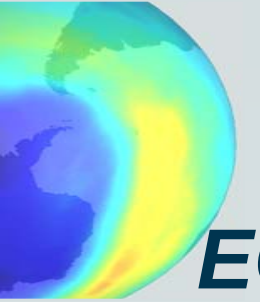


EC Commission Workshop on HCFCs

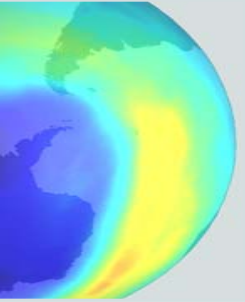
ICAO Building, Montreal, Canada

Saturday 5th April 2008

Overview of the Challenge

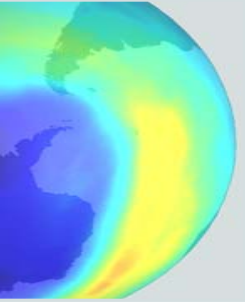
HCFC consumption, emissions and alternatives

Paul Ashford & Lambert Kuijpers



Outline of Presentation

1. Components of HCFC use
2. Dynamics of HCFC growth & challenges of Decision XIX/6
3. What is at stake



1. Components of HCFC use

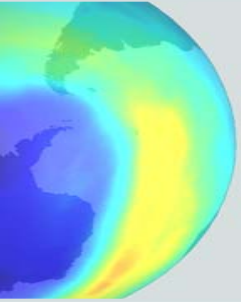
Three key sources of HCFC use

- Pre-existing HCFC (22) use
- Transition from CFCs
- New HCFC use:
  - Expansions of existing activities
  - Novel technologies & new markets

Pre-existing HCFC use

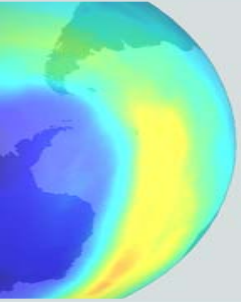
- Primarily HCFC-22 use in the refrigeration and air conditioning industry
  - commercial refrigeration (also in R502)
  - stationary air conditioning units
  - HCFC-22 chillers
  - industrial refrigeration applications

HCFC-22 remains the 'refrigerant of choice' for many applications and not the 'substitute of choice'



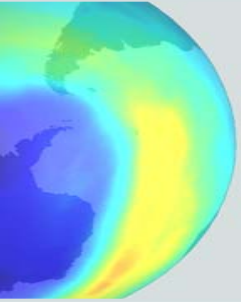
Transitions from CFCs

- Driven by the immediate requirements of the Montreal Protocol in phasing out Group A substances
- At the London (1990) meeting HCFCs seen as ‘transitional substances’ (legitimate)
- Multilateral Fund able to adopt all technologies including HCFCs
- Cost/benefit approach led to use of ‘drop-in’ (low threshold) approaches for small players



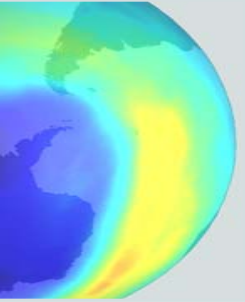
Expansion of existing activities

- No new capacities (post-1995) included in funding provisions for ODSs
- Refrigeration and foam applications growing in both market size and geographic spread
- New phase-out schedule for Article 5 HCFCs might lead to the need to abandon assets prior to conclusion of investment cycle



Novel technologies and uses

- Growth of the Extruded Polystyrene (XPS) industry in China
- Novel small-scale process plant not seen elsewhere
- 350 plants installed since 2001 - consumption potential of 52,000 tonnes
- Relatively emissive – particularly where HCFC-22 is used
- No ‘total solution’ yet available



2. Dynamics of HCFC growth….

Aspects to consider…..

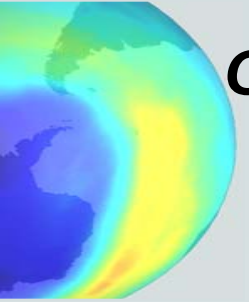
- Historic & existing consumption
- Growth rates
- Range of HCFCs involved
- Timing in terms of Dec. XIX/6
- Ozone versus climate
- Consumption versus emissions

Consumption Assessments as in Dec. XVIII/12

	2005	2015	Growth Factor	Annual Growth
SROC	275,000	489,000	1.78	5.9%
"World Bank"	280,000	786,000	2.81	10.9%
HCFC Surveys	195,250	415,450	2.13	7.9%
XVIII-12 "High"	275,000	687,500	2.50	9.6%

….but latest data give 318,000 for 2005….

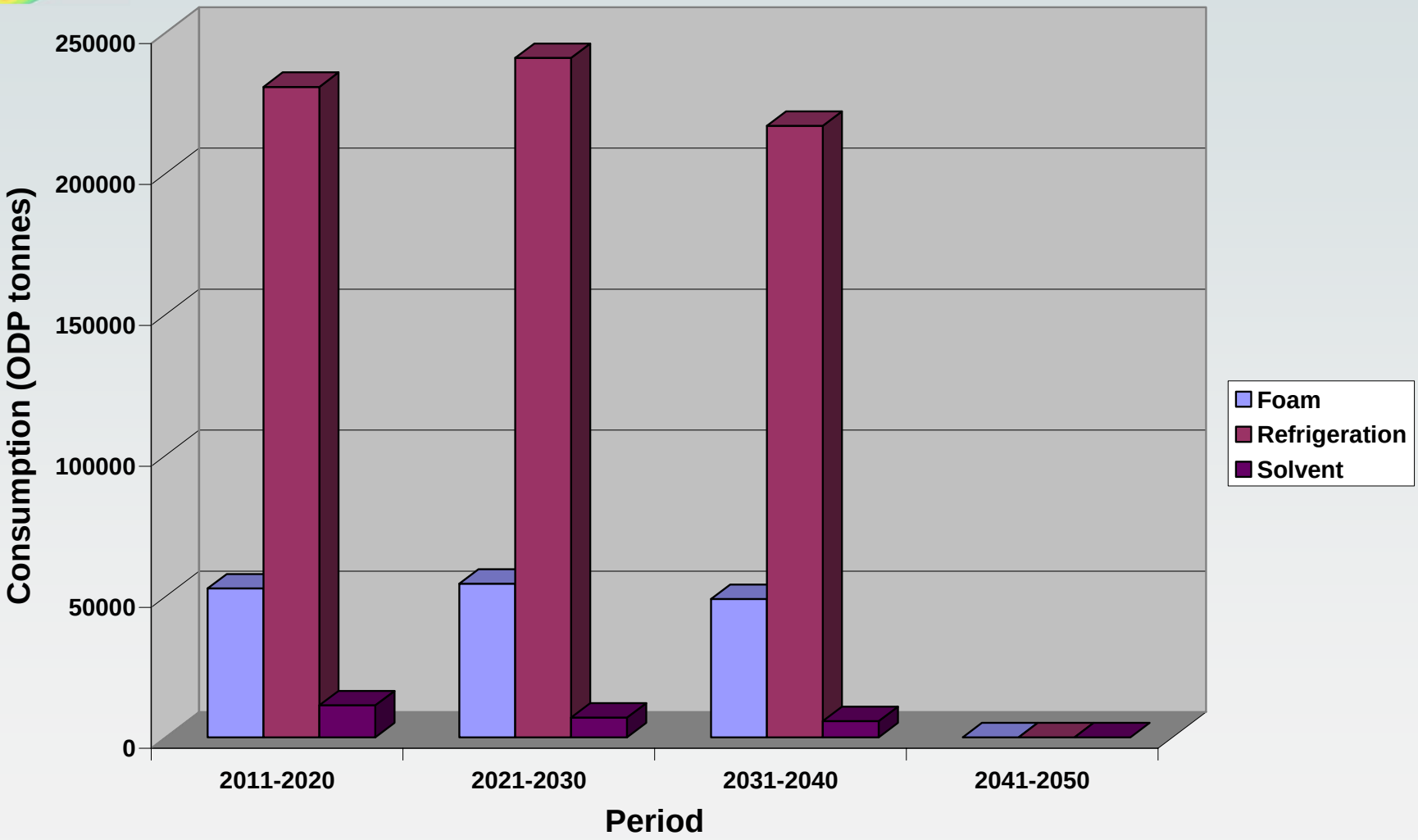
….and 380,000 for 2006 – extrapolation????



