



Global Environmental Benefits of Introducing R-744 (CO₂) Mobile Air Conditioning

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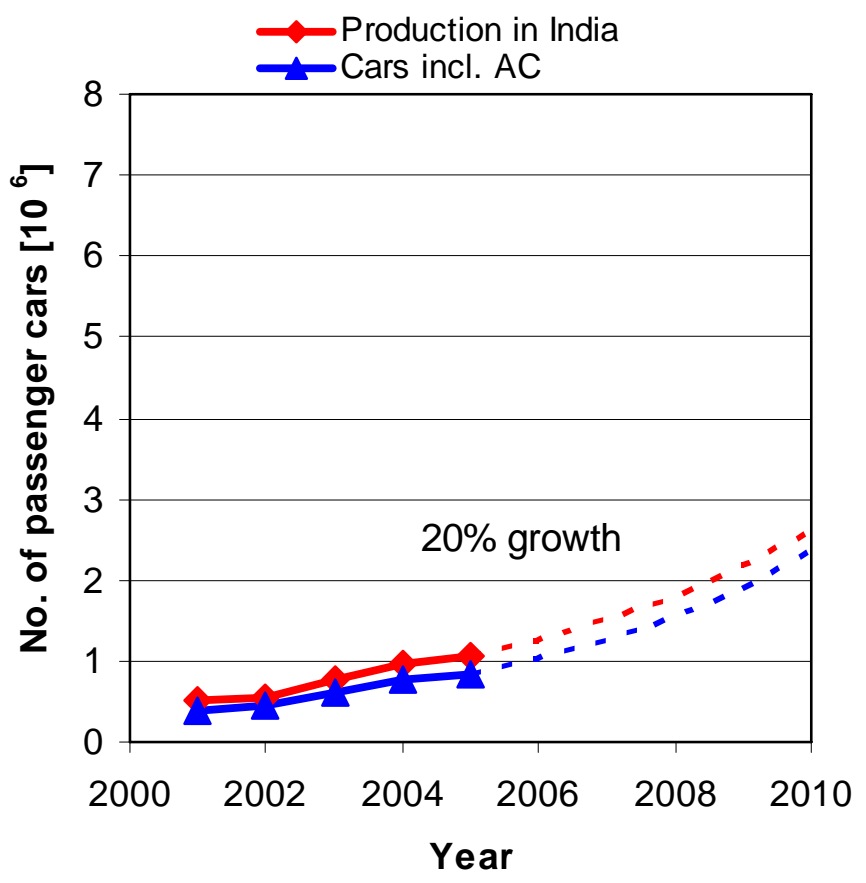
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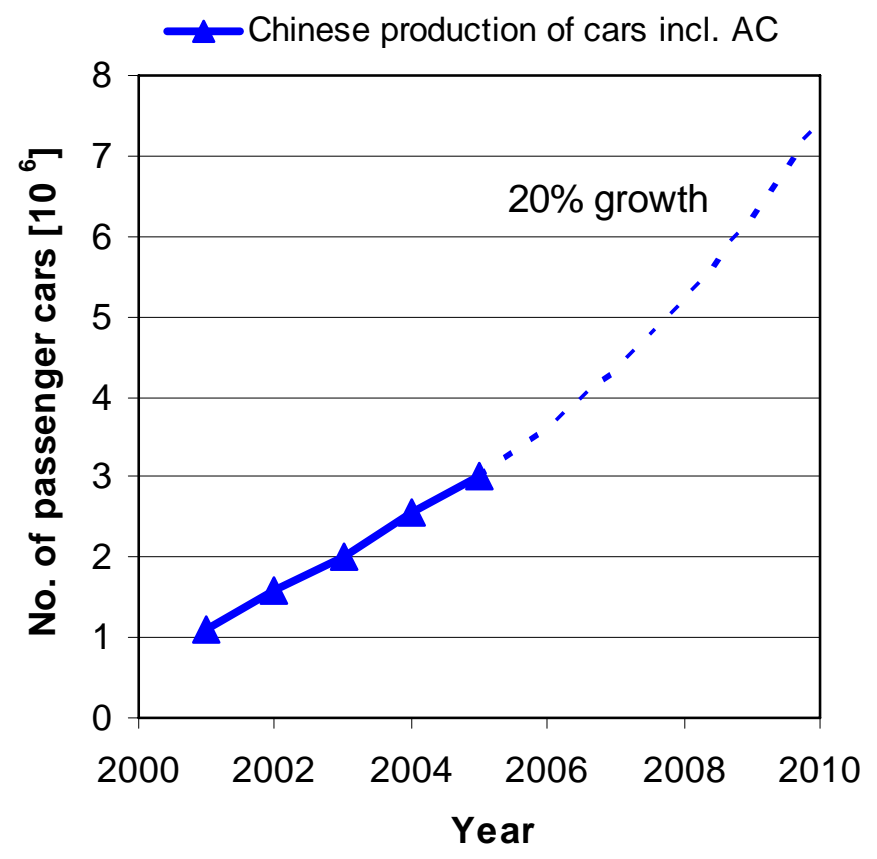


