

**Decision XXVIII/1: Further Amendment of the Montreal Protocol**

To adopt, in accordance with the procedure laid down in paragraph 4 of Article 9 of the Vienna Convention for the Protection of the Ozone Layer, the Amendment to the Montreal Protocol set out in annex 1 to the report of the Twenty-Eighth Meeting of the Parties;

# Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer

## Article I: Amendment

### *Article 1, paragraph 4*

In paragraph 4 of Article 1 of the Protocol, for the words:

“Annex C or Annex E”

there shall be substituted:

“Annex C, Annex E or Annex F”

### *Article 2, paragraph 5*

In paragraph 5 of Article 2 of the Protocol, for the words:

“and Article 2H”

there shall be substituted:

“Articles 2H and 2J”

### *Article 2, paragraphs 8 (a), 9 (a) and 11*

In paragraphs 8 (a) and 11 of Article 2 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

The following words shall be added at the end of subparagraph (a) of paragraph 8 of Article 2 of the Protocol:

“Any such agreement may be extended to include obligations respecting consumption or production under Article 2J provided that the total combined calculated level of consumption or production of the Parties concerned does not exceed the levels required by Article 2J.”

In subparagraph (a) (i) of paragraph 9 of Article 2 of the Protocol, after the second use of the words:

“should be;”

there shall be deleted:

“and”

Subparagraph (a) (ii) of paragraph 9 of Article 2 of the Protocol shall be renumbered as subparagraph (a) (iii).

The following shall be added as subparagraph (a) (ii) after subparagraph (a) (i) of paragraph 9 of Article 2 of the Protocol:

“Adjustments to the global warming potentials specified in Group I of Annex A, Annex C and Annex F should be made and, if so, what the adjustments should be; and”

### *Article 2J*

The following Article shall be inserted after Article 2I of the Protocol:

“Article 2J: Hydrofluorocarbons

1. Each Party shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of

consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO<sub>2</sub> equivalents:

- (a) 2019 to 2023: 90 per cent
  - (b) 2024 to 2028: 60 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
2. Notwithstanding paragraph 1 of this Article, the Parties may decide that a Party shall ensure that, for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of consumption of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of consumption of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its calculated level of consumption of Annex C, Group I, controlled substances as set out in paragraph 1 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2020 to 2024: 95 per cent
  - (b) 2025 to 2028: 65 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
3. Each Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2019, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus fifteen per cent of its calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2019 to 2023: 90 per cent
  - (b) 2024 to 2028: 60 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent
4. Notwithstanding paragraph 3 of this Article, the Parties may decide that a Party producing the controlled substances in Annex F shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its calculated level of production of the controlled substances in Annex F, expressed in CO<sub>2</sub> equivalents, does not exceed the percentage, set out for the respective range of years specified in subparagraphs (a) to (e) below, of the annual average of its calculated levels of production of Annex F controlled substances for the years 2011, 2012 and 2013, plus twenty-five per cent of its calculated level of production of Annex C, Group I, controlled substances as set out in paragraph 2 of Article 2F, expressed in CO<sub>2</sub> equivalents:
- (a) 2020 to 2024: 95 per cent
  - (b) 2025 to 2028: 65 per cent
  - (c) 2029 to 2033: 30 per cent
  - (d) 2034 to 2035: 20 per cent
  - (e) 2036 and thereafter: 15 per cent

5. Paragraphs 1 to 4 of this Article will apply save to the extent that the Parties decide to permit the level of production or consumption that is necessary to satisfy uses agreed by the Parties to be exempted uses.
6. Each Party manufacturing Annex C, Group I, or Annex F substances shall ensure that for the twelve-month period commencing on 1 January 2020, and in each twelve-month period thereafter, its emissions of Annex F, Group II, substances generated in each production facility that manufactures Annex C, Group I, or Annex F substances are destroyed to the extent practicable using technology approved by the Parties in the same twelve-month period.
7. Each Party shall ensure that any destruction of Annex F, Group II, substances generated by facilities that produce Annex C, Group I, or Annex F substances shall occur only by technologies approved by the Parties.

