

VEDANTA'S COMMITMENT TO THE ENVIRONMENT

FACT SHEET – FEBRUARY 2019

Lisheen, Ireland






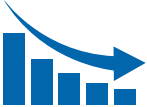


Protecting and nurturing the environment is built into our business strategy and philosophy. Our products and processes have sustainability as their central pivot, not only because this is core to our values, but because it makes business sense.

Across all our operations, we continuously implement technologies and systems to optimise water consumption, enhance energy productivity and safeguard biodiversity. Technology and systems also serve in the prevention of emissions discharge, the maintenance of air quality, the recycling and upcycling of waste, as well as rehabilitation and closure.

Vedanta is also determined to minimise the impact of our operations on the environment. As a resources company, we appreciate the vital importance of using resources wisely. Our Environmental Technical Standard encapsulates our approach, where all our operations are obliged to avoid if possible, or otherwise minimise, adverse impacts on the environment from their operations through effective management systems and processes that work towards continuous improvement of our environmental performance.

Our products enhance the longevity of others and, over time, reduce the demand for natural resources – for instance, zinc galvanising increases the longevity of the base metal product.

HIGHLIGHTS IN 2017/18

 <p>Invested US\$100 million in environmental performance management programmes</p>	 <p>Recycled 82% of high-volume and low effect waste in sustainable applications (fly ash, slag, red mud, gypsum)</p>	 <p>Saved 4.1 million m³ of water against the target of 2.2 m³</p>	 <p>With active closure successfully completed, the Lisheen mine site in Ireland has been redeveloped as a National Bioeconomy Campus</p>
 <p>Dedicated the first Green Road made by Vedanta Jharsuguda using fly ash as a primary component</p>	 <p>GHG intensity reduction from a 2012 baseline is on track – 14% achieved against expectation of a 16% reduction by 2020</p>	 <p>Conserved 2.6 million GJ of energy against the target of 1.39 million GJ</p>	 <p>Hindustan Zinc is the only Indian mining and metals company to be listed in the Dow Jones Sustainability Index – ranked #1 in the environmental category</p>



▲ Bharat Aluminium Company, Chhattisgarh



▼ Gamsberg, Northern Cape

▲ Hindustan Zinc



CASE STUDY


Lisheen closure and rehabilitation

Mining at Vedanta's Lisheen Mine in Tipperary, Ireland, ceased at the end of 2015, after 17 years of operation. The cessation of mining at Lisheen was not the end of the story as far as we are concerned. From the beginning, Vedanta had always planned for the closure and successful rehabilitation of the Lisheen site.

Focusing on physical closure of the mine and aftercare of the site, a best practice mine closure plan was implemented to fully address all regulatory authority permit requirements. Lisheen's closure programme is believed to be among the world's finest examples of environmentally sensitive mine closure and rehabilitation.

Site rehabilitation work included:

- Ensuring that the underground workings cannot collapse leading to surface subsidence
- Removing all surface and underground plant and equipment
- Allowing the mine workings to refill with clean water

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- Blocking and sealing all access to the underground workings
 - Fully engineered covering of the tailings deposition facility to provide a multiple of possible after-uses, from animal grazing to solar power or energy crops
 - Creating a space that will be attractive to other industries
 - Supporting Lisheen staff during the closure, from upskilling and training grants to redeployment at other Vedanta operations

Lisheen's management and a task force appointed by the Irish Government worked with a range of stakeholders to redevelop the site as a National Bioeconomy Campus. At Lisheen, Vedanta committed to ensure that a safe and secure site would be left behind, and to strive to provide replacement industry on the site with all the social benefits that this brings.

In December 2017, the Irish Government announced substantial funding to establish a bioeconomy innovation and piloting at Lisheen. The next stage of the site's life is well underway, as a result of our commitment to world-class closure and rehabilitation.



▲ Lisheen, Ireland



▲ Lisheen, Ireland

OUR APPROACH

The Vedanta Sustainability Framework ensures that each of our businesses follows the same high standards of environmental management. As part of our quantitative risk assessment and critical control development exercises, all our businesses evaluate the effectiveness of their current environmental controls and strengthen them where required.

WATER

An increasingly finite and precious resource, water plays a crucial role in the socio-economic development of a nation. Our approach to water management respects the water use rights of all stakeholders, which in turn strengthens our social licence to operate. Vedanta has both a water management policy and a water management standard in place which integrate with decision-making processes for all new and existing projects, ensuring that all necessary measures are in place to minimise the water footprint of our projects. Our water management strategy focuses on optimising our water consumption and minimising the amount of fresh water we consume by using as much recycled water as possible in our processes. To this end, we achieve zero discharge at many of our businesses, including Tuticorin and Hindustan Zinc.

Measures taken to counter risk

- Each business has been mandated to review and put in place appropriate mitigation measures to counter water-related risks
- Hindustan Zinc has entered into a Public-Private Partnership to install and treat 20,000 m³ a day of municipal waste water from the City of Udaipur. This meets about 85% of the water needs at Rajpura Dariba complex. An additional 40,000 m³ a day will come online by the end of 2019.

In 2017/18, Vedanta undertook a water risk assessment at 30 of our most significant business locations, to evaluate all risk related to water. This assessment established that our Indian operations manifest higher degrees of physical risk due to their location in high water-stress areas. In Zambia, the operations are exposed to higher regulatory risks because of legacy water discharge.

CASE STUDY



Improving the quality of discharge water at KCM

Konkola Copper Mines (KCM) in Zambia, which is Africa's largest copper mining operation, has been in continuous production for over 60 years. Vedanta acquired a majority share of KCM in 2004. Konkola operates some of the wettest mining operations in the world – mining processes require ~350,000m³ of water to be removed every day.

KCM embarked on a 10-year, US\$22 million project to improve the quality of its discharge water. Previously, sediments had been removed from the water flowing through the mines before being discharged to the surface. However, the concentration of suspended solids tended to remain high, which meant that additional measures were needed to improve water quality.

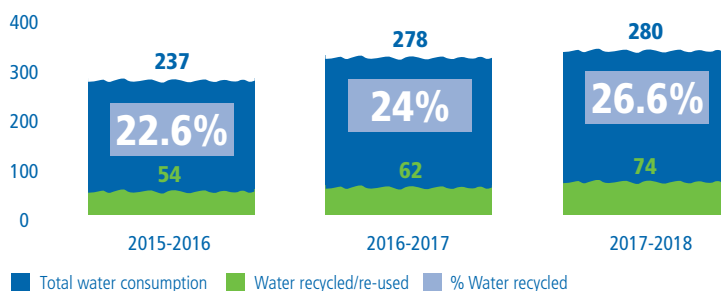
At KCM, suspended solids are primarily removed from water via 20 settling tanks, both on surface and underground. To improve the efficiency of these tanks, four major projects were undertaken:

- Refurbishment of existing underground settlers to make them more efficient
- De-silting of choked drain drives, which included the removal of mud that had accumulated over the years
- Procurement and installation of slurry pumps, which allowed the desludging period to be reduced from eight months to three weeks
- Procurement and use of flocculants to enhance settling

The immediate outcomes of the project have been two-fold:

- Suspended solids levels are now below the statutory threshold of 100 mg/l
- Wear and tear on pumping infrastructure is notably reduced due to improved water quality, which has lessened abrasive impacts

Water performance dashboard
(million m³)





Cairn Oil & Gas

ENERGY AND EMISSIONS

Vedanta's Energy and Carbon Management Policy and Performance Standard are the guiding documents for our approach to mitigating our climate-related business risk and ensuring that we minimise our energy consumption and air emissions.

Vedanta has established a carbon forum, led by the chief operating officers of our businesses. The forum has been tasked with developing and overseeing the implementation of Vedanta's carbon mitigation approach. Included in the forum's work are discussions related to approving Vedanta's carbon management strategy, long-term greenhouse gas (GHG) emissions intensity reduction targets, alignment with investor requirements, emerging regulatory risks and carbon pricing.

Given the risk posed by climate change, India has set ambitious targets for the reduction of emissions intensity by 33-35% by 2030, as well as sourcing 40% of its electrical power from non-fossil sources. In line with these commitments, Vedanta expects to reduce its GHG intensity by about 16% by 2020 from a 2012 baseline.

Hindustan Zinc and Cairn Oil & Gas have increased their investments in solar power, while other businesses have made significant improvements in process efficiencies. In addition to the 14% intensity reduction that we have achieved to date, our absolute GHG emissions have reduced by 2% even though we have ramped up our aluminium production, the greatest source of GHG emissions, by 40% year on year.

CASE STUDY

Checking the hidden fugitive at Cairn Oil & Gas

In the oil and gas industry, fugitive emissions often make up a significant proportion of a company's GHG emissions. These are not only a waste of resources but also have high global warming potential – as they are primarily methane and thus 23 times more potent than carbon dioxide in terms of global warming potential.

Along with an independent external expert, Cairn Oil & Gas conducted a fugitive emissions study for its Rajasthan operations. A leak detection and repair programme was carried out to check for emission leaks from process equipment. All joints such as valves, connectors, pumps, sampling connections, compressors, pressure relief devices and open-ended lines in the process plant and well pads were monitored.

Findings were positive, with fugitive emissions accounting for only 0.011% of the total GHG emissions of the process and well pad areas – significantly lower than the 13% correction factor which was being applied to account for unmeasured emissions. These numbers compared favourably with fugitive emission ranges found in North American oil and gas installations.

The study highlighted the excellent asset management and upkeep of facilities at Cairn's Rajasthan operations.



Cairn Oil & Gas



Gamsberg, Northern Cape

BIODIVERSITY

Vedanta strives to prevent any adverse impacts on biodiversity as a result of our operations. We manage and use land across the project life-cycle in a way that ensures biodiversity conservation needs are integrated with the needs of the business.

We have adopted a Biodiversity Policy and Management Standard in line with international standards and the guidelines of the International Finance Corporation (IFC). This is an integral part of our commitment to sustainable development. We also follow IFC guidelines and the International Council on Mining and Metals mitigation hierarchy – an internationally recognised approach designed to help limit, as far as possible, the impacts of development projects on biodiversity and ecosystem services.

Vedanta conducts environmental and social impact assessments for new projects or major expansions to understand the presence of critical biodiversity attributes before starting work. Sites that may have a significant impact on the biodiversity of an area must develop biodiversity management plans (BMPs) to mitigate that impact. As of the 2017/18 financial year, more than 80% of our sites have re-evaluated their BMPs and are in the process of developing plans to mitigate their impacts.

Biodiversity management has been made integral in all our projects across all three stages – the design phase, the operational phase and the post-closure phase.



CASE STUDY

Gamsberg: operating in a uniquely fragile biome

Preserve, protect, restore and rehabilitate are the pillars which should guide the environmental planning of any mining project – none more so than in the environmentally sensitive and fragile Northern Cape.

The Succulent Karoo Biome is unique, even for a country such as South Africa which is renowned for its floral diversity. The biome is home to at least 6,000 species of plants that have evolved over millennia to survive the desert's aridity, many of them rare and, until our environmentalists started on the area, some of which had been previously unrecorded.

The Bushmanland Centre of Endemism is smaller but nevertheless hosts 397 unique succulents, among them 16 that are endemic and four that are restricted to a small space. VZI was faced with a major challenge of how to develop the Gamsberg Project both without damaging the fragile site and in a way that would ensure the area can be restored when mining ends.

VZI's environmental specialists worked closely with a wide range of experts to design and implement a process to ensure the necessary protection, preservation and ultimate restoration. VZI enlisted advice from a range of environmental organisations, local and international, such as the International Union for Conservation of Nature – one of the world's oldest and most respected environmental groups.

Some 80,000 plants and 360,000 seeds have been collected and moved to the specialised facilities of the Karoo Desert National Botanical Garden. The objective is that, once mining has ended and the area's surface is restored, it can be replanted with the endemic species that were removed from the site, saved and protected. Areas that are particularly sensitive have been fenced off, while operations have been designed to limit and minimise any direct effects on the entire region.



Gamsberg, Northern Cape



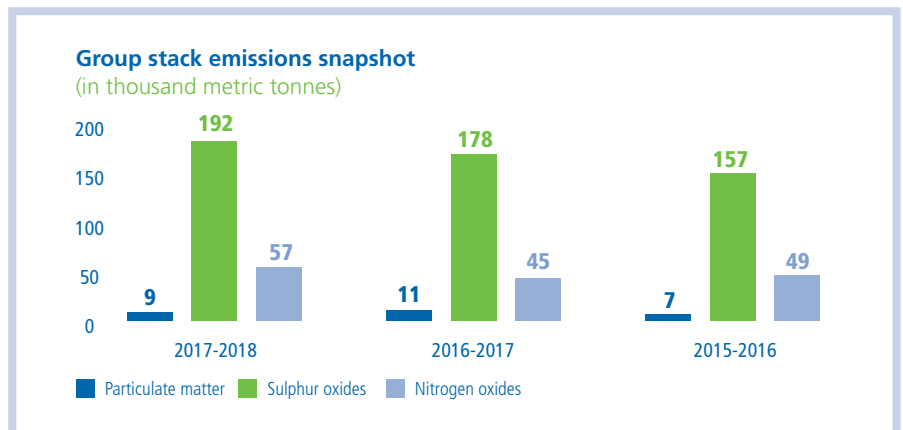
Bharat Aluminium Company (BALCO)

AIR QUALITY

Vedanta operates with a policy of 'Zero Harm', and manages emissions into the atmosphere both from point sources and from process activities associated with combustion.

As part of our ambient air quality monitoring process, we monitor Particulate Matter (PM) and Sulphur Oxides (SO_x) across all operations. We also monitor lead, fluoride and Polycyclic Aromatic Hydrocarbons emissions from our operations where applicable.

