VIENNA CONVENTION AND MONTREAL PROTOCOL
HFC PHASEDOWN: INDIAN PROPOSAL

Presentation for Hon'ble Minister
Ministry of Environment, Forest and Climate Change
Government of India
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DISCOVERY OF OZONE HOLE

- Three UK scientists discovered a hole in the ozone layer in the atmosphere above Antarctica in 1985. Joe Farman attributed it to chlorofluorocarbons.

- Vienna Convention for Protection of Ozone Layer was signed on 22 March 1985, and Montreal Protocol on substances that depletes Ozone layer was established in 1987; entered into force in 1989 (188 countries).

- India became Party to the Vienna Convention and the Montreal Protocol on 18th March, 1991 and 19th June 1992 respectively.

- The Montreal Protocol - most successful international environmental treaty in history. It has been universally ratified and all the 197 countries.

VIENNA CONVENTION AND MONTREAL PROTOCOL

- The Government of India has entrusted the work relating to the ozone layer protection and implementation of the Montreal Protocol to the Ministry of Environment, Forest and Climate Change (MoEF&CC).

- The Ministry has established an Empowered Steering Committee (ESC) Chaired by Secretary (EF&CC), which is supported by two standing committees viz. Technology and Finance Standing Committee (TFSC) and the Standing Committee on Monitoring.

- The Ministry has set up an Ozone Cell as a National Ozone Unit (NOU) to render necessary services for effective and timely implementation of the Montreal Protocol and its ODS phase-out program in India.
- The CFCs were used as refrigerants in domestic refrigerators, commercial refrigeration appliances, Mobile air-conditioners (MAC), Chillers, foam, Aerosol Propellants, MDIs, etc.
- Kyoto Protocol was established for reduction of emissions of Seven Green House Gases (CO_2, NO_2, SF_6, CH_4, PFC, HFC, NF_3).
- The substitute for CFCs were HFCs, HCs or HCFCs (transitional) which have either zero ODP or lower ODP compared to CFCs. HFCs were potent Green House Gases but with lower potency than that of CFCs.
- HFCs are non-ozone depleting substance but have high Global Warming Potential (4 to 14800 GWP).

IMPORTANT CHEMICALS , THEIR TRANSITION AND USAGE

APPLICATIONS	CHEMICALS CFC	HCFC (1990)	HFC	NATURALS
RAC	CFC 11, CFC 12,	HCFC 22	HFC-410A, HFC-32	HC 290 (R290 or Propane)
Refrigeration	CFC-11, 12	HCFC - 22		HC-290, R-744, R-717
Propellant	CFC 114		HFC 134 a,	
Blowing agent for Foams	CFC 11	HCFC 141b		Cyclopentene

TIME SERIES OF DEVELOPMENTS

S.N	ACTIVITY	Non- Article 5	Article 5
1	India ratifying the Montreal Protocol		1992
2	Beginning of Phase out of CFC	1989	1999
3	Completion of phase out of CFC	1996	2010
4	Beginning of phase down of HCFC	1996	2013
5	Completion of phase down of HCFC	2020	2040
6	Beginning of discussion on phase down of HFC by bringing it under Montreal Protocol	2009	

Article 5 Parties have got a grace period of 10 -17 years historically in beginning of phase down

RATIONALE FOR BRINGING HFC UNDER MONTREAL PROTOCOL

- HFCs have high Global Warming Potential (4 to 14800).
- Avoid lock-in with high HFC use as a substitute of HCFC.
- India is signatory to Paris Climate Agreement.
- Montreal Protocol adopted phase out of CFC and HCFC (ODS) and HFC came as substitute for CFCs and HCFCs .
- HFC-23 is bi-produced when HCFC-22 is produced , which is controlled by Montreal Protocol. HFC – 23 has GWP of 12,300.
- HCFC users will normally switch over to HFC: Increasing demand for AC / Refrigeration in developing world has potential for tremendous increase of HFC sin atmosphere – significant impact on radiative forcing.
- Complementarity in objectives of Montreal Protocol and UNFCCC.
- A clear signal for intensifying research in alternatives of HFCs.
- The HCFC phase-out has just begun, so scope of leap frogging to non- HFC options.

