UK Government | iDeeksha | Bureau of Energy Efficiency, Ministry of Power, Government of India | Knowledge Exchange Platform — Transmitting Knowledge through Best Practices

ASPiRE Programme

Accelerating Smart Power & Renewable Energy in India

CONSULTATION WORKSHOP ON

PATHWAYS FOR ENERGY EFFICIENCY AND DECARBONISATION IN THE INDIAN ALUMINIUM INDUSTRY

WORKSHOP:

August 28th, 2024
(09:30 – 17:30 IST / 04:00 – 12:00 GMT)
Vedanta Auditorium, Jharsuguda

vedanta — transforming for good

Hosted by:

VEDANTA LIMITED, JHARSUGUDA, ODISHA.

Contents

About ASPIRE Programme

During COP26, India had pledged to achieve net-zero emissions target by 2070; to get 50% of its energy from renewable resources and by the same year to attain 500GW non-fossil electricity capacity. These targets shall help India reduce its total projected carbon emissions by 1 billion tonnes and lower its emissions intensity by 45% by 2020 (over 2005 levels).

The UK and India share a key strategic partnership and as part of the '*3rd India – UK Energy for Growth Partnership*', an inter-ministerial energy dialogue was held on 8th October 2021 to strengthen collaboration on accelerating the move to global clean energy in the decade ahead. During this, the minsters endorsed '*Roadmap 2030 for India-UK Forward Action Plan*' on clean energy, improving energy efficiency measures, enabling use of green hydrogen, and increasing the switch to electric mobility. One of the actions under the *Forward Action Plan* was to launch the India-UK joint partnership technical assistance programme on Smart Power and Renewable Energy, titled '*Accelerating Smart Power and Renewable Energy in India" programme (ASPiRE)'*. One of the thematic areas of ASPiRE is industrial energy efficiency and decarbonisation (IEED).

The objective of ASPiRE is to catalyse increased investment in IEED, renewable energy, storage deployment and electricity distribution in India. The programme aims to catalyse increased investment that supports sustained & inclusive economic growth, low carbon and leads to poverty reduction including through the promotion and empowerment of women and other socially weaker groups.

A consortium led by KPMG has been selected by the Foreign, Commonwealth and Development Office (FCDO), UK as the implementing agency for ASPiRE programme in consortium with Idam Infra and Carbon Trust.

About IDEEKSHA Platform

The Industrial Decarbonisation and Energy Efficiency Knowledge Sharing (IDEEKSHA) Platform has been developed under the ASPIRE Programme in collaboration with the BEE to promote and share best practices and energy-efficient technologies among large-scale industries. The IDEEKSHA platform was launched by Mr. R.K. Singh, Hon'ble Cabinet Minister

Snapshots from IDEEKSHA Platform and Newsletter launch during BEE's Foundation Day Event

for Power and New and Renewable Energy, Government of India during the 21st Foundation Day Event of BEE on 1st March 2023, in Delhi.

The IDEEKSHA platform is a one-stop shop for all energy efficiency/ decarbonisation needs of large industries covered/ expected to be covered under BEE's PAT Scheme. The IDEEKSHA platform would thus facilitate:

- Exchange of knowledge and information to enhance peer-to-peer learning.
- Designated Consumers (DCs) in the adoption of new and emerging IEED tools & technologies by facilitating access to Indian and global (including from the UK) technology suppliers.
- Access to a database of financial institutions.
- Access to IEED tools, technologies & technology providers available in India and globally.
- Access to data sources and knowledge repositories to support knowledge translation.
- Sector/industry-specific workshops/ seminars to enhance EE measures.
- Knowledge and commercial partnerships.

The IDEEKSHA platform facilitates knowledge exchange and partnerships among industry and technology suppliers for 8 hard-to-abate industrial sectors (Cement, Aluminium, Iron & Steel, Textile, Fertiliser, Chlor-Alkali, Pulp & Paper, and Refinery) which are also covered under BEE's Perform Achieve and Trade (PAT) scheme. Under the IDEEKSHA Platform, support was extended to ten (10) energy-intensive industrial sectors (Cement, Aluminium, Iron & Steel, Textile, Fertiliser, Refinery, Chlor-Alkali, Pulp & Paper, Sugar and Tyre Manufacturing) in terms of providing access to database of global industrial energy efficiency & decarbonisation (IEED) technologies, organising capacity building workshops and study trips, etc. Seven (7) sectoral workshops and study trips were organised between 2022 and 2024, each focusing on key industries: Aluminium, Textile, Cement, Iron & Steel, Pulp & Paper, Chlor-Alkali and Sugar sectors. These events are aimed at understanding industry-specific challenges, opportunities, and identifying strategies for sustainable development. The details of the events, including background notes, presentations, event summary reports, etc., can be accessed through the IDEEKSHA Platform under 'Past Events' tab. Below are the direct links to access the resources:

S.No.	Past Events	Sector	Reference Links
1	Sectoral Workshop on Best Practices in Energy Efficiency in Aluminium Sector: A Path for Decarbonisation	Aluminium	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Aluminium Sector
2	Study Trip/ Visit of Aditya Aluminium Plant, Lapanga, Odisha		https://www.ideeksha.in/pages/A Study Tour Visit of Aditya Aluminium Plant
3	Sectoral Workshop on Best Practices in Energy Efficiency in Textile Sector: A Path for Decarbonisation	Textile	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Textile Sector

S.No.	Past Events	Sector	Reference Links
4	Study Trip/ Visit of Raymond Textile Plant, Chhindwara, Madhya Pradesh		https://www.ideeksha.in/pages/A Study Tour Visit of Raymond Textile Plant
5	Sectoral Workshop on Best Practices in Energy Efficiency in Cement Sector: A Path for Decarbonisation	Cement	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Cement Sector: A Path for Decarbonisation
6	Study Trip/ Visit of Udaipur Cement Works Limited (UCWL)		https://www.ideeksha.in/pages/A Domestic Study Tour-Visit of Cement Plant
7	Sectoral Workshop on Best Practices in Energy Efficiency in Iron & Steel Sector: A Path for Decarbonisation	Iron & Steel	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Iron & Steel Sector: A Path for Decarbonisation
8	Study Trip/ Visit of Godawari Power & Ispat Limited (GPIL)		https://www.ideeksha.in/pages/A Domestic Study Tour-Visit of Iron & Steel Plant
9	Sectoral Workshop on Best Practices in Energy Efficiency in Pulp & Paper Sector: A Path for Decarbonisation	Pulp & Paper	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Pulp & Paper Sector: A Path for Decarbonisation
10	Study Trip/ Visit of Khanna Paper Mills, Amritsar		https://www.ideeksha.in/pages/Study Tour-Visit of Khanna Paper Mills Limited
11	Sectoral Workshop on Best Practices in Energy Efficiency in Chlor-Alkali Sector: A Path for Decarbonisation	Chlor-Alkali	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Chlor-Alkali Sector: A path for Decarbonisation
12	Study Trip/ Visit of Gujarat Alkalies and Chemical Limited (GACL)		https://www.ideeksha.in/pages/A Study Tour-Visit of Gujarat Alkalies and Chemicals Limited
13	Sectoral Workshop in Best Practices in Energy Efficiency in Sugar Sector: A Path for Decarbonisation	Sugar	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Sugar Sector: A path for Decarbonisation
14	Study Trip/ Visit to Balarampur Chini Mills Ltd (BCML), Haidergarh		https://www.ideeksha.in/pages/A Study Tour-Visit of Balrampur Chini Mills Limited
15	Sectoral Workshop on Best Practices in Energy Efficiency in Tyre Sector - A Path for Decarbonisation	Tyre	This workshop has recently happened on 7th of August and same is yet to be uploaded on the event page of the IDEEKSHA website. Number of participants attended this event was 71.

Aluminium Sector in India

India is world's second-largest producer of Aluminium[1], contributing about ~6% to the global output. Indian Aluminium Market was valued at ~INR 940 billion in 2023 and is predicted to grow ~1.75 times to INR 1650 billion by 2030, with a CAGR of ~8-10 % from 2024 to 2030[2]. The per capita Aluminium consumption in India during FY 2023 was around 3.1 kg which is much below the global average of 12 kg[3]. Thus, Indian market offers a huge potential for demand growth of Aluminium Industry. To reach the global average of 12 kg per capita, India will require an additional annual consumption of 16 million tonnes, and if achieved India would become the second largest consumer in the world. Moreover, government schemes and initiatives such as 'Make in India' scheme, smart city development programmes, rural electrification, EV adoption, etc. are expected further to boost Aluminium demand in the country. India's Aluminium demand is expected to reach ~8 million tonnes by 2032, majorly propelled by industries like building & construction, transportation, packaging, electrical, and fast-emerging sunrise sectors like renewable energy, electric vehicles, defence, and aerospace[4].

