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COUNTRY PROGRAMME: IRAN



ISLAMIC REPUBLIC OF IRAN
DEPARTMENT OF THE ENVIRONMENT

COUNTRY PROGRAMME

FOR

PHASE-OUT OF OZONE DEPLETING SUBSTANCES

AUGUST 1992

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IN THE NAME OF GOD

CHAPTER 1

INTRODUCTION

1.1 THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER

The Islamic Republic of Iran is preparing a country programme which is a pre-requisite for assistance from the Interim Fund under the Montreal Protocol. This report encompasses all items needed to qualify as a country programme.

The Islamic Republic of Iran ratified the Vienna Convention and the Montreal Protocol on 10 March 1990. Therefore, the Islamic Republic of Iran was eligible to receive assistance 90 days following the date of ratification.

The United Nations Development Programme (UNDP) fielded mission to the Islamic Republic of Iran in April, May/June and Aug, 1992. The duties were 1) to accomplish the objectives of the country programme, 2) to examine the least cost phase out option to the country and 3) to anticipate the rate of transition to alternatives based on interviews with industry leaders in The Islamic Republic of Iran.

According to paragraph 1 of Article 5 of Montreal Protocol on Substances that Deplete the Ozone Layer, ANY PARTY THAT IS A DEVELOPING COUNTRY AND WHOSE ANNUAL CALCULATED LEVEL OF CONSUMPTION OF THE CONTROLLED SUBSTANCES IN ANNEX A IS LESS THAN 0.3 KILOGRAMS PER CAPITA ON THE DATE OF ENTRY INTO FORCE OF THE PROTOCOL FOR IT, OR ANY TIME THEREAFTER UNTIL 1 JANUARY 1999, SHALL IN ORDER TO MEET ITS BASIC DOMESTIC NEEDS, BE ENTITLED TO DELAY FOR TEN YEARS ITS COMPLIANCE WITH THE CONTROL MEASURES SET OUT IN ARTICLES 2A TO 2E. Although the calculated level of consumption of the controlled substances in Annex A is less than 0.3 Kilograms per capita on the date of ratification of the Protocol.

Initial communications with industries using CFC-11 and CFC-12, indicates their desire for transition to a non-ozone depleting substances or using recycling whenever such substances are still under development.

For the purpose of this report, ozone depleting substances (ODSs) are defined as substances currently regulated by the Montreal Protocol and its London amendment of in June 1990. The ODSs most widely used in the Islamic Republic of Iran are CFC-11 and CFC-12.

CHAPTER 2

USE OF OZONE DEPLETING SUBSTANCES AND ALTERNATIVES

2.1 BACKGROUND:-

This chapter deals with a review of current uses of ODSs in the Islamic Republic of Iran and options open to this country in preparing for and implementing the complete phase-out of these substances in accordance with the requirements of the Montreal Protocol.

The Islamic Republic of Iran has no CFCs or Halons production facilities. All ODSs used in the country are directly imported by the users. The only consumers of ODSs are the private industries, the manufacture of and service domestic refrigerators, as well as the foam industries. Some quantities of ODSs are also used in some fire extinguishers applications. The data obtained indicate that in 1991, no halons were imported into Islamic Republic of Iran.

The consumption of CFCs in the Islamic Republic of Iran is not only limited to CFC-11 and CFC-12. For instance CFC-22 and CFC-502 are being used in many cold stores and CFC-22 is also being used in mobile air conditioners.

2.2 ODSs CONSUMPTION

The consumption of CFC-11 and CFC-12 have increased from 1231 tonnes in 1986 to 1383 tonnes in 1991, with a decline in 1988 and a sharp increase in 1989. This was followed to date by normal consumption (Fig.1). CFC-11 imports were 377 tonnes in 1986. A sudden increase to 1397 tonnes in 1990 was followed to normal long term trends in 1991 (1174 tonnes; Fig.2). As for CFC-12, imports were 854 tonnes in 1986 then rose sharply to 854 tonnes in 1989 and dropped gradually to a consumption of 209 tonnes in 1991 (Fig. 3).

Details on ODSs consumption in The Islamic Republic of Iran are presented in Tables 1, 2, 3, 4 and 5 respectively. These are shown graphically in Figures 4, 5, 6, 7, and 8 respectively. ODSs consumption by the three sectors (refrigerators and foam industries and private) in 1991 are given in Table 6 and is illustrated in Fig 9, for comparison.

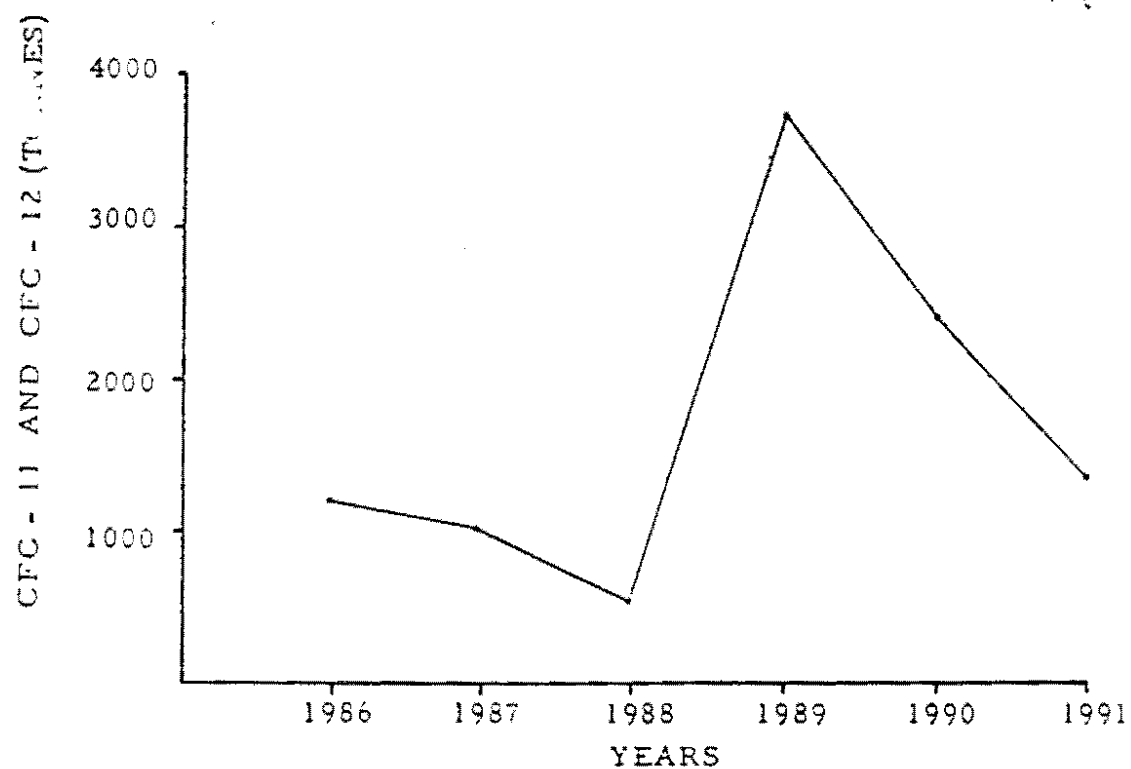


Fig. 1 CONSUMPTION OF CFC-11 AND CFC-12
DURING 1986 TO 1991.

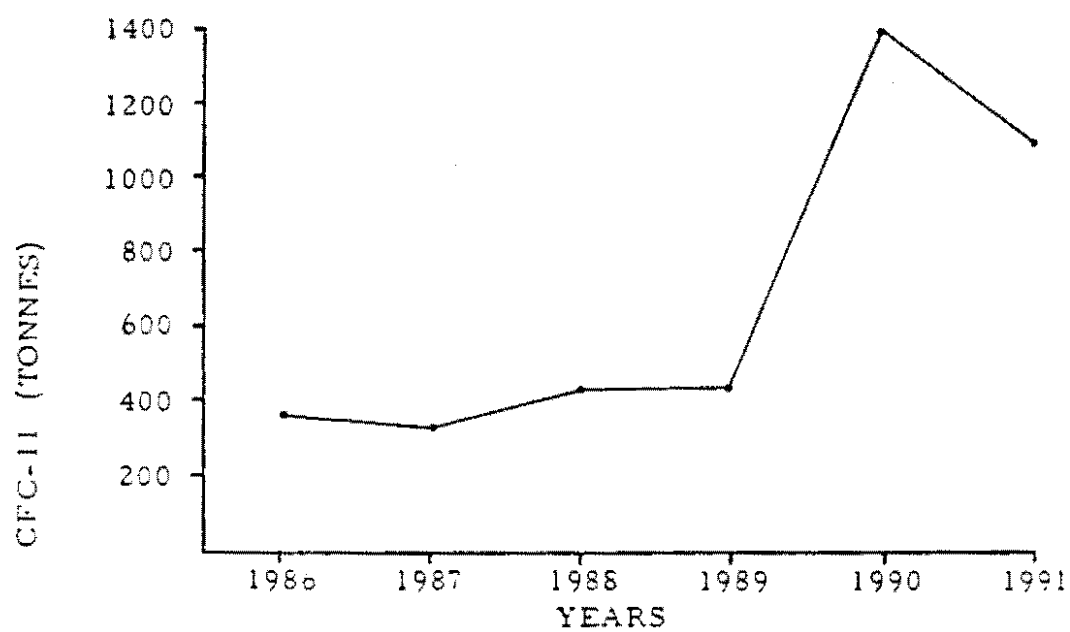


Fig. 2 IMPORT OF CFC-11 IN TO THE ISLAMIC
REPUBLIC OF IRAN DURING 1986-1991

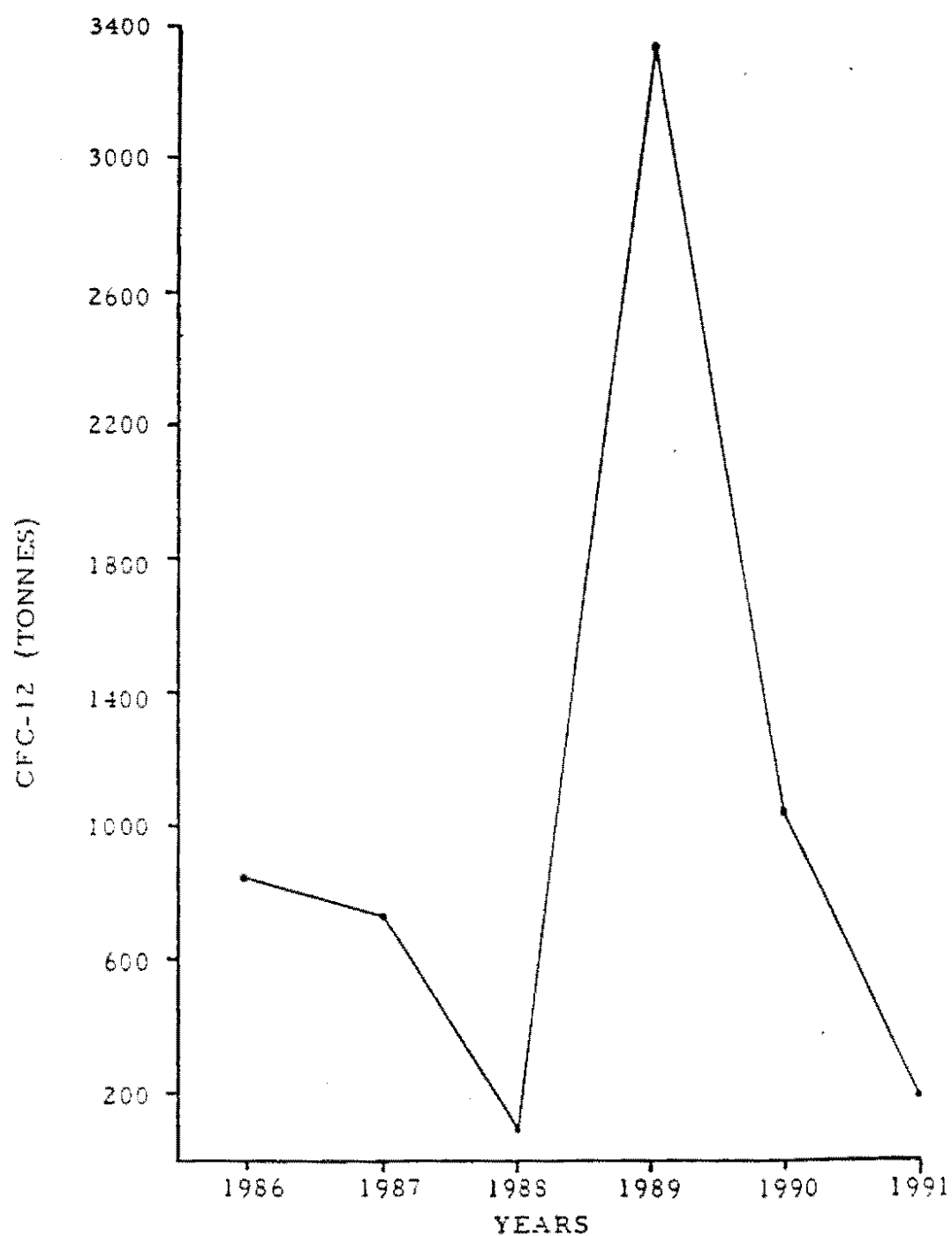


Fig. 3 IMPORT OF CFC-12 INTO THE ISLAMIC
REPUBLIC OF IRAN DURING 1986 to 1991

TABLE 1. SOME INFORMATION ABOUT THE IMPORT OF CFC-11 BY
REFRIGERATOR INDUSTRIES

AMOUNT OF CFC-11 (TONNES) DURING 1986-1992						
COMPANY'S NAME	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
IRAN PUYA	19.04					
FREEZ IRAN	37.80	56.70			18.90	
BAHMAN	56.70	56.70			94.50	56.70
JEBAL	6.00					
AZMAYESH	19.04		71.92	89.90	94.51	94.50
PARS		89.60	66.08		132.30	207.83
MOVALED			159.50	19.04	9.44	
TOTAL	138.58	203.00	297.50	108.94	349.65	359.03

NOTE: These are the amounts imported by the above mentioned companies.

Some of them might have obtained their needs from other sources.



Fig. 4 IMPORT OF CFC-11 BY REFRIGERATOR INDUSTRIES DURING 1986 TO 1991.

TABLE 2. SOME INFORMATION ABOUT THE USE OF CFC-12 BY
REFRIGERATOR INDUSTRIES

AMOUNT OF CFC-12 (TONNES) DURING 1986-1992						
COMPANY'S NAME	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
IRAN PUYA				20.00	78.00	
FREEZ IRAN	20.64				13.00	
BAHMAN	100.00			40.00	60.00	60.00
JEBAL	13.00			5.99		13.50
AZMAYESH					40.00	60.00
PARS		39.00	19.00		26.00	20.00
MOVALED				3.00	25.47	
TOTAL	133.64	39.00	19.00	68.99	242.47	153.50

NOTE: These are the amounts imported by the above mentioned companies.

Some of them might have obtained their needs from other sources.

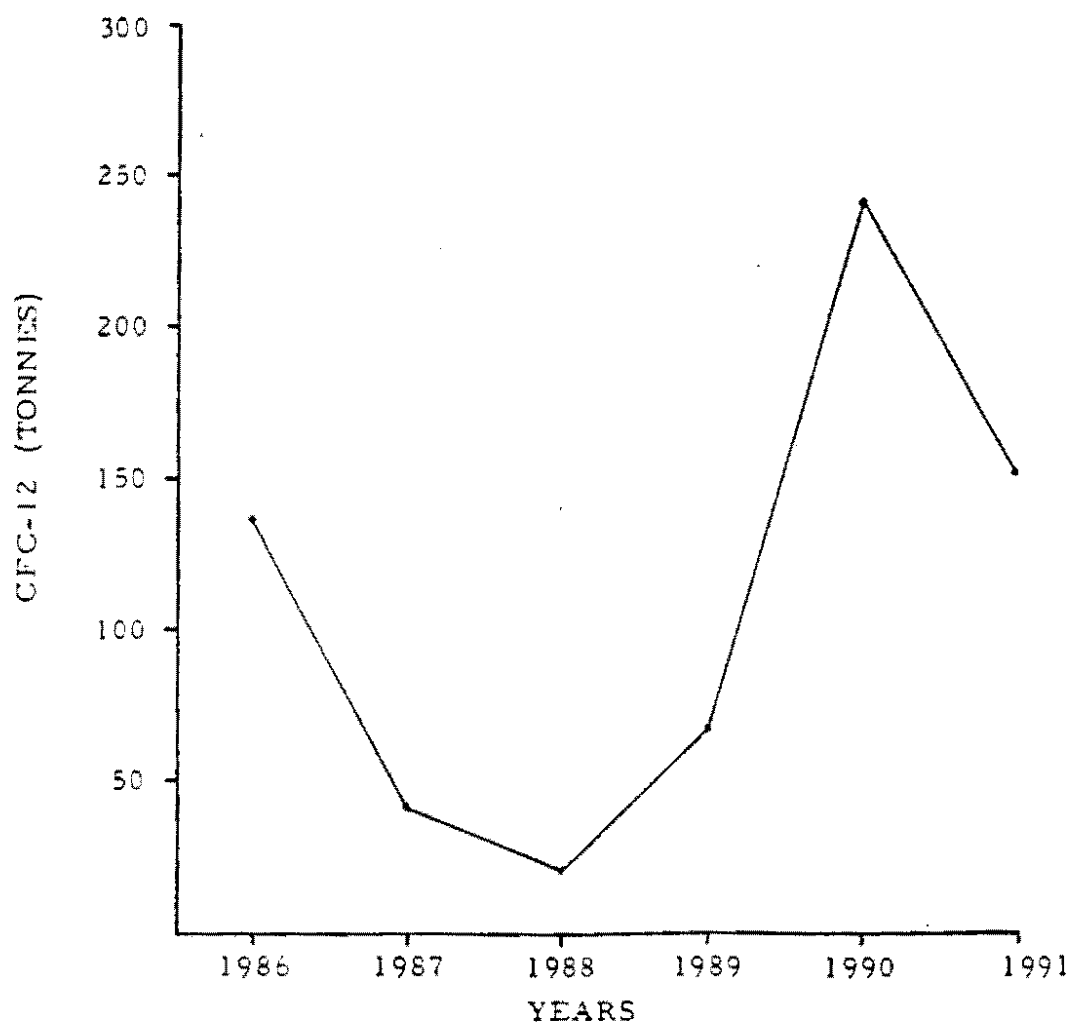


Fig. 5 IMPORT OF CFC-12 BY REFRIGERATOR INDUSTRIES DURING 1986 TO 1991.

TABLE 3. SOME INFORMATION ABOUT THE USE OF CFC-11 BY
FOAM INDUSTRIES

AMOUNT OF CFC-11 (TONNES) DURING 1986-1992						
COMPANY'S NAME	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
A're Sanati Iran	5.04		1.94	10.08		56.70
Peak Foam		15.95	4.93	18.03	34.85	18.90
Tolidy Polyurethane		36.4	17.92	75.52	93.00	
Safoam		17.98	95.7		17.08	
Shizar		17.98			99.90	
Bahman		56.70			94.50	56.70
Bahman plastics			1.94	17.98	19.04	206.36
Esfanj Abre Iran				15.95		
Pars Foam					18.90	
Urethan Systems					113.40	
Esfanj Hamedan					18.90	94.50
Khorasan Synthetic Alyaf					38.35	
Tolidy Tehran				19.09	49.80	

CONTINUED..

TABLE 3. continued

AMOUNT OF CFC-11 (TONNES) DURING 1986-1992						
COMPANY'S NAME	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
Khozestan Plastics					30.00	
Mashad Foam					116.65	94.20
Abre Shomal						95.50
Tolidy Iran-Gharb						18.90
Isfahan Moble Industry						8.40
TOTAL	5.04	145	122.4	156.7	744.40	650.20

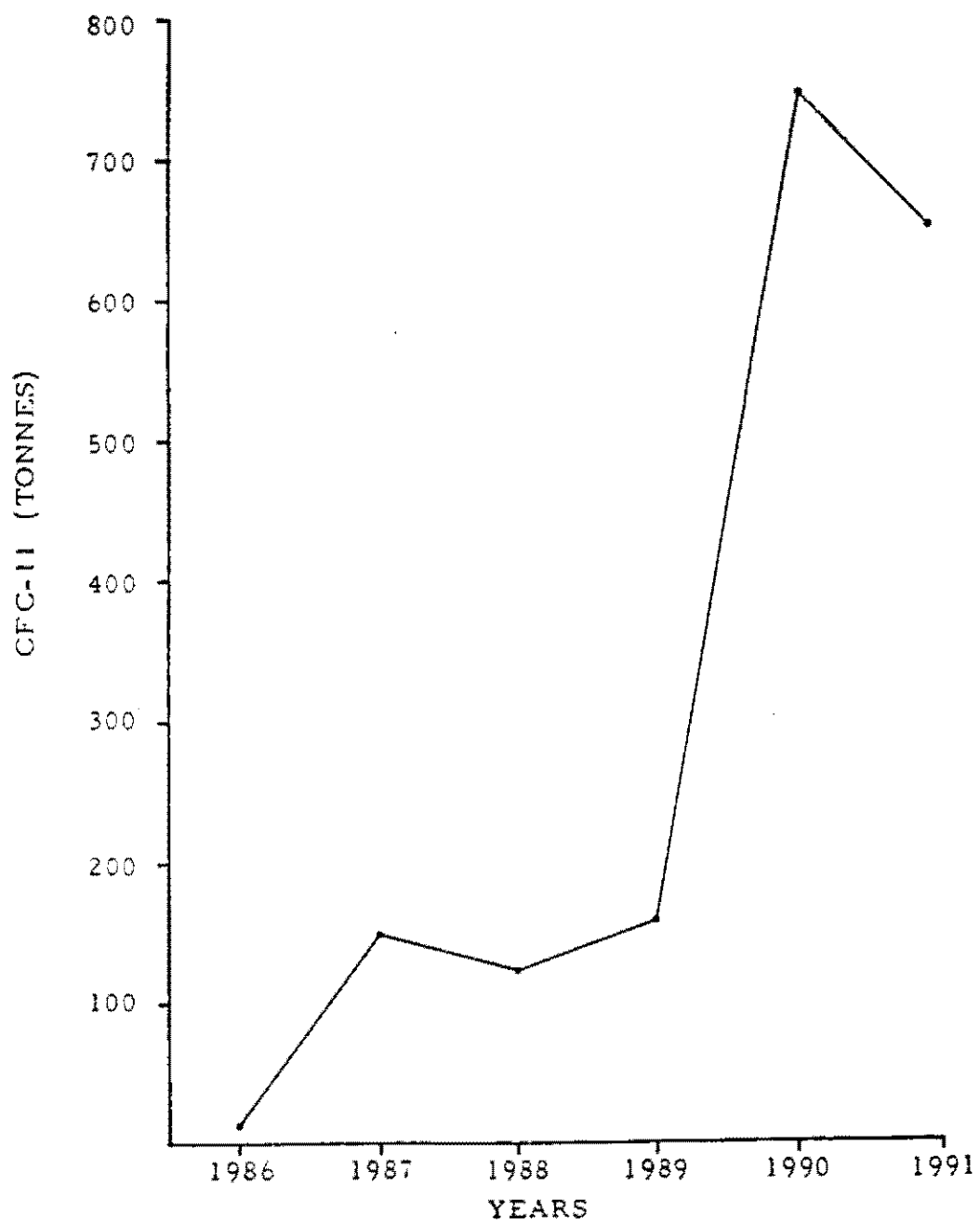


Fig. 6 IMPORT OF CFC-11 BY FOAM INDUSTRIES
DURING 1986 TO 1991.

TABLE 4. CFC-11 IMPORTED BY DIFFERENT SECTORS
NOT INCLUDING FOAM AND REFRIGERATORE INDUSTRIES

IMPORTER	AMOUNT OF CFC-11 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
Tolidy FM	114.24			24.03	57.12	
Ministry of Sepah Pasdaran	120.16					
Islamic Republic of Iran Broadcasting		1.96				
Azadeh Shoes			17.92			17.92
Ferdousi University				0.04		
M. Zargarian				37.12		
Fadak Shoes				19.04		
Zidans Co.				6.99		5.04
Lizinc Iran				19.04		
Yekodow				18.56		
A. Abbass Fard				40.50		
M. Ashaliene					23.04	
E. J. Gillani					5.40	

CONTINUE...

TABLE 4. continued

IMPORTER	AMOUNT OF CFC-11 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
N. Shahedi					29.46	
Pars Aluminium					75.52	
Electro Steel					5.04	
Pak Fam					19.04	35.84
Fabis Industries					47.85	75.60
Iran Khodrow					40.20	
Ojit Co.						19.04
Pirouzi Shoes						10.08
TOTAL	234.40	1.96	17.92	165.32	302.70	163.50

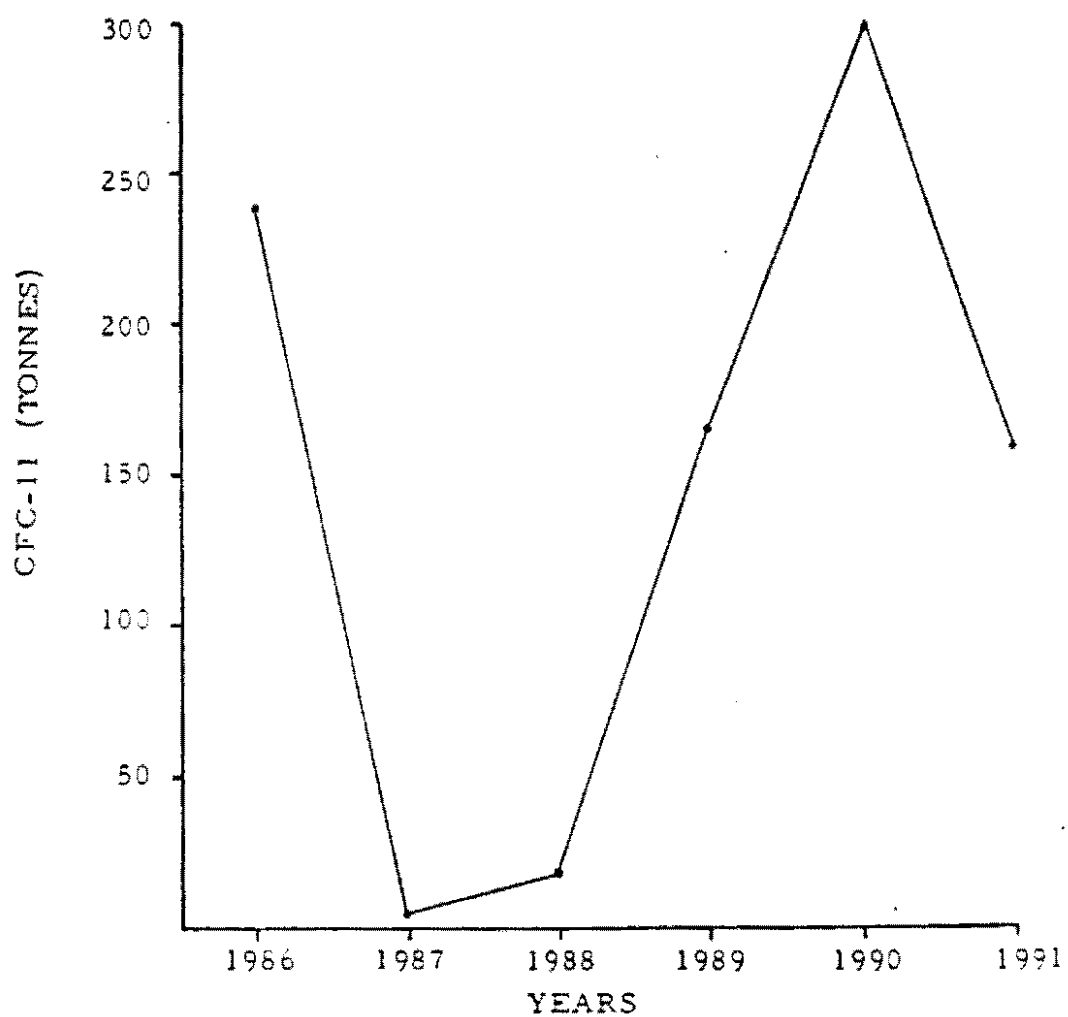


Fig. 7 IMPORTED CFC-11 BY DIFFERENT SECTORS NOT INCLUDING FOAM AND REFRIGERATOR INDUSTRIES DURING 1986 TO 1991.

TABLE 5. CFC-12 IMPORTED BY DIFFERENT SECTORS
NOT INCLUDING FOAM AND REFRIGERATORS INDUSTRIES

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
M. Baluchian	5.00					
Tolidy FM	2.00			5.00	4.91	
Shahed investing Co.	598.00	599.25				
Kimi Darow	90.00	40.00		1380.00		
Noobough Co.	26.00					
A. Ebrahimi		10.32		43.20		
Islamic Republic of						
Iran Broadcasting		3.00				
Mashale Kaveh		2.00				
Pars Machine		3.00				
Sepidan Industries		13.00				
Ahvaz Steel Industry		19.96		31.14	1.50	
Naval Force		14.67			9.38	
F. A. Sefideh			30.00	6.50		
Poly Akril Iran			0.10			
Naser Industries			2.70			

continue.....

TABLE 5. CONTINUED

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
M. Froughmanesh			2.70	12.05		
B. Lashkari			36.31	35.10		
Cooperative of Oil, Gas and Electricity Cooperative Society of Ardebil				2.29		
A. E. Shamsabad				10.88		
M. Babakhani				24.75		
S. Bagher Nejad				32.64		
H. B. Fard				18.40		
S. Bashiri				47.25		
M. P. Ghazi				0.14		
S. M. Jamani				17.00		
E. C. Dashti				45.21		
S. M. Borhan				43.32	13.50	
M. A. Haddad				64.80		
A. Houseini				132.53		
M. B. Khoshnevis				14.17		
B. Daryani				1.20		

continue.....

TABLE 5. CONTINUED

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
B. Daroudi				32.80		
A. Rajab Ali				16.74		
M. Zarehi				68.00		
M. Zargarian				64.80		
K. Z. Beighi				9.45		
M. Z. Abarghouei				35.10		
S. E. Shirazi				13.60		
M. H. S. Salehi				16.20		
Surena Co.				54.00		
Chimi House				120.00		
Distilled Co.				151.00		
Kalai Automobile				17.00		
Kulak Air Mac				64.80		
Pars Co.				16.29	79.15	
M. S. Far				59.40		
M. Sajaie				12.15		
A. A. Fard				79.65		
H. Gh. Beedhendi				17.18		
B. Ghafari				16.20		

continue....

TABLE 5. CONTINUED

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
H. Falah				13.50		
M. Falahi				13.50		
J. Kerachian				2.62		
F. K. Motejaded				14.17		
M. L. Sepehri				32.83		
A. R. Mohammadi				20.25		
Y. Mahmudi				13.50		
A. Mossadegh				27.00		
I. M. Kar				21.76		
S. A. K. Mosavi				13.50		
A. Mehdizadeh				145.34		28.35
A. Mehdizadeh				11.80		
M. Mehdizadeh				5.40		
S. Z. Miri				43.20		
H. N. Qomi				0.81		
Gh. N. Parvar				13.97		
D. Nowshadi				34.00		
M. Vaisi				10.68		
B. Ahmadi					11.34	

continue.....

TABLE 5. CONTINUED

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
M. Ashaliene					27.02	
M. Aflatoni					20.00	
M. Akbari					14.85	
S. M. Emami					6.93	
F. Jowghini					5.40	
R. J. Gharoud					3.25	
M. A. Haddadi					14.85	
A. Houseini					27.00	
K. D. Morshedi					14.51	
A. R. Zulfaghar					13.50	
M. Z. Abarghouie					29.70	
N. Shahedi					47.09	
Pak Fam Co.					13.00	
M. Bahar Eng. Co.					6.00	14.00
M. Shouri					4.72	
K. Karimi					15.79	
S. H. Mosavi					29.17	
N. M. M. Kalai					14.85	
Defence Ministry					17.09	

continue....

TABLE 5. CONTINUED

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
H. Ehsai					13.50	
R. Eshagh					4.05	
M. Javid					11.34	
A. C. Z. Dashti					29.20	
A. H. Barjin					5.00	
S. Roshani					15.60	
Spiko Co.					16.32	
Chekad Lorestan					16.20	
Yazd Sardin Co.					13.65	
H. Farivar					16.32	
J. Makinichi			13.00			
A. R. J. Firouzabadi					13.00	
E. Ch. Dashti					26.00	
A. H. Barjin					13.00	
A. R. Ali					11.70	
Electro Steel Co.					7.80	
Zam Harir Pars					15.60	
Paak Dairy					1.73	
M. Sadeghin					60.45	

continue....

TABLE 5. CONTINUED

24

IMPORTER	AMOUNT OF CFC-12 IMPORTED DURING 1986-1992 (TONNES)					
	(86-87)	(87-88)	(88-89)	(89-90)	(90-91)	(91-92)
M. J. A. Sharifabad					13.00	
K. A. Majazi					8.80	
M. Froughmanesh					13.00	
M. A. M. Bahmani					13.00	
A. Mosadegh				8.80		
M. J. Mehdizadeh				13.00		
E. Gh. Dezfoli					6.50	
F. Ghozini					6.50	
TOTAL	721.00	705.00	72.00	3284.00	805.00	55.00

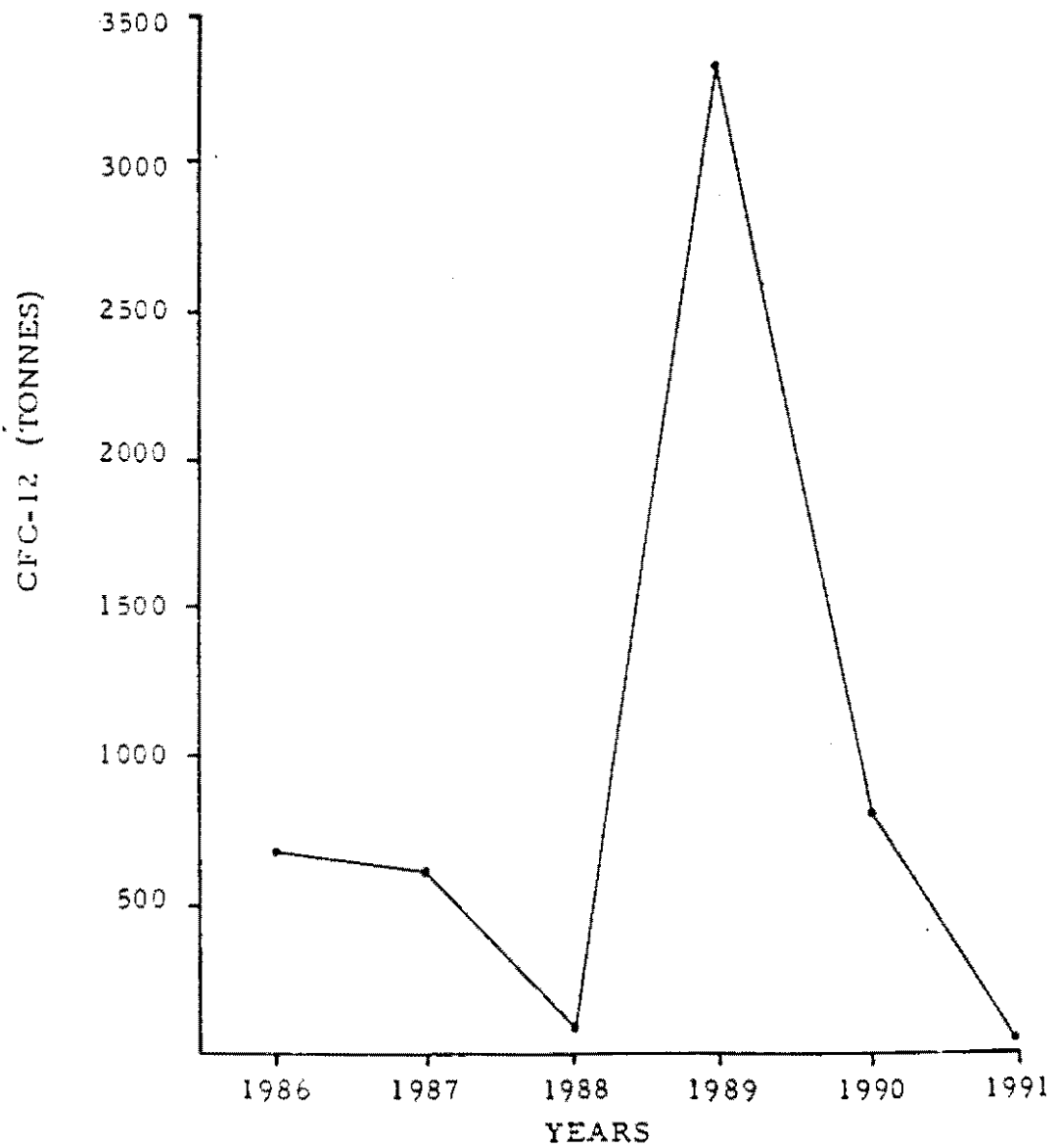


Fig. 8 IMPORTED CFC-12 BY DIFFERENT SECTORS
NOT INCLUDING FOAM AND REFRIGERATOR
INDUSTRIES DURING 1986 TO 1991

TABLE 6. ODSs IMPORTED BY THE THREE SECTORS

SECTOR	1986	1987	1988	1989	1990	1991
TONNES						
PRIVATE(CFC-12)	721	705	72	3284	805	55
PRIVATE(CFC-11)	234	2	18	165	303	164
FOAM(CFC-11)	5	145	122	157	744	650
REFRIGER(CFC-11)	138	203	298	109	350	360
REFRIGER(CFC-12)	133	39	19	69	243	154
TOTAL	1231	1094	529	3784	2445	1383

NOTE: The word *private* refers to unknown importers, shoes and chemical manufactureres.

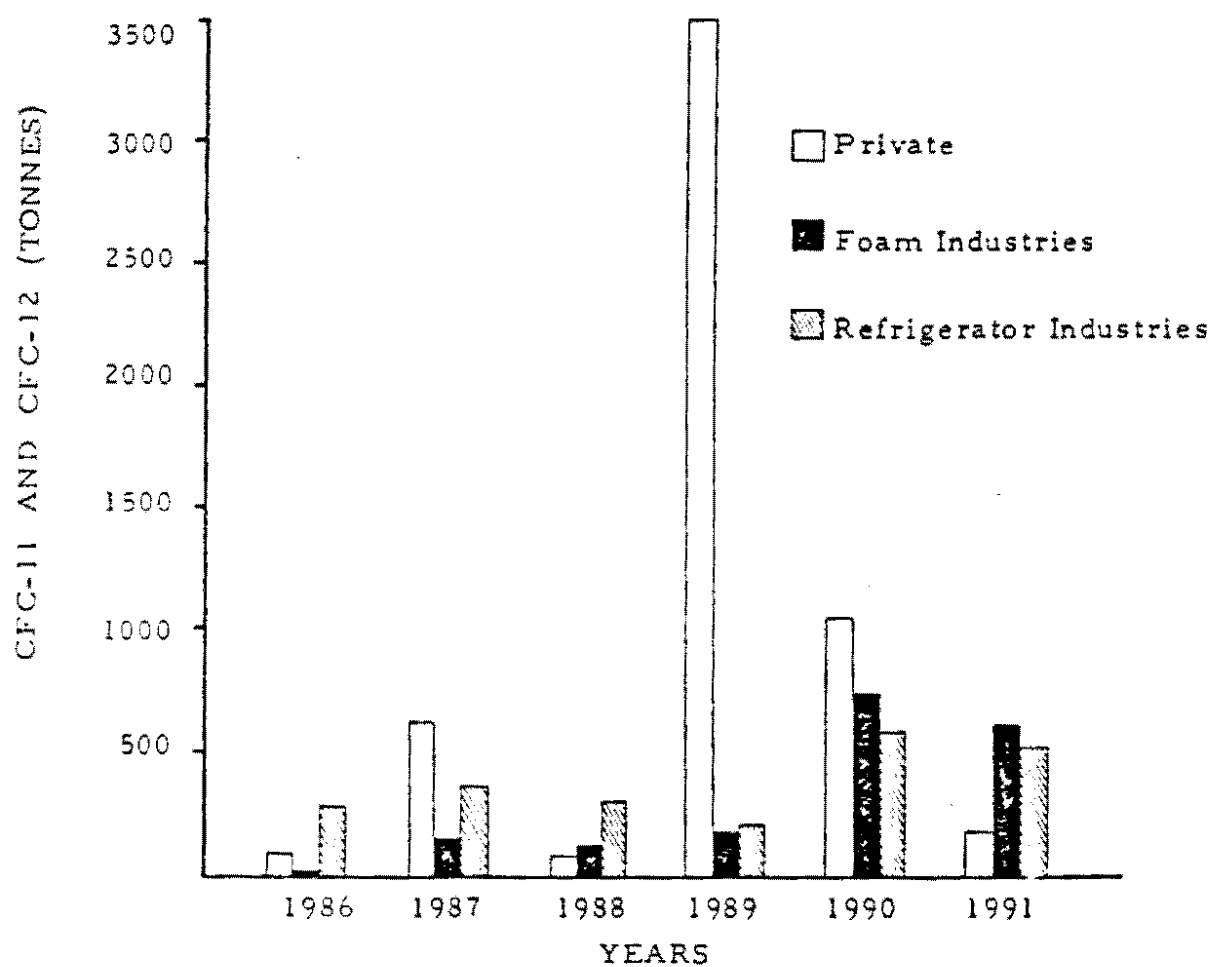


Fig. 9 ODSs CONSUMPTION BY VARIOUS SECTORS

TABLE 7. SOURCES OF CFCs (SUPPLIER OF CFCs TO
DIFFERENT COMPANIES IN IRAN)

SUPPLIER (1991)	CFC	AMOUNT/TONNES
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	75.60
HOECHST AKTIEGESELLSCHAFT	11	10.80
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	94.50
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	56.70
WECO EXPORT GMBH	11	19.40
WECO EXPORT GMBH	11	190.40
WECO WEIGERMULLER AND VOIGTMANN	11	15.96
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
KALI CHEMIE AG	11	35.84
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
DMF WARENHANDELS GMBH	11	42.00
KALI CHEMIE AG	11	89.60
WECO EXPORT GMBH	11	38.08
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	94.50
WECO EXPORT GMBH	11	38.08
WECO WEIGERMULLER AND VOIGTMANN	11	1.12
HOECHST AKTIENGESELLSCHAFT	11	5.04
K.H.I.HANDEL INTERNATIONAL GMBH	11	8.40
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	56.70

CONTINUE...

TABLE 7. CONTINUED

SUPPLIER (1991)	CFC	AMOUNT/TONNES
I.C.I. IMPERIAL CHEMICAL INDUSTRIES PLC	11	207.68
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	94.50
HOECHST AKTIENGESELLSCHFT	11	17.92
INDUSTRIES CHINIQUES DU NORD DE LA GRE	11	37.80
WECO EXPORT GMBH	11	57.12
I.C.I IMPERIAL CHEMICAL INDUSTRIES PLC	11	75.52
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	37.80
HOECHST AKTIENGESELLSCHFT	11	38.08
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	37.80
HOECHST AKTIENGESELLSCHFT	11	57.12
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	114.40
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
I.S.C. CHEMICAL LTD	11	38.35
MARUBENI CORPORATION, TOKYO	11	93.00
GALEX SA	11	17.08
ENIMONT OVERSEAS AG	11	31.90
INTUSTRIES CHIMIQUES DU NORD DE LA GRE	11	99.90
INTUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
INTUSTRIES CHIMIQUES DU NORD DE LA GRE	11	37.80
INTUSTRIES CHIMIQUES DU NORD DE LA GRE	11	94.50
ALLCHEM INTL. CO	11	30.00

CONTINUE...

TABLE 7. CONTINUED

SUPPLIER (1991)	CFC	AMOUNT/TONNES
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	40.20
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	132.20
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	94.51
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
YOUSUF AHMED AL AFZAL GENERAL TERADING	11	23.04
KELLER AND BOHACEK ROSTSCHUTZ GES KG	11	5.40
KELLER AND BOHACEK ROSTSCHUTZ GES KG	11	5.40
YOUSUF AHMED AL AFZAL GENERAL TRADING	11	29.46
GALCO S.A (GAZ LIQUEFIES ET COMPRIMES)	11	5.04
HOECHST AKTIENGESELLSCHFT	11	19.04
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
HOECHST AKTIENGESELLSCHFT	11	19.04
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
MONTEDISON OVERSEAS	11	34.85
HOECHST AKTIENGESELLSCHFT	11	19.04
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	37.80
ENIMONT OVERSEAS AG	11	47.85
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	18.90
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	11	37.80
HOECHST AKTIENGESELLSCHFT	11	49.84
HOECHST AKTIENGESELLSCHFT	11	49.80

CONTINUE..

TABLE 7. CONTINUED

SUPPLIER (1991)	CFC	AMOUNT/TONNES
I.C.I IMPERIAL CHEMICAL INDUSTRIES PLC	11	9.44
ENIMONT OVERSEAS AG	11	111.65
AL NISBAH GENERAL TRADING EST.	12	29.20
HOECHST AKTIENGESELLSCHFT	12	13.00
AL SADAF GEN. TRADING EST.	12	30.00
AL SADAF GEN. TRADING EST.	12	30.00
EMIRATES RESOURCES TRADING CO	12	13.50
AL BAZ REFRIGERATION SPARE PARTS EST	12	4.05
EASTERN TRADING LTD	12	11.34
YOUSUF AHMED AL AFZAL GENERAL TRADING	12	5.00
GALCO S.A (GAZ LIQUEFIES COMPRIMES)	12	15.60
GALCO S.A (GAZ LIQUEFIES COMPRIMES)	12	16.32
GALCO S.A (GAZ LIQUEFIES COMPRIMES)	12	16.20
DCS INTERNATIONAL TRADE AND FINANCE LTD	12	16.20
GOUESHAGHI HOSSEIN ERDING GIP	12	3.96
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	12	60.00
GALEX SA	12	13.50
HOECHST AKTIENGESELLSCHFT	12	20.00
INDUSTRIES CHIMIQUES DU NORD DE LA GRE	12	60.00
HOECHST AKTIENGESELLSCHFT	12	14.00
YOUSUF AHMED AL AFZAL GENERAL TRADING	12	13.50

CONTINUE...

TABLE 7. CONTINUED

SUPPLIER (1991)	CFC	AMOUNT/TONNES
GALCO S.A (GAZ LIQUEFIES ET COMPRIMES)	12	16.32
GALCO S.A	12	1.51
YOUSUF AHMED AL AFZAL GENERAL TRADING	12	28.35
GTI GMBH	12	9.38
GREAT LAKES CHEMICAL LTD	12	27.21
TOTAL	CFC-11=468.14	CFC-12=3032.29
GRAND TOTAL (CFC-11+CFC-12)=3500.43 TONNES		

SOURCE: CENTRE FOR DISTRIBUTION OF CHEMICALS, THE MINISTRY OF COMMERCE.

SUMMARY OF TABLE 7.

INDUSTRIES CHIMIQUES DU NORD DE LA GRE	WITH MARKET SHARE OF 44.71%
WECO EXPORT GMBH	WITH MARKET SHARE OF 10.29%
HOECHST AKTIENGESELLSCHFT	WITH MARKET SHARE OF 8.96%
OTHERS	WITH MARKET SHARE OF 36.04%

From the above Tables and Figs. it is evident that domestic refrigerator from manufacturing and refrigerant use accounts for 37.17 % of ODSs consumption, Foam blowing industries accounts for 47% of ODSs consumption while the remainder was utilized by private SECTORS (15.83%) in 1991 (the word private sector refers to shoe companies, and unknown importers).

It is interesting to note about the imports of CFC-11 and CFC-12 by some persons (PRIVATE). Why they are importing these CFCs and what they do with it, is not yet known. Please refer to Tables 4 and 5 and Figs. 7 and 8 for details. A minute amount of these CFCs have been received by some famous factories and organizations (for instance Islamic Republic of Iran Broadcasting, shoes factories, etc. ...) but the major part imposes some ambiguity. Some people produce foam in their houses by using CFC-11 as blowing agent. More investigation is needed to find out where exactly these CFCs are being used.

2.3 SOURCES OF ODSs TO THE ISLAMIC REPUBLIC OF IRAN

For the sake of cross checking the obtained data we are presenting a Table in which the different suppliers of

CFC-11 and CFC-12 to The Islamic Republic of Iran along with the supplied amount are given . According to this Table (Table No. 7) the amount of imported CFC-11 and CFC-12 are 3032 and 468 tonnes respectively, in the year 1991. Thus the actual amount of CFCs (11 and 12) imported in 1991 stands at 3500 tonnes but the consumption as it was mentioned earlier is 1383 tonnes in the same year.

As it was mentioned earlier, there is no CFC production in the country. The industries involved, import CFCs directly from world producers. These are refrigerator and freezer manufacturers and foam blowers. Through interviews with foam and refrigerator industries it was found out that they purchased CFC-11 at 1250 to 1400 US\$/tonne. Most companies manufacturing refrigeration units have licensed servicing shops. The companies import the required ODSs and supply the service shops with the necessary refrigerants. All the companies involved with ODSs are in the semi-private sector.

2.4 MANUFACTURERS OF DOMESTIC REFRIGERATORS

There are 12 major refrigerator manufacturers in the Islamic Republic of Iran and 18 small ones (the word major

refers to production of more than 10,000 units per year). The total production capacity in the Islamic Republic of Iran is 1,227,600 units per year. However, it is estimated that only 1,107,538 units are actually produced. The companies that produce the largest number of REFRIGERATORS in The Islamic Republic of Iran are AZMAYESH, ARJ , IRAN PUYA , BAHMAN , PARS MACHINE , FREEZ IRAN and PARS. Their market share is about 83.97% with Azmayesh 12.19%, Arj 12.19%, Iran Puya 16.25%, Bahman 13.54%, Pars machine 8.13%, Freez Iran 13.54% and Pars 8.13%.

These refrigeratore manufacturers import the compressors , although there are compressor manufacturing facilities in The Islamic Republic of Iran. All the manufacturers blow rigid polyurethane foam as insulation directly into the cavity between the inner and outer skins of the refrigerator cabinets. Table 8, shows the production of REFRIGERATORS by various manufacturers.

2.5 MANUFACTURERS OF DOMESTIC FREEZERS

There are four major freezer manufacturers and nine small ones in the Islamic Republic of Iran. It is estimated that

about 134,400 units are being produced yearly. It is worth noting that imported freezers are more abundant in the market. Some investigation is underway to estimate the actual numbers of imported freezers. Table 8, shows the production of freezers by various manufacturers. The companies that produce the largest number of freezers in The Islamic Republic of Iran are Azmayesh (45000 units), Bahman (40000 units) and Pars (30000 units). Their market share are 33.48%, 29.76% and 22.32% respectively.

TABLE 8. SOME CHARACTERISTICS OF REFRIGERATORS' MANUFACTURER

COMPANY'S NAME	ADDRESS	TELEPHONE	CAPACITY PER YEAR	
			REFRIGERATOR	FREZER
AZMAYESH	FARS	49510/2293	135000	45000
ARJ	TEHRAN	903915-9	136000	
IRAN PUYA	KARAJ	992001-4	180000	
BAHMAN(FILCO)	TEHRAN	348091-8	150000	40000
PARS MACHINE	KARAJ		90000	
PAYAM MINAB	HORMOZGAN		5000	
TOLIDY BOARD	TEHRAN		20000	
JEBAL(GENERAL)	TEHRAN		50000	
SAEED SHAFEEE	ARAK			250
GADOUK	JAJROUD		10000	
FREEZ IRAN	TEHRAN	941196-7	150000	
PARS	QAZVIN	5050	90000	30000
PARS-NOO	TEHRAN		750	
MOVALED	SAVEH	4020	60000	
MIR JAVAD KHAYAT				
BAGHER ZADEH	TEHRAN		2500	2500

CONTINUED..

