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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eightieth Meeting
Montreal, 13 – 17 November 2017

OVERALL ANALYSIS OF THE RESULTS OF THE SURVEYS OF ODS ALTERNATIVES (DECISION 79/42(C))

Background

1. At its 74th and 75th meeting, the Executive Committee approved US $8.76 million for national surveys on ODS alternatives in 127 countries in line with decision XXVI/9 of the Meeting of the Parties,[1] with an overall analysis of the results of the surveys to be presented for consideration of the Executive Committee by its first meeting in 2017. The Executive Committee also noted the format[2] for the preparation of surveys of ODS alternatives (decision 75/67).

2. The Secretariat presented to the 78th meeting, preliminary results of surveys of ODS alternatives from 30 Article countries focusing only on HFC consumption.[3] Subsequent to a discussion, the Executive Committee urged bilateral and implementing agencies to work with relevant Article 5 countries to complete and submit, no later than 8 May 2017, as many ODS alternatives survey reports as possible, and to return to the 81st meeting unspent balances for those reports that had not been submitted to either the 79th or 80th meetings (decision 78/2).

3. At the 79th meeting, the Secretariat submitted an overview of the 57 surveys on ODS alternatives that were submitted prior to 8 May 2017. Subsequent to a discussion, the Executive Committee decided, *inter alia,* to request the Secretariat to submit, to the 80th meeting, an overall analysis of the results of the surveys of ODS alternatives, updated to include all surveys submitted to the Secretariat by 18 September 2017 (decision 79/43).

[1] In paragraph 4 of decision XXVI/9, the Parties requested the Executive Committee to consider providing additional funding to conduct inventories or surveys on alternatives to ODS in interested Article 5 parties.

[2] The format of the surveys is contained in UNEP/OzL.Pro/ExCom/75/77/Rev.1. The Secretariat prepared a Guide for preparation of the surveys of ODS alternatives (MLF/IACM.2016/2/21), based on the format noted by the Committee, and distributed to bilateral and implementing agencies to facilitate data collection and reporting.

[3] UNEP/OzL.Pro/ExCom/78/4 and Corr.1.

Scope of the document

4. This document presents an overview of the 119 reports[4] on surveys on ODS alternatives that were submitted by 18 September 2017 (out of 127 approved). It describes the methodology followed by the countries in collecting and analysing data; it presents an analysis of the results of the survey, compared to findings of the TEAP study under decisions XXV/5 and XXVI/9 of the Parties that included information on global HFC use;[5] and it presents findings and observations resulting from the review of the reports. It also presents information on alternatives to ODS, particularly related to HFCs and the distribution of the consumption by sector and subsector; and a forecast of the consumption up to 2030; conclusions, and lessons from the surveys that can be used for future actions relating to HFCs.

5. The document also contains the following annexes:

Annex I Information on HFC consumption from surveys on ODS alternatives from 119 Article 5 countries

Annex II Article 5 countries with approved funding to conduct surveys on ODS alternatives

6. This document is prepared in response to decisions 74/53(h) and 79/43. The analysis done by the Secretariat was based only on the information provided in the submissions. Many of the reports were submitted only at the deadline of 18 September 2017. However, some clarifications to address data inconsistencies were required after this date, limiting the time available to the Secretariat for its analysis. Therefore, the Secretariat was only able to ensure consistency within each individual country report; verification of the accuracy and quality of the HFC consumption data provided could not be undertaken. Further, the HFC consumption trends, drivers affecting HFC growth and the methodology for projecting HFC consumption were not analyzed at the country level.

Overview of reports on surveys on ODS alternatives

7. The Executive Committee approved funding for undertaking ODS alternatives surveys for 127 Article 5 countries; 28 countries in Latin America and the Caribbean region, 48 countries in Africa, 11 countries in Eastern Europe, eight countries in West Asia, and 32 countries in Asia and the Pacific region. The survey covered 46 non-LVC and 81 LVC countries.

8. The 119 Article 5 countries that submitted reports up to the 80th meeting, followed a combination of top-down and bottom-up approach in collecting data on ODS alternatives. National Ozone Units (NOUs), together with bilateral and implementing agencies, developed methodologies for data collection and analysis (e.g., several countries prepared structured questionnaires that were distributed to stakeholders). The data was consolidated and cross-checked, and an analysis was carried out to present, *inter alia*, the market structure of supply of ODS alternatives; consumption of ODS alternatives by applications, and consumption trends (2016 to 2020/2030); and an overview of policy and regulatory framework relating to ODS alternatives were provided.

9. Based on the analysis of the information presented in the 119 reports, the following observations are relevant:

(a) Limited information was provided on the status of policies and regulations, standards for handling refrigerants, and imports of other non-HFC alternatives. Twenty-seven (16 LVC

[4] Reports were not submitted for Algeria, Antigua and Barbuda, Bahamas, Democratic People's Republic of Korea, Fiji, India, Morocco and Myanmar; funding for the ODS alternatives survey for India was returned to the Multilateral Fund.

[5] TEAP Task Force Report – Additional information on alternatives to ODS.

and 11 non-LVC) countries reported having a licensing system for ODS alternatives, and 56 (41 LVC and 15 non-LVC) countries are amending their licensing systems to include HFCs. Thirty countries require permits/licenses for HFC imports; and 28 countries require that importers provide information on imports of non-ODS alternatives on a voluntary basis. In certain countries, the European Union regulations have contributed to the adoption of HFO-based technologies;

(b) Several reports provided data for all alternative substances used in the country, including HFCs (pure or contained in blends); HFOs; hydrocarbon (HC)-based (reported as HC, propane (R-290), isobutane (R-600a), propane/butane blend, pentane, and cyclopentane); ammonia (R-717); and CO_2 (R-744). However, other reports submitted data only related to HFCs. Except for HFCs, some reported alternative substances which are used in many applications not related to industrial processes where ODS are used (e.g., HCs may also be used for heating and cooking applications). It was, therefore, not possible to ascertain whether the reported amounts of these alternative substances were entirely used as replacement of ODS, or for non-ODS use applications. For this reason, the analysis presented below focuses mainly on HFCs;

(c) Consumption was not disaggregated by sub-sector and application in refrigeration and air-conditioning (RAC) sector and hence, analysis at disaggregated level could not be provided;

(d) The use of some substances was reported incorrectly in certain applications (e.g., R-404A, HFC-32, R-410A, R-407C, R-401A were reported in the mobile air-conditioning (MAC) subsector);

(e) Forecast of ODS alternatives was provided in 112 reports (73 LVC and 39 non-LVC) out of the 119 countries. The forecast methodology used varied by country; and projections were based on sector/substance level growth, economic growth, overall growth of non-ODS or a linear growth. In some cases, the forecast was made annually to 2030, while in other cases it was done for intermediate years (e.g., 2020, 2025, 2030); and

(f) Increase in the consumption of alternatives to HFCs (namely R-404A, R-407C, R-410A, HFC-32 and R-290) is expected in the next several years, partially due to the phase-out of HCFC-22 resulting from conversion of lines manufacturing HCFC-based equipment, as well as national policies banning manufacturing (where applicable) and/or the importation of HCFC-based equipment. As technologies in the refrigeration/air-conditioning and/or foam sectors based on HFC-32, HCs, HFOs and new blends further penetrate local markets and become more cost-effective, the consumption trend of HFCs and other alternatives would change.

Analysis of data from surveys on ODS alternatives

10. The data reported by 119 Article 5 countries showed that a total of 13 HFCs (pure) and 37 HFC blends, with GWPs ranging from 124 to 14,800 (e.g., small amounts of HFC-23 are used for fire-fighting and in specialized refrigeration applications in a few countries), are currently in use. For most of the countries, consumption was mainly in HFC-134a, R-410A, R-404A, R-407C, and R-507A, for RAC applications (i.e., manufacturing and servicing). For LVC countries, this use was almost exclusively in servicing and/or installation/charging of RAC equipment.

11. In 2015, 119 countries reported a total HFC consumption (pure and blends) of 182,141 mt equivalent to 345,118 CO_2 tonnes. The main HFCs and HFC-blends used in these countries, are summarized in Table 1; a sector distribution of consumption is presented in Annex I to the present document. As a

reference, the CFC and HCFC baselines for compliance of the 77 LVC countries that submitted reports on ODS alternatives represented 92 and 91 per cent, respectively, of all LVC countries, while the CFC and HCFC baselines of the 42 non-LVC countries that submitted reports represented 35 and 24 per cent, respectively, of all non-LVC countries.

Table 1. Main HFCs and HFC-blends consumed in 119 Article 5 countries

HFC	No. of countries	% of total	Growth rate%*	Uses
HFC-134a	119	34	9	Domestic and commercial refrigeration and MAC; with small uses in other RAC applications, foam and aerosols
R-410A	119	43	40	Air-conditioning applications
R-404A	118	7	11	Low temperature refrigeration applications
R-507A	70	1	21	RAC sector (commercial refrigeration)
R-407C	110	6	33	Air-conditioning applications
HFC-152a**	19	4	23	Industrial aerosol sector and extruded polystyrene foam
HFC-245fa***	10	2	9	Polyurethane (PU) foam
Others	64	3	35	Small uses in all applications
Total		100	22	

(*) Calculated as compounded annual growth rate (CAGR) between 2012 and 2015.
(**) Over 90 per cent of this consumption was reported for only one country.
(***) One country reported a high use of HFC-245fa for the PU foam sector (i.e., around 15 per cent of its total HFC consumption).

12. Out of the 119 countries, the 77 LVC countries constituted 8 per cent of total HFC consumption in metric tonnes (mt) in 2015. Their reported consumption trends is provided in Table 2 below.

Table 2. HFC consumption and trends in 77 LVC countries

Description	Consumption (mt)				% of 2015 mt	CAGR (%)	CO_2 tonnes (*1,000)				% of 2015 GWP
	2012	2013	2014	2015			2012	2013	2014	2015	
By application											
RAC	10,405	9,859	11,459	14,466	95.1	11.6	21,446	20,215	23,841	30,609	97.6
Foam	444	478	414	491	3.2	3.4	355	381	341	403	1.3
Solvents	3	3	4	4	0.0	17.8	*	*	*	*	0.0
Aerosol	158	165	158	193	1.3	6.9	209	238	231	279	0.9
Fire-fighting	12	5	3	9	0.1	-9.2	32	15	8	47	0.1
Others	60	73	31	54	0.4	-3.2	20	9	7	26	0.1
Total	**11,082**	**10,583**	**12,069**	**15,218**	**100.0**	**11.2**	**22,062**	**20,858**	**24,428**	**31,364**	**100.0**
By substance											
HFC-134a	5,177	5,278	5,583	6,711	44.1	9.0	7,403	7,548	7,985	9,597	30.6
HFC-152a	250	287	203	246	1.6	-0.5	31	36	32	30	0.1
HFC-245fa	14	14	13	26	0.2	24.0	14	15	14	27	0.1
HFC-365mfc	7	8	8	16	0.1	30.6	6	6	7	13	0.0
R-404A	1,762	1,597	1,938	2,591	17.0	13.7	6,910	6,263	7,599	10,159	32.4
R-410A	1,597	1,677	2,073	2,791	18.3	20.4	3,334	3,501	4,328	5,826	18.6
R-407C	1,621	1,027	1,301	1,531	10.1	-1.9	2,876	1,821	2,308	2,716	8.7
R-507A	85	100	93	124	0.8	13.4	340	400	373	496	1.6
Other HFCs	12	8	8	19	0.1	16.0	31	17	22	57	0.2
Other HFC blends	557	586	848	1,163	7.6	27.9	1,117	1,251	1,760	2,443	7.8
Total	**11,082**	**10,583**	**12,069**	**15,218**	**100.0**	**11.2**	**22,062**	**20,858**	**24,428**	**31,364**	**100.0**

*Negligible.

13. The following are the main observations from analysis of consumption of LVC countries:

(a) HFC-134a constituted the highest percentage of consumption in mt followed by R-410A, R-404A and R-407C; 29 other HFC blends accounted for 8 percent of the consumption. Expressed in CO_2 tonnes, R-404A has the largest consumption, followed by HFC-134a,

R-410A and R-407C;

(b) HFC consumption was highest in the RAC sector (95 per cent of the total consumption) in mt, and 98 per cent in CO_2 tonnes, followed by the foam sector (3 per cent in mt);

(c) Blends, mainly R-404A, R-410A, R 407C and R-507A, constituted 54 per cent of the total consumption in mt; and

(d) The consumption of HFCs grew by 11 per cent annually during the period 2012 to 2015 in mt: HFC-134a (9 per cent), R-404A (14 per cent), R-410A (20 percent) representing the main HFCs/HFC blends contributing to this growth. A negative growth in R-407C and HFC-152a may be on account of estimates made for specific years and may not represent the general trends in consumption of these substances.

14. Out of the 119 countries, 42 non-LVC countries had a share of 92 per cent of total HFC consumption in mt in 2015. Their consumption trend is given in Table 3.

Table 3. HFC consumption and trends in 42 non-LVC countries

Description	Consumption (mt)				% of 2015 mt	CAGR (%)	CO_2 tonnes (*1,000)				% of 2015 GWP
	2012	2013	2014	2015			2012	2013	2014	2015	
By application											
RAC	80,671	90,043	120,050	151,548	90.8	23.4	154,777	176,014	241,409	297,704	94.9
Foam	5,004	6,625	6,990	8,177	4.9	17.8	3,360	4,285	4,466	5,829	1.9
Solvents	89	122	137	132	0.1	13.9	40	57	47	40	0.0
Aerosol	1,949	2,832	3,616	4,336	2.6	30.5	1,168	1,502	1,746	2,024	0.6
Fire-fighting	1,180	1,485	2,129	2,542	1.5	29.1	3,440	4,611	6,495	7,917	2.5
Other - unidentified	30	402	30	189	0.1	85.5	7	759	42	240	0.1
Total	**88,923**	**101,509**	**132,953**	**166,923**	**100.0**	**23.4**	**162,792**	**187,228**	**254,205**	**313,754**	**100.0**
By substance											
HFC-134a	42,422	43,927	50,240	54,815	32.8	8.9	60,663	62,815	71,843	78,385	25.0
HFC-152a	3,349	4,894	5,816	6,523	3.9	24.9	416	607	721	808	0.3
HFC-245fa	2,853	3,462	3,496	3,696	2.2	9.0	2,939	3,566	3,601	3,807	1.2
HFC-365mfc	-	19	8	125	0.1	-	-	15	6	100	0.0
R-404A	7,432	8,545	11,757	9,818	5.9	9.7	29,146	33,510	46,104	38,504	12.3
R-410A	26,856	33,346	51,782	75,700	45.3	41.3	56,061	69,610	108,095	158,023	50.4
R-407C	2,835	3,478	3,912	8,865	5.3	46.2	5,029	6,170	6,940	15,726	5.0
R-507A	685	779	1,706	1,235	0.7	21.7	2,729	3,103	6,797	4,922	1.6
Other HFCs	1,160	1,427	2,405	3,567	2.1	45.4	3,589	4,988	6,895	8,753	2.8
Other HFC blends	1,332	1,631	1,832	2,578	1.5	24.6	2,220	2,844	3,203	4,726	1.5
Total	**88,923**	**101,509**	**132,953**	**166,923**	**100.0**	**23.4**	**162,792**	**187,228**	**254,205**	**313,754**	**100.0**

15. The following are the main observations from analysis of consumption of non-LVC countries:

(a) R-410A constituted the highest percentage of consumption in mt (45 per cent) followed by HFC-134a (33 per cent), R-404A (6 per cent), and R-407C (5 per cent). Other HFCs and HFC blends constituted about 10 per cent of the total consumption. In CO_2 tonnes, R-410A constituted 50 per cent of the total, followed by HFC-134a (25 per cent), R-404A (12 per cent) and R-407C (5 per cent);

(b) HFC consumption in the RAC sector represents 91 per cent of the total consumption in mt and 95 per cent in CO_2 tonnes, followed by the foam sector (5 per cent in mt) and aerosol sector (3 per cent in mt); and

(c) Total HFC consumption grew by 23 per cent annually during the period 2012 to 2015 in mt; R-410A and R-407C grew at more than 40 per cent on account of growth in consumption in air-conditioning applications. HFC-134a and R-404A grew 9 per cent and 10 per cent, respectively. HFC-245fa consumption grew at 9 per cent attributed mainly to one country, while consumption of HFC-365mfc showed a steep increase between 2014

(8.0 mt) and 2015 (125 mt). The high growth shown in the aerosol sector is due to the use of HFC-152a (37 per cent) and HFC-134a (18 per cent); growth in fire-fighting applications mainly from HFC-125 (54 per cent), HFC-227ea (24 per cent) and blend of HFC-227ea/HFC-365mfc (30 per cent).

RAC sector

16. All 119 countries reported HFC use in servicing, which accounted for 78 per cent of the total HFC consumption in RAC applications (i.e., 97 per cent of total consumption of HFCs in LVC countries and 76 per cent in non-LVC countries).

17. In 2015, the total HFC consumption in the RAC sector amounted to 166,014 mt, composed mainly of four HFCs/ HFC blends: HFC-134a (36 per cent), R-410A (47 per cent), R-404A (8 per cent) and R-407C (6 per cent), in mt. The annual growth rate of R-410A was 40 per cent, followed by R-404A (11 per cent) and HFC-134a (8 per cent). The consumption levels of R-407C, R-507A and other HFC blends are relatively low; their individual annual growth rate is, however, higher than that of HFC-134a but lower than R-410A. High growth in the category other HFCs in the manufacturing sector relates to HFC-32 as a result of conversion projects funded by the Multilateral Fund. Table 4 provides an analysis of the aggregated consumption of HFCs in the RAC sector by all 119 countries.

Table 4. Analysis of the aggregated consumption of HFCs in the RAC sector by all 119 countries

HFC	No. of countries	2012	2013	2014	2015	% of 2015	CAGR (%)
Manufacturing							
HFC-134a	36	7,003	7,283	8,378	8,587	26.3	7.0
R-410A	21	9,429	3,366	16,721	18,482	56.6	25.1
R-404A	34	2,280	2,544	3,431	2,518	7.7	3.4
R-407C	20	266	297	392	1,394	4.3	73.7
R-507A	7	115	127	547	188	0.6	17.8
Other HFCs	2	20	20	101	1,007	3.1	270.5
HFC blends	5	85	181	120	490	1.5	79.3
Total		**19,198**	**23,818**	**29,691**	**32,667**	**100.0**	**19.4**
Servicing							
HFC-134a	118	23,359	23,649	29,167	31,845	27.8	10.9
R-410A	42	19,024	21,657	37,134	60,009	52.4	46.7
R-404A	42	6,914	7,598	10,263	9,892	8.6	12.7
R-407C	41	4,189	4,207	4,821	9,000	7.9	29.0
R-507A	26	655	752	1,252	1,170	1.0	21.3
Other HFCs	17	65	57	389	249	0.2	56.4
HFC blends	35	1,485	1,509	1,855	2,448	2.1	18.1
Total		**55,691**	**59,430**	**84,881**	**114,612**	**100.0**	**27.2**
Grand total		**74,889**	**83,248**	**114,572**	**147,279**		**25.3**
MAC	42	16,187	16,654	16,936	18,735		5.0
Grand total including MAC		**91,076**	**99,902**	**131,508**	**166,014**		**22.2**
HFC-134a	119	46,548	47,586	54,481	59,167	35.6	8.3
R-410A	119	28,453	35,023	53,856	78,490	47.3	40.2
R-404A	118	9,194	10,142	13,694	12,409	7.5	10.5
R-407C	110	4,456	4,504	5,213	10,394	6.3	32.6
R-507A	70	770	879	1,799	1,358	0.8	20.8
Other HFCs	21	85	78	490	1,257	0.8	145.5
HFC blends	37	1,570	1,690	1,975	2,939	1.8	23.2
Total		**91,076**	**99,902**	**131,508**	**166,014**	**100.0**	**22.2**

Other sectors

18. HFC consumption reported in the foam, aerosol, fire-fighting and solvent sectors represents about 9 per cent of the total consumption in 2015. A brief overview of HFC consumption in these applications is given below:

(a) The foam sector constituted 5 per cent of the total HFC consumption (182,141 mt). Of the total HFC consumption in the foam sector, only two countries reported the use of more than 100 mt of HFC-245fa; HFC-245fa accounted for 43 per cent of the total consumption followed by HFC-152a, (39 per cent) and HFC-134a (10 per cent);

(b) Consumption in aerosol applications included mainly HFC-134a (29 per cent in mt and 80 per cent in CO_2 tonnes in 2015) and HFC-152a (71 per cent in mt and 17 per cent in CO_2 tonnes in 2015);

(c) HFC use in fire-fighting represented 1 per cent of the total HFC consumption in mt, and included HFC-125, HFC 227ea, HFC 227ea/HFC 365mfc, HFC-23 and HFC-236fa, the equivalent consumption in CO_2 tonnes is 2 per cent; and

(d) A small amount of HFC use was reported for the solvent sector (0.07 per cent of the total HFC consumption in 2015 in mt); the substances consumed were mainly HFC-134a, HFC-152a and HFC-245fa. HCs and chlorinated chemicals are predominantly used in this sector.

Analysis of consumption of HFCs in HAT countries

19. Out of the 119 countries, 27 were classified as countries with high ambient temperatures (HAT) under the Kigali Amendment. Noting the special challenges faced by these countries, information on their consumption is presented separately, for information purposes only.

20. Consumption of alternatives to HCFCs in these 27 countries include R-404A, R-407C, R-410A, HFC-32 and HCs (R-290, R-600a and cyclopentane), mainly in RAC applications, with a high growth as a result of replacement of HCFCs in these markets, and the increased adoption of HFC-based alternatives.

21. The total consumption of HFCs in these countries showed a high increase between 2012 and 2015, with 96 per cent of total HFC consumption in 2015 in RAC applications. It was observed that the growth of R-407C and R-410A is higher in HAT countries than in other Article 5 countries. Table 5 presents the summary of HFC consumption in RAC sector in 27 HAT countries.

Table 5. Analysis of the aggregated consumption of HFCs in the RAC sector by 27 HAT countries

HFC	No. of countries	2012	2013	2014	2015	% of 2015 (mt)	CAGR (%)
Manufacturing							
HFC-134a	10	2,556	2,504	3,322	3,520	50.5	11.3
R-410A	8	330	183	565	933	13.4	41.4
R-404A	9	1,032	1,335	2,066	1,324	19.0	8.7
R-407C	8	79	126	206	1,195	17.1	147.3
Total		**3,997**	**4,148**	**6,159**	**6,972**	**100.0**	**20.4**
Servicing							
HFC-134a	27	8,629	10,496	13,056	15,118	18.7	20.6
R-410A	27	15,451	16,777	26,787	52,703	65.3	50.5
R-404A	27	2,861	3,339	4,768	4,610	5.7	17.2
R-407C	26	2,020	2,328	3,045	7,216	8.9	52.9
R-507A	13	62	126	78	143	0.2	32.1

HFC	No. of countries	2012	2013	2014	2015	% of 2015 (mt)	CAGR (%)
Other HFCs	4	-	6	16	4	0.0	
HFC blends	5	503	546	762	945	1.2	23.4
Total		**29,526**	**33,618**	**48,512**	**80,739**	**100.0**	**39.8**
Grand total		**33,523**	**37,766**	**54,671**	**87,711**		**37.8**
MAC		6,396	6,224	6,707	7,600		5.9
Grand total including MAC		**39,919**	**43,990**	**61,378**	**95,311**		**33.7**
HFC-134a	27	17,581	19,224	23,085	26,238	27.5	14.3
R-410A	27	15,781	16,960	27,352	53,636	56.3	50.4
R-404A	27	3,893	4,674	6,834	5,934	6.2	15.1
R-407C	26	2,099	2,454	3,251	8,411	8.8	58.8
R-507A	13	62	126	78	143	0.2	32.1
Other HFCs	4	-	6	16	4	0.0	-
HFC blends	6	503	546	762	945	1.0	23.4
Total		**39,919**	**43,990**	**61,378**	**95,311**	**100.0**	**33.7**

22. The following are observations from the above table:

(a) Consumption of R-410A in mt was 56 per cent of the total consumption, followed by HFC-134a (28 per cent), R-407C (9 per cent) and R-404A (6 per cent);

(b) The consumption of blends (i.e., R-404A, R-410A, R-407C and R-507A) constituted 73 per cent of the total consumption in mt; and

(c) HFC consumption grew by 34 per cent during the period 2012 to 2015 in mt: R-407C (59 per cent), R-410A (50 per cent), R-404A (15 per cent) and HFC-134a (14 per cent) are the main HFCs/HFC blends that contribute to this growth.

Comparison of ODS alternatives surveys data with TEAP data

23. The Secretariat undertook a comparison of the data from the TEAP report (which covered HFC use globally) and that reported by the 119 countries, for information only, noting that the data from the ODS alternatives surveys do not include several large HFC consuming countries (e.g., Brazil, China and India) and that the TEAP report included HFC consumption data analysed during the years 2014 and 2015 while the surveys included actual HFC consumption for 2012-2015 based on country level data collection. Table 6 provides a comparison of TEAP projections with data reported under the ODS alternatives survey.

Table 6. Analysis of the aggregated consumption of HFCs in the RAC sector (119 countries)

Sectors and substances	TEAP 2015 (mt) (all Article 5 countries)	ODS alternatives survey (119 countries) 2015 (mt)	Percentage (%)
(a)	**(b)**	**(c)**	**d (c/b)**
RAC			
HFC-134a	74,524	59,167	79.4
R-410A	106,661	78,490	73.6
R-407C	55,278	10,394	18.8
R-404A	18,202	12,409	68.2
R-507	18,202	1,358	7.5
Total RAC	**272,867**	**161,819**	**59.3**
Foam			
HFC-134a	3,364	896	26.6
HFC-152a	3,364	3,381	100.5
HFC-245fa	2,172	3,722	171.4

Sectors and substances	TEAP 2015 (mt) (all Article 5 countries)	ODS alternatives survey (119 countries) 2015 (mt)	Percentage (%)
HFC-365mfc/ HFC-227ea	1,758	494	28.1
Total foam	**10,658**	**8,494**	**79.7**
MDI			
HFC-134a	800	286.6	35.8
Total MDI	**800**	**286.6**	**35.8**
Total by HFC			
HFC-134a	78,688	60,350	76.7
R-410A	106,661	78,490	73.6
R-407C	55,278	10,394	18.8
R-404A	18,202	12,409	68.2
R-507A	18,202	1,358	7.5
HFC-152a	3,364	3,381	100.5
HFC-245fa	2,172	3,722	171.4
HFC-365mfc/ HFC-227ea	1,758	494	28.1
Grand total	**284,325**	**170,599**	**60.0**

24. The following observations are relevant:

(a) The consumption of HFC-245fa and HFC-152a for 119 countries is higher than the estimates provided in the TEAP report for all Article 5 countries, on account of possible high growth in consumption of these substances in the period 2013 to 2015; a large portion of consumption of HFC-245fa reported in the surveys is in one country only; and

(b) TEAP estimates of HFC-134a consumption in MDIs is higher than HFC-134a consumption in aerosol as part of the surveys, as the latter does not include data from all countries (e.g., China and India).

Growth patterns in the consumption of HFCs and HFC blends

25. Following the guide for preparing the ODS alternatives surveys, the reports included information on projected consumption levels of the ODS alternatives reported. Table 7 presents projected HFC consumption based on the survey reports for 119 countries out of which only 112 countries provided projection data in their reports. Where projections were not provided, the Secretariat used the trends of the past four years, with adjustments in cases where high growth was reported in the last four years. This allowed a more complete presentation of the HFC growth projections for all 119 countries, and is provided only for information purposes.

Table 7. Forecast consumption of HFCs for the period 2015 to 2030 (1,000 CO_2 tonnes) for 119 countries

HFCs	2015	2020	2025	2030	CAGR (%)
HFC-134a	87,982	130,665	196,295	301,067	8.5
HFC-152a	838	1,080	1,549	1,892	5.6
HFC-245fa	3,834	4,514	6,638	15,083	9.6
HFC-365mfc	129	217	434	850	13.4
Other HFCs	8,794	25,271	42,244	98,393	17.5
HFC blends					
R-404A	48,663	85,322	140,515	253,622	11.6
R-410A	163,849	293,527	456,257	644,828	9.6
R-407C	18,442	38,291	69,811	123,499	13.5
Other HFC blends	12,587	21,982	57,901	306,360	23.7
Total	**345,118**	**600,870**	**971,644**	**1,745,594**	**11.4**

26. The observations based on these projected estimates are as follows:

(a) The annual growth of HFC-134a and R-404A is at 8.5 and 12 per cent, respectively;

(b) The annual growth rate of HFC-245fa and HFC-365mfc at 10 per cent and 13 per cent, respectively, seen in a few countries;

(c) Other HFCs (including HFC-32) and HFC blends used in air-conditioning applications show a growth of 10 per cent or more mainly because of the introduction of these substances in the last 3-4 years; and

(d) Mixed trends were observed for the category other blends: R-507A used in the RAC sector and blends with HFC-365mfc/227ea used in the foam sector are those expected to have high growth in the future;

27. The growth rate of HFCs for future years may change depending upon:

(a) Penetration in the market of different substances introduced in markets of Article 5 countries (e.g., high growth rate of HFC-32, R-410A, R-407C and HFC-245fa in the last 2-3 years);

(b) Adoption of low-GWP substances including low-GWP blends particularly in RAC sector. This could be in the form of replacement by industry as well as drop-in/retrofit substitutes;

(c) Other market factors such as economic growth trends, growth in import of new and second-hand equipment (e.g., import of HFC-134a based mobile air-conditioners, R-410A based residential air-conditioners), product performance, and/or adoption of "not-in-kind technologies"; and

(d) Regulations that would influence adoption of different technologies in HFC consuming applications, and projects such as those funded under the Multilateral Fund that could result in adoption of low-GWP technologies.

28. The projected HFC consumption in CO_2 tonnes for the 119 countries that undertook the survey for the baseline years under the Kigali Amendment is presented in Table 8, noting that these figures are projections and would need to be adjusted for actual consumption reported for the relevant years.

Table 8. Projected HFC consumption for 119 Article 5 countries

Particulars	Estimated HFC consumption in CO_2 tonnes
Non-group 2 countries (HFC baseline years: 2020-2022) (112 countries)	287,708
Group 2 (HFC baseline years: 2024-2026) (7 countries)	498,976

Conclusions

29. The ODS alternatives surveys conducted by the 119 countries have met the objectives and scope set out in decision 75/53(b) and (c),[6] and have collected significant data particularly on HFC consumption.

[6] Decision 75/53(b) That the objective of the surveys was to give effect to paragraph 4 of decision XXVI/9, which requested the Executive Committee to consider providing additional funding to conduct inventories or surveys of alternatives to ozone-depleting substances (ODS) in interested Article 5 parties upon their request; (c) That the scope of the surveys was to obtain information on ODS alternatives in Article 5 countries. Information would include data (where available) and estimates of ODS alternatives currently in use by sector and subsector, and forecasts of ODS alternatives most commonly used.

Some general conclusions that can be made from the review and analysis of the information submitted include, but are not limited to, the following:

(a) The overall analysis of HFC consumption patterns was limited in its scope as it did not include all Article-5 countries; the current data provides useful insights on the consumption of HFCs in LVC countries;

(b) The consumption data provided was based on best estimates from the 119 countries and the lack of a regulatory system monitoring the import and export of ODS alternatives particularly HFCs may have affected data quality; strengthening the regulatory system for monitoring HFC trade may need to be prioritised while HFC phase-down activities are initiated;

(c) Because of the dynamic nature of markets on the adoption of HFCs and other ODS alternatives coupled with technology options under development, consumption projections of HFCs and other ODS alternatives may not accurately represent future consumption patterns of these substances; and

(d) A more comprehensive analysis of consumption of all Article-5 countries and technology trends (e.g., TEAP reports on HFC consumption pattern) may be required for global policy analysis and decision-making.

Lessons learned from the ODS alternatives survey

30. The reports for the ODS alternatives survey contained valuable lessons that could facilitate future data collection and reporting, and identifies institutional and regulatory mechanisms that should be put in place for HFC phase-down activities, and may provide each country with a useful basis to develop a framework for an initial national strategy for compliance with the Kigali Amendment. Some of the key lessons gathered from the reports, which would be useful for Article 5 countries are the following:

(a) The combination of a top-down and bottom-up approach worked best for gathering data that provided best estimates. This process helped in identification of main stakeholders related to HFC consumption whose continued participation in HFC phase-down activities would be very helpful to the countries;

(b) As HFC blends constitute a significant portion of HFC consumption, early action to promote awareness and outreach on HFCs and HFC blends is necessary to address consumption and control of these substances in a strategic manner. Training and capacity building of enforcement authorities on HFC blends and mechanisms of monitoring and reporting consumption is essential for accurate data monitoring and reporting;

(c) Mechanisms to encourage voluntary reporting from users (i.e., servicing and manufacturing) of ODS alternatives, particularly HFCs should be put in place as soon as possible to simplify the process of future mandatory reporting, and the establishment of an HFC licensing system;

(d) Controls on HFCs and HFC blends, including standardisation of blend composition is very important for ensuring accuracy of data reporting and safe use of these substances;

(e) Disaggregated information on uses (e.g., HFC used in servicing refrigerators, MACs, small commercial refrigeration equipment, etc.) would be very useful while designing national phase-out approaches, particularly noting that HFC consumption in the servicing sector constitutes a significant percentage of total HFC consumption;

(f) The data collection methodologies that have been used in the ODS alternatives surveys should be used to set-up an effective data reporting mechanism on HFCs and other substances; and

(g) Harmonized systems (HS) codes for all substances is critical for ensuring accurate data collection, monitoring and reporting; this is particularly challenging given the number of blends to be monitored, compared to the number of blends in use during CFC / HCFC phase-out.

Recommendation

31. The Executive Committee may wish:

(a) To note the Overall analysis of the results of the surveys of ODS alternatives (decision 79/42(c)) contained in document UNEP/OzL.Pro/ExCom/80/54;

(b) To request bilateral and implementing agencies to use the survey findings and lessons highlighted in the analysis of the results of ODS alternatives surveys, while undertaking enabling activities with particular attention to strengthening data collection and reporting of HFCs and HFC blends; and

(c) To request bilateral and implementing agencies to return balances to the 81st meeting of the Executive Committee relating to those countries whose ODS alternatives surveys were not submitted to the 80th meeting (i.e., Algeria, Antigua and Barbuda, Bahamas, Democratic People's Republic of Korea, Fiji, Morocco and Myanmar) in line with decision 79/43.

Annex I

Information on HFC consumption from ODS alternatives survey reports from 119 Article 5 countries

Particulars	Consumption in mt				Percentage (%) of consumption in sectors	Annual growth rate (%)	CO_2 tonnes (thousand)				Percentage (%) total CO_2 tonnes
	2012	2013	2014	2015			2012	2013	2014	2015	
RAC											
HFC-134a	46,548	47,586	54,481	59,167	35.6	8.3	66,564	68,048	77,908	84,609	25.8
HFC-152a	1	0	2	2	0.0	26.2	0	0	8	1	0.0
R-404A	9,194	10,142	13,694	12,409	7.5	10.5	36,056	39,773	53,704	48,664	14.8
R-407C	4,456	4,504	5,213	10,394	6.3	32.6	7,904	7,989	9,248	18,439	5.6
R-410A	28,453	35,023	53,856	78,490	47.3	40.2	59,395	73,111	112,423	163,848	49.9
R-507A	770	879	1,799	1,358	0.8	20.8	3,069	3,503	7,169	5,412	1.6
Other HFCs	84	77	489	1,255	0.8	146.3	235	293	610	1,065	0.3
HFC blends	1,570	1,690	1,975	2,939	1.8	23.2	2,997	3,512	4,180	6,279	1.9
Sub-total	**91,076**	**99,902**	**131,509**	**166,014**	**100.0**	**22.2**	**176,222**	**196,231**	**265,251**	**328,316**	**100.0**
Foam											
HFC-134a	210	221	191	896	10.3	62.1	301	315	273	1,281	20.6
HFC-152a	2,198	3,044	3,235	3,381	39.0	15.4	273	377	401	419	6.7
HFC-245fa	2,867	3,476	3,486	3,722	42.9	9.1	2,953	3,581	3,590	3,834	61.5
HFC-365mfc	7	27	16	141	1.6	170.9	6	22	13	112	1.8
Other HFCs	-	0	15	31	0.4		-	0	17	34	0.5
HFC blends	165	334	461	496	5.7	44.3	184	371	512	551	8.8
Sub-total	**5,448**	**7,102**	**7,404**	**8,668**	**100.0**	16.7	**3,716**	**4,667**	**4,806**	**6,231**	**100.0**
Aerosol											
HFC-134a	827	1,042	1,133	1,295	28.6	16.1	1,182	1,490	1,620	1,852	80.4
HFC-152a	1,255	1,952	2,632	3,213	70.9	36.8	156	242	326	398	17.3
Other HFCs	12	2	9	14	0.3	5.0	38	8	29	44	1.9
HFC blends	14	0	0	8	0.2	-18.0	0	0	1	9	0.4
Sub-total	**2,107**	**2,997**	**3,775**	**4,529**	**100.0**	29.1	**1,376**	**1,740**	**1,976**	**2,303**	**100.0**
Fire-fighting											
HFC-125	234	383	688	844	33.1	53.4	818	1,342	2,406	2,955	37.1
HFC-227ea	571	611	907	1,082	42.4	23.8	1,838	1,969	2,920	3,485	43.8
HFC-227ea/HFC-365mfc	140	192	244	299	11.7	28.9	155	213	271	332	4.2
HFC-236fa	50	96	81	100	3.9	26.2	490	940	792	985	12.4
Other HFCs	199	207	213	225	8.8	4.3	170	163	114	207	2.6
Sub-total	**1,193**	**1,490**	**2,133**	**2,551**	100.0	28.8	**3,471**	**4,626**	**6,503**	**7,963**	**100.0**
Solvents											
HFC-134a	3	5	5	6	4.1	16.6	4	6	6	7	18.4
HFC-152a	70	94	108	115	85.1	18.2	8	11	13	14	36.8
HFC-245fa	-	-	23	-	0.0	-	-	-	23	-	0.0
Other HFCs	18	27	5	15	10.9	-6.8	25	39	3	17	44.7

Particulars	Consumption in mt				Percentage (%) of consumption in sectors	Annual growth rate (%)	CO_2 tonnes (thousand)				Percentage (%) total CO_2 tonnes
Sub-total	**92**	**125**	**141**	**136**	**100.0**	14.0	**37**	**56**	**45**	**38**	**100.0**
Other uses											
HFC-134a	9	352	13	162	66.6	157.9	14	504	19	232	87.3
HFC-152a	75	91	41	58	23.7	-8.3	9	11	5	7	2.7
R-404A	-	0	-	-	0.0		-	0	-	-	0.0
R-407C	0	1	0	2	0.7	154.8	0	2	0	3	1.2
R-507A	-	-	-	2	0.7		-	-	-	7	2.5
Other HFCs	5	31	6	20	8.2	61.1	4	252	25	17	6.3
HFC blends	0	-	-	-	0.0		0	-	-	-	0.0
Sub-total	**89**	**475**	**61**	**243**	**100.0**	39.7	**27**	**769**	**49**	**265**	**100.0**
Grand Total	**100,005**	**112,091**	**145,022**	**182,141**		**22.1**	**184,849**	**208,089**	**278,631**	**345,118**	
By Application											
RAC	91,076	99,902	131,509	166,014	91.1	22.2	176,222	196,231	265,251	328,316	95.1
Foam	5,448	7,102	7,404	8,668	4.8	16.7	3,716	4,667	4,806	6,231	1.8
Aerosol	2,107	2,997	3,775	4,529	2.5	29.1	1,376	1,740	1,976	2,303	0.7
Fire-fighting	1,193	1,490	2,133	2,551	1.4	28.8	3,471	4,626	6,503	7,963	2.3
Solvents	92	125	141	136	0.1	14.0	37	56	45	38	0.0
Others	89	475	61	243	0.1	39.7	27	769	49	265	0.1
Grand total	**100,005**	**112,091**	**145,022**	**182,141**	**100.0**	**22.1**	**184,849**	**208,089**	**278,631**	**345,118**	**100.0**
By Substance											
HFC-134a	47,598	49,205	55,823	61,526	33.8	8.9	68,065	70,363	79,827	87,981	25.5
HFC-152a	3,599	5,181	6,018	6,769	3.7	23.4	446	642	754	840	0.2
R-404A	9,194	10,142	13,694	12,409	6.8	10.5	36,056	39,773	53,704	48,664	14.1
R-407C	4,456	4,505	5,213	10,396	5.7	32.6	7,904	7,991	9,248	18,442	5.3
R-410A	28,453	35,023	53,856	78,490	43.1	40.2	59,395	73,111	112,423	163,848	47.5
R-507A	770	879	1,799	1,360	0.7	20.9	3,069	3,503	7,169	5,418	1.6
HFC-245fa	2,867	3,476	3,509	3,722	2.0	9.1	2,953	3,581	3,613	3,834	1.1
HFC-365mfc	12	42	21	161	0.1	138.4	9	33	17	128	0.0
Other HFCs	1,167	1,421	2,408	3,566	2.0	45.1	3,614	4,994	6,913	8,793	2.5
HFC blends	1,888	2,217	2,680	3,742	2.1	25.6	3,337	4,097	4,964	7,170	2.1
Total	**100,005**	**112,091**	**145,022**	**182,141**	**100.0**	22.1	**184,849**	**208,089**	**278,631**	**345,118**	**100.0**

Annex II

ARTICLE 5 COUNTRIES WITH APPROVED FUNDING TO CONDUCT SURVEYS ON ODS ALTERNATIVES

Country	Region	HCFC status	Agency	Approved	Submitted
Afghanistan	Asia and the Pacific	Non-LVC	UNEP	74th	80th
Albania	Europe	LVC	UNIDO	74th	78th
Algeria*	Africa	Non-LVC	UNEP	74th	
Angola	Africa	LVC	UNEP	74th	79th
Antigua and Barbuda*	Latin America and the Caribbean	LVC	UNEP	74th	
Argentina	Latin America and the Caribbean	Non-LVC	UNIDO	74th	78th
Armenia	Europe	LVC	UNEP	74th	80th
Bahamas*	Latin America and the Caribbean	LVC	UNEP	75th	
Bahrain	Asia and the Pacific	Non-LVC	UNEP, UNIDO	75th	80th
Bangladesh	Asia and the Pacific	Non-LVC	UNDP	75th	79th
Barbados	Latin America and the Caribbean	LVC	UNEP	74th	80th
Belize	Latin America and the Caribbean	LVC	UNEP	75th	80th
Benin	Africa	Non-LVC	UNEP	74th	80th
Bhutan	Asia and the Pacific	LVC	UNEP	74th	80th
Bolivia (Plurinational State of)	Latin America and the Caribbean	LVC	UNIDO	74th	78th
Bosnia and Herzegovina	Europe	LVC	UNIDO	74th	78th
Botswana	Africa	LVC	UNEP	74th	79th
Brunei Darussalam	Asia and the Pacific	LVC	UNEP	74th	80th
Burkina Faso	Africa	Non-LVC	UNEP	74th	80th
Burundi	Africa	LVC	UNEP	75th	80th
Cambodia	Asia and the Pacific	LVC	UNEP	74th	79th
Cameroon	Africa	Non-LVC	UNIDO	75th	79th
Cape Verde	Africa	LVC	UNEP	74th	80th
Chad	Africa	LVC	UNEP	74th	80th
Chile	Latin America and the Caribbean	Non-LVC	UNIDO	74th	78th
Colombia	Latin America and the Caribbean	Non-LVC	Germany	75th	78th
Comoros	Africa	LVC	UNEP	74th	80th
Congo	Africa	LVC	UNEP	75th	80th
Cook Islands	Asia and the Pacific	LVC	UNEP	75th	80th
Costa Rica	Latin America and the Caribbean	LVC	UNDP	74th	78th
Cote d'Ivoire	Africa	Non-LVC	UNEP	74th	80th
Cuba**	Latin America and the Caribbean	LVC	UNDP	75th	80th
Democratic Rep. of Congo	Africa	Non-LVC	UNEP	75th	80th
Djibouti	Africa	LVC	UNEP	74th	80th
Dominican Republic	Latin America and the Caribbean	Non-LVC	UNDP	75th	78th

Country	Region	HCFC status	Agency	Approved	Submitted
Ecuador	Latin America and the Caribbean	Non-LVC	UNIDO	74th	78th
El Salvador**	Latin America and the Caribbean	LVC	UNDP	74th	78th
Equatorial Guinea	Africa	LVC	UNEP	74th	80th
Eritrea	Africa	LVC	UNEP	74th	79th
Ethiopia	Africa	LVC	UNEP	74th	79th
Fiji*	Asia and the Pacific	LVC	UNEP	75th	
Gabon	Africa	Non-LVC	UNEP	75th	80th
Gambia	Africa	LVC	UNEP	74th	79th
Georgia	Europe	LVC	UNIDO	74th	80th
Ghana	Africa	Non-LVC	UNEP	74th	79th
Grenada	Latin America and the Caribbean	LVC	UNEP	75th	80th
Guatemala	Latin America and the Caribbean	LVC	UNIDO	74th	78th
Guinea	Africa	Non-LVC	UNEP	74th	80th
Guinea-Bissau	Africa	LVC	UNEP	75th	80th
Guyana	Latin America and the Caribbean	LVC	UNEP	74th	80th
Honduras	Latin America and the Caribbean	LVC	UNIDO	74th	78th
India***	Asia and the Pacific	Non-LVC	UNDP	74th	
Iran (Islamic Republic)	Asia and the Pacific	Non-LVC	UNDP	74th	80th
Iraq	Asia and the Pacific	Non-LVC	UNEP	75th	80th
Jamaica	Latin America and the Caribbean	LVC	UNEP	74th	80th
Jordan	Asia and the Pacific	Non-LVC	IBRD	76th	80th
Kenya	Africa	Non-LVC	UNEP	74th	78th
Kiribati	Asia and the Pacific	LVC	UNEP	75th	79th
Korea, Dem. People's Rep.*	Asia and the Pacific	Non-LVC	UNEP	74th	
Kuwait	Asia and the Pacific	Non-LVC	UNEP, UNIDO	75th	80th
Kyrgyzstan	Europe	LVC	UNEP	74th	79th
Lao, PDR	Asia and the Pacific	LVC	UNEP	74th	80th
Lebanon	Asia and the Pacific	Non-LVC	UNDP	74th	78th
Lesotho	Africa	LVC	UNEP	74th	79th
Liberia	Africa	LVC	UNEP	74th	79th
Libya	Africa	Non-LVC	UNIDO	75th	80th
Macedonia, FYR	Europe	LVC	UNIDO	74th	78th
Madagascar	Africa	Non-LVC	UNEP	74th	78th
Malawi	Africa	LVC	UNEP	74th	79th
Maldives	Asia and the Pacific	LVC	UNEP	74th	80th
Mali	Africa	LVC	UNEP	75th	80th
Marshall Islands	Asia and the Pacific	LVC	UNEP	75th	80th
Mauritius	Africa	LVC	Germany	75th	79th
Mexico	Latin America and the Caribbean	Non-LVC	UNIDO	74th	78th
Micronesia (Federated States of)	Asia and the Pacific	LVC	UNEP	74th	80th
Moldova, Republic of	Europe	LVC	UNDP	74th	78th
Mongolia	Asia and the Pacific	LVC	UNEP	74th	80th

Country	Region	HCFC status	Agency	Approved	Submitted
Montenegro	Europe	LVC	UNIDO	74th	78th
Morocco*	Africa	Non-LVC	UNEP	75th	
Mozambique	Africa	LVC	UNEP	74th	80th
Myanmar*	Asia and the Pacific	LVC	UNEP	74th	
Namibia	Africa	LVC	UNEP	74th	79th
Nauru	Asia and the Pacific	LVC	UNEP	75th	79th
Nepal	Asia and the Pacific	LVC	UNEP	74th	80th
Nicaragua	Latin America and the Caribbean	LVC	UNIDO	74th	78th
Niger	Africa	LVC	UNIDO	74th	80th
Nigeria	Africa	Non-LVC	UNEP	74th	79th
Niue	Asia and the Pacific	LVC	UNEP	75th	79th
Oman	Asia and the Pacific	Non-LVC	UNIDO	74th	78th
Pakistan	Asia and the Pacific	Non-LVC	UNEP	74th	80th
Palau	Asia and the Pacific	LVC	UNEP	75th	80th
Panama	Latin America and the Caribbean	Non-LVC	UNDP	74th	78th
Papua New Guinea	Asia and the Pacific	LVC	Germany	75th	79th
Paraguay	Latin America and the Caribbean	LVC	UNDP	75th	78th
Peru**	Latin America and the Caribbean	Non-LVC	UNDP	75th	80th
Philippines	Asia and the Pacific	Non-LVC	IBRD	75th	80th
Rwanda	Africa	LVC	UNEP	74th	80th
Saint Lucia	Latin America and the Caribbean	LVC	UNEP	75th	80th
Samoa	Asia and the Pacific	LVC	UNEP	75th	80th
Sao Tome and Principe	Africa	LVC	UNEP	74th	80th
Saudi Arabia	Asia and the Pacific	Non-LVC	UNEP	75th	80th
Senegal	Africa	Non-LVC	UNEP	75th	80th
Serbia	Europe	LVC	UNIDO	74th	78th
Seychelles	Africa	LVC	UNEP	74th	79th
Sierra Leone	Africa	LVC	UNEP	74th	80th
Solomon Islands	Asia and the Pacific	LVC	UNEP	75th	80th
Sri Lanka	Asia and the Pacific	LVC	UNEP	74th	80th
Sudan	Africa	Non-LVC	UNEP, UNIDO	74th	78th
Suriname	Latin America and the Caribbean	LVC	UNEP	75th	80th
Swaziland	Africa	LVC	UNEP	74th	78th
Thailand	Asia and the Pacific	Non-LVC	IBRD	74th	80th
Timor Leste	Asia and the Pacific	LVC	UNEP	74th	80th
Togo	Africa	Non-LVC	UNEP	74th	80th
Tonga	Asia and the Pacific	LVC	UNEP	75th	79th
Trinidad and Tobago	Latin America and the Caribbean	Non-LVC	UNEP	74th	80th
Tunisia	Africa	Non-LVC	UNIDO	74th	80th
Turkey	Europe	Non-LVC	UNIDO	74th	80th
Turkmenistan	Europe	LVC	UNEP	74th	80th
Tuvalu	Asia and the Pacific	LVC	UNEP	75th	79th
Uganda	Africa	LVC	UNIDO	74th	78th
United Republic of Tanzania	Africa	LVC	UNEP	74th	79th

Country	Region	HCFC status	Agency	Approved	Submitted
Uruguay	Latin America and the Caribbean	Non-LVC	UNIDO	74th	78th
Vanuatu	Asia and the Pacific	LVC	UNEP	75th	80th
Venezuela (Bolivarian Republic of)	Latin America and the Caribbean	Non-LVC	UNIDO	74th	80th
Viet Nam	Asia and the Pacific	Non-LVC	IBRD	75th	79th
Zambia	Africa	LVC	UNEP	74th	79th
Zimbabwe	Africa	LVC	UNEP	74th	78th

*No submission
**Report awaiting translation to English
***Survey was cancelled and funds returned to the Multilateral Fund.