Car Production Numbers

INDIA



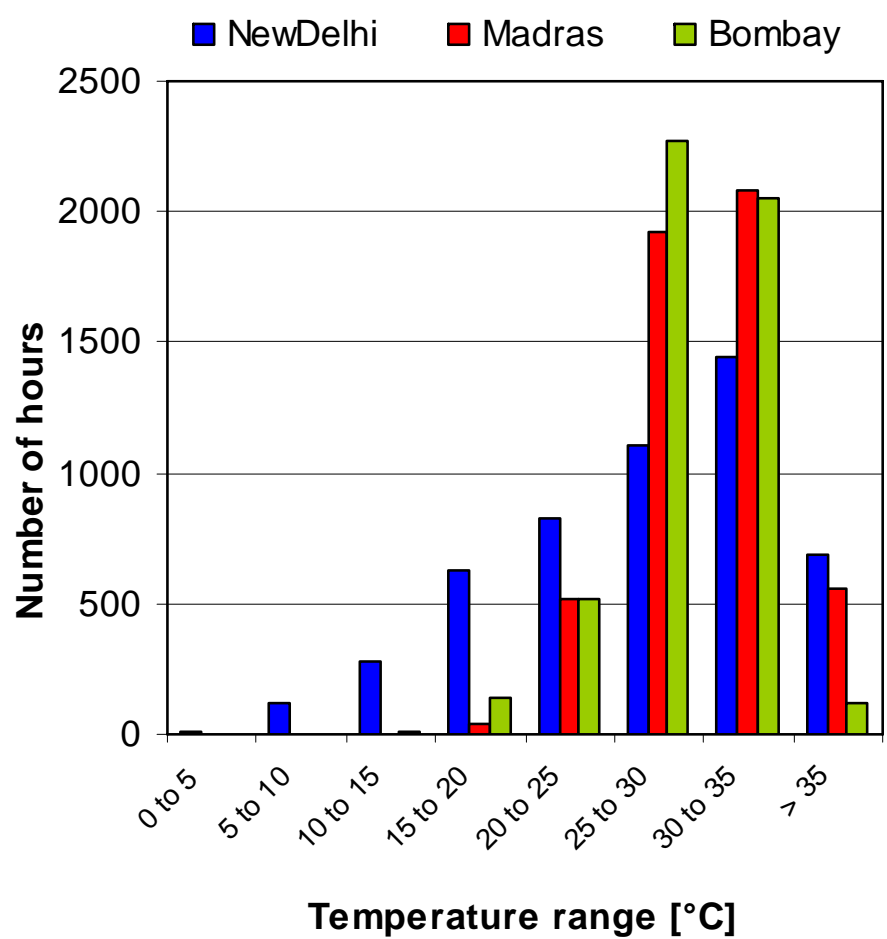
CHINA



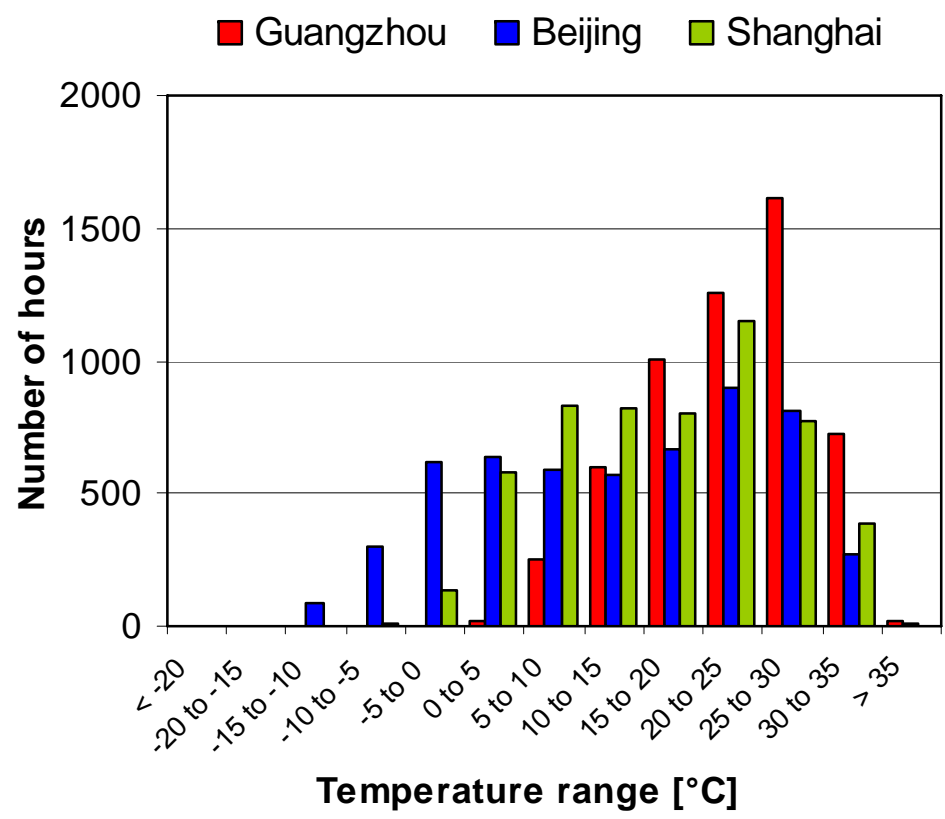