WHAT SHOULD BE AN IDEAL SUBSTITUTE

- Substitute should come out of market driven research with or without policy signal.
- Health and Safety aspect (toxicity and flammability)
- Low Global Warming Potential.
- Should be more Energy Efficient other wise indirect impact of more GHG.
- Product Performance.
- Compatibility with existing equipment.
- It should be of lower cost, more efficient, environment friendly (generation of volatile compound), and wider usage range.
- Cost of transition should be affordable to industries in developing countries.
- Preferably non patentable like naturally available substances.
- Well researched for possible unintended side effects.

INDIAN PERSPECTIVE

S.N	COUNTRY / REGION	HFC PRODUCTION CAPACITY (MTPA)	% SHARE	HFC CONSUMPTION (MTPA)	% SHARE
1	USA	233000	24.53	254000	37.03
2	WESTERN EUROPE	84000	8.84	98000	14.28
3	JAPAN	72800	7.66	44000	6.41
4	CHINA	538000	56.64	160000	23.32
5	INDIA	22000	2.32	13000	1.89
6	REST OF THE WORLD	0	0	117000	17.05
	TOTAL	949800		686000	

INDIAN PERSPECTIVE

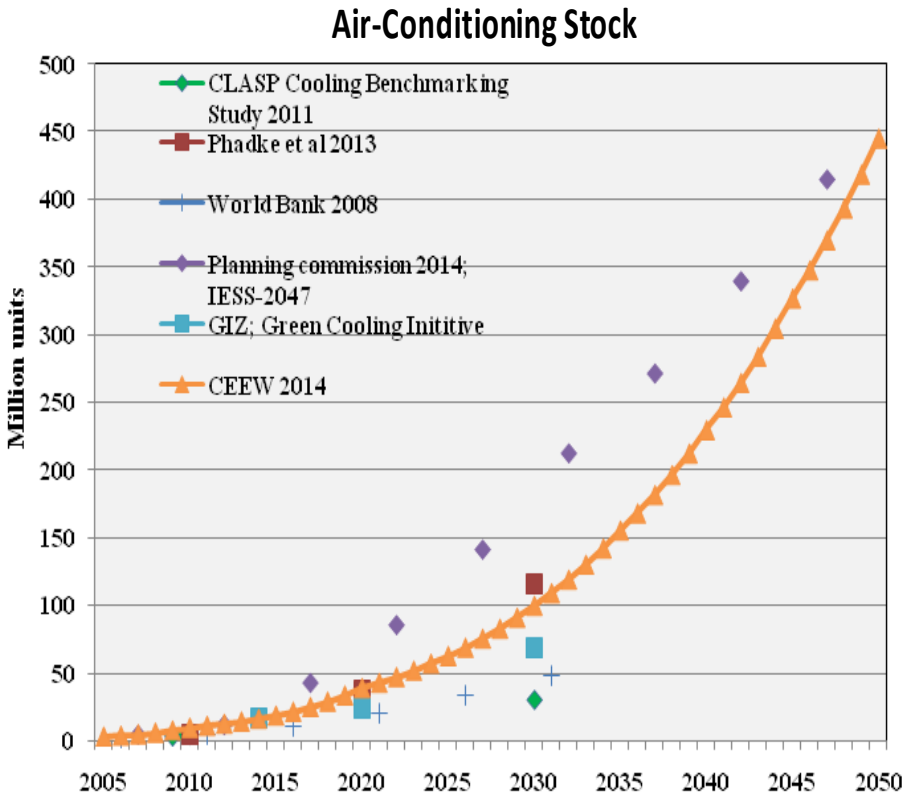
- High Growth Rate of GDP (more than 7% annual) – Rising Income and Aspirations.

