Republic of Armenia
Ministry of Nature Protection

HCFC Phase out Management Plan

Yerevan, August 2010

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

HPMP SUBMISSION CHECKLIST

BASIC INFORMATION	
Country:	**Armenia**
Project Title:	**HCFC Management Plan for Armenia – Stage 1**
Lead Agency:	**UNDP**
Cooperating Agencies:	**UNEP**

MONTREAL PROTOCOL AMENDMENT RATIFICATION STATUS		
Amendment	**Ratified (Y/N)**	**Date**
Copenhagen Amendment	**Yes**	**November 26, 2003**
Beijing Amendment	**Yes**	**December 18, 2008**

HCFC DATA	
Article-7 data reported	☒ **Yes** ☐ **No** **Year: 2009**
CP progress data reported	☒ **Yes** ☐ **No** **Year: 2009**
Calculated HCFC baseline (ODP tonnes)	**7.83**
Starting point (ODP tonnes)	**7.83**

DOCUMENTATION		
Document	**Submitted (Y/N)**	**Remarks**
Letter of transmittal	**Yes**	
HPMP document and components	**Yes**	
Draft agreement	**Yes**	
MYA online tables	**Yes**	
Technical review (where applicable)		

HPMP SCOPE		
Sectors covered	☐ Manufacturing only ☐ Servicing only	☒ Manufacturing and Servicing
Phase-out targets	☒ Freeze and 10% reductions (2015) ☐ Complete phase-out (Year:)	☐ 35% reductions (2020) ☐ Other
Priority given to reductions/phase-out in manufacturing (over servicing)	☒ Yes ☐ No ☐ Not required/applicable	
Justification for not prioritizing HCFC-141b	☐ Yes ☐ No ☒ Not required/applicable	

HPMP COMPONENTS		
Components	**Included (Y/N)**	**Remarks**
Executive Summary	**Yes**	
Overarching Strategy	**Yes**	
Strategy and action plan for Stage-I	**Yes**	
Sector plans/individual projects	**Yes**	
Annual implementation plan	**Yes**	
Implementation arrangements	**Yes**	
Environmental Impact	**Yes**	

HPMP FUNDING		
Components	**Included (Y/N)**	**Remarks**
Consistency with guidelines (for servicing sector, cut-off date, second conversions, HCFCs in preblended polyols, technology upgrade, non-A5 ownership, non-A5 exports)	**Yes**	
Funding for first tranche requested	**Yes**	
Funding for last tranche in last year	**No**	**One tranche requested only**

Executive Summary

This HCFC Phase out Management Plan (HPMP) documents the analysis and actions proposed by the government of the Republic of Armenia in respect to meeting the obligations assumed under Decision XIX/6 of the Parties to the Montreal Protocol on the accelerated phase of HCFC's. It has been prepared by the National Ozone Unit in the Ministry of Nature Protection with the support of UNDP acting as implementing agency. The project will be implemented by UNDP as a lead agency and UNEP as a cooperating agency. It is intended to serve as an integral component of the country's policy and commitment to meet its obligations under the Montreal Protocol. It is also intended to support the country's request to the Executive Committee of the Multi-lateral Fund of the Montreal Protocol for funding for its implementation during the period 2010-2015.

The HPMP documents a detailed survey and assessment of HCFC consumption in the country along with trends in and a forecast of this consumption. The results indicate that Armenia currently consumes (2009) an estimated 7.64 ODP tons/year of HCFCs (131.3 tons ODS/year), in the form of HCFC-22 (123.8 tons/year) and 7.5 tons/year of HCFC-141b in imported fully formulated polyol. . Consumption of HCFC-22 is primarily in the refrigeration servicing sector (98.3 tons/year) although 25.5 tons/year is consumed in the manufacture of commercial refrigeration equipment. This consumption has been growing rapidly over the past five years, largely due to servicing demands from dramatic growth in HCFC based refrigeration and air condition in equipment, and particularly imported small domestic air conditioners. The survey work also documents the current regulatory regime governing ODS, as well as current technical and institutional capacity to manage its import, distribution and use. In that regard, Armenia has identified availability of adequate human resource and procedural capability related to customs controls and refrigeration servicing as a critical barrier to its ability to comply with accelerated phase out requirements.

Based on this information, the document details an overall strategy for meeting the required phase out schedule through to 2030 when substantive consumption in Article 5 countries is to be completed. This involves two stages corresponding to the period 2010-2015 and 2015-2030. This is elaborated as a detailed action plan for Stage 1 in a number of areas. A menu of regulatory and administrative control measures are outlined including imposition of mandatory quotas on the import of HCFCs set at a freeze in 2013 at 2009/2010 level and a 10% reduction in 2015, as well as other control measures related to controlling import of HCFCs. Proposed non-investment activities support a range of actions related to enhancing customs control practices and most critically the availability and capability of refrigeration servicing technicians, through initial trainings, and strengthening of coordination and reporting. Finally, two specific investment projects are proposed. One supports the conversion of the country's only consumer in the manufacturing sector to non-ODS/low GWP alternatives, an action that will be important in allowing the country to meet its 2013 freeze obligations while it initiates first steps to equip qualified technicians/principal workshops to reduce refrigeration servicing consumption. Launching the project in manufacturing sector in Stage 1 in association with the initiation of training and capacity building in the servicing sector is important to the country's prospects of meeting phase out obligations by 2015. However, it is noted that with the established level of technical assistance, the support is not considered as sufficient to meet the actual needs in the servicing sector.

The overall incremental cost estimated for implementation of this HPMP is US$ 633,353. This does include the SAGA manufacturing project, which is being submitted along with the HPMP. Details of this funding can be found in Annex F, but is summarized as follows:

	IA	Project	TOTAL	Tranche 1
1&2. Non-investment Components	UNEP	Legal and Regulatory Action	10,000	10,000
	UNEP	Import and Application Control Capacity	14,000	9,000
	UNEP	Refrigeration Servicing Human Resource and Institutional Capacity	10,000	10,000
	UNEP	Monitoring	5,000	2,515
3. Investment Components	UNDP	SAGA - Manufacturing Sector Phase Out	534,353	247,479
	UNDP	Initial development of the Refrigerant Management System	60,000	18,182

Total

	TOTAL
Sub-total UNEP	39,000
Sub-total UNDP (lead)	594,353
Support Cost UNEP	5,070
Support Cost UNDP (lead)	44,577
Grand Total UNEP	44,070
Grand Total UNDP (lead)	638,930
	683,000

In addition it should be noted that the country chooses to receive institutional strengthening assistance outside of this HPMP, as was the case in the past.

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List of Abbreviations and Acronyms

A/C	Air Conditioner
AMD	Armenian Dram
CEIT	Countries with Economies in Transition
CFC	Chlorofluorocarbons
CIS	Commonwealth of Independent States
EU	European Union
ExCom	Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol
GEF	Global Environmental Facility
GDP	Gross Domestic Product
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
HPMP	HCFC Phase Out Management Plan
kW	Kilowatt
IA	Implementing Agency
LVC	Low Volume Country
MAC	Mobile Air Conditioning
MLF	Multilateral Fund for the Implementation of the Montreal Protocol
MNP	Ministry of Nature Protection of the Republic of Armenia
MP	Montreal Protocol
NEAP	National Environmental Action Plan
NOU	National Ozone Unit
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substance
PU	Polyurethane
RAC	Refrigeration and Air Conditioning
RMP	Refrigerant Management Plan
TA	Technical Assistance
TEAP	Technology and Economic Assessment Panel
TEWI	Total Equivalent Warming Impact
UNEP	United Nations Environmental Programme
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Programme

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1.0 General Information

1.1 Scope and Context

This document has been prepared to define the Government of the Republic of Armenia's commitment and plan to meet the obligations that it has assumed as a Party to the Montreal Protocol under Decision XIX/6[1] of the Nineteenth Meeting of the Parties which accelerated the phase out of hydrochlorofluorocarbons (HCFCs) in both Article 5 and non-Article 5 countries. Furthermore, it is intend to fulfill the requirements of the Executive Committee (ExCom) of the Multilateral Fund for the Implementation of the MP (MLF) respecting adoption and submission of a HCFC Phase Out Management Plan (HPMP) applied to Article 5 countries seeking MLF financial support.

This HPMP has been prepared by the National Ozone Unit (NOU) in the Ministry of Nature Protection of Armenia with the financial support of the MLF and with UNDP acting as implementing agency. It has been developed in accordance with the guidance issued by ExCom, specifically the document UNEP/OzL.Pro/ExCom/54/53[2] and ExCom Decision 54/39[3].

For purposes of the HPMP, Armenia is categorized as a Low Volume Country (LVC). Historically, ODS and specifically HCFC consumption has occurred almost entirely in the refrigeration servicing sector and has been almost exclusively HCFC-22. Therefore in a global context, Armenia would generally be considered a "servicing only" country. However, some direct consumption of HCFCs in commercial refrigeration manufacturing also exists, exclusively as refrigerant. Similarly, HCFC based products using HCFC-141b, specifically imported fully formulated polyol are used in commercial refrigeration manufacturing. The HPMP will also address these areas.

Consistent with the recommendations of draft ExCom guidance on HPMPs referenced above, a staged approach to the HPMP is taken based on a consumption baseline to be determined by the average consumption officially reported in 2009 and 2010. It involves presentation of a long term strategy directed to meeting the 2020 (35% baseline reduction) and 2025 (67.5% baseline reduction) phase out targets and ultimately effective elimination of HCFC consumption in 2030. However, within this overall strategy, the primary focus of the HPMP is on the actions required to achieve the immediate phase targets of a 2013 freeze at the baseline and 2015 10% reduction of the baseline.

1.2 Country Profile

1.2.1 Geography: Armenia is located in southern Transcaucasia, the region southwest of the Russian Federation between the Black Sea and Caspian Sea. Armenia is bordered on the north by Georgia, on the east and south west by Azerbaijan, on the south by Iran, and on the west by Turkey as illustrated in Figure 1.1 which includes a summary table of the of principle geographical statistics.

About half of Armenia's area of approximately 29,800 square kilometers has an elevation of at least 2,000 meters, and only 3 % of the country lies below 650 meters. The lowest points are in the valleys of the Araks River and the Debet River in the far north, which have elevations of 380 and 430 meters, respectively. Elevations in the Lesser Caucasus vary between 2,640 and 3,280 meters. To the

[1] http://ozone.unep.org/Meeting_Documents/mop/19mop/MOP-19-7E.pdf, Page 33
[2] http://www.multilateralfund.org/files/54/5453.pdf,
[3] http://www.multilateralfund.org/files/54/5459.pdf, Page 43, Annex XIX

southwest of the range is the Armenian Plateau, which slopes southwestward toward the Araks River on the Turkish border. The plateau is masked by intermediate mountain ranges and extinct volcanoes. The largest of these, Mount Aragats, 4,430 meters high, is also the highest point in Armenia. Most of the population lives in the western and northwestern parts of the country, where the two major cities, Yerevan and Gyumri are located.

The valleys of the Debet and Akstafa Rivers form the chief routes into Armenia from the north as they pass through the mountains. Lake Sevan, 72.5 kilometers across at its widest point and 376 kilometers long, is the largest water body. It lies 2,070 meters above sea level on the plateau. Terrain is most rugged in the extreme southeast, which is drained by the Bargushat River, and most moderate in the Araks River valley to the extreme southwest. Most of Armenia is drained by the Araks or its tributary, the Razdan, which flows from Lake Sevan. The Araks forms most of Armenia's border with Turkey and Iran while the Zangezur Mountains form the border between Armenia's southern province of Syunik and Azerbaijan's adjacent Nakhchivan Autonomous Republic.

Figure 1.1 Map of Armenia and Principle Geographic Statistics

Geographical Location	Southwestern Asia (Caucasus) South: 38 50' Northern Latitude North: 41 20’ Northern Latitude West: 43 30’ Eastern Longitude East: 46 00’ Eastern Longitude
Land area:	Total: 29,800 sq.km Water:1 400 sq. km Land: 28 400 sq. km
Land borders	Total: 1254 km Azerbaijan: 566 km; Azerbaijan-Nakhichevan: 221 km Georgia: 164 km; Iran: 35 km; Turkey: 268 km
Land use	Arable land: 18% Permanent crops: 2% Other: 80%(1998 est.)
Irrigated land	2 870 sq. km (1998 est.)
Elevation extremes	Highest: 4 090 m (Mount Aragats) Lowest: 450 m (River Debed)

1.2.2 Climate: Climate in Armenia generally depends upon elevation with weather changing according to the wide variety of geographical terrain. Mountain formations block the moderating climatic influences of the Mediterranean Sea and the Black Sea, creating wide seasonal variations.

Common July temperatures range between highs of 25-30 ^{0}C in the Ararat Valley to middle mountain regions summer highs of 18-20^{0}C. The absolute recorded high was 42^{0}C in Ararat Valley. Common January temperatures range between lows of -5 to -7^{0}C in the Ararat Valley, with an absolute recorded minimum of -30^{0}C; to middle mountain regions common lows of -8 to -12^{0}C and an absolute low of -46^{0}C recorded at Arpi. The average number of frost-free days in Armenia is 250 in Ararat Valley, and 150-200 days in the middle mountain areas. In the upper elevations no more than 30-50 days are considered frost-free. On the Armenian Plateau, the mean midwinter temperature is 0 °C, and the mean midsummer temperature exceeds 25 °C. Despite the harshness of winter in most parts, the fertility of the plateau's volcanic soil made Armenia one of the world's earliest sites of agricultural activity.

Armenia receives a total average precipitation of 550 mm. Ararat Valley receives the least amount of precipitation, 200-250 mm. The most amount of precipitation occurs in the upper elevations (up to 800 mm). and is concentrated during Spring and early Summer, with a second rainy season in October and November. The country receives an average of 2700 sun hours of light a year. In the summer months, the Ararat valley is perpendicular to the sun, and each sq. cm of land receives per minute 1.46 calories of heat.

1.2.3 Population: Armenia has a population of 3,437,000 (2007) and is the second most densely populated of the former Soviet republics. There has been a problem of population decline due to elevated levels of emigration after the break-up of the Soviet Union. The rates of emigration and population decline, however, have decreased significantly in the recent years, primarily due to Armenians returning. In fact Armenia is expected to resume its positive population growth by 2010.

The country has a relatively homogeneous ethnic character with ethnic Armenians make up 97.9% of the population. Yazidis make up 1.3%, and Russians 0.5%. Other minorities include Assyrians, Ukrainians, Greeks, Kurds, Georgians, and Belarusians. There are also smaller communities of Vlachs, Mordvins, Ossetians, Udis and Tats. Minorities of Poles and Caucasus Germans also exist. Armenia also has a relatively large diaspora (8 million by some estimates), greatly exceeding the 3 million population of Armenia itself, with communities existing across the globe. The largest Armenian communities outside of Armenia can be found in Russia, France, Iran, the United States, Georgia, Syria, Lebanon, Argentina, Australia, Canada, Greece, Cyprus, Israel, Poland and Ukraine. 40,000 to 70,000 Armenians still live in Turkey. In addition, approximately 139,000 Armenians live in the de facto country of Nagorno-Karabakh where they form a majority.

1.2.4 Government and International Relations: Armenia is former a republic of the Soviet Union that declared its sovereignty on August 23, 1990, and became an independent state a year later, on September 23, 1991. It is an independent, democratic, social, rule of law state. The state power is administered pursuant to the Constitution and the laws based on the principle of separation of the legislative, executive and judicial branches. The first constitution was adopted on July 5, 1995 and the second on November 27, 2005, both through a popular referendum.

The form of government is defined as a presidential representative democratic republic. The President, being elected by the citizens of the Republic of Armenia for a five year term of office, is the head of government and leader of a governing party in a multi-party electoral system sitting in the National Assembly. Executive power is exercised by the government. Legislative power is vested in both the government and the National Assembly. It has universal suffrage above the age of eighteen. The single-chambered National Assembly is the supreme legislative authority of the Republic of Armenia and consists of 131 deputies (75 of which are elected on the basis of proportional representation and 56 - majority representation). The National Assembly is elected through general elections for a term of five years. In the Republic of Armenia justice shall be administered solely by the courts in accordance with the Constitution and the laws. The courts operating in the Republic of Armenia are the first instance court of general jurisdiction, the courts of appeal, the Court of Cassation, as well as specialized courts in cases prescribed by the law.

Armenia is divided into ten provinces (*marzes*, singular *marz*), with the city of Yerevan having special administrative status as the country's capital. The chief executive in each of the ten provinces is the *marzpet* (*marz* governor), appointed by the government of Armenia. In Yerevan, the chief executive is the mayor, appointed by the president.

Armenia is a member of more than 40 international organizations, including the United Nations, the Council of Europe, International Bank for Reconstruction and Development, International Development Association, International Finance Corporation, European Bank for Reconstruction and Development, the Asian Development Bank, the Commonwealth of Independent States, the World Trade Organization, the Organization of Black Sea Economic Cooperation, and La Francophonie. It is also a member of the CTSO military alliance, and also participates in NATO's Partnership for Peace Programme and is also an observer member of the Eurasian Economic Community and the Non-Aligned Movement.

A particular priority of in the context of this HPMP is expanded cooperation with the European Union. A Partnership and Cooperation Agreement between Armenia and the European Union has been in place since 2000 and the country is active in the EU "European Neighborhood Policy"[4] and signed the EU-Armenia Action Plan[5] in 2006. Strong public support exist for seeking membership in the EU and government officials have expressed the desire for their country to eventually become an EU member state, some predicting that it will make an official bid for membership in a few years.

1.2.5 Economy: At the beginning of the 1990s, the newly independent Armenia entered into a period of radical change impacting political, social and economic systems. Between 1990 and 1993 GDP shrunk more than twice so that 1993 GDP was only 46.9% of the 1990 level - the largest decline in GDP among the CIS countries. Since 1994, however, Armenia has experienced uninterrupted economic growth which over the period 2004-2008 has averaged over 10% annually, with the largest overall growth in the region. However, the impact of the global recession has been reflected with lower growth in 2008 (6.8%) and expected negative growth in 2009 and 2010, followed by positive and increasing growth rates thereafter[6]. Economic growth has been broad-based, with each sector making contributions. The key contributors to GDP growth were the industrial, services and

[4] http://ec.europa.eu/world/enp/partners/enp_armenia_en.htm
[5] http://ec.europa.eu/world/enp/pdf/action_plans/armenia_enp_ap_final_en.pdf
[6] Country Partnership Strategy for the Republic of Armenia, World Bank Report 48222-AM, May 2009, http://siteresources.worldbank.org/INTARMENIA/Resources/CPSforWeb-Print.pdf

agricultural sectors[7]. In the industrial sector (43.6% in 2007), construction has been the fastest growing component with manufacturing sector declining. The service sector (38.1% in 2007) has also been increasing its share while the agricultural sector (18.3% in 2007) has declined. Imports still exceed exports by a ratio of 2:1 but export volumes have increased significantly in recent years.

With sustained, high, and broad-based economic growth, poverty in Armenia has continued to decline. Armenia registered a significant reduction in overall poverty, with the proportion of poor in the population declining from 58% in 1998 to 25% in 2007. Growth also cut extreme poverty-from 16% in 2001 to less than 4% in 2007. Poverty reduction has declined in both urban and rural areas although significant regional differences remain. Official unemployment rates have generally decline from 11% in 1999 to 6.3% in 2008, although these absolute rates are generally considered underestimated.

The main economic indicators for 2006-2009 period based on official government data[8] are given in the Table 1.1 below:

Table 1.1: Principle Economic Indicators

	2006	**2007**	**2008**	**2009***
Real sector indicators				
GDP, billion AMD	2,656.2	3,149.3	3,646.1	2,120.3
Real growth of GDP (cumulative), %	113.2	113.7	106.8	81.7
GDP deflator (cumulative), %	104.6	104.2	108.4	99.8
Unemployment rate (cumulative, %)	7.4	7.1	6.3	6.8
Population (thousand people)	3,222.7	3,230.1	3,238.4	3,245.9
Average monthly salary, AMD (cumulative)	64,278.0	77,469.0	91,331.0	98,369.0
CPI (cumulative) , %	102.9	104.4	109.0	102.9
CPI (at the end of the period, with respect to December of the previous year), %	105.2	106.6	105.2	102.7
Price index of industry (cumulative),%	100.9	100.6	102.2	100.8
Government sector indicators				
Budget balance (cash), % in GDP	-0.9	-0.8	-1.4	-21.5
External sector indicators				
Exchange rate AMD/USD (at the end of the period)	416.0	342.1	306.0	372.6
Exports of goods (FOB) , mln. USD	985.1	1,152.3	1,068.4	480.8
Imports of goods (CIF), mln. USD	2,191.6	3,276.6	4,410.3	2,251.5
Trade balance , mln. USD	-1,206.5	-2,124.3	-3,341.9	-1,770.9

* The first three quarters covered

1.2.6 Environmental Overview: Upon independence in 1992, Armenia had accumulated a similar range of environmental legacies characteristic of many countries in the Former Soviet Union and Eastern Europe operating under command economies that had fallen behind in terms of balancing gross production with environmental quality. In 1998, the country adopted its first formal National Environmental Action Programme (NEAP-1)[9]. Based on its implementation, it has made significant gains in improving environmental protection and the general quality of its environmental resources over the last decade. Based on a periodic updating process, NEAP 2[10] is currently being finalized to sustain this process.