Stringent new norms for stack emissions from independent and captive power plants in India came into effect in December 2017. Most of Vedanta's operations meet the Nitrogen Oxide (NO_x) and PM norms, or are in the process of meeting them. The challenge we are facing is to meet the new SO_x norms, considering site layout issues and the effectiveness of available technologies in abating overall pollution and environmental impact.



Note: Stack monitoring is an important tool used to determine a facility's compliance with regulated emission limits.



Vedanta Aluminium, Jharsuguda

WASTE

The exploration and development of natural resources provides great economic opportunities for resource-rich countries. However, they also generate a large quantity of waste, which must be managed well.

In accordance with Vedanta's Resource Use and Waste Management Technical Standard, we follow the waste management hierarchy of:

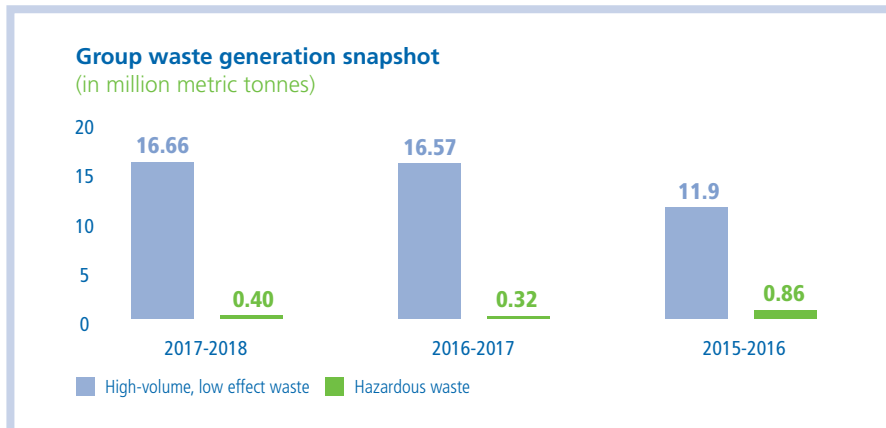
- Decrease waste, quantitatively as well as qualitatively, by reducing toxicity
- Recover and recycle wherever possible, either ourselves or through authorised recyclers
- Dispose of remaining waste in landfill or by incineration, using authorised, licensed and secured landfills.

Major waste categories at Vedanta operations are:

- Hazardous waste, including used/spent oil, waste refractories, aluminium dross, spent pot lining and residual sludge from smelters
- High-volume, low-effect waste, including fly ash (from captive and merchant power plants), slag, red mud (aluminium refinery waste), gypsum (from phosphoric acid plants) and jarosite (from zinc smelting)



Bharat Aluminium Company (BALCO)



Note: The measurement of waste generation is a valuable as an indicator of progress against our zero waste goal



Cairn Oil & Gas

In 2017/18,
Vedanta re-used
or recycled

61%
of our hazardous waste

82%
of our high-volume, low-effect waste (in sustainable applications)

Total fly ash utilisation increased to 90%, from 53% the previous year, as we used it to repair the tailings dam and ash-dyke walls at Jharsuguda and Balco.



Mangala Processing Terminal



TAILINGS DAMS

Vedanta currently oversees 18 tailings management facilities (TMF) and two water dams. To manage these crucial structures, the company relies on a Tailings Dam Management Standard, which is in alignment with guidelines issued by ICMM.

An independent, global expert – Golder Associates – oversees and reviews implementation of our tailings dam management practices.

Since the tragedy at the Vale/BHP operation at Samarco in Brazil's Minas Gerais province in November 2015, Vedanta has instituted a tailings management assessment process across the entire business. These assessments were based on the potential impact of any tailings management failure, not on probability – which is always very low.

Each business has implemented the Group standards and conducts specific pre-monsoon preparations to ensure the integrity of the structures. Group oversight – including by the Vedanta Risk Committee, Sustainability Committee, and Executive Committee – also keeps a check on the process.

Despite the roll-out of the new standard however, Vedanta experienced two TMF failures in 2017 – an embankment foundation failure at Jharsuguda's Katikela Lagoon No. 2 and an over-topping failure at BALCO Korba's Pond 6.

In both cases the structural design was reviewed. At Jharsuguda there has been some major dam wall rebuilding. In addition, as a precaution, a large number of monitors and monuments were installed to measure hydraulic pressure and wall movement respectively. As a further precautionary measure, the TMFs across the group were maintained at the lowest possible water level with emergency contingencies in place to deal with the possibility of unprecedented rainfall levels.

We have also rolled out the Vedanta Tailings Management Standard to ensure that we have consistent dam management practices across all companies and operations.

Tailings Management Facility, Gamsberg