



Assessing F Gases- India Context

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Montreal Protocol Adherence and Replacements



Target: To reduce HCFCs by 8,190 MT or 769.49 ODP tonne of HCFC between 2017 to 2023

- To encompass
 - More than 400 enterprises- including 300+ Micro, Small and Medium Enterprises (MSMEs) in the foam manufacturing sector and 6 large air-conditioning manufacturing enterprises,
 - Revision of building codes
 - Cold chain development using naturals
- Development of standards for non-ODS and Low GWP alternatives.
- R&D on low GWP alternatives

Net direct CO₂-equivalent emission reductions of about 8.5 million metric tonne annually from 2023.

From ODS to GWS

ODS	GWS	GWP	In the atmosphere (years)
<ul style="list-style-type: none"> • HCFC • CFC 	<ul style="list-style-type: none"> • HFCs • PFCs • SF6 	<ul style="list-style-type: none"> • 490-9100 • 23900 • 23900 	<ul style="list-style-type: none"> • 1.5-264 • 3200-50000 • 3200

Inventory of GWS

	Base Year	HFC-134a (Gg)	HFC-23 (Gg)	CF ₄ (Gg)	C ₂ F ₆ (Gg)	SF ₆ (Gg)	CO ₂ eq (Gg)	Percentage of Total Country Emissions
NATCOM 1	1994	NR	NR	NR	NR	NR	NR	
NATCOM 2	2000	0.220	0.420	0.870	0.087	0.013	11966.1	0.92
BUR 1	2010	-	1.43	2.13	0.58	0.0042	36012.4	1.19

Sources and Emission Factors Considered

Gas	EF	Source
HFC 23	0.03 kg HFC-23/kg of HCFC-22 produced (HCFC-22 consumption in 2014-15 was 79 MT which is expected to increase to 105 MT in 2020-21)	Industry Specific-Indigenous
CF4	1.4 kg CF4/t Aluminium produced	IPCC default
C2 F6	Default rate for C2F6 emissions is 1/10 that of CF4 emissions (0.1 C2F6/CF4)	IPCC default
SF6	Consumption = Emission in Magnesium production and Casting	IPCC

Gas	Gap Areas
SF6	Switch gears, Sound proofing and Glazing Glass, Sports shoes, Sports equipment's, Tyres, Tennis balls
HFCs	Aerosols
PFCs	Semiconductor industry

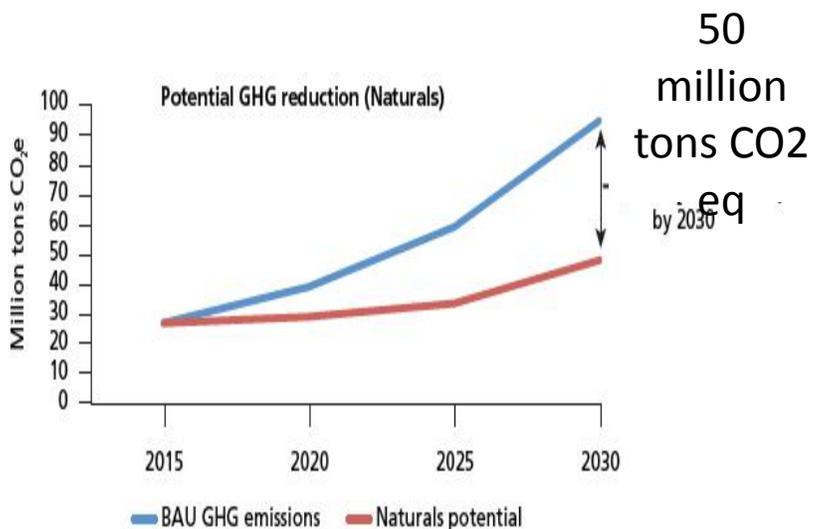
India's Commitment to Kigali Amendment- Reducing HFCs

Action Point	Description			Comments
Baseline	2024-26			Production expected to peak. HFC consumption in 2047 must be less than 15% of the average consumption between 2024-26
Freeze year	2028			HFC consumption must decrease from 2028
HFC Phasedown schedule	Step	Reduction in Consumption	Year	HFC Phasedown schedule of India
	1	10%	2032	
	2	20%	2037	
	3	30%	2042	
	4	85%	2047	

Alternatives being considered for HFCs in cooling devices

Current capacity of cooling is constitutes of

- 90 percent hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFC)
- about 10 percent is based on naturals



Sector	Natural Alternatives	% Potential
Domestic Refrigeration	R600a (Isobutane)	100%
Commercial Refrigeration	CO ₂ , R600a, Ammonia	100%
Industrial Refrigeration	Ammonia, R290 (Propane)	100%
Transport Refrigeration	Not available	0%
Residential AC	R290	95%
Commercial AC	Ammonia	50%
MAC	Not available	0%
Total Potential	77% of India's RAC sector can be converted to naturals by using currently available technologies	

Source: <http://www.cseindia.org/userfiles/prioritizing-natural-refrigerants-reportch.pdf>

Way Forward

- A plan for systematic collection of industry specific production, import and export data along with assessment of emission factors
- Options to replace by Natural alternatives need to be aggressively explored with co-benefits of energy efficiency and reduction in net CO₂ equivalent emissions
- Amendments required in standards of inflammable coolants (such as ISO-5149)
- Channelization of funds to priority industries - available to India as it's a part of Article 5 Countries of the Montreal Protocol.

Thank You