voltage level for further utilization in rectifier transformers. The function of rectifier units is to convert the AC power generated into DC for feeding the pot line to carry out reduction process. VAL, Plant-2 has 4 pot lines each consisting of 6 units (n+1 configuration) of 76 KA rectifier system. The rectifiers continuously feed current of 340KA to the pot line. Each rectifier unit consists of a regulating transformer, a rectifier transformer, and 2 diode cubicles and associated cooling systems. Each unit can deliver a maximum of 76 KA. As the total pot line current requirement is 340 KA.

Please refer below tables for further construction and Technology details of Potline (table:1) Rectifier & Switchyard (table:2)

Table:1- Construction and Technology details of Potlines

PARTICULARS	PLANT-1	PLANT-2
Technology supplier	GAMI	GAMI
Technology	GP320	GP340
Present operating Current	333 KA	340 KA
No. of Potline(s)	2	4
Name of Potline(s)	Potline #1 & Potline #2	Potline #3, Potline #4, Potline #5 & Potline #6
Cell Type	GAMI/325 KA	GAMI/340 KA
No. of Room(s)/Potline	2	2
No. of Section(s)/Room	4	4
No. of Pot(s)/Section	38	42
No. of PTM(s)	16	52
No. of FTP(s)	4	8
Metal Tapping	By Tapping Vehicle	By PTM crane
PTM interchangeability	NO	Through Transfer Gantry
Production Capacity	0.55 Million Ton Per Annum	1.25 Million Ton Per Annum

Table:2 – Construction and Technology details of Rectifier & Switchyard

PARTICULARS	PLANT-1	PLANT-2
Rectifier unit		
Regulating transformer		
Make of Transformer	Jiangxi	Jiangxi/XD
Capacity	146MVA	142 MVA
Primary side voltage	220KV	220KV
Tertiary Side Voltage	20 KV	20 KV
OLTC tap no	107	107
Cooling System	OFWF	OFWF
Rectifier Transformer		
Make of Transformer	Jiangxi	Jiangxi/XD
Capacity	146 MVA	142 MVA
Secondary Side Voltage	13-1328 V	13-1328 V
Cooling System	OFWF	OFWF
Diode cubicle		
Make	ABB	ABB
Rectifier System	12 Pulse	12 Pulse
Maximum system voltage	1380V	1560V
Maximum Current	2*43.75 KA	2*38 KA
Rectifier Connection	Double 3 phase Bridge	Double 3 phase Bridge
Cooling System	WFWF	WFWF
Rectifier Coolant	De-Ionised Water	De-Ionised Water

4. INDICATIVE DELIVERABLES

Vedanta Ltd. is keen for partnering with the excellent Technology Provider/ Innovation Firm/ Institutions to **achieve more than 10%** “Specific Power Consumption Reduction” from current level for Jharsuguda smelters, by studying, redesigning, reverse engineering and implementing innovative ideas and technologies for improving on:

- Potline Specific DC Power Consumption
- Potline Specific Auxiliary Power Consumption
- Rectifier Conversion Efficiency Loss

5. BATTERY LIMIT

All the Potlines and Rectifiers of both the Smelters-1 & 2 at Vedanta Ltd. Jharsuguda.

6. PAYOUT AGREEMENT MODALITY

VL is looking forward for output-based payment models instead of “fixed cost/variable cost models” however VL is open for discussions with aspiring business partners.