*Article 3*

The preamble to Article 3 of the Protocol should be replaced with the following:

“1. For the purposes of Articles 2, 2A to 2J and 5, each Party shall, for each group of substances in Annex A, Annex B, Annex C, Annex E or Annex F, determine its calculated levels of:”

For the final semi-colon of subparagraph (a) (i) of Article 3 of the Protocol there shall be substituted:

“, except as otherwise specified in paragraph 2;”

The following text shall be added to the end of Article 3 of the Protocol:

“; and

(d) Emissions of Annex F, Group II, substances generated in each facility that generates Annex C, Group I, or Annex F substances by including, among other things, amounts emitted from equipment leaks, process vents and destruction devices, but excluding amounts captured for use, destruction or storage.

2. When calculating levels, expressed in CO<sub>2</sub> equivalents, of production, consumption, imports, exports and emissions of Annex F and Annex C, Group I, substances for the purposes of Article 2J, paragraph 5 of Article 2 and paragraph 1 (d) of Article 3, each Party shall use the global warming potentials of those substances specified in Group I of Annex A, Annex C and Annex F.”

*Article 4, paragraph 1 sept*

The following paragraph shall be inserted after paragraph 1 *sex* of Article 4 of the Protocol:

“1 *sept*. Upon entry into force of this paragraph, each Party shall ban the import of the controlled substances in Annex F from any State not Party to this Protocol.”

*Article 4, paragraph 2 sept*

The following paragraph shall be inserted after paragraph 2 *sex* of Article 4 of the Protocol:

“2 *sept*. Upon entry into force of this paragraph, each Party shall ban the export of the controlled substances in Annex F to any State not Party to this Protocol.”

*Article 4, paragraphs 5, 6 and 7*

In paragraphs 5, 6 and 7 of Article 4 of the Protocol, for the words:

“Annexes A, B, C and E”

there shall be substituted:

“Annexes A, B, C, E and F”

*Article 4, paragraphs 8*

In paragraph 8 of Article 4 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

*Article 4B*

The following paragraph shall be inserted after paragraph 2 of Article 4B of the Protocol:

“2 *bis*. Each Party shall, by 1 January 2019 or within three months of the date of entry into force of this paragraph for it, whichever is later, establish and implement a system for licensing the import and export of new, used, recycled and reclaimed controlled substances in Annex F. Any Party operating under paragraph 1 of Article 5 that decides it is not in a position to establish and implement such a system by 1 January 2019 may delay taking those actions until 1 January 2021.”

*Article 5*

In paragraph 4 of Article 5 of the Protocol, for the word:

“2I”

there shall be substituted:

“2J”

In paragraphs 5 and 6 of Article 5 of the Protocol, for the words:

“Article 2I”

there shall be substituted:

“Articles 2I and 2J”

In paragraph 5 of Article 5 of the Protocol, before the words:

“any control measures”

there shall be inserted:

“with”

The following paragraph shall be inserted after paragraph 8 *ter* of Article 5 of the Protocol:

“8 *qua*

(a) Each Party operating under paragraph 1 of this Article, subject to any adjustments made to the control measures in Article 2J in accordance with paragraph 9 of Article 2, shall be entitled to delay its compliance with the control measures set out in subparagraphs (a) to (e) of paragraph 1 of Article 2J and subparagraphs (a) to (e) of paragraph 3 of Article 2J and modify those measures as follows:

- (i) 2024 to 2028: 100 per cent
- (ii) 2029 to 2034: 90 per cent
- (iii) 2035 to 2039: 70 per cent
- (iv) 2040 to 2044: 50 per cent
- (v) 2045 and thereafter: 20 per cent

(b) Notwithstanding subparagraph (a) above, the Parties may decide that a Party operating under paragraph 1 of this Article, subject to any adjustments made to the control measures in Article 2J in accordance with paragraph 9 of Article 2, shall be entitled to delay its compliance with the control measures set out in subparagraphs (a) to (e) of paragraph 1 of Article 2J and subparagraphs (a) to (e) of paragraph 3 of Article 2J and modify those measures as follows:

- (i) 2028 to 2031: 100 per cent
- (ii) 2032 to 2036: 90 per cent
- (iii) 2037 to 2041: 80 per cent
- (iv) 2042 to 2046: 70 per cent
- (v) 2047 and thereafter: 15 per cent

