

Interactive Montreal Protocol Amendment Comparison Tool (IMPACT)

Version 2.2

Developed by the Natural Resources Defense Council (NRDC) and
the Institute for Governance & Sustainable Development (IGSD)

Alexander Hillbrand, NRDC
Geneva, 5 April 2016

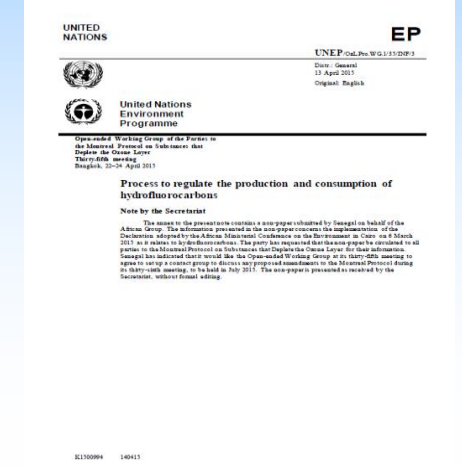
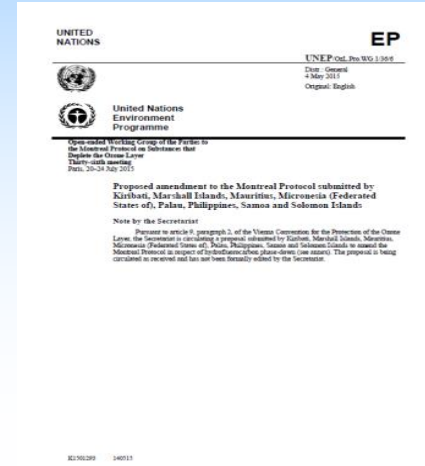
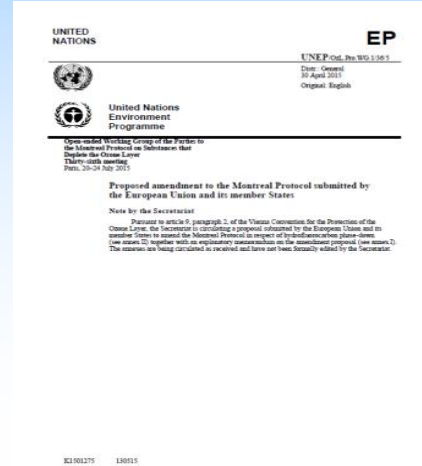
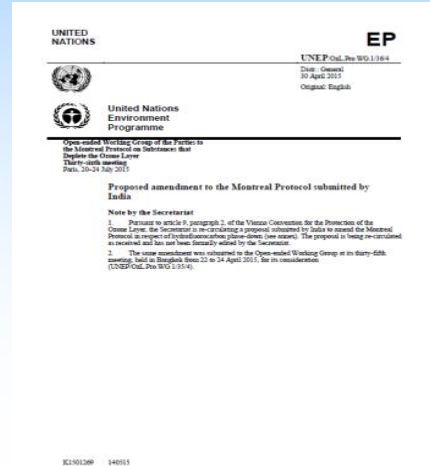
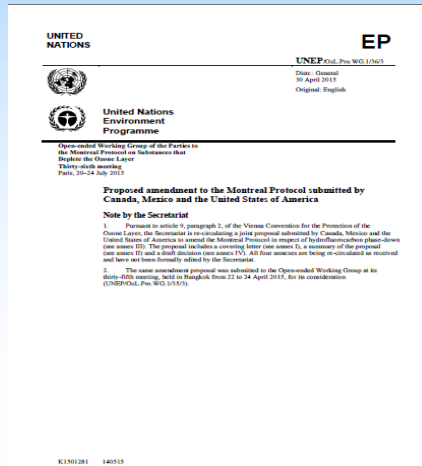
Available at app.box.com/impact