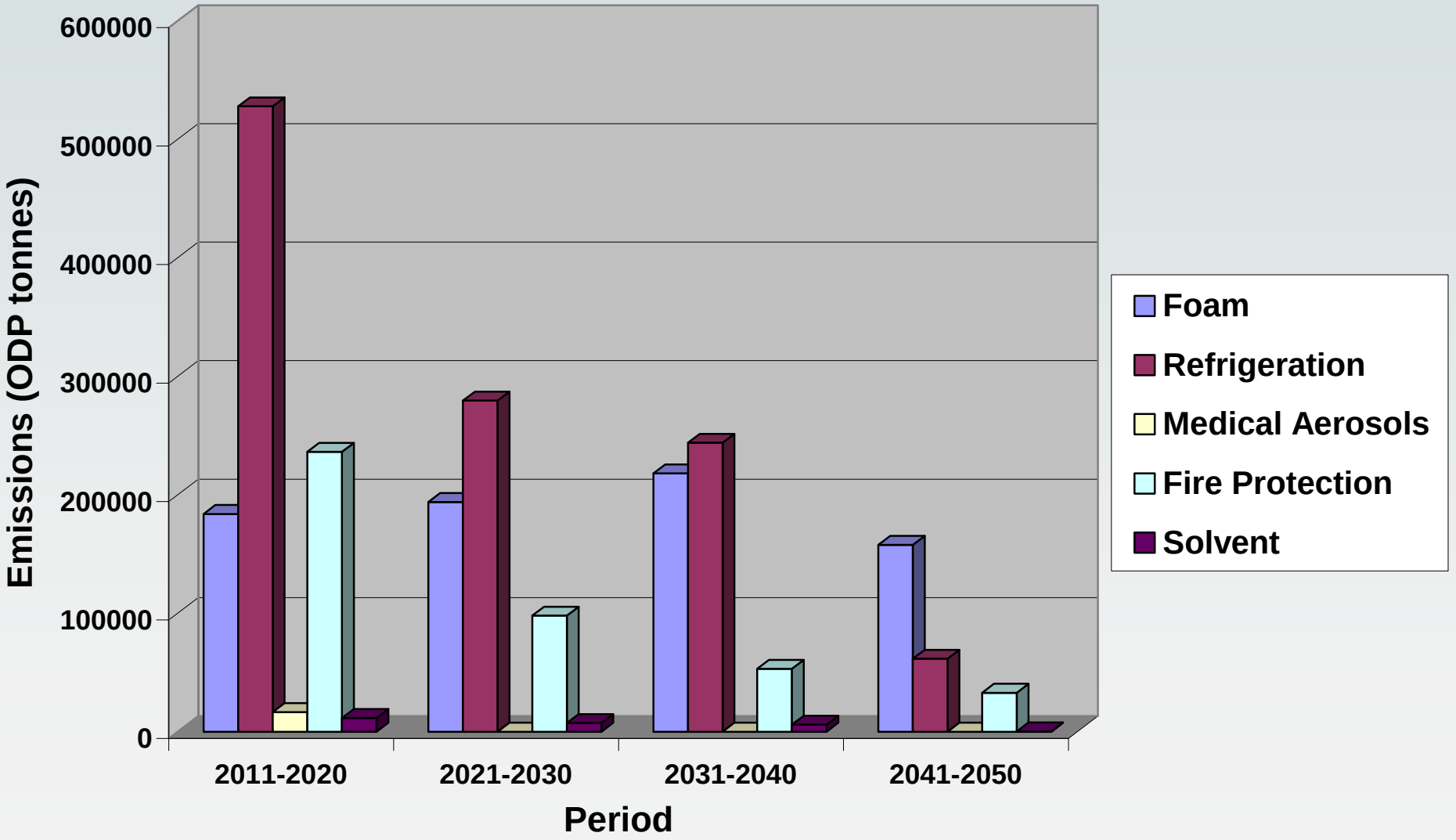
Ozone and climate properties of the three major HCFCs

	Primary Uses	2005 tonnage	ODP	GWP
HCFC-22	*Refrigeration* *Foam*	*221,836*	*0.055*	*1780*
HCFC-141b	*Foam* *Solvent*	*77,071*	*0.110*	*713*
HCFC-142b	*Foam*	*16,441*	*0.065*	*2270*

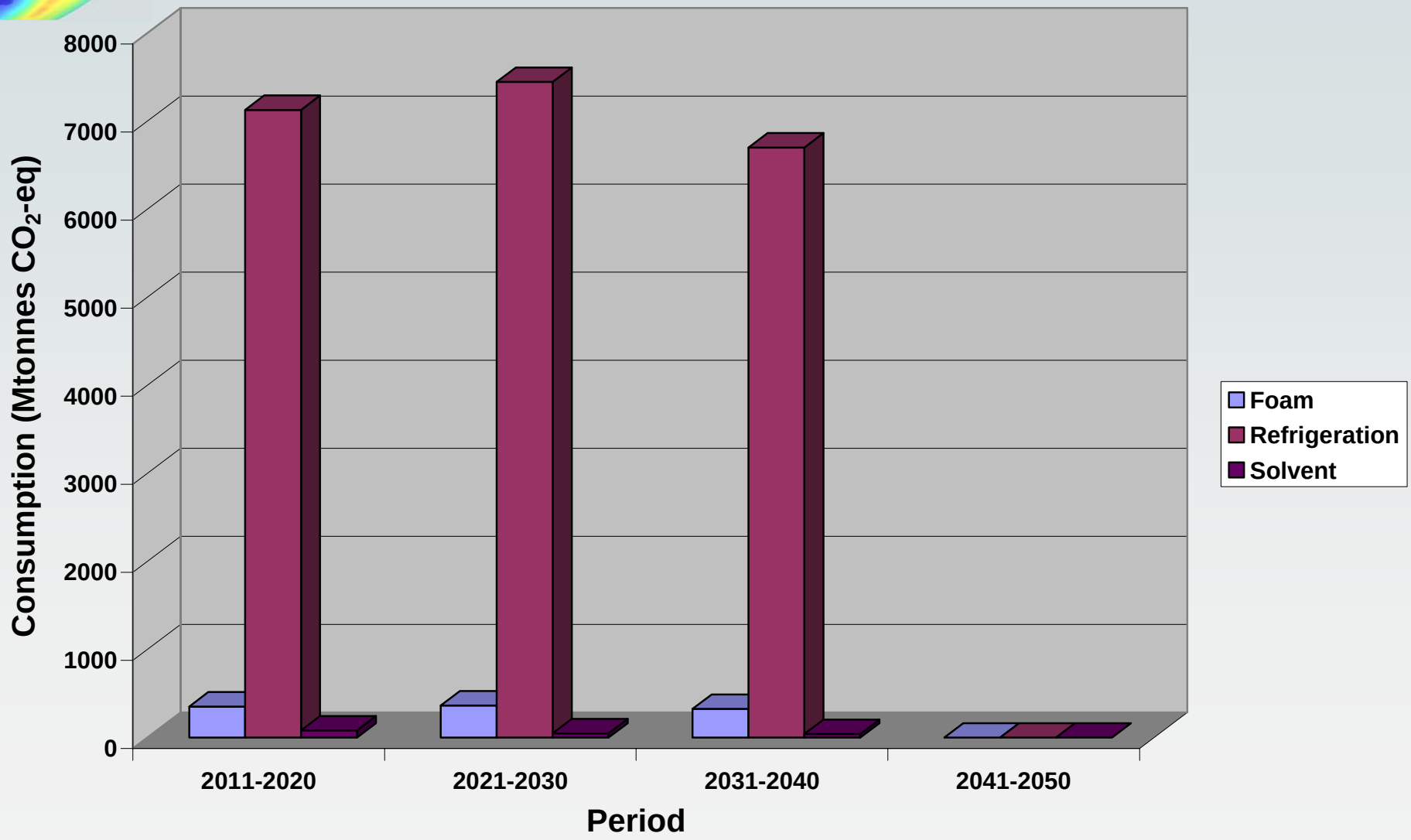
Original Consumption – ODP tonnes



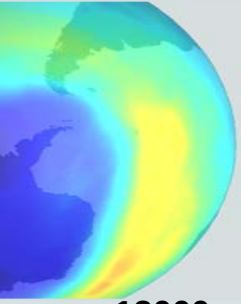
Original Emissions – ODP tonnes

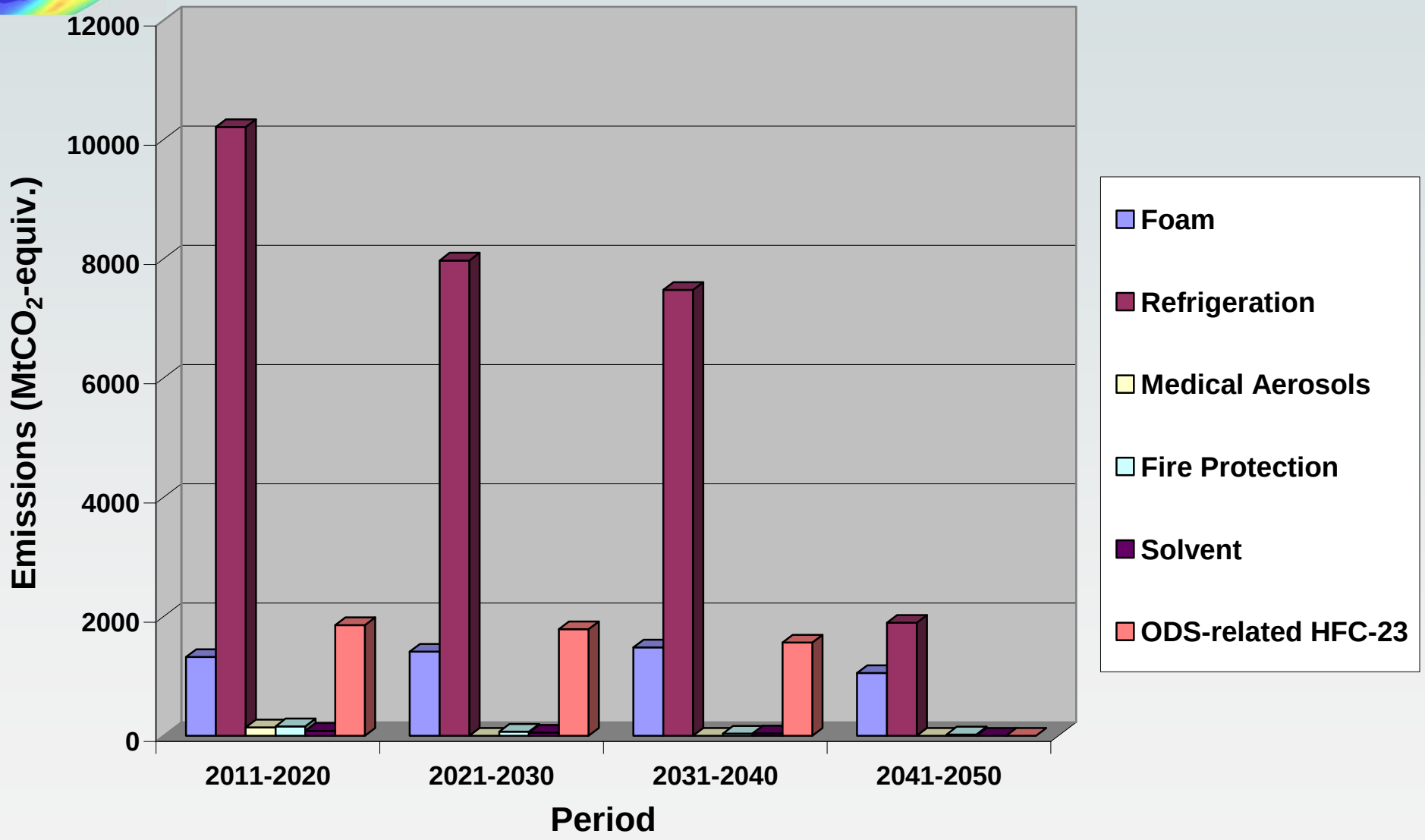


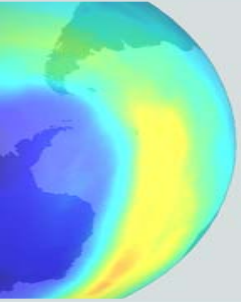
Original Consumption – $MtCO_2$-eq



Original Emissions – $MtCO_2$-eq

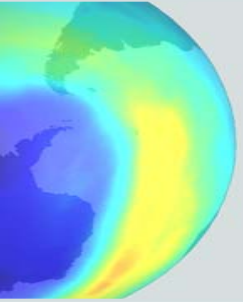






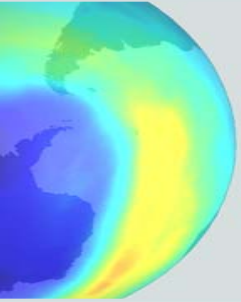
Timing issues re. Decision XIX/6

- Baseline for freeze is established in 2009/2010 although further growth will occur 2011/2012
- Could be an ‘over-shoot’ of about 10-20% by 2013 which will need to be funded for phase-out
- A further 10% reduction will be required by 2015
- Projects will need to deliver reductions by 2012 to assist compliance – focus on high impact projects (e.g. those involving HCFC-141b)



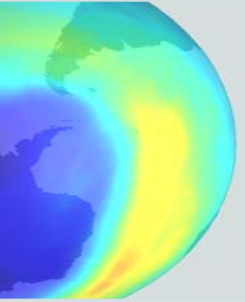
Key elements for achieving reductions

- Several aspects need to be taken into account:
  - High ODP consumption to be focused on first
  - Low GWP solutions to be preferred