(c) Each Party operating under paragraph 1 of this Article, for the purposes of calculating its consumption baseline under Article 2J, shall be entitled to use the average of its calculated levels of consumption of Annex F controlled substances for the years 2020, 2021 and 2022,

plus sixty-five per cent of its baseline consumption of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(d) Notwithstanding subparagraph (c) above, the Parties may decide that a Party operating under paragraph 1 of this Article, for the purposes of calculating its consumption baseline under Article 2J, shall be entitled to use the average of its calculated levels of consumption of Annex F controlled substances for the years 2024, 2025 and 2026, plus sixty-five per cent of its baseline consumption of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(e) Each Party operating under paragraph 1 of this Article and producing the controlled substances in Annex F, for the purposes of calculating its production baseline under Article 2J, shall be entitled to use the average of its calculated levels of production of Annex F controlled substances for the years 2020, 2021 and 2022, plus sixty-five per cent of its baseline production of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(f) Notwithstanding subparagraph (e) above, the Parties may decide that a Party operating under paragraph 1 of this Article and producing the controlled substances in Annex F, for the purposes of calculating its production baseline under Article 2J, shall be entitled to use the average of its calculated levels of production of Annex F controlled substances for the years 2024, 2025 and 2026, plus sixty-five per cent of its baseline production of Annex C, Group I, controlled substances as set out in paragraph 8 *ter* of this Article.

(g) Subparagraphs (a) to (f) of this paragraph will apply to calculated levels of production and consumption save to the extent that a high-ambient-temperature exemption applies based on criteria decided by the Parties.”

#### *Article 6*

In Article 6 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

#### *Article 7, paragraphs 2, 3 and 3 ter*

The following line shall be inserted after the line that reads “– in Annex E, for the year 1991,” in paragraph 2 of Article 7 of the Protocol:

“– in Annex F, for the years 2011 to 2013, except that Parties operating under paragraph 1 of Article 5 shall provide such data for the years 2020 to 2022, but those Parties operating under paragraph 1 of Article 5 to which subparagraphs (d) and (f) of paragraph 8 *qua* of Article 5 applies shall provide such data for the years 2024 to 2026;”

In paragraphs 2 and 3 of Article 7 of the Protocol, for the words:

“C and E”

there shall be substituted:

“C, E and F”

The following paragraph shall be added to Article 7 of the Protocol after paragraph 3 *bis*:

“3 *ter*. Each Party shall provide to the Secretariat statistical data on its annual emissions of Annex F, Group II, controlled substances per facility in accordance with paragraph 1 (d) of Article 3 of the Protocol.”

#### *Article 7, paragraph 4*

In paragraph 4 of Article 7, after the words:

“statistical data on” and “provides data on”

there shall be added:

“production,”

*Article 10, paragraph 1*

In paragraph 1 of Article 10 of the Protocol, for the words:

“and Article 2I”

There shall be substituted:

“, Article 2I and Article 2J”

The following shall be inserted at the end of paragraph 1 of Article 10 of the Protocol:

“Where a Party operating under paragraph 1 of Article 5 chooses to avail itself of funding from any other financial mechanism that could result in meeting any part of its agreed incremental costs, that part shall not be met by the financial mechanism under Article 10 of this Protocol.”

*Article 17*

In Article 17 of the Protocol, for the words:

“Articles 2A to 2I”

there shall be substituted:

“Articles 2A to 2J”

*Annex A*

The following table shall replace the table for Group I in Annex A to the Protocol:

Group	Substance	Ozone-Depleting Potential*	100-Year Global Warming Potential
<i>Group I</i>			
CFCl <sub>3</sub>	(CFC-11)	1.0	4,750
CF <sub>2</sub> Cl <sub>2</sub>	(CFC-12)	1.0	10,900
C <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub>	(CFC-113)	0.8	6,130
C <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub>	(CFC-114)	1.0	10,000
C <sub>2</sub> F <sub>5</sub> Cl	(CFC-115)	0.6	7,370

*Annex C and Annex F*

The following table shall replace the table for Group I in Annex C to the Protocol:

Group	Substance	Number of isomers	Ozone-Depleting Potential*	100-Year Global Warming Potential***
<i>Group I</i>				
CHFCl <sub>2</sub>	(HCFC-21)**	1	0.04	151
CHF <sub>2</sub> Cl	(HCFC-22)**	1	0.055	1810
CH <sub>2</sub> FCI	(HCFC-31)	1	0.02	
C <sub>2</sub> HFCl <sub>4</sub>	(HCFC-121)	2	0.01–0.04	
C <sub>2</sub> HF <sub>2</sub> Cl <sub>3</sub>	(HCFC-122)	3	0.02–0.08	
C <sub>2</sub> HF <sub>3</sub> Cl <sub>2</sub>	(HCFC-123)	3	0.02–0.06	77
CHCl <sub>2</sub> CF <sub>3</sub>	(HCFC-123)**	–	0.02	
C <sub>2</sub> HF <sub>4</sub> Cl	(HCFC-124)	2	0.02–0.04	609
CHFClCF <sub>3</sub>	(HCFC-124)**	–	0.022	
C <sub>2</sub> H <sub>2</sub> FCI <sub>3</sub>	(HCFC-131)	3	0.007–0.05	
C <sub>2</sub> H <sub>2</sub> F <sub>2</sub> Cl <sub>2</sub>	(HCFC-132)	4	0.008–0.05	
C <sub>2</sub> H <sub>2</sub> F <sub>3</sub> Cl	(HCFC-133)	3	0.02–0.06	
C <sub>2</sub> H <sub>3</sub> FCI <sub>2</sub>	(HCFC-141)	3	0.005–0.07	
CH <sub>3</sub> CFCl <sub>2</sub>	(HCFC-141b)**	–	0.11	725
C <sub>2</sub> H <sub>3</sub> F <sub>2</sub> Cl	(HCFC-142)	3	0.008–0.07	
CH <sub>3</sub> CF <sub>2</sub> Cl	(HCFC-142b)**	–	0.065	2310
C <sub>2</sub> H <sub>4</sub> FCI	(HCFC-151)	2	0.003–0.005	

C <sub>3</sub> HFCl <sub>6</sub>	(HCFC-221)	5	0.015–0.07	
C <sub>3</sub> HF <sub>2</sub> Cl <sub>5</sub>	(HCFC-222)	9	0.01–0.09	
C <sub>3</sub> HF <sub>3</sub> Cl <sub>4</sub>	(HCFC-223)	12	0.01–0.08	
C <sub>3</sub> HF <sub>4</sub> Cl <sub>3</sub>	(HCFC-224)	12	0.01–0.09	
C <sub>3</sub> HF <sub>5</sub> Cl <sub>2</sub>	(HCFC-225)	9	0.02–0.07	
CF <sub>3</sub> CF <sub>2</sub> CHCl <sub>2</sub>	(HCFC-225ca)**	–	0.025	122
CF <sub>2</sub> ClCF <sub>2</sub> CHClF	(HCFC-225cb)**	–	0.033	595
C <sub>3</sub> HF <sub>6</sub> Cl	(HCFC-226)	5	0.02–0.10	
C <sub>3</sub> H <sub>2</sub> FCl <sub>5</sub>	(HCFC-231)	9	0.05–0.09	
C <sub>3</sub> H <sub>2</sub> F <sub>2</sub> Cl <sub>4</sub>	(HCFC-232)	16	0.008–0.10	
C <sub>3</sub> H <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub>	(HCFC-233)	18	0.007–0.23	
C <sub>3</sub> H <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub>	(HCFC-234)	16	0.01–0.28	
C <sub>3</sub> H <sub>2</sub> F <sub>5</sub> Cl	(HCFC-235)	9	0.03–0.52	
C <sub>3</sub> H <sub>3</sub> FCl <sub>4</sub>	(HCFC-241)	12	0.004–0.09	
C <sub>3</sub> H <sub>3</sub> F <sub>2</sub> Cl <sub>3</sub>	(HCFC-242)	18	0.005–0.13	
C <sub>3</sub> H <sub>3</sub> F <sub>3</sub> Cl <sub>2</sub>	(HCFC-243)	18	0.007–0.12	
C <sub>3</sub> H <sub>3</sub> F <sub>4</sub> Cl	(HCFC-244)	12	0.009–0.14	
C <sub>3</sub> H <sub>4</sub> FCl <sub>3</sub>	(HCFC-251)	12	0.001–0.01	
C <sub>3</sub> H <sub>4</sub> F <sub>2</sub> Cl <sub>2</sub>	(HCFC-252)	16	0.005–0.04	
C <sub>3</sub> H <sub>4</sub> F <sub>3</sub> Cl	(HCFC-253)	12	0.003–0.03	
C <sub>3</sub> H <sub>5</sub> FCl <sub>2</sub>	(HCFC-261)	9	0.002–0.02	
C <sub>3</sub> H <sub>5</sub> F <sub>2</sub> Cl	(HCFC-262)	9	0.002–0.02	
C <sub>3</sub> H <sub>6</sub> FCl	(HCFC-271)	5	0.001–0.03	

\* Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

\*\* Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.

\*\*\* For substances for which no GWP is indicated, the default value 0 applies until a GWP value is included by means of the procedure foreseen in paragraph 9 (a) (ii) of Article 2.

The following annex shall be added to the Protocol after Annex E:

*"Annex F: Controlled substances*

Group	Substance	100-Year Global Warming Potential
<i>Group I</i>		
CHF <sub>2</sub> CHF <sub>2</sub>	HFC-134	1,100
CH <sub>2</sub> FCF <sub>3</sub>	HFC-134a	1,430
CH <sub>3</sub> FCHF <sub>2</sub>	HFC-143	353
CHF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	HFC-245fa	1,030
CF <sub>3</sub> CH <sub>2</sub> CF <sub>2</sub> CH <sub>3</sub>	HFC-365mfc	794
CF <sub>3</sub> CHFCF <sub>3</sub>	HFC-227ea	3,220
CH <sub>2</sub> FCF <sub>2</sub> CF <sub>3</sub>	HFC-236cb	1,340
CHF <sub>2</sub> CHFCF <sub>3</sub>	HFC-236ea	1,370
CF <sub>3</sub> CH <sub>2</sub> CF <sub>3</sub>	HFC-236fa	9,810
CH <sub>2</sub> FCF <sub>2</sub> CHF <sub>2</sub>	HFC-245ca	693
CF <sub>3</sub> CHFCF <sub>2</sub> CF <sub>3</sub>	HFC-43-10mee	1,640
CH <sub>2</sub> F <sub>2</sub>	HFC-32	675
CHF <sub>2</sub> CF <sub>3</sub>	HFC-125	3,500
CH <sub>3</sub> CF <sub>3</sub>	HFC-143a	4,470
CH <sub>3</sub> F	HFC-41	92

CH <sub>2</sub> FCH <sub>2</sub> F	HFC-152	53
CH <sub>3</sub> CHF <sub>2</sub>	HFC-152a	124
<i>Group II</i>		
CHF <sub>3</sub>	HFC-23	14,800

**Article II: Relationship to the 1999 Amendment**

No State or regional economic integration organization may deposit an instrument of ratification, acceptance or approval of or accession to this Amendment unless it has previously, or simultaneously, deposited such an instrument to the Amendment adopted at the Eleventh Meeting of the Parties in Beijing, 3 December 1999.

**Article III: Relationship to the United Nations Framework Convention on Climate Change and its Kyoto Protocol**

This Amendment is not intended to have the effect of excepting hydrofluorocarbons from the scope of the commitments contained in Articles 4 and 12 of the United Nations Framework Convention on Climate Change or in Articles 2, 5, 7 and 10 of its Kyoto Protocol.

**Article IV: Entry into force**

1. Except as noted in paragraph 2, below, this Amendment shall enter into force on 1 January 2019, provided that at least twenty instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.
2. The changes to Article 4 of the Protocol, Control of trade with non-Parties, set out in Article I of this Amendment shall enter into force on 1 January 2033, provided that at least seventy instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.
3. For purposes of paragraphs 1 and 2, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.
4. After the entry into force of this Amendment, as provided under paragraphs 1 and 2, it shall enter into force for any other Party to the Protocol on the ninetieth day following the date of deposit of its instrument of ratification, acceptance or approval.

**Article V: Provisional application**

Any Party may, at any time before this Amendment enters into force for it, declare that it will apply provisionally any of the control measures set out in Article 2J, and the corresponding reporting obligations in Article 7, pending such entry into force.