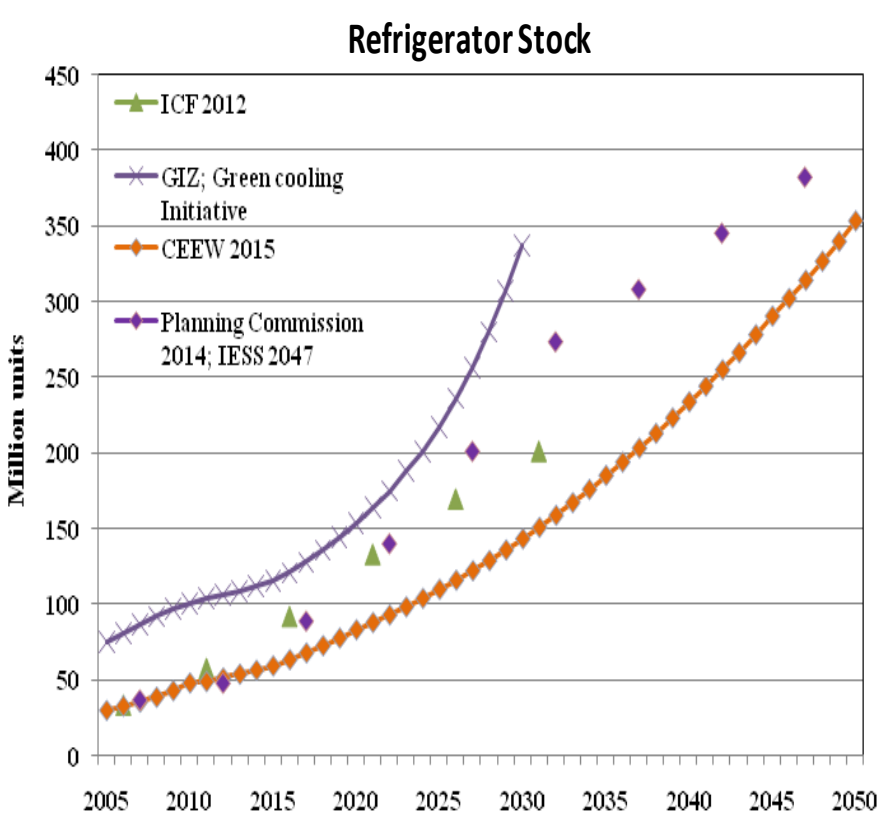
- 70 % of buildings which will exist in India in 2050, there construction is yet to begin.

- High rate of urbanization; High growth rate in residential, office and commercial space.
- Low penetration of cars: India- 15 per 1000 population, China – 60 per 1000, Brazil is 200 per 1000, and USA is 800 per 1000. Indian car industry to touch 4 m units in 2016.
- Steep increase envisaged in food processing, refrigeration, storage and transportation in refer vans of agricultural produce.

- HFC s is 1% of GHG emission (though growing at rate of 8 to 9% per year).