[7] http://devdata.worldbank.org/AAG/arm_aag.pdf
[8] Central Bank of Armenia, National Statistical Service of Armenia, http://www.armstat.am/en/
[9] http://www.mnp.am/eng_htmls/frset_glink7_1.htm
[10] Draft Second National Environmental Action Programme, MNR, October 2007

The principal environmental issues identified in the country include maintaining biodiversity, combating desertification, addressing climate change impacts and adaptation issues, urban air quality, water quality and distribution, and hazardous and solid waste management. In addition to specific programs to address these specific issues, a number of overarching policy themes are being pursued including i) reduction in the current dependence on high energy intensity technology with adoption of cleaner production approaches, ii) ecosystem approaches to land and service water protection, iv) integration of environmental and sustainable development into national economic and social policy particularly in relation to health and poverty reduction, and v) maintaining and expanding participation in multilateral environmental agreements, both regionally and globally.

Of particular interest at a policy level is enlarging of cooperation with EU in the environmental sector and integration with EU institutions. In this regard the effective implementation of the provisions of Partnership and Cooperation Agreement between Armenia, the EU European Communities and its member countries is considered a primary vehicle for this, something that is given substance under the EU "European Neighborhood Policy" and EU-Armenia Action Plan. These specifically attach priorities to things like harmonization of regulation generally, particularly those on environment, trade and customs with the EU

Armenia is a signatory and/or Party to a wide range of international agreements and conventions related to the environment. The principle ones with some relation to ozone protection issues are listed below.

Convention/Agreement	Signature	Ratification/ Accession (a)
Vienna Convention	n/a	Oct. 1/1999
Montreal Protocol	n/a	Oct. 1/1999
– London Amendment to the Montreal Protocol	n/a	Nov. 26/2003
– Copenhagen Amendment to the Montreal Protocol	n/a	Nov. 26/2003
– Montreal Amendment to the Montreal Protocol	n/a	Dec. 18/2008
– Beijing Amendment to the Montreal Protocol	n/a	Dec. 18/2008
Stockholm Convention on Persistent Organic Pollutants	May 23/2003	Nov. 26/2005
Basel Convention on the Trans-boundary Movement of Hazardous Waste and their Disposal	n/a	Oct. 1/1999 (a)
Rotterdam Convention on Prior Informed Consent for Certain Chemicals and Pesticides in International Trade	Sept. 11/ 1998	Nov. 26/2003
UNECE Convention on Long-Range Trans-boundary Air Pollution	n/a	Feb. 21/1997 (a)
– Gothenburg Protocol to Abate Acidification, Eutrophication, and Ground-Level Ozone	Dec.1/1999	
– Aarhus Protocol on Persistent Organic Pollutants	Dec. 18/1998	
– Aarhus Protocol on Heavy Metals	Dec. 18/1998	
Convention on Access to Information, Public Participation in Decision Making, and Access to Justice in Environmental Matters	June 25/1998	June 27/2001
– Protocol on Pollutant Release and Transfer Registers	Mar. 21/2003	
ESPOO Convention on Environmental Impact Assessment in a Trans-boundary Context	n/a	Feb. 21/1997 (a)
– Protocol on Strategic Environmental Assessment	Mar. 21/2003	
UN Framework Convention on Climate Change	June 13/1992	May 14/1993
– Kyoto Protocol	n/a	April 25/2003
UN Convention to Combat Diversification	Oct. 14/1994	July 2/1997
Convention on Biological Diversity	June 5/1992	May 14/1993
– Cartenga Protocol on Bio-safety	n/a	April 30/2004 (a)
Convention on Trans-Boundary Effects of Industrial Accidents	n/a	Feb. 21/1997

1.3 History and Status of ODS Phase Out

Armenia was relatively late in formally joining the Montreal Protocol and implementing ODS phase out. It acceded to the Vienna Convention and Montreal Protocol in 1999. Targeted action on the issue began in 2000 with the development of the Country Program which was completed in 2002. In 2003 the country acceded to the London and Copenhagen Amendments assuming phase out obligations for all principle ODS including HCFCs. This also allowed the country to qualify for international assistance for CFC phase out. The country subsequently acceded to the Montreal and Beijing Amendments in 2008 making it up to date on assumption of obligations under the MP. Upon becoming a Party, the country was initially classed as a non-Article 5 country eligible to receive support from the Global Environmental Facility (GEF) but in 2002 this was changed[11] and Armenia now operates under Article 5 of the MP and qualifies for international assistance under the MLF.

International assistance on ODS phase out began in 2000 when Armenia was considered an Article 2 CEIT with the inclusion in the GEF pipeline of a "Programme for Phasing Out Ozone Depleting Substances" [12] including a US$159,000 project preparation grant that assisted in developing the Country Program[13] Following GEF approval of the Country Program and formally meeting the GEF eligibility requirement of ratification of the London Amendment, the full scale project was approved in 2004 and implementation began in 2005, coincident with formation of a formal National Ozone Unit (NOU) in the Ministry of Nature Protection. The overall project consisted of six sub-projects that were undertaken and completed in the period 2005-2009 addressing capacity building (NOU support and customs capacity), refrigeration technician training, recovery and recycling program, awareness and incentive program, refrigerant management plan monitoring, investment in CFC-11 and CFC-12 phase out in domestic and commercial refrigeration, and CFC-11/12 phase out in consumer aerosols. Subsequent to its reclassification as an Article 5 Country, Armenia has received support from the MLF through two projects; an ongoing institutional strengthening project that sustains support for the NOU as well as institutional development and awareness activities, and the current project for the preparation of the HPMP. The Table 1.2 below summarizes the international support projects undertaken to date or currently underway.

Table 1.2 International Support Projects

Project Name	Financial Support Agency	Funding (US$)	Implementing Agency/Partner	Status/Remarks
1. Programme for Phasing Out ODS	GEF Project ID: 1226	2,086,772	UNDP PIMS#2646	Completed March 2009
1.1 GEF Project Preparation Grant (PDF-B)	GEF	159,000	UNDP	Completed 2002
1.2 Institutional Strengthening and Capacity Building: Establishment of an Ozone Office and Training for Customs Officers and Refrigeration technicians	GEF	233,860	UNEP/DTIE GFL-2328-2750-4820, PMS:GF/4040-05-02	Completed March, 2009
1.2 Awareness and Incentive Programme	GEF	446,638	UNDP/UNOPS PIMS#2648	Completed May, 2009
1.3 National Programme for Recovery/Recycling of Refrigerants	GEF	551,306	UNDP/UNOPS PIMS#2646	Completed May, 2009
1.4 Monitoring the Activities in the RMP	GEF	50,000	UNDP/UNOPS PIMS#2647	Completed May, 2009

[11] http://ozone.unep.org/Meeting_Documents/mop/14mop/14mop-9.e.pdf, Decision XIV/2

[12] http://www.gefonline.org/projectDetailsSQL.cfm?projID=1226

[13] http://www.gefonline.org/ProjectDocs/Ozone%20Depletion/Armenia%20Programme%20for%20Phasing%20Out%20Ozone%20Depleting%20Substances/ExSummCountryProgram%20Final.pdf

Project Name	Financial Support Agency	Funding (US$)	Implementing Agency/Partner	Status/Remarks
1.5 Phase-out of CFC 11/12 mixture in the Manufacture of Aerosols by Conversion to Hydrocarbon Propellant at Yerevan Household Chemistry Plant	GEF	211,200	UNDP/UNOPS PIMS#2650	Completed August, 2006
1.6 SAGA – Phase-out of CFC 11 & CFC 12 by Conversion to CO_2 & HFC 134a and R 404 in the Manufacture of Commercial Refrigeration Equipment	GEF	158,860	UNDP/UNOPS PIMS#2649	Completed, January, 2006
2. Institutional Strengthening and Capacity Building:	MLF MP/ARM/09/002	120,000	UNIDO	Ongoing
3. Preparation of an HCFC Phase Out Management Plan (HPMP)	RM/PHA/55/PRP/03	85,000	UNDP	Ongoing

The principle focus of Armenia's efforts in meeting its Article 5 country obligations under the Montreal Protocol to date have focused on the phase out of Annex A and B substances, particularly CFCs. More specifically this has involved sustaining the initial freeze on CFC consumption and meeting the 2005 (50%) and 2007 (85%) reduction targets leading to complete phase out January 1, 2010, which has been achieved. Through implementation of its Country Program noted above the following specific results are highlighted and are elaborated on the NOU web site[14]:

- *Institutional Capacity:* Beginning in 2005, Armenia has maintained an active NOU, currently consisting of three fulltime and one part time staff, within the Ministry of Nature Protection, along with national technical consultants working on refrigeration, customs, methyl bromide, and awareness issues. In addition to administering Country Program implementation, the NOU has developed and put in place a menu of regulations supporting current Annex A and B ODS phase out obligations including the establishment of a permitting (licensing) system and obtaining country ratification of all current amendments to the MP.
- *Customs Training:* In association with development of the permitting system, training for of 112 customs officers has been completed and refrigerant detection equipment supplied (12 units) supplied to customs houses and border entry points.
- *Refrigeration Technician Training:* 712 refrigeration technicians were provided with introductory training and 2 training centers established: one in Yerevan and the other in Gyumri (Shirak Marz) with a further plan of permanent operation for hosting refrigeration technician training.
- *Public Awareness:* A number of awareness raising seminars and other events (round tables, exhibitions, TV programs, etc.) have been organized targeting the general public. Within the overall awareness campaign publications and video/audio materials were produced among which is a poster devoted to the 20th Anniversary of the Montreal Protocol which won the Best 20th Anniversary Related Poster Prize in 2007.
- *Refrigeration Equipment Retrofit/Replacement (Awareness and Incentive Program)*: 35 enterprises on the food industry sector received incentives (US$ 3,000-15,000/enterprise) to undertake retrofit or replacement of their ODS-based (CFC-12 or R-502) equipment resulting in elimination of 5.3 ton of CFC-12 charge.
- *Refrigerant Recovery/Recycling:* 70 sets of portable recovery equipment and 100 manual recovery pump sets were delivered to respective number of refrigeration technicians who had the best progress in previous training. 260 refrigeration technicians were trained in good practices in refrigeration based on this equipment. 4 sets of recycling equipment were distributed to the 4 Recycling Centers located throughout the country (2 in Yerevan, 1 in Vanadzor and 1 in Artashat)

[14] http://www.nature-ic.am/Ozone/C/eE1/n.htm

to be used to recycle and clean the recovered refrigerant. 2 MAC Recovery/Recycling/Evacuation/Charging units were delivered to automotive air conditioner service centers. All equipment has capability for both CFC-12 and HCFC-22. Estimated reduction in virgin CFC consumption was estimated to be 13 tons. The Table 1.3 below summarizes the results of the monitoring and reporting of recovered and recycled refrigerant noting that amounts recovered and refilled without recycling are not included.

Table 1.3: ODS Recovery and Recycling Performance

Year	Recovered (kg)		Recycled (kg)	
	CFC-12	**HCFC-22**	**CFC-12**	**HCFC-22**
2006 (April-December)	2,599	1,321	456	198
2007	2,198	1,387	1,355	880
2008	862	1,081	495	673
2009	370	1,621	210	950
Total:	6,029	5,410	2,516	2,701

- *Phase out in Commercial Refrigeration Equipment Manufacturing*: The use of CFC-11 in foam blowing and CFC-12 as refrigerant was eliminated at SAGA the country's only manufacturer of refrigeration equipment. 6.5 ODP tons/year of CFC consumption was eliminated.
- *Phase out of CFCs in the Manufacture of Aerosols:* The Yerevan Household Chemistry Plant's consumer aerosol production capacity was converted to use hydrocarbon propellants in its production, eliminating consumption of 14.3 ODP tons of CFCs.

1.4 Lessons Learned

Over the relatively short period that Armenia has been directing focus efforts on ODS phase out under the Montreal Protocol a number of lessons have been learned that are specifically relevant to the development and ultimate implementation of HCFC phase out, and which should be taken into account in the HPMP.

Overall, the country can be characterized as being concerned about consumption only, in the absence of any production of either CFCs or HCFCs. The nature of its geographical location, being relatively isolated makes its trade focus on controlling imports for use in the country, without a high likelihood of re-exporting as a transit country. While there is some historic consumption of ODS in the manufacturing sector, ODS consumption and the primary challenges in addressing it have and will likely continue to be in the refrigeration servicing sector. The strong emphasis on refrigerant management planning activities under the Country Programs implementation to date reflect this focus and its importance in achieving phase out of CFCs. However it is also recognized that this was achieved in significant part by conversion to HCFCs, in refrigeration and to some degree in expansion of manufacturing operations. Similarly, the recent period of high economic growth has significantly increased the utilization of refrigeration and air conditioning (RAC) equipment, a large portion of which has been HCFC based. In that regard, an associated lesson is that an HPMP needs to anticipate future phase out global control measures such as might be applied to HFCs.

Following from the experience to date related to technical capacity building an important lesson is that this is not a onetime initiative and must be sustained. This is particularly true for the training of customs officials and refrigeration technicians where progressive changes in country obligations, technology and the inevitable high turnover rates in these areas requires continuous new and refresher training to support even existing obligations.

Another important lesson learned, is the importance of awareness both among stakeholders and the general public in achieving and sustaining ODS phase out. This has been an integral part of the work in each area addressed in the Country Program implementation to date with a practice adopted of holding stakeholder workshops during and at the conclusion of major projects, and the production of general educational material for wide distribution by a wide range of dissemination vehicles. The acceptance of regulatory control measures over a relatively short period must in part be attributed to these awareness and consultation activities. This has been continued during the preparation of the HPMP where three stakeholder workshops have been held at each stage of its development, and has underpinned the process of its acceptance and endorsement.

Finally, a key lesson learned is the importance of maintaining strong institutional capacity in support of ODS phase out activities and the value of having this embedded in a line Ministry with overall responsibility for environmental protection and enforcement. From a national perspective, this is critical to creating the necessary regulatory frame work, obtaining stakeholder and ultimately government policy commitment to its implementation and to implementing it effectively. For the HPMP, the need for a close institutional linkage within the responsible Ministry related to climate change initiatives is an important need underpinned by this experience. With respect to implementation of regulatory and legislative measures, an important lesson is recognition that it takes some time for these to become fully effective after they are in place, which is something that needs to be taken into consideration in the HPMP. From an international perspective, an associated lesson may also be the high importance of strong institutional capacity that can act as both an effective champion for ODS phase out and who can undertake the implementation of international assistance directed to doing so.

2.0 Description of Existing Policy, Legislation, Regulation and Institutional Framework

2.1 General Policy and Regulatory Framework

Armenia's overall policy respecting the phase out of ODS is reflected in its original accession to the Montreal Protocol in 1999 along with subsequent ratification of all current amendments, hence a policy commitment to meet applicable control measures. This overarching commitment along with detailed aspects that give it substance has been formalized in the form of national legislation and supporting government resolutions addressing specific issues such as application of import quotas and a permitting (licensing) system.

The national framework for the regulation of ODS under the Montreal Protocol and the administration thereof within the national institutional structure is defined by overarching legislation entitled the Law on Substances that Deplete the Ozone Layer enacted in 2006. This law provides the legal basis for applying restrictions on the production, import, export, and transit movement of ODS controlled under the Montreal Protocol as well as providing for restrictions to be applied in related legislation, including the Customs Code of the Republic of Armenia and the Law on the Protection of Atmospheric Air of the Republic of Armenia. The legislation acknowledges that the obligations and restrictions contained in treaties and international agreements have precedent over national legislation.

Under the framework of the Law on Substances that Deplete the Ozone Layer, a series of specific regulations enacted under Government Resolution were put in place in 2007 as summarized in Table 2.1 below.

Table 2.1: Legal Acts Governing Ozone Depleting Substances

Legal Act Name	Adoption Date/No
Law on Substances that Deplete the Ozone Layer	27 November, 2006
RA Government Resolution on the Acknowledgement of the Authorized Government Body in the Sector of ODS Usage	15 March, 2007/291-N
RA Government Resolution on the Approval of ODS List and ODS Global Quota Establishment	15 March, 2007/327-N
RA Government Resolution on the Approval of Quota Establishment Procedure for Ozone Depleting Substances Import	17 May, 2007/591-N
RA Government Resolution on the Approval of ODS Import, Export, Transit Shipment Permit Form and Its Issuing Procedure	21 June, 2007/771-N
RA Government Resolution on the Approval of the ODS Recording Procedure	27 December, 2007/1565-N

Government Resolution 2007/291-N assigns responsibility to the Ministry of Nature Protection (MNP) as the authorized government body for administration and implementation of the legislation with the following explicit authority: i) development of legal acts on ODS import, export and transit; ii) recording of ODS quantities and transactions; iii) establishment of ODS import quotas; and iv) issuing of ODS shipment permits upon application. Responsibility for recording shipment permits is also assigned to the Government Adjunct State Revenue Committee that acts as the state customs authority.

Subsequent Government resolutions establish a list of ODS subject to controls, based on the Montreal Protocol, and bans ODS production, import from and export to Non-Parties to the MP, as well as ODS transit through the territory of Armenia if the importing or exporting countries are Non-Parties to the MP.

Additionally, an overall (global) quota for ODS import into the territory of Armenia is established annually in accordance with the control measures in the MP in advance of the international control measures coming into force. This is presently applied to Annex A and B substances. A further legislative act, either in the form of a new government resolution, amendment to an existing one or potentially the Law on Substances Depleting the Ozone Later will be required to allow application of similar quota mechanisms for HCFCs as well as any extension of licensing and import restrictions on HCFC containing products..

2.2 Implementation of the Permitting System[15] and Application of Quotas

The procedure for establishing actual annual quotas defining the maximum amount of an ODS allowed for import, involves setting an overall quota by June 30 of the calendar year prior to that which it is to be applied. This is done formally by the Government based on the recommendation of MNP. MNP then administers this quota through an allocation/permitting system where individual importers make application for an allocation under the overall quota and then request permits for each actual import transaction within their allocation. Provision in administering the allocation is also made to adjust individual quota allocations during the reporting year where there appears to be lower allocations applied for than the amounts allowed under the overall annual quota. The availability of additional allocations is advertised on MNR (www.mnp.am) and the NOU (www.ozone.nature-ic.am) web sites, as well as in at least one newspaper having a minimum circulation of 2,000.

The application process for individuals or enterprises to obtain an initial quota allocation or additional allocation involves submission of an application containing: i) an application form (provided by MNP), and ii) a copy of a state registration certificate for legal entities or a copy of an identification document for physical persons. Where import of more than one ODS is applied for, the permitted quantities established for separate substances are identified within one import quota allocation. MNP can accept the application as proposed, partially accept the application with a reduced quota allocation, or reject the application. Causes of rejection would include import proposed from a non-Party or the amounts would result in exceeding the overall annual quota. In case the application is approved at a reduced amount or rejected the applicant is provided with a written notice substantiating the decision made. If the total ODS import quantities contained in the initial applications submitted exceeds that of the ODS overall import quota established for the reporting year, allocations may be on a proportional basis as well as an assessment of economic importance of the intended use based MNP's decision.

During the year, an allocation holder may import in single or multiple lots or shipments, provided prior notice in writing is provided to MNP in the form of an application for an import permit, including data on each import date and imported ODS quantities. Provided the application/notice is accepted, MNP will issue a shipment permit. Rejection may occur if the application does not meet

[15] The term permitting rather than licensing is used in this document to maintain consistency with Armenian Law which differentiates between legal permissions issued for activities and actions. The permitting system has been accepted by the Ozone Secretariat as meeting the requirements for a national licensing system.

legal and regulatory restrictions related import, export or transit transactions under the Law on Substances that Deplete the Ozone Layer, in which case MNP provides the applicant with written notice on the reasons for rejection. The shipment permit is issued in three parts, 1 original and 2 copies. The original and one of the copies of the document are provided to the applicant whereas the other copy remains with MNR. The applicant submits one of the shipment permit copies to the Government Adjunct State Revenue Committee as part of the shipment clearance process into the country. For every single ODS shipment permit issued by MNP the applicant pays a national tax amounting to AMD 50,000. The ODS shipment permit is issued to the applicant only upon the submission of the receipt for payment of the national tax to the MNP of Armenia. A requirement of all recipients of a shipment permit in a particular calendar year is that by February 25 of the following year they submit a report to the MNP the disposition and usage of the ODS imported under the issued permits within their quota allocation.

The Government Adjunct State Revenue Committee provides MNP with information on ODS import, export and transit within a month after the completion of the transaction. The information includes data on ODS import/export/transit quantities of ODS, the transaction period, names of importing and exporting countries all correlated with the import permits issued by MNP. MNP and the Government Adjunct State Revenue Committee perform overall ODS reporting on an annual basis. The ODS reporting and record keeping system is maintained continuously with supporting documents, information on quantitative and qualitative indicators, as well as on transactions regarding their import, export and transit, including registration of the ODS-related data maintained in the ODS record book and a separate documents folder.

Overall the existing policy/legislative/regulatory and institutional framework governing the control of ODS in Armenia provides the basic capacity to control the import of ODS chemicals currently subject to control measures under the MP. It has the capability to apply import quotas supported by a permitting (licensing) system that tracks actual ODS chemical imports and their disposition within the country, as well as providing for reporting and record keeping. The administrative structure and supporting procedures are in place and largely implemented to accomplish these tasks. However, it is also recognized that this system has only been operational for two years and as such is still maturing as experience and awareness increases. Looking to the future, it is also recognized that the addition of active control measures as will occur in 2013 with a freeze on HCFC consumption with subsequent reductions will add an additional dimension to this activity. While not critical to date, a recognized gap in the legislative/regulatory framework is the absence of control or administrative measures on the import of ODS containing equipment and products[16].

