

**Date: 01.05.2017**

## **Expression of Interest**

**Vedanta Limited** a subsidiary of Vedanta Resources plc, is one of the world's leading diversified natural resources company. With business operation in India, South Africa, Australia, Ireland, Namibia, Liberia and Sri Lanka; Vedanta is a leading producer of Oil & Gas, Zinc, Lead, Silver, Copper, Iron Ore, Aluminium and Commercial Power.

VEDANTA believes in sustainable development in harmony with nature and accordingly, is committed to the protecting its surrounding environment and making a contribution to the development of community. This commitment encompasses efficient use of natural resources, protection of assets and provision of a safe workplace with support systems for zero harm to the environment

Vedanta Aluminium & Power, a division of Vedanta Limited and leading producer of Alumina, Aluminium and Commercial Power in India.

### **Lanjigarh Alumina plant site location**

Lanjigarh, in the district of Kalahandi, is the site for our Alumina Refinery. Lanjigarh is situated at the southern part of Orissa, 450 kms of Bhubaneswar the state capital and 300 kms from Vishakhapatnam.

Vedanta has a Greenfield 2.0 mtpa alumina refinery plant and an associated 90 MW captive power plant at Lanjigarh, Orissa. At Lanjigarh, plans have been made to enhance capacity of the alumina refinery from 2 MTPA to 6 MTPA. In addition to this, total captive power generation capacity is also expected to be increased to 300 MW in near future.

The details of the Projects at Lanjigarh are as follows.

1. 2 mtpa Alumina Refinery.
2. 3x30 MW coal fired cogeneration power plant.
3. Railway linkage of about 16 km length from the plant to Ambadola Railway Station.
4. Port infrastructure at Kakinada for export of all alumina and at Vizag for import of caustic soda.
5. 66 km long water pipe line from Tel River near Kesinga.
6. A state-of-the-art modern township and hospital.

### **Vanadium Potential for Sustainable Energy storage**

Vedanta Limited has set up an Alumina refinery (having a total installed capacity of 2 MTPA) and a 90 MW captive power plant at Lanjigarh, Odisha. Alumina is extracted from bauxite through Bayer's process, in which Vanadium **pentoxide** is obtained as a by-product.

The facility is already producing 99.7 % pure Vanadium Pentoxide. Alumina refinery produces Vanadium in sludge form. The same is further processed to produce Vanadium Pentoxide.

### **Quantity of Vanadium Sludge and Vanadium Pentoxide produced and potential**

#### **Vanadium Sludge**

- Production in FY 2016-17-1125 MT
- Estimated production for FY17-18 –2000 MT

#### **Vanadium pentoxide**

- Production in FY 2016-17- Nil
- Estimated production FY17-18 – 216 MT

### **Sample Analysis of Vanadium Sludge produced**

% V <sub>2</sub> O <sub>5</sub>	-	13.92 (as is)
% Na <sub>2</sub> O	-	28.35
% Moisture	-	43.42
% Al <sub>2</sub> O <sub>3</sub>	-	7-12

### **Purpose of Expression of Interest**

The objective of this project would be to convert the Vanadium Pentoxide produced in the plant to Vanadium Electrolyte which is a key ingredient of the Vanadium Flow batteries used for Energy Storage. Vanadium Flow batteries are ideal solutions to grid scale energy storage and the technology has entered the commercialisation phase in FY 15-16 onwards in US and China.

The process of producing Vanadium Electrolyte from Vanadium Pentoxide involves producing a 1.6 M solution of Sulphuric Acid with Vanadium Pentoxide. The Electrolyte produced is expected to be used in Energy Storage batteries and the quality of Electrolyte would be judged based on Energy density and flow characteristics suitable for grid scale Energy storage applications.

Shortlisting of the participants would be done based on the following criteria and the parties would be contacted for subsequent RFPs and RFQs.

### **Technical Qualification criteria**

The Technical Qualification would be a qualitative evaluation of the following dimensions

1. Processing cost of Electrolyte from Vanadium Sludge/ Vanadium pentoxide
2. Cost of processing vis-à-vis Energy density of Electrolyte produced
3. Scalability, demonstrability, knowledge bank and Capex requirement for large scale production
4. Experience of commercial / pilot projects on Energy Storage solutions
5. Quality of the overall proposal and methodology
6. Financial strength of the party

A minimum 25% of overall rating on any of the dimensions would be needed. Applications with unacceptable levels of risks, high level of grant needed, lack of scale, or lack of clarity/details/ quality of information provided may be rejected. Prospective parties having experience in Energy storage equipment



manufacturing or suitable ties ups with equipment manufacturers would be preferred

Vedanta Limited invites Expression of Interest from established, technically competent and financially sound vendors / business partners in the following supply and service fields:

Seeking expertise to produce Vanadium Electrolyte from Vanadium pentoxide produced in Alumina Plant for development of Grid Scale batteries

Marketing of Vanadium Electrolyte to various energy storage system producers

**Interested and Competent Parties can submit their expression of interest** giving details of their Organization, offices, major clientele, performance certificates and other necessary data etc., within 2 weeks from the date of this advertisement by submitting the following documents through e-mail.

1. Registration, Legal Details of the Organization
2. Brief Description of Business, Organization's History Etc.
3. Experience in Implementing Energy storage projects