Outline

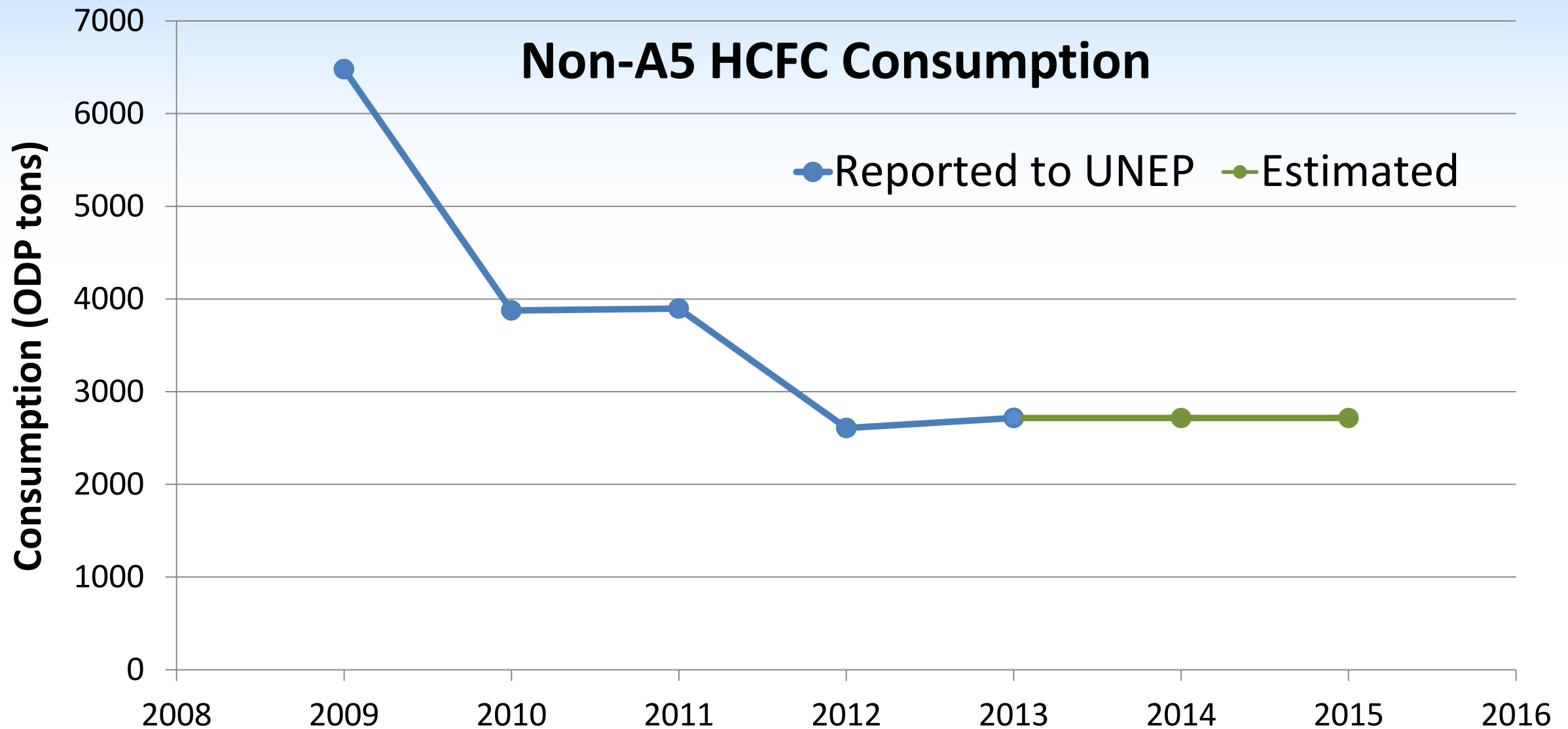
1. Goals
2. Data & Assumptions
3. IMPACT Examples
4. Contact

Goals



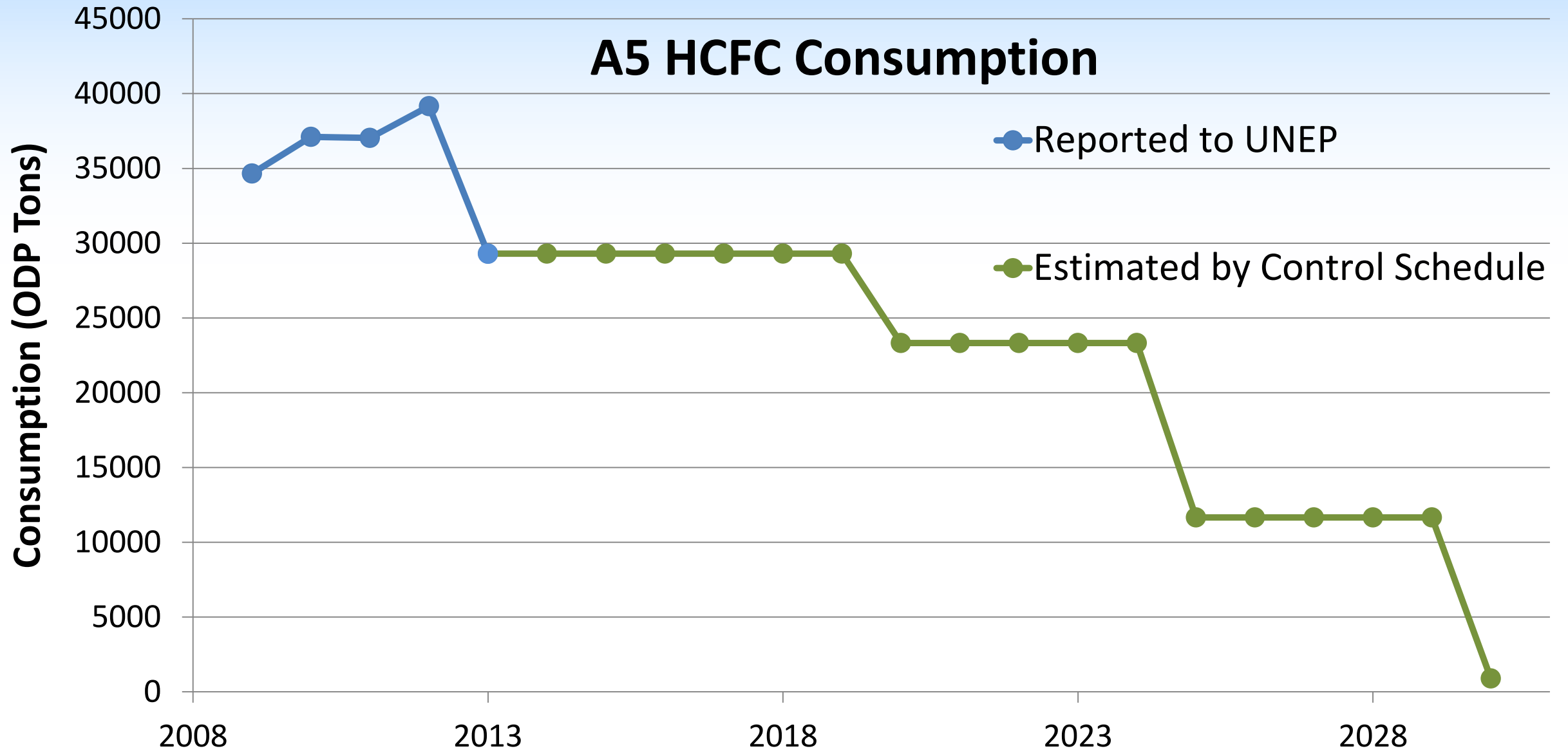
1. Quantify the allowed consumption under each of the 4 proposed amendments for A5 and non-A5 blocks
2. Compare proposed amendments by permitted carbon equivalent HFC consumption through 2050
3. Customize proposed schedules and baselines
4. Build entirely new control schedules and baselines
5. Allow nations to input their own data to see domestic implications