2.3 Measures respecting HCFCs

Apart from the assumption of HCFC phase out obligations current under the MP, specific legislation and regulation applicable to HCFCs is limited to HCFC chemicals being subject to import permitting as an ODS. This permitting does not include HCFC containing equipment or products. The preparation of the HPMP represents the country's first formal initiative in relation to accelerated HCFC phase out.

[16] In this document the terminology ODS or HCFC containing equipment and products includes equipment containing ODS or HCFCs, and equipment that rely on ODS or HCFCs

2.4 Stakeholder Involvement in the Policy and Regulatory Regime

Armenia has a long standing formal process of developing and reviewing all legal acts either in the form of Laws or Government Resolutions, the latter being generally used for regulations such as would be required as part of the HPMP implementation. This is done with the overall framework of a Government Legislative and Regulatory Action Plan that covers a 4 to 5 year period. When responsible competent authorities, in this case MNP, identify such action they make application for inclusion of the proposed measures for inclusion in this Action Plan. Upon acceptance, the required legislation or regulations are drafted by the authority, finalized internally through a process of interdepartmental agreement and with external stakeholder consultation as appropriate. It is then submitted for inter-agency review within the government that includes all identified stakeholder authorities with mandatory inclusion of the Ministry of Finance. Once this is completed and all comments are incorporated, it is submitted to the Ministry of Justice for legal review and submitted to the Government for final approval by a Ministerial Committee. In the case of a formal law, this is also reviewed by the Constitutional Court, a process that typically takes 2 to 3 months, and is followed by submission to the National Assembly. Here a law would be subject to the review by a legislative committee followed by passage through at least two readings in the Legislative Assembly and finally passage into law with the appropriate promulgation measures applied. In general the process for a law takes at least a year while Government resolutions take 3 to 8 months. For all legal acts, there is a requirement for public disclosure and solicitation of input before final government consideration.

At the level of end users, individual service providers and the general public, the NOU's implementation of the Country Programme previously described has involved extensive awareness and public disclosure on ODS phase out. Annex A provides a representative list of the stakeholder workshops, information products produced and activities undertaken including three stakeholder workshops involving government, industry and NGO participants directly related to the development of this HPMP.

The associated monitoring activities applied during the Country Programme implementation and ongoing institutional strengthening has served to feedback lessons learned to the policy level. In terms of direct incentives that have been used, the Awareness and Incentive sub-project in the Country Programme applied an end user incentive program to promote the conversion from CFCs in refrigeration equipment.

2.5 Multilateral Fund Projects involving Replacement of CFCs with HCFCs:

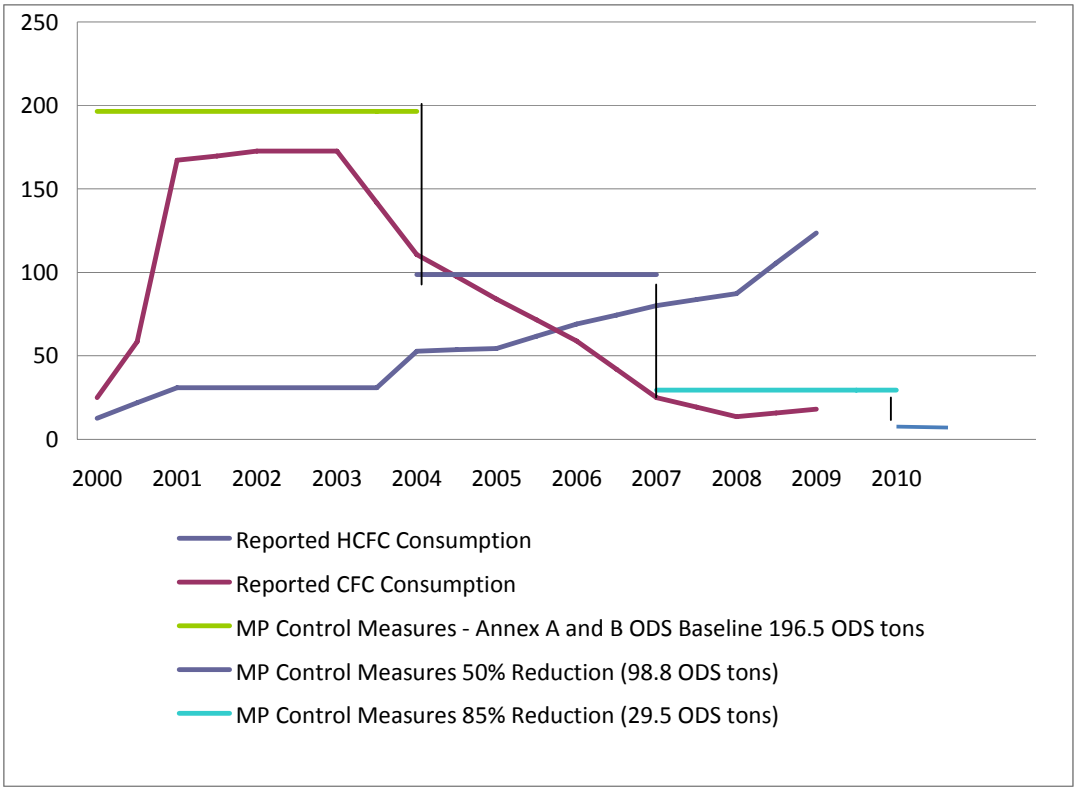
No MLF projects have been undertaken involving replacement of CFCs with HCFCs. However, GEF funding for retrofit and replacement was predominately directed to transition from CFCs to HCFCs. GEF funding for SAGA was primarily used for conversion to HFC refrigerants in domestic refrigeration equipment and some lines of commercial equipment with subsequent development of other products utilizing HCFCs.

3.0 Data Collection and Surveys

3.1 Survey Methodology and Approach

The general profile of ODS import, export and use indicated that ODS consumption in Armenia has effectively been equal to imports, given that the country has no production capability and has never been an exporter or transit country. Recorded ODS imports and consumption have been confined to CFC-11, CFC-12 and HCFC-22. Historically, CFC consumption was primarily attributed to the refrigeration servicing sector although some direct consumption occurred in the manufacturing sector (aerosol and refrigeration sectors) until 2006. The consumption in the refrigeration servicing sector transitioned between 2002 and the present from predominately CFC-12 to HCFC-22 with new CFC-12 consumption being eliminated at the end of 2009. This consumption profile based on consumption reported to the Ozone Secretariat[17] is illustrated in graphical and tabular form in Figure 3.1, noting that 7.5 tons of HCFC-141b contained in imported fully formulated polyol was also reported in 2009..

Figure 3.1: CFC and HCFC-22 Consumption 2000-2009 (ODS tons)



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CFCs (Tons)	25.0	162.7	172.7	172,7	110.7	84.0	59.0	25	13.6	18.1
HCFC-22 (Tons)	12.7	30.9	30.9	30.9	52.7	54.5	69.1	80	87.3	123.9

[17] http://ozone.unep.org/Data_Reporting/Data_Access/

The above data shows that the country is currently on a steady, continuing, and relatively rapid upward trajectory in terms of HCFC-22 consumption. This is in part associated with the replacement of CFC-12 based equipment with that operating on alternative refrigerants of which HCFC-22 is the main one. There has also been some transition to HFCs in this process but, based on reported data there has been negligible use of HCFC based drop-in mixtures to retrofit and sustain operation of CFC based equipment, as has been seen in some other CIS countries or use of HCFC based blends such as HCFC-406a. There has also been a secondary contribution to HCFC-22 consumption from its use as a refrigerant in the manufacture of commercial refrigeration equipment. Additionally, there is a small amount imported HCFC-141b based fully formulated polyol used in the manufacture of commercial refrigeration equipment and insulating panels that has also been reported. No historical consumption or use of HCFC has historically been reported or known in other sectors such as fire protection, aerosol or solvent applications.

The methodology for estimating ODS consumption and HCFC consumption in particular has historically been based on statistical estimates, customs data where available. After 2002 with the initiation of the Country Program this has increasingly been based on data and contacts developed by the NOU and its national experts particularly in the course of implementing the overall refrigerant management plan and components involved with upgrading service capacity and refrigeration retrofit/replacement incentive programs. Beginning in 2008 additional information was added from the permitting system described above and 2009 reporting is based on the detailed survey and analytical work reported herein.

In selecting a methodology for estimation of current HCFC consumption on which to base the HPMP, the application of a strictly "top down" approach relying primarily on import and permitting data, along with applicable statistical data as may be available, while useful as a reference, was considered insufficient in supporting the development of an effective HPMP. As in any country, the accuracy and comprehensiveness of this type of data will be a function of the capacity of the responsible institutions to identify imported HCFCs and HCFC containing equipment through statistics kept by customs authorities, and the maturity of the permitting system.. In the case of Armenia, this system has only recently been implemented and is still maturing. It is anticipated, in part through actions taken under the HPMP that present inconsistencies in reporting, customs code application, and coordination between agencies, its reliability will increase. The accuracy of such a system will also be a function of the degree to which importers, distributors and end users of such equipment voluntarily comply with reporting and control measures and what economic and structural factors may exist to discourage such compliance. Generally, it is anticipated that estimation of national consumption using this kind of "top down" official process will tend to understate true consumption until it fully matures. However, in the longer term and as a result of HPMP implementation, such "top down" reporting should be enhanced so it can serve as a reliable base for official reporting and compliance performance measurement.

Therefore for purposes of the HPMP, a "bottom up" survey approach has been adopted using the information base developed during country program implementation as the basis for surveys of end users (those that operate refrigeration equipment and manufacturers potentially using HCFCs and alternatives) and of service providers in the refrigeration sector and those who import and distribute chemicals for re-sale. Recognizing the primary focus would be on the refrigeration servicing sector, emphasis was placed on estimating the bank of refrigerant in operating equipment, and the experience of refrigeration servicing enterprises, as well as that of distributors and importers.

The survey work was undertaken by national experts and involved data collection directly at the enterprise level, including import/distribution enterprises, end users of HCFCs and HCFC containing equipment, and refrigeration servicing organizations. Where available statistical data related to the utilization and import of HCFC containing equipment in the country has also been used. This approach has been facilitated by being able to access the extensive network of contacts maintained by the NOU generally and particularly in the refrigeration sector, including involvement of the refrigeration association. Additional contacts among end users generally were obtained through relevant national and local government agencies, as was the statistical data related to the utilization of operating HCFC containing equipment and its import.

Given the relatively small size of the country as well as the general concentration of refrigeration and air conditioning equipment in several regions and urban centers, the number of survey targets while significant was of a size that survey's could generally conducted by direct contact from experts, either using telephone, electronic communication and/or visits. In this regard the national expert team was assigned specific sectors and sub-sectors that may utilize HCFCs and alternatives namely: i) end users of industrial refrigeration equipment; ii) end users of commercial refrigeration equipment; iii) end users of transportation refrigeration equipment; iv) end users of air conditioning equipment, heat pumps and chillers units; v) RAC servicing enterprises; vi) manufacturers of RAC equipment; vii) manufacturers of PU rigid foams based products; and viii) importers and distributors. Respondents were asked to respond verbally with the local expert completing a standard form developed by the NOU and UNDP based on survey formats being used in a number of MLF and GEF projects in the region. Responding enterprises were then asked to verify information in writing or by e-mail, where possible and practical. Annex B summarizes the type of information solicited for each of the above sectors and sub-sectors.

In total, 151 end users,10 importers/distributors, 28 refrigeration serve providers, 2 foam sector enterprises and 1 refrigeration equipment manufacturing enterprises were identified, contacted and responded. The overall coverage of end users is estimated to be 70% in the industrial, large commercial and transportation sectors. Coverage in the air conditioning/chiller/heat pump sector was lower as discussed in Section 3.3.

3.2 HCFC Supply and Import/Export Profile

There were a total of 10 enterprises reporting and permitting importers of HCFCs in 2008 and 2009, with 4 having permits in 2008 (a total of 5 permits with one importer receiving 2 permits) and 7 (a total of 15 permits) in 2009. Only one importer received permits in both years, something that indicates the fluid nature of the business. In most cases they were also importing HFCs (HFC-134a, HFC-404a) as well. These enterprises include enterprises that are end users themselves, trading firms acting strictly as importing agents and distributors. The supply of HCFC-22 to the country originated primarily from sources in the UAE with Iran being the main transit country. The original production sources of this material are China, India and the EU with a general preference stated by importers and distributors for material produced in the EU and India on the basis of better quality, although it was generally higher cost. The form of import is generally in non-refillable or returnable containers ranging from 10 to 15 kg which are tailored for direct sale to end users and refrigeration service providers. While larger importers/distributors would import in bulk returnable containers and refill in smaller returnable containers, infrastructure for local re-filling is lacking. End users who are also importers express a preference for container sizes tailored to direct application which in the cases of

service enterprises will be smaller containers. There is no official export of HCFCs from the country and it does not appear to be a transit country for movement of HCFCs to other countries.

3.3 Current HCFC Consumption

A basic requirement of developing an effective HPMP is to obtain as accurate an estimate of current HCFC consumption as possible along with a quantitative and qualitative characterization of this consumption by sector. This will provide the starting point for forecasting and scenario trend analysis so that compliance risks and issues can be identified and responses developed in the HPMP. As previously indicated consumption is largely confined to servicing of the accumulating bank of HCFC containing equipment in the country, hence this will be the main focus of estimation of current consumption. The relatively small consumption in the manufacturing sector can be directly obtained from few enterprises involved.

There are several methodologies available to make the estimate of current HCFC-22 servicing consumption including: i) simple extrapolation by a historical recent composite growth rate of 2008 reported consumption; ii) use of available 2009 import permit data; iii) current survey data adjust for coverage and overlaps: iv) calculation of statistically based estimates of the bank of HCFC containing equipment in the country.

Extrapolation of 2008 reported consumption would estimate a consumption of between 96 to 101 tons depending on whether the rate of growth in reported consumption from 2007 to 2008 (9%) or the average rate of increase from 2005 to 2008 (16.6%) was used. While this likely provides a reasonable global estimate of overall current consumption, it does not allow any discrimination between sectors and applications. Application of 2009 import permit data, as previously noted has some limitations due its very recent introduction and still being implemented. The current 2009 total permitted HCFC-22 import is 34 tons, a number that still substantially underestimates consumption based on historical estimates and, as described below, the current survey based estimates. Data on imports of specific categories of equipment and statistical data on numbers of applications may be more useful particularly at the sector level.

The approach selected for the estimate of current HCFC consumption used in the HPMP was primarily based on the survey data with some adjustments made for uncertainties and the use of statistical information where applicable. As noted previously, the survey approach focused on the end users by sector and the use of leakage rates arrived at by using data provided by users and refrigeration service providers. These numbers were correlated with consumption survey results from major service providers and a survey applied to individual service technicians operating outside of organized service enterprises. Also available was data from the Government Adjunct State Revenue Committee on the import of HCFC equipment. As noted above the direct national HCFC consumption and that consumed in the form of HCFC content of products used in manufacturing (i.e. imported fully formulated polyol) in the manufacturing sector was obtained by direct survey from the enterprises. Table 3.1 below provides a summary of the raw survey data for end user and the refrigeration servicing sector.

Table 3.1: Summary of Raw HCFC and other Refrigerant Consumption Survey Data

Sector	Number of Enterprises	No of Units	Charge (kg)				Annual Servicing Requirement (kg)			
			CFC-12	HCFC-22	HFC	Other (NH_3)	CFC-12	HCFC-22	HFC	Other (NH_3)
End User Sector										
Industrial Refrigeration	103	1,291	7,153	45,980	3,837	22,800	765	11,310	436	3,370
Commercial Refrigeration (Large Enterprises)	33	23,873	4,448	28,040	51,241	8,000	906	6,920	5,792	800
A/C, Heat Pump, Chillers	15	4,561 (Note 2)	-	11,582	492	-	-	3,012	150	-
Transport	23 (Note 1)	3,341	315	16,540	5,369	-	108	5,540	1,277	-
Refrigeration Servicing Sector										
Servicing Enterprises (Amount recycled)	6	n/a	n/a	n/a	n/a	n/a		12,440 (1,230)	5,010 (1,000)	1,000
Servicing Individuals	22	n/a	n/a	n/a	n/a	n/a	n/a	21,930	n/a	

Note 1: Estimates include approximately 500 individual private operators
Note 2: All A/C units except for 32 chillers

The following provides a sector by sector estimate of HCFC consumption and sector characterization based on the end user survey work and integration of other information as appropriate.

- *Industrial Refrigeration:* This sector was generally defined as all refrigeration equipment in industrial enterprises. The survey covered 103 enterprises accounting for 1,291 refrigeration units with a total refrigerant charge of 79,770 kg of refrigerant of which 58% (45,980 kg) was HCFCs (exclusively HCFC-22), 5% was HFCs (primarily HFC-134a with limited amounts of HFC-404a and HFC-410a), 9% was CFC-12, and 29% was ammonia. The total HCFC servicing requirement identified by end users was 11,310 kg which corresponds to a leakage rate of approximately 25% per year. The survey is estimated to cover 70% of the enterprises in this sector.

- *Commercial Refrigeration:* This sector primarily covered food distribution and retail applications and applications in the general service and hospitality sectors. Survey coverage was limited to larger enterprises (33) operating 23,873 refrigeration appliances with a total refrigerant charge of 91,729 kg, particularly food retail chains (supermarkets), retail vending operators and larger hospitality establishments. Of the surveyed enterprises, 60-65% of the consumption is in supermarkets. The dominant refrigerant was HFCs (HFC-134a in smaller units and HFC-404a in larger systems) which accounted for 56% of capacity surveyed while with HCFC (entirely HCFC-22) and CFC-12 accounted for 31% and 5% of capacity respectively. One large ammonia application accounts for 9% of capacity and in fact should likely have been classed as an industrial end user. One observation made in the course of the survey is that a significant amount of modernization is being undertaken in supermarkets with fairly rapid replacement of older HCFC based equipment with HFC-404a systems. The total HCFC servicing requirement identified by end users was 6,920 kg which corresponds to a leakage rate of approximately 25% per year. While the survey is estimated to cover 70% of larger enterprises in this sector, one qualification applicable to the survey in this sector is that it does not cover the significant number

of smaller commercial appliances in use in small food and beverage retail enterprises so the survey estimate likely underestimates the total charge and associated service demand in the sector.

- *Transport Refrigeration:* This sector is entirely highway and local delivery refrigerated truck based and primarily involves vehicles used for transport in the food distribution system. The survey directly covered 23 enterprises operating fleets of vehicles including all major food distribution and retail enterprises. Data was also collected to estimate consumption in approximately 500 individual private operators. In total 3,341 units were involved with a total refrigerant charge of 21,869 kg. The dominant refrigerant was HCFC-22 accounting for 75% of capacity with HFC-134a and CFC-12 accounting for 24% and 1%. The total HCFC servicing requirement identified by end users was 5,540 kg which corresponds to a leakage rate of approximately 33% per year. Survey coverage is estimated to cover 70% of the sector. It should be noted that there is a small demand for HCFC-22 in MACs in cars manufactured in the region.

- *Air Conditioning, Heat Pumps and Chillers:* The survey was only able to collect data in this sector on air conditioning and chillers and only covered 15 large buildings (hotels, airports and public buildings) involving 561 units, along with an allowance for old CFC unitary type air conditioners made in the Soviet Union that have been locally converted to HCFC-22 and are used in a variety of cooling applications in rural areas. This is estimated at an additional 4,000 units of various sizes. It is estimated that the total charge recorded based on the survey data was12,074 kg, of which 96% was HCFC-22 with remainder being HFCs, principally HFC-134a.

  It was recognized that the survey data was substantially underestimating the profile of the air conditioning/chiller/heat pump sector. Split system and window air conditioners, largely based on HCFC-22 have been imported in increasing quantities to the point where it is estimated that 40%of urban households have such units. Similarly renovations of older commercial, retail, health care and public buildings generally have resulted in a large inventory of this equipment. Additionally, the rapid expansion of new building construction since 2000 and particularly since 2004 has resulted in the installation of large air condition units, chillers and heat pumps, partially based on HCFC technology. For this reason an alternative approach was used to estimate consumption in this sector. Table 3.2 below summarizes data obtained from the Government Adjunct State Revenue Committee on imports of HCFC based air conditioners, chillers and heat pumps from 2004 to 2008. Added to this table are estimates of imports based on simple extrapolation of 2004 imports back to 2000 and assuming 2009 imports are the same as 2008. Using a total estimated charge in the sector of 254,895 kg and applying a 23% average annual leakage rate that was suggested by direct survey data in this sector, an estimated annual servicing consumption of 58,626 kg is arrived at as representing what currently may the current bank of equipment in this sector requiring servicing.