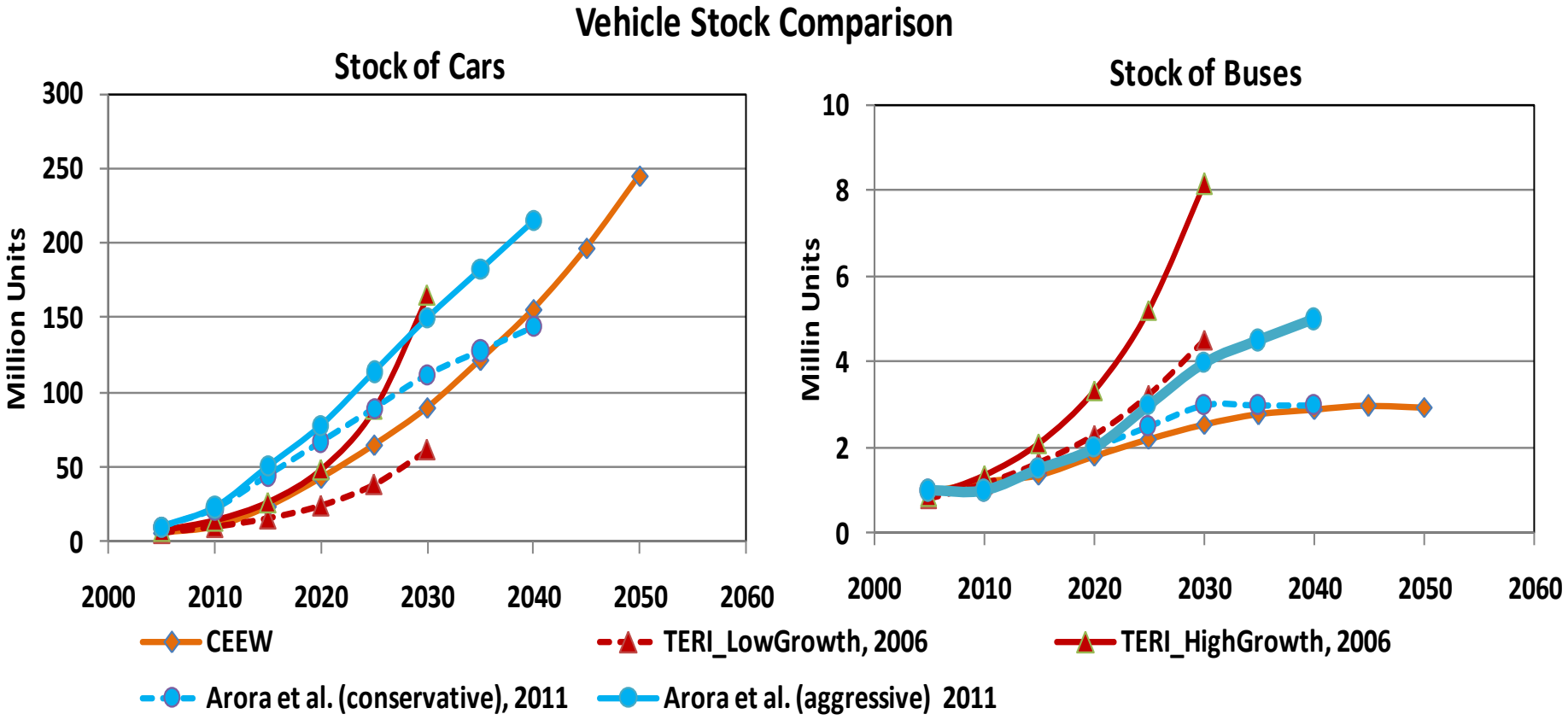
Low urbanization, low Penetration of RAC and Refrigeration stock: High Growth Rate In Future