The current market size of the Aluminium industry in India underscores its significant presence in the global trade dynamics. With a consistent increase in demand, the industry has been a substantial contributor to India's economic growth. Aluminium contributes to nearly 2% of manufacturing GDP and with projected consumption growth, the share (% of manufacturing GDP) may go higher, reflecting its role as a key driver of economic activity, with its applications spanning over various sectors.

Vedanta, Hindalco, and NALCO are the primary producers, contributing nearly all of the 4.07 million tonnes of Aluminium production in FY 2022-23[5]. Over the past decade from FY 2012-13, the Indian Aluminium sector saw significant growth. Alumina production increased from 3.74 MTPA to 7.45 MTPA, and Aluminium production increased from 1.72 MTPA to 4.07 MTPA. Energy consumption grew from 420 million GJ to 689 million GJ, with Vedanta consuming 48%, Hindalco 39%, and NALCO 13%.

Perform, Achieve, and Trade (PAT) Scheme for Aluminium Sector

The aluminium sector is one of the designated sectors covered under Bureau of Energy Efficiency's (BEE) flagship Perform, Achieve, Trade (PAT) scheme for large energy-intensive industrial sectors.

The Aluminium production process starts with the mining of Bauxite ore, an aluminium-rich mineral in the form of Aluminium hydroxide. Approximately 90% of global Bauxite is found in tropical areas. Bauxite mining contributes insignificantly in terms of scope 1 and scope 2 emissions. Major emissions from mining are due to the thermal energy required in the process. The Aluminium sector has been categorised based on its process into four subsectors: refinery, smelter, integrated, and cold sheet mills.

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1 Top 10 Aluminium-producing Countries (Updated 2023) (investingnews.com)

2 India Aluminium Market Report Forecast Till 2030 (alcircle.com)

3 Indian Mineral Year Book, Indian Bureau of Mines

4 Metal-Asia-Cover-Story-June-2022.pdf (vedantaaluminium.com)

5 Ministry of Mines, Government of India, Home

The aluminium industry, with an annual consumption of over 7.71 million tonnes of oil equivalent (toe)[6], is notified as a Designated Consumer (DC) under the Energy Conservation Act, 2001.

In the aluminium sector, to become a designated consumer the threshold limit is 7.71 mtoe and in PAT cycle-I 10 designated consumers from Odisha, Karnataka, Jharkhand, Chhattisgarh, Maharashtra and Uttar Pradesh have been notified and their targets have already been notified.

The majority of the DCs from Odisha, Karnataka, Jharkhand, Chhattisgarh, Maharashtra, and Uttar Pradesh have already been notified under PAT.

- Best Practices & Technology upgradation[7]:

To achieve the target, Designated Consumer's has commissioned a variety of projects; from this, some are best practices that were commissioned during PAT cycle 1. The following is the list of best practices that were followed:

- Implementation of slotted anode in pots
- Eco-contact to reduce voltage drop at conductor joints
- Use of self-developed fuel “CRYSTAL" additive for dozing inside the furnace
- STAL additive for dozing inside the furnace Intelligent soot blowing system
- Installation of VFD
- Installation of High efficient screw compressor.

The achievement of Aluminium Sector in terms of IEED at the end of PAT cycle II is presented in Table 1 below.

Table 1: IEED potential and achievement of the Aluminium sector under PAT Scheme

Total Number of DCs Notified in PAT Cycle I to VI	Energy Efficiency (MTOE)		Decarbonisation ($MTCO_2$)	
	Potential (PAT Cycle I to VI)	Achievement (PAT Cycle I & II)	Potential (PAT Cycle I to VI)	Achievement (PAT Cycle I & II)
14	1.061	1.303	3.628	4.456

Decarbonisation of Indian Aluminium Industry

This report focuses on advancing energy efficiency and decarbonisation in the Indian aluminium industry for short and medium-term trajectories. It provides an overview of both global and Indian aluminium sectors, compares them with global peers, and highlights key learnings from current practices. The report outlines critical success factors for achieving net-zero goals, strategies for enhancing energy efficiency, and potential interventions to accelerate decarbonisation. It also identifies specific policy measures to support and speed up these efforts.