Table 3.2: Estimated Imports of Air-conditioners, Chillers and Heat Pumps (2000-2009)

'Type of Equipment	Average Charge (kg/unit)	Number of Units / Amount of Refrigerant Charge						Total (2005-2008)
		2000-2004**	2005*	2006*	2007*	2008*	2009***	
A/C	2.5	18,680/ 46,725	7,476 / 18,690	11,000 / 27,500	12,380 / 30,950	19,132 / 47,830	19,132 / 47,830	87,700/ 219,525
Chillers	50	35/ 17,500	14/ 700	16 / 800	24/ 1,200	24 / 1,200	24 / 1,200	161/ 22,600
Heat Pumps	2.5	58/ 144	23/ 58	62/ 155	65 / 163	2,450 / 6,125	2,450 / 6,125	5,108/ 12,770
Sector Totals		18,773/ 64,369	7,513/ 19,448	11,078/ 28,455	12,469/ 32,313	21,606/ 55,155	21,606/ 55,155	92,969/ 254,895

*Based on Customs data from Government Adjunct State Revenue Committee

**Assume average annual consumption in the period 50% of 2005

***Assume 2009 equal 2008

- *Refrigeration Servicing Sector:* While the basic refrigeration servicing demand is estimated as described above for each major consuming sector, the refrigeration servicing sector was also subject to survey to get a "bottom up" estimate of servicing consumption, but also to collect data on the structure and capacity of the sector. The survey work undertaken was organized to reflect the current structure of the refrigeration servicing sector operating in the country. Servicing is undertaken by three distinct groups. The first is servicing directly by end users of their own equipment which accounts for 55 % of the activity. The second is that undertaken by covered the organized servicing companies of which 22[18] exist and which undertake 25 % of the activity under end user service contract arrangements for maintenance of equipment. The third is individual technicians operating either as entrepreneurs or more informally and is thought to account for 30% of the activity. The latter group tends to undertake service of small commercial and agricultural refrigeration appliances as well as small air conditioners in houses and small shops and food/beverage establishments. The country currently has an active industry association for the refrigeration sector with 56 members made up primarily of larger owners of refrigeration equipment and servicing enterprises.

  An estimated 325 trained and experienced technicians support the organized servicing activity and up to 300-400 are involved on a casual basis, many of which have minimal qualifications. Currently, no formal certification of technicians is in place and primary training capacity for new and existing technicians is being downgraded in the post secondary education system. Overall a major human resource capacity gap exists in this sector which will become critical in the next five years where an estimated 120 new trained technicians would be required just to replace those leaving the business due to retirement (average technician age is 45-50 years) and other reasons. The sector has a very high turnover rate, largely associated with emigration of skilled technicians or migration to other trades as well as retirement and limited new entries are being attracted due to limited training opportunities.

  It is assumed that data for end users undertaking their own servicing is captured in the sector estimates described above. For the organized servicing firms, 6 enterprises responded with an estimated annual HCFC use of 12,440 kg (with 1,230 recovered for direct re-use) and HFC use of 5,010 kg with 1,000 kg recovered for direct re-use. The significantly higher recovery rate for

[18] Based on information from the Refrigeration Association

HFCs reflects the price differential between HCFCs and HFCs. For purposes of estimating overall consumption, it is apparent that these numbers are underestimated based on the low survey response rate from service enterprises (27%). However, it is also assumed that these numbers are already substantially reflected in the end user estimates described above. For the unorganized individual refrigeration servicing sector, a separate survey of individual service technicians involved with the refrigeration association was undertaken. The results from 22 responses, collectively covering approximately 80 individual technicians accounted for 21,930 kg of consumption in the small commercial and air conditioning sector by these individuals and an associated network of other individual technicians. Recognizing that the equipment import based estimate above in the air conditioning sector would cover some of this quantity, the estimated split between air conditioning and small commercial refrigeration appliances was estimated to be 35 % air conditioning and 65% small commercial appliances based on technician interviews.

As a final point, the refrigeration service sector surveys, both at the enterprise and individual technician level confirmed the high leakage rates indicated by the above end user surveys. This is generally reflective of a relatively low level of equipment maintenance as well as limited capacity or economic incentive to recover and return refrigerant during service. The capacity limitations are associated with the experience and training of technicians as well as limited availability of refrigerant recovery/testing equipment.

- *Refrigeration Equipment Manufacturing:* There is one manufacturer of refrigeration equipment in the country: SAGA Ltd. Located in Yerevan[19]. It is a 100% Armenian owned company was established in 1995 and currently has 72 employees. It produces a wide range of commercial refrigeration equipment. The lines of commercial equipment produced are: i) 25 models of retail food display cases based on HCFC-22 and HFC-134a, ii)11 models of beverage display cases based on HCFC-22 and HFC-134a; iii) 16 models of freezers based on HFC-134a and HFC-404a; iv) 12 models of restaurant display cases based on HCFC-22; v) 3 models of salad bar based on HFC-134a; and vi) a range of cold rooms (8 m^3 to over 100 m^3) based primarily on HCFC-22. It also produces three models of domestic refrigerators based on HFC-134a. Table 3.3 below summarizes production and refrigerant consumption.

Table 3.3: SAGA Ltd: Production and Refrigerant Consumption 2006-2009

Year	Commercial Equipment Production (Units)		Refrigerant Consumption for Production (kg)		
	Commercial Equipment	Cold Rooms	HCFC-22	HFC-134a	HFC-404a
2006	700	-	17,680	4,420	2,269
2007	905	-	19,448	6,188	2,340
2008	1010	32	22,100	7,072	2,480
2009	945	138	25,530	8,840	2,634

- *Foam Sector Manufacturing:* Survey activity identified two manufacturing enterprises producing foam products. One is SAGA Ltd. described above who also manufactures sandwich insulation sheets and finished panels for the general construction market as well as use in its commercial refrigeration equipment and cold rooms. The other is "Danesia" Ltd who also manufacture sandwich panels for the general construction market but in very small quantities currently and has

[19] http://www.saga.am/

only recently been established[20]. Both enterprises utilize a HCFC-141b based, fully formulated polyol, imported primarily from a system house supplier in Turkey. Table 3.4 below summarizes the production and raw material inputs from SAGA and estimated indirect HCFC-141b consumption based on 15% HCFC-141b content in the fully formulated polyol.

Table 3.4: Foam Manufacturing Production and Raw Material Consumption Summary

Year	Sandwich Production (m2)		MDI (kg)	Polyol (kg)	Total PU (kg)	Estimated HCFC-141b Consumption (kg)
	Sheets	Panels				
SAGA Ltd.						
2006	300	-	2,250	1,980	4,230	297
2007	2,380	-	5,500	4,620	10,120	693
2008	1,950	3,750	14,250	11,880	26,130	1,782
2009	2,000	25,000	60,000	50,160	110,160	7,524

Utilizing the sectoral analysis above, Table 3.5 below provides a summary of the HPMP estimate of current HCFC consumption for refrigeration servicing demand and for manufacturing. In summary the methodology used is as follows:

- Under refrigeration servicing, consumption in the industrial, commercial and transportation sectors this is based on the survey data increased by a factor of 1.3 to account for the estimated 70% coverage of the survey as applied to major industrial and commercial users.
- Under refrigeration servicing, consumption in the air conditioning/chiller/heat pump sector is estimated based on 2005-2008 customs data on imported equipment, an average charge, its extrapolation to the period 2000-2009, and application of a leakage rate supported by the current survey data in the sector, such that the major portion of HCFC based equipment operational in the country is covered.
- Under the refrigeration servicing sector, a general refrigeration servicing amount is included to cover the small commercial refrigerator sector not covered in the survey based data. This is calculated as 40% of the refrigeration service sector consumption obtained by survey of individual technicians.
- Under manufacturing, only SAGA Ltd's 2009 consumption of HCFC-22 is included. Consumption of HCFC-141b in fully formulated polyol in the amount of 7.5 tons ODS also exists and is also included in the consumption.

[20] The NOU has advised this enterprise of Decision XIX/6 control measures and are monitoring the enterprise's activity

Table 3.5: Estimated Current National Consumption of HCFCs

Sector/Sub-Sector	Original Charging (kg)	Estimated Current National (kg)	Estimated Annual Leakage/replacement Rate
Refrigeration Servicing (HCFC-22)			
Industrial Refrigeration Units and installations	59,670	14,703	24.6%
Commercial Refrigeration Units and installations	36,452	8,996	24.6%
Transportation Units and installations	21,502	7,202	33.5%
Air conditioners, chillers, heat pumps	254,895	58,626	22.6%
General Servicing	-	8,772	n/a
Sub-Total Refrigeration Servicing from Survey	372,519	98,299	27.4%
Manufacturing (HCFC-22)			
Commercial Refrigeration Equipment	n/a	25,530	n/a
Manufacturing (HCFC-141b)			
Foam Applications –Commercial refrigeration/Panels	n/a	7,524	n/a
Total Overall HCFC Consumption - ODS kg (ODP tons)	n/a	131,353 (7.640)	n/a

3.4 Forecast HCFC Consumption

Starting from the estimated current 2009 consumption of 7.64 ODP tons determined in Section 3.3, the base case HCFC consumption forecast assumed to involve unconstrained HCFC demand from the 2009 base year through to 2015 and from 2016 forward it is assumed that consumption is frozen. The application of the 2016 freeze would have been the country's compliance obligation under the Copenhagen Amendment in the absence of adoption of Decision XIX/6 and effectively defines the basis for identifying incremental impact of country compliance with Decision XIX/6.

The assumed consumption growth scenario applicable to the establishment of this base case between 2010 and 2015 has been developed on the basis of the following rationale. Firstly, it is assumed that consumption growth will be driven by growth in the bank of HCFC based equipment, primarily imported, with annual increase in this bank requiring servicing being reflected of the country's economy and the market trends anticipated. A similar growth rate can be assumed for the domestic manufacture of commercial refrigeration equipment. It is also assumed that for the base case in the period 2010 to 2015, no significant change in the technology of choice would occur given that such equipment would likely remain the lowest price alternative and continue to be available from industrialized Article 5 country producers as would be the case for HCFC-22 required to service operating equipment. In making this assumption, it is recognized that in the same period it would be anticipated that Article 2 country markets for such equipment would increasingly be closed to such equipment and non-ODS alternatives would generally start to become more readily available and competitive. However, this would be balanced by producing Article 5 countries redirecting established production in the immediate future to smaller Article 5 countries at discounts as they fully convert to non-ODS alternatives required in their primary markets. Additionally, there would likely be the potential for refurbished used HCFC based equipment being readily available as such equipment is replaced elsewhere. On this basis, annual growth rates in the table below have been selected as a

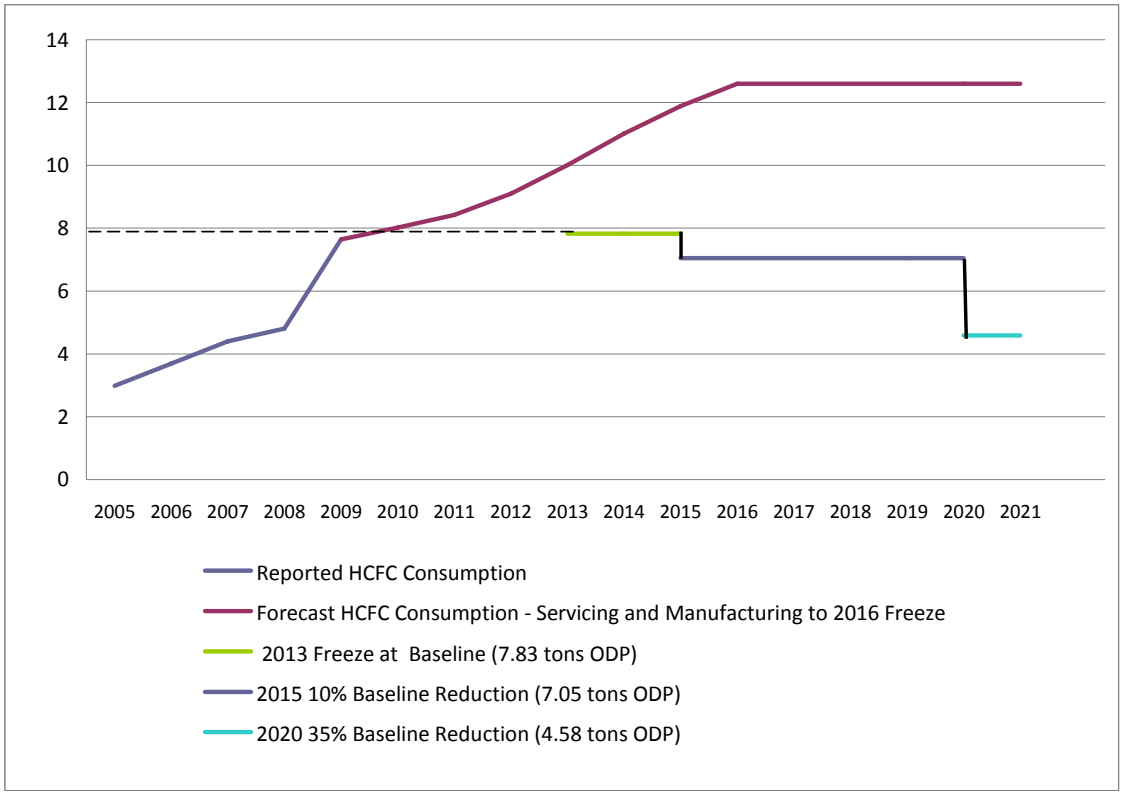
base case. The modest growth in 2010 and 2011 reflect the impact of the current global recession but with the assumption of the strong economic growth from 2012 through 2015 consistent with what the country had enjoyed prior to the recession. It should be noted that for purposes of this analysis these growth rates should be conservative considering the much higher growth rates in consumption and imported HCFC based equipment, particularly air conditioning equipment, in recent years.

Assumed Base Case Consumption Growth Rates 2010-2021

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
5%	5%	8%	10%	10%	8%	6%	0%	0%	0%	0%	0%

Figure 3.2 provides a graphical and tabular illustration of the base case relative to the Decision XIX/6 phase out requirements. It is apparent that a compliance gap exist beginning in 2013 (2.18 tons ODP or 39.6 tons HCFC-22) and this grows steadily into the foreseeable future.

Figure 3.2: HCFC Consumption Forecast to 2020 - Unconstrained Service Growth Servicing and Manufacturing to 2016 Freeze (ODP tons)



Year	09	10	11	12	13	14	15	16	17	18	19	20	21
HCFC Consump. (ODP)	7.64	8.02	8.43	9.10	10.01	11.01	11.89	12.60	12.60	12.60	12.60	12.60	12.60
MP Compliance (ODP)	n/a	n/a	n/a	n/a	7.83	7.83	7.83	7.05	7.05	7.05	7.05	4.58	4.58
Compliance Gap (ODP)	n/a	n/a	n/a	n/a	2.18	3.18	4.06	5.55	5.55	5.55	5.55	8.02	8.02
Compliance Gap (ODS HCFC-22)	n/a	n/a	n/a	n/a	39.64	57.82	73.82	100.91	100.91	100.91	100.91	145.82	145.82

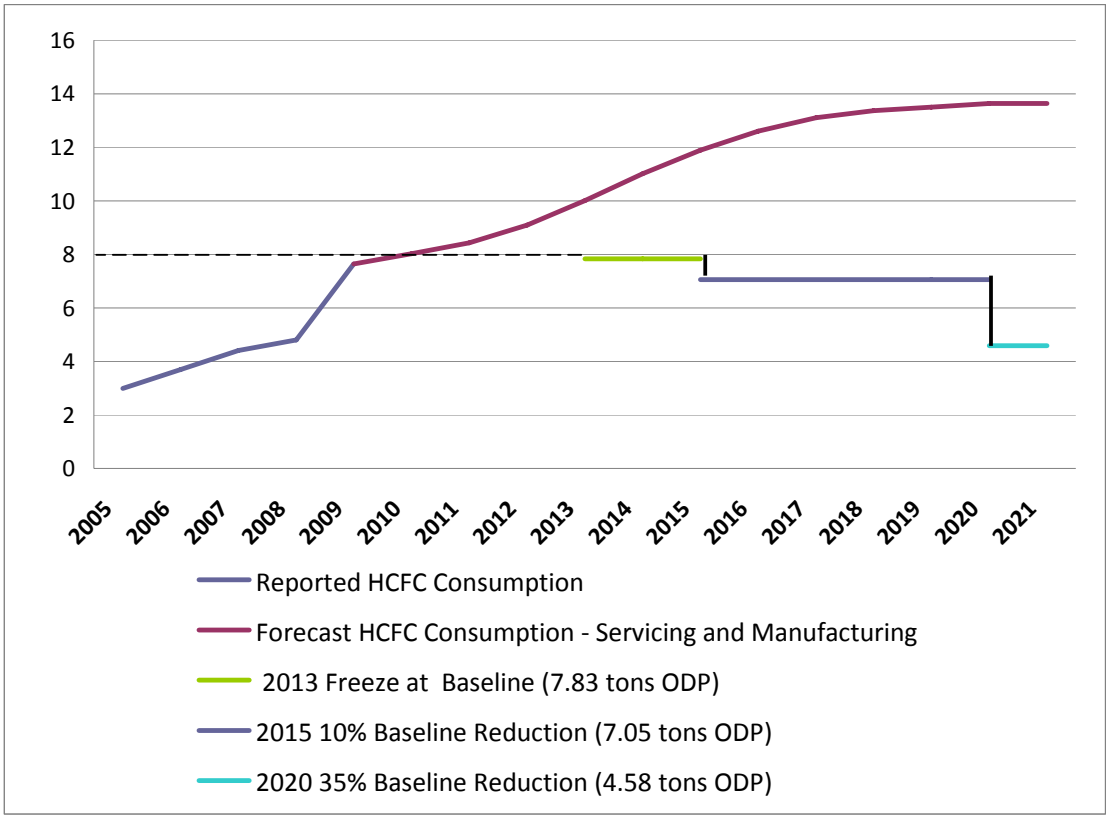
An alternative base case might also be considered based on no 2016 freeze applying, hence the incremental impact that would be defined would be for being a Party to the MP operating under Article 5 generally, rather than just assuming the obligations of Decision XIX/6. In this alternative base case , consumption would remain unconstrained after 2016, but realistically it can also be assumed that technology developments and the dominance of non-ODS demand in major non-Article 5 country markets would have generally made non-ODs alternatives the products of choice globally by 2020. The table below provides the assumed consumption growth rates through to 2021 under the alternative base case.

Assumed Alternative Base Case Consumption Growth Rates 2010-2021

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
5%	5%	8%	10%	10%	8%	6%	4%	2%	1%	1%	0%

Figure 3.3 provides a graphical and tabular illustration of the alternative base case relative to the Decision XIX/6 phase out requirements. The same compliance gap exist beginning in 2013 ((2.18 tons ODP or 39.6 tons HCFC-22) and this even more rapidly grows until after 2020 when it starts to stabilize.

