

HFC Phasedown Under the Montreal Protocol



Presented at the 30th Open-Ended Working Group
of the Parties to the Montreal Protocol in Geneva,
15-18 June 2010

Canada, Mexico and the United States of America



Agenda

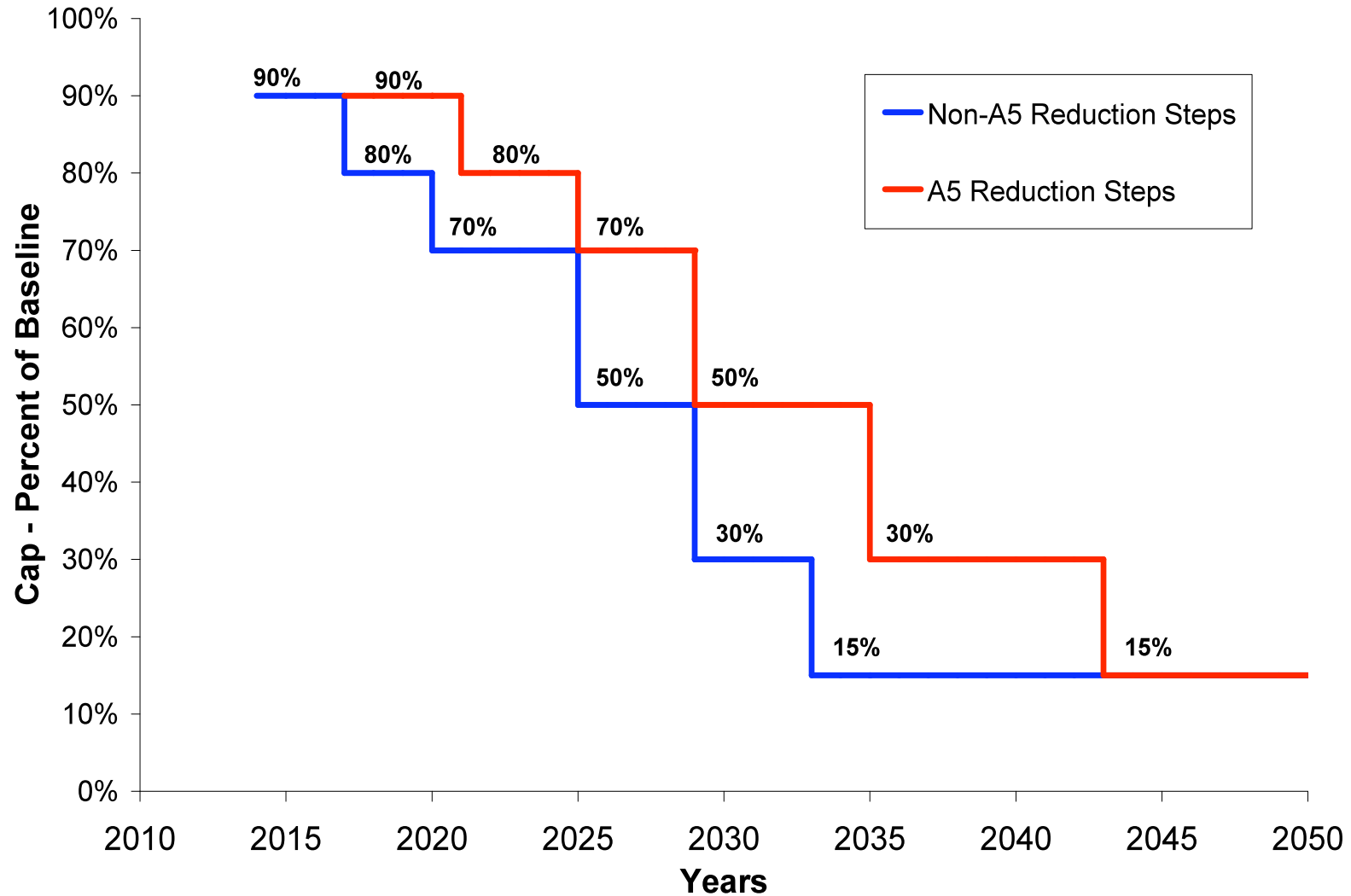
- Overview of Trilateral Proposal
- Overview of Micronesia Proposal
- Comparisons
- Benefits
- Substitutes
- Path Forward
- HFC-23 By-Product Emissions
- Discussion



Trilateral Amendment Proposal

- Canada, Mexico and United States Proposal
- Similar to 2009 Proposal
 - Phased**down**, not phase**out** of HFCs
 - Phases down to 15% of baseline
 - Phasedown is GWP weighted
 - Covers 20 HFCs, including 2 known as HFOs
 - Limits by-product emissions of HFC-23
 - Leaves UNFCCC obligations unchanged
 - Supports global efforts to reduce GHGs
 - MLF eligibility for production and consumption and HFC-23 by-product reductions

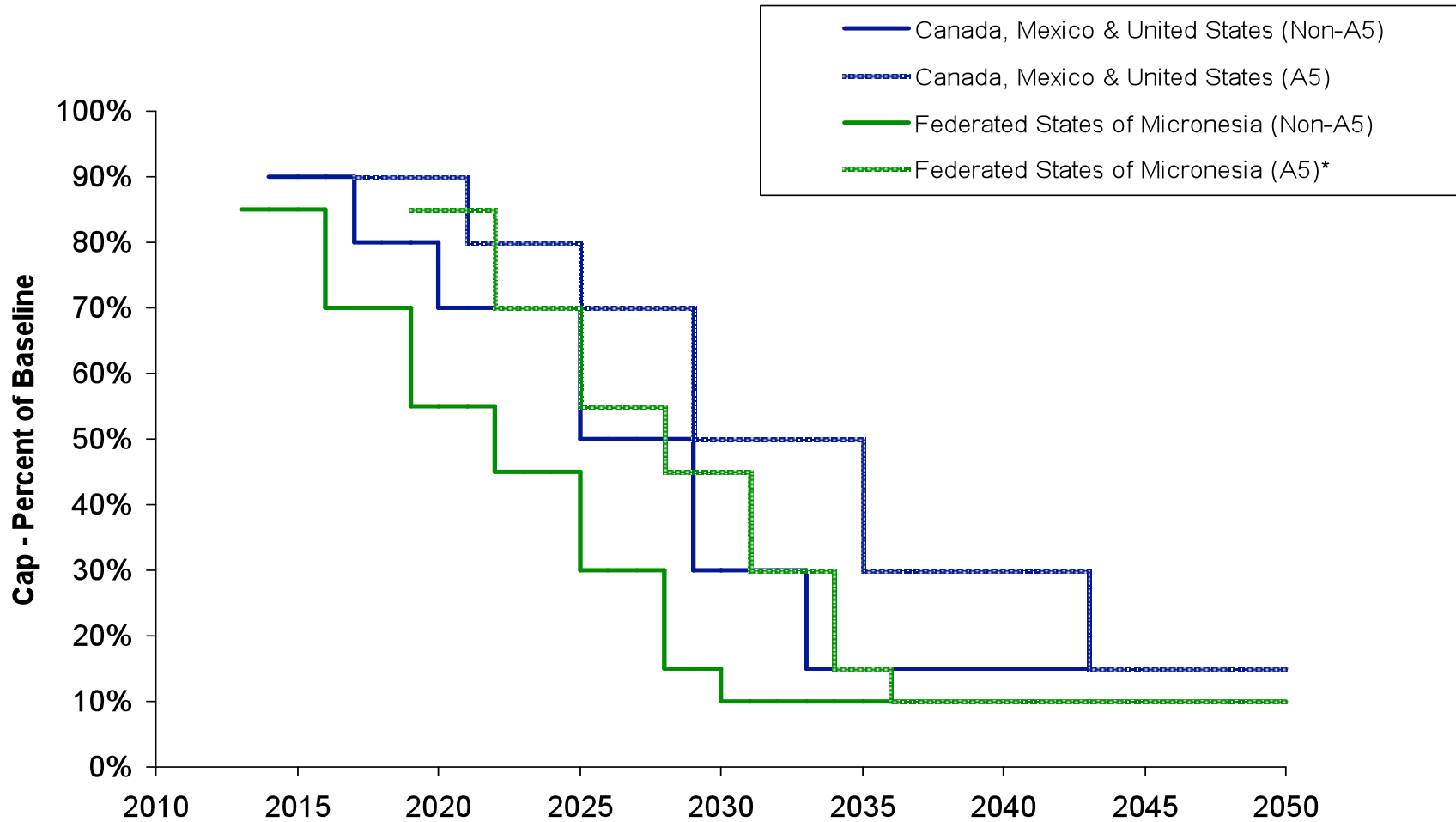
Trilateral Proposal Phasedown Schedule



Federated States of Micronesia HFC Amendment Proposal: Differences

- ❑ A5 Country baseline established with different methodology
 - Article 5 – Average 2007-2009 HCFC
- ❑ Schedule differs
 - Reductions every 3 years until 2028, then plateau established in 2030
 - Plateaus at 10% of baseline
 - Includes by-product control provisions starting in 2013