Fourteen manufacturing plants from the Aluminium sector, covered under the PAT scheme, cumulatively consume ~7.71 MTOE and emit 16-20 TCO_2/ MT of Aluminium annually. These units offer an energy saving potential of ~1.226 MTOE and a decarbonisation potential of

[6] https://beeindia.gov.in/en/aluminium
[7] https://beeindia.gov.in/en/aluminium

3.628 $MTCO_2e$. Some of the initiatives/ commitments adopted by leading aluminium manufacturers in India to achieve decarbonisation and GHG reduction targets of the aluminium industry are discussed below:

- **Vedanta Ltd.** –GHG emission reduction by 25% till FY 2024-25 against FY 2011-12 level (25.5 tCO2-e/Mt of Al)[8]
    - Announced a smelter capacity addition of 0.5 MMT by FY 2026-27 [11]
    - Transition to Natural Gas at Calciner Enhancement of Potline and Power Plant energy efficiency[9].
    - Procurement of 1500 MW of Renewable Energy Analysing adoption of Natural Gas at Cast-house and Bake oven.
    - Adoption of Inert Anode and wetted cathode technologies.
    - Study to examine adoption of hydrogen for Calciner at Alumina Refinery
- **Hindalco Industries Ltd.**, - Absolute emission reduction by 25% till 2030 compared with FY 2020-21 (42 M tCO2-e).
    - RE adoption plans to increase the total renewable capacity of Hindalco to 300 MW by 2025
    - Energy Efficiency measures include, phased implementation of copper insert collector bar, installation of clamp modification, cast iron sealing, step stub Anode, pot noise and application of Digital Twin.
    - Recycling aluminium requires just 5% of the energy used to produce primary aluminium with only 5% of the associated greenhouse gases.
- **NALCO (Angul, Odisha)** – Increase in non-fossil power sources to 40% by 2030[10].
    - NALCO has plans for a substantial increase of 1 MMT by 2027-28
    - Adoption of Energy Efficiency measures
    - Transition to clean energy mix
    - Increased focus on Aluminium recycling
    - Analysis of Hydrogen usage
    - Adoption of CCUS technology

In addition to above, aluminium industries have adopted the following key operational best practices and technologies as part of their IEED measures:

- 100% graphitised cathode installation
- Improvement of conversion efficiency of rectifier systems
- Graphitised pots current efficiency improvement and average voltage reduction
- Silicate based anode coating technique applied in reducing the top oxidation which has a major impact on Net Carbon Consumption
- AC to DC conversion efficiency improvement
- Use of RUC (Ready to use Cathode) copper inserted collector bar for pot cathode
- Reducing the dead pot residual voltage to zero by a shorter current path having a higher cross-section and lower current density
- Fitch fuel catalyst use in the Bake oven and cast house to save HFO consumption and to reduce emissions in the Bake Oven and cast house (around 5 % of fuel saving)
- Biomass Co-firing in boilers
- Energy Analytic Platform using Power BI with AI and energy saving using copper insert
- Digital smelter solution (first in India), deployed at an aluminium smelter in Jharsuguda, Odisha - uses digital twin technology for human-less monitoring, operational control thus enhancing energy & resource efficiency through remote advisory system

[8] Vedanta Sustainability Report 2021-22 (vedantalimited.com
[9] https://www.vedantalimited.com/vedanta-sr3/aim-4.html
[10] Annual Reports | NALCO (National Aluminium Company Limited) | A Govt. of India Enterprise (nalcoindia.com)

- OSIsoft PI (Process Information) System, an industrial IoT solution, implemented in Jharsuguda uses machine learning to boost operational efficiency and productivity

Key findings of the report

The key findings based on analysis and stakeholder consultations include:

- **Production Efficiency:** The Indian aluminium industry is globally competitive, with energy consumption comparable to global standards but relies heavily on captive thermal power, resulting in higher carbon emissions.
- **Export Growth:** Indian aluminium exports have grown at ~14% CAGR over the past 5 years. To remain competitive and meet global standards like the Carbon Border Adjustment Mechanism (CBAM), emission intensity must be reduced.
- **Green Aluminium Market:** Growing demand for green aluminium and carbon taxation policies are driving Indian companies to adopt low-carbon and recycled aluminium practices. Certification for green aluminium is increasingly important.
- **Energy Efficiency and Decarbonisation:** Energy efficiency is crucial for achieving net-zero targets. Decarbonising energy supply and increasing aluminium recycling are key. Recycling uses only 5% of the energy and emits 5% of the greenhouse gases compared to primary production.
- **Renewable Energy Integration:** Integrating aluminium production with low-carbon power, especially hydropower, is essential for decarbonisation. However, India's smelting units are predominantly powered by fossil fuels, unlike their European and American counterparts.
- **Emerging Technologies:** New technologies like inert anodes, carbon capture and storage (CCS), and HalZero are emerging. These technologies are expected to become commercially available in the next decade, promising reduced emissions and enhanced sustainability.
- **Gender Diversity:** The aluminium industry has room to improve gender diversity. Companies like Vedanta and Novelis are making strides, with Vedanta having over 22% female employees and Novelis aiming for 30% female leadership by 2024.
- **Sustainability Reporting:** There is significant variation in how aluminium companies report sustainability data, influenced by differing frameworks and practices. This inconsistency complicates accurate assessment and comparison of sustainability performance.

