

# *INDIAN FOAM SECTOR HCFC PHASE OUT*

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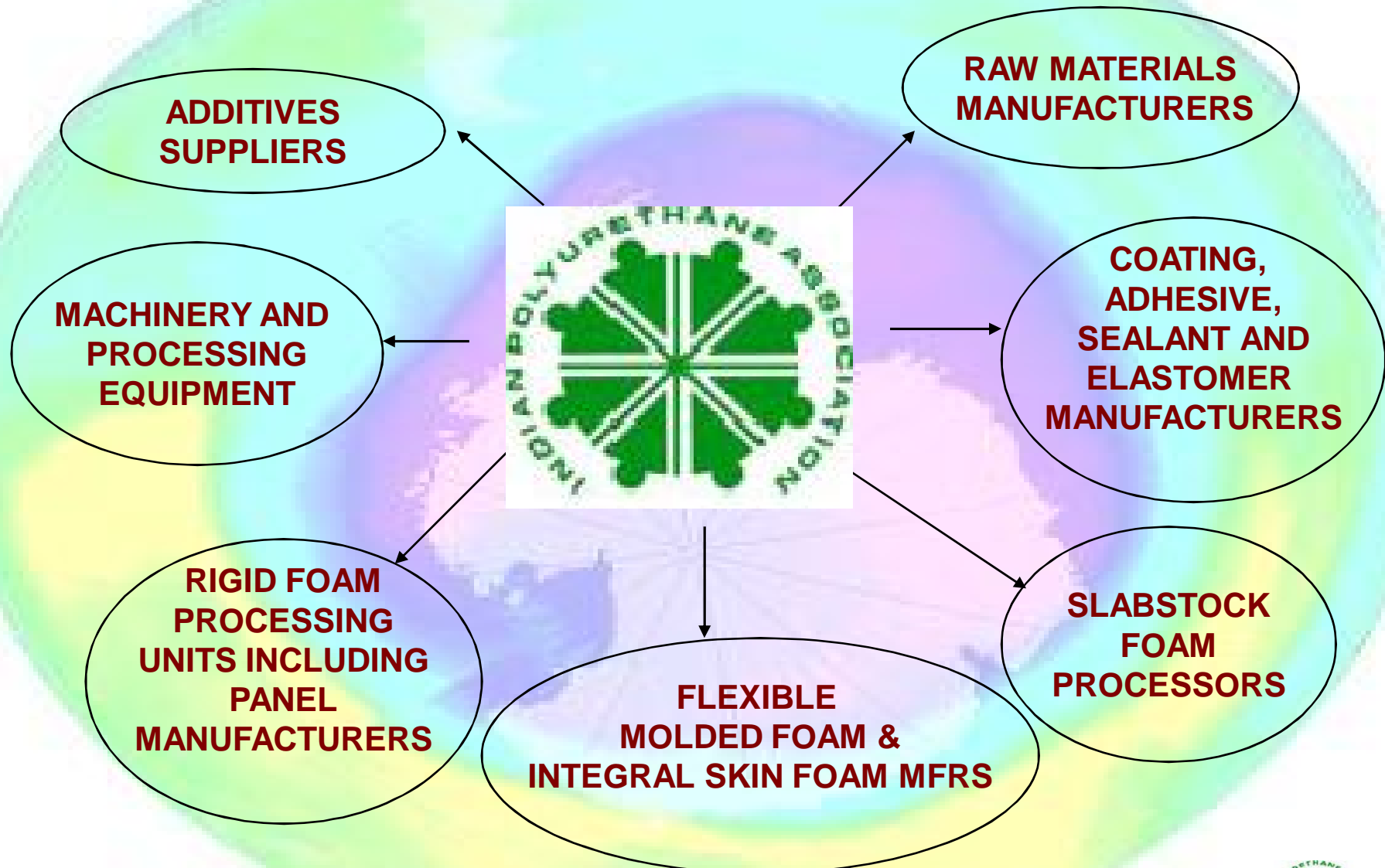
September 24<sup>th</sup> & 25<sup>th</sup>

HCFC Phase out Management Plan (HPMP) Meeting

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# *IPUA - Indian Polyurethane Association*