  - Focus on key markets with significant consumption
  - Servicing to be addressed early because of consumption pattern of LVCs
  - Can only use commercially-proven technologies
  - Technology transfer needs and intellectual property rights need to be addressed



Key observations on emissions

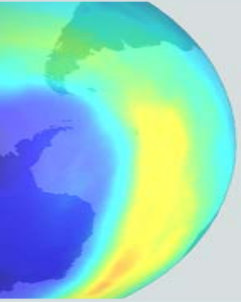
- Annual emissions are de-linked from annual consumption for the key HCFC uses
- A large part of on-going emissions will come from banks within developed countries – not now addressed formally in the Montreal Protocol
- Accelerated HCFC phase-out will clearly affect ozone-related impacts and consumption most
- Choice of alternatives will have major affect on climate impact of future emissions



3. What is at stake….

Aspects to consider…..

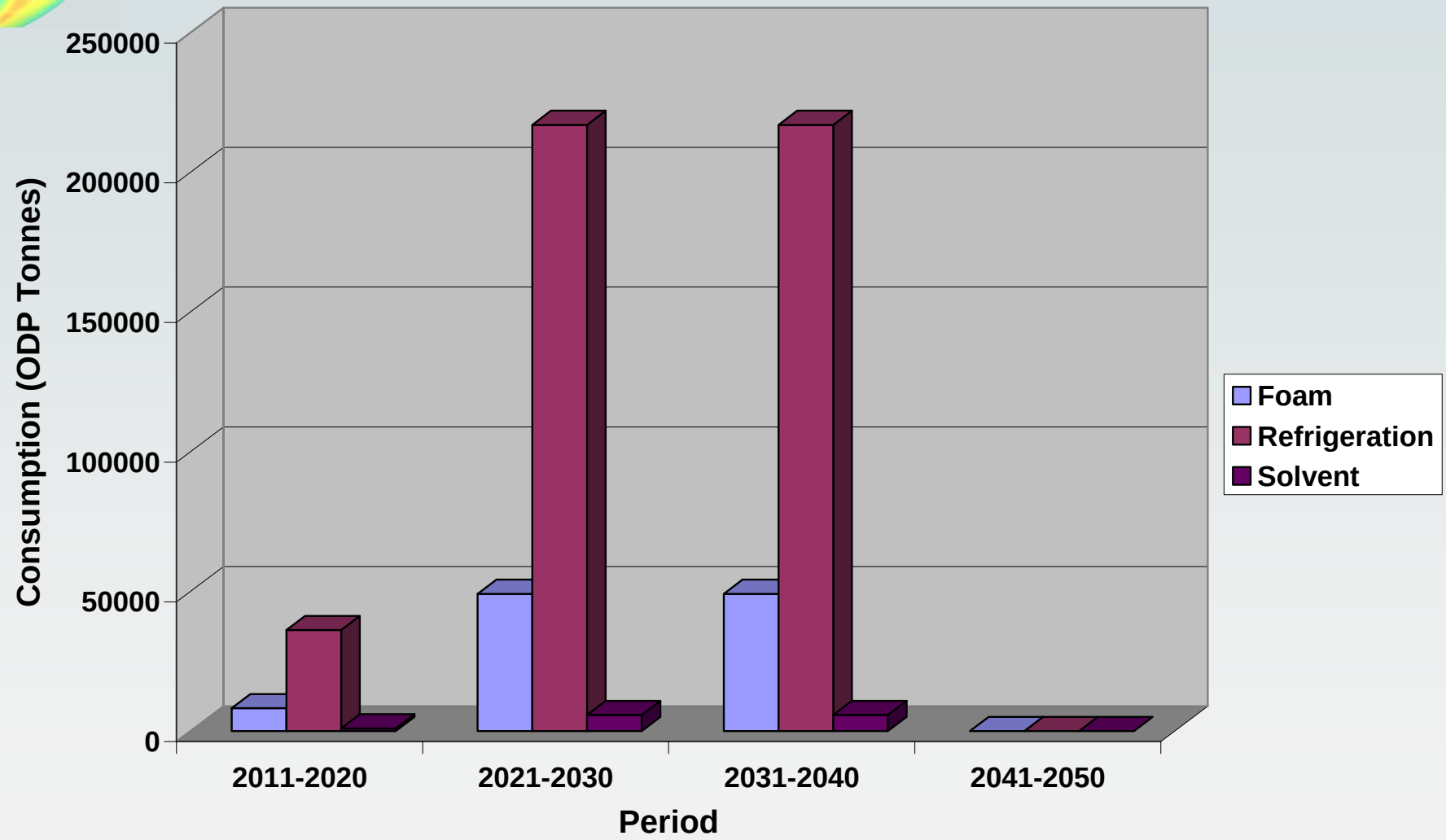
- Atmospheric benefits arise from extent & timing of emissions reductions
- Actions outside of Decision XIX/6 will also contribute
- Is the cost/benefit gained from Decision XIX/6 measures comparable with other climate options?