Potential technology interventions for enhancing energy efficiency/ decarbonisation in Aluminium Sector

Some of the potential areas for technology intervention to facilitate rapid transition of aluminium sector's journey to net-zero by 2070 have been identified below:

- Technological Advancement - Inert anodes, Carbon Capture Utilisation and Storage (CCUS), Hal Zero Technology, Mechanical Vapour Recompression (MVR) for Alumina Refinery.
- Energy Monitoring and Efficiency Interventions - Copper inert and insert collector bars, Magnetic compensation loop (MCL) for reducing DC consumption & Digital Twin.
- Circular Economic Waste Management such as Bauxite Residue – Holistic use, Spent pot lining – Use in cement, Dross – Recycling and use.

Leverage strengths and capabilities of UK Aluminium Sector

The aluminium sector in the UK contributes **~£10 billion** annually to the country's economy. The UK aluminium sector offers some key technologies and solutions along with best practices

in the areas of electrolysis (process improvements and inert anodes), material lightweighting, recycling and secondary production, advanced kilns and furnaces, digital technologies, etc. One such technology includes, a highly efficient lightweighting technology – 'hot form quench (HFQ)', producing high strength Aluminium which is as a cost-effective alternative to steel or low strength Aluminium.

Strengths and capabilities of UK aluminium sector can be leveraged to facilitate rapid transition of Indian aluminium sectors' journey to net-zero, through adoption of best practices, technologies and solutions.

To facilitate access to leading best practices and technologies of UK aluminium sector, some key UK organisations such as the UK Aluminium Federation, Innoval Technology, Foundation Industries Group of Innovate UK (KTN), Opex Group, Global Nano Network and UK Advanced Forming Research Centre (leading UK research centre on metals forming), are participating in the below mentioned sectoral workshop on **28th August 2024**.

Consultative of Energy efficiency and decarbonisation strategy for Indian aluminium industry

A one-day consultation workshop on "***Energy efficiency and decarbonisation strategy for Indian aluminium industry"*** is being organised on 28th August **2024** at Vedanta Ltd, Jharsuguda, Odisha. The workshop will cover the discussions on findings of report on decarbonisation, and the journey of various leading aluminium manufacturers, and new decarbonisation technologies, etc. The workshop is designed to provide national and international organisations with a platform to present their best practices/ net zero journey and technologies for IEED in the aluminium sector. The workshop would thus enable in capacity building of aluminium sector stakeholders.

ASPiRE programme promotes gender equality, and the sectoral workshop is expected to deliver GESI (Gender Equality and Social Inclusion) through the participation of women and stakeholders from marginalised groups from large energy-intensive industries.

The detailed agenda for the workshop has been provided in Annexure.

Annexure

CONSULTATION WORKSHOP

ON

'PATHWAYS FOR ENERGY EFFICIENCY AND DECARBONISATION IN THE INDIAN ALUMINIUM INDUSTRY'

HOSTED BY: VEDANTA LIMITED, JHARSUGUDA

August 28, 2024 (09:30 – 17:30 IST)
Venue: Vedanta Meadows Community Hall, Vedanta Township, Jharsuguda

AGENDA

Time (IST)	Session Name	Speaker
	Inaugural Session	
09:00 – 09:30	Registration	
09:30 – 09:35	Lighting of Lamp	
09:35 – 09:40	Welcome address	Mr. Anurag Singh Sirola, Associate Director, KPMG (ASPIRE Programme Team)
09:40 – 09:50	Introduction to the ASPIRE Programme	Representative of the Foreign and Commonwealth Development Office, UK*
09:50 – 10:00	1.Brief overview of industrial energy efficiency (IEE) theme of the ASPIRE Programme	Mr. Balawant Joshi, Managing Director, Idam Infra (ASPIRE Programme Team) *
10:00 – 10:10	Special Address by Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC)	Dr. Anupam Agnihotri, Director, JNARDDC
10:10 – 10:20	Keynote Address by Bureau of Energy Efficiency (BEE)	Mr. Sunil Khandare, Director, BEE
10:20 – 10:30	Inaugural Address by Vedanta Jharsuguda	Mr. Sunil Gupta, COO-Aluminium Business & CEO, Vedanta Jharsuguda
10:30 – 10:35	Vote of Thanks	Mr. K. K. Chakarvarti, Senior Advisor, Idam Infra (ASPIRE Programme Team)
10:35 – 10:45	Group Photograph	
10:45 – 11:15	Tea Break and Networking	
Session I – PAT and Carbon Credit and Trading Scheme (Indian Aluminium sector)		
11:15 – 11:20	Moderator	Mr. Sunil Khandare, Director, BEE
11:20 – 12:00	2.Indian Aluminium sector – PAT Scheme and its Transition to Carbon Credit and Trading Scheme	Mr. V. Jagadeesan, BEE Sector Expert
12:00 – 12:15	Discussions	
Session II – Dissemination of findings of the draft report on 'Pathways for Energy Efficiency and Decarbonisation in the Indian Aluminium Industry'		
12:15 – 12:20	Moderator	Dr. Anupam Agnihotri, Director, JNARDDC
12:20 – 13:15	3.Presentation on Draft Report – 'Pathways for Energy Efficiency and Decarbonisation in the Indian Aluminium Industry'	ASPIRE Programme Team
13:15 - 14:00	Networking Lunch	

Time (IST)	Session Name	Speaker
Session III – Consultative discussion with industry stakeholders on the draft report		
14:00 – 14:10	Moderator	Dr. Anupam Agnihotri, Director, JNARDDC
14:10 – 15:10	Consultative discussion with stakeholders from industry, JNARDDC and BEE on the draft report	Participants from Aluminium and Alumina Industry
Session IV – Key energy efficiency & decarbonisation strategies adopted by Indian industries		
15:10 – 15:15	Moderator	ASPIRE Programme Team
15:15 – 15:35	4.Energy efficiency and decarbonisation strategy adopted in the Aluminium Smelters - Vedanta (Metal Team)	Ms. Vysyaraju Harika, Technical Analyst-Potline; Ms. Prapti Varshney, Lead-Innovation Cell; and Mr.Swapnil Hirave, Manager- Pot Repair/Lining/Delinning - Vedanta, Jharsuguda
15:35 – 15:55	5.Energy efficiency and decarbonisation strategy adopted in the Captive Power Generation -Vedanta (Power Team)	Mr. Prafulla Chandrakar, Lead O&E CPP; and Ms. Payal Agrawal, Lead Chemist, CPP Water System ;Vedanta, Jharsuguda
15:55 – 16.15	6.Decarbonisation Initiatives at Aditya Aluminium	Mr.Jay Prakash Soni, Asst.GM and Mr. Sourav Kumar Gorain , Manager, Aditya Aluminium, Hindalco
16:15 –16:35	7.Energy efficiency and decarbonisation strategies adopted by BALCO	Mr. Ranjan Mishra, Associate GM, BALCO
16:35-16:55	8.Energy Efficient Initiatives at Vedanta Lanjigarh- Driving Efficiency & Decarbonization for Climate change Through its NET ZERO efforts	Mr. Sanjaya Kumar Jena, General Manger – Commissioning & EM , Mr .Soumava Das - Deputy Manager, Energy & Carbon- Lead Vedanta Limited, Lanjigarh
Session V – Key decarbonisation levers for aluminium industry		
16:55 – 17:00	Moderator	ASPIRE Programme Team
17:00 – 17:20	9.New & emerging technologies for decarbonising the aluminium sector	Dr. Anupam Agnihotri, Director, JNARDDC
Conclusion and Feedback		
17:20 – 17:30	Mr. Sunil K. Khandare, Director, BEE Representative of the Foreign and Commonwealth Development Office, UK Dr. Anupam Agnihotri- Director, JNARDDC Mr. Sunil Gupta, CEO Vedanta Jharsuguda ASPIRE Programme Team	
17:30 onwards	High-Tea	

**Virtual presentation*