TABLE 8. CONTINUED

COMPANY'S NAME	ADDRESS	TELEPHONE	CAPACITY PER YEAR	
			REFRIGERATOR	FREEZER
YAZD ENJEMAD	YAZD		18000	12000
JAVIDAN	ARAK			300
ALI HAIDAR QOMI	ARAK			300
SALEHI Co.	ARAK			100
HAGHIGHI NEJAD	KERMAN			1000
SANATI AFSHAR KAR	KERMAN			1000
KHOZESTAN	KHOZESTAN			5000
RAVANSHAD	FARS		40	
EHSANI			30	
BROODATI HORMOZGAN	BANDAR ABBASS		300	300
PARS	EAST AZARBAIJAN		4000	
CRYSTAL	EAST AZARBAIJAN		300	
NASRIN	EAST AZARBAIJAN		400	
BARFAK	EAST AZARBAIJAN		218	
QOTBI AND Co	EAST AZARBAIJAN		5000	
TOTAL			1107538.00	137750.00

2.6 REFRIGERATOR REPAIR WORKSHOPS

It is estimated that there are about 1,200 workshops that repair refrigerators in The Islamic Republic of Iran. About 900 of these are authorized service centres for the manufacturing companies. The remainder are small, often family business. Typically 13.5 Kilograms disposable cylinders of CFC-12 are used in recharging.

2.7 CUSTOM DUTY AND COMMERCIAL TAX ON IMPORTED REFRIGERATORS AND FREEZERS

TYPE	CUSTOM DUTY (%)	COMMERCIAL TAX (%)
NORMAL REFRIGERATOR	25	100
BOX FREEZER	25	200
SHOW CASE FREEZER	25	100
BLOOD BANK FREEZER	25	NONE
WATER CHILLERS	25	50
SPARE PARTS	25	10

2.8 MOBILE AIR CONDITIONING IMPORTS AND SERVICING

All mobile air conditioning units are already imported in the vehicle. Servicing is typically undertaken by the

vehicle manufacturer's servicing centres. However, some servicing is undertaken in small workshops once the warranty period has expired.

The commercial tax is 80% and custom duty is 20% on air conditions.

2.9 FOAM INDUSTRIES

Foam industries import CFC-11 and polyurethane foam formulations (for both rigid and flexible foams) into the Islamic Republic of Iran. The sources of CFC-11 into the Islamic Republic of Iran are given in Table 7. For instance, Industries Chimiques Du Nord De la Gre has exported about 1565 tonnes of CFC-11 and CFC-12 (market share=44.71%) to The Islamic Republic of Iran. WECO EPORT GMBH and HOECHST AKTIENGESELLSCHAFT with 10.29 and 8.96% market share stand in second and third place respectively.

Apart from the rigid polyurethane foams produced by refrigerator manufacturers for insulation of the refrigerators, rigid polyurethane foam which uses CFC-11 as

the blowing agent are also produced for building insulations. In short, the followings (9 factories) are major foam producers in the Islamic Republic of Iran (please see Table 9 for more details):-

COMPANY'S NAME	MARKET SHARE%
1. IRAN GHARB	27
2. SHIZAR	16
3. KHOZESTAN PLAST AHVAZ	12
4. URETHAN SYSTEM	8
5. MASHAD FOAM	7
6. BAHMAN PLASTIC	5
7. TOLIDY TEHRAN	4
8. ABRE IRAN	3
9. LATEX	3
10. PEAK FOAM	3

TABLE 9. SOME CHARACTERISTICS OF FOAM INDUSTRIES

COMPANY'S NAME	ADDRESS	TELEPHONE	PRODUCTION (TONNES/Yr)	KIND OF PRODUCTION
1. Latex	Karaj	945993	1170	Moulding foam
2. Bahman plastic	Karaj		2000	Foam
3. Pars foam	Khavaran		400	Foam
4. Penon	Karaj		20	Polyurethane
5. Tolidy Tehran	Karaj(km12)	944002	1500	Foam
6. Shizar	Qazvin		6440	Non-injection foam
7. Peak foam	Karaj(km18)		1150	Foam
8. Tehran foam	Qazvin		350	Foam
9. Abre Sanati Iran	Qazvin	(0283)6424	600	Industrial foam
10. Tolidy Iran Gharb	Karaj(km14)		11000	Foam
11. Behravash	Qom		540	Foam
12. Abre Iran	Rasht		1188	Foam
13. Abre Shomal	Rasht	3333746	1200	Foam
14. Urethan system	Rasht		3200	Soft Foam
15. Esfanj Tabriz	Tabriz		300	Foam
16. Mashad Foam	Mashad	43850	3000	Foam

CONTINUE....

TABLE 9. CONTINUED

COMPANY'S NAME	ADDRESS	TELEPHONE	PRODUCTION (TONNES/Yr)	KIND OF PRODUCTION

17. Esfanj Shirvan	Ghouchan		1200	Foam
18. Khozestan plast	Ahvaz		5000	Foam
19. Small workshops	Khozestan		4	Foam
TOTAL:			40254 (Tonnes)	

There are about 8 smaller producers with over all market share of 12%, such as Pars Foam, Penon, Tehran Foam, Abre Sanati Iran, Behravash, Esfanj Tabriz, Esfanj Shirvan, Ghouchan and small workshops of Khozestan. More investigations are underway to find out the exact amount of flexible and rigid polyurethane foam productions. Our data indicates that in 1991 about 40254 tonnes of flexible and rigid polyurethane foams have been produced (Table 9). Table 3 provides some information about the use of CFC-11 by foam industries.

Chemicals that are commonly used by foam industries include 1) Polyol , 2) T.D.I , 3) Dabco , 4) D.M.E.A , 5) Silicon , 6) Cosmos, 7) CFC-11 and 8) Water.

2.10 AEROSOL FILLING OPERATIONS

There are eleven aerosol producers in the Islamic Republic of Iran. Five of these dominate the market. All aerosols in the Islamic Republic of Iran use hydrocarbons as propellants. One finds on the market small quantities of imported aerosols. These are mainly hydrocarbon filled. However, more investigations are under way to bring out details about their products and their amount of chemical usages.

2.11 CURRENT DEMAND OF ODSs

The Government of Islamic Republic Of Iran is presently using the Brussels Harmonized Classification System for chemicals that are imported. The Customs Department issues a yearly book on imports and exports. Since all ODSs users have licences to operate, they are allowed to import their requirements themselves with no restrictions. They only have to obtain a licence from the Procurement and Distribution Centre of the Ministry of Commerce. This organization keeps computerized records of all imports into the Islamic Republic Of Iran.

2.12 FUTURE DEMAND OF ODSs

Projection of demand in each user sector are required to the year 2010, the cut off date for CFC consumption for paragraph 1 of Article 5 of Montreal Protocol. The forecasts presented in this section assume that the Montreal Protocol does not exist, that there are no supply constraints and therefore define demand with no substitution. They do not take into account any possible product development or other changes in manufacturing

practices as a result of normal progress. These unconstrained demand projections are the starting point for determining the demand for substitutes.

Table Nos. 10 and 11 show the estimated production of REFRIGERATORS and foams from 1991 to 2010, respectively.

In general, production of refrigerator from 1,111,000 units in 1991 increases to 3,160,000 units in the year 2010 (Table 10, Fig. 10). The total production of rigid and flexible foams from 36848 tonnes in 1991 would increase to 120,500 tonnes in the year 2010 (Table 11, Fig. 11).

Tables 12 and 13 set out a forecast of unconstrained demand for CFC-11 and CFC-12 in refrigerator manufacturing centres. The demand for CFC-11 and CFC-12 by refrigerator manufacturers increases from 608 and 223.6 tonnes in 1991 to 1713 and 635 tonnes in 2010, respectively. These demands are graphically shown in Figs. 12 and 13 too.

Table 14 sets out a forecast of unconstrained demand for CFC-11 by foam industries in the Islamic Republic of Iran between 1991 and 2010, these values are also shown in Fig. 14. In general, use of CFC-11 by foam industries would increase from 650 tonnes in 1991 to 2308 tonnes in

2010. Therefore, the overall unconstrained CFC consumption (foam and refrigerator industries) is projected to increase from 1481 tonnes in 1991 to 4656 tonnes in 2010; an increase of 214% . This corresponds to an annual growth rate of about 6%.

TABLE 10. SOME INFORMATION ABOUT PRODUCTION OF REFRIGERATORS AND FREEZERS AT THE PRESENT AND IN THE FUTURE (PRODUCTION RATE EQUAL TO 12% FOR THE YEARS 1991 TO 1995 AND 4% FROM 1995 TO 2010 ARE CONSIDERED)

COMPANY'S NAME	NUMBER OF PRODUCTION				
	(1991)	(1995)	(2000)	(2005)	(2010)
AZMAYESH	160000	270000	328000	400000	486000
ARJ	136000	200000	243000	296000	360000
IRAN PUYA	180000	280000	340000	414000	504000
BAHMAN(FILCO)	150000	230000	280000	340000	414000
FREEZ IRAN	150000	230000	280000	340000	414000
PARS MACHINE	90000	140000	170000	207000	252000
PAYAM MINAB	5000	9000	10900	13300	16200
TOLIDY BOARD	20000	30000	36000	44000	54000
JEBAL (GENERAL)	50000	90000	109000	133000	162000
PARS	90000	140000	170000	207000	252000
GADOUK	10000	15000	18000	22000	27000
MOVALED	60000	94000	114000	139000	169000
YAZD ENJEMAD	18000	28000	34000	41000	50000
TOTAL	1119000	1756000	2132900	2596300	3160200

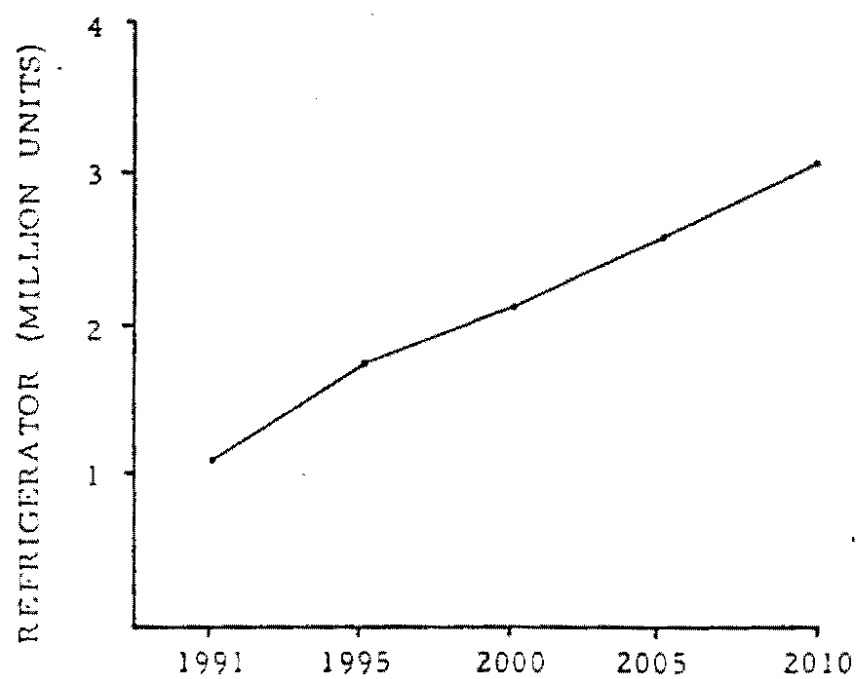


Fig. 10 FORECAST ABOUT REFRIGERATOR
PRODUCTION FROM 1991 to 2010

TABLE 11. ESTIMATION ABOUT PRODUCTION OF FOAM (FROM 1991-2010)

	1991	1995	2000	2005	2010
COMPANY'S	TONNES				
I-TEX	1170	1500	2050	2800	3900
BAHMAN PLASTIC	2000	2600	3500	4800	6600
TOLIDY TEHRAN	1500	1900	2600	3600	4900
SHIZAR	6440	8300	11300	15000	21000
PEAK FOAM	1150	1500	2000	2800	3800
ABRE IRAN	1188	1500	2100	2900	3900
ABRE SHOMAL	1200	1500	2100	2900	4000
URETHAN SYSTEM	3200	4100	5600	7700	11000
MASHAD FOAM	3000	3900	5300	7200	9900
KHOZESTAN PLAST AHVAZ	5000	6400	8300	11000	15500
IRAN GHARB	11000	14000	19000	26000	36000
TOTAL**	36848	47200	63850	86700	120500

** Only major factories were considered in the estimations. As there was no normal trend in production rate, a factor of 6.5% (twice the population growth rate) was considered for estimating future productions.

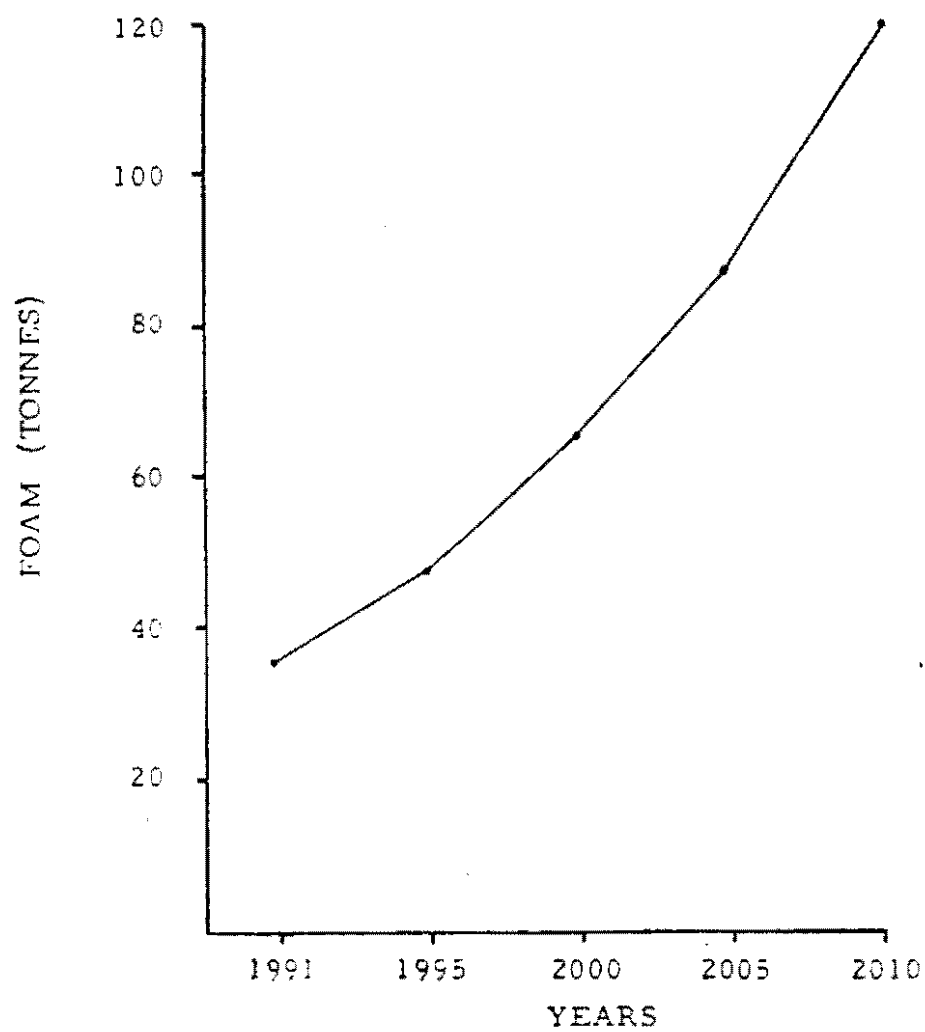


Fig. 11 FORECAST OF FOAM
PRODUCTION FROM 1991 TO 2010

TABLE 12. SOME INFORMATION ON USE OF CFC-11 IN
REFRIGERATOR INDUSTRIES

USE OF CFC-11 (TONNES)					
COMPANY'S NAME	(1991)	(1995)	(2000)	(2005)	(2010)
AZMAYESH	88	148	178	217	264
ARJ	74	110	132	160	195
IRAN PUYA	99	150	184	224	273
BAHMAN	82	126	152	184	224
FREEZ IRAN	80	125	151	183	223
PARS MACHINE	50	75	92	112	137
PAYAM MINAB	3	5	6	7	9
TOLIDY BOARD	11	15	20	24	29
JEBAL	25	50	59	72	88
PARS	50	75	92	112	137
GADOUK	6	8	10	12	15
MOVALED	30	50	62	75	92
YAZD ENJEMAD	10	15	18	22	27
TOTAL	608	952	1156	1404	1713