# *Indian Polyurethane Association: Aims*

- **To actively promote usage of Polyurethanes in India by conducting Seminars / Technical Workshops to disseminate information on Technology / Markets.**
- **To maintain the highest standards for protection of the environment and safety in the Polyurethane Industry.**
- **To promote Education & Training in Polyurethanes so that a dedicated trained technical manpower is available to the Indian PU Industry.**
- **To promote the highest Ethical standards in the Polyurethane Industry.**
- **To effectively represent Polyurethane Industry point of view with the Union / State Governments and strive for an equitable /level playing field.**
- **To interact with other Trade Bodies to build a fraternal bond between the Polyurethane Industry and Other Industries**



# SITUATION AFTER CFC PHASE OUT

When CFC Phase out was started in 90's, change over decision by Indian Foam Industries was relatively simple, as selection had to be made from three alternative blowing agents which were well established in developed world and could easily be adopted by Indian Foam Sector. These were:-

Water	Long Term	Mainly for Flexible Foams
Hydrocarbons	Long Term	For large enterprises such as Domestic Refrigerators
141b	Short Term	Most SMEs including mfrs of IFS, Discontinuous Panels, Thermowares, Commercial Refrigerators and some large domestic Refrigerators, etc.



# *HCFC Phase Out :Present Scenario*

As for developing countries like India, since initial HCFC phase out date was 2040, not much work has been put in by Indian Foam Industries including chemical suppliers for early phase out.

Now that the dates are advanced, there is a big challenge for Indian Foam Sector as no technically and economically viable solution is available to phase out HCFC 141b considering the fact that most HCFC 141b users are SMEs including few large enterprises too.

Estimated 6000-7000 MT /Annum of HCFC is being used in this sector.



# AVAILABLE ALTERNATIVE BLOWING AGENT

Presently, alternative blowing agents in use in developing countries are listed below:-

	HCFC-141b	HFC-134a	HFC-245fa	HFC-365mfc	cyclopentane	Normal pentane	iso pentane	Methyl Formate
Formula	CH <sub>3</sub> CCl <sub>2</sub> F	CF <sub>3</sub> CH <sub>2</sub> F	CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> H	CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> CH <sub>3</sub>	C <sub>5</sub> H <sub>10</sub>	C <sub>5</sub> H <sub>12</sub>	C <sub>5</sub> H <sub>12</sub>	HCOOCH <sub>3</sub>
Molecular Weight	116.9	102.03	134	148	70	72	72	60
Normal Boiling Point °C	32.1	-26.2	15.3	40.0	49.3	36.0	27.8	31.5
Lambda value mW/mK	10.04	14.05	12.00	10.70	11.97	15.00	15.00	10.7
Flash Point °C	None	None	None	-25 [5]	-7 [8]	-56.2 [8]	-57 [8]	-19
Auto ignition Temperature °C	550	770	NA	NA	361[8]	260[8]	420 [8]	> 449 °C
Atmospheric Lifetime, yr.	9.4	14.6	8.4	10.8	Days	Days	Days	NA
ODP	0.11	0	0	0	0	0	0	0
GWP, 100 yr time horizon [6]	725	1430	1030	794	11 [7]	11[7]	11[7]	0
VOC Status	No	No	No	Not Reported	Yes	Yes	Yes	Exempt



# *HCFC phase out application wise*

Foam sector may be divided in four main areas

- **Flexible slab stock**
- **Flexible moulded**
- **Rigids**
- **Integral skin**

It is the Rigids and Integral skin & some flexible slabstock foam applications where HCFC's are being used wherein phase out program requires careful approach