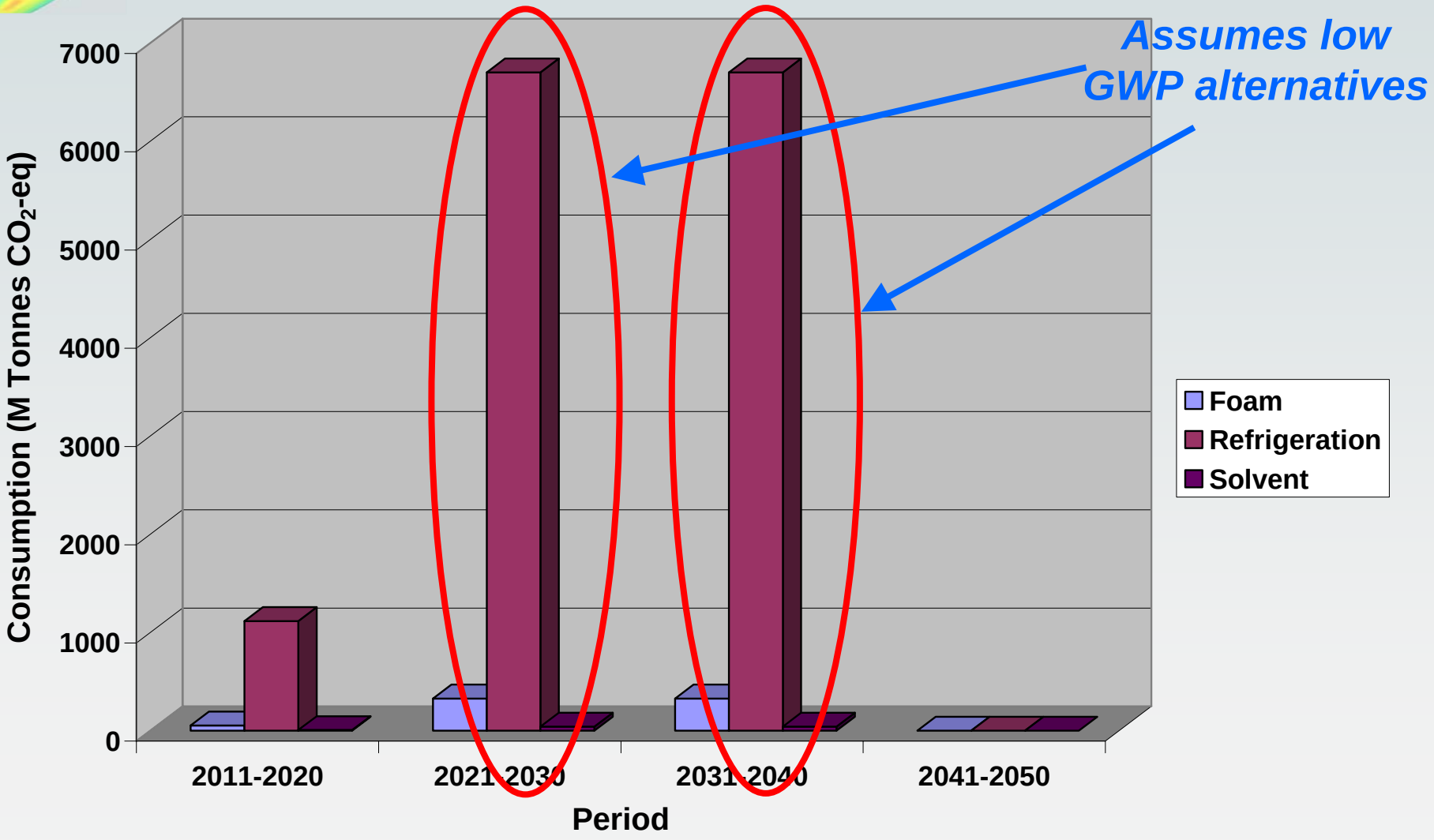
Technology and cost factors

- Are there technology options available with low climate impact today?
- Is there an incremental cost to these technologies and, if so, how much?
- Does the time-frame of Decision XIX/6 act against the adoption of low climate impact technologies?
- Is there any scope for obtaining further financial assistance to maximise the climate benefit?

Consumption Savings by Time Period (ODP tonnes)