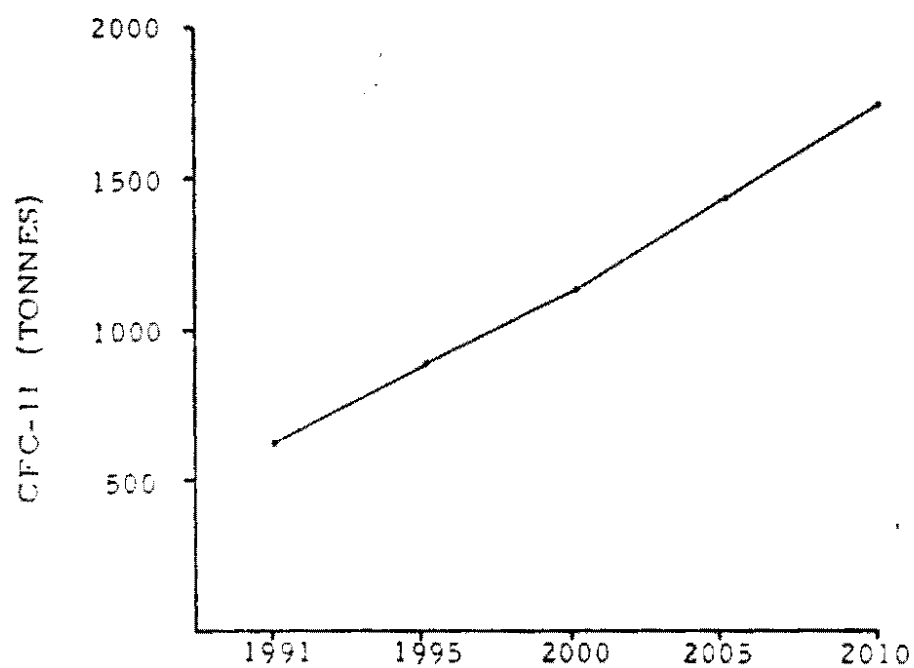


Fig. 12 FORECAST ABOUT CFC-11 CONSUMPTION
BY REFRIGERATOR INDUSTRIES FROM
1991-2010

TABLE 13. SOME INFORMATION ABOUT USE OF CFC-12 IN
REFRIGERATOR INDUSTRIES

COMPANY'S NAME	USE OF CFC-12 (TONNES)				
	(1991)	(1995)	(2000)	(2005)	(2010)
AZMAYESH	32	54	66	80	97
ARJ	27	40	49	59	72
IRAN PUYA	36	56	68	83	101
BAHMAN	30	46	56	68	83
FREEZ IRAN	30	46	56	68	83
PARS MACHINE	18	28	34	41	50
PAYAM MINAB	1	1.8	2	3	4
TOLIDY BOARD	4	6	7	9	11
JEBAL	10	18	22	27	32
PARS	18	28	34	41	50
GADOUK	2	3	4	5	6
MOVALED	12	18.8	23	28	34
YAZD ENJEMAD	3.6	5.6	7	8	10
TOTAL	223.6	351	428	520	635

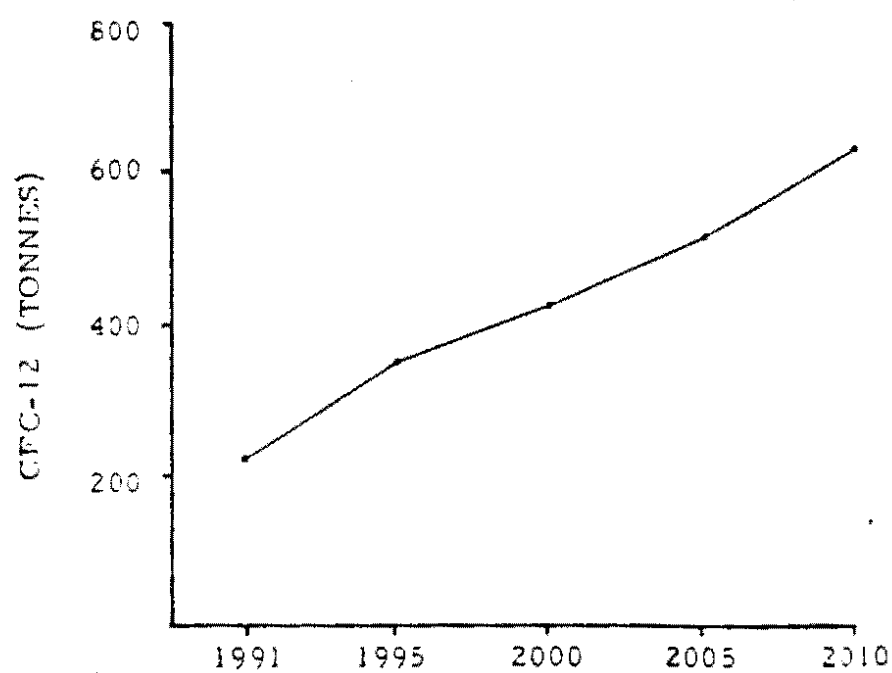


Fig. 13 FORECAST ABOUT CFC-12 CONSUMPTION
BY REFRIGERATOR INDUSTRIES FROM
1991 to 2010

TABLE 14. ESTIMATIONS ABOUT USE OF CFC-11 BY FOAM INDUSTRIES (1991-2010)

COMPANY'S NAME	1991	1995	2000	2005	2010
(TONNES/Yr)					
Abre Sanati Iran	28	35	50	68	92
Peak Foam	26	33	46	63	86
Tolidy Polyurethane	46	59	81	111	152
Safoam	8	10	14	19	26
Shizar	50	64	88	120	165
Bahman	75	96	132	181	248
Bahman plastics	112	144	197	270	370
Esfanj Abre Iran	5	6	9	12	17
Pars Foam	9	12	16	22	30
Urethan Systems	56	72	99	133	185
Esfanj Hamedan	57	73	100	138	189
Khorasan Synthetic Alyaf	19	24	33	46	63
Tolidy Tehran	25	32	44	60	83
Khozestan Plastics	15	19	26	36	50
Mashad Foam	105	135	185	253	347
Abre Shomal	48	61	85	116	159

continued...

TABLE 14. CONTINUED

COMPANY'S NAME	1991	1995	2000	2005	2010
(TONNES/Yr)					
Tolidy Iran-Gharb	10	13	18	24	33
Isfahan Moble Industry	4	5	7	10	13
TOTAL*	650	893	1230	1684	2308

* As some of the factories have not imported CFC-11 in 1991, in the present estimations, the base values were obtained by averaging the last 2-3 years of consumption. As Islamic Republic of Iran is not a tourism place and since the manufacturers could not estimate future production rate, a factor of 6.5 (approximately twice the population growth rate) was considered in estimating future use of CFC-11 by foam industries.

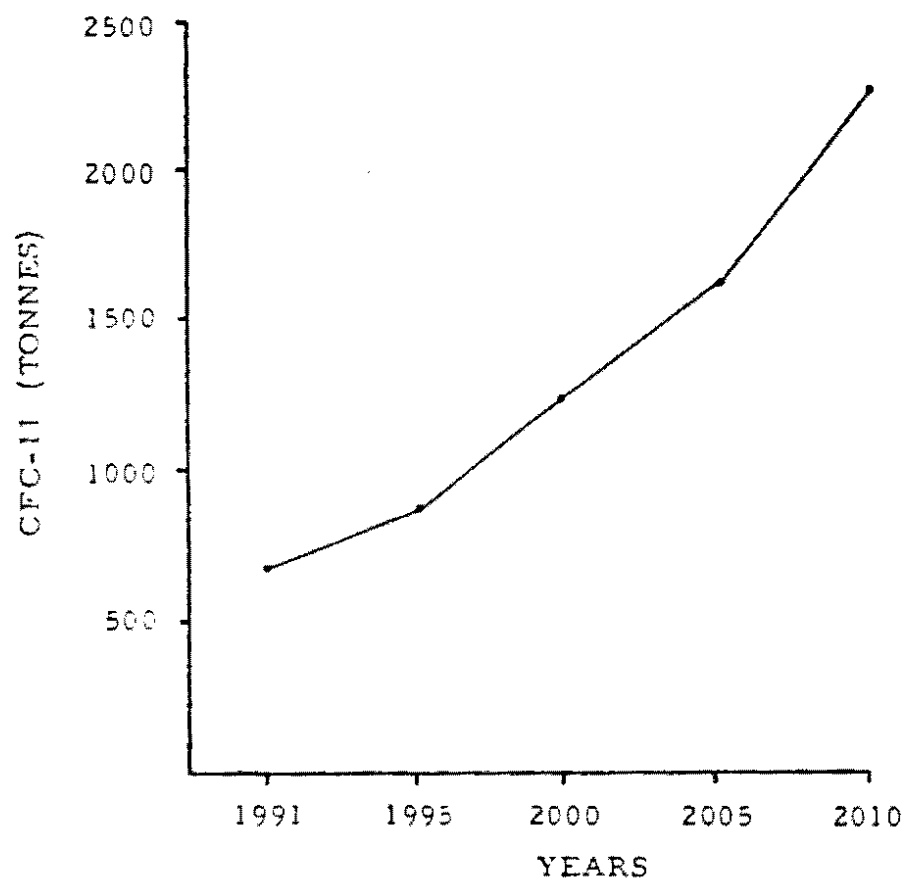


Fig. 14 FORECAST ABOUT CFC-11 CONSUMPTION
BY FOAM INDUSTRIES FROM 1991 TO 2010

CHAPTER 3

ECONOMIC CONDITIONS

Before describing the economic conditions of Iran, it is pertinent to know about some characteristics of the country.

3.1 SELECTED CHARACTERISTICS OF THE COUNTRY

1. POPULATION	: YEAR	NUMBER
	1980	38783000
	1985	46600000
	1986	49445000
	1989	53876000
	1990	55698000
	1991	57592000
	1995	65508000
	2000	77812000
	2005	91393000
	2010	107346000

2. POPULATION GROWTH RATE : 3.17 in 1991

3.	LABOR FORCE	: 22.25% of the total population
4.	AGRICULTURE	: 29.99% of the total employees
5.	INDUSTRY	: 14.79% of the total employees
6.	SERVICES	: 55.22% of the total employees
7.	SCIENTISTS	: 0.082/1000 in 1987
8.	ADULT LITERACY	: 74.4% in 1991 & 61% in 1986
9.	LAND AREA	: 1,648,000 Km ²
10.	FOREST LAND	: 18 million hectares in 1987
11.	ARABLE LAND	: 16.9 million hectares in 1987
12.	POPULATION DENSITY	: 350/1000 hectares in 1991
13.	PROTECTED LAND AREA	: 30,000 hectar
14.	HUMAN DEVELOPMENT INDEX	: 12.8 millions active population
15.	GDP PER CAPITA	: YEAR US\$**
		1987 98.00
		1988 105.00
		1989 113.00
		1990 122.00
		1991 132.00
		1992 143.00
		1995 180.00
		2000 250.00
		2005 390.00
		2010 570.00

** 1 US\$ = 600 RIALS

16.	GNP	: YEAR	MILLION US\$
		1988	84,672
		1989	82,979
		1990	81,319
		1991	92,703
		1995	156,572
		2000	NOT PREDICTABLE
17.	NUMBER OF YEAR IN WHICH POPULATION DOUBLES : 21 years		
18.	URBANIZATION	: 54.1%	
19.	AVERAGE NUMBER OF PERSONS IN ONE FAMILY : Five (based on average of years 1965 to 1991)		
20.	NUMBER OF HOUSEHOLDS RECEIVING ELECTRICITY : 8,826,000 in 1991		
21.	RATE OF INFLATION	: YEAR	RATE (%)
		1988	27.60
		1989	17.40
		1990	9.00
		1991	20.00
22.	UNEMPLOYMENT RATE	: YEAR	RATE (%)
		1991	15.90
		1992	14.70
		1993	13.40

3.2 FACTORS AFFECTING THE ECONOMIC CONDITIONS OF IRAN

The Following are the main factors affecting the economic conditions of Iran:

3.2.1 A. EXTERNAL FACTORS

- * Reduction in the foreign currency revenue and subsequently reduction in imports*
- * Reduction in the dollars rate when compared with other foreign exchanges*
- * Increase in the international prices of raw materials and*
- * Problems associated with the international policies against the Islamic Republic of Iran.*

3.2.2 B. INTERNAL FACTORS

- * Increase in population growth rate*
- * Increase in income of personel*
- * Utilization of foreign exchanges with different rates and rapid increase in the prices of goods*
- * Exemption of some goods with respect to rate fixation*
- * Increase in the number of middlemen in one hand and decrease in productions/imports on the other*

- * Increase in expenditures of production units as a result of increase in the price of raw materials
- * Implementation of subsidies rates' policy for basic goods

3.3 BUSINESS REGULATIONS AND INCENTIVES

A thorough survey of existing booklets on business regulations indicate that the imports of goods into the Islamic Republic of Iran require permissions issued by concerned Ministries. For instance, the following Ministries are frequently involved in imports:

- * Ministry of Commerce
- * Ministry of Industries
- * Ministry of Heavy Industries
- * Ministry of Mines and Metals
- * Ministry of Health and Medical Education
- * Ministry of Agriculture
- * Ministry of Post, Telegraph and Telephone
- * Ministry of Oil

Usually the imported goods undergo commercial taxation and customs duty too. As far as the on going project on ozone depleting chemicals is concerned, the import of most of chemicals are carried out with the permission of the Ministry of Commerce.

As the CFC's name does not appear in the related lists, the figures 15 and 25% as commercial tax and customs duty were found respectively.

3.4 INCENTIVES

At the present most of imports are based on 1 US\$ equal to 1450 Rials, however, for encouraging the industries, Government of Islamic Republic of Iran is providing 1 US\$ at the rate of 600 Rials. There are some special loans that are being given to industries for their further developments by various Banks in the Islamic Republic of Iran. Usually, the interest on Bank loans are more than 13% for people, but for agricultural and industrial sectors the interest on bank loans are much lower (ranging from 4 to 8%).

3.5 SUMMARY

A summary of the growth and other assumptions which were made in forecasting unconstrained ODSs use is presented in Tables 15 , 16 , 17 and 18 and Figures 15, 16, 17 and 18 respectively. These Tables and Figures are prepared using computer analysis (Exponential , Linear and Quadratic Trend Models). Tables 15 through 17 and Figures 15 through 17 show actual and estimated values of CFC-11 and CFC-12 for refrigerators, foams and private sectors, respectively. Table 18 and Figure 18 show the overall actual and estimated values for the above mentioned sectors.

It can be inferred from Tables 15 and 16 that compound growth rate is about 16.4 and 132.3 per cent for refrigerator and foam sectors, respectively. For refrigerator sector the exponential trend, linear trend and quadratic trend models are marginally significant. In the case of foam industries, exponential , linear and quadratic trend models are very significant.

Table 17 indicates that exponential, linear and quadratic trends are not significant for private sectors. Besides,

the compound growth rate for private sector stands at -0.6.5%.

The over all compound growth rate according to computer analysis stands at 15.2% (Table 18) for all the three sectors (refrigerator , foam and private). However,

TABLE 15. Refrigerator

TABLE OF ACTUAL AND ESTIMATED REFRIG VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
1986	271	220.762	18.5	200.429	26.0	266.500	1.7
1987	242	256.945	-6.2	261.257	-8.0	248.043	-2.5
1988	317	299.058	5.7	322.086	-1.6	269.229	15.1
1989	178	348.074	-95.5	382.914	-115.1	330.057	-85.4
1990	593	405.123	31.7	443.743	25.2	430.529	27.4
1991	514	471.523	8.3	504.571	1.8	570.643	-11.0
1992		548.806		565.400		750.400	
1993		638.755		626.229		969.800	
1994		743.447		687.057		1228.842	
1995		865.298		747.886		1527.528	
1996		1007.121		808.714		1865.856	
1997		1172.188		869.543		2243.827	
1998		1364.310		930.371		2661.441	
1999		1587.921		991.200		3118.698	
2000		1848.181		1052.029		3615.597	
2001		2151.097		1112.857		4152.140	
2002		2503.663		1173.686		4728.325	

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED REFRIG VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
2003		2914.014		1234.514		5344.153	
2004		3391.621		1295.343		5999.624	
2005		3947.509		1356.171		6694.738	
2006		4594.503		1417.000		7429.494	
2007		5347.544		1477.828		8203.894	
2008		6224.012		1538.657		9017.936	
2009		7244.124		1599.486		9871.619	
2010		8431.439		1660.314		10764.948	

Press any key to continue

SUMMARY OF FIT FOR THE THREE MODELS OF REFRIG

	Exponential Model	Linear Model	Quadratic Model
Mean Absolute Per Cent Error	27.6	29.6	23.8
Standard Error	131.4308	132.0355	135.4814
R-Squared	0.3823	0.4815	0.5905

Press any key to continue

ESTIMATED TREND MODELS OF REFRIG

1. Exponential Trend Model [for $t=1,2, \dots, 6$]

$$Y = 189.674 (1.16390)^t$$

Compound growth rate = 16.4 per cent

Exponential trend is marginally significant (t-statistic = 1.573)

2. Linear Trend Model [for $t=1,2, \dots, 6$]

$$Y = 139.600 + 60.8286 t$$

Linear trend is marginally significant (t-statistic = 1.927)

3. Quadratic Trend Model [for $t=1,2, \dots, 6$]

$$Y = 324.600 - 77.9213 t + 19.8214 t^2$$

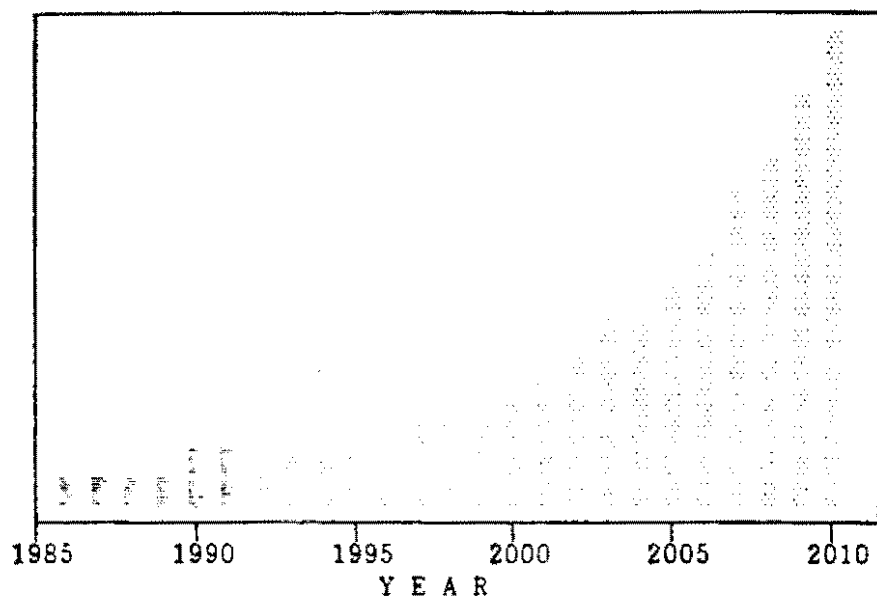
Linear trend is not significant (t-statistic = -0.491)

Quadratic trend is not significant (t-statistic = 0.894)

Press any key to continue

FIGURE 15

GRAPH OF REFRIG FOR YEARS 1986 TO 2010
(Exponential Model Forecasts Shown As Dots)



Where now: E=EXPLORE menu R=Run TREND again X=exit ?