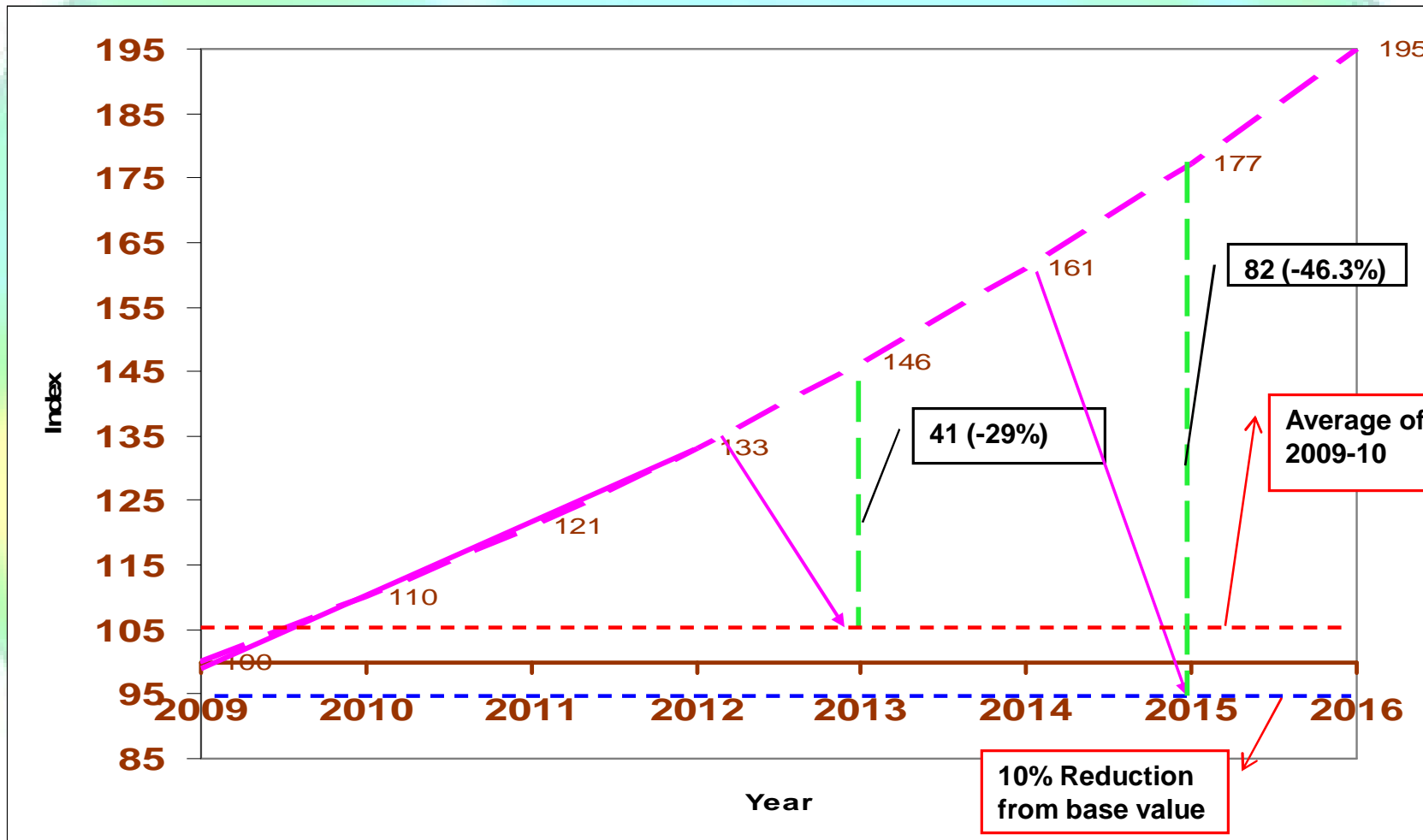
## HCFC phase out application wise ( cont'd )

Foam Type	Application	Present Blowing agent	Alternative Blowing Agents
Flexible slab stock	Mattress and other General purpose use	Methylene Chloride / 141b	Methylene Chloride  CO2
Flexible Molded	Automotive / Furniture	Water Water	Not required Not required
Integral Skin (IFS)	Automotive / Furniture	HCFC 141b /Water	N.Pentane/Methyl Formate / Water
Rigids	Domestic Refrigerators	Cyclopentane HCFC 141b	No change required Cyclopentane, 245 FA, 365 MFC
	Commercial Refrigeration	Water / HCFC 141b	Pentane, 245FA or 365 MFC
	Continuous Panel	N Pentane HCFC 141b	Not required N Pentane
	Discontinuous Panels	HCFC 141b	Pentane / 134A /245FA /Methyl Formate
	Thermoware	HCFC 141b	Methyl Formate / 134A
	General Insulation	HCFC 141b	Methyl Formate / 134A
	Spray	HCFC 141b	245FA / Methyl Formate





# HCFC Consumption & Phase Out Pattern



# *HCFC Phase Out Approach*

The right approach for phase out of HCFC 141b from Indian foam sector can be as under:-

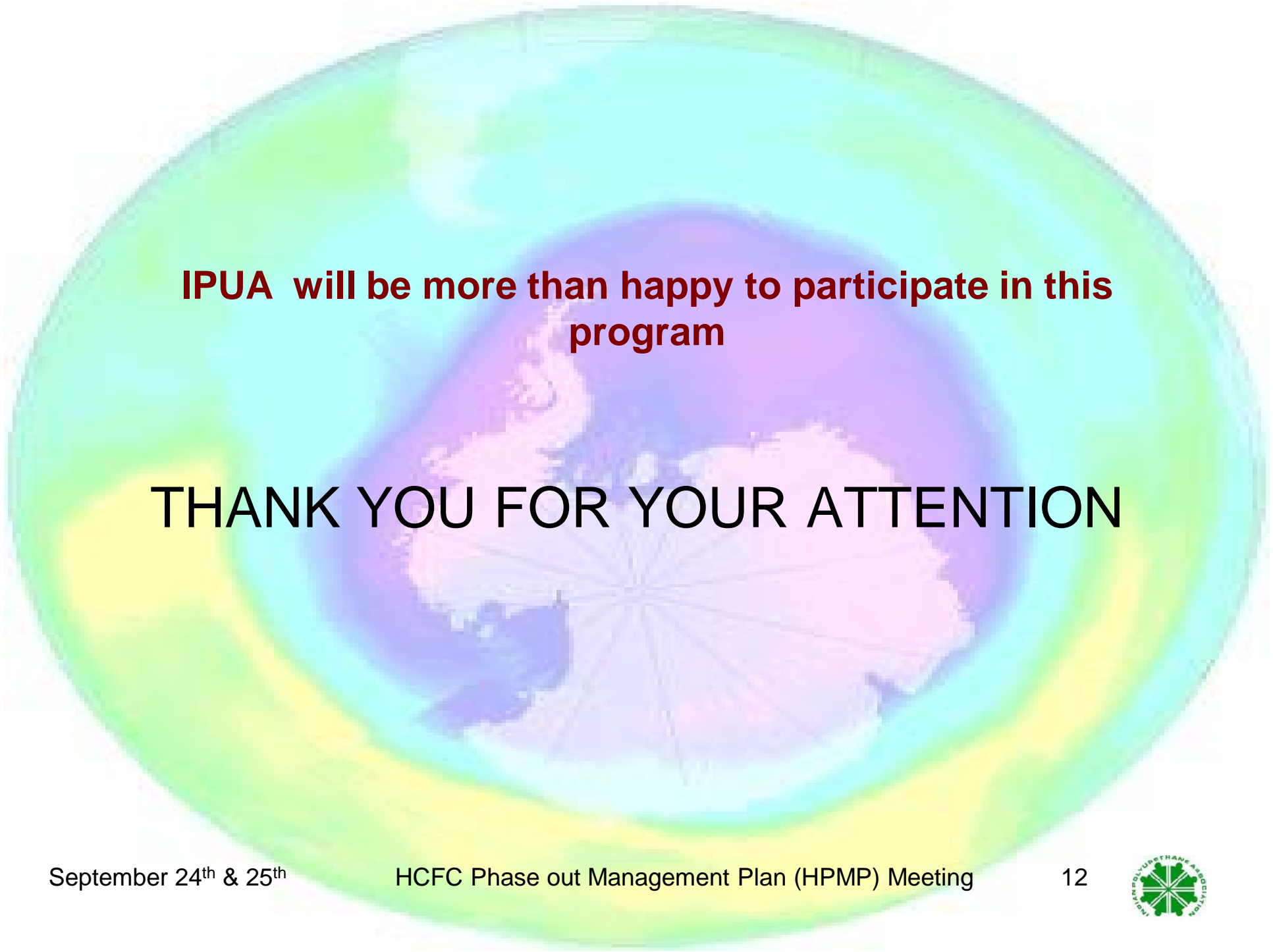
- Complete change over to long term blowing agent for large enterprises.
- Partial production can be changed to alternative blowing agent where HCFC 141b can be phased out stepwise over a period of time.
- Use reduced HCFC 141b systems where mixture of HCFC 141b with other alternative blowing agent may be used which can allow cut down of HCFC 141b phase wise this solution can be adopted for SMEs.



# *Safety and Energy Concerns*

- While selecting an alternative blowing agent safety and fire hazards must be given due considerations as some of the blowing agents are highly combustible / explosive and as such can be difficult to handle by small enterprises.
- Energy should be most important factor particularly for rigid foams which are mainly used for insulation applications.





**IPUA will be more than happy to participate in this program**

**THANK YOU FOR YOUR ATTENTION**