Data & Assumptions—HCFCs



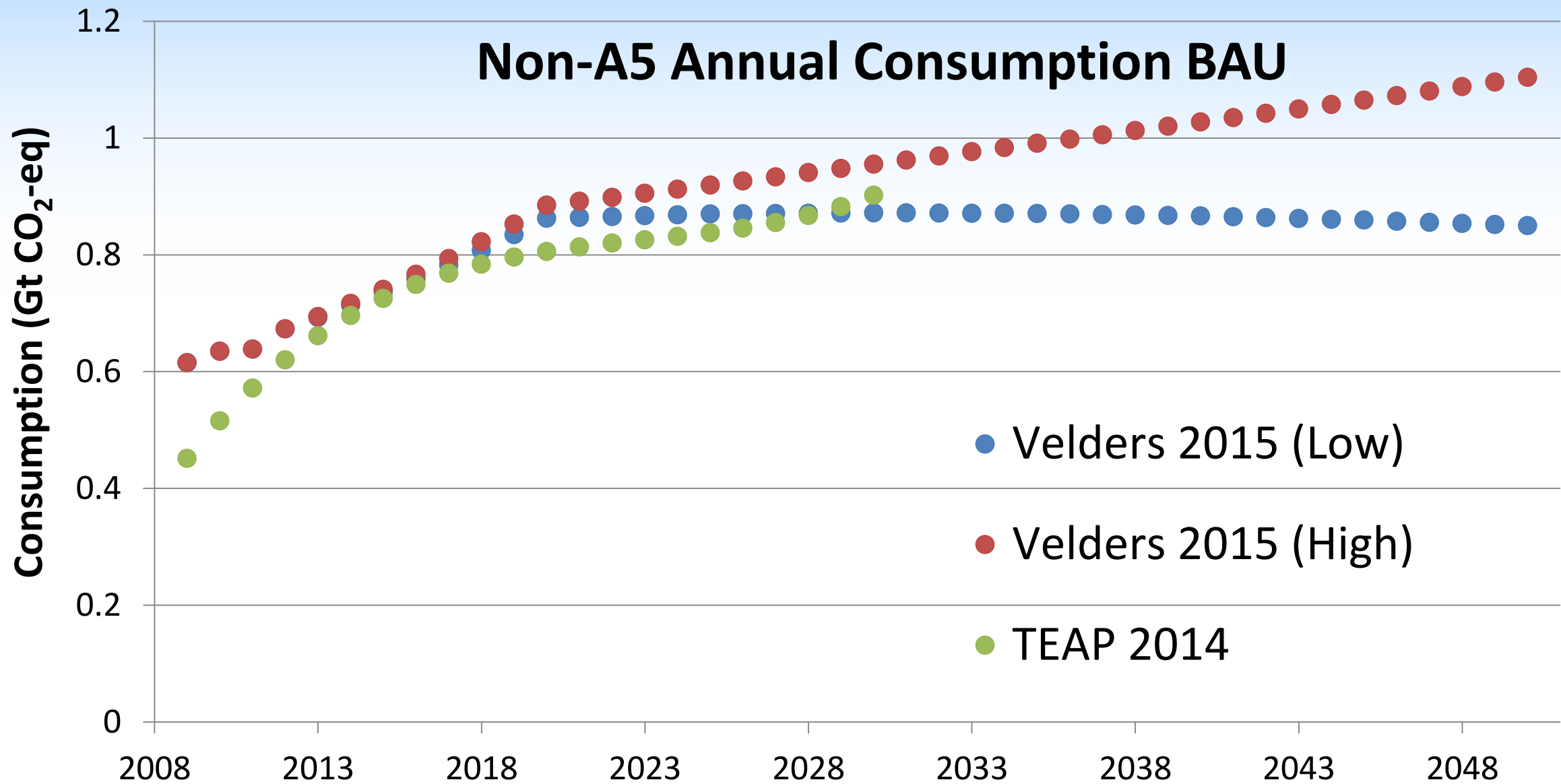
IMPACT uses an ODP tons \rightarrow GtCO₂-eq conversion from McFarland 2008.