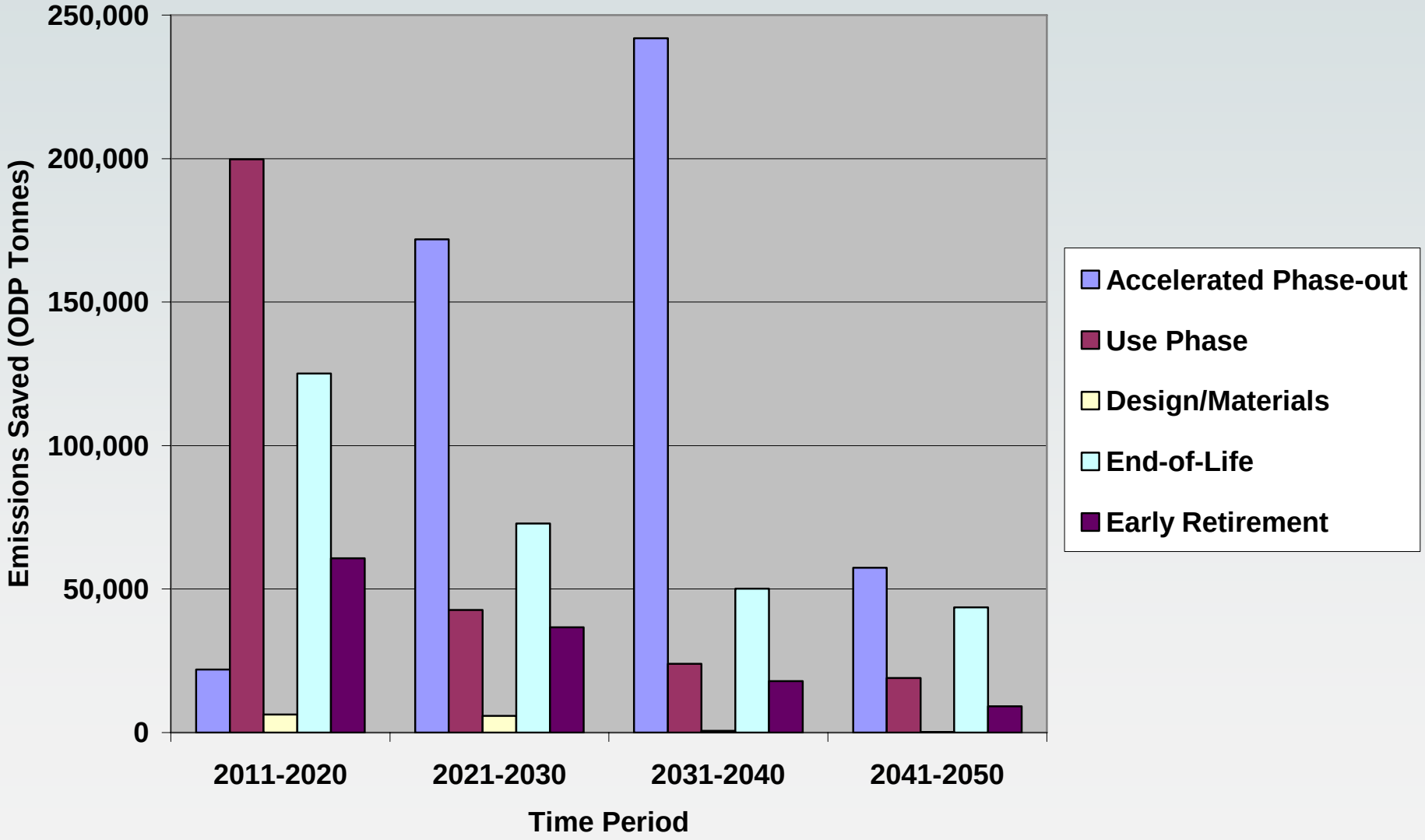


Consumption Savings by Time Period (M tonnes CO_2-equiv.)



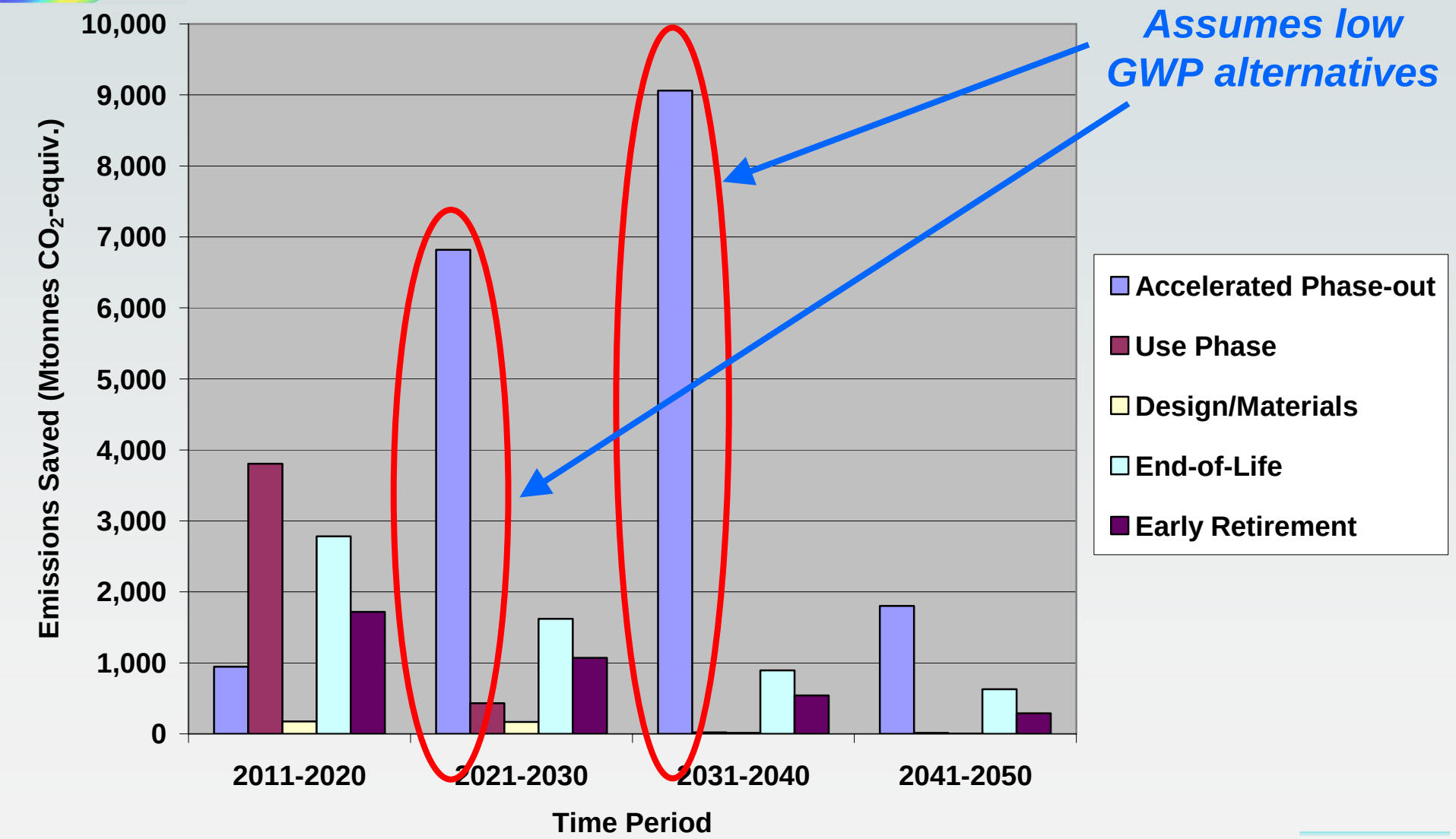
Emission Reductions by Time Period

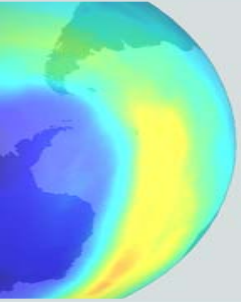
ODP tonnes (2010-2050)