LCCP; Temperature bin

INDIA

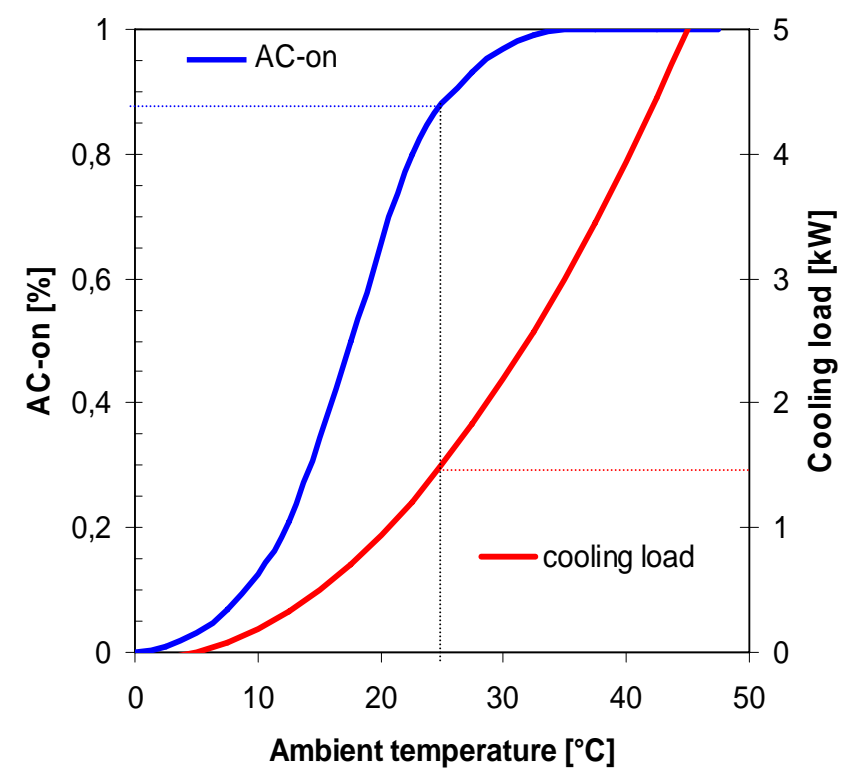
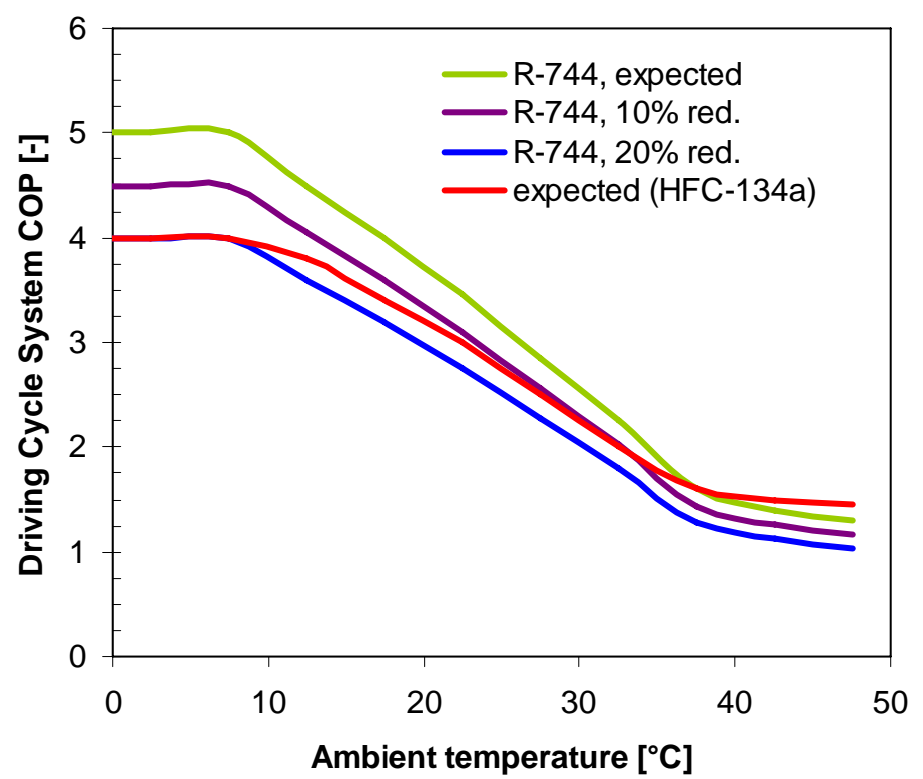


CHINA





LCCP; System COP / Q_o & AC-on





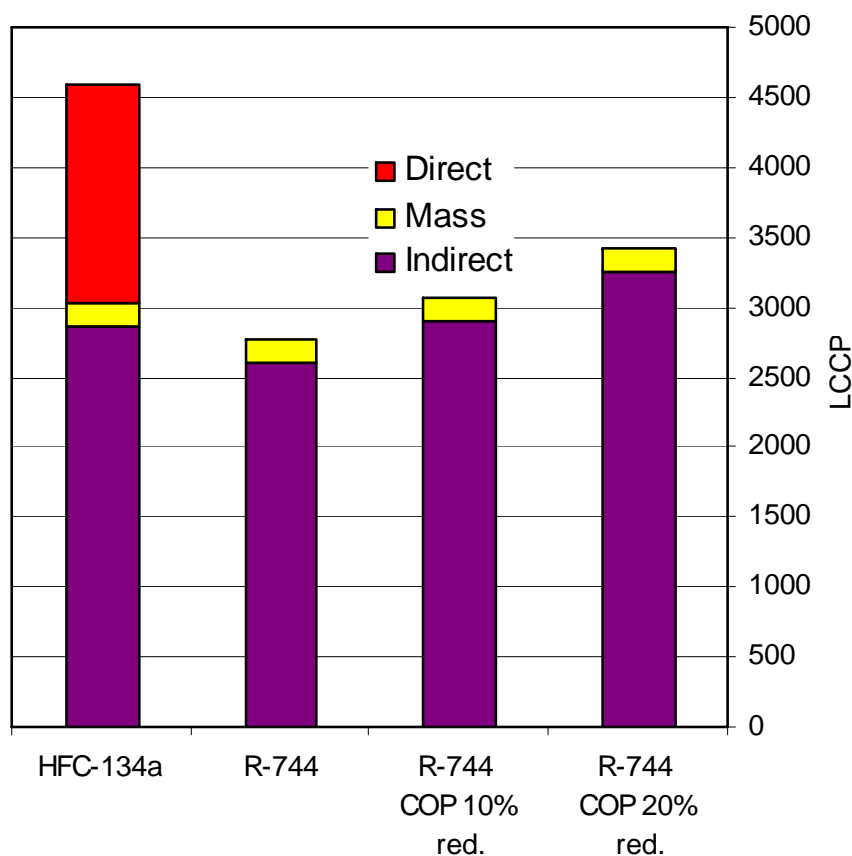
HFC emission scenarios

	Case A	Case B
Vehicle lifetime [years]	12	
System charge [g]	650	
Annual HFC leakage [g/a]	40	
No. of lifetime services [-]	5	
Emissions of HFC producing and re-processing [kg CO ₂ eq.]	133	
End of life recovery rate [%]	80	0
Loss of remaining charge at service [%]	20	100
Total HFC leakage [g]	1034	3250

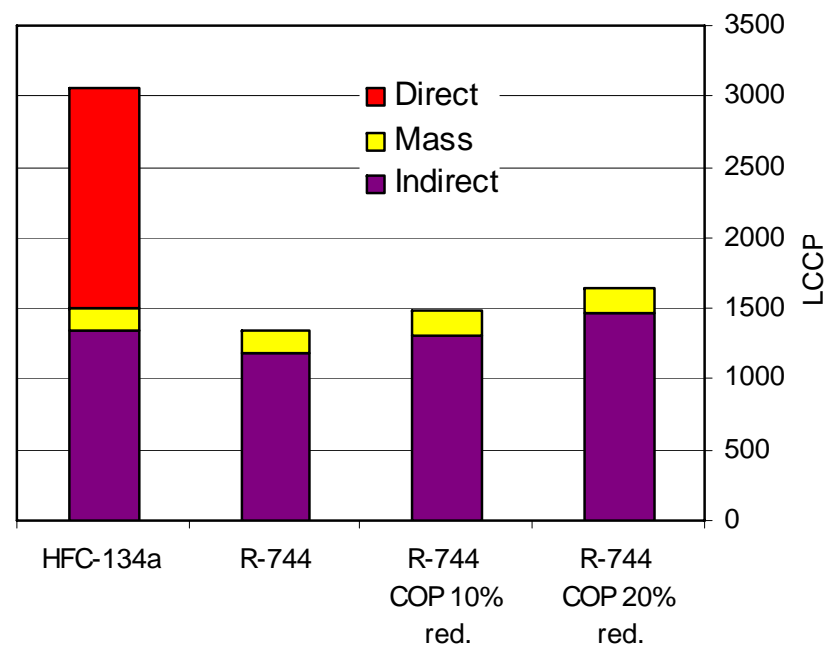


LCCP; Results (optimistic. case A)

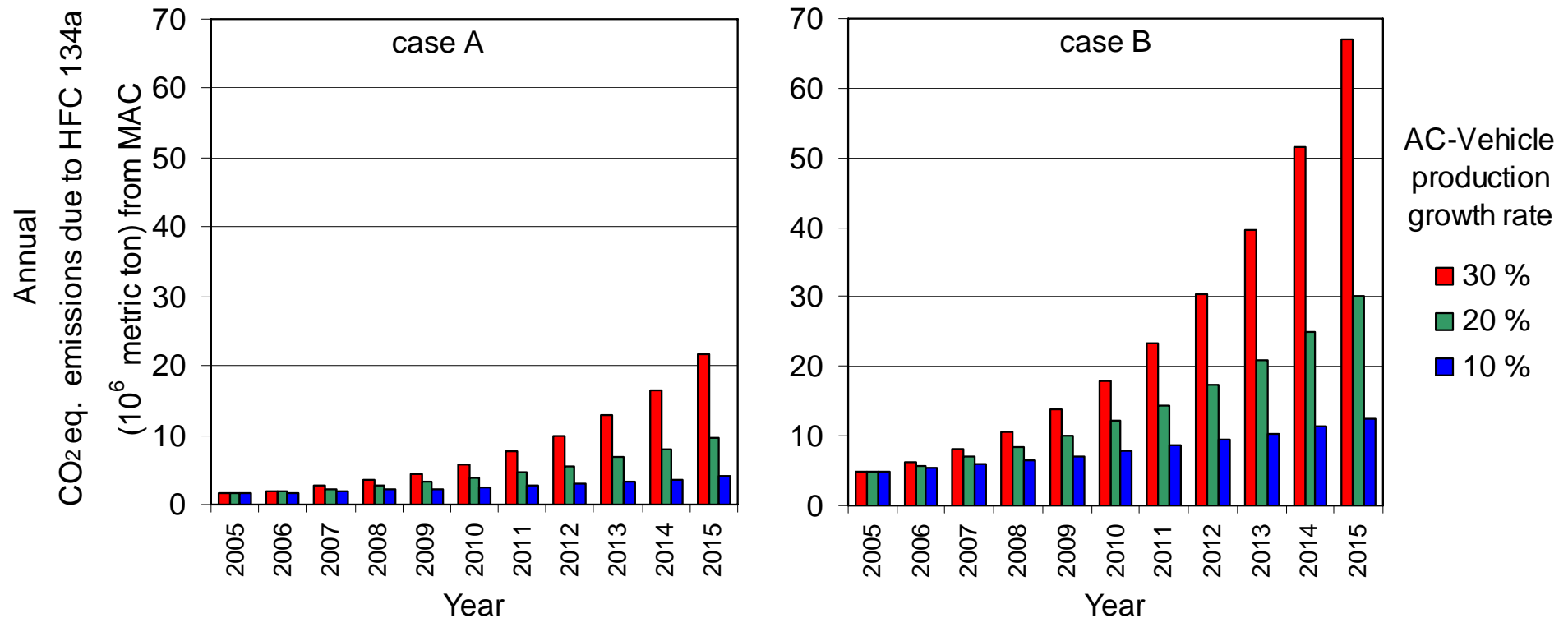
MADRAS, India



Guangzhou, China



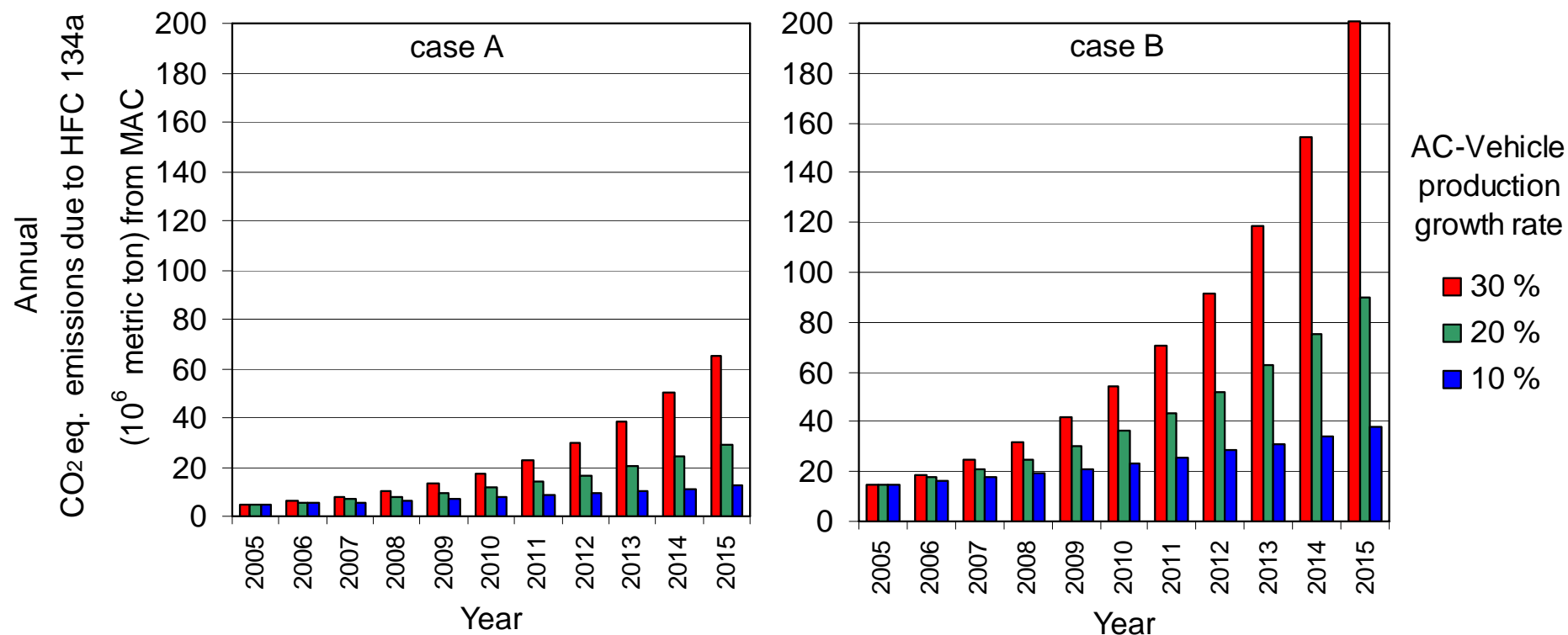
MAC GHG emission due to HFC, *India*



