Update on Kigali Amendment to the Montreal Protocol

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Montreal Protocol on Substances that Deplete the Ozone Layer

- First established in 1987
  - 197 signatories – universal ratification
  - Two groups of parties: Article 5 Parties and non-Article 5 Parties
- The Montreal Protocol is phasing out ozone-depleting substances (ODS) used in sectors such as refrigeration, air-conditioning, aerosols, foam blowing, and fire suppression
  - Global phase out of chlorofluorocarbons (CFCs) and halons was completed in 2010
- Hydrochlorofluorocarbons (HCFCs) phase out currently underway
HFCs: Why use the Montreal Protocol to phase down HFCs

- Hydrofluorocarbons (HFCs) are potent GHGs and used in all the same sectors as ODS
  - Hundreds to thousands times the GWP of CO$_2$
  - Growth in HFCs directly tied to ODS phase out as well as expansion of cooling technologies
- Montreal Protocol is a successful global agreement
  - Appropriate sector expertise
    - Technical bodies that support the Protocol and relevant country experts
  - Effective financial mechanism
    - Uses incremental cost model that has worked in these sectors
### Kigali Amendment to the Montreal Protocol (October 15, 2016)

- Avoids over 80 billion metric tons of carbon dioxide equivalent cumulatively through 2050
- Phasedown, not a phase out, of HFCs

<table>
<thead>
<tr>
<th></th>
<th>A5 Group 1</th>
<th>A5 Group 2</th>
<th>A2</th>
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</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>2020-2022</td>
<td>2024-2026</td>
<td>2011-2013</td>
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<tr>
<td><strong>Formula</strong></td>
<td>Average HFC</td>
<td>Average HFC</td>
<td>Average HFC</td>
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<td></td>
<td>consumption</td>
<td>consumption</td>
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<tr>
<td><strong>HCFC</strong></td>
<td>65% baseline</td>
<td>65% baseline</td>
<td>15% baseline*</td>
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<tr>
<td><strong>Freeze</strong></td>
<td>2024</td>
<td>2028</td>
<td>-</td>
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<tr>
<td><strong>1st step</strong></td>
<td>2029 – 10%</td>
<td>2032 – 10%</td>
<td>2019 – 10%</td>
</tr>
<tr>
<td><strong>2nd step</strong></td>
<td>2035 – 30%</td>
<td>2037 – 20%</td>
<td>2024 – 40%</td>
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<tr>
<td><strong>3rd step</strong></td>
<td>2040 – 50%</td>
<td>2042 – 30%</td>
<td>2029 – 70%</td>
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<td><strong>4th step</strong></td>
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<td>2034 – 80%</td>
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<tr>
<td><strong>Plateau</strong></td>
<td>2045 – 80%</td>
<td>2047 – 85%</td>
<td>2036 – 85%</td>
</tr>
</tbody>
</table>

*For Belarus, Russian Federation, Kazakhstan, Tajikistan, Uzbekistan 25% HCFC component of baseline and different initial two steps (1) 5% reduction in 2020 and (2) 35% reduction in 2025
Notes:
- Group 1: Article 5 parties not part of Group 2; Group 2: GCC, India, Iran, Iraq, Pakistan
- Technology review in 2022 and every 5 years; Technology review 4-5 years before 2028 to consider the compliance deferral of 2 years from the freeze of 2028 of Article 5 Group 2 to address growth in relevant sectors above certain threshold.
Kigali Amendment to the Montreal Protocol

- The HFC phasedown is expected to avoid up to 0.5 degree Celsius of global temperature rise by 2100, while continuing to protect the ozone layer (Source: Ozone Secretariat)