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COMITÉ EXÉCUTