Implications of different baselines and freeze years for an operational strategy and sector wise HFC phase down in India

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The world map showcases places where CEEW has engaged in projects or presented its work. The icons represent thematic areas of CEEW's work, each of which is studied in depth while also focusing on its linkages with other development concerns.

Resource efficiency & security

Renewables

Water

Integrated energy, environment and water plans

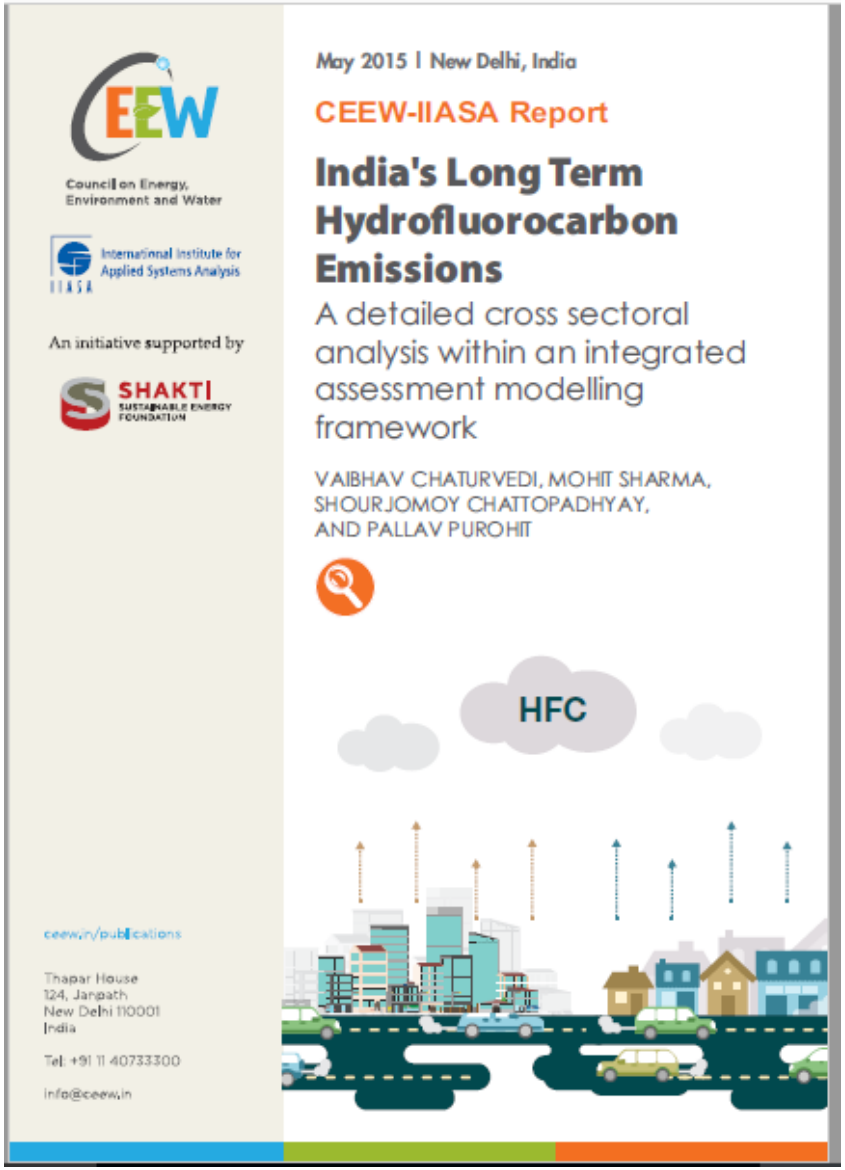
Energy-trade-climate linkages

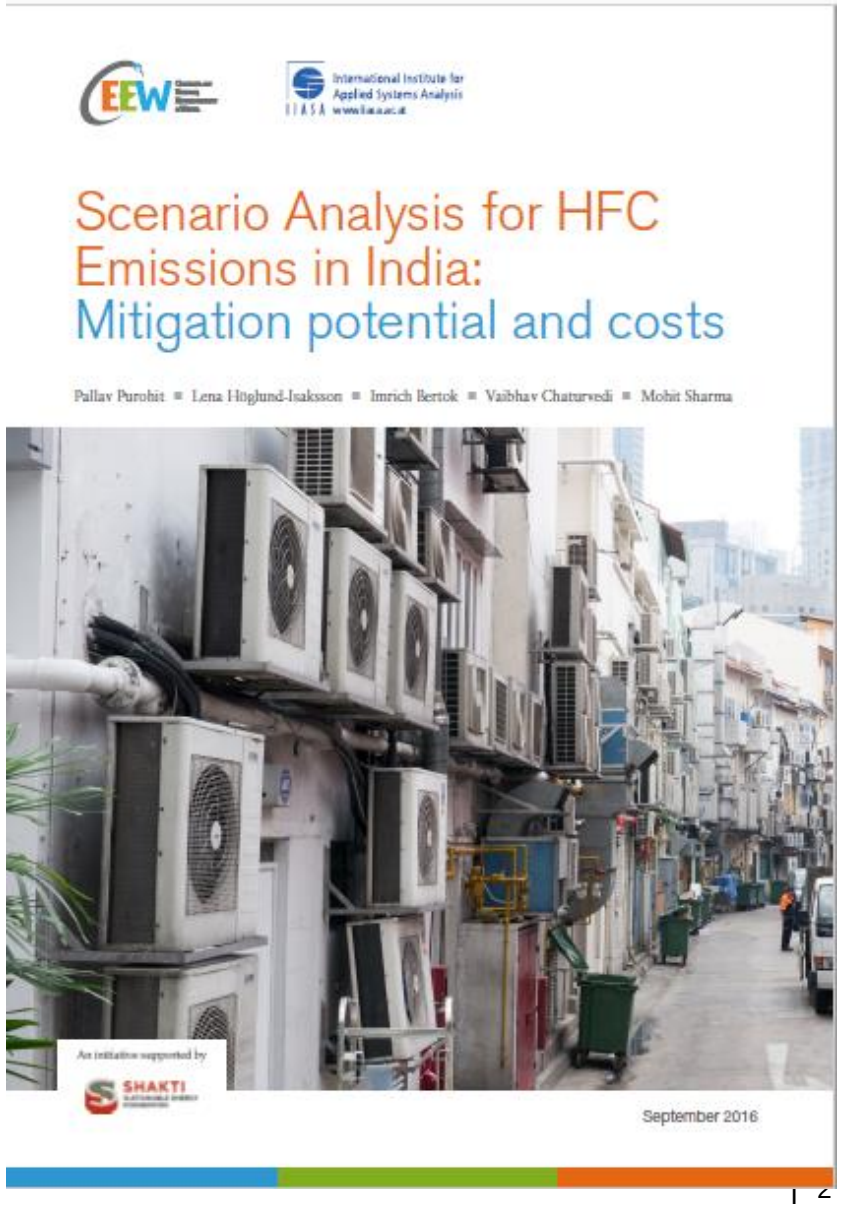
Sustainability finance

Technology horizons

International co-operation

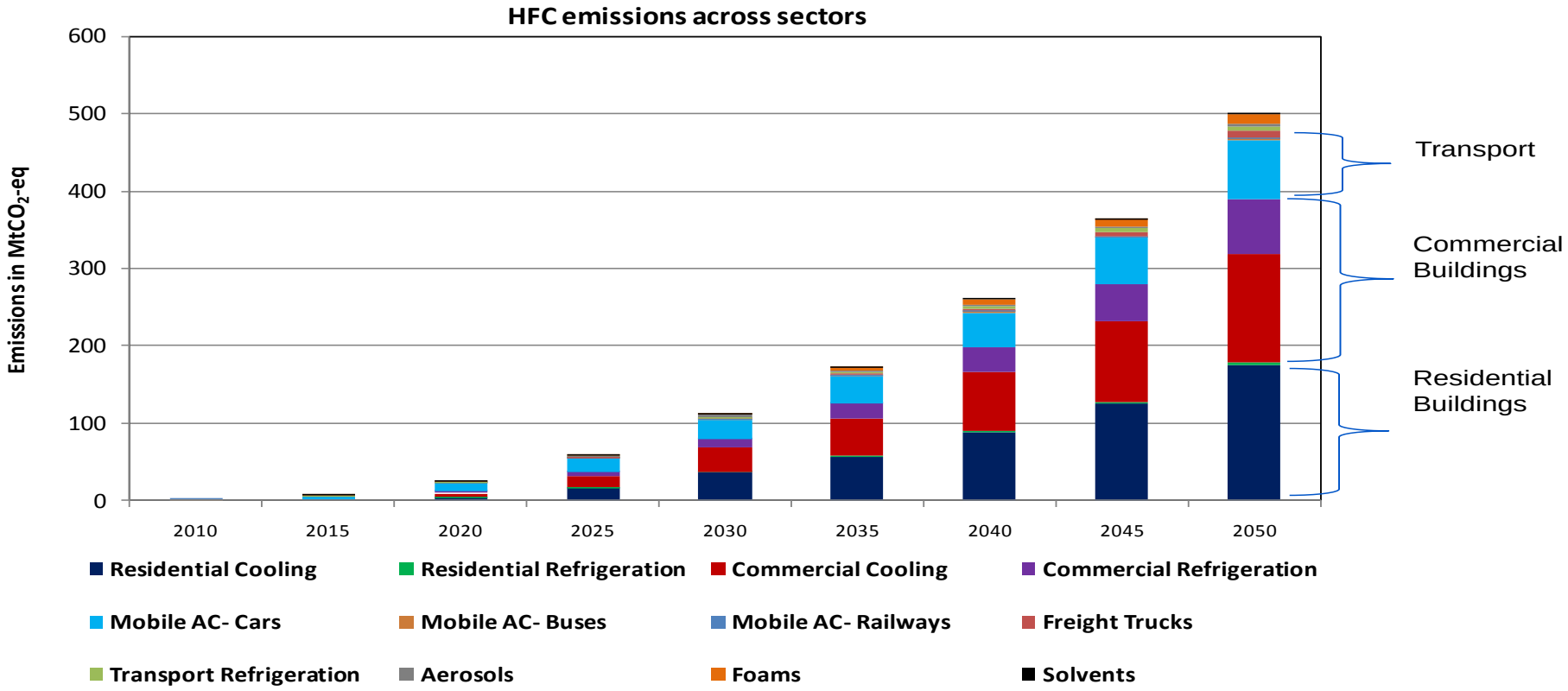
Building on CEEW's earlier work on HFCs





Updating analysis on India's HFC consumption and emissions

- CEEW initiated efforts to understand how HFC emissions could grow in India relative to carbon dioxide