TABLE 16. FOAM

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TABLE OF ACTUAL AND ESTIMATED FOAM VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
1986	5	16.705	-234.1	-57.381	1247.6	18.214	-264.3
1987	145	38.802	73.2	87.105	39.9	71.985	50.4
1988	122	90.126	26.1	231.590	-89.8	171.114	-40.3
1989	157	209.337	-33.3	376.076	-139.5	315.600	-101.0
1990	744	486.230	34.6	520.562	30.0	505.443	32.1
1991	650	1129.374	-73.7	665.048	-2.3	740.643	-13.9
1992		2623.215		809.533		1021.201	
1993		6092.984		954.019		1347.115	
1994		14152.271		1098.505		1718.386	
1995		32871.703		1242.990		2135.015	
1996		76351.625		1387.476		2597.000	
1997		x177343.125		1531.962		3104.343	
1998		x411917.690		1676.448		3657.042	
1999		x956767.750		1820.933		4255.099	
2000		x2222299.800		1965.419		4898.512	
2001		x5161771.000		2109.905		5587.283	
2002		x11989327.000		2254.391		6321.411	

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED FOAM VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
2003		x27847800.000		2398.876		7100.896	
2004		x64682696.000		2543.362		7925.738	
2005		x150239536.000		2687.848		8795.938	
2006		x348963740.000		2832.334		9711.493	
2007		x810543620.000		2976.819		10672.406	
2008		x 1882.662E+06		3121.305		11678.677	
2009		x 4372.890E+06		3265.791		12730.304	
2010		x 1015.698E+07		3410.276		13827.288	

Press any key to continue

SUMMARY OF FIT FOR THE THREE MODELS OF FOAM			
	Exponential Model	Linear Model	Quadratic Model
Mean Absolute Per Cent Error	79.2	258.2	83.7
Standard Error	279.0229	171.3175	180.9212
R-Squared	0.7633	0.7568	0.7966
Press any key to continue			

ESTIMATED TREND MODELS OF FOAM

1. Exponential Trend Model [for $t=1,2, \dots, 6$]

$$Y = 7.19218 (2.32272)^t$$

Compound growth rate = 132.3 per cent

Exponential trend is very significant (t-statistic = 3.592).

2. Linear Trend Model [for $t=1,2, \dots, 6$]

$$Y = -201.867 + 144.486 t$$

Linear trend is very significant (t-statistic = 3.528)

3. Quadratic Trend Model [for $t=1,2, \dots, 6$]

$$Y = 9.79874 - 14.2638 t + 22.6785 t^2$$

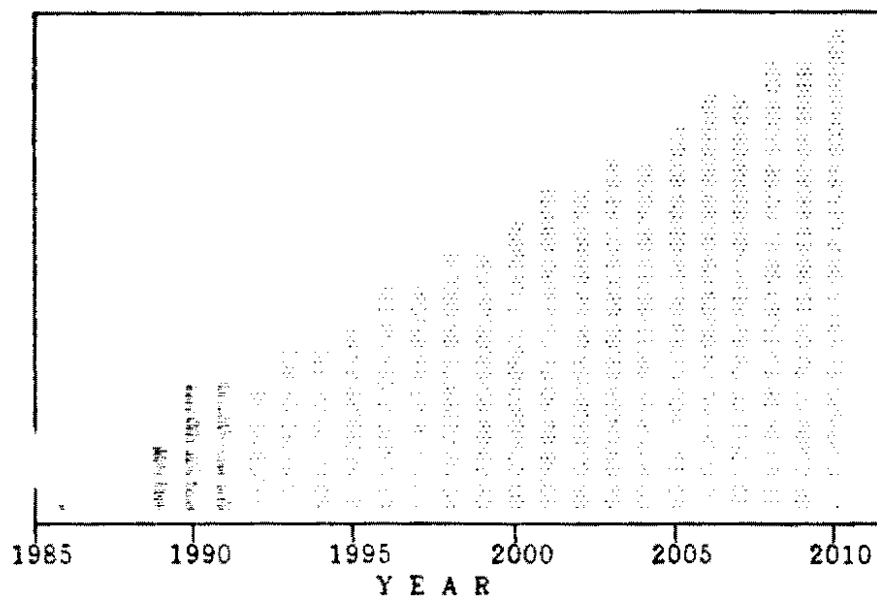
Linear trend is not significant (t-statistic = -0.067)

Quadratic trend is not significant (t-statistic = 0.766)

Press any key to continue

FIGURE 10. FOAM

GRAPH OF FOAM FOR YEARS 1986 TO 2010
(Linear Model Forecasts Shown As Dots)



Where now: E=EXPLORE menu R=Run TREND again X=exit ?

TABLE OF ACTUAL AND ESTIMATED PRIVATE VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
1986	955	720.93	24.5	1025.00	-7.3	423.75	55.6
1987	707	673.74	4.7	1050.20	-48.5	1170.45	-65.6
1988	90	629.64	-599.6	1075.40	-1094.9	1556.40	-1629.3
1989	3449	588.42	82.9	1100.60	68.1	1581.60	54.1
1990	1108	549.91	50.4	1125.80	-1.6	1246.05	-12.5
1991	219	513.91	-134.7	1151.00	-425.6	549.75	-151.0
1992		480.28		1176.20		-507.30	
1993		448.84		1201.40		-1925.10	
1994		419.46		1226.60		-3703.64	
1995		392.00		1251.80		-5842.94	
1996		366.35		1277.00		-8342.99	
1997		342.37		1302.20		-11203.79	
1998		319.96		1327.40		-14425.33	
1999		299.01		1352.60		-18007.63	
2000		279.44		1377.80		-21950.68	
2001		261.15		1403.00		-26254.47	
2002		244.06		1428.20		-30919.02	

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED PRIVATE VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
2003		228.08		1453.40		-35944.31	
2004		213.15		1478.60		-41330.36	
2005		199.20		1503.80		-47077.15	
2006		186.16		1529.00		-53184.70	
2007		173.98		1554.20		-59652.99	
2008		162.59		1579.40		-66482.02	
2009		151.95		1604.60		-73671.82	
2010		142.00		1629.80		-81222.37	

Press any key to continue

TABLE 17. Continued

SUMMARY OF FIT FOR THE THREE MODELS OF PRIVATE			
	Exponential Model	Linear Model	Quadratic Model
Mean Absolute Per Cent Error	149.5	274.3	328.0
Standard Error	1494.025	1367.262	1444.873
R-Squared	0.0097	0.0015	0.1637

Press any key to continue

ESTIMATED TREND MODELS OF PRIVATE

1. Exponential Trend Model [for $t=1,2, \dots, 6$]

$$Y = 771.419 (0.934545)^t$$

Compound growth rate = -6.5 per cent

Exponential trend is not significant (t-statistic = -0.198)

2. Linear Trend Model [for $t=1,2, \dots, 6$]

$$Y = 999.800 + 25.2000 t$$

Linear trend is not significant (t-statistic = 0.077)

3. Quadratic Trend Model [for $t=1,2, \dots, 6$]

$$Y = -683.699 + 1287.82 t - 180.375 t^2$$

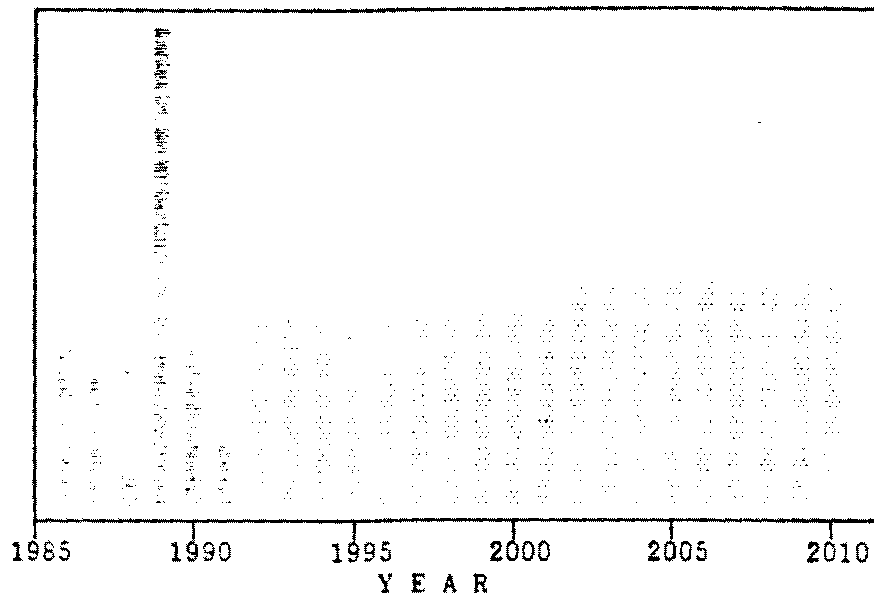
Linear trend is not significant (t-statistic = 0.762)

Quadratic trend is not significant (t-statistic = -0.763)

Press any key to continue

FIGURE 17. PRIVATE SECTOR

GRAPH OF PRIVATE FOR YEARS 1986 TO 2010
(Linear Model Forecasts Shown As Dots)



Where now: E=EXPLORE menu R=Run TREND again X=exit ?

TABLE 18. REFRIGERATOR, FOAM AND PRIVATE SECTORS

TABLE OF ACTUAL AND ESTIMATED CFC11&12 VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
1986	1231	1013.98	17.6	1168.05	5.1	708.47	42.4
1987	1094	1168.43	-6.8	1398.56	-27.8	1490.48	-36.2
1988	529	1346.41	-154.5	1629.08	-208.0	1996.74	-277.5
1989	3784	1551.50	59.0	1859.59	50.9	2227.26	41.1
1990	2445	1787.82	26.9	2090.10	14.5	2182.02	10.8
1991	1383	2060.15	-49.0	2320.62	-67.8	1861.04	-34.6

Press any key to continue

SUMMARY OF FIT FOR THE THREE MODELS OF CFC11&12

	Exponential Model	Linear Model	Quadratic Model
Mean Absolute Per Cent Error	52.3	62.3	73.8
Standard Error	1284.064	1226.308	1329.865
R-Squared	0.1518	0.1339	0.2361

Press any key to continue

ESTIMATED TREND MODELS OF CFC11&12

1. Exponential Trend Model [for
- $t=1,2, \dots, 6$
-]

$$Y = 879.943 (1.15232)^t$$

Compound growth rate = 15.2 per cent

Exponential trend is not significant (t-statistic = 0.846)

2. Linear Trend Model [for
- $t=1,2, \dots, 6$
-]

$$Y = 937.533 + 230.514 t$$

Linear trend is not significant (t-statistic = 0.786)

3. Quadratic Trend Model [for
- $t=1,2, \dots, 6$
-]

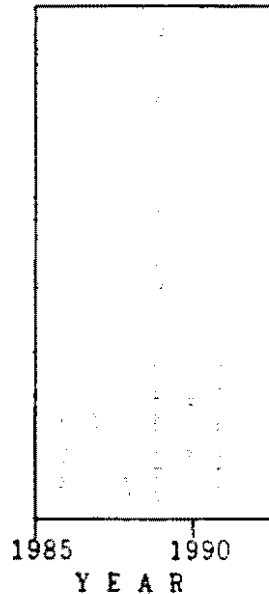
$$Y = -349.297 + 1195.64 t - 137.875 t^2$$

Linear trend is not significant (t-statistic = 0.768)

Quadratic trend is not significant (t-statistic = -0.633)

Press any key to continue

GRAPH OF CFC11&12 FOR YEARS 1986 TO 1991



Where now: E=EXPLORE menu R=Run TREND again X=exit ?

TABLE 16. Continued

TABLE OF ACTUAL AND ESTIMATED CFC11&12 VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
1986	1231	1013.98	17.6	1168.05	5.1	708.47	42.4
1987	1094	1168.43	-6.8	1398.56	-27.8	1490.48	-36.2
1988	529	1346.41	-154.5	1629.08	-208.0	1996.74	-277.5
1989	3784	1551.50	59.0	1859.59	50.9	2227.26	41.1
1990	2445	1787.82	26.9	2090.10	14.5	2182.02	10.8
1991	1383	2060.15	-49.0	2320.62	-67.8	1861.04	-34.6
1992		2373.96		2551.13		1264.30	
1993		2735.56		2781.65		391.82	
1994		3152.25		3012.16		-756.42	
1995		3632.41		3242.68		-2180.40	
1996		4185.71		3473.19		-3880.13	
1997		4823.29		3703.70		-5855.61	
1998		5557.98		3934.22		-8106.84	
1999		6404.59		4164.73		-10633.82	
2000		7380.14		4395.25		-13436.55	
2001		8504.31		4625.76		-16515.03	
2002		9799.70		4856.28		-19869.26	

Press any key to continue

TABLE OF ACTUAL AND ESTIMATED CFC11&12 VALUES

Time	Actual	Exponential Trend	% Error	Linear Trend	% Error	Quadratic Trend	% Error
2003		11292.42		5086.79		-23499.24	
2004		13012.51		5317.30		-27404.97	
2005		14994.61		5547.82		-31586.45	
2006		17278.62		5778.33		-36043.67	
2007		19910.55		6008.85		-40776.65	
2008		22943.36		6239.36		-45785.38	
2009		26438.16		6469.88		-51069.84	
2010		30465.26		6700.39		-56630.07	

Press any key to continue

SUMMARY OF FIT FOR THE THREE MODELS OF CFC11&12

	Exponential Model	Linear Model	Quadratic Model
Mean Absolute Per Cent Error	52.3	62.3	73.8
Standard Error	1284.064	1226.308	1329.866
R-Squared	0.1518	0.1339	0.2361

Press any key to continue

ESTIMATED TREND MODELS OF CFC11&12

1. Exponential Trend Model [for
- $t=1,2, \dots, 6$
-]

$$Y = 879.943 (1.15232)^t$$

Compound growth rate = 15.2 per cent

Exponential trend is not significant (t-statistic = 0.846)

2. Linear Trend Model [for
- $t=1,2, \dots, 6$
-]

$$Y = 937.533 + 230.514 t$$

Linear trend is not significant (t-statistic = 0.786)

3. Quadratic Trend Model [for
- $t=1,2, \dots, 6$
-]

$$Y = -349.297 + 1195.64 t - 137.875 t^2$$

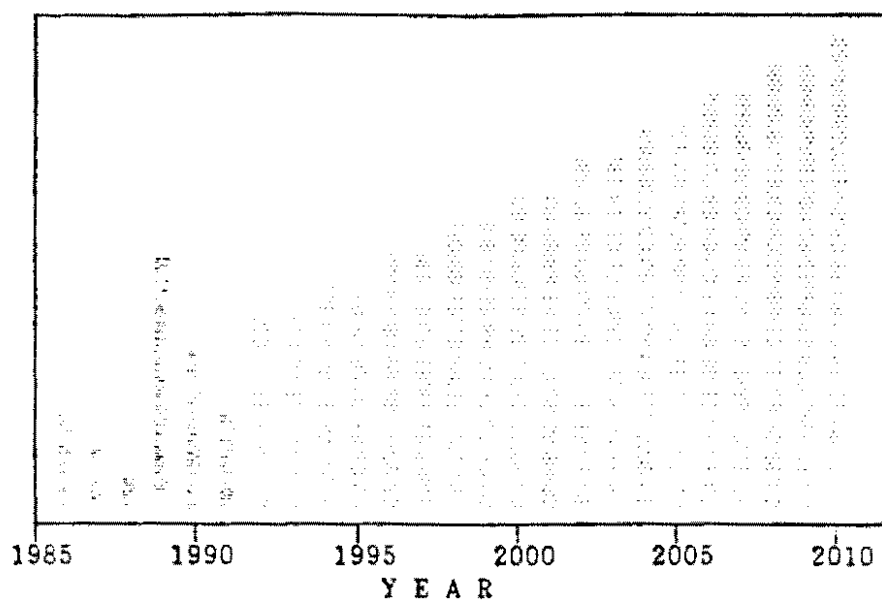
Linear trend is not significant (t-statistic = 0.768)

Quadratic trend is not significant (t-statistic = -0.633)

Press any key to continue

FIGURE 18. REFRIGERATOR, FOAM AND PRIVATE SECTORS

GRAPH OF CFC11&12 FOR YEARS 1986 TO 2010
(Linear Model Forecasts Shown As Dots)



Where now: E=EXPLORE menu R=Run TREND again X=exit ?