Proposed HFC Reduction Steps for Article 5 and Non-A5 Countries

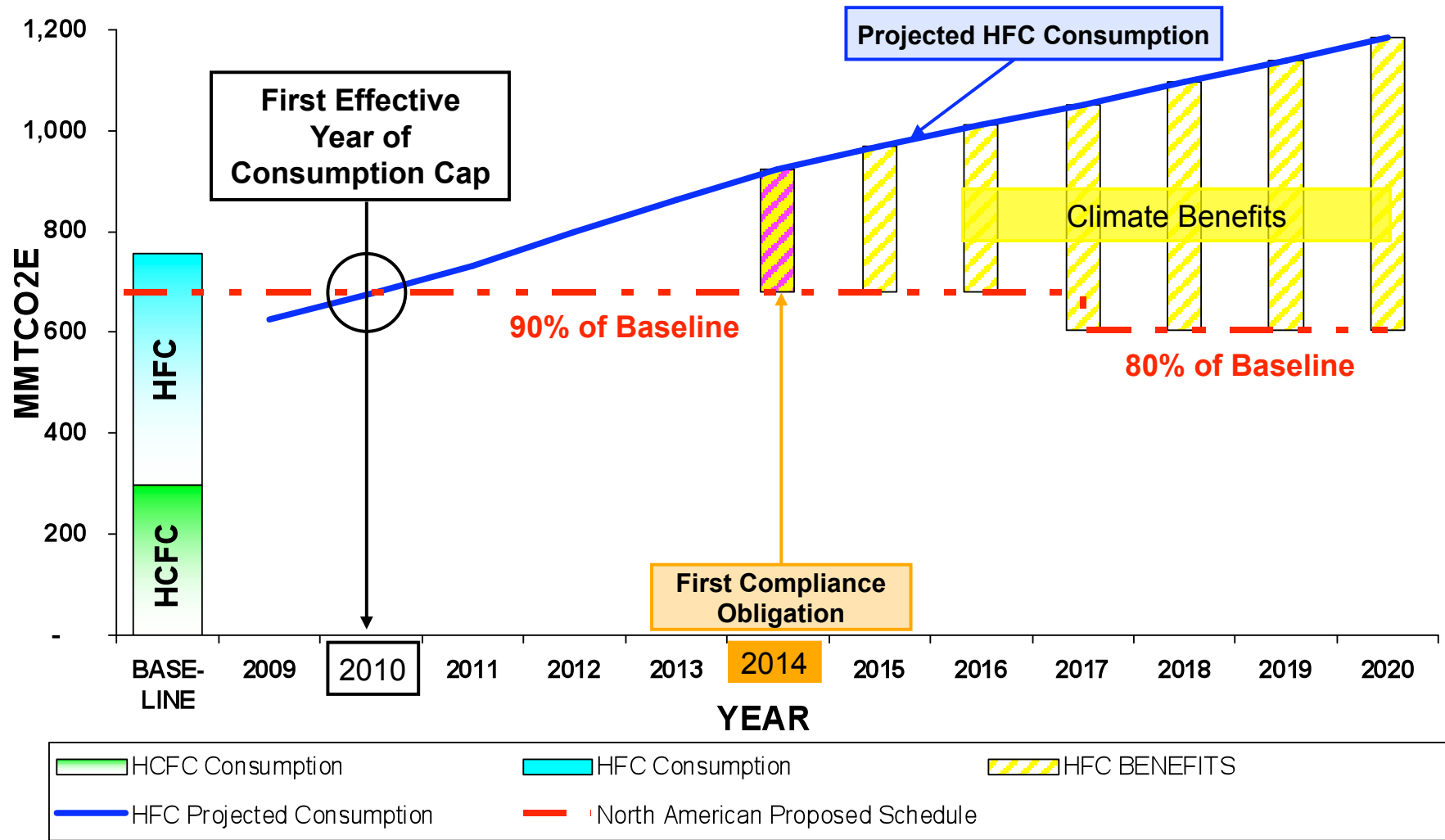


* Baseline = Average HCFC Consumption, 2007-2009 (all others Average HCFC+HFC, 2004-

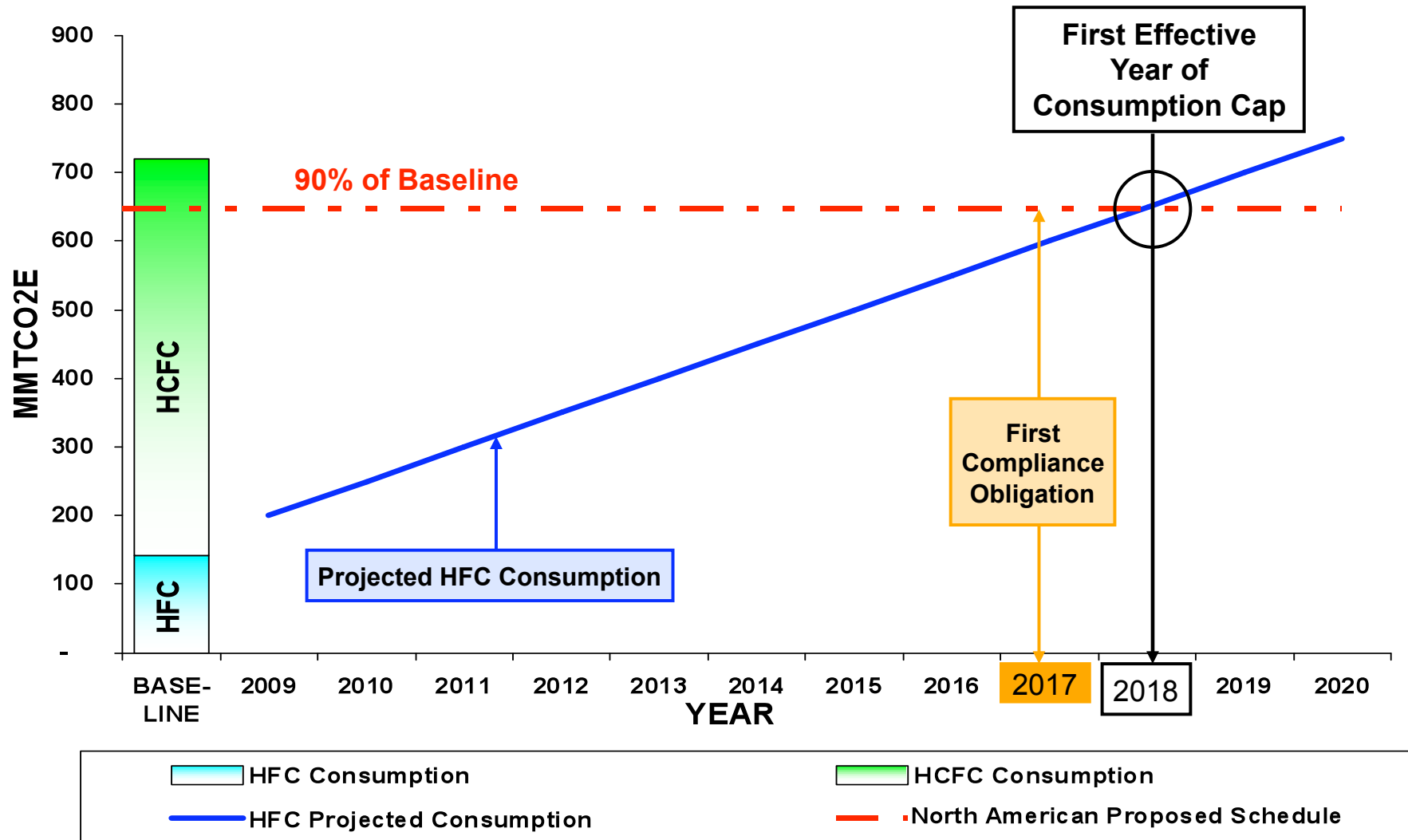
Overview of HFC Proposals

Trilateral Proposal				Micronesia Proposal			
Non-A5 Schedule		A5 Schedule		Non-A5 Schedule		A5 Schedule	
Year	Cap	Year	Cap	Year	Cap	Year	Cap
2014	90%	2017	90%	2013	85%	2019	85%
2017	80%	2021	80%	2016	70%	2022	70%
2020	70%	2025	70%	2019	55%	2025	55%
2025	50%	2029	50%	2022	45%	2028	45%
2029	30%	2035	30%	2025	30%	2031	30%
2033	15%	2043	15%	2028	15%	2034	15%
Plateau	15%	Plateau	15%	2030	10%	2036	10%
				Plateau	10%	Plateau	10%
Non-A5 Baseline		A5 Baseline		Non-A5 Baseline		A5 Baseline	
HFC+HCFC from 2004-2006		HFC+HCFC from 2004-2006		HFC+HCFC from 2004-2006		HCFC from 2007-2009	