Data & Assumptions—HCFCs



IMPACT uses an ODP tons -> GtCO₂-eq conversion from McFarland 2008.

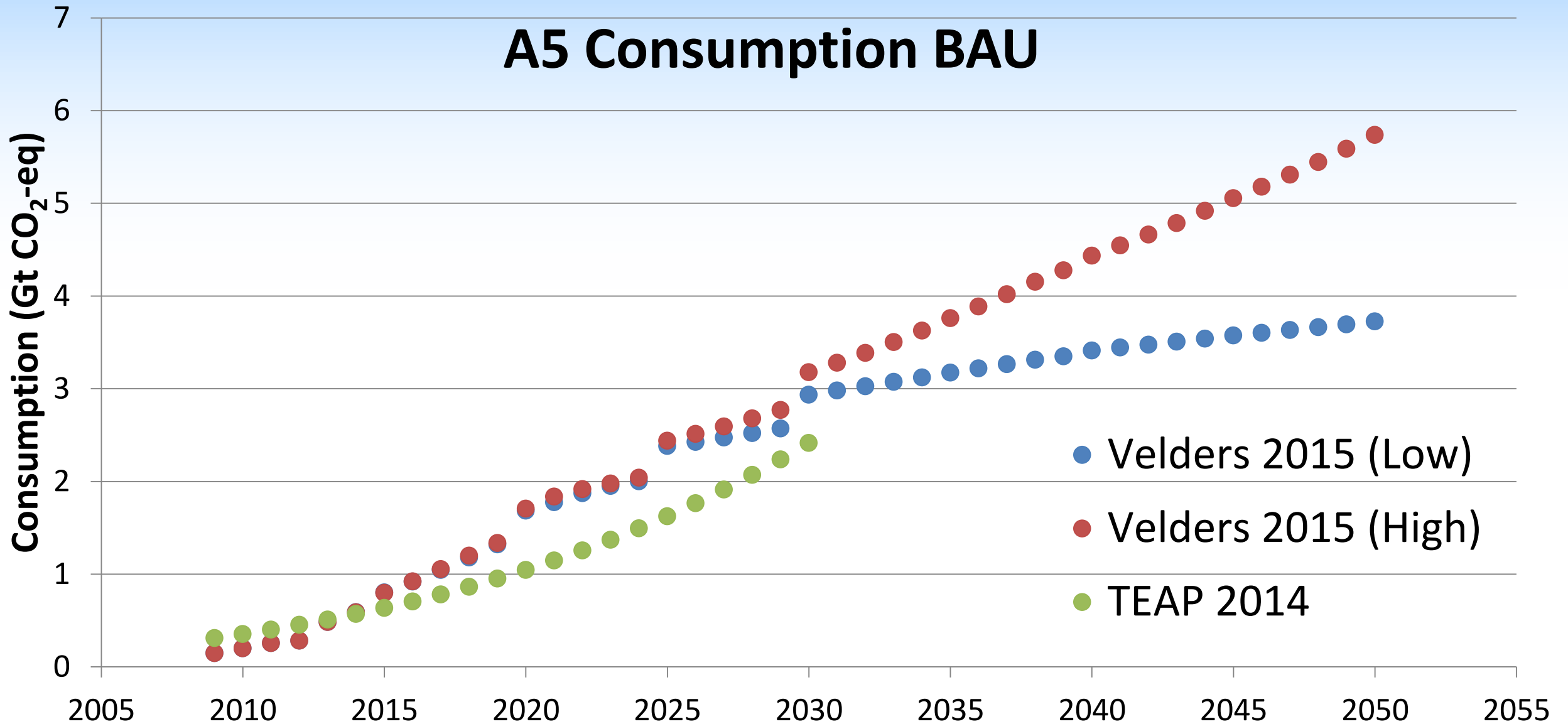
Data & Assumptions—HFCs



From TEAP 2014 Comparative BAU Scenarios for Foam & RAC Applications and Velders et al. 2015 BAU Consumptions, Low & High.

Data & Assumptions—HFCs

A5 Consumption BAU



From TEAP 2014 Comparative BAU Scenarios for Foam & RAC Applications and Velders et al. 2015 BAU Consumptions, Low & High.

Meet IMPACT

INTERACTIVE MONTREAL PROTOCOL AMENDMENT COMPARISON TOOL (IMPACT)

First Amendment: North America
Select Party: A5
 Non-A5
Second Amendment: EU
Select Party: A5
 Non-A5
HFC BAU Case: Low

If "Custom" is selected, continue below:

Custom Step 1: Baseline Entry

Non-A5

HFC Base Period Start: 2011
 HFC Base Period End: 2013
 HFC Fraction: 100
 HCFC Base Period Start: 2011
 HCFC Base Period End: 2013
 HCFC Fraction: 75
 Original HCFC Baseline Fraction:*

A5

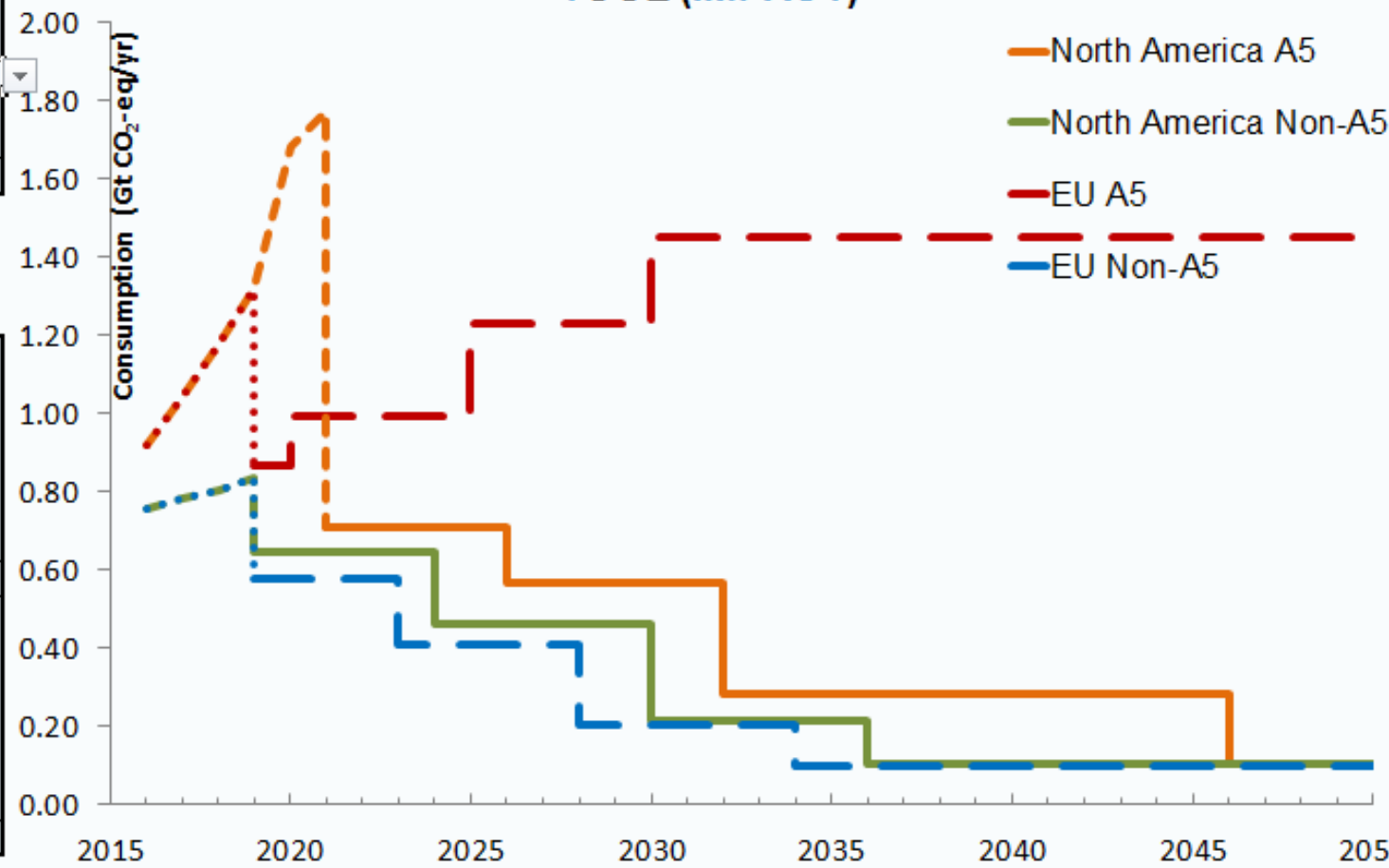
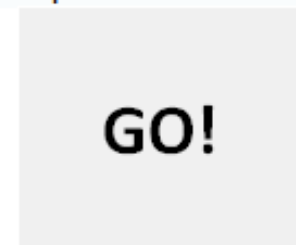
HFC Base Period Start: 2011
 HFC Base Period End: 2013
 HFC Fraction: 100
 HCFC Base Period Start: 2011
 HCFC Base Period End: 2013
 HCFC Fraction: 50
 Original HCFC Baseline Fraction:*

*Non-blank selection negates other HCFC selections

Custom Step 2: Control Schedule Entry

Non-A5			A5		
Step #	Year	Percentage	Step #	Year	Percentage
1	2019	90	1	2021	100
2	2024	65	2	2026	100
3	2030	65	3	2036	100
4	2036	65	4	2041	100
5	2050	65	5	2050	100

Custom Step 3: Press GO!

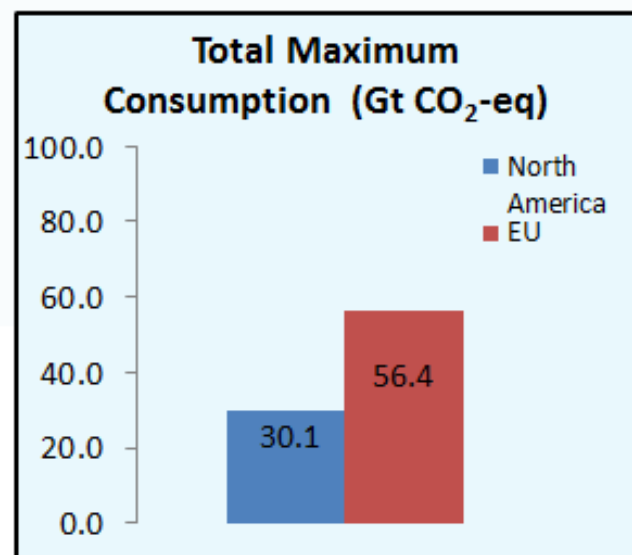


All consumption totals through 2050

North America	Max Consumption
A5	18.5 Gt CO ₂ -eq
Non-A5	11.7 Gt CO ₂ -eq

EU	Max Consumption
A5	46.3 Gt CO ₂ -eq
Non-A5	10.1 Gt CO ₂ -eq

Total Maximum Consumption	
North America	30.1 Gt CO ₂ -eq
EU	56.4 Gt CO ₂ -eq



References

Velders et al, *Future atmospheric abundances and climate forcings from scenarios of global and regional hydrofluorocarbon (HFCs) emissions*. Atmospheric Environment, October 2015.

McFarland, M, *Potential climate benefits of a global cap and reduction agreement for HFCs*. Presentation at 20th meeting of the Parties to the Montreal Protocol, Doha, Qatar, 2008.

Questions?

Email me at ahillbrand@nrdc.org with any questions or concerns.