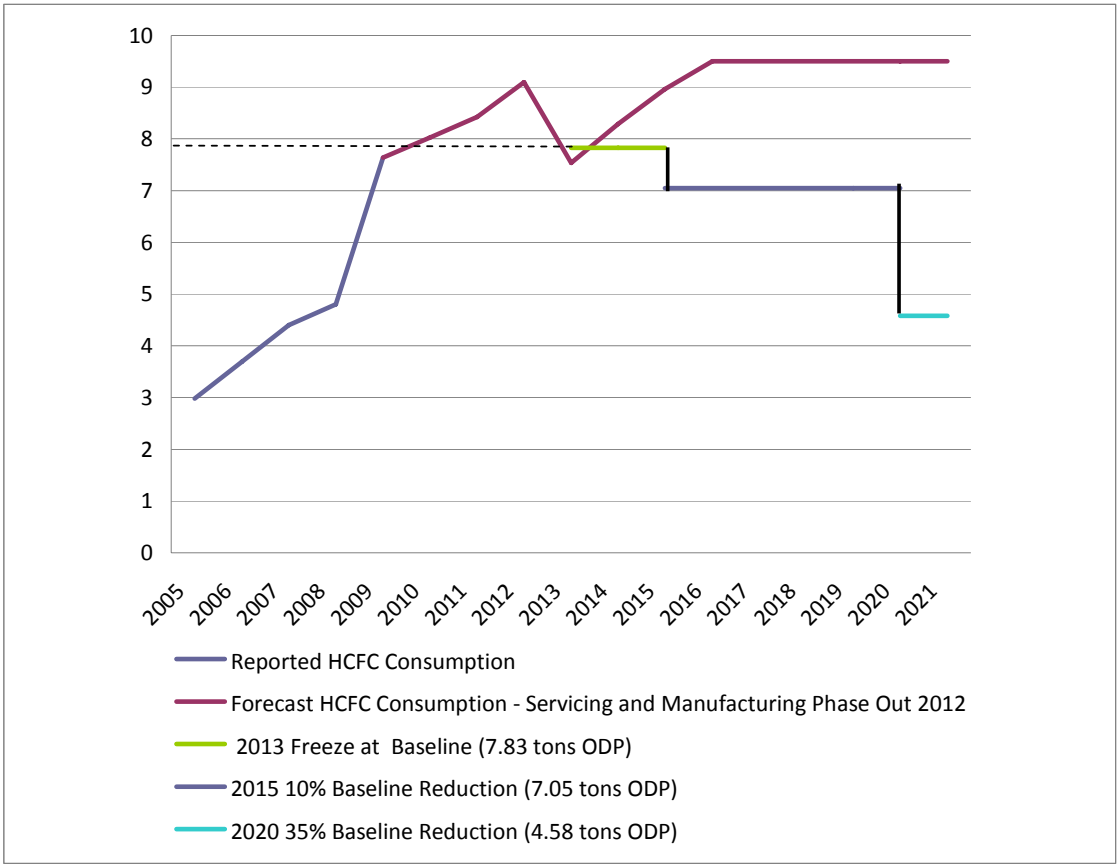
Figure 3.3: HCFC Consumption Forecast to 2020 - Unconstrained Service Growth Servicing and Manufacturing (ODP tons)



Year	09	10	11	12	13	14	15	16	17	18	19	20	21
HCFC Consump. (ODP)	7.64	8.02	8.43	9.10	10.01	11.01	11.89	12.60	13.11	13.37	13.50	13.64	13.64
MP Compliance (ODP)	n/a	n/a	n/a	n/a	7.83	7.83	7.83	7.05	7.05	7.05	7.05	4.58	4.58
Compliance Gap (ODP)	n/a	n/a	n/a	n/a	2.18	3.18	4.06	5.55	6.06	6.32	6.45	9.06	9.06
Compliance Gap (ODS HCFC-22)	n/a	n/a	n/a	n/a	39.64	57.82	73.82	100.90	110.18	114.90	117.27	164.73	164.73

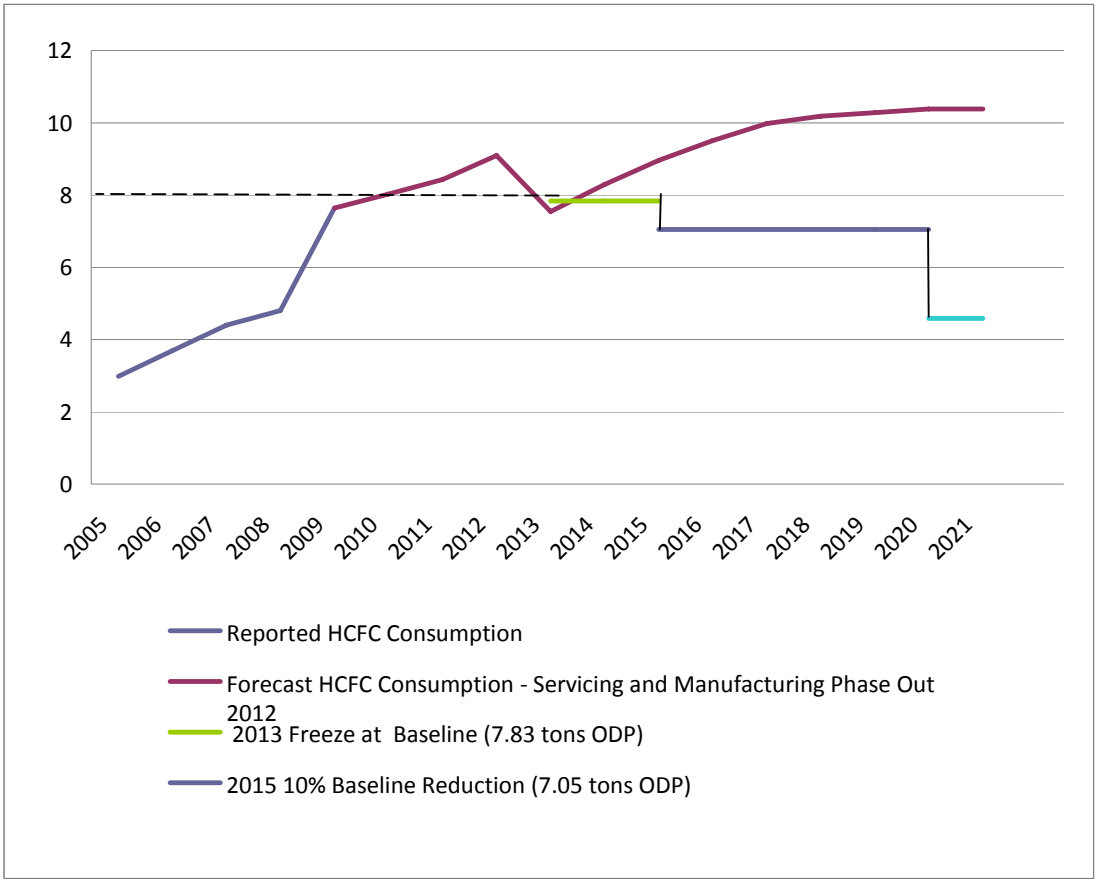
To assess the impact of a HPMP strategy that targets phase out of manufacturing consumption as a priority while deferring addressing servicing consumption and its growth as defined in the base case, Figure 3.4 illustrates the impact of eliminating manufacturing consumption by 2012 (25.5 tons ODS of HCFC-22 and 7.5 tons ODS of HCFC-141b) while leaving refrigeration servicing unconstrained until 2016, after which it is frozen in accordance with the original Article 5 Copenhagen Amendment control measures. While this would allow compliance with the 2013 freeze, a compliance gap of 1.91 ton ODP (34.7 tons ODS HCFC-22) would occur in 2015 which would grow steadily and only stabilizes after 2020. The alternative base case that assumes no 2016 freeze is illustrated in Figure 3.5

Figure 3.4 HCFC Consumption Forecast to 2020 - Unconstrained Service Growth to 2016 Freeze, Manufacturing Phase Out in 2012 (ODP tons)



Year	09	10	11	12	13	14	15	16	17	18	19	20	21
HCFC Consump. (ODP)	7.64	8.02	8.43	9.10	7.54	8.29	8.96	9.50	9.50	9.50	9.50	9.50	9.50
MP Compliance (ODP)	n/a	n/a	n/a	n/a	7.83	7.83	7.05	7.05	7.05	7.05	7.05	4.58	4.58
Compliance Gap (ODP)	n/a	n/a	n/a	n/a	n/a	0.46	1.91	2.45	2.45	2.45	2.45	4.92	4.92
Compliance Gap (ODS HCFC-22)	n/a	n/a	n/a	n/a	n/a	8.36	34.72	45.55	45.55	45.55	45.55	89.45	89,45

Figure 3.5: HCFC Consumption Forecast to 2020 - Unconstrained Service Growth, Manufacturing Phase Out in 2012 (ODP tons)



Year	09	10	11	12	13	14	15	16	17	18	19	20	21
HCFC Consump. (ODP)	7.64	8.02	8.43	9.10	7.54	8.29	8.96	9.50	10.00	10.18	10.28	10.38	10.38
MP Compliance (ODP)	n/a	n/a	n/a	n/a	7.83	7.83	7.05	7.05	7.05	7.05	7.05	4.58	4.58
Compliance Gap (ODP)	n/a	n/a	n/a	n/a	n/a	0.46	1.91	2.24	2.95	3.13	3.23	5.80	5.80
Compliance Gap (ODS HCFC-22)	n/a	n/a	n/a	n/a	n/a	8.36	34.73	44.55	53.64	56.90	58.73	105.34	105.34

The overall conclusion drawn from this forecast analysis is that for Armenia to achieve compliance with the 2015 phase out requirement, immediate action is required to address both manufacturing demand and servicing demand. Over a three year period the country will have to 1.58 ODP tons annual manufacturing consumption demand and at least stabilize refrigeration consumption in the refrigeration sector such that it has stopped increasing. Following that, it will have to reduce that annual servicing demand by an estimated 35 tons of HCFC-22 by 2015.

3.5 Data Validation

In general the above estimates of current consumption and forecasts of consumption in the near and medium term are based on factual data including a significant component of direct enterprise survey information and in the case of the manufacturing sector, documentation presented by the enterprise. Overall these estimates are considered conservative. However, the area where direct survey data is not easily obtainable is for small air conditioning and small commercial refrigeration applications and has been factored to obtain the estimates contained in Section 3.3. For purposes of validating this aspect of the estimate, a parallel estimate for refrigeration servicing covering the small commercial and air conditioning sectors has been undertaken. This is based on statistical data from the National Statistical Body of the Republic of Armenia[21] and the second "Spyur" Information Centre[22] on the number of households, service organizations and public buildings in the country. The results of this analysis along with the assumptions used are contained in Annex C. Overall it suggests that if the leakage rates indicated by the survey data for larger refrigeration and air conditioning systems are extrapolated to small air conditioners and commercial refrigeration appliances, the annual servicing demand would be approximately 100 tons of HCFC-22 (70 tons for air conditioners and 30 tons for commercial refrigerators). Within these categories, the air conditioning demand is predominantly in households (70 %) and in retail trade establishments (30%). In summary, it can be concluded that the estimates made in Section 3.3 are conservative.

Comparison with refrigeration servicing in other similar CIS countries also shows that Armenia's per capita consumption is generally consistent with comparable CIS countries currently undertaking similar survey work when variations in GDP are taken into account. This is illustrated in Table 3.6 below.

Table 3.6: Servicing Consumption Per Capita Comparison for Similar CIS Countries

Country	Population[23] (Millions)	GDP[24] US$/ person	Estimated 2009 HCFC Consumption (ODS tons)	Consumption per Capita (Tons/Million)	Consumption per Capita per GDP Tons/Million/$
Kyrgyzstan	5.24	951	71.96	13.6	0.014
Armenia	3.00	3,401	123.6	41.6	0.012
Tajikistan	6.74	741	64.8	9.6	0.013
Moldova	3.79	1,830	42.2	11.1	0.006

[21] http://www.armstat.am/en/
[22] http://www.spyur.am/rekleng/1a.htm
[23] World Bank (http://siteresources.worldbank.org/DATASTATISTICS/Resources/POP.pdf)
[24] IMF: World Economic Outlook Data Base, October 2008

3.6 Availability of HCFC Alternatives and Prices

The principle HCFC consumption is in servicing refrigeration and air conditioning equipment in applications virtually all of which can readily utilize available non-ODS based equipment as replacements in existing or new applications. In most applications, such equipment is already in use in the country. For the most part, this alternative equipment is primarily based on established HFC refrigerant technology.

In the commercial sector, presently available alternatives are primarily based on HFC-134a and HFC-404a, including equipment produced domestically. In fact, HFCs already dominate the refrigerant charge in the commercial sector as surveyed, noting that a higher level of HCFC technology is still used in smaller commercial units in small enterprises. In the industrial sector surveyed, a higher proportion of HCFC equipment is in use with non-ODS technology accounting for 34% (5% HFC, 29% ammonia). Also in the transportation sector, HCFC-22 use dominates with 24% being HFC-134a. In the largest sector covering air conditioning, chillers and heat pumps, HCFC-22 remains substantially dominant with only 4% penetration of HFC-134a and other HFCs. It is also apparent from the import data that the growth of HCFC imports continues to rapidly grow.

Similarly, there is potential to utilize relatively recently introduced "drop-in" HFC based refrigerant blends in certain kinds HCFC equipment as a retrofit option. Examples of these seeing use in Europe include Forane 427, R-422d and R-417a. However, these have yet to see any penetration in the Armenian market, in part because users and service providers are as yet unfamiliar with them, but also because of their high cost relative to HCFC-22.

Overall the above suggests that while there are no availability barriers to replacement of HCFC technology in new equipment with HFC based equipment and in a limited number of suitable industrial applications with ammonia, market barriers remain for adoption of non-ODS technology. In addition, there is also a need for greater awareness of alternatives among end users as well as increased technical familiarity with these technologies. Tables 3.6 and 3.7 below summarize comparative prices in the Armenian market where available for various refrigerant options or otherwise in the EU, and for a range of common RAC equipment based on HFCs.

Table 3.7: Comparative Indicative Chemical Price Ranges (US$/kg)

CFC-12	HCFC-22	HFC-134a	HFC-404a	HFC-407c	HFC-410-a	R-600a	R-290	Ammonia
5-8	4-5	8-10	10-13	9-12	10-14	21.33 9.33*	7.48- 28.81*	4.00 5.40*

HCFC-141b	C-pentane	N-pentane	HFC-245fa	Forane 427	R-422d	R-417a
4-5	2.75- 3.30	1.95- 2.20	8.90- 9.60	17.00*	35.00*	51.00*

*EU Prices

Table 3.8 Comparative Indicative RAC Equipment Cost Ranges (US$/Unit or System)

Equipment Description	HCFC	HFC	Other
Domestic Refrigerators (360 l)	200-1,000 (HCFC-22)	400-1,000 (HFC-134a)	450-1,100 (R-600a)
Split System A/C (3 kW)	600-800 (HCFC-22)	800-1,000 (HFC-410a	n/a
A/C units/Heat Pumps (5kW)	800-1,550 (HCFC-22)	1,000-1,700 (HFC-410a)	n//a
Condensing Units (10-16 kW)	1,000-5,000 (HCFC-22)	2,000-8,000 (HFC-404a)	n/a
Cold Rooms (10-15 kW)	1,500-80,000 (HCFC-22)	1,500-80,000 (HFC-404a)	n/a
Chillers (120 kW)	38,000 (HCFC-22)	38,000 (any suitable HFC blend)	n/a

As is apparent from the above discussion, there is currently little active consideration of low GWP or "natural refrigerant" options except for use of ammonia in traditional industrial applications. Given the expanding development and commercialization of these options elsewhere, both in Europe and increasingly in producing Article 5 countries, their active promotion in the long term context of the HPMP needs to be considered. Demonstration projects would be useful in this context. Specific applications may be smaller commercial refrigeration where hydrocarbon (R-600a and R-290) may be a cost effective low GWP alternative. CO_2 and potentially ammonia would also be potential alternatives in larger commercial and industrial systems as well air conditioning applications.

With respect to the manufacturing sector, SAGA Ltd currently manufactures approximately 33% of its commercial refrigeration product lines products using non-ODS refrigerant HFC-134a and HFC-404a and could effectively convert entirely if justified by market demand. Given the relatively modest size of the enterprise this may be its immediate option. However, as elaborated in Section 4, an investment project has been developed for potential MLF funding that would substantively transition the enterprise to low GWP hydrocarbon based refrigerants. Similarly, the technology is also available to replace HCFC-141b based imported formulated polyol in foam production with non-ODS alternatives at SAGA Ltd and potentially "Danesia" Ltd. The option of choice would be low GWP cyclopentane if the capital investment is affordable. A second alternative may be a HFC-245fa blowing agent, although this retains a significant GWP and a higher input cost.

4.0 Strategy and Plan for the Implementation of HCFC phase out

4.1 Strategy Framework and Rationale

The overall objective of the HPMP is to address the complete HCFC phase out cycle as defined in Decision XIX/6. Therefore, the overall HPMP and supporting strategy will encompass the period 2010 through to the target terminal date for HCFC consumption in 2030. However, consistent with available ExCom guidance, the HPMP and the strategy for its implementation will be staged, with Stage 1 covering a period from 2010 to 2015 and Stage 2 covering the period 2015-2030. Stage 1 is the principle focus of what is presented in this section in terms of detailed actions and national commitments but as described in this section, the strategy framework encompasses Stage 2 conceptual terms for Stage 2, particularly the period 2015-2020 to ensure continuity with Stage 1.

The current situation respecting HCFCs in Armenia described in Sections 2 and 3 above provides both a baseline and suggests the priorities that need to be addressed, both in the near and longer term. In summary, it is apparent that Armenia will be challenged to meet its immediately pending obligations of a 2013 freeze at 2009/2010 consumption and further reduce this in 2015 in the absence of phase out interventions. Like most Article 5 countries with growing economies, HCFC consumption has been growing rapidly over the past five years, and without active intervention it is forecast to continue to do so at least until 2015 and potentially beyond. The predominant source of consumption is the imperative to service the growing bank of primarily imported HCFC based refrigeration equipment, mainly in the air conditioning sector and heavily biased to relatively small units being extensively used in domestic, commercial and institutional applications globally. The compounding impact of the continued import of such equipment and resulting growth in refrigeration servicing demand if unrestrained is the main driver in the forecast growth of HCFC consumption in Armenia. A secondary contribution is also made to current consumption by direct manufacturing, something that also needs to be addressed early such that the refrigeration servicing growth can be mitigated by a one-time consumption reduction in this consumption. This effectively defines what the strategy and resulting action plan must address.

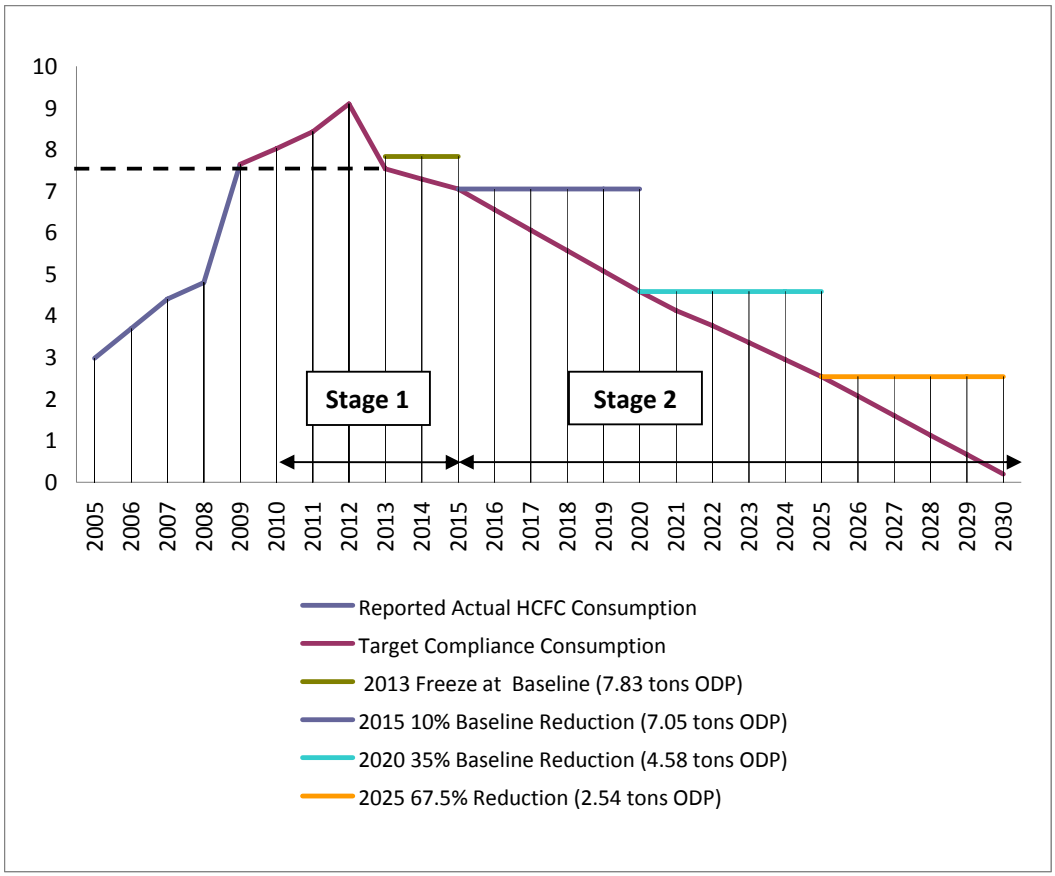
The overall strategic objectives associated with the HPMP in Stage 1 and Stage 2 are:

1. Stage 1: To rapidly stabilize and initiate reduction in current HCFC consumption over a three year period to a projected baseline level forecast to be approximately 7.83 tons ODP (142.4 tons HCFCs) by 2013 and reduce this to 7.05 tons ODP (128.2 tons HCFCs) by 2015.
2. Stage 2: To sustain the progressive reduction in consumption reduction to a level of 5.08 ODP (92.53 tons HCFC-22) in 2020, 2.54 ODP tons (46.3 tons HCFC-22) in 2025 and effectively zero in 2030[25].
3. To the maximum degree practical utilize technologies that minimize climate change impacts.
4. To accomplish the above in such a way as to minimize economic and social impacts, particularly in vulnerable sectors and portions of the population.

Figure 4.1 below provides an illustration of a target phase out scenario consist with the primary phase out objectives above. This is followed by a more detailed description of the Stage 1 and 2 strategy and targets, and the linkages this has with other global environmental issues, particularly climate change.

[25] A 2.5% allowance (3.11 tons of HCFC-22) is contemplated as a RAC servicing allowance.

Figure 4.1 Target Consumption Compliance Profile: 2010-2030



- *Stage 1 HPMP Compliance Strategy and Phase Out Targets:* While the current consumption trends will continue initially in the period 2010-2012 while implementation of the HPMP is initiated, the first target will be to stabilize consumption in 2012 and then reduce it to meet or be below the 2013 freeze level through phase out of HCFC manufacturing in consumption. This is the first priority of the Stage 1 strategy. The underpinning action required will be imposition of a regulated quota capping imports at the base line level and at the subsequent 10% reduction level in 2015, something that is effectively required at the outset of HPMP implementation. However, at a practical level, the inevitable growth above the base line initially, actions implemented by 2013 to meet the freeze will have to result from actual elimination of at least 1.3 ODP tons ODS of HCFC from the forecast peak level beginning in 2011 and extending through 2012. This can be achieved by eliminating HCFC-22 consumption in the commercial refrigeration manufacturing sector. However, during this period the country will also have to begin to arrest and begin to reduce import of HCFC based equipment to avoid consumption re-bounding – the first step could be to consider restrictions on the new large HCFC installations. Effectively, refrigeration servicing demand should be stabilized by 2013-2014 and a net reduction of approximately 0.25 ODP tons per year should occur by 2015 in the form of reduced HCFC-22 consumption (4.6 tons ODS/year) for servicing to meet the 2015 compliance quota. In case if the funding for HPMP implementation in Stage 1 was sufficient and assuming that upgrading of the currently degraded

refrigeration servicing system in terms of equipment and human resource capacity occurs in this period, reductions in demand can be achieved through the impact of more comprehensive maintenance and recovery practices reducing the current high leakage rates. A further important aspect of Stage 1 will be ensuring that a reliable and creditable basis for consumption reporting and compliance performance measurement exist by 2013, hence a priority will be upgrading the country's import permitting system inclusive of information collection and enforcement.

