An equity-based framework for an ambitious phase-down of HFCs under the Montreal Protocol

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Judging on equity & ambition

• Equity
  – Equity – How equal or unequal is consumption of HFCs – past, present and future?
  – Common but differentiated responsibility & capability – Who will do how much and on what basis?
  – No unreasonable burden on any party – How appropriate is the phase-down and the means of implementation?

• Ambition
  – How ambitious is the proposal on reducing HFCs?
  – How ambitious is the proposals in addressing indirect emissions?
  – How enabling is the proposal?
What happens in a business-as-usual (HFC+HCFC)?
## Baselines

<table>
<thead>
<tr>
<th>Article 2 countries</th>
<th>Baselines</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>100% HFC + 75% HCFC for 2011–13</td>
</tr>
<tr>
<td>Island</td>
<td>100% HFC 2011–13 + 10% HCFC baseline</td>
</tr>
<tr>
<td>European</td>
<td>100% HFC 2009–12 + 45 % HCFC 2009–12</td>
</tr>
<tr>
<td>Indian</td>
<td>100% HFC 2013–15 + 25% HCFC baseline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Article 5 countries</th>
<th>Baselines</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>100% HFC + 50% HCFC for 2011–13</td>
</tr>
<tr>
<td>Island</td>
<td>100% HFC 2015–17 + 65% HCFC baseline</td>
</tr>
<tr>
<td>European (Consumption)</td>
<td>Average HFC &amp; HCFC in 2015–16</td>
</tr>
<tr>
<td>Indian</td>
<td>100% HFC 2028–30 + 32.5% HCFC baseline</td>
</tr>
</tbody>
</table>
What does HFC phase-down schedule look like for A2?

![Graph showing HFC phase-down schedule](image)
What does HFC phase-down schedule look like for A5?

![Graph showing phase-down schedule for different regions over the years 2009 to 2048. The x-axis represents years from 2009 to 2048, and the y-axis represents MMTCO2e emissions. Different regions have different phase-down schedules, with North American, Island, European, and Indian regions depicted in distinct colors. Each line shows the reduction in emissions over time, with steeper declines in later years.](image-url)
The Indicators

- The Cap: per capita baseline and baseline as percentage of current consumption
- Consumption: Cumulative consumption and per capita cumulative consumption: 2016-2050
- Ambition: Percentage reduction from BAU
- Energy Efficiency
- Leapfrogging
- Finance and technology transfer
- HFC-23
The Indicators

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Baseline: The HFC Cap

<table>
<thead>
<tr>
<th>Region</th>
<th>A2</th>
<th>A5</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>721</td>
<td>836</td>
</tr>
<tr>
<td>Island</td>
<td>704</td>
<td>1419</td>
</tr>
<tr>
<td>European</td>
<td>612</td>
<td>821</td>
</tr>
<tr>
<td>Indian</td>
<td>838</td>
<td>2669</td>
</tr>
</tbody>
</table>
Per capita cap tells a different story...
Baseline as percentage of 2014 HFCs consumption

North American | Island | European | Indian
---|---|---|---
104 | 101 | 88 | 121
155 | 264 | 153 | 496
The Indicators

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Cumulative HFCs consumption: 2016-2050

<table>
<thead>
<tr>
<th>Region</th>
<th>A2 MMTCO2e</th>
<th>A5 MMTCO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>11282</td>
<td>18784</td>
</tr>
<tr>
<td>Island</td>
<td>8220</td>
<td>21201</td>
</tr>
<tr>
<td>European</td>
<td>8886</td>
<td>21636</td>
</tr>
<tr>
<td>Indian</td>
<td>12241</td>
<td>57411</td>
</tr>
</tbody>
</table>
Per capita cumulative HFCs consumption: 2016-2050

TCO2e

North American | Island | European | Indian
--- | --- | --- | ---
8.9 | 6.5 | 7.0 | 9.7
3.4 | 3.8 | 3.9 | 10.3

A2

A5
The Indicators

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Cap, consumption & reduction....

• North American proposal: Inequitable for A5 and relatively unambitious for A2
• Indian proposal: Most unambitious, but relatively equitable
• European proposal: Ambitious for A2, inequitable for A5
• Micronesia: Most ambitious, but relatively low on equity
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AC Sector: HFC + Efficiency doubles the gain

![Graph showing the comparison of different scenarios for AC sector efficiency.](image-url)
Energy Efficiency

• North American, Indian & European proposals have no provision on energy efficiency
• Micronesian proposal, suggests amending Article 10 of the protocol to provide financial and technological cooperation to promote energy efficiency
• A phase-down proposal must go beyond a mere refrigerant transition – specific and ambitious enabling provisions required
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Leapfrogging - getting off the chemical treadmill

• North American, Indian and European proposals are silent
• Micronesian proposal: Should a party choose to finish the phasedown ahead of schedule, funding for an early compliance shall be made available.
• Proposed amendment must incentivise A5 countries to leapfrog HFCs where viable alternatives are available.
The Indicators

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Finance & technology transfer

• *Status quo* in European and North American proposals

• Micronesian and Indian proposals seeks major changes – Amendment to 10, 10a, full cost of conversion etc.