Emission Reductions by Time Period

Mt CO_2 –equiv. (2010-2050)



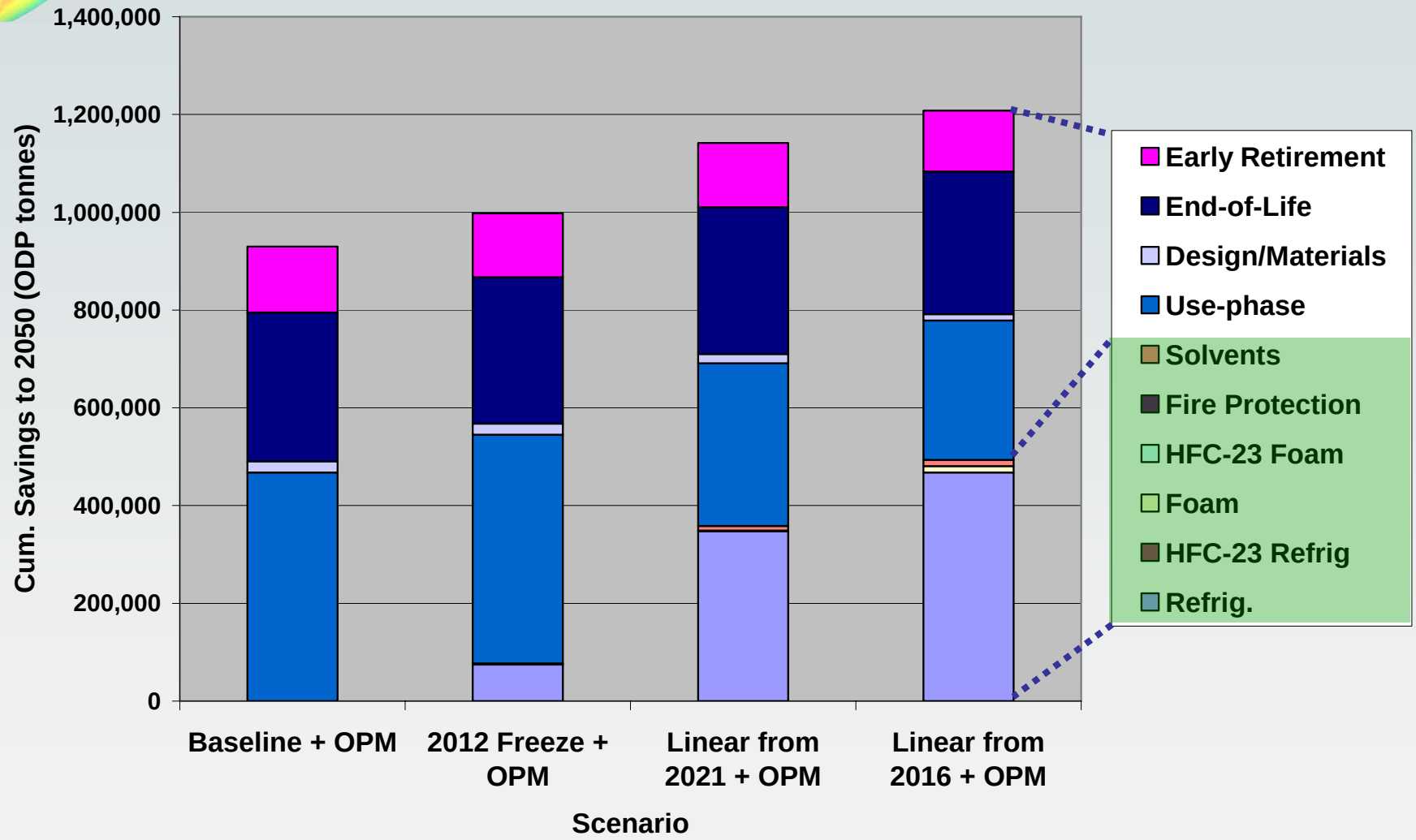


Key observations on 'options'

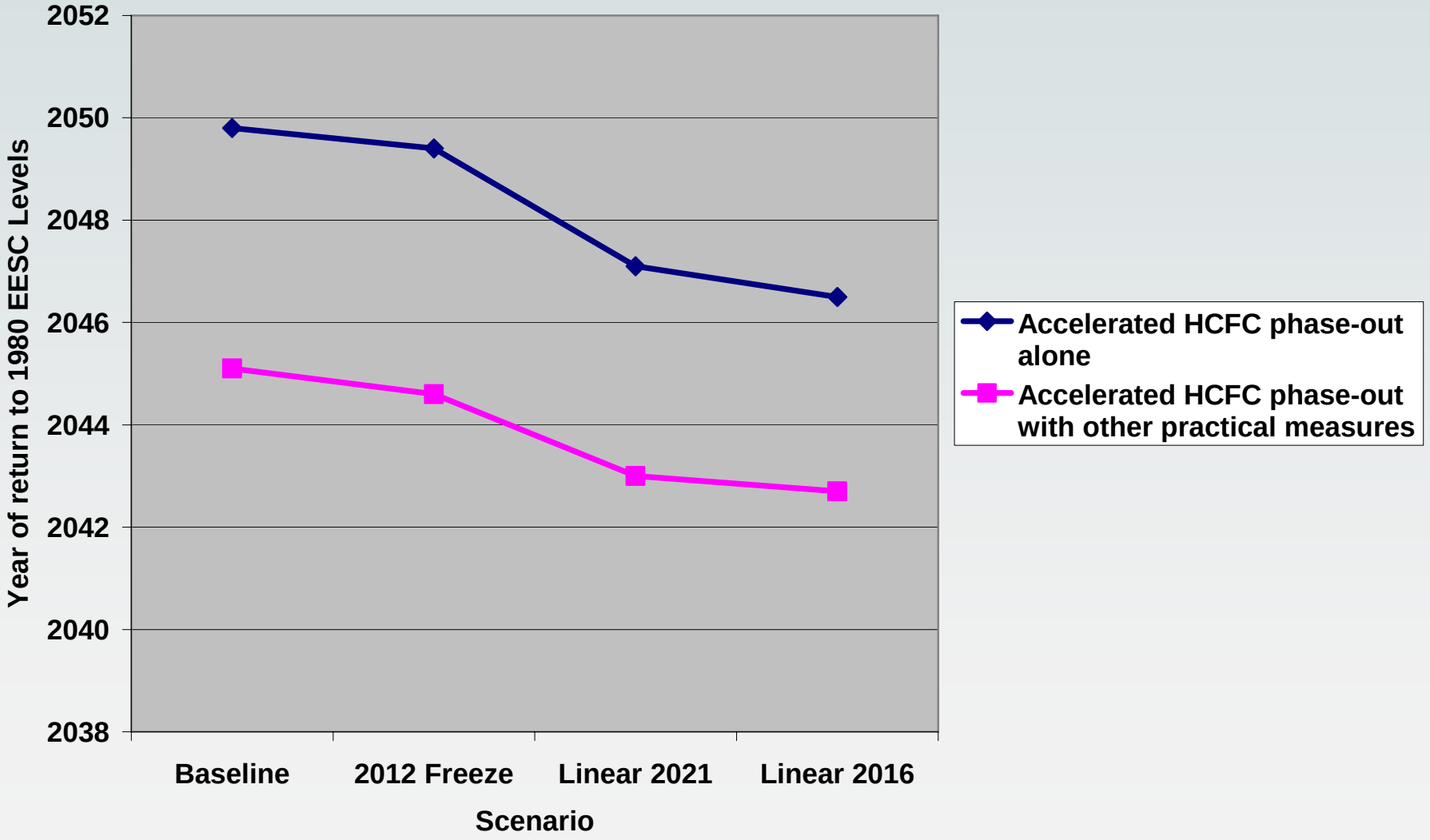
- Not all options are yet available to facilitate key climate gains
- Where they are available, they tend to be more costly, at least in key some sectors
- Difficult to make choices based on lifecycle consideration at enterprise level
- 'Worst-first' approach in Decision XIX/6 maximises ozone/consumption benefit, but may not ensure all climate/emission benefits.

Cumulative Emission Reductions of up to 54%

ODP tonnes (2010-2050)

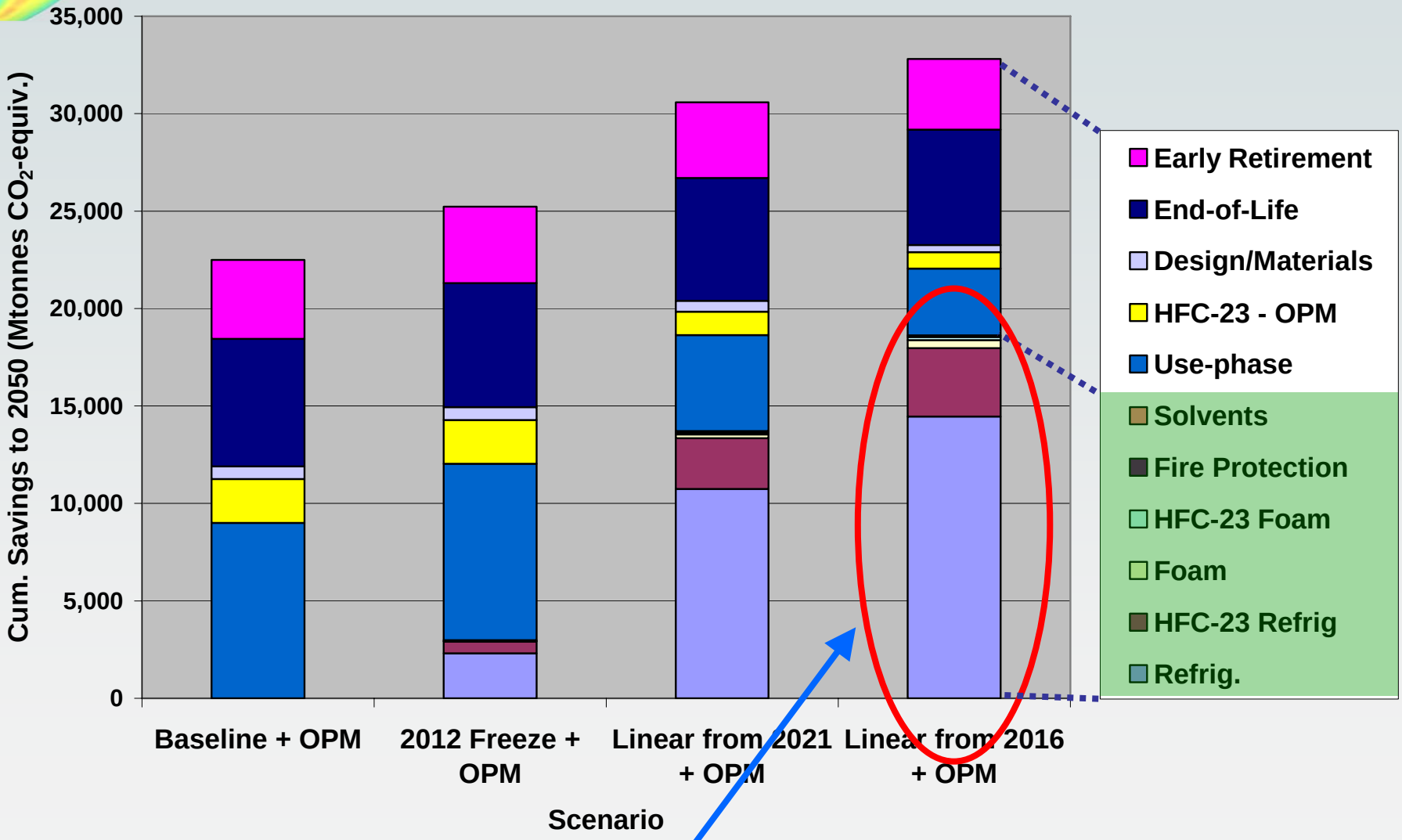


Impact of Actions on Ozone Layer Recovery

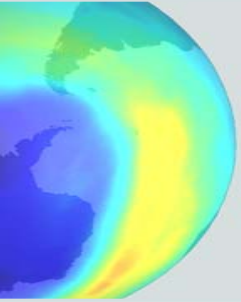


Cumulative Emission Reductions of up to 82%

Mt CO_2 –equiv. (2010-2050)



18 billion tonnes is a lot in any language!!!



The 'missed opportunity' dilemma

- Proper assessment is critical to know how to treat climate 'responsibilities'……therefore:
- Should the Montreal Protocol be carrying all of the burden itself?
- Is there a risk that too narrow a focus on the timetable for ozone action allows us to miss climate benefit?
- Can we plan and prioritise sufficiently well to maximise both streams of benefit?
- How do we constrain 'metrics' that are often global and lifecycle based to decisions that are local (enterprise level) and imminent?