Tutorial

Step 1: Selecting Amendments

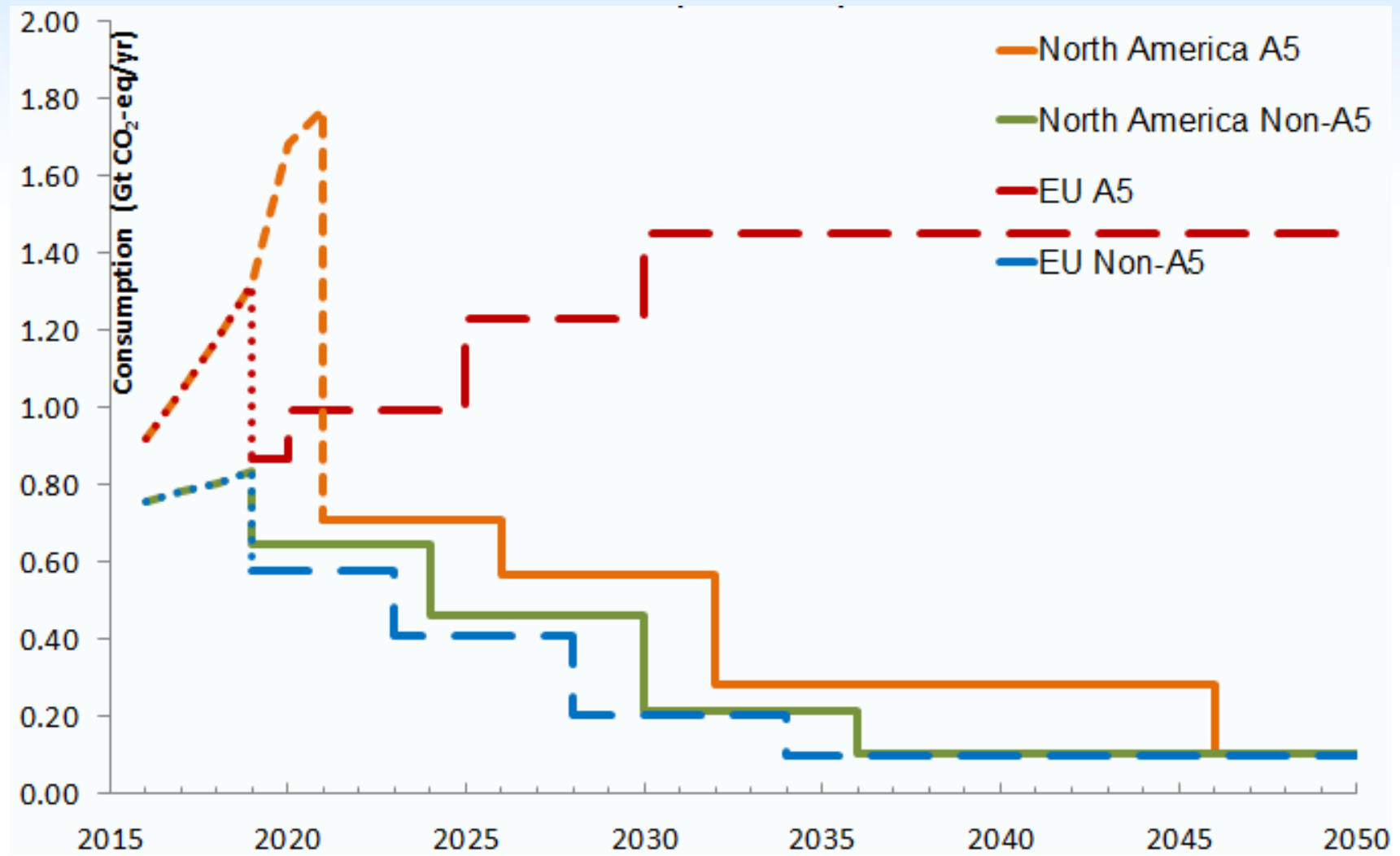
First Amendment: Select Party:	North America Non-A5 A5
Second Amendment: Select Party:	Island States Non-A5 A5
HFC BAU Case:	TEAP

- Use the drop-down menu lists, indicated by blue text, to select one or two amendments for analysis or comparison.
- Select Party schedules: Non-A5, A5 , or both.
- In the HFC BAU Case field, use TEAP or toggle between Velders High or Low HFC projections. National Data may be selected to view national implications of a phasedown if data is provided in the National Party Data tab (this will be explained later).

First Amendment: Select Party:	North America Non-A5
Second Amendment: Select Party:	
HFC BAU Case:	TEAP

Step 2: Viewing the Graph

- The chart prints the annual BAU consumption in small dotted or dashed lines out to the point that the control schedule takes effect.
- The chart prints the control schedule in large dashed or solid lines.
- All units are billion tons CO₂-eq per year of consumption



Step 3: Viewing Outputs

All fields displayed in the boxes are outputs from the analysis, in billion tons of CO₂-eq consumption

- The top two boxes show Non-A5 and A5 Party consumption for the first and second amendment through 2050.
- The third box shows total global consumption through 2050 for each proposal.
- The fourth box graphically represents the total global consumption under each of the proposals.

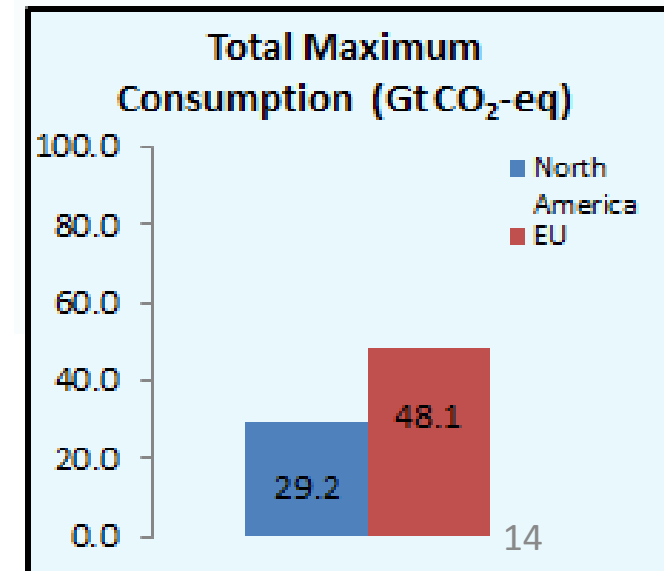
Please note: IMPACT does NOT display consumption savings relative to BAU