Non-Article 5 Parties Estimated HFC Consumption and Benefits from Phase Down



Estimated First Effective Year of Proposed Phase Down for Article 5 Parties



Climate Benefits are Substantial

- Trilateral proposal cumulative benefits:
 - ~3,000 MMTCO₂eq* through 2020
 - ~88,000 MMTCO₂eq through 2050

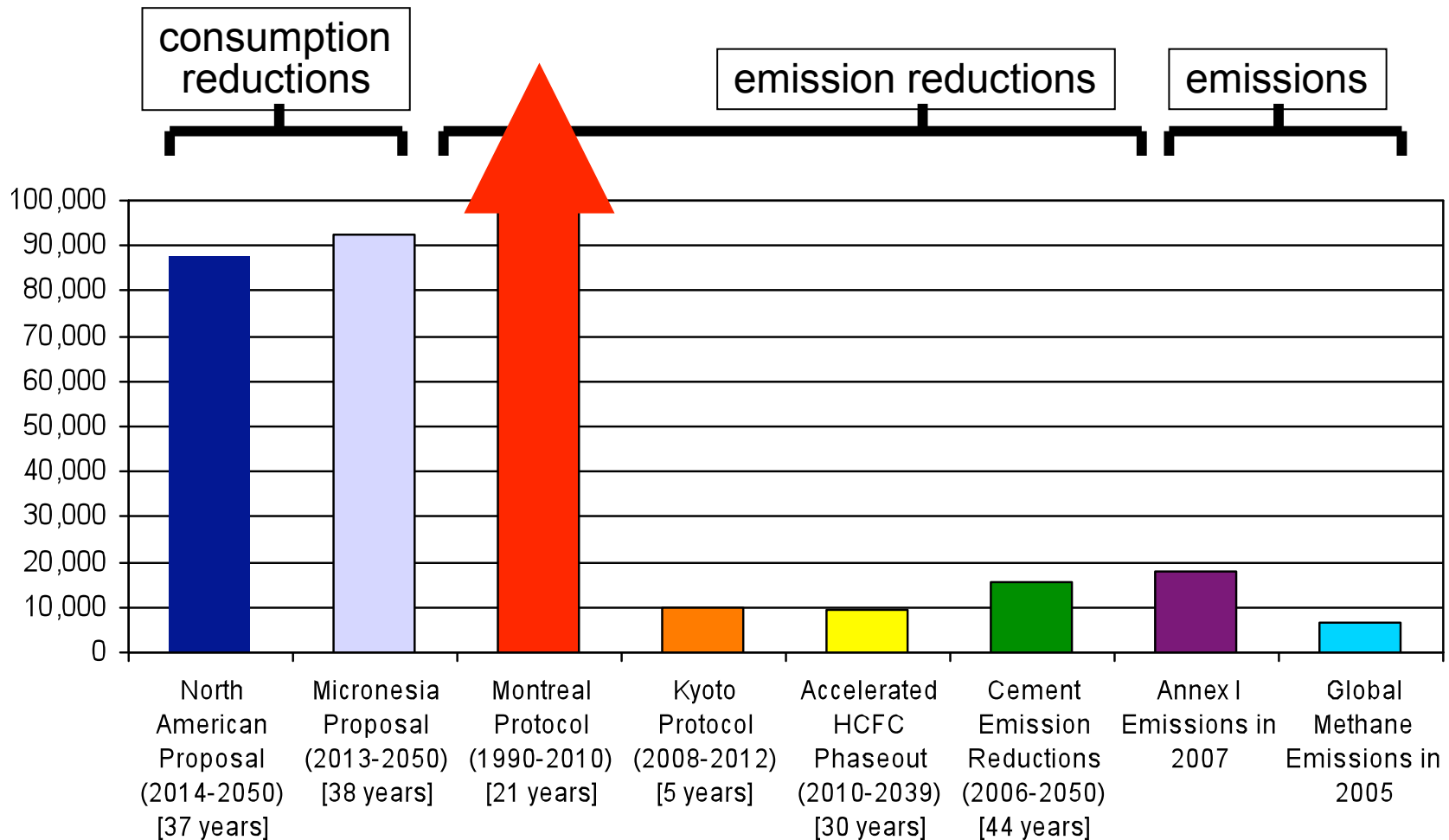
- FSM Proposal cumulative benefits:
 - ~4,000 MMTCO₂eq through 2020
 - ~93,000 MMTCO₂eq through 2050

- EPA's *Analysis of HFC Production and Consumption Controls*:
 - http://www.epa.gov/ozone/downloads/Analysis_of_HFC_Production_and_Consumption_Controls.pdf
 - *MtCO₂eq

Methodology For Estimating Benefits

- ❑ Use ODS consumption data, by ODS type and end-uses
- ❑ Use ODS consumption to estimate HFC consumption multiplying by ratio for relevant year
- ❑ U.S. HFC consumption estimates from EPA model
- ❑ HFC consumption scaled by each region's GDP growth, historical/projected GDP
- ❑ Apply adjustment factors for transition pathways
- ❑ Multiply consumption by average GWP to derive GWP-weighted consumption (i.e., MMTCO₂eq)

How Do the HFC Amendment Proposals Stack Up?



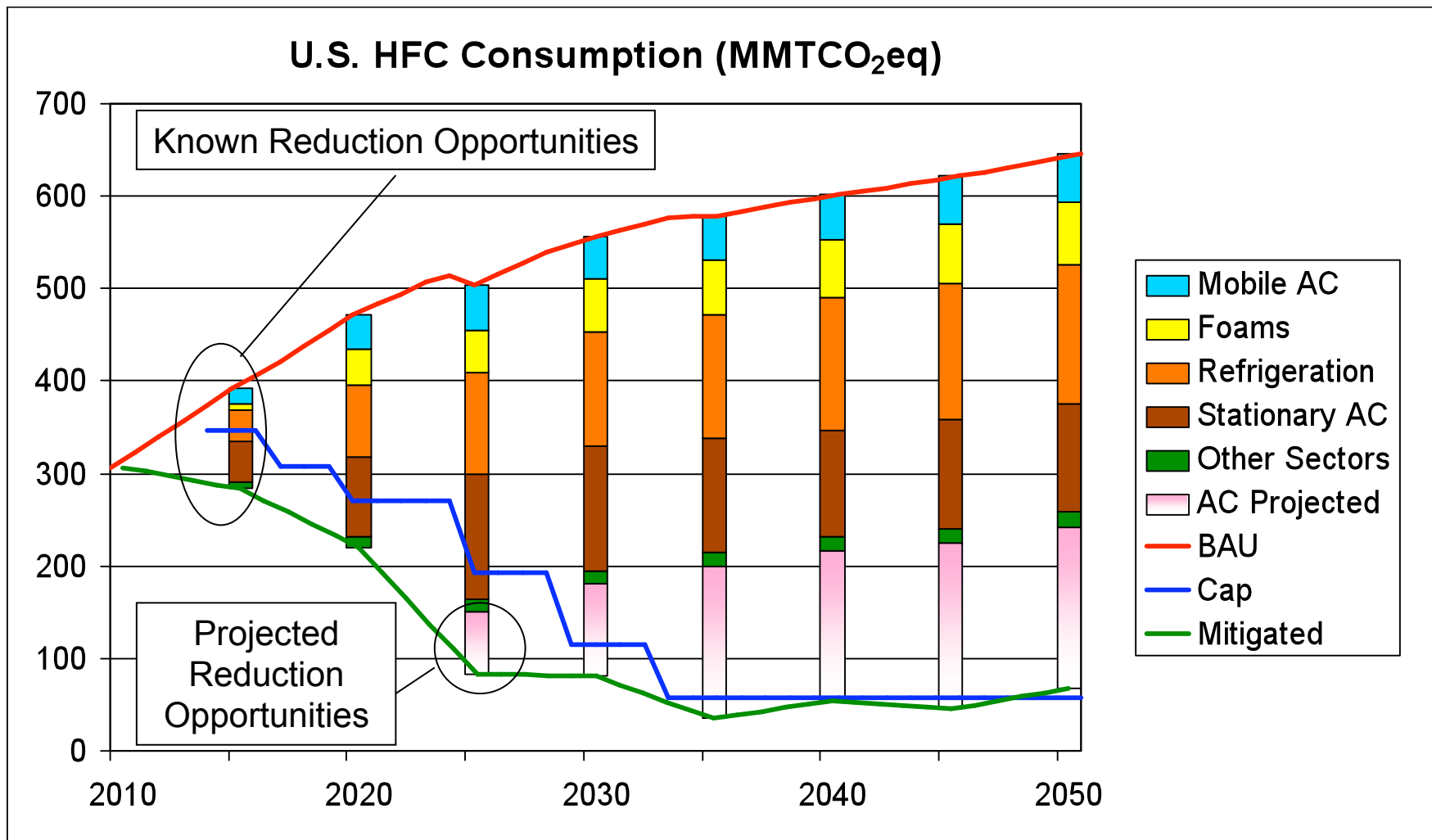
Many Substitutes Available and More on the Way