CHAPTER 4

IMPLEMENTING THE PHASE OUT

4.1 STRATEGY STATEMENT BY GOVERNMENT

According to the Montreal Protocol, developing countries should phase out CFCs , Halons and carbon tetrachloride by the year 2010 and methyl chloroform by the year 2015. As mentioned in the earlier chapters, The Islamic Republic of Iran does not produce ODSs but only imports them into the country. The ODSs are distributed within a small number of large industries and therefore, the coordination of the phase-out activities by The Government of The Islamic Republic of Iran would not be difficult. Thus, as an importer of controlled substances and associated technology, phase out by the year 2007 or earlier in the Islamic Republic of Iran is feasible provided that financial support proposed in this country programme is received.

The Government of Islamic Republic of Iran expects to reduce the consumption of controlled substances by 60% between 1993 to 1997 and to reduce the remaining consumption during the 1998 to 2007 period. The Action plan, would describe the activities for reduction of ODSs. Measures that appear in the action plan are consistent with the

current policy frame-work for environmental protection (50th Article of constitutional law of The Islamic Republic of Iran). Therefore, the Government of the Islamic Republic of Iran will announce that importation of controlled substances will be banned after the year 2007 except for essential uses. Even the servicing of the remaining stock of refrigeration equipment may be done using "drop in" substitutes providing funds are made available. Medical and other very special cases would use ODSs until such a time as substitutes are made available. The government will avoid the imposition of import quotas or import tariffs during the transition towards the phase out of controlled substances. However, bans where and when appropriate will be imposed.

4.2 ACTION PLAN

The action plan consists of three elements, 1) A set of Government actions that support the above mentioned strategy; 2) A series of projects to be undertaken by the private sector in response to the Government actions and 3) Control by the government through the Ozone Monitoring Centre.

4.2.1 GOVERNMENT ACTIONS

The following are the government actions that constitute the essence of this country programme:

- A. Technological Conversion Financing programme*
- B. Public Awareness programme*
- C. Creation of Ozone Monitoring Centre*

4.2.2 A. TECHNOLOGICAL CONVERSION FINANCING programme

To encourage the industries, the Government of the Islamic Republic of Iran is providing foreign exchange on a preferential basis. There are some special loans that are being given to industries to further their development by various banks. Usually, the interest on bank loans is more than 13% (reaching 22%) for some. For agricultural and industrial sectors the interest on bank loan is much lower (ranging from 4 to 8%). Therefore the technological conversion financing programme is partially supported in this way by the Government. In order to substitute the ODS grant financing is required to industries in order to encourage these in conversion. Only incremental costs would be grant financed.

4.2.3 B. PUBLIC AWARENESS programme

The public awareness programme would have two objectives; one is to raise public awareness about ozone layer depletion and simultaneously induce consumers to prefer products exhibiting the ozone seal. The second objective is to provide guidelines to prevent excessive exposure to Ultra Violet Rays. These two objectives will be carried out intensively during 1993 to 1997. However, it would be continued beyond 1997 too, but at a slower pace. At present, some environmental issues are being discussed on T.V, Radio and news papers. A series of seminars would also be conducted on this important subject matter.

4.2.4 C. CREATION OF THE OZONE MONITORING CENTRE

This centre would be responsible for the evaluation, coordination and supervision of all Government Actions and their corresponding projects. For the first five years (1993-1997) of the programme, the centre would operate with two professionals and four assistants. A consultant from abroad may also be needed. The responsibility of the centre would be as follows:

1. To monitor the commitments made by the government as described in this country programme
2. To supervise public awareness programmes
3. To communicate with the Montreal Protocol committee and Government agencies
4. To provide the industries with the latest information about the substitution of ODSs
5. To provide the industries with the latest technologies achievements in other parts of the world
6. To propose an action programme for 1997-2007 period
7. To evaluate potential applicants for specific training courses
8. To conduct seminars
9. To investigate the problems of industries
10. To supervise the operations of transition in industry sectors
11. To monitor the gathering of the latest information about the import of ODSs and its use in the country.

The intended effect of each of these programmes is to reduce consumption of ODSs in the various sectors within the set time-table. Based on the structure of the industry that consumes controlled substances in the Islamic Republic of Iran, current users could be divided into the following three categories:

1. Incremental conversion cost close to zero (hereafter referred to as others "such as extinguisher, shoes, distillation ect")
2. Low incremental conversion costs (many small enterprises producing flexible foam)
3. Significant incremental conversion costs (commercial refrigeration, rigid foams)

Based on the action plan described above, it is expected to reduce the consumption of ODSs by 60 percent (that is 1337 tonnes of ODP to 535 tonnes of ODP). This is shown in the following Table:

REDUCTION OF ODSs FROM 1993 TO 1997 IN THE ISLAMIC REPUBLIC
OF IRAN (in ODP)

CATEGORY	CONSUMPTION OF ODS IN 1991 (TONNES)	REDUCTION IN ODS IN 1997 (TONNES)	REDUCTION % OF 1991	TIME
FOAM INDUSTRY	650	220	16.45	1994
		180	13.46	1995
		100	7.48	1996
		20	1.50	1997
SUBTOTAL		520	38.89	1997
REFRIGERATOR	514	120	8.98	1994
INDUSTRY		70	5.24	1995
		50	3.74	1996
		30	2.24	1997
SUBTOTAL		270	20.11	1977
OTHERS*	219	---	---	1994
		7	0.52	1995
		4	0.30	1996
		1	0.08	1997
SUBTOTAL		12	0.90	1997
GRAND TOTAL	1337	802	59.90	1997

* As foam and refrigerator industries have expressed their willingness for transition, it is expected to reach the set goal on time by phasing out ODSs from these two sectors much earlier than in other categories. Hence the reduction of ODSs in the last category is expected to be low between 1993-1997.

4.3 PRIVATE SECTOR PROJECTS

The Government actions would create the incentives to the private sector for the formulation and implementation of technological conversion projects. For each project, a brief technological description is provided and the relevant government actions together with financing are outlined.

4.4 PROJECTS

4.4.1 CATEGORY 1.

It should be noted that there are about 11 aerosol producers in the Islamic Republic of Iran and all of them use hydrocarbons as propellants. Thus, there will be no projects on aerosols.

PROJECT NO.1: STERILANTS

OBJECTIVES:- Conversion from CFC-12 and ethylene oxide to CO2 and ethylene oxide

EXPECTED ODS REDUCTION:- 25 tonnes (based on six years consumption, 1986-1992)

COST :- 400,000 US\$

DESCRIPTION :- It is intended to replace the existing sterilization chambers in hospitals from CFC and ethylene oxide to CO2/ethylene mixture and in this direction and due to the higher pressure necessary for operation of CO2, training of nurses would be essential.

RELEVANT GOVERNMENT ACTION:- Ozone Monitoring Centre

AREAS WHERE FINANCING IS REQUIRED :- Training programme for hospital nurses

PROJECT NO.2: SHOE COMPANIES

OBJECTIVES:- Conversion of CFC-11 to methylene chloride
for production of flexible foam

EXPECTED ODS REDUCTION:- 25 tonnes (62.5% of CFC-11 used in
the production of shoes)

COST :- 300,000 US\$

DESCRIPTION:- Conversion of flexible slabstock polyurethane
foam from CFC-11 to methylene chloride. Some
initial investigations carried out by one of
the factories has indicated that some of the
workers may have had cancer due to this
conversion. Therefore, the project would train
the workers and add equipment to properly vent
the workplace of methylene chloride fumes.

RELEVANT GOVERNMENT ACTIONS:- Public awareness programme ,
Funds received from the Multilateral Fund
would be allocated to each industry by the
Ozone Monitoring Centre to cover incremental
costs.

AREAS WHERE FINANCING IS REQUIRED :- Training and new
equipment paid for through Funds from the
Montreal Protocol. Necessary guidelines and
technology would also be provided by the ozone
monitoring centre.

4.4.2 CATEGORY 2.

PROJECT NO.3: Conversion of CFC-11 by methylene chloride in foam industries

OBJECTIVES:- This project is similar to project No.2 but on a larger scale. The main objectives is to convert flexible slabstock polyurethane foam from using CFC-11 to methylene chloride. Thus apart from provision of proper ventilation systems, electrical blades for cutting slabs instead of using hot metals, operators would receive necessary training.

EXPECTED ODS REDUCTION:- 520 tonnes (80% of CFC-11 used in the flexible foam sectors)

COST :- 500,000 US\$

RELEVANT GOVERNMENT ACTIONS:- Public awareness programme , Funds received from the Multilateral Fund would be allocated to each industry by the Ozone Monitoring Centre to cover incremental costs.

AREAS WHERE FINANCING IS REQUIRED :- Training technical conversion programme would help to cover the incremental costs of new equipment. Necessary guidelines will be provided by ozone monitoring centre.

PROJECT NO.4: RIGID FOAMS

OBJECTIVES:- 50% reduction of CFC-11 in rigid foams

EXPECTED ODS REDUCTION :- 180 tonnes (50% of CFC-11 used by refrigerator manufacturers and other foam blowers)

COST :- 500,000

DESCRIPTION :- Training and capital investment to reduce 360 tonnes of CFC-11 by 50% in rigid polyurethane foam used for insulation in the production of domestic and commercial refrigeration as well as the insulation applications equipment. The Project involves reformulating foam systems, short production trials, process modifications and quality control and verification tests. About 13 companies would undertake this project (expectedly).

RELEVANT GOVERNMENT ACTIONS:- Funds received from the Multilateral Fund would be allocated to each industry by the Ozone Monitoring Centre to cover incremental costs.

AREAS WHERE FINANCING IS REQUIRED:- Subsidy of CFC-11 by 50% in accordance with action plan. Receiving grants for incremental costs according to Montreal Protocol regulations.

4.4.3 CATEGORY 3.

PROJECT NO.5: REFRIGERANTS CONSERVATION AND RECYCLING

OBJECTIVES:- To recycle existing units

COST :- 2,000,000 US\$

DESCRIPTION:- To make use of old refrigerators before dumping them. In this way refrigerator industries could recover some CFC-12 for repair purposes.

RELEVANT GOVERNMENT ACTIONS:- Ozone monitoring centre

AREAS WHERE FINANCING IS REQUIRED:- It is expected to generate some recycling centres among the service firms engaged in equipment maintenance. The incremental costs of using "drop in" substitutes would also be given for refrigerator repair.

PROJECT NO.6: NEW EQUIPMENT COMPATIBLE WITH EXPORTED
REFRIGERATOR COMPRESSORS

OBJECTIVES :- Development of new equipment (sarrogants)
compatible with HCFCs and Ammonia

EXPECTED ODS REDUCTION :- 77 tonnes (50% of CFC-12 used in
refrigerator sector).

COST :- 750,000 US\$

DESCRIPTION:- Production of new equipment which is used to
replace old equipment or equipment needed in
new facilities.

RELEVANT GOVERNMENT ACTIONS :- Public awareness and
incremental costs to factories

AREAS WHERE FINANCING IS REQUIRED:- Industries would use
less ODS much faster. Their products would
receive ozone seal and will benefit from the
public awareness campaign.

PROJECT NO.7: DISPOSAL OF OLD REFRIGERATOR

OBJECTIVES:- Safe dumping of old refrigerator so that the
leachate would not contaminate the ground
waters.

COST :- 400,000 US\$

DESCRIPTION:- It is pertinent to find out suitable locations
for the burial of old refrigeratores. Thus,
a proper place should be investigated for
each province of the Isalmic Republic of Iran.

This will include studies about geology of the area, climate , type of soil and ground water levels.

RELEVANT GOVERNMENT ACTIONS:- Ozone monitoring centre

AREAS WHERE FINANCING IS REQUIRED:- An area of investigation would be created for the researchers of the universities.

PROJECT NO.8:- CREATION OF OZONE MONITORING CENTRE***

OBJECTIVES :- To monitor the commitments made by the Government of the Islamic Republic of Iran as described in this country programme.

COST :- 300,000 US\$

DESCRIPTION: This centre would be responsible for the
*** evaluation, coordination and supervision of all Government Actions and their corresponding projects. The centre would operate with two professionals and four assistants. A consultant from abroad may also be need.

RELEVANT GOVERNMENT ACTIONS :- Public awareness, Ozone Monitoring Centre

AREAS WHERE FINANCING IS REQUIRED :- Salaries of professionals , Fax, Telephone, Office , Travelings, Xerox machine, Services and activities.

*** Please see Annex A for more details about the Ozone Monitoring Centre.

4.5 BUDGET

There are about 30 refrigerator manufacturers (12 major ones and 18 small ones) in the Islamic Republic of Iran. The total number of refrigerator production stands beyond 1,100,000 units per year. In the year 1997 (the time for phasing out about 60% of ODSs) the number of production would be about 2,200,000 units. The number of factories producing foam stands at 17 (9 major and 8 smaller ones). The total production of these factories is about 40,000 tonnes foam in 1991. And it would reach 59,000 tonnes in 1997.

Thus considering the above figures it is evident that the project will be extended to about 50 factories and for reaching the goals, the budget requirements shown in the following Table is essential.

PROJECTS AND THEIR COSTS

GOVERNMENT ACTIONS	COST	COST	COST	COST	COST	TOTAL
	1993	1994	1995	1996	1997	93-96
1. STERILANTS	100000	100000	100000	50000	50000	400000
2. SHOE COMPANIES	100000	50000	50000	50000	50000	300000
3. FLEXIBLE FOAMS	200000	200000	50000	50000	-----	500000
4. RIGID FOAM	200000	200000	50000	50000	-----	500000
5. REFRIGERATOR	300000	300000	700000	500000	200000	2000000
CONSERVATION						
6. KEY EQUIPMENT	100000	200000	300000	100000	50000	750000
7. DISPOSAL OF OLD	-----	-----	200000	100000	100000	400000
REFRIGERATORS						
8. OZONE MONITORING	100000	100000	50000	50000	-----	300000
TOTAL	1100000	1150000	1500000	950000	450000	5150000

TOTAL BUDGET REQUIREMENTS FOR THE ISLAMIC REPUBLIC OF
IRAN'S COUNTRY programme (ALL VALUES IN US\$)

GOVERNMENT ACTIONS	COST	COST	COST	COST	COST	TOTAL
	1993	1994	1995	1996	1997	93-96
TCFP (1)	700000	500000	500000	400000	400000	2500000
PAP (2)	50000	75000	120000	150000	150000	545000
8 PROJECTS (3)	1100000	1150000	1500000	950000	450000	5150000
TOTAL	1850000	1725000	2120000	1500000	1000000	8195000

1. TECHNOLOGICAL CONVERSION FINANCING PROGRAMME

2. PUBLIC AWARENESS programme

3. CREATION OF OZONE MONITORING CENTRE IS INCLUDED IN THE 8 PROJECTS

CHAPTER 5

EXECUTIVE SUMMARY

5.1 INTRODUCTION

The Montreal Protocol is an agreement ratified by over 70 countries worldwide to reduce the emissions of ozone depleting substances (ODSs) through regulation of consumption. Under the Montreal Protocol (MP), the participating developed countries have established the Interim Multilateral Fund (Multilateral Fund) to help qualified developing countries with the cost of meeting the Protocol agreement. At the request of the Government of Islamic Republic of Iran, the UNDP assisted with the preparation of a Country programme, a requisite activity for assistance from the Multilateral Fund.

Islamic Republic of Iran ratified the Montreal Protocol on 10 March 1990, and qualifies under paragraph one Article 5 of the Protocol for a ten year delay in the phase out of ODSs. Islamic Republic of Iran can also qualify for assistance from the Multilateral Fund in accomplishing the phase-out as of June 10, 1991. Such assistance will

be available once it has met the Multilateral Fund criteria for its projects.

Even before ratifying the Protocol, the Islamic Republic of Iran made the entire Montreal Protocol as part of its constitutional laws (Official Gazette No.13063 on 28/9/1368 AH (8 DEC 1989)) and at the present The Environmental Protection Agency is operating under direct supervision of The President.

5.2 ODS Use in Islamic Republic of Iran

Islamic Republic of Iran does not produce ODS, but there are numerous users of ODS in the country. The bulk of the demand is concentrated in the industries that manufacture and service domestic refrigerators (approximately 9 Million refrigerators are currently in use), and in the foam industry which produces cushioning, building insulation and packaging and as solvents. These industries contribute to a higher standard of living and, in recent years, have experienced growth exceeding that of the population. Some fire extinguishing materials are also ODSs, unfortunately available data is limited, it is nevertheless estimated that the consumption is small. Total ODS consumption is estimated to be 1337 in 1991.

5.3 Methodology for Country programme

The methodology for the preparation of the Country programme for the Islamic Republic of Iran involved a data collection and analysis mission to Islamic Republic of Iran in March 1992, during which data on the supply and demand for ODSs were collected; the institutional and policy framework was researched with industry leaders and government officials; ODS phase-out problems and plans were discussed with major consumers of ODS; and the availability of ODS substitutes was investigated. A set of project activities which may qualify for Multilateral Fund grants was identified, prefeasibility studies were prepared and costed. A set of ODS phaseout scenarios which spanned a full range of probable activities were identified and costed. The optimum scenario was selected and was used as a foundation for a phase-out strategy for the Islamic Republic of Iran and an action plan to accomplish the strategy.

5.4 ECONOMIC COST TO THE ISLAMIC REPUBLIC OF IRAN

The net incremental economic cost to the Islamic Republic of Iran for phase-out of ODSs is 8,195,000 US\$ (expressed as the net present value in 1991 US dollars).

The primary conclusion drawn from this analysis is that a prompt ODS phase-out will be beneficial to the Islamic Republic of Iran economy. The determination of reimbursement of costs of financing the projects proposed in this country programme is an issue for Multilateral Fund Executive Committee to decide in accordance with the Montreal Protocol.

In order of importance to the economic cost to the Islamic Republic of Iran, the following conclusions were also reached:

1) The most significant net incremental costs to the Islamic Republic of Iran are those associated with the potential forced early replacement of domestic refrigerators when virgin CFCs are no longer available for recharge. This stems from the fact that there will be roughly 30 M refrigerators in service in the Islamic Republic of Iran in 2010, but replacement costs only apply to those continuing to use CFC-12. An early transition to refrigerant HFC-134a for domestic refrigerators will reduce the population of CFC-12 refrigerators in 2010, and hence reduce early replacement costs. The average age of the CFC-12 refrigerator population in 2010 was also a factor. In the absence of recycling of CFC-12 refrigerant in the

accelerated cases, the average age of CFC-12 refrigerators is substantially decreased.

2) The incorporation of recycle/recovery into any phase out case has the effect of directly reducing ODSs consumption. Its primary benefit is to assure local supplies of CFC-12 for recharging refrigerators. Additional savings (not included) should be expected from applying recycle/recovery technology to the conservation of HFC-134a.

3) Capital requirements were minimal in all cases analysed. Any delay in the timing of investments reduces the economic cost.

The tables shown on the following page gives the incremental costs and the CFC reduction by industry sector in Islamic Republic of Iran.

REDUCTION OF ODSs FROM 1993 TO 1997 IN THE ISLAMIC REPUBLIC
OF IRAN (ODP/tonne)

CATEGORY	CONSUMPTION OF ODS IN 1991 (TONNES)	REDUCTION IN ODS IN 1997 (TONNES)	REDUCTION % OF 1991	TIME
FOAM INDUSTRY	650	220	16.45	1994
		180	13.46	1995
		100	7.48	1996
		20	1.50	1997
SUBTOTAL		520	38.89	1997
REFRIGERATOR	514	120	8.98	1994
INDUSTRY		70	5.24	1995
		50	3.74	1996
		30	2.24	1997
SUBTOTAL		270	20.11	1977
OTHERS	219	---	---	1994
		7	0.52	1995
		4	0.30	1996
		1	0.08	1997
SUBTOTAL		12	0.90	1997
GRAND TOTAL	1337	802	59.90	1997

TOTAL BUDGET REQUIREMENTS FOR THE ISLAMIC REPUBLIC OF
IRAN'S COUNTRY programme (ALL VALUES IN US\$)

GOVERNMENT ACTIONS	COST	COST	COST	COST	COST	TOTAL
	1993	1994	1995	1996	1997	93-96
TCFP (1)	700000	500000	500000	400000	400000	2500000
PAP (2)	50000	75000	120000	150000	150000	545000
8 PROJECTS (3)	1100000	1150000	1500000	950000	450000	5150000
TOTAL	1850000	1725000	2120000	1500000	1000000	8195000

1. TECHNOLOGICAL CONVERSION FINANCING PROGRAMME

2. PUBLIC AWARENESS programme

3. CREATION OF OZONE MONITORING CENTRE IS INCLUDED IN THE 8 PROJECTS

The optimum strategy for the Government of Islamic Republic of Iran is to adopt a set of policies and implement a series of projects that support a phase-out of ODSs consumption as soon as is technically feasible. This strategy will accomplish the complete phase-out of ODSs at the least economic cost to the country and provide the basis for an officially recognized National Ozone Policy to which industry and government leaders are committed for phasing out ODSs.

5.5 Policies

The following are the main policies that are recommended to be included in the National Ozone Policy (NOP) for the Islamic Republic of Iran :

- * Enhance public awareness of the "ozone issue" through media attention. The emphasis should at first be placed on the conservation aspects of ODS and subsequently on substitution;

- * Announce proposed phase out schedule;

- * Establish ODS import monitoring policies and procedures which account for all ODS as required under the Montreal

Protocol and from which progress in reducing ODS consumption is tracked to guide appropriate adjustments in programmes and policies.

* Create an "OZONE MONITORING CENTRE" within the Department of Environment to act as a focal point that will provide guidance in the formulation and promulgation of specific policies consistent with the NOP. (Requisition for creation of Ozone Monitoring Centre is attached; please see Annex A).

5.6 PROJECTS

The Multilateral Fund may provide financial assistance for selected projects. A capital investment of US \$ 5,150,000 is proposed for the following projects:

1. Conversion of CFC-12 and ethylene oxide to CO₂/ethylene oxide (cost=400,000 US\$)
2. Conversion of CFC-11 to methylene chloride for production of flexible foam in shoe industries (cost=300,000 US\$)
3. Conversion of CFC-11 to methylene chloride in foam industries (cost=500,000 US\$)
4. Reduction of CFC-11 in rigid foams (cost=500,000 US\$)

5. Refrigerants conservation and recycling (cost=2,000,000 US\$)
6. Production of equipment compatible with exported refrigerator compressors (cost=750,000 US\$)
7. Disposal of old refrigerators (400,000 US\$)
8. Creation of Ozone Monitoring Centre (300,000 US\$)

5.7 ACTION PLAN

5.7.1 Objectives and Coordination

The objective of the Action Plan is to effectively, efficiently and as fairly as possible, phase out the consumption of ODS in the Islamic Republic of Iran in compliance with the Montreal Protocol, as ratified by the Government of the Islamic Republic of Iran in accordance with the proposed optimum strategy.

The Action Plan comprises the investments, policies and implementation actions needed to ensure compliance. The principal agents are the Government (which is responsible for the specific policies, referred to here as "National Ozone Policy") and UNDP (as implementing agency). These two agencies must be synchronized to effect the purpose of

the Action Plan, i.e., compliance with the terms of the Protocol. The required budget for phase-out of ODSs would be transferred into the UNDP account in Tehran through Multi lateral Funds. Cheques would be drawn to the industries (project executors) by the UNDP upon the acceptance of Projects by UNDP and Ozone Monitoring Centre. The Ozone Monitoring Centre and a supervisor from UNDP will be responsible for checking the Projects' progress.

This action plan is consistent with the principles for evaluating and financing incremental costs for the ODS phase-out as detailed in the "Indicative List of Categories of Incremental Costs" adopted by the Second Meeting of the Parties to the Montreal Protocol. In summary these are:

- * be cost-effective and attuned to the national industrial strategy
- * include a careful review of cost items and avoid double counting
- * feature early adoption of ozone protecting technologies

The action plan proposed for the Islamic Republic of Iran is based on the optimum phase-out scenario. In this strategy, action is initiated in 1993. The phase-out is completed by 2007.

5.7.2 SUMMARY OF PROPOSED ACTIONS

The followings are the outlines of Action Plan.

- A. Technological conversion financing programme*
- B. Public awareness programme*
- C. Creation of Ozone Monitoring Centre*

5.8 OTHER FACTORS OF SIGNIFICANT IMPACT TO THE PHASEOUT PROGRAMME

The following factors will have direct bearing on phase-out activities, timing and process:

The future supply and associated costs of alternate refrigerants, and fire extinguishers and their associated appliances is not known precisely, and the feasibility of some technologies remains to be confirmed. However, the cost of alternatives is expected to approach the cost of existing technologies at some point in the future. It is anticipated that the cost of the available ODS, after an initial period of oversupply, will eventually rise sharply as supplies become greatly diminished with limited production.

If phase-out is slow in a fast developing economy, the stock of existing ODS using plant equipment and products will continue to grow. The result of such build up will ultimately increase the overall cost of ODSs phase-out.

The make-up of the NOP will directly influence the cost of phase-out to participating industries. It should be recognized that the eligibility rules under the Multilateral Fund will also create strategic incentives. To the extent that incremental costs incurred by rapid phase-out are reimbursable under the Multilateral Fund's incremental cost rules, higher costs need not be a burden to the developing country. The best approach for formulating the NOP appears to be a combination of elements representing various approaches in a pragmatic way.

5.9 CURRENT DEMAND OF ODS

The Government of the Islamic Republic of Iran uses the Brussels Harmonized Classification System for chemicals that are imported into the country. Besides, The Ministry of Commerce keeps a record of chemicals too. Therefore, the statistical data could be obtained from the above sources. At present the ODS consumption in the Islamic Republic of Iran is about 1383 tonnes.

5.10 FORECAST DEMAND FOR ODS BY SECTOR

The forecasts presented in this section assume that the Montreal Protocol does not exist, that there are no supply constraints and therefore defines demand with no substitution. They do not take into account any possible product development or other changes in manufacturing practices as a result of normal progress. These unconstrained demand projections are the starting point for determining the demand for substitutes.

The overall unconstrained CFC consumption is projected from 1383 tonnes in 1991 to 4656 tonnes in 2010. This corresponds to an annual growth rate of 6%. It is evident that the annual growth rate is high, however it should be pointed out that these figures have been built up based on the interviews with leading foam and refrigerator industries. Therefore, it is to be noted that these projections can only be approximate.

5.11 UNDERLYING GROWTH ASSUMPTIONS

In making these projections, the following were taken into

account:

* The opinion of industry leaders about the growth of production and its forecast: Based on the interviews it was found that the annual growth rate in refrigerator production would be 12% for the next 4 years (1991-1995) and 4% from 1995 to 2010. The annual growth rate for the foam productions would be around 6.5%.

* population: The 1991 census shows a population of 57.59 million. The Government is forecasting this to grow at 3.17% per year to 107 million in 2010.

* GDP : GDP is assumed to grow at an average 3.4% per year for the next 19 years.

5.12 REFRIGERATORS AND FOAM INDUSTRIES

The largest use of CFCs in the Islamic Republic of Iran is in the Foam and Refrigerator sectors. According to refrigerator's industries, production would continue at an annual growth rate of 12% and 4% for the years 1991-1995 and 1995-2010 respectively. The growth in foam production is estimated at 6.5% per year.

There are around 12 million refrigerators in use in 1991 with an average life of 16-18 years. Based on the

estimated growth rate this will rise to 20 and 30 million units in the years 2000 and 2010 respectively. Based on an average family size of 5 in urban and rural areas the number of households in the Islamic Republic of Iran is about 12 million in 1991. This will increase to 21 million in the year 2010.

SUMMARY OF GROWTH AND OTHER ASSUMPTIONS

AREA	GROWTH AND OTHER ASSUMPTIONS	PERIOD
POPULATION	3.17% ANNUAL GROWTH RATE	1991-2010
GDP	3.40% AVERAGE ANNUAL GROWTH	1990-2010
DOMESTIC REFRIGERATOR		
MANUFACTURERS	12% ANNUAL GROWTH RATE	1991-1995
	4% ANNUAL GROWTH RATE	1991-2010
	20 MILLION WILL BE IN USE	2000
	30 MILLION WILL BE IN USE	2010
	AVERAGE LIFE	16-18 YEARS
HOUSEHOLDS	11.4 MILLION	1991
REFRIGERATOR FAILURE	3%	1ST YEAR
	5%	5-10TH YEAR
	10%	10-18TH YEAR
CENTRAL AIR CONDITIONING	VERY LIMITED (IMPORTED ONES ONLY)	
MOBILE AIR CONDITIONERS	VERY LIMITED (IMPORTED ONES ONLY)	
FOAMS	6.5% AVERAGE ANNUAL GROWTH RATE	1991-2010
	FOR BOTH FLEXIBLE AND RIGID FOAMS	

ANNEX A

A. GENERAL

1. TITLE OF REQUEST : Creation of an Ozone Monitoring Centre
2. NAME OF COUNTRY : Islamic Republic of Iran
3. EXECUTING AGENCY : Department of Environment
4. IMPLEMENTING AGENCY : UNDP
5. GNP/CAPITA : 1626 US\$

6. CONSUMPTION OF CONTROLLED SUBSTANCES: 1383 ODP/TONNES

7. CONSUMPTION OF CONTROLLED SUBSTANCES BY SECTORS:

REFRIGERATION	514 ODP/TONNES
FOAM	650 ODP/TONNES
OTHER	219 ODP/TONNES

8. OBJECTIVES:

This centre would be responsible for the evaluation, coordination and supervision of all Government Actions and their corresponding projects. For the first five years (1993-1997) of the programme, the centre would operate with two professionals and four assistants. A consultant from abroad may also be needed. The responsibility of the centre would be as follow:

- A. To monitor the commitments made by the government as described in this country programme
- B. To supervise public awareness programme
- C. To communicate with the Montreal Protocol committee and

other Government agencies

- D. To provide the industries with the latest information about the substitution of ODSs
- E. To provide the industries with the latest technologies achievements in other parts of the world
- F. To propose an action programme for 1997-2007 period
- G. To evaluate potential applicants for specific training courses
- H. To conduct seminars
- I. To investigate the problems of industries
- J. To supervise the operations of transition in industry sectors
- K. To monitor the gathering of the latest information about the import of ODSs and its use in the country.

9. SCOPE OF PROJECT: Covers foam and refrigeration sectors all over the country

10. JUSTIFICATION:

- A. The relative lack of awareness of the phenomenon of stratospheric ozone depletion and its potential impacts, coupled with the complexity and fast changing nature of technical and scientific issues involved in protecting the ozone layer in general , and in using ODS substitute technology in particular.
- B. The weak institutional infrastructure for dealing with issues involved in the phase-out of the ODSs, such as transfer of technologies

C. The commitment to earlier ODS phase-out schedules than provided for under the Protocol.

11. BENEFICIARIES OF THE PROJECT:

About 50 foam and refrigerator industries (20 large and 30 small ones)

12. CAPABILITIES OF BENEFICIARIES:

Some of the beneficiaries possess skilled technicians for transition. Some of them are not aware of substitutes of ODS.

B. STRUCTURE AND MANAGEMENT:

Ozone Monitoring Centre does not exist and this Centre will be solely responsible for the implementation of the Montreal Protocol in the country. The Department of the Environment will be responsible for this centre.

C. ACTIVITIES:

- A. To monitor the commitments made by the government as described in this country programme
- B. To supervise public awareness programmes
- C. To communicate with the Montreal Protocol committee and other Government agencies
- D. To provide the industries with the latest information about the substitution of ODSs

- E. To provide the industries with the latest technologies achievements in other parts of the world
- F. To propose an action programme for 1997-2007 period
- G. To evaluate potential applicants for specific training courses
- H. To conduct seminars
- I. To investigate the problems of industries
- J. To supervise the operations of transition in industry sectors
- K. To monitor the gathering of the latest information about the import of ODSs and its use in the country.

D. REQUIRED INPUTS AND BUDGET: 295,400 US\$

1. CAPITAL EXPENDITURE	PER YEAR	3 YEAR PERIOD
------------------------	----------	---------------

OFFICE BUILDING (RENT)		12000
------------------------	--	-------

COMPUTER WITH DISK DRIVE, MONITOR,		
------------------------------------	--	--

PRINTER AND SOFTWARE		5000
----------------------	--	------

PHOTOCOPIER		3000
-------------	--	------

TYPE WRITER		1000
-------------	--	------

FAX MACHINE		1500
-------------	--	------

SUB-TOTAL		22500
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2. RECURRENT EXPENDITURE

2 PROFESSIONAL STAFF	32000	96000
----------------------	-------	-------

4 SUPPORTING STAFF	16000	48000
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SUB-TOTAL	48000	144000
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3. OPERATIONAL COSTS

OFFICIAL TRAVEL	30000	90000
-----------------	-------	-------

TELECOMMUNICATIONS	3000	9000
--------------------	------	------

SERVICE CHARGES	1000	3000
-----------------	------	------

OFFICE SUPPLIES	1000	3000
-----------------	------	------

SUB-TOTAL	35000	105000
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TOTAL (2 & 3)	83000	249000
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CONTIGENCIES (10% OF 2 & 3)		24900
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TOTAL		272900
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* 272900 US\$ of paras 2 & 3 plus 22500 US\$ for para 1 would be 295400 US\$

E. OUT PUTS

- * Preparation of Country Programme for 1997-2007**
- * Monitor progress of implementation of actions within the country programme to phase out ODSs and report to the Fund Secretariate as necessary**
- * Submit annual account of expenditure on the institutional support activities**
- * Collect and process local data**
- * Exchange relevant information with other countries**
- * Disseminate to local end-users on the ODS phase- out process received**
- * Facilitate access of local entrepreneurs to relevant experts.**