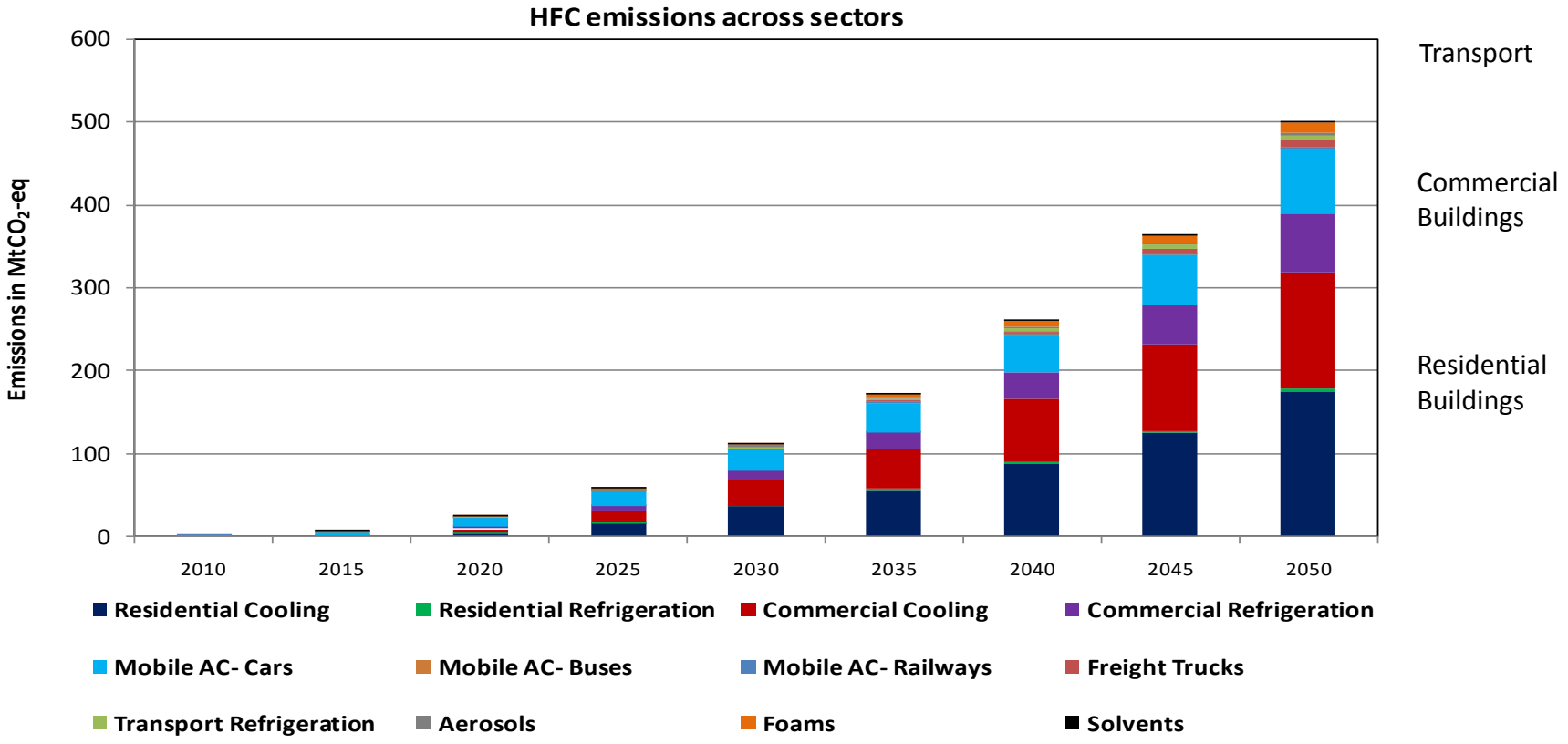
Study of CEEW, TERI

Low Penetration of Vehicles: High Growth Rate Expected



Study of CEEW, TERI and Arora et. al

77 % HFC Emissions expected from Building Sector

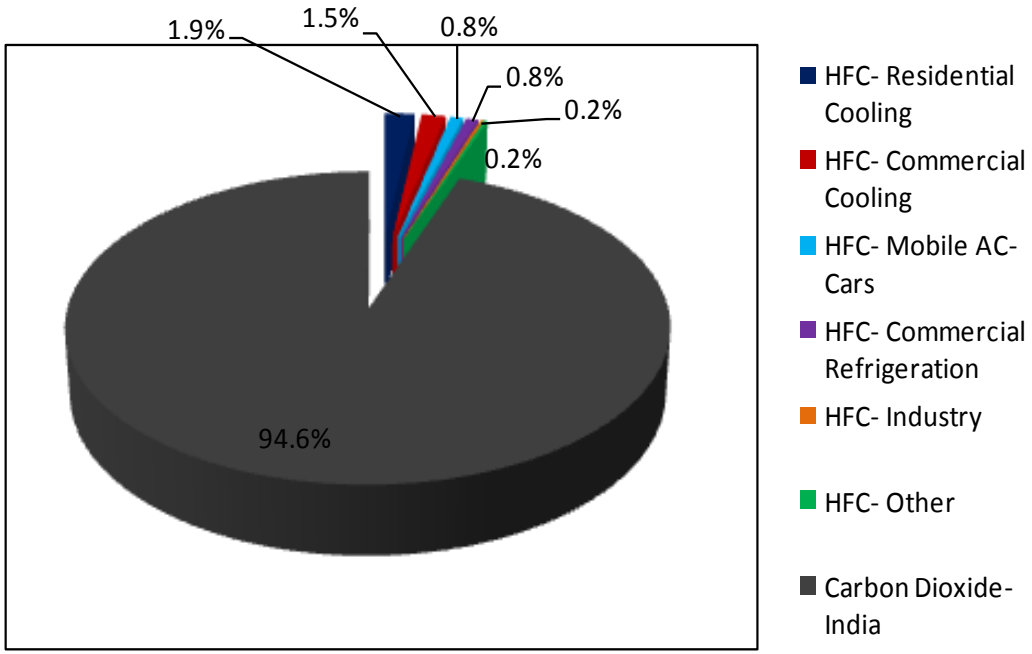


HFC emissions from end-use sectors will grow significantly: by 186 times from current level to 500 million tonne CO_2e in 2050.

Study by CEEW and TERI

Cumulative global warming impact from HFC emissions is 6.56 GtCO2-eq between 2010 and 2050

Share of global warming impact of HFC emissions in total GHG emissions for India in 2050



Study by CEEW and TERI

INDIAN AMENDMENT PROPOSAL

1. 19 HFCs with varying GWP from 4 to 12400.

2. Baseline year (Production and consumption): 2013, 2014, 2015 (non- Article 5)
   2028, 2029, 2030 (Article 5)

3. Freeze in 2015 (non- Article 5)
   in 2031 (Article 5)

4. Phase down completion: 2035 (non- Article 5)
   2050 (Article 5)

5. Control Period: 19 years (non Article 5).

6. Nationally determined phase down steps for Article -5 Parties, to be decided five years in advance for next five years.

7. Continue to use HCFC / HFC and blends of HFCs in transition of phasing out HCFC wherever low GWP / Zero-GWP alternatives are not available.

8. Full Conversion Cost:

(i) Total cost of converting a chemical production plant from HFCs to low GWP / Zero GWP alternatives.

(ii) Cost for manufacturing unit of equipment from HFC to low GWP / Zero GWP alternatives and operating cost for 5 years.