- Within India, HFC emissions are estimated to be 5.4% of India's total CO_2 and HFC emissions in 2050 (CEEW)

Moving from BAU for estimating climate benefits, to including current market transformations

	2020	2025	2030 and onwards
Room AC	HFC-32: 35% R-410A: 40% R-290: 5% HCFC-22: 20%	HFC-32: 45% R-410A: 45% R-290: 10% HCFC-22: 0%	HFC-32: 45% R-410A: 45% R-290: 10% HCFC-22: 0%
Comm AC	HFC-134a: 40% R-410A: 50% HFC-32: 10%	HFC-134a: 40% R-410A: 50% HFC-32: 10%	HFC-134a: 40% R-410A: 50% HFC-32: 10%
Comm Ref	HFC-134a: 65% R-404A: 35%	HFC-134a: 60% R-404A: 40%	HFC-134a: 55% R-404A: 45%
Mobile AC	HFC-134a: 100%	HFC-134a: 100%	HFC-134a: 100%

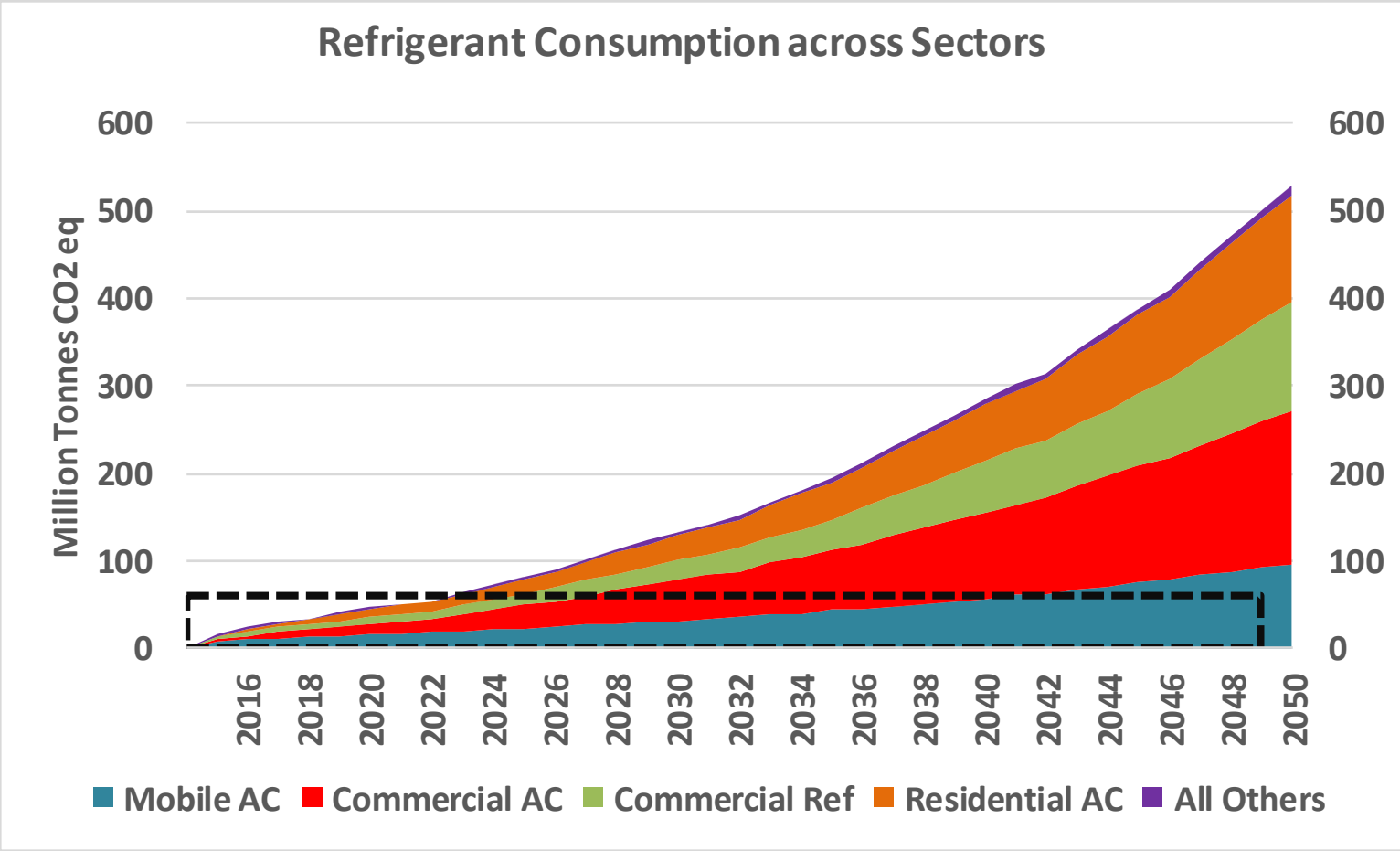
Baseline scenarios

Baseline	Freeze
2017-19	2021
2020-22	2025
2024-26	2028
2028-30	2031

2017-19 as baseline, 2021 as freeze year

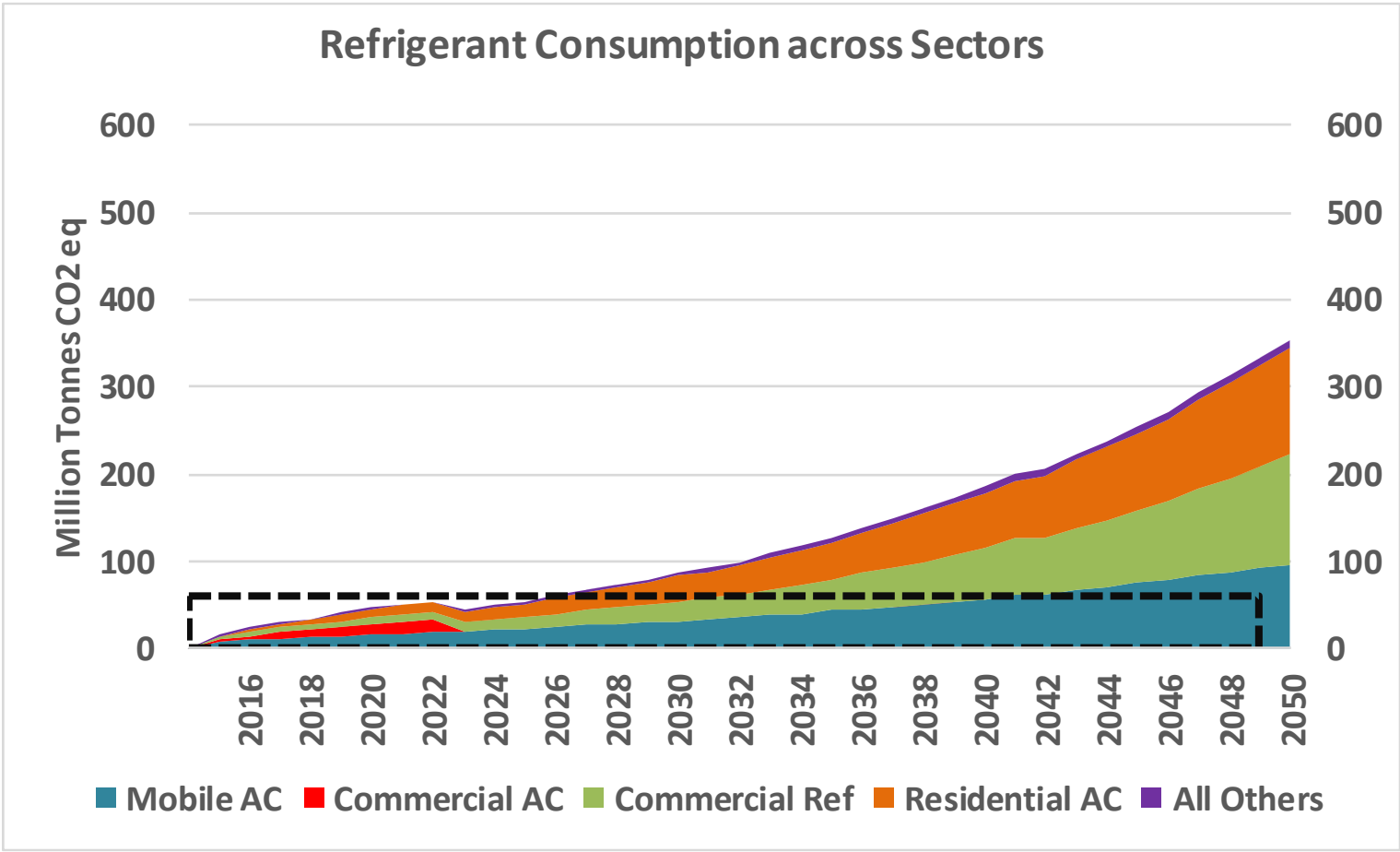
2017-19 as baseline, 2021 as freeze year

- Baseline is of 60 MtCO2eq (HFC+67.5% of HCFC baseline)
- HFC/HCFC consumption crosses this baseline only in 2023



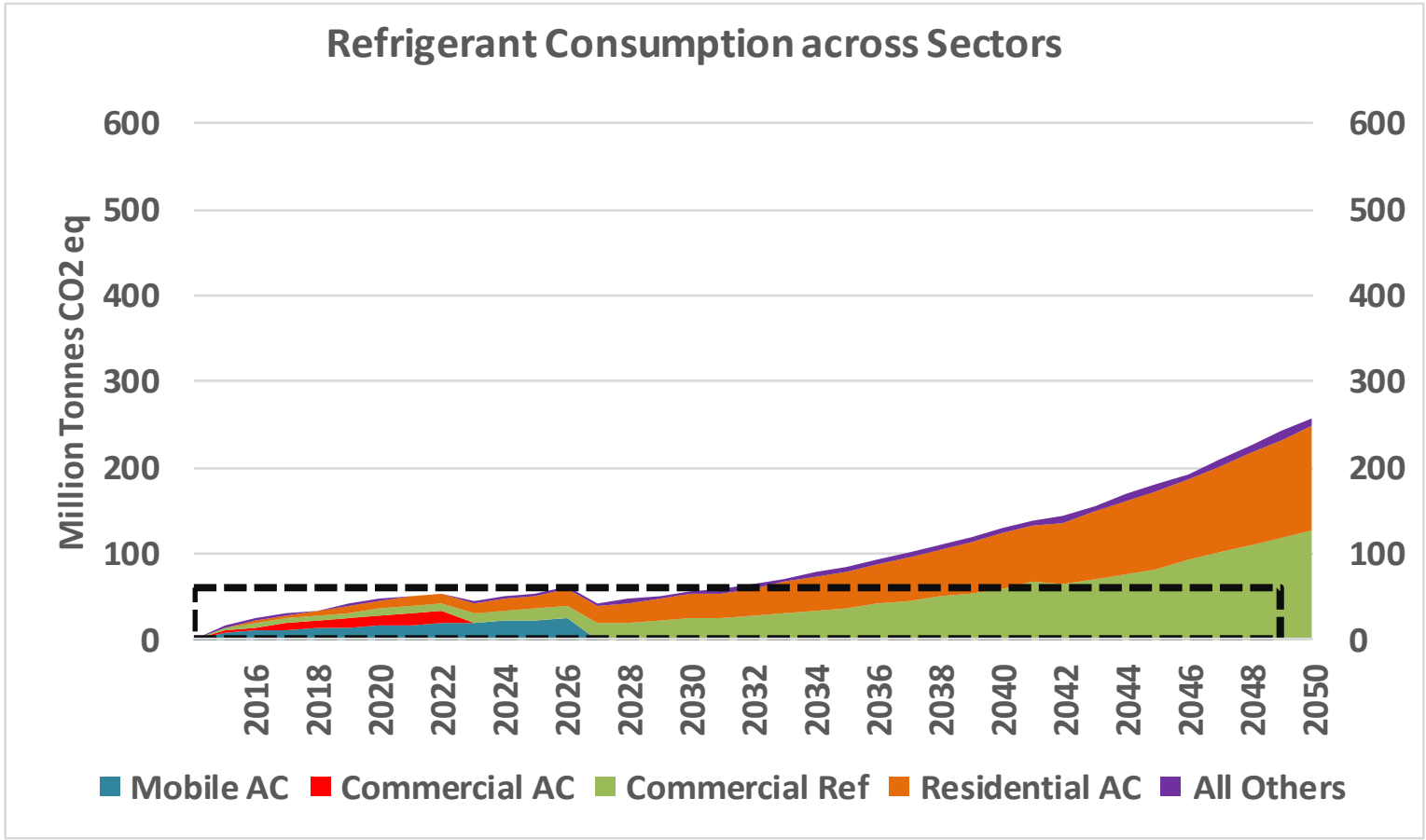
2017-19 as baseline, 2021 as freeze year

- After phasing down HFCs in Commercial AC sector in 2023, India has to choose another sector in 2027 to adhere to the cap



2017-19 as baseline, 2021 as freeze year

- Post phase down in Mobile AC sector in 2027, India has to choose another sector in 2032 to adhere to the limit

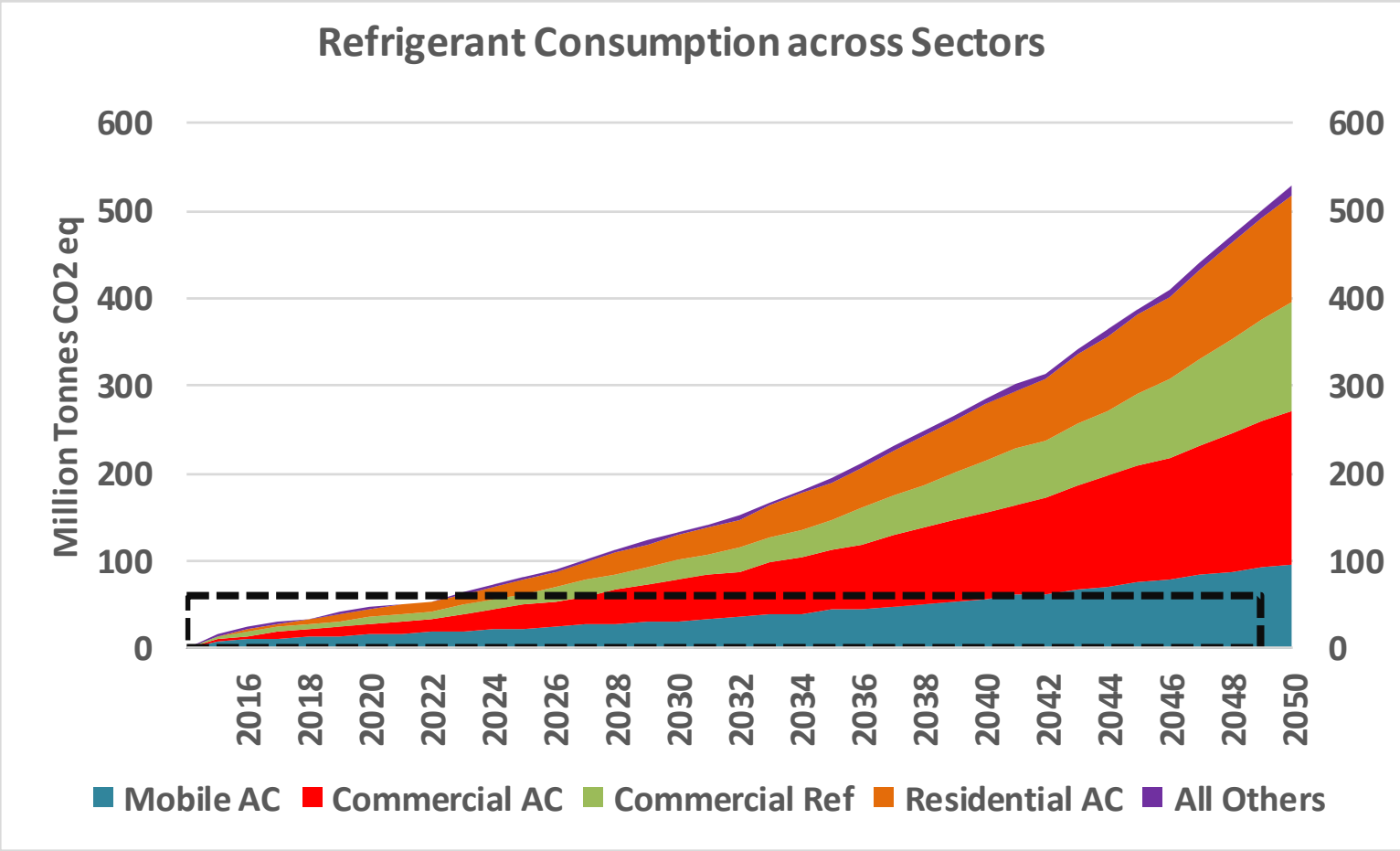


To summarise, three large sectors have to transition by 2032 to adhere to the cap

2020-22 as baseline, 2025 as freeze year

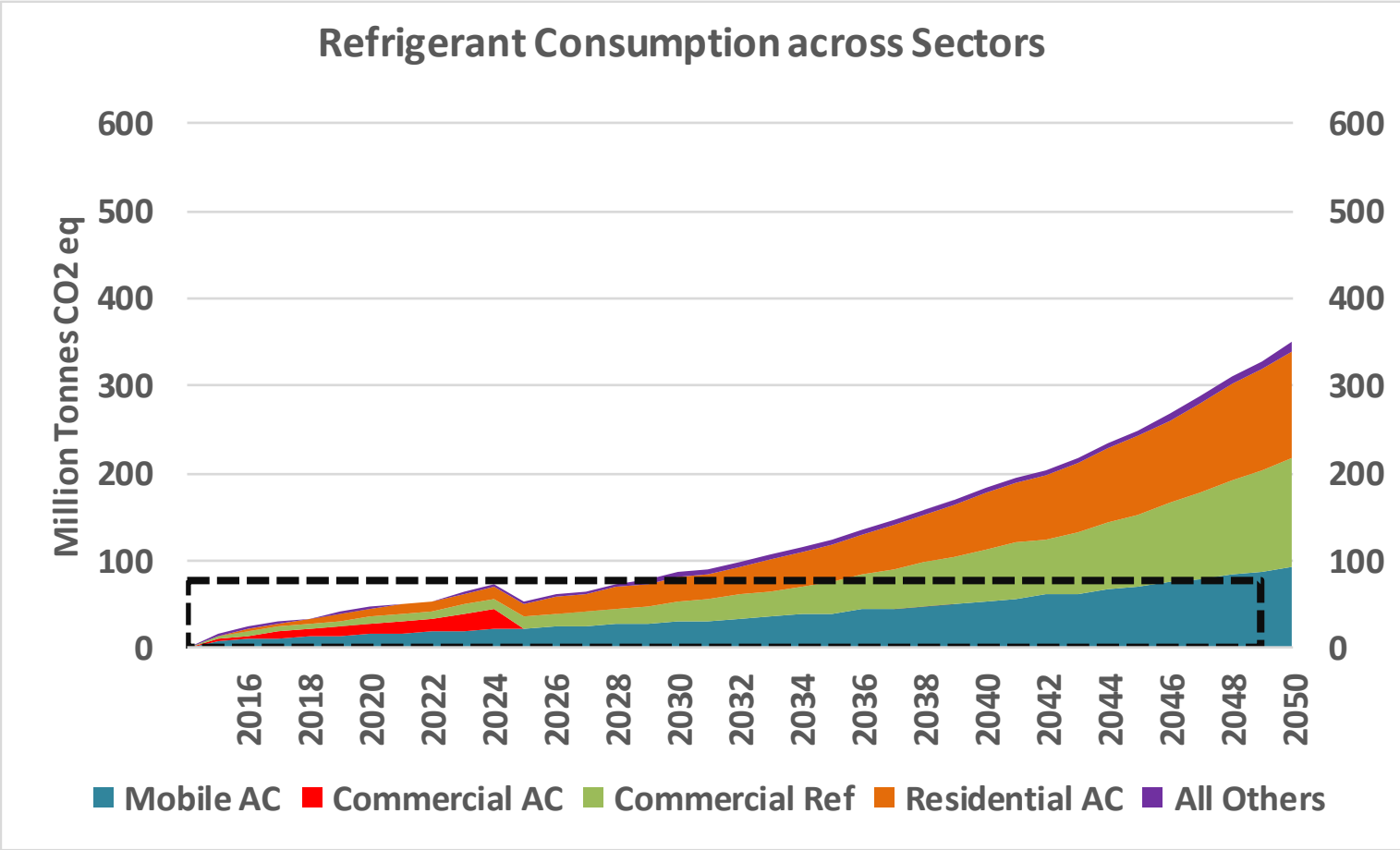
2020-22 as baseline, 2025 as freeze year

- Baseline is of 77 MtCO2eq (HFC+67.5% of HCFC baseline)
- HFC consumption crosses this baseline in 2025



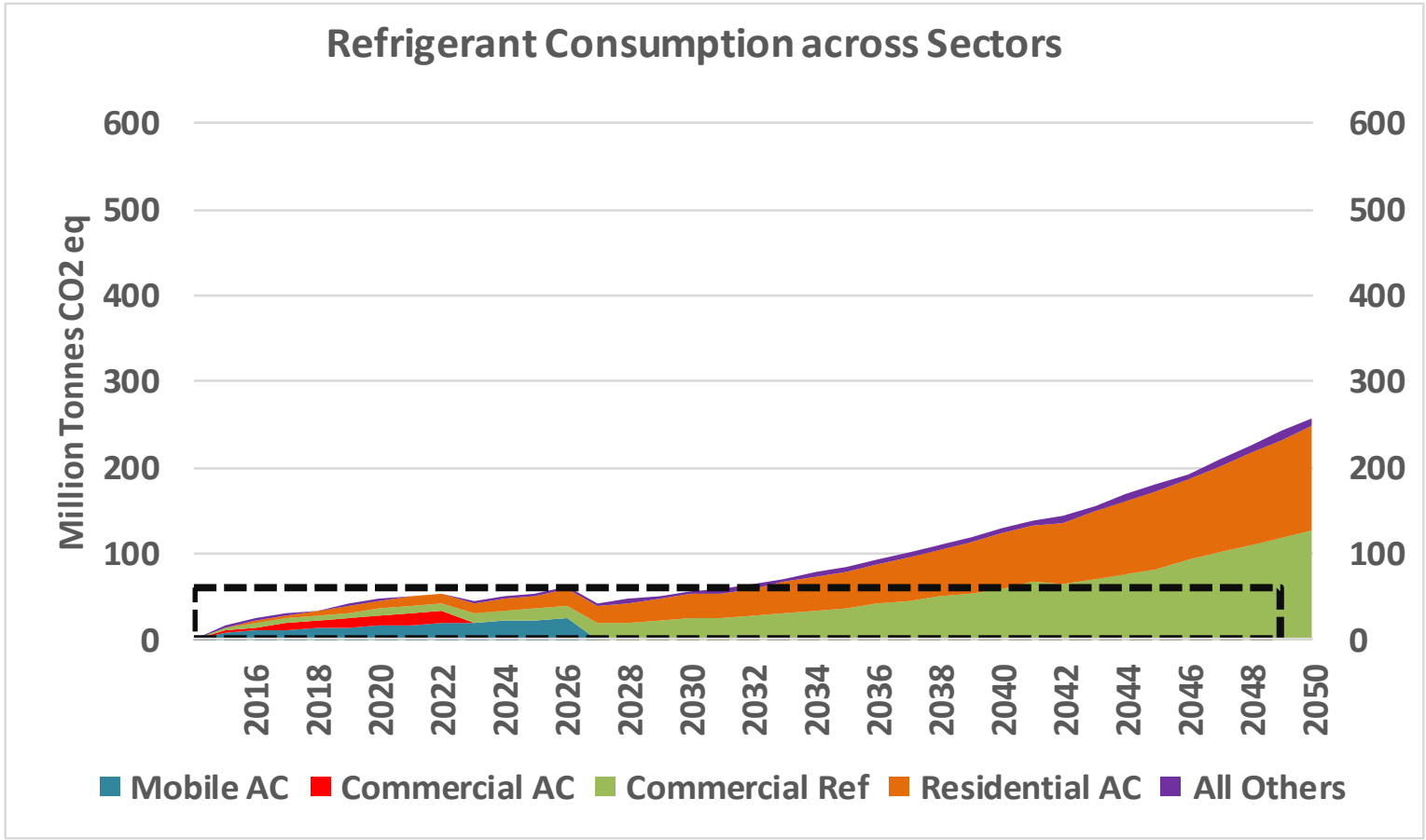
2020-22 as baseline, 2025 as freeze year

- After phasing down HFCs in Commercial AC sector in 2025, India has to choose another sector in 2029 to adhere to the cap



2020-22 as baseline, 2025 as freeze year

- Post phase down in Mobile AC in 2029, India has to choose another sector in 2034 to adhere to the limit

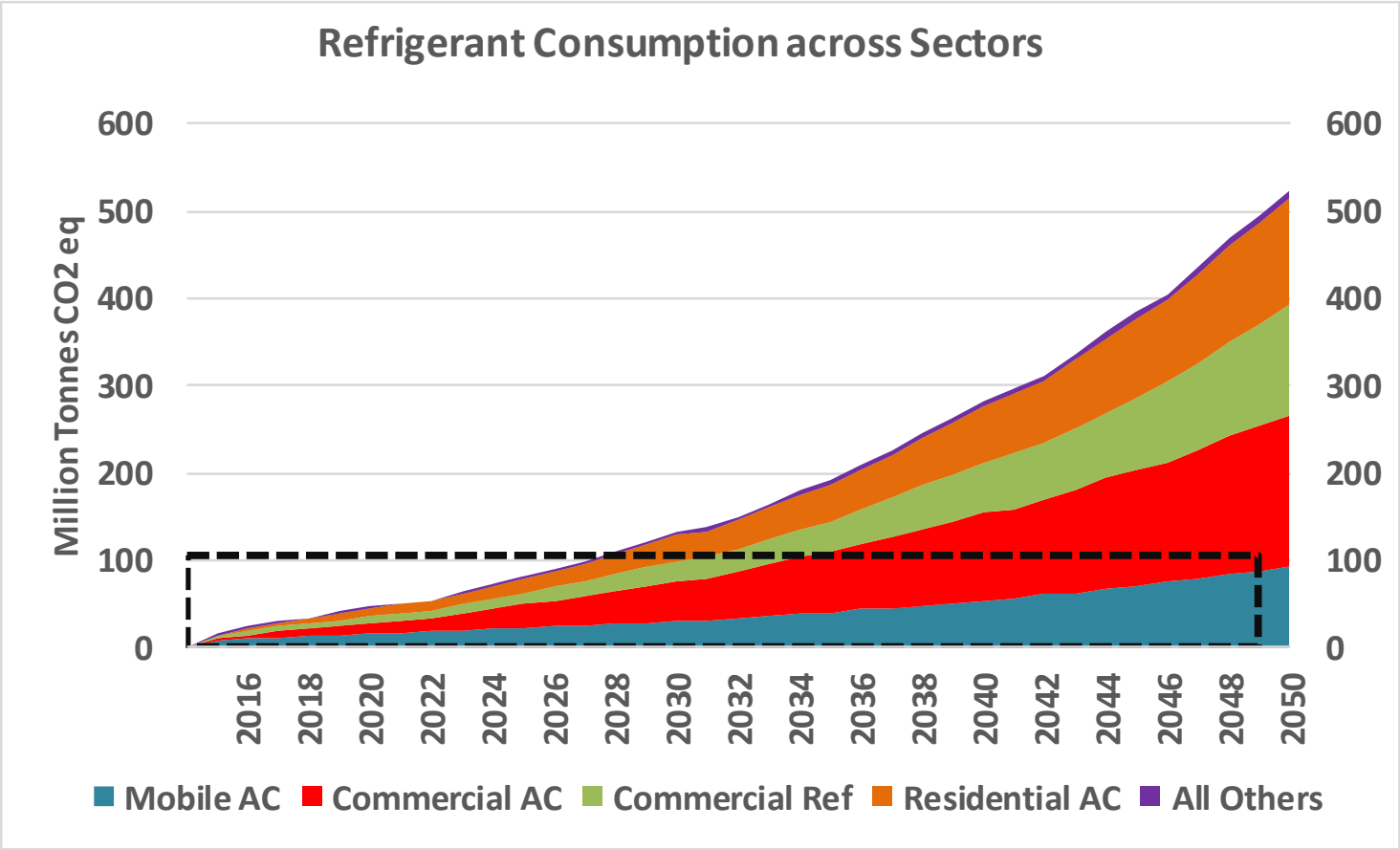


To summarise, three large sectors have to transition by 2034 to adhere to the cap

2024-26 as baseline, 2028 as freeze year

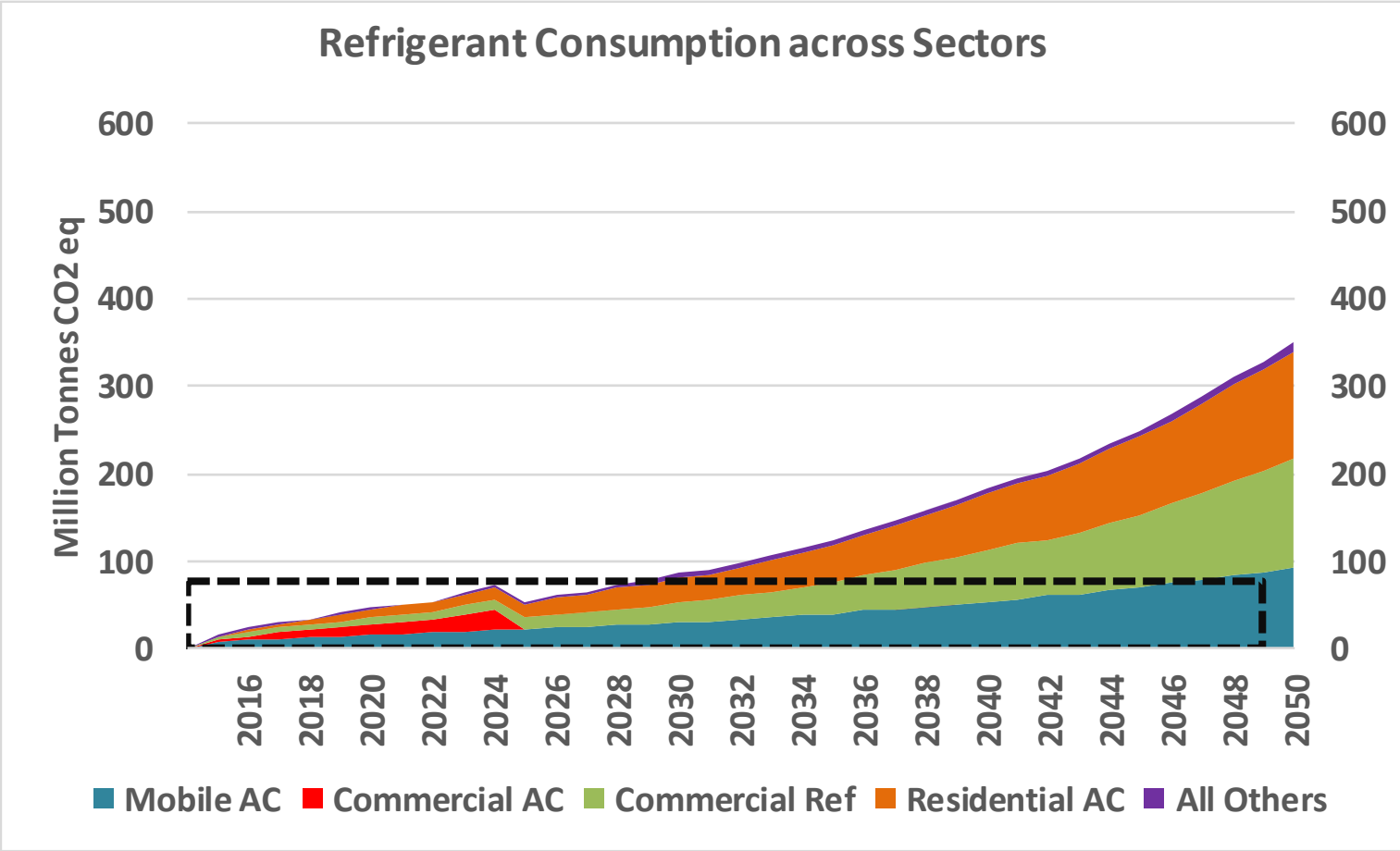
2024-26 as baseline, 2028 as freeze year

- Baseline is of 106 MtCO2eq (HFC+67.5% of HCFC baseline)
- HFC consumption crosses this baseline in 2028



2024-26 as baseline, 2028 as freeze year

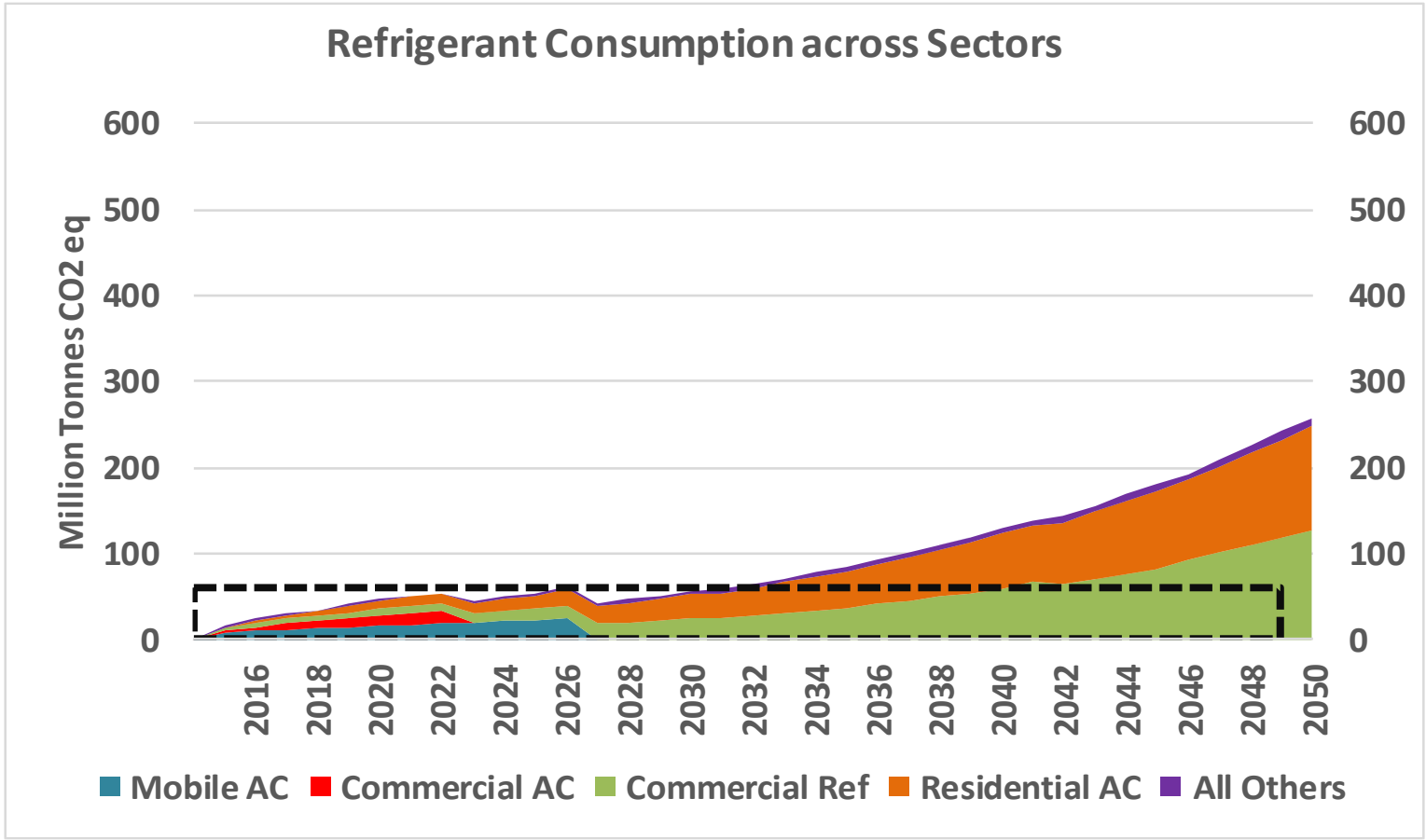
- After phasing down HFCs in Commercial AC sector in 2028, India has to choose another sector to transition in 2033 to adhere to the cap



- Instead, if mobile AC transitions in 2028, India has to choose another sector to transition in 2031 to adhere to the cap

2024-26 as baseline, 2028 as freeze year

- Post phase down in Mobile AC/Residential AC in 2033, India has to choose another sector in 2038 to adhere to the limit

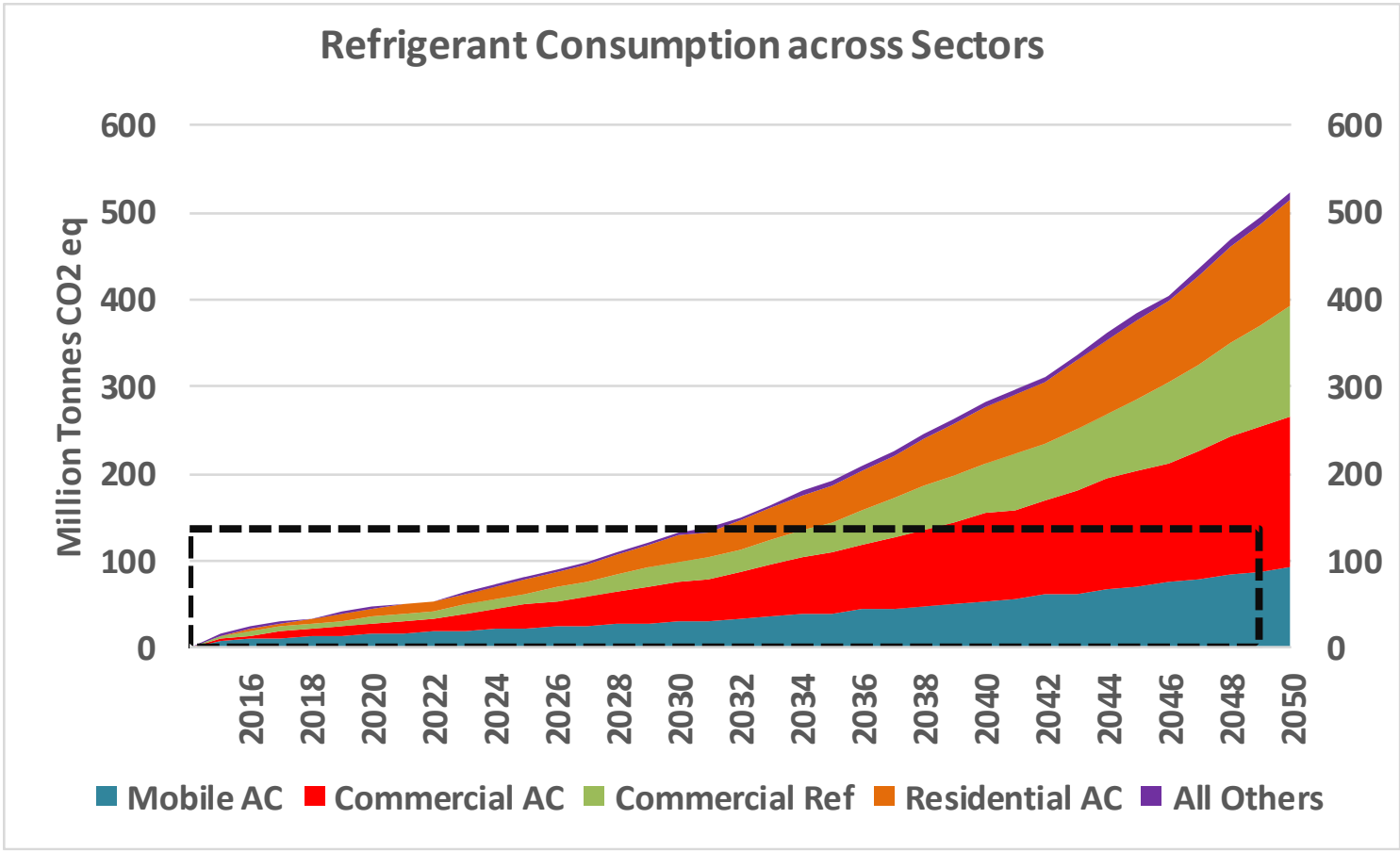


To summarise, three large sectors have to transition by 2038 to adhere to the cap (irrespective of whether MAC goes first or CAC goes first)

2028-30 as baseline, 2031 as freeze year

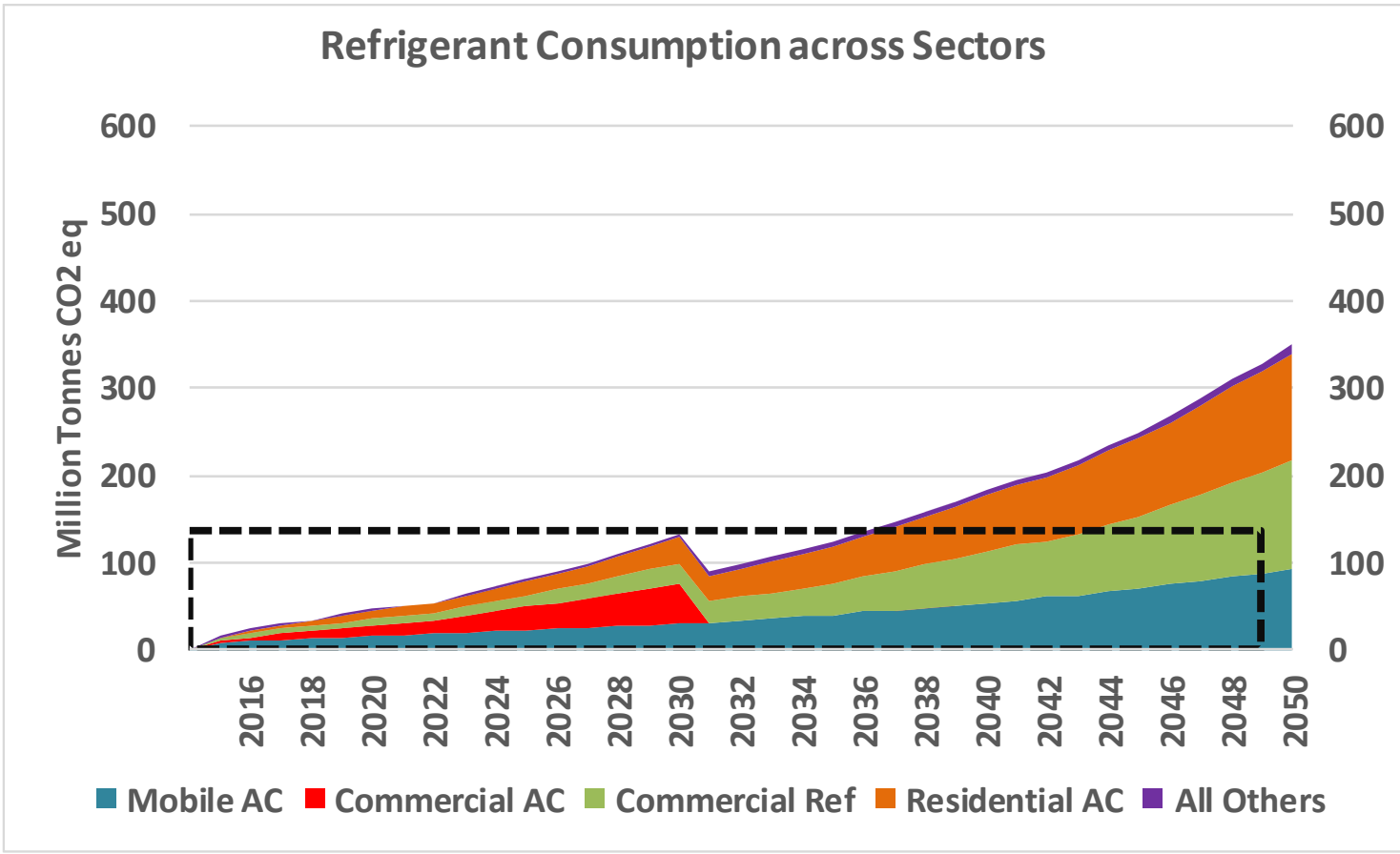
2028-30 as baseline, 2031 as freeze year

- Baseline is of 135 MtCO2eq (HFC+32.5% of HCFC baseline)
- HFC consumption crosses this baseline in 2031



2028-30 as baseline, 2031 as freeze year

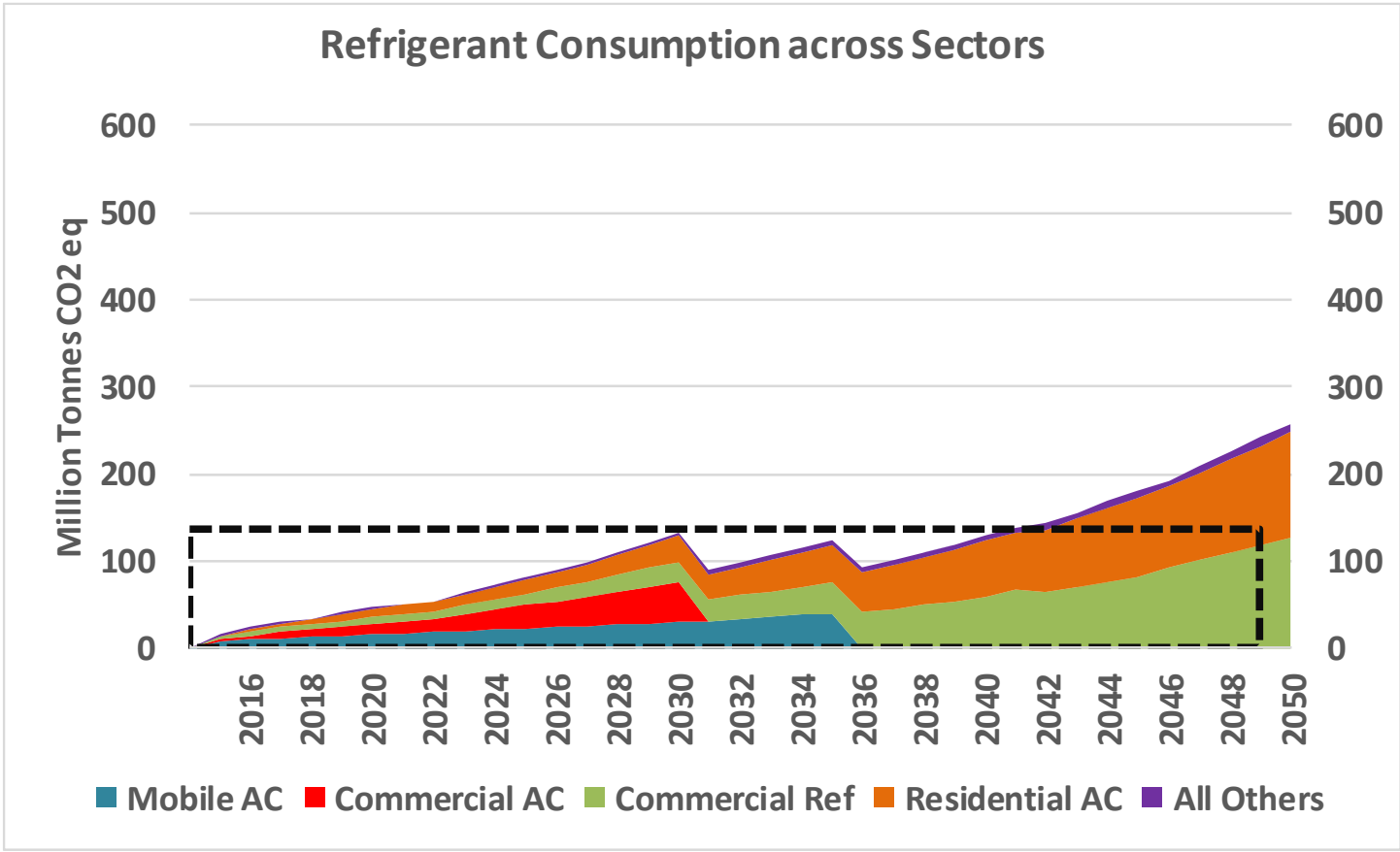
- After phasing down HFCs in Commercial AC sector in 2031, India has to choose another sector to transition in 2036 to adhere to the cap



- Instead, if mobile AC transitions in 2028, India has to choose another sector to transition in 2031 to adhere to the cap

2028-30 as baseline, 2031 as freeze year

- Post phase down in Mobile AC/Residential AC in 2036, India has to choose another sector in 2041 to adhere to the limit



To summarise, three large sectors have to transition by 2041 to adhere to the cap (irrespective of whether MAC goes first or CAC goes first)

To summarize

This analysis in a way assumes that there is no intermediate schedule, and the country needs to only achieve a final phase down target in 2050.

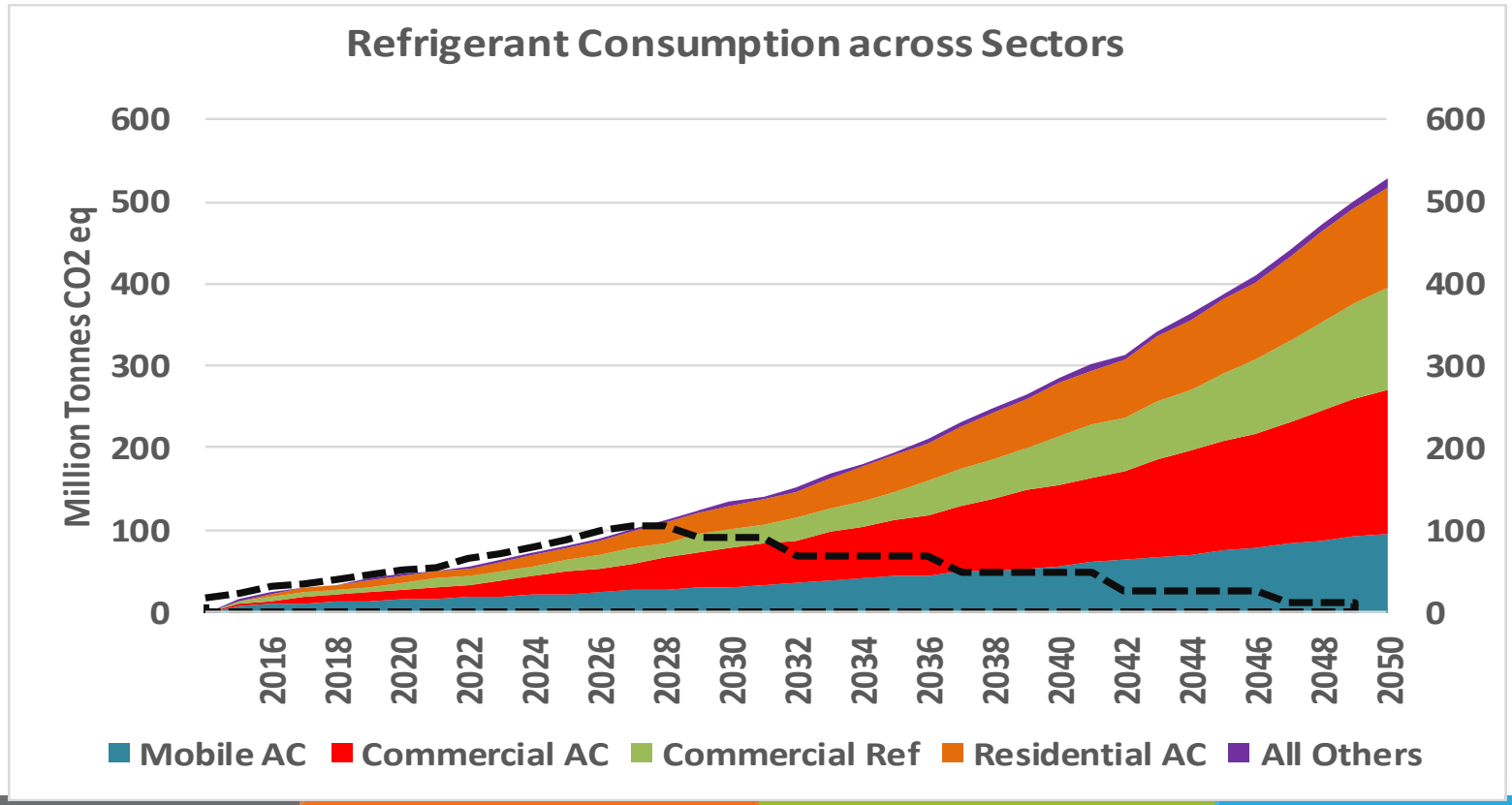
Baseline	Freeze years	Conclusion
2017-19	2021	Three large sectors have to transition between 2021 and 2032
2020-22	2025	Three large sectors have to transition between 2025 and 2034
2024-26	2028	Three large sectors have to transition between 2028 and 2038
2028-30	2031	Three large sectors have to transition between 2031 and 2041

Key Insight: The argument that after transition in one big sector, there will be a window of 8-10 years to make the transition in any other sector is invalid

