Action Plan for the Phase-out of Ozone Depleting Substances at Hindalco

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Abstract

Ozone Depleting Substances more commonly known as ODS are widely used as refrigerants in industrial and domestic appliances such as heating ventilation and air conditioning (HVAC), refrigerators, chillers, coolers, etc. These, when released into the atmosphere, react with the ozone layer, and deplete it resulting in the penetration of radioactive ultraviolet rays into the earth's atmosphere. Besides the depletion of the ozone layer, they disrupt the food chains, spread skin cancer, and cause other health hazards. With the enforcement of the Montreal Protocol accepted back in 1987, countries worldwide stopped the use of chlorofluorocarbons (CFCs) which were the most potent ozone-depleting substances used back then with an ozone-depleting potential (ODP) of 1. This protocol laid down the plan to phase out the rest of ODS in use by 2020 in developed nations and by 2030 in developing nations, such as India.

Hindalco has taken the initiative to achieve the target of phasing out ODS use from all its factories by 2026. Predominantly 5 types of ODS using equipment are used at Hindalco sites, i.e., HVAC systems, water coolers, refrigerators, chillers, dryers, and all the mentioned equipment uses R-22 as refrigerant. The action plan consists of factory-wise equipment inventory creation, year-wise phase out target and projecting the capex involved. The list of equipment to be replaced involved an exhaustive exercise at each factory as it involves many functions and departments. It also involves the process of declaring each equipment out from the "Asset Register" and completing all the related financial calculations.

This project includes a complete technical analysis of the alternate gases and their ODS potential, energy consumption, heat recovery, discharge temperature and Global Warming Potential (GWP). ODS have to be replaced by fiscal year 2026 (FY-26) in 4369 devices, at an estimated cost of 7.5 million USD. ODS substances are already reducing at Hindalco, and a complete phase out would not only make Hindalco environmentally friendly but also much more resource efficient.

Keywords: Ozone depleting substances (ODS), Refrigerants, ODS phase-out, Global warming potential, Inventory of ODS.

1. Introduction

Ozone depleting substances are man-made gases that destroy ozone once they reach the ozone layer. These are mostly used as refrigerants in commercial and residential air conditioners, refrigerators, coolers etc. foam blowing agents, components in electrical equipment and industrial solvents, cleaning solvents and aerosol spray propellants and fumigants.

1.1 Types of Ozone Depleting Substances

a) Chlorofluorocarbons (CFCs): R-11, R-12 etc.

b) Hydrochlorofluorocarbons (HCFCs): R-22, R-141b etc
c) Hydrobromoflurocarbons (HBFCs): HF2Br
d) Halons- Halon-1211, Halon-1301 etc.
e) Methyl bromide- CH_3Br
f) Carbon tetrachloride- CCl_4
g) Methyl chloroform – CH_3CCl_3

1.2 Ban on the use of Ozone Depleting Substances is Essential Due to the Following Reasons

a) Depletion of Ozone Layer

ODS substances absorb the UV radiation of the sun and set up a chain reaction where a halogen atom attacks the Ozone Molecule (O3) to form monoxide and Oxygen (O2) which subsequently depletes the ozone layer.

b) Food Chain Disruptions

Depletion of ozone has repercussions on the entire food chain of the planet wherein the plants get affected due to excessive UV Radiation. Life in the ocean also gets affected as Planktons and Fishes are sensitive to UV Radiations.

c) Spread of Skin Cancer

Diseases like Melanoma- a type of skin cancer will be prevalent among humans due to abnormal exposure to UV Radiation.

2. British Antarctic Survey and its Role in Paving the Way to Montreal Protocol [1]

The British Antarctic Survey (BAS) has been actively involved in researching the Earth's polar regions and has made significant contributions to the study of the ozone layer. One of the most notable findings made by the BAS was the identification of the Antarctic ozone hole during the 1980s. They discovered that the ozone layer over Antarctica was being depleted at a rapid pace due to the release of human-made chemicals, particularly chlorofluorocarbons (CFCs) that were commonly used in various industrial products such as refrigerants and aerosols. The ozone hole over Antarctica grew considerably during the 1980s and 1990s, which resulted in increased ultraviolet radiation reaching the Earth's surface. To identify the ozone hole, the BAS established research stations in Antarctica to monitor the atmospheric conditions and ozone levels. Moreover, the BAS played a pivotal role in providing scientific evidence that led to the establishment of the Montreal Protocol in 1987.

2.1 Montreal Protocol – 1987 [1]

The Montreal Protocol, an international treaty established in 1987, has set specific targets to protect the Earth's ozone layer. Its primary objective is to phase out the production and consumption of ozone-depleting substances, such as chlorofluorocarbons (CFCs), by establishing timelines for their reduction. The first target set by the Protocol aimed to reduce CFC consumption and production by 50 % before 1999. This target was successfully achieved by most countries, leading to further targets for the complete phase-out of other ozone-depleting substances, including halons, carbon tetrachloride, and methyl chloroform. As of September -2021, 197 countries have signed up for the Montreal Protocol.

6. Overcoming major challenges

As Hindalco has numerous factories country-wide, it was a major challenge to collect the inventory and plan the phase out of ODS. The table below shows the challenges faced and steps taken to overcome .

Table 6. Challenges faced and steps taken to overcome.

S. No	Challenges	Steps taken
1	Aligning personnel at factories with the target of ODS phase out by FY 26	Multiple sessions and webinars with SPOCs from the factories and senior management to sensitize about the business requirement for phasing out ODS
2	Collection of inventory and data discrepancy	Conducted on-site audits to create an inventory of equipment along with refrigerant used. The collected data was verified with the procurement team at the site.
3	Strategic planning of YoY phase out along with budget requirement.	Consulted site team as well as senior management for year-wise allocation of budget for each factory according to the market price and inflation.

7. Conclusion

Taking a clue from international protocols for phasing out of ODS and commitment by Govt of India, Hindalco is taking proactive steps to phase out ODS from its Units by 2026 well before the Montreal Protocol deadline for India by 2030 and are committed to the cause. This involves substantial capital expenditure (Capex) provisioning therefore individual units of Hindalco have planned well in advance for phasing out ODS completely by 2026. Phasing out actions already started at many sites and each factory committed to meet the deadline.

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