All consumption totals through 2050

North America	Max Consumption
A5	18.2 Gt CO ₂ -eq
Non-A5	11.0 Gt CO ₂ -eq

EU	Max Consumption
A5	39.2 Gt CO ₂ -eq
Non-A5	8.9 Gt CO ₂ -eq

Total Maximum Consumption	
North America	29.2 Gt CO ₂ -eq
EU	48.1 Gt CO ₂ -eq



Step 4A: Making a Custom Baseline

- The user can construct and display “custom” control schedules – variations of an existing proposal or a wholly new schedule.
- By selecting ‘Custom’ in Step 1, the user may adjust the baseline with the following fields. You’ll notice that the custom curves instantly update to reflect the new values
- Separate baselines are displayed for Non-A5 and A5 parties. Construct the averaging period by choosing dates in the “Base Period Start” and “End” fields for HFCs and HCFCs. Then select the desired fractions (e.g. 33% of HCFC production in 2010-2030, as shown at right for A5 parties)
- Alternatively, select a fraction of the original HCFC baseline, which negates any other HCFC selections

Custom Step 1: Baseline Entry

Non-A5	
HFC Base Period Start:	2013
HFC Base Period End:	2015
HFC Fraction:	100
HCFC Base Period Start:	2009
HCFC Base Period End:	2009
HCFC Fraction:	100
Original HCFC Baseline Fraction:*	25
A5	
HFC Base Period Start:	2028
HFC Base Period End:	2030
HFC Fraction:	100
HCFC Base Period Start:	2009
HCFC Base Period End:	2010
HCFC Fraction:	32
Original HCFC Baseline Fraction:*	32

Step 4B: Making Custom Control Schedules

Custom Step 2: Control Schedule Entry			Custom Step 3: Press GO!		
Non-A5			A5		
Step #	Year	Percentage	Step #	Year	Percentage
1	2017	100	1	2031	100
2	2021	90	2	2036	85
3	2026	65	3	2039	65
4	2029	30	4	2042	55
5	2035	30	5	2048	15

GO!

- The fields shown above allow the user to choose custom control schedules for Non-A5 and A5 parties
- Blue text indicates drop-down menus that accept user input
- Start at Control Step 1 and set control year and percentage before moving to Control Step 2
- If fewer than Control 5 steps are desired, additional years may be set to the same percentage reduction as the earlier control measure, as shown above for Non-A5 parties
- Changes will not take effect until you press the GO! button on the right

Step 5a: Adding National Data

A user can now add HFC and HCFC consumption data from their country (or as a new BAU case) and see how an amendment would affect the country or region whose data has been added.

- First enter the name of the country (or region).

Enter Country Name:

India

- Then select a party type and add data to both columns at right in GtCO₂-eq. Blue cells indicate data required to evaluate the four existing amendment proposals, while green cells are required if the user plans to make custom amendment proposals with custom baselines. The next page has more detail.

	HFC Consumption	HCFC Consumption	
select party type:	A5	A5	
2009	0.00333754	0.03342	<- Enter all data in GtCO₂-eq
2010	0.00345514	0.033815	
2011	0.00377832	0.031034	DATA REQUIRED TO EVALUATE 4 MAIN AMENDMENTS
2012	0.00391134	0.034573	
2013	0.00785601	0.020402	
2014	0.0109739	0.020402	
2015	0.0182243	0.020402	DATA REQUIRED TO EVALUATE CUSTOM AMENDMENTS
2016	0.0220401	0.020402	
2017	0.0261854	0.020402	
2018	0.0306856	0.020402	
2019	0.0355664	0.020402	
2020	0.0510679	0.020402	
2021	0.055874	0.020402	
2022	0.0610094	0.020402	
2023	0.0664918	0.020402	
2024	0.0723432	0.020402	
2025	0.0925817	0.010926	
2026	0.0979822	0.010926	
2027	0.103661	0.010926	
2028	0.109625	0.010926	
2029	0.1159	0.010926	
2030	0.136086	0.00084	

Step 5b: Adding National Data

- Adding HFC data and forecasts:
 - Enter HFC consumption data as determined by a survey or some other method. If no data is available, and for future years that require forecasting, see the “Velders Lower” and “Velders Higher” tabs within IMPACT to find some national and regional HFC data and forecasts. All values in the Velders tabs are in CO₂-eq tons and must be divided by 1e9 before being entered into the National Data HFC column.
- Adding HCFC data and forecasts:
 - Find national ODS data in the “ODS Consumption” tabs, including annual consumption and 2013 baseline quantities. That data is in ODP tons, so the user should simply multiply the values by the ODP -> GtCO₂-eq conversion shown below when entering annual consumption.

ODP -> GtCO ₂ -eq Conversion	2.09E-05	<- enter custom value (optional)
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Step 5c: Adding National Data

- Add your country's 2013 HCFC baseline in ODP tons:

HCFC baseline (ODP tons) <- enter data

- Add a custom ODP tons -> GtCO₂-eq factor if desired. If left blank the value will default to 2.0905e-5, as calculated in the tab "ODP Conv."

ODP -> GtCO₂-eq Conversion <- enter custom value (optional)

- The 2013 HCFC baseline in GtCO₂-eq will be calculated based on the fraction above.

HCFC baseline (GtCO₂-eq) (calculated result)

- Press Advance to Interface.

Advance to
Interface

Download at:

app.box.com/impact