• Issues to be resolved – cost-effectiveness, incremental costs, IPR & a new matrix to finance low-GWP + energy efficiency
The Indicators

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- HFC-23
HFC-23

• The North American, Micronesian and European proposals seeks to restrict emissions of HFC-23 as a by-product and proposes its destruction. However, silent on finance.

• Indian proposal: Montreal protocol not appropriate to address emissions of HFC 23.

• We need to resolve HFC 23 and banks for an effective climate deal. Financing for destruction is the way ahead.
Way ahead

• Pros and cons in each proposal. But also each has something good to build on.

• The world needs an effective agreement to address HFCs in a manner that allows for maximising climate benefits as well as equitable sharing of the burden of transition.

• We need to develop a deal based on equity and ambition.
Equity Proposal

• Framework for convergence of per capita cumulative consumption of HFCs from 1990 to 2050 between A2 and A5.
• Integrating HCFC phase-out schedule with HFC phase-down
• Ambition at least equal to maximum reductions proposed in the current proposals (about 80 per cent)
80% reduction @5 tonnes per capita HFCs: 1990-2050

<table>
<thead>
<tr>
<th></th>
<th>HFC budget @ 5 tCO₂e/ per capita: 1990-2050 (GtCO₂e)</th>
<th>HFCs consumption: 1990-2014 (GtCO₂e)</th>
<th>Remaining HFCs budget: 2015-2050 (GtCO₂e)</th>
<th>BAU HFCs consumption: 2015-2050 (GtCO₂e)</th>
<th>HCFC budget as per HCFC phase-down schedule: 2015-2050 (GtCO₂e)</th>
<th>Remaining HCFC+HFC budget: 2015-2050 (GtCO₂e)</th>
<th>Reduction from BAU (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>6.3</td>
<td>6.5</td>
<td>-0.2</td>
<td>39.3</td>
<td>0.28</td>
<td>0.1</td>
<td>99.7</td>
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<tr>
<td>A5</td>
<td>27.9</td>
<td>2.7</td>
<td>25.2</td>
<td>124</td>
<td>8.2</td>
<td>33.4</td>
<td>75</td>
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<tr>
<td>Global</td>
<td>34.2</td>
<td>9.2</td>
<td>25</td>
<td>163.3</td>
<td>8.45</td>
<td>33.5</td>
<td>80</td>
</tr>
</tbody>
</table>
55% reduction @12 tonnes per capita HFCs: 1990-2050

<table>
<thead>
<tr>
<th></th>
<th>HFC budget @ 12 tCO₂e/ per capita: 1990-2050 (GtCO₂e)</th>
<th>HFCs consumption: 1990-2014 (GtCO₂e)</th>
<th>Remaining HFCs budget: 2015-2050 (GtCO₂e)</th>
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<tbody>
<tr>
<td>A2</td>
<td>15</td>
<td>6.5</td>
<td>8.5</td>
<td>39.3</td>
<td>0.28</td>
<td>8.8</td>
<td>77</td>
</tr>
<tr>
<td>A5</td>
<td>67</td>
<td>2.7</td>
<td>64.3</td>
<td>124</td>
<td>8.2</td>
<td>72.5</td>
<td>45</td>
</tr>
<tr>
<td>Global</td>
<td>82</td>
<td>9.2</td>
<td>72.8</td>
<td>163.3</td>
<td>8.45</td>
<td>81.3</td>
<td>53</td>
</tr>
</tbody>
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CSE framework

• Waiving off historical consumption of HFCs (1990-2014: 6.5 GtCO2e) in A2 countries in lieu of finance and technology support to the A5 countries

• Equal per capita cumulative consumption of refrigerants (HFC+HCFC) from 2016 to 2050 in A2 and A5 countries – converge at 5.5 tCO2e

• Integrating HCFC phase-out schedule with HFC phase-down (HCFC consumption as CO2e remain the same as phase-out schedule)
Cumulative HFCs consumption: 2016-2050

- North American: 11282 (A2), 18784 (A5)
- Island: 8220 (A2), 21201 (A5)
- European: 8886 (A2), 21636 (A5)
- Indian: 12241 (A2), 57411 (A5)
- CSE's framework: 6712 (A2), 23223 (A5)
Percentage reduction in HFCs from BAU

- North American: A2 71, A5 85, Global 81
- Island: A2 79, A5 83, Global 82
- European: A2 77, A5 82, Global 81
- Indian: A2 68, A5 53, Global 57
- CSE’s framework: A2 83, A5 81, Global 82
Cumulative per capita (HFC+HCFC) consumption: 2016-2050

North American: 9.1
Island: 6.7
European: 7.2
Indian: 9.9
CSE's framework: 5.5

A2
A5
Converging at 5.5 tCO2e (HFC+HCFC): 2016-2050
Finance & Technology

• Waiving off 6.5 GtCO2e historical consumption of HFCs in A2 countries is at least equivalent to US $65 billion – 20 times the amount the A2 countries have transferred to MLF so far.

• Enough to pay for real transition
  – Incentivizing leapfrog and paying for transition
  – Pay for energy efficiency improvements at least double of the baseline
  – Pay for destruction of HFC 23 and Banks
  – R&D in not-in-kind technologies, capacity building, servicing sector etc.