Insights for phase down schedule

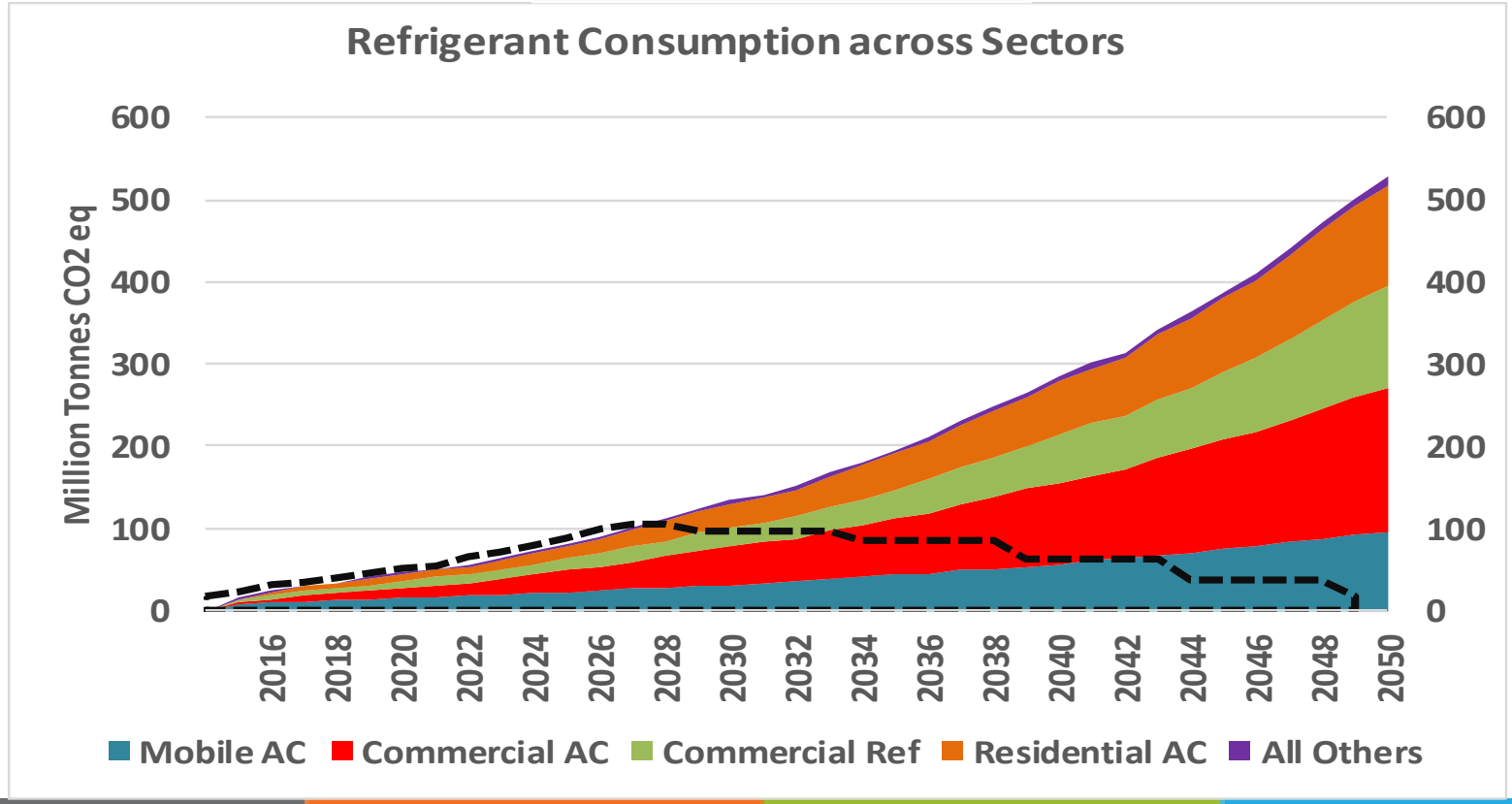
Insights for phase down schedule- Stringent phase down steps during the transition

2028: Freeze
15% reduction in 2030
35% reduction in 2033
55% reduction in 2038
75% reduction in 2043
90% reduction in 2048



Insights for phase down schedule- Less Stringent phase down steps during the transition

2028: Freeze
10% reduction in 2030
20% reduction in 2035
40% reduction in 2040
60% reduction in 2045
85% reduction in 2050



Comparing the two phase down schedules

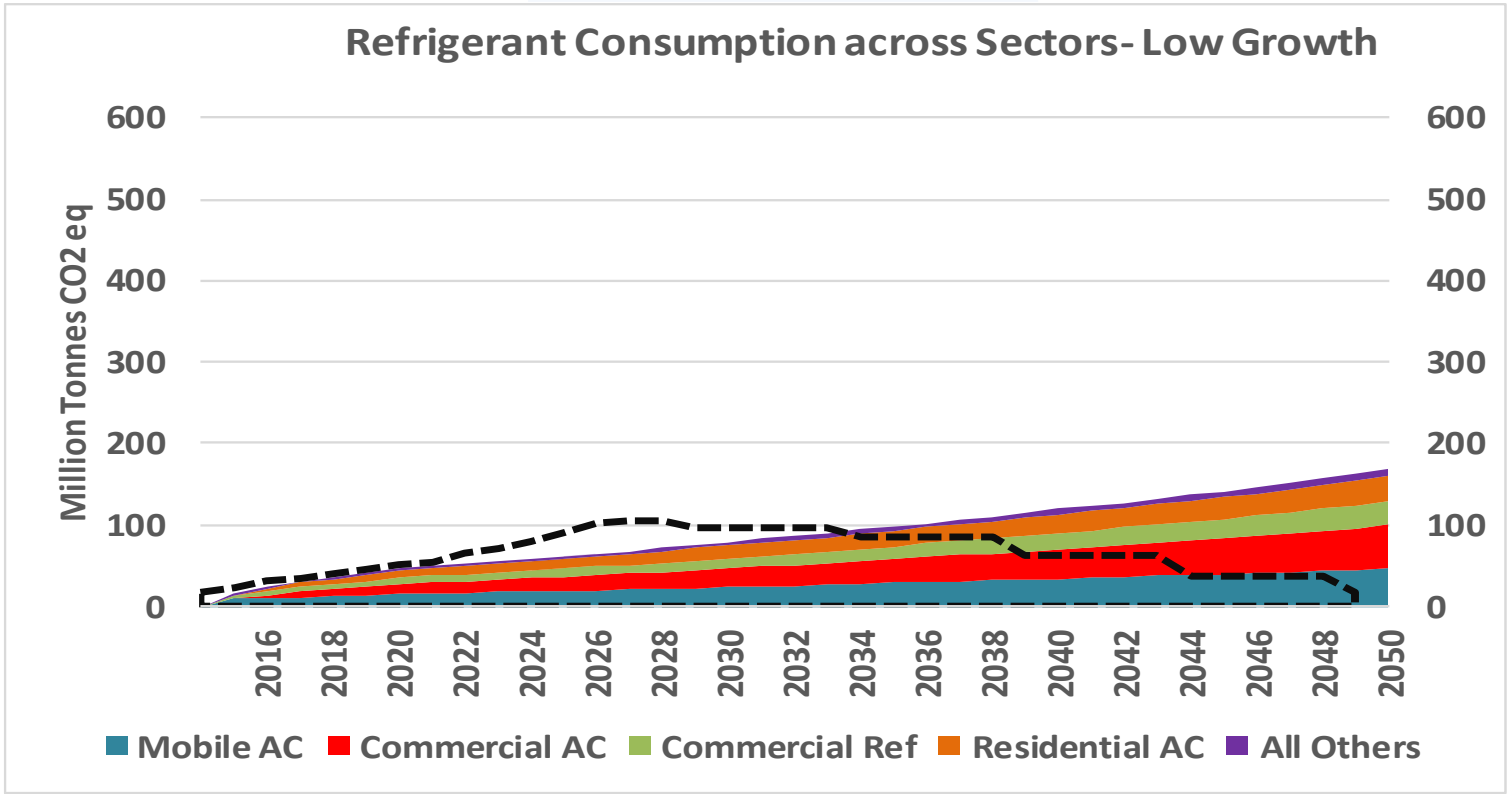
Schedule	Freeze	1st sector	2nd sector	3rd sector	4th sector
Less Stringent	2028	2028	2032	2036	2040
Stringent	2028	2028	2031	2033	2038

- Under the stringent schedule, three major sectors need to transform within five years from the freeze

- Even under the lenient schedule, three major sectors will need to transform within eight years

Low Growth and Less Stringent phase down steps during the transition

2028: Freeze
10% reduction in 2030
20% reduction in 2035
40% reduction in 2040
60% reduction in 2045
85% reduction in 2050



If average refrigerant growth rate is <6% post 2020, then the first phase down in any sector needs to happen only in 2033, and second in 2039, and third in 2049, i.e. 21 years post freeze (under less stringent phase down schedule).

To conclude

- Growth rates matter!
- Given the low penetration and high growth expectations, three major sectors will need to transform within eight years of the freeze, if the freeze is in 2028, and schedule is lenient
- If growth rate of the economy is much lower, then there will definitely be a longer window
- Commercial air-conditioning sector might need to move first
- Two things become very important: relative contributions of sectors, and sectoral growth rates
- Stringency of phase-down schedule matters in the context of growth rates

THANK YOU

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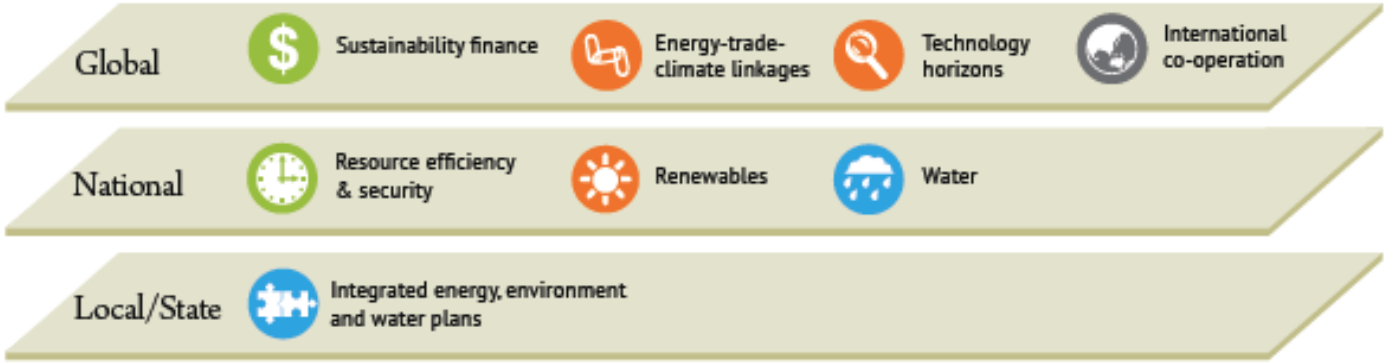

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