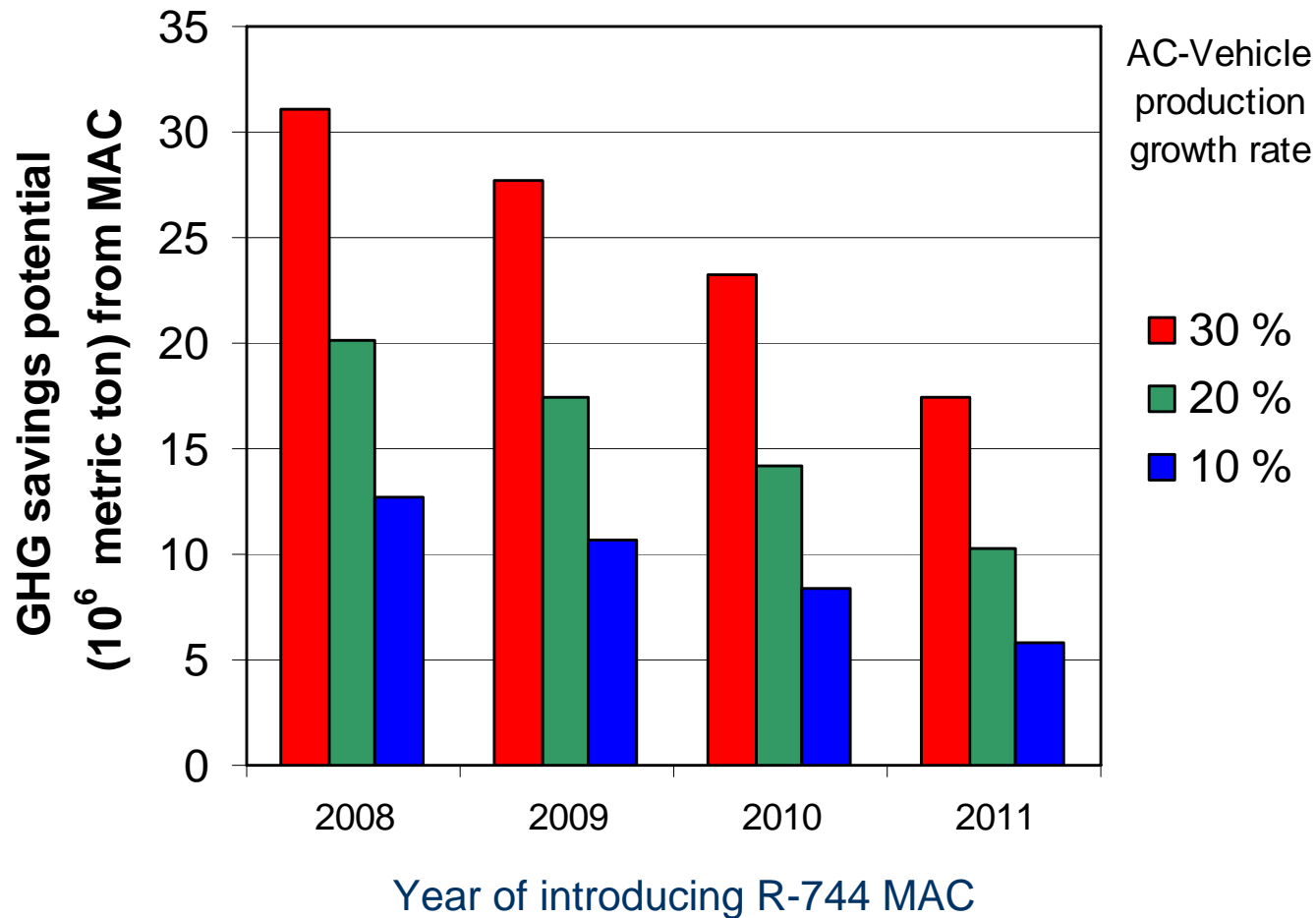
The total annual GHG emissions of Norway are between 50 and 60 million metric tons



MAC GHG emission due to HFC, China

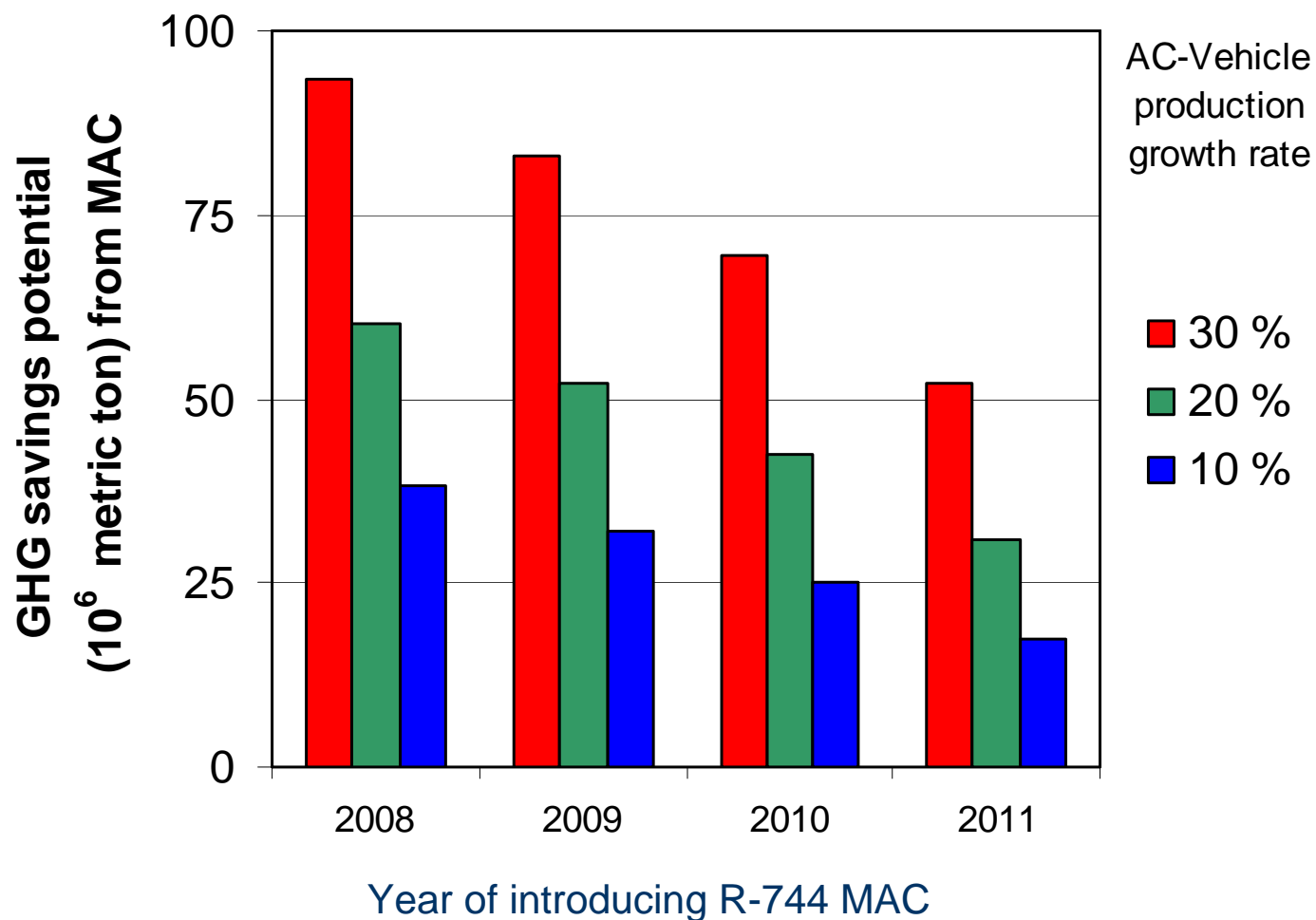


GHG saving potential prior 2012; *India*





GHG saving potential prior 2012; *China*





Conclusion

- Release to the atmosphere of chemicals that are foreign to nature involves a great risk.
- R-744 AC systems are the sustainable solution for mobile AC and heat pumping systems of the future.
- Large GHG savings can be achieved by an early introduction of R-744 and a rapid phase out of HFC-134a not only in Europe. The fast developing Asian nations India and China may avoid several hundred million metric ton's of tradable GHG emissions.