- “The ultimate choice of technology to phase-out HCFCs will be based on ozone depletion and also climate impact, health, safety, affordability and availability, as Decision XIX/6 requires”

*May 2010 TEAP XXI/9 Task Force Report
Assessment Of HCFCs and Environmentally Sound Alternatives*

- 2010 TEAP Progress Report
 - Substitutes for many sectors and sub-sectors available
 - Additional substitutes under development
 - Global acceptance for alternatives strengthening
 - Potential to skip higher-GWP HFC alternatives, go directly to lower GWP alternatives

How U.S. Could Meet HFC Phasedown

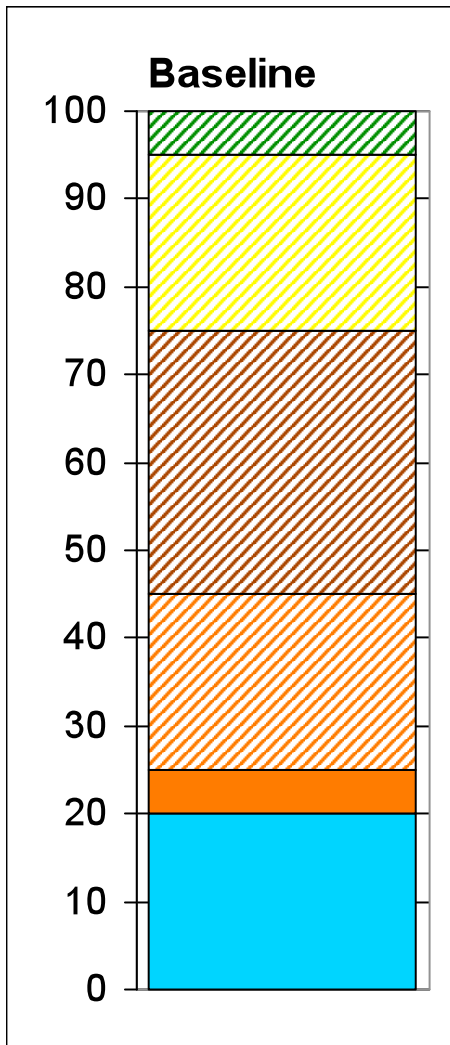


What Substitutes will be Available?

Sector examples:

- ❑ MVACs: very low GWP HFC-1234yf, CO₂, HFC-152a
- ❑ Refrigeration:
 - domestic refrigeration - HCs
 - Retail refrigeration: secondary loop, CO₂, ammonia
- ❑ Foams: HCs, water, very low GWP HFCs
- ❑ Stationary AC: micro-channel heat exchangers, Moderate GWP blends
- ❑ Non-Medical Aerosols: very low GWP HFC-1234ze
- ❑ Fire Suppression: very low GWP fluorinated ketones & Solvents: low GWP HFEs