(iii) Adequate funding for servicing sector including training of technician, awareness, equipment support to technicians, compensation for obsolescence, / immature retirement of equipment etc.

(iv) Full second conversion cost wherever transitional technologies shall be deployed

(v) Cost of IPR / Patents / Technology Transfer / Research and Development / in-house development.

(vi) Lost profit due to shut down / closure of plant and manufacturing unit.

(vii) Change in structure design, layout of plant and machinery, civil, electrical and mechanical works.

9. Strengthening of financial mechanism under Montreal Protocol by addressing the following:

(i) Compensation for lost profit streams for gradual closure of production facilities of HFCs.

(ii) Full Conversion cost.

10. Grace period of 15 years for Article 5 Parties. Why?

(i) To ensure that by the time a safe, technically proven, energy efficient, environment friendly, economically viable, commercially available, matured non- HFC technologies are available.

(ii) Historically a grace period of 10 to 17 years has been provided to Article 5 Parties in CFC and HCFC phase downs.

11. Date of freeze shall be the date of eligibility of enterprises for financial assistance in case of Article -5 Parties.

12. Categorization of HFCs in Groups:

ANNEX F

Group I: HFC 134, HFC 134a, HFC 143, HFC 245 fa, HFC 365 mfc.

Group II: HFC 227 ea, HFC 236 cb, HFC 236 ea, HFC 236 fa, HFC 245 ca, HFC 43-10 mee.

Group III: HFC 32, HFC 125, HFC 143 a

Group IV: HFC 41, HFC 152, HFC 152 a, HFC 161

INDIAN AMENDMENT PROPOSAL

ANNEX G

- HFC -23 Comprehensive R&D to be taken to make use of HFC-23 for converting it in a useful product.

13. Use of GWP weightage for HFCs in Montreal Protocol.
14. Exemption for production and consumption of HFCs for manufacturing of Metered Dose Inhalers and other medical appliances.
15. Provisions of Essential Use Nomination for both non- Article 5 and Article 5 Parties.
16. No control on feedstock applications of HFCs.
17. Requirement of licensing of HFC imports and exports and bans imports and exports to non-Parties.
18. Requirement of Reporting of production, imports and exports of HFCs.

INDIAN AMENDMENT PROPOSAL

19. Phasedown of production and consumption of HFCs shall be eligible for funding under the Montreal Protocol.

20. Relationship with UNFCCC:

(I) The proposal intends to support overall global efforts aimed at climate system protection.

(II) The proposal envisages continuance of inclusion of HFCs within the scope of the UNFCCC and its Kyoto Protocol for accounting and reporting of emissions.

(III) It calls for an amendment in the UNFCCC and Kyoto Protocol.

IMPACT OF INDIAN AMENDMENT PROPOSAL

- Emissions peak somewhere close to 2035-36
- Transition away from HFCs will need to start somewhere around 2025 itself

Year	**Business as usual Indian HFC emissions** ($MtCO_2$-eq.)	**HFC Emissions if Indian Amendment proposal is adopted** ($MtCO_2$ eq.)	**Emissions avoided** ($MtCO_2$ eq.)
2010-20	134	134	
2020-30	699	567	
2030-40	1,879	1,028	
2040-50	3,845	613	
2010-50	6,557	2,342	4,215
2050-2100	42,365	850	41,515

Study of CEEW and TERI

IMPORTANT ISSUES FOR DISCUSSION: PRODUCTION

1. The main producers and users of HFC today are USA, EU and China.
2. China alone accounts for 50% production and consumption of HFC in world and more than 95% in developing world.
3. The US and EU by domestic legislation are prohibiting use of HFC by 2017 and in some sector by 2021.
4. Chinese plants are running at 60% capacity. Phase down means closing 40% facility and taking money from MLF.
5. Special Considerations for giving more funds to China:

   "That enterprises that convert from HCFCs to high-GWP HFCs after the adoption of an HFC amendment under HPMPs already approved by the Ex. Com will be eligible to receive funding from the MLF for a subsequent conversion to low-GWP or zero GWP alternatives to meet agreed incremental costs in the same manner as enterprises eligible for 1st conversions."

IMPORTANT ISSUES FOR DISCUSSION: CONSUMPTION

1. The cost of alternatives is 10-20 times more than the chemical in use today (HFC-134a and HFO 1234yf). HFC-134a costs Rs.450 per litre whereas HFO1234yf costs Rs.6000 a litre.
2. The two companies in USA (Honeywell and Du-Pont) and China will get all the monetary benefits from this amendment.
3. Rest of the world (consumers ultimately) will be paying this higher cost of new chemicals and cost related to change in equipments.
4. India should target for manufacturing facility: we are today exporters, should not loose this position. With our size and growth we cannot be dependent on two companies in monopolistic situation.

PROPOSED STAND FOR DISCUSSION

6. If we move the baseline and freeze date early, the consumers will be forced to pay higher amount for use of new chemicals due to IPR.
7. If we allow China to avail funds from Montreal Protocol to reduce production, the consumers will be forced to pay higher amount as there will be premium on HFO as well as HFC. This will also mean paying the polluter.
8. The baseline and freeze date of Indian proposal will take care of this above adverse situation as, IPRs will expire before that and cost of chemicals will come down.
9. We should try and stop fund flow from MLF for reducing production of HFC in China.

THANKS