- *Stage 2 Strategy Compliance Strategy and Phase Out Targets:* Between 2015 and 2020, a progressive net consumption reduction of approximately 0.50 ODP tons per year (9 tons ODS of HCFC-22) should be targeted to achieve 2020 compliance targets and this consumption reduction rate be 0.41 ODP tons/year (7.4 tons ODS of HCFC-22) from 2020 to 2025 and 0.47 ton ODP (8.5 tons ODS of HCFC-22) from 2025 to 2030 in order to complete phase out when substantive global consumption of new HCFCs is eliminated. These reductions would increasingly be achieved by "end of life" retirements of equipment and replacement by non-ODS alternatives but will also have to be underpinned by a viable system of recovery and recycling that is capturing and returning substantial quantities of HCFC-22 for use in remaining equipment. This will be particularly critical during the 2015-2020 period when a substantial bank of presently existing HCFC based equipment retains a significant remaining operating life. This underlines the criticality of action to upgrade the overall refrigerant management system in Stage 1 to ensure that such a system is in place and is sustainable both in terms of availability of trained human resources and its economic viability. However, due to limited – insufficient for the better coverage of the sector - funding in stage 1, additional support for the strengthening of such system is to be requested in Stage 2 as required by the actual needs. The other issue that is anticipated to become particularly important by 2015 is the existence of basic system for environmentally sound "end of life" management of ODS with the priority in Stage 2 being ensuring it is sustained and expanded as necessary.

- *Integration of HPMP Phase out Strategy with Other Global Environmental Strategies:* While the primary HPMP objective is MP compliance per Decision XIX/6, the HPMP strategy and action plan should also be aligned with and reinforce broader global environmental priorities related to climate change and sound chemicals management, the former particularly being prioritized in Decision XIX/6. Minimizing climate change impacts as part of HCFC phase out will generally involve the integration of the use of low GWP non-ODS alternative technology, and implementation of phase out measures that enhance energy efficiency such that the lowest Total Equivalent Warming Impact (TEWI) is achieved. As in the case of most small Article 5 countries, Armenia is in the position that the urgency of immediate action to arrest HCFC consumption growth and initiate phase out in a short period will tend to favor adoption of fully commercialized non-ODS alternatives that are readily available in the local market. This will mean that in the near term during Stage 1, HFC based technologies with relatively high GWP will be inevitably utilized. This effectively mirrors the current experience in advanced non-Article 5 countries. Tthe strategy's emphasis on upgrading refrigeration servicing capacity capitalizes on the linkage between improved maintenance and recovery practice with lower leakage rates (hence GHG emissions) and improved energy efficiency. The linkage with sound chemical management largely relates to "end of life" management of ODS. This issue may be viewed as a sub-set of an overall environmental issue associated with hazardous chemical waste management. In addressing it, the HPMP strategy will be to look for economies of scale that may be obtained from a connection with initiatives addressing the broader issue in terms of regulation and infrastructure

providing for environmentally sound capture, storage and ultimate destruction of “end of life” ODS as well as HFCs.

4.2 Description of HPMP Stage 1 Action Plan and Activities

The following section details the proposed HPMP action plan and its component activities for Stage 1 consistent with the above overall strategy and as designed meet the phase out targets defined in it. For purpose of presentation and defining a funding framework, the action plan is subdivided into three components: i) legal and regulatory action and ii) technical capacity strengthening; and iii) investment. However, in doing so, it is recognized that there is a high level of interdependence between them and the individual activities that they encompass. Therefore, it is imperative that coordination exist between these components such that the tools and capacity exist to support the compliance oriented measures being implemented.

4.2.1 HPMP Component 1: Legal and Regulatory Action (UNEP)

As described in Section 2, Armenia has a basic legal and regulatory framework in place for the control of ODS which underpins maintaining compliance with its current obligations under the MP. However, to meet HCFC phase out obligations this will require enhancement as the HPMP is implemented.

As part of HPMP preparation with MLF funding, a team of legal experts undertook an evaluation of what measures would be necessary and practical to apply in order to achieve compliance with Decision XIX/6. This work examined the experience of Article 2 countries, notably the EU and particularly new member states, and resource materials made available through the ECA Network. This was integrated into the Armenian context, particularly the practical ability to implement such measures and general government policy guidance related to introduction of new legal and regulatory measures. By way of overall conclusions, it is recognized that the development and implementation of regulatory controls is not an instantaneous process and cannot be done arbitrarily, particularly when they may have significant social and economic implications. Additionally it was underlined that MNP must also be sensitive to the general policy of the Government to seek to streamline and simplify regulations generally. As a consequence, it is necessary to fully validate the need for specific regulatory action and fully exploit existing regulatory and administrative tools before new regulations are introduced.

Based on this guidance, the action plan in this area as described in the following has been developed based on introducing a basic compliance requirement defined by quotas on the import of HCFCs in accordance with Decision XIX/6 utilizing an extension of the existing regulatory framework, along with strengthening administrative and data reporting practice to identify the import of HCFC containing equipment and products. Additionally, the action plan identifies a range of supplementary regulatory and administrative measures that will be considered and implemented based on initial performance of those initially introduced. In all cases, the action plan makes provision for appropriate consultation and awareness activities in advance of consideration and adoption of any binding regulations and administrative measures, as well as the continuation of these activities on an ongoing basis to ensure they are fully implemented.

a) Binding Regulatory and Administrative Commitments

i) *Sub-Component 1.1 - Application of Import Quotas on HCFCs:* The highest priority identified is to establish the legal basis for application of a fixed upper limit on the amount of HCFC that can be imported into the country in 2013 and in 2015 consistent with Decision XIX/6. With the endorsement and submission of this HPMP and inclusion in a formal funding agreement with ExCom, the government is confirming its commitment to the principle of imposing quotas with the adoption of specific numbers being left to announcing them when in 2011 they are specifically determined. Stating this commitment as part of the HPMP is important for two reasons. The first is that it demonstrates the government's commitment to meeting the accelerated phase out schedule. The second is that it provides an early signal to users, manufacturers, importers and refrigeration service providers that the current consumption trends will have to stop and their proactive participation in the process is in their interests.

ii) *Sub-Component 1.2 - Administrative Monitoring and Control Imported HCFC Equipment and Products:* Currently, Armenia does require permitting or licensing of ODS containing equipment and but has the administrative powers in place through the customs authorities to monitor and, as required, control the import of HCFC containing equipment and products. Rather than introduce a formal permitting system, it is proposed to strengthen the existing administrative process and associated data collection and reporting such that the status of these imports is readily available and the election to exercise specific controls can be implemented as required. In this regard, the import of used HCFC containing equipment and small air conditioning equipment will be specifically targeted, such that controls can be placed on these if necessary. In the case of used HCFC containing equipment, the Customs Authorities have sufficient administrative powers at present to impose an effective ban if this becomes a significant issue. For purposes of this HPMP, it is the intention of the government to implement the required administrative monitoring measures in 2011 with the activity being coordinated with the non-investment activities related to strengthening customs control procedures and coordination capacity described in Action Plan Component 2.1 below.

iii) *Sub-component 1.3 – Introduction of ban on the import and or use of HCFC-141b contained in the pre-blended polyol systems*: Such ban will be introduced in line with the requirement as set out in ExCom Decision 61/47 after the technological conversion at SAGA enterprise is completed.

b) Supplementary Legal and Regulatory Actions to be Evaluated

i) *Application of a supplementary surcharge on HCFC imports:* To increase the attractiveness of non-ODS alternatives as well as promoting recovery of HCFC during servicing, consideration will be given to application of an environmental surcharge applied to import duties HCFC chemicals. The level of this surcharge to be collected at point of entry/customs clearance would be based on the market price differential with non-ODS alternatives. Based on current prices as illustrated in Section 3.6 above, the surcharge on HCFC-22 could be as high as 100% while that applied to equipment would be the range of 20-30%. The timing of implementation could be staged with early application to HCFC chemicals which are now subject to permitting and through the administrative procedures applied by Customs Authorities. The potential for any such measures to create a greater temptation for illegal trade also requires that adequate capacity exists for enforcement.

ii) *Controls on New HCFC Large Commercial/Industrial Refrigeration and A/C Installations.* The other major source of growth in HCFC demand is addition of large refrigeration and air conditioning equipment using HCFC-22. Restricting the import and installation of such equipment is an optional tool that will be considered for implementation latter in Stage 1 depending on the effectiveness of other measures. This approach is taken in recognition that some lead time is required to implement such a measure and advance warning needs to be provided well in advance of the date that it would come into effect and awareness of it needs to be developed among potential developers/investors, technical regulatory authorities providing approvals, building and plant designers, and equipment importers. In addition, the potential to initiate administrative measures within the government to prohibit the purchase of HCFC containing equipment and products for state financed requirements will be evaluated.

4.2.2 HPMP Component 2: Technical Capacity Strengthening and Monitoring (UNEP)

The ability to develop, implement and sustain the legal and regulatory measures will be dependent on having the institutional and technical capacity to support them. Similarly such capacity is closely linked and highly interrelated with the incremental investment identified to support HCFC phase out in the next section, particularly related to developing an effective refrigerant management system. For purposes of the HPMP, capacity strengthening has been divided into three components; i) import and application control capacity; ii) refrigeration servicing institutional and human resource capacity; iii) general institutional strengthening and awareness, and iv) monitoring of the non-investment section.

i) *Sub-Component 2.1.Import and Application Control Capacity:* As indicated above the current system of permitting is relatively immature, having only been implemented in 2008. As such it is still developing in terms of coverage, coordination and interagency reporting, noting that this is a current area that is being addressed by MNP (NOU) and the customs authorities within the Government Adjunct State Revenue Committee. Given that the permitting system is not yet fully capturing the import of HCFC chemicals, a key target of the HPMP Stage 1 strategy is to ensuring that it provides a reliable and creditable basis for consumption reporting and compliance performance measurement by 2013. This must be done while expanding the scope of import controls as described above, particularly in light of the increased emphasis on administrative measures being applied by customs authorities in monitoring and potentially controlling the import of HCFC containing equipment and products.

   To date training programs for customs officials has been undertaken with 112 customs officers receiving basic training and 12 detection devices being supplied. Based on a total current complement of 600 front line customs officers located at 7 entry points (420 customs officers) and 8 in-country custom houses (180 customs officers), the training coverage has been less than 20%. Armenia like most countries in the region experiences a high turnover of front line customs officers. In recognition of this, the process will have to be repeated regularly. The NOU and customs authorities are also currently working to embed this training into the regular entry and refresher training programs used by the customs authorities. The initial baseline deficit in capacity and compounding effect of high turnover rates, substantial increase in scope of controls for HCFCs contemplated, and potential increased need for aggressive enforcement related to illegal trade, indicates a requirement for a significant effort in this area.

The approach proposed is focus on three specific areas.

- Enhanced coordination between MNP and customs authorities respecting methodologies where by customs codes can better discriminate between and among those items of specific interest (i.e. HCFC chemicals, HCFC containing equipment/products, HFCs) and other imports, preparation of practical instructions on labeling and designations of items being controlled, development of streamlined reporting and information exchange procedures.
- Initial program of expanded training of present front line customs and environmental enforcement officers to upgrade both their knowledge level and effectiveness, inclusive of detection equipment suitable for a complete range of ODS and HFCs (Current requirement is estimated to be at least 500 trainees, 30 detection units).
- Development and implementation of curriculum modules for customs and environmental enforcement officer training, both entry and renewal, to be embedded in the Government Adjunct State Revenue Committee and MNR training institutions and programs, inclusive of "train the trainers" activities, supply of Armenian language course materials, and demonstration equipment.

The indicative timing of these activities would place an initial emphasis on coordination between MNP and customs authorities both because of the priority in ensuring procedures and reporting is efficient and the input that this will provide for the training activities. This activity will be ongoing through to 2013 and then occur on a formal basis annually as data collection, exchange and reporting is required. The first training priority will be training of an expanded cadre existing front line customs and environmental enforcement officials, likely in two phases starting in 2011 and again in 2012 and being coordinated with the expanded administrative measures discussed above. This would involve 40 people. The development of a sustainable ongoing training capacity will start with development work in 2011 and be targeted for implementation on an annual basis in 2012. Though the requirements are the training 400 customs officers and 100 environmental enforcement officers through the regular training system for customs staff in the period 2012-2015; however, there are limited funds available under the first phase of HPMP and the country would be able only to organize seminars for 40 experts.

ii) *Sub-Component 2.2 Refrigeration Servicing Human Resource and Institutional Capacity:* Perhaps the most significant gap in capacity that will most impact the prospects of the country in achieving accelerated phase out in the medium and long term is the declining capacity to maintain and service the current bank of HCFC containing equipment to a reasonable standard of practice. This is reflected in high overall leakage rates something that is a direct result of maintenance and refrigerant recovery practices. The critical need is for a higher standard of servicing practice in terms of HCFC recovery and equipment maintenance, something that is directly linked to availability of enough skilled technicians operating with modern equipment and tools. The initial training undertaken during earlier projects covered introductory training for 712 individuals and more intensive training for 260 of these technicians hence approximately 37 % of technicians working at that time received a sustaining level of training specifically for CFC phase out. Currently, the estimated number of active technicians is 325 working directly for end users and organized service enterprises with 300 being individual operators, many with limited training. Recognizing the annual replacement requirement of approximately 125 technicians it is also imperative that sustainable capacity be created to continuously train both existing and new technicians, with particular emphasis on the latter recognizing the serious short falls predicted

during the next critical 5 year period. The actual demand in capacity strengthening would require the following activities which are essential for the country:

- Initial refresher training for existing qualified technicians, estimated to be 240 individuals, with emphasis on HCFCs and modern maintenance and refrigeration management practices in 2011.
- Development of nationally supported formal entry level and refresher refrigeration training capacity in place by 2012
- Delivery of entry level training for 200 individuals and refresher training for 300 individuals between 2012 and 2015
- Development of a national certification system for refrigeration technicians and service providers in place by 2012.
- Support to strengthen the refrigeration association with sustaining capability to act as a technical information dissemination vehicle, focal point for international networking on alternatives and modern practice, implementation of refrigeration technician certification, and ongoing training facilitation.

However, there are limited funds available under the first phase of HPMP and the country would be able only to organize seminars for 40 technicians.

This would like be undertaken in two sessions, starting in 2011.

iii) *Sub-Component 2.3-Institutional Strengthening and Awareness:* The ability to implement the measures contained in the HPMP requires significant institutional effort within the government and more particularly MNP and the NOU. Notwithstanding the significant progress made by the country in meeting its international obligations over a relatively short period, HCFC phase out substantially increases the demands on the NOU. This will be associated with the additional regulatory work load associated with introduction of new regulations, particularly related to administering permits, establishing and enforcing quotas, and coordination with customs and other authorities. Additionally, there will be a major increase in and change in the focus of awareness activities to support measures intended to reduce HCFC equipment imports and use. In particular, there will be a continuing need for regular stakeholder consultation and target audience specific information products that relate to specific regulatory and investment related initiatives such as retrofit/replacement programs and introduction of low GWP alternative technology and enhancement of energy efficiency. There will also be continuing and potentially expanded demand for an administrative role in implementing international assistance that is assumed to support the implementation of the HPMP, at least in part. Currently NOU operations are supported by an annual MLF institutional strengthening grant. It is assumed that this could continue to be available until 2015. It should be noted that the country chooses to receive institutional strengthening assistance outside of this HPMP, as was the case in the past.

iv) *Sub-Component 2.4. – Monitoring on the Implementation of the Non-Investment Section*: The role of UNEP is to provide technical assistance and further guidance towards successful implementation of the non-investment component of HPMP. Under the non-investment component of HPMP, there are three major sub-activities to be implemented. Implementation of these sub-activities involves constant interaction with the concerned stakeholders, periodic

dialogue on issues and concerns and evolving schemes for implementation. Expected results from the monitoring and review include the following:

⇒ Provide focused attention on timely implementation of non-investment components of HPMP.
⇒ Periodic interaction with the stakeholders on HPMP non-investment implementation modalities.
⇒ Review of effectiveness of implementation of sub-components through surveys.

4.2.3 HPMP Sub-Component 3: Investment Projects (UNDP)

The investment component of the Stage 1 HPMP is envisioned to include two overall sub-components in line with the above strategy and for which MLF funding is proposed in principal. These are: i) manufacturing sector phase out; and iii) initial development of the refrigeration management system.

These are described in the following.

i) *Sub-Component 3.1 - Manufacturing Sector Phase Out:* An important part of the HPMP strategy to achieve compliance in the near term, particularly the 2013 base line freeze obligation is to eliminate the use of HCFCs in the manufacturing sector. More specifically this involves the elimination of HCFC-22 refrigerant in the manufacture of commercial refrigerator appliances and cold rooms which currently consumes 25.5 tons per year and the indirect consumption of HCFC-141b that consumes 7.5 tons per year for sandwich panels used primarily for fabrication of commercial refrigeration equipment and general construction use. All of this consumption is within a single enterprise (SAGA Ltd.) and at plant facilities located in Yerevan. Based on current project preparation work, it is currently planned to submit a combined foam and refrigerant commercial phase out project to ExCom for consideration at the last meeting of 2010. The proposed project will convert all HCFC-22 based commercial refrigeration to hydrocarbon refrigerant (R-290). This will also encompass applications where it currently uses HFCs in order to step by step eliminate this high GWP non-ODS alternative. It will also convert the current use of imported HCFC-141b based formulated polyol in foam blowing to the use of cyclopentane. The overall impact would be to completely transition the manufacturing facility to natural refrigerants and low GWP blowing agents by 2013. As such, the proposed combined project represents a highly replicable demonstration of conversion to technologies expected to be fully environmentally sustainable with a facility sized similarly to many that will ultimately require conversion in Article 5 countries. Annex D provides the preliminary cost estimates for this investment project. In terms of timing, it is anticipated that this project will be submitted for ExCom approval in late 2010, implementation would start in 2011, and it would be completed in 2012.

ii) *Sub-Component 3.2 – Initial development of the Refrigerant Management System:* This investment sub-component attempts to address the physical capacity requirements associated with the urgent and longer term need to initiate the staged upgrade the country's refrigeration servicing capability. It terms of its effectiveness, if it is sufficiently funded, it will have added practical and comprehensive incremental capability that would ultimately support sustaining residual HCFC demand through the use of reclaimed and recycled refrigerant as well as manage end of life refrigerants in an environmentally sound manner. However, in Stage 1, due to limitations in the financial support available, it is planned to initiate its gradual development, with expectations of

continuing such activities in Stage 2 of the HPMP and later, and taking into consideration the actual needs of the country. It is envisioned to have one principal project activity - upgrading refrigerant recovery capability. Further details are provided in Annex F, section "Investment Projects", in association with the overall cost estimate. A description of this activity is provided below.

- *Upgraded refrigerant recovery capability*: The initial focus would be on ensuring that qualified technicians are equipped with adequate recovery equipment along with supporting tools and leak detection equipment. At present it is estimated that only approximately 15% of the technicians are adequately equipped and have some access to basic recovery capability. This sub-component would target increasing this number to the extent possible in Stage 1. In Stage 1, with the funding level for this activity as outlined in Annex F, this is the realistic scope of coverage of technicians in the country. In making these investments it is recognized that a close linkage exists to Sub-Component 2.2 through training. It will also need to be subject to strict monitoring of equipment supply and its ultimate utilization.

4.2.4 Climate Change and Sound Chemicals Management Considerations

As noted above in the presentation of the HPMP strategy framework, integration of consideration of broader global environmental issues, namely climate change and sound chemicals management is a part of this framework. Consistent with the direction provided in Decision XIX/6 and subsequent ExCom guidance this particularly relates to climate change, the description of the action plan above notes where these linkages exist. The following summarizes specific aspects that specifically relate to climate change and sound chemicals management:

- Involvement of authorities responsible for climate change policy as key institutional stakeholders
- Promoting introduction of "natural refrigerant" and hydrocarbon based blowing agent technology in the commercial refrigeration manufacturing sector
- Inclusion of HFC recovery capability in during the initial stage of upgrading of refrigerant management infrastructure

4.2.5 HPMP Stage 1 Action Plan Timetable

The overall timetable proposed for implementation of the Stage 1 HPMP is provided in Annex E. It is based on submission of the HPMP for consideration by ExCom in 2010. The binding regulatory and administrative control actions will be developed in 2011 and implemented in 2012 with others being initiated based on phase out progress and institutional capacity to develop and sustain their implementation. Priority technical and capacity building will be initiated in 2011 and continue throughout Stage 1. The investment activities will also begin in 2011 for all proposed projects with manufacturing sector consumption phase out being completed in 2012.

4.3 HPMP Stage 1 Cost Estimate

This Section provides the costs for Stage 1 in line with the established funding levels as per ExCom Decision 60/44 for which Armenia, while recognizing that these limit the scope of support for the servicing sector, is seeking international funding through the MLF under this HPMP and in the case of manufacturing sector investment by a separate submission. The total costs for the HCFC-22 consumption category in the servicing sector, which is being considered in the project document, would, in line with the decision 60/44, constitute US$ 99,000.

These costs have been developed based on using Stage 1 to move the country from having a basic legal and regulatory framework dealing with Annex A and B ODS, limited human resource capacity to address new obligations, dated manufacturing capacity reliant on HCFCs, and significant deficits in critical refrigerant management infrastructure to initiate activities, though limited in scope, to start HCFC phase-out.

The costs are divided into two principle categories; Non-Investment Activities and Investment Projects. It is noted that these costs are additional to the basic institutional costs of administering the country's current ODS related regulatory and other activities, specifically that undertaken by the NOU, MNP generally and other stakeholder government agencies. This has in past and is currently being supported by an institutional strengthening grant from the MLF of US$60,000 per year. A basic assumption of this HPMP is that MLF support for this continues through Stage 1 of the HPMP implementation.

Cost Category 1: Non-Investment Activities (Component 1 and 2)

Non-Investment Activities: This covers what would be considered funding required for maintenance of a level of attention to HCFC phase out in terms of achieving immediate compliance objectives and partially addressing the actual needs identified to sustain technical capacity. Armenia with a refrigeration servicing consumption of approximately 100 tons/year of HCFC-22 would require substantial funding distributed between legislation/regulatory development, customs training, refrigeration servicing training, and monitoring, though at the current level of funding, at this stage only US$ 39,000 would be channeled into this component.

Legal and Regulatory Action

Regulatory initiatives are split into (1) basic and (2) potential supplementary measures:

(1) Application of Import Quotas on HCFCs, and Ban on the import and or use of HCFC-141b in the pre-blended polyol systems (after the technological conversion at SAGA is completed);

(2) Application of a supplementary surcharge on HCFC imports, and Controls on New HCFC Large Commercial/Industrial Refrigeration and A/C Installations – these measures would be potentially developed and evaluated through National legislation experts.

Customs training:

To date training programs for customs officials has been undertaken with 112 customs officers receiving basic training and 12 detection devices being supplied. Based on a total current complement of 600 front line customs officers located at 7 entry points (420 customs officers) and 8 in-country custom houses (180 customs officers), the training coverage has been less than 20%. Armenia like most countries in the region experiences a high turnover of front line customs officers. In recognition of this, the process will have to be repeated regularly. The initial baseline deficit in capacity and compounding effect of high turnover rates, substantial increase in scope of controls for HCFCs contemplated, and potential increased need for enforcement related to illegal trade, indicates a requirement for a significant effort in this area.

The approach proposed is focused on three specific areas.

- Enhanced coordination between MNP and customs authorities respecting methodologies where by customs codes can better discriminate between and among those items of specific interest (i.e. HCFC chemicals, HCFC containing equipment/products, HFCs) and other imports, preparation of practical instructions on labeling and designations of items being controlled, development of streamlined reporting and information exchange procedures.

- Initial program of expanded training of present front line customs and environmental enforcement officers to upgrade both their knowledge level and effectiveness, inclusive of detection equipment suitable for a complete range of ODS and HFCs. With the current requirement is estimated to be at least 500 trainees and 30 detection units. During Stage 1, however, it would be possible to plan trainings for 40 officers only.

Refrigeration Service Sector Human Resource Capacity Upgrading:

The initial training undertaken during earlier projects covered introductory training for 712 individuals and more intensive training for 260 of these technicians hence approximately 37 % of technicians working at that time received a sustaining level of training specifically for CFC phase out. Currently, the estimated number of active technicians is 325 working directly for end users and organized service enterprises with 300 being individual operators, many with limited training. Recognizing the annual replacement requirement of approximately 125 technicians it is also imperative that sustainable capacity be created to continuously train both existing and new technicians, with particular emphasis on the latter recognizing the serious short falls predicted during the next critical 5 year period. Developing this capacity would at least initially be based on the two centers established during the earlier GEF funded project with appropriate upgrading for HCFCs and HFCs. Their operation would be based on a partnership arrangement between the NOU, the refrigeration association and potentially an educational institution.

Despite the actual needs in strengthening capacity as outlined in section 4.2.2.(ii) above, during Stage 1, it would be possible to plan trainings for 40 technicians only

Monitoring of activities:

The role of UNEP is to provide technical assistance and further guidance towards successful implementation of the non-investment component of HPMP.

Under the non-investment component of HPMP, there are three major sub-activities to be implemented. Implementation of these sub-activities involves constant interaction with the concerned stakeholders, periodic dialogue on issues and concerns and evolving schemes for implementation. Expected results from the monitoring and review include the following:

- Provide focused attention on timely implementation of non-investment components of HPMP.
- Periodic interaction with the stakeholders on HPMP non-investment implementation modalities.
- Review of effectiveness of implementation of sub-components through surveys.

Cost Category 2: Investment Projects

Component 2 - Investment Projects: The second cost category involves two investment projects. The first investment project is the MLF funded conversion of both HCFC refrigerants and HCFC based foam blowing to low GWP hydrocarbon technology at SAGA. This is a key component of the country's strategy to meet its 2013 freeze obligation as well as a significant step in introducing natural refrigerant use into the commercial refrigeration sector. A summary of this project and its currently estimated costs, totaling US$ 534,353, are included in Annex D. The second investment project

involves initial steps to start addressing the significant gaps in the country's refrigerant management infrastructure. The costs for this sub-component are US$ 60,000, and, these, along with the detailed project description, are provided in Annex F, section "Investment projects".

4.4 Project Coordination and Management

The Republic of Armenia has demonstrated experience in the successful implementation of its Country Programme to date. The capacity that has undertaken this within the government, specifically the National Ozone Unit in the Ministry of Nature Protection, will continue to act as the focal point for HPMP project coordination and management. This activity will be directly undertaken by experienced project managers acting under the direction of the Head of the NOU who also acts as the national focal point on Montreal Protocol and various international bodies involved with its implementation globally. As described above the work will be undertaken with a high level of stakeholder consultation both with various government agencies and with external stakeholders and the general public.

Implementation will be undertaken through both UNDP and UNEP with the former being the lead for the implementation of the HPMP and having responsibility for Investment Projects, and the latter being the cooperating agency and having responsibility for Non-Investment Activities. UNDP be responsible for coordination between investment and non-investment activities, noting that this is fundamental to HPMP implementation. Each IA will use their own established procedures governing preparation of specific project proposals, procurement, financial management, reporting and monitoring of the relevant implementing agency and international funding facilities, specifically the MLF. Implementation will be further supported by various administrative and service bodies within the government, international and national consultants, suppliers of equipment and services, and beneficiary enterprises.

Annex A

Stakeholder Information Products and Activities

Stakeholder Events

- Round table in the Ministry of Nature Protection of Armenia (13.09.07)
- National Train-the-Trainers Workshop for Customs Officers (Phase 1) was held in Yerevan, 22-24 May, 2007: 13 customs officers trained. Six outside sessions were held for Customs Officers in the following Customs Houses/Entry Points of Armenia in 2008: Meghri (12-16
  May), Sisian (19-23 May), Shirak (9-13 June), Bavra (23-27 June), Gogavan (7-11 July), Airum (14-18 July)
- National Train-The-Trainers Workshop for Refrigeration Technicians on Good Practices in Refrigeration was held in Yerevan on October 10-14, 2005
- 5 five-day similar sessions on Good Practices in Refrigeration were held in Yerevan, in November-December, 2006 and in 2007 4 outside sessions in the following regions of Armenia: Gyumri (24-26 April), Kapan (2-5 May), Yeghegnadzor (14-16 May) and Vanadzor (17-19 May)
- Refrigeration equipment End-user Awareness and Incentive workshops were held in Yerevan on 2 June, 2005 and 24 October, 2007
- Introductory Workshop on Preparation of the HPMP, Tsaghkazor, Oct, 2009
- Second Workshop on Preparation of the HPMP, Tsaghkazor, Dec, 2009
- Final HPMP Workshop, February 2010, Yerevan

Technical Publications/Information Products

- The Training Manual for Customs Officers, leaflets "Checking of Documentation","Inspection of Goods", "Smuggling Methods" and Customs Officer's Quick Tool for Screening ODS were adapted into Armenian, published and distributed to Customs Officers.
- Manual "Alternative to Methyl bromide" (adapted from the English original)
- The training manuals "Good Practices in Refrigeration" and "Natural Refrigerants as Alternatives to HCFC" were adapted into Armenian, published and distributed to Refrigeration Technicians.
- The film "Good Practices in Refrigeration" was translated into Armenian, duplicated and further shown at workshops.
- A TV Programme devoted to this project and aiming at raising awareness among end-users was prepared and broadcast.
- A booklet "Improve your production efficacy by switching to ozone-friendly technologies!" was prepared and published to inform end-users.
- A TV Programme "Environmental Diary" covering the issue of the International Ozone Day Celebration was prepared and broadcast
-

General Publications & Video/Audio Materials

- Leaflet on the Ozone Layer
- Poster "Saving the Ozone Layer!"

- Calendar with the image depicted on the poster
- Copy-books containing pictures, slogans and information on the Ozone Layer on the inner pages
- Booklet “Save the Ozone Layer! Children’s pictures
- The first three issues of the “Ozzy Ozone” Comics (translated from the English original)
- Ozzy Ozone Game translated and reproduced in 3m x 3m format for making it playable on the ground
- Education pack: teachers’ guideline “Saving the Ozone Layer” with related questionnaires for children (adapted from the English original)
- Book “Twenty Questions about the Ozone Layer” (adapted from the English original)
- Articles on the problem of the Ozone Layer Protection in the newspapers “Hayastani Hanrapetutyun”, “Aravot” and “Bnutyun"
- TV spot on the Protection of the Ozone Layer with an emphasis on a safe rest in the high mountainous Lake Sevan
- The film “Saving the Ozone Layer” and the cartoon “Ozzy Ozone” (translated from the English original)
- TV Programme on Ozone Related Issues on “Kentron” TV Channel (14.10.05)
- Radio Live Programme dedicated to the Ozone Day Celebration (15.09.05)
- Awareness seminars dedicated to the International Ozone Day Celebration with distribution of awareness materials (School after A. Pushkin (15.09.05) and School after A. Khalatyan (18.09.05), Yerevan
- Exhibition of Children’s Paintings on the Ozone Layer dedicated to theInternational Ozone Day celebration (16 -18.09.05)
- Awareness seminars on the Ozone Layer Issues in the following regions (marzes) of Armenia: Kotayk, Syunik, Tavoush, Lori (24-25.09.05)
- Awareness seminar on the Ozone Layer Issues at School №1 in the village Verin Artashat, Marz of Ararat (22.12.05)
- TV Programme on the draft of the Law on Substances that Deplete the Ozone Layer on “Kentron” TV Channel (28.04.06)
- Awareness seminar in the community Nor Nork, Yerevan, dedicated to the Ozone Day Celebration with participation of Nor Nork kindergartens and schools representatives and with distribution of comics, copy-books and flyers (27.06.2006)
- Round table in the Ministry of Nature Protection of Armenia, dedicated to the Ozone Day Celebration. Presentation of books "20 Questions about Ozone Layer" and "Save the Ozone Layer! Children's Pictures" (13.09.07)
- Awareness seminars on the Ozone Layer Issues at Schools No176 and No196 (Yerevan, 17-18.09.07)
- Awareness seminar on Global Environmental Issues organized at School No 4 named after S. Avanyan in Charentsavan town, Kotayk Region (28.09.07)
- Awareness seminar at Gavar Children's Home followed by the delivery of the award the NOU, Armenia received for the Poster "Save the Ozone Layer" (19.03.08)
- Awareness seminar on the ozone-related issues with distribution of awareness materials to the school library (School in v. Gargar, Marz of Lori, 23.05.2008)
- Awareness seminar dedicated to the International Ozone Day Celebration at Yerevan Secondary School N 176 with participation of teachers and students of 16 schools located in the same community called Malati-Sebastia (16.09.08)

- Awareness seminar for the students of the Yerevan Fine Arts Academy held at the Ministry of Nature Protection (16.09.09)
- Graffitii painting by the students of the Yerevan Fine Arts Academy on the walls of the yard of the “Taron”Aesthetic Center. Only spray paints with "ozone-friendly" labels were used (16.09.09)
- Exhibition-awareness seminar at the Yerevan Scientific-Technical Library dedicated to the International Ozone Day (16.09.09)

A series of seminars in the middle schools of Yerevan (16.09-30.09.09)

Annex B

Summary of Survey Information Solicited by Sector and Sub-Sector

a) End Users of Industrial, Commercial, Air Conditioning/Heat Pump/Chiller, Transportation Sectors
   i) Enterprise name/location/contact information
   ii) Equipment type/application and number of units operated
   iii) Original refrigerant charge by refrigerant (CFC, HCFC, HFC, other)
   iv) Annual average servicing requirement (2006-2009)

b) Refrigeration Servicing Sector
   i) Enterprise name/location/contact information
   ii) Sectors and areas covered
   iii) Number of staff (technicians)
   iv) Amount of available equipment (charging units, recovery/recycling units, reclaim (cleaning units, other)
   v) Annual average servicing consumption (2006-2008) of CFC, HCFC, HFC
   vi) Annual average recycled amounts (2006-2008) of CFC, HCFC, HFC

c) Manufacturers of Refrigeration Sector
   i) Enterprise name/location/contact information
   ii) Year of first HCFC use/Last year of CFC use (if applicable)
   iii) Types of products produced and compressor capacity or cooling range (kW)
   iv) Plant design capacity (units/year by product type)
   v) Total domestic sales of HCFC based units
   vi) Average/yearly production by product type (units/years) 2005-2008
   vii) Original charging by product type (model) and Annual anticipated servicing consumption for CFC,HCFC, HFC, other)

d) Manufacturing Using Foam Blowing Agents
   i) Enterprise name/location/contact information
   ii) Year of first HCFC use/Last year of CFC use (if applicable)
   iii) Types of products produced (only PU rigid foams identified)
   iv) Plant design capacity (foam tons/year by product type)
   v) Average/yearly consumption of blowing agents (kg) 2006-2008
   vi) Form in which blowing agents are purchased (as chemical or in pre-mixed polyol)
   vii) Main equipment parameters used and age

e) Importers and Distributors of HCFCs and HFCs
   i) Enterprise name/location/contact information
   ii) Original suppliers
   iii) Import volumes HCFCs and HFCs (2008-2009)
   iv) Price range by container type
   v) Market served

Annex C

Estimates of Small A/C and Commercial Refrigeration Appliance Servicing Demand Based on Statistical Data

Building/ Establishment Type	Number	Units		Average Charge/ Unit (kg)	Total Charge[1] (kg)	Annual Leakage Rate [3] (kg)	Estimated Annual Demand (kg)
		# per Place	Total Number				
Small Air Conditioning Equipment							
Domestic Households [2]	822,102		228,842	1.0 kg	216,830	23%	49,871
• Urban	536,390	0.4	214,556				
• Rural	285,712	0.05	14,286				
Retail Trade Establishments	18,202	1.2	21,842				
Medium/Large Commercial Blg. [4]	1,436	10	14,360	1.0 kg	13,642	23%	3,138
Hotels	110						
• Urban	45	50	2,250	2.0kg	4,275	23%	983
• Rural	65	25	1,625	1.0 kg	1,544	23%	355
Food/Beverage Establishments	1,151	2	2,302	2 kg	4,373	23%	1,006
Health/Social Establishments	903		2,846	2.0 kg	5,407	23%	1,244
• Hospitals	130	10	1,300				
• Clinics	761	2	1,522				
• Childcare	12	2	24				
Educational Institutions	2,299		6,218	1.0 kg	6,218	23%	1,430
• Schools	2,209	2	4,418				
• Higher Education	90	20	1,800				
Cultural Buildings	1,156		1,836	2.0 kg	6,983	23%	1,606
• Libraries	1,034		1,226				
o Urban	192	2	384				
o Rural	842	1	842				
• Museums	96	5	480				
• Theatres	26	5	130				
Public Administration Blgs.	2,371		47,990	1.0 kg	45,591	23%	10,486
• Yerevan	607	50	30,350				
• Regions	1,764	10	17,640				
Totals for Small A/C Equipment			330,111		333,969		70,119
Small Commercial Refrigeration Appliances							
Retail Trade Establishments	18,202						
• Display		4.0	72,808	0.5 kg	25%	25%	6,371
• Cold Rooms/Freezer		0.25	4,550	15 kg	25%	25%	11,943
Medium/Large Commercial Blg. [4]	1,436	2	2,872	0.5	25%	25%	251
Hotels	110						
• Display		4	440	0.5 kg	25%	25%	39
• Cold Rooms/Freezer		2	220	15 kg			588
Food/Beverage Establishments	1,151			2 kg	23%	23%	
• Display		2	2,302	0.5 kg	25%	25%	201
• Cold Rooms/Freezer		1	1,151	15 kg	25%	25%	3,031
Health/Social Establishments	903			2.0 kg	23%	23%	
• Display[5]		10	1,420	0.5 kg			124
• Cold Rooms/Freezer [5]		2	284	15 kg			746
Educational Institutions	2,299			1 kg	23%	23%	
• Display[6]		5	11,495	0.5 kg	25%	25%	1,006
• Cold Rooms/Freezer [6]		1	2,299	15 kg	25%	25%	6,035
Totals for Small Commercial Refrigeration Appliances			103,513		121,261		30,335

Assumptions

(1) Amount of HCFC charge assuming 95% of air conditioning equipment is based on HCFC-22 and 70% of small commercial refrigeration appliances are based on HCFC-22

(2) Domestic households are 392,590 individual houses (134,454 urban, 258,236 rural) and 429,512 apartments (402,036 urban 27,476 rural)

(3) Leakage rates based on results of survey data from A/C and Commercial refrigeration sectors

(4) Including financial and property management institutions

(5) Institutional food services in hospitals/orphanages

(6) Assume one cafeteria per school and 2 per higher educational institution

Annex D

Preliminary Cost Estimate: SAGA Ltd Refrigerant and Foam Conversion Project

Incremental Capital Costs: Foam Conversion

Item	Description	Cost US$	Local Works US$
	Hydrocarbon Storage/blending		
1	Pentane storage base and drum pump unit	10,000	5,000
2	Pentane pipeline (2 x 40 meters)	2,500	
3	Premixer and feeding directly to the work tanks of the foaming machines	90,000	
	Total Storage/Blending	**102,500**	**5,000**
	Foam Equipment		
4	Retrofit of foaming machine	78,000	
5	Upgrading of existing dry end		10,000
6	Exhaust ventilators for premix + 2 foaming units + 2 foaming positions		10,000
7	Safety control cabinet	31,900	
8	Automatic switch off system from main electrical line to the secondary one	3,625	
9	5 pcs of Gas sensors with special cables	35,000	
10	Remote control panel	5,000	
11	Nitrogen cylinder set, distribution piping to foaming machines tank and mixing head		8,000
12	Power generator		6,000
	Total foam equipment	**153,525**	**34,000**
	General		
16	Training and International Technical Support	20,000	
17	Trials	10,000	
19	Safety Audits	10,000	
	Total General	**40,000**	
	Total	**296,025**	**39,000**
	Contingencies 10%	29,603	3,900
	TOTAL CAPITAL INVESTMENT COSTS	**325,628**	**42,900**
	GRAND TOTAL CAPITAL INVESTMENT COSTS	**368,528**	

Incremental Capital Costs: Refrigeration Component

Item	Description	Cost US$	Local Cost US$
	R600a/R290 Storage and Feeding		
1	HC-Feeding pump with automatic change over	19,000	
2	HC-pipeline		3,500
3	Absorption filter dryer	2,100	
4	Storage and feeding room with bottle rack (locally made)		3,800
	HC Charging		
5	Power switch-off safety board	500	
	HC-discharge for repair		
6	HC-EX-pumping system	1,500	
7	Exhaust pipe		500
	Safety devices		
8	Gas Alarm system with 4 gas sensors, fire detectors, ventilation control etc.	28,000	
9	Gas sensor calibration system	2,000	
10	Handheld HC-leak detector for maintenance	550	
11	Ventilation system	10,000	
12	Enclosure		4,000
13	Sets of safety markings, escape ways and emergency exit lamps		800
	Leak detection lines		
14	Handheld HC-leak detector for refrigerators	4,500	
	Evacuation lines		
15	Three units of evacuation pumps 18m³/h with condensate separator, oil filter, joints, 2 hoses	10,000	
	Electric safety		
16	Electric safety board acc. to IEC 60335-1 and 2-24+2-89 incl. calibration kit	15,000	
	Totals of equipment	**93,150**	**12,600**
	General		
21	Training and International Technical Support	20,000	
22	Trials	10,000	
23	Testing	5,000	
24	Safety Audits	10,000	
	Total General	45,000	
	TOTAL	138,150	12,600
	Contingencies 10%	13,815	1,260
	TOTAL CAPITAL INVESTMENT COSTS	**151,965**	**13,860**
	GRAND TOTAL CAPITAL INVESTMENT COSTS	**165,825**	

ANNEX 2

CALCULATION OF INCREMENTAL OPERATING COSTS: FOAM

The following costs have been based on the current system costs and consumption at SAGA and a replacement formulation provided by Bayer Material Science:

Before:	50.2 t systems	@ US$ 3,100	=	US$ 155,620
	60.0 t MDI	@ US$ 3,100	=	US$ 186,000
				US$ 341,620
After:	4.5 t CP	@ US$ 3,600	=	US$ 16,200
	43 t systems	@ US$ 3,100	=	US$ 133,300
	60 t MDI	@ US$ 3,100	=	US$ 186,000
				US$ 335,500
Incremental Operating Costs/year				US$ -6,120
Total				US$ -6,120

CALCULATION OF INCREMENTAL OPERATING COSTS: REFRIGERANT

SAGA's purchase cost for HCFC 22 has been between USD 4.50-5.50 and estimated cost for R 290 (propane) is 9.35 (Cost in Swaziland). Equimolar ratio between propane and HCFC-22 is 50.8% :

Before:	25.5 t R22	@ US$ 4,800	=	**US$ 122,400**
After:	12.98 t R290	@ US$ 9,350	=	**US$ 121,363**
Incremental Operating Costs/year				US$ -1,037
Total				US$-1,037

TOTAL COMBINED IOC FOR THE REFRIGERATION AND FOAMS PARTS OF THE PROJECT

	One year
Foams	-6,120
Refrigeration	-1,037
Total	-7,157

Annex E

Proposed HPMP Stage 1 Action Plan Implementation Schedule

Action Plan Component/Sub-Component	2010				2011				2012				2013				2014				2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
HPMP Development																								
• Preparation																								
• National Legal Review																								
• Government Approval																								
• ExCom Submission																								
• General Awareness Program on HPMP																								
HPMP Action Plan Component 1– Legal and Regulatory Measures																								
Mandatory Commitments																								
1. Legal and Regulatory Action																								
1.1 Application of HCFC Import Quota																								
• Announce intention to apply quotas																								
• Preparation and approval of Legal Acts																								
• Announce Quota Levels																								
• Coordination with customs authorities																								
• Freeze quota in force																								
• Coordination with customs authorities																								
• 10% reduction quota in force																								
1.2 Administrative Control Measures on Import of HCFC Equipment/Products																								
• Stakeholder consultation																								
• Preparation/approval of administrative procedures acts																								
• Coordination between MNP and customs authorities																								
• Implementation of control measures																								

Annex E

Proposed HPMP Stage 1 Action Plan Implementation Schedule (Continued)

Action Plan Component/Sub-Component	2010				2011				2012				2013				2014				2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
HPMP Action Plan Component 2-Technical and Institutional Capacity Strengthening																								
2.1 Import and Application Control Capacity																								
• Customs authority MNP coordination																								
• Training current existing custom/ environmental officers																								
• Implementation of entry level/refresher training																								
2.2 Refrigeration Servicing Human Resource and Institutional Capacity																								
• HCFC/ Refrigerant Mgt. technician training																								
• Develop ongoing entry level/ refresher training capacity																								
• Develop certification system																								
• Refrigeration association strengthening																								
2.3 Awareness Programs																								

Annex E

Proposed HPMP Stage 1 Action Plan Implementation Schedule (Continued)

Action Plan Component/Sub-Component	2010				2011				2012				2013				2014				2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
HPMP Action Plan Component 3 - Investment Projects																								
3.1 Manufacturing Sector Phase Out																								
• SAGA foam c-pentane conversion																								
• SAGA refrigerant HC conversion																								
3.3 Initial Development of Refrigerant Mgt. System Development																								
• Upgraded recovery and recycling capability																								

Annex F

Project description and Cost Estimate for Stage 1 HPMP Implementation
Component 1 and 2: UNEP
Component 3: UNDP

HPMP Components 1 and 2: Legal and Regulatory Action, and Technical Capacity Strengthening (UNEP)

This covers what would be considered funding required for a maintenance level of attention to HCFC phase out in terms of achieving the immediate compliance objectives and partially addressing the actual needs identified.

MLF funding will be distributed between:

(-) legislation/regulatory development,
(-) Customs training,
(-) refrigeration servicing training, and
(-) monitoring.

Implementing partner:	UNEP
Implementation period:	2010-2014
Cost:	US$ 39,000 MLF Funding

Budget:

Budget Item	**Costs in US$**
Development of the legislation system	
National legislation experts	10,000
Sub-total	**10,000**
Customs training	
Customs Training (40@ US$250)	10,000
TA in information exchange, labeling standards and others	4,000
Sub-total	**14,000**
Training in the refrigeration sector	
Technician Training in the refrigeration sector (40@US$250/trainee)	10,000
Sub-total	**10,000**
Monitoring	
Monitoring experts	5,000
Sub-total	**5,000**
Total cost for the components	**39,000**

HPMP Component 3: Investment Projects (UNDP)

The investment component of the Stage 1 HPMP is envisioned to include two sub-components in line with the above strategy and for which MLF funding will be sought. These are:

(1) manufacturing sector phase out; and
(2) initial development of refrigeration management system.

(1) Manufacturing Sector Phase Out:

The principle focus of this will be the elimination of HCFC-22 refrigerant in the manufacture of commercial refrigerator appliances and cold rooms which currently consumes 25.5 tons per year and the consumption of HCFC-141b that consumes 7.5 tons per year for sandwich panels used primarily for fabrication of commercial refrigeration equipment and general construction use.

All of this consumption is within a single enterprise (SAGA Ltd.) and plant facilities located in Yerevan. Based on current project preparation work, it is currently planned to submit a combined foam and refrigerant commercial phase out project to the MLF for funding. In terms of timing, it is anticipated that this project will be submitted for in 2010 along with the HPMP, implementation would start in 2011, and it would be completed in 2013. The preliminary cost estimate prepared for this project is provided in Annex D.

Implementing partner:	UNDP
Implementation period:	2011-2013
Cost:	US$ 534,353 MLF Funding

(2) Initial Development of Refrigerant Management System:

This investment sub-component will attempt to start addressing the physical capacity requirements associated with the urgent and longer term need to upgrade the country's refrigeration servicing capability.

<u>Upgraded refrigerant recovery capability</u>:

The initial focus would be on ensuring that qualified technicians are equipped with recovery equipment along with supporting tools and leak detection equipment. At present it is estimated that only approximately 15% of the technicians are adequately equipped and what capacity that exists is largely designed for CFCs. The current proposal will assist in increasing this level to the extent possible. It is expected that 30-35 technicians could be equipped with complete sets of equipment as described above, depending on equipment and freight costs during international biddings.

The following standard servicing equipment will be considered:

⇒ Vacuum pumps
⇒ Manifolds, gauges and standard hoses (HCFC, HFC, and HC)
⇒ Portable leak detectors
⇒ Thermometers and servicing tools

⇒ Re-usable refrigerant charging cylinders
⇒ Portable Recovery Machines capable of handling HCFCs and HFCs

The project component will be closely linked to and coordinated with the planned training of technicians contemplated in Component 2. Once the trainings have been accomplished, qualified technicians will be allocated with equipment sets.

In this component, a national expert will be hired to help the National Ozone Unit in implementing this program.

Implementing Partner:	UNDP
Implementation Period:	2011-2014
Cost:	US$ 60,000 MLF Funding

Budget:

Budget item	**Cost in US$**
Basic equipment for recovery and tools (and freight)	57,000
National expert	3,000
Total	**60,000**

Annex G

DRAFT AGREEMENT BETWEEN ARMENIA AND THE EXECUTIVE COMMITTEE OF THE MULTILATERAL FUND FOR THE REDUCTION IN CONSUMPTION OF HYDROCHLOROFLUROCARBONS

1. This Agreement represents the understanding of the Government of Armenia (the "Country") and the Executive Committee with respect to the reduction of controlled use of the ozone-depleting substances (ODS) set out in Appendix 1-A ("The Substances") to a sustained 7.05 ODP tonnes / maximum consumption allowed for 2015 under the Montreal Protocol reduction schedule prior to 1 January 2015 in compliance with Montreal Protocol schedules.

2. The Country agrees to meet the annual consumption limits of the Substances as set out in row 1.2 of Appendix 2-A ("The Targets and Funding") in this Agreement as well as in the Montreal Protocol reduction schedule for all Substances mentioned in Appendix 1-A . The Country accepts that, by its acceptance of this Agreement and performance by the Executive Committee of its funding obligations described in paragraph 3, it is precluded from applying for or receiving further funding from the Multilateral Fund in respect to any consumption of the Substances which exceeds the level defined in row 1.2 of Appendix 2-A (maximum allowable total consumption of Annex C, Group I substances) as the final reduction step under this agreement for all of the Substances specified in Appendix 1-A, and in respect to any consumption of each of the Substances which exceeds the level defined in rows 4.1.3 and 4.2.3 (remaining eligible consumption).

3. Subject to compliance by the Country with its obligations set out in this Agreement, the Executive Committee agrees in principle to provide the funding set out in row 3.1 of Appendix 2-A (the "Targets and Funding") to the Country. The Executive Committee will, in principle, provide this funding at the Executive Committee meetings specified in Appendix 3-A (the "Funding Approval Schedule").

4. The Country will meet the consumption limits for each of the Substances as indicated in Appendix 2-A. It will also accept independent verification, to be commissioned by the relevant bilateral or implementing agency, of achievement of these consumption limits as described in sub-paragraph 5(b) of this Agreement.

5. The Executive Committee will not provide the Funding in accordance with the Funding Approval Schedule unless the Country satisfies the following conditions at least 60 days prior to the applicable Executive Committee meeting set out in the Funding Approval Schedule:

    a. That the Country has met the Targets for all relevant years. Relevant years are all years since the year in which the hydrochloroflurocarbons phase-out management plan (HPMP) was approved. Exempt are years for which no obligation for reporting of country programme data exists at the date of the Executive Committee Meeting at which the funding request is being presented;

    b. That the meeting of these Targets has been independently verified, except if the Executive Committee decided that such verification would not be required;

    c. That the Country had submitted tranche implementation reports in the form of Appendix 4-A (the "Format of Tranche Implementation Report and Plan") covering each previous calendar year, that it had achieved a significant level of implementation of activities initiated with previously approved tranches, and that the rate of disbursement of funding available from the previously approved tranche was more than 20 per cent; and

    d. That the Country has submitted and received approval from the Executive Committee for a tranche implementation plan in the form of Appendix 4-A (the "Format of Tranche

Implementation Reports and Plans") covering each calendar year until and including the year for which the funding schedule foresees the submission of the next tranche or, in case of the final tranche, until completion of all activities foreseen.

6. The Country will ensure that it conducts accurate monitoring of its activities under this Agreement. The institutions set out in Appendix 5-A (the "Monitoring Institutions and Roles") will monitor and report on Implementation of the activities in the previous tranche implementation plan in accordance with their roles and responsibilities set out in Appendix 5-A. This monitoring will also be subject to independent verification as described in sub-paragraph 5(b).

7. The Executive Committee agrees that the Country may have the flexibility to reallocate the approved funds, or part of the funds, according to the evolving circumstances to achieve the smoothest phase-down and phase-out of the Substances specified in Appendix 1-A. Reallocations categorized as major changes must be documented in advance in a Tranche Implementation Plan and approved by the Executive Committee as described in sub-paragraph 5(d). Major changes would relate to reallocations affecting in total 30 per cent or more of the funding of the last approved tranche, issues potentially concerning the rules and policies of the Multilateral Fund, or changes which would modify any clause of this Agreement. Reallocations not categorized as major changes may be incorporated in the approved Tranche Implementation Plan, under implementation at the time, and reported to the Executive Committee in the Tranche Implementation Report. Any remaining funds will be returned to the Multilateral Fund upon closure of the last tranche of the plan.

8. Specific attention will be paid to the execution of the activities in the refrigeration servicing sub-sector, in particular:

    a. The Country would use the flexibility available under this Agreement to address specific needs that might arise during project implementation; and

    b. The Country and the bilateral and implementing agencies involved will take full account of the requirements of decisions 41/100 and 49/6 during the implementation of the plan.

9. The Country agrees to assume overall responsibility for the management and implementation of this Agreement and of all activities undertaken by it or on its behalf to fulfil the obligations under this Agreement. UNDP has agreed to be the lead implementing agency (the "Lead IA") and UNEP has agreed to be cooperating implementing agency (the "Cooperating IA") under the lead of the Lead IA in respect of the Country's activities under this Agreement. The Country agrees to evaluations, which might be carried out under the monitoring and evaluation work programmes of the Multilateral Fund or under the evaluation programme of any of the IA taking part in this Agreement.

10. The Lead IA will be responsible for carrying out the activities of the plan as detailed in the first submission of the HPMP with the changes approved as part of the subsequent tranche submissions, including but not limited to independent verification as per sub-paragraph 5(b). The Executive Committee agrees, in principle, to provide the Lead IA and the Cooperating IA with the fees set out in rows 2.2 and 2.4 of Appendix 2-A.

11. Should the Country, for any reason, not meet the Targets for the elimination of the Substances set out in row 1.2 of Appendix 2-A or otherwise does not comply with this Agreement, then the Country agrees that it will not be entitled to the Funding in accordance with the Funding Approval Schedule. At the discretion of the Executive Committee, funding will be reinstated according to a revised Funding Approval Schedule determined by the Executive Committee after the Country has demonstrated that it has satisfied all of its obligations that were due to be met prior to receipt of the next tranche of funding under the Funding Approval Schedule. The Country acknowledges that the Executive Committee may reduce the amount of the Funding by the amounts set out in Appendix 7-A in respect of each ODP tonne of reductions in consumption not achieved in any one year. The Executive Committee will discuss each specific case in which the country did not comply with this

Agreement, and take related decisions. Once these decisions are taken, this specific case will not be an impediment for future tranches as per paragraph 5.

12. The Funding of this Agreement will not be modified on the basis of any future Executive Committee decision that may affect the funding of any other consumption sector projects or any other related activities in the Country.

13. The Country will comply with any reasonable request of the Executive Committee, the Lead IA and the Cooperating IA to facilitate implementation of this Agreement. In particular, it will provide the Lead IA and the Cooperating IA with access to information necessary to verify compliance with this Agreement.

14. The completion of the HPMP and the associated Agreement will take place at the end of the year following the last year for which a maximum allowable total consumption has been specified in Appendix 2-A. Should at that time activities be still outstanding which were foreseen in the Plan and its subsequent revisions as per sub-paragraph 5(d) and paragraph 7, the completion will be delayed until the end of the year following the implementation of the remaining activities. The reporting requirements as per Appendix 4-A (a), (b), (d) and (e) continue until the time of the completion if not specified by the Executive Committee otherwise.

15. All of the agreements set out in this Agreement are undertaken solely within the context of the Montreal Protocol and as specified in this Agreement. All terms used in this Agreement have the meaning ascribed to them in the Montreal Protocol unless otherwise defined herein.

APPENDICES

APPENDIX 1-A: THE SUBSTANCES

Substance	Annex	Group	Starting point for aggregate reductions in consumption (ODP tonnes)
HCFC-22	C	I	7
HCFC-141b	C	I	0.83

APPENDIX 2-A: THE TARGETS, AND FUNDING

		2010	2011	2012	2013	2014	2015	Total
1.1	Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tonnes)	n/a	n/a	n/a	7.83	7.83	7.05	n/a
1.2	Maximum allowable total consumption of Annex C, Group I substances (ODP tonnes)	n/a	n/a	n/a	7.83	7.83	7.05	n/a
2.1	Lead IA UNDP agreed funding (US $)	265,661	297,177			31,515		594,353
2.2	Support costs for Lead IA(US $) 7.5%	19,925	22,288			2,364		44,577
2.3	Cooperating IA UNEP agreed funding(US $)	31,515	-			7,485		39,000
2.4	Support costs for Cooperating IA(US $) 13%	4,097	-			973		5,070
3.1	Total agreed funding (US $)	297,176	297,177			39,000		633,353
3.2	Total support cost (US $)	24,022	22,288			3,337		49,647
3.3	Total agreed costs (US $)	321,198	319,465			42,337		683,000
4.1.1	Total phase-out of HCFC-22 agreed to be achieved under this agreement (ODP tonnes)							1.40
4.1.2	Phase-out of HCFC-22 to be achieved in previously approved projects (ODP tonnes)							0
4.1.3	Remaining eligible consumption for HCFC-22 (ODP tonnes)							5.60
4.2.1	Total phase-out of HCFC-141b agreed to be achieved under this agreement (ODP tonnes)							0.83
4.2.2	Phase-out of HCFC-141b to be achieved in previously approved projects (ODP tonnes)							0
4.2.3	Remaining eligible consumption for HCFC-141b (ODP tonnes)							0

APPENDIX 3-A: FUNDING APPROVAL SCHEDULE

1. Funding for the future tranches will be considered for approval not earlier than the last meeting of the year specified in Appendix 2-A.

APPENDIX 4-A: FORMAT OF TRANCHE IMPLEMENTATION REPORTS AND PLANS

1. The submission of the Tranche Implementation Report and Plan will consist of five parts:

    a. A narrative report regarding the progress in the previous tranche, reflecting on the situation of the Country in regard to phase out of the Substances, how the different activities contribute to it and how they relate to each other. The report should further highlight successes, experiences and challenges related to the different activities included in the Plan, reflecting on changes in the circumstances in the country, and providing other relevant information. The report should also include information about and justification for any changes vis-à-vis the previously submitted tranche plan, such as delays, uses of the flexibility for reallocation of funds during implementation of a tranche, as provided for in paragraph 7 of this Agreement, or other changes. The narrative report will cover all relevant years specified in sub-paragraph 5(a) of the Agreement and can in addition also include information about activities in the current year;

    b. A verification report of the HPMP results and the consumption of the substances mentioned in Appendix 1-A, as per sub-paragraph 5(b) of the Agreement. If not decided

otherwise by the Executive Committee, such a verification has to be provided together with each tranche request and will have to provide verification of the consumption for all relevant years as specified in sub-paragraph 5(a) of the Agreement for which a verification report has not yet been acknowledged by the Committee;

c. A written description of the activities to be undertaken in the next tranche, highlighting their interdependence, and taking into account experiences made and progress achieved in the implementation of earlier tranches. The description should also include a reference to the overall Plan and progress achieved, as well as any possible changes to the overall plan foreseen. The description should cover the years specified in sub-paragraph 5(d) of the Agreement. The description should also specify and explain any revisions to the overall plan which were found to be necessary;

d. A set of quantitative information for the report and plan, submitted into a database. As per the relevant decisions of the Executive Committee in respect to the format required, the data should be submitted online. This quantitative information, to be submitted by calendar year with each tranche request, will be amending the narratives and description for the report (see sub-paragraph 1(a) above) and the plan (see sub-paragraph 1(c) above), and will cover the same time periods and activities; it will also capture the quantitative information regarding any necessary revisions of the overall plan as per sub-paragraph 1(c) above. While the quantitative information is required only for previous and future years, the format will include the option to submit in addition information regarding the current year if desired by the country and lead implementing agency; and

e. An Executive Summary of about five paragraphs, summarizing the information of above sub-paragraphs 1(a) to 1(d).

APPENDIX 5-A: MONITORING INSTITUTIONS AND ROLES

1. *Appendix 5-A, Monitoring Institutions and Roles, may vary from agreement to agreement. Previous agreements entered by the Committee as reflected in the Reports of the Meetings as well as the existing agreements for the TPMP should be referenced to provide relevant examples. The principle need is for the appendix to provide a detailed and credible indication of how progress is to be monitored and which organizations will be responsible for the activities. Please take into account any experiences from implementing the TPMP, and introduce the relevant changes and improvements.*

APPENDIX 6-A: ROLE OF THE LEAD IMPLEMENTING AGENCY

1. The Lead IA will be responsible for a range of activities. These can be specified in the project document further, but include at least the following:

a. Ensuring performance and financial verification in accordance with this Agreement and with its specific internal procedures and requirements as set out in the Country's phase-out plan;

b. Assisting the Country in preparation of the Tranche Implementation Plans and subsequent reports as per Appendix 4-A;

c. Providing verification to the Executive Committee that the Targets have been met and associated annual activities have been completed as indicated in the Tranche Implementation Plan consistent with Appendix 4-A;

d. Ensuring that the experiences and progress is reflected in updates of the overall Plan and in future Tranche Implementation Plans consistent with sub-paragraphs 1(c) and 1(d) of Appendix 4-A;

e. Fulfilling the reporting requirements for the tranches and the overall Plan as specified in Appendix 4-A as well as project completion reports for submission to the Executive Committee. The reporting requirements include the reporting about activities undertaken by the Cooperating IA;

f. Ensuring that appropriate independent technical experts carry out the technical reviews;

g. Carrying out required supervision missions;

h. Ensuring the presence of an operating mechanism to allow effective, transparent implementation of the Tranche Implementation Plan and accurate data reporting;

i. Co-ordinating the activities of the Cooperating IA, and ensuring appropriate sequence of activities;

j. In case of reductions in funding for failure to comply in accordance with paragraph 11 of the Agreement, to determine, in consultation with the Country and the co-ordinating implementing agencies, the allocation of the reductions to the different budget items and to the funding of each implementing or bilateral agency involved;

k. Ensuring that disbursements made to the Country are based on the use of the indicators; and

l. Providing assistance with policy, management and technical support when required.

2. After consultation with the Country and taking into account any views expressed, the Lead IA will select and mandate an independent organization to carry out the verification of the HPMP results and the consumption of the substances mentioned in Appendix 1-A, as per sub-paragraph 5(b) of the Agreement and sub-paragraph 1(b) of Appendix 4-A.

APPENDIX 6-B: ROLE OF COOPERATING IMPLEMENTING AGENCY

1. The Cooperating IA will be responsible for a range of activities. These activities can be specified in the respective project document further, but include at least the following:

a. Providing policy development assistance when required;

b. Assisting the Country in the implementation and assessment of the activities funded by the Cooperating IA, and refer to the Lead IA to ensure a co-ordinated sequence in the activities; and

c. Providing reports to the Lead IA on these activities, for inclusion in the consolidated reports as per Appendix 4-A.

APPENDIX 7-A: REDUCTIONS IN FUNDING FOR FAILURE TO COMPLY

1. In accordance with paragraph 11 of the Agreement, the amount of funding provided may be reduced by US $ 10,000 per ODP tonne of consumption beyond the level defined in row 1.2 of Appendix 2-A for each year in which the target specified in row 1.2 of Appendix 2-A has not been met.

APPENDIX 8-A: SECTOR SPECIFIC ARRANGEMENTS

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