

Sustainable Aluminium for a Greener Tomorrow—Vedanta Aluminium Metal Perspective

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Abstract

Aluminium is a critical material enabling global decarbonization and energy transition through its applications in renewable energy, electric mobility, power transmission, infrastructure, and sustainable packaging. However, alumina refining and primary aluminium production remain energy-intensive processes with significant environmental footprints. As one of India's largest integrated aluminium producers, Vedanta Aluminium is focusing on balancing business growth with sustainability by reducing greenhouse gas emissions, improving resource efficiency, enhancing circularity, and strengthening responsible production practices across the value chain.

This paper presents the current sustainability and operational transformation initiatives being pursued across Vedanta Aluminium's alumina refineries and smelter operations. In alumina production, key focus areas include energy-efficient process optimization, increased use of biomass and alternative fuels, improved steam and thermal efficiency, red mud and by-product utilization, water conservation through closed-loop systems, digital process monitoring, and deployment of advanced analytics to reduce specific energy and carbon intensity. Rather than relying on a single technological breakthrough, Vedanta's approach is based on a balanced portfolio of operational improvements, digital innovations, renewable energy adoption, and circular economy solutions that collectively support sustainable growth while enhancing environmental performance, resource security, and long-term competitiveness in the global aluminium industry.

Keywords: Low-carbon aluminium, Decarbonization, Renewable energy, Circular economy, Sustainable aluminium production.