Country "A" Baseline



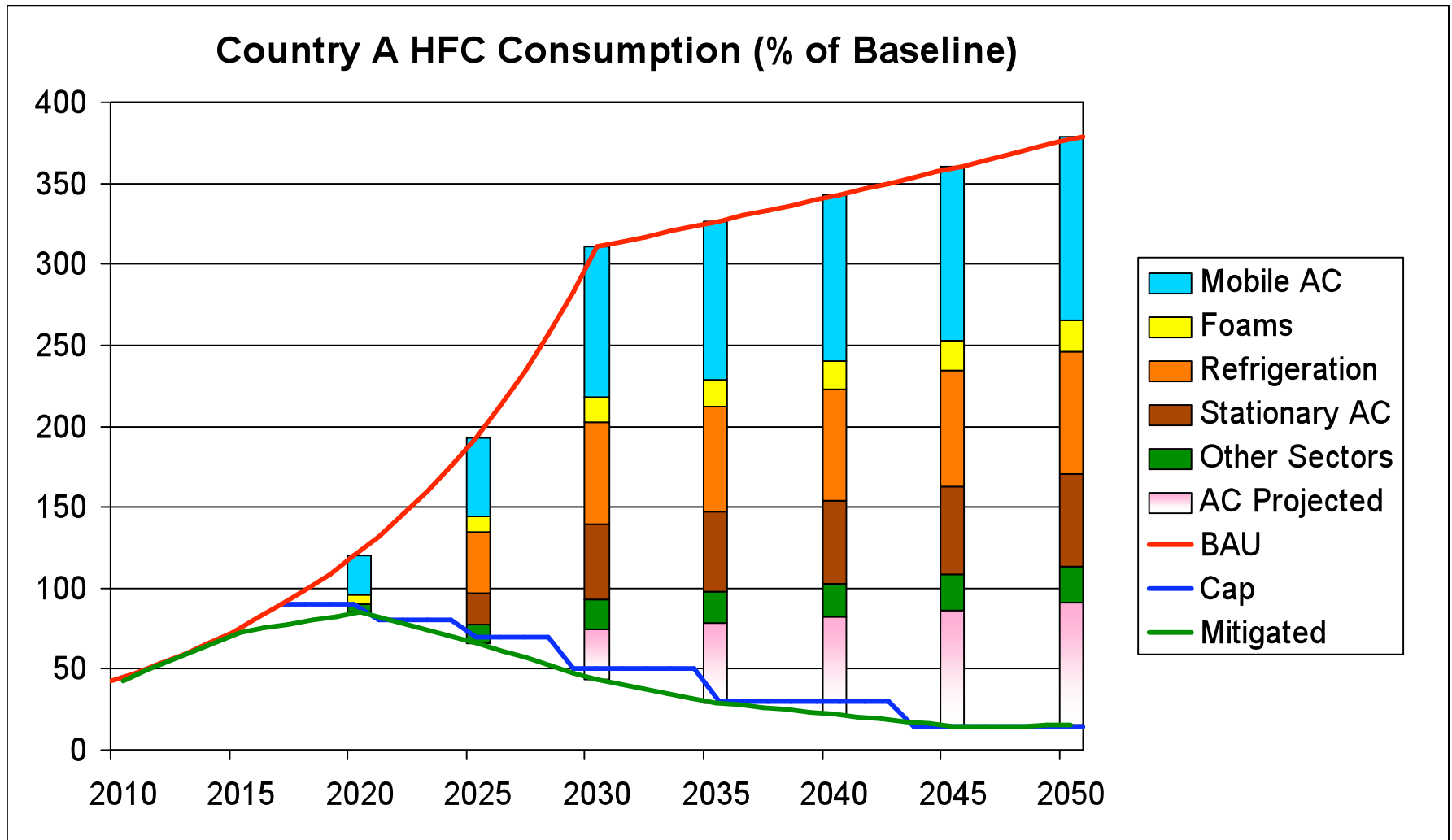
Makeup

- 20% Mobile AC (HFC)
- 5% Refrigeration (HFC)
- 20% Refrigeration (HCFC)
- 30% Stationary AC (HCFC)
- 20% Foam (HCFC)
- 5% Other Sectors (HCFC)

Growth Rates:

- 10% 2010-2030 (majority of HCFC phased out)
- 1% 2030-2050 (population growth)

How Country "A" Could Meet the HFC Phasedown





HFC-23 By-Product Controls

- Amendment refines control of by-product emissions
 - Covers emissions from all facilities
 - Makes by-product obligations eligible for MLF funding
 - Would cover facilities *not* covered by CDM
 - Does *not* allow double payment if receive other funds

Decision on HFC-23 By-Product Emissions

- Recognizes HFC emissions covered by Kyoto Protocol to UNFCCC
- Requests ExCom of MLF to:
 - Update information on Article 5 HCFC-22 facilities, including whether CDM-covered
 - Develop estimates of capital and operational costs
 - Formulate Guidelines by 64th ExCom Meeting
 - Facilitate implementation of projects
- Request TEAP/SAP to:
 - Study cost and environmental benefit



HFC-23 By-Product Emissions

- ❑ Increases in HFC-23 global emissions attributable to increases in HCFC-22 production
- ❑ While globally HFC-23 emitted per HCFC-22 has decreased, higher emissions in Article 5 countries with facilities not covered by CDM projects (Montzka, et al)
- ❑ CDM projects cover >50% HFC-23 emissions in Article 5 countries

Methodology for HFC-23 Benefits

- Estimate number of facilities
 - Those covered by CDM & those not covered by CDM
- Estimate requirements for the adoption of thermal oxidation technologies
- Estimate number of facilities without thermal oxidation technologies
- Estimate unmitigated annual emissions
- Calculate benefits – based on annual emissions
- Additional Benefits from HFC-23 Mitigation:
 - **~6,000 MMTCO₂eq by 2050**



Summary

- ❑ HFC amendment proposals provide meaningful opportunities for near-term climate benefits by allowing Parties to harmonize policies in addressing ODS substitutes
- ❑ Low GWP alternatives and proper refrigerant management are available now, with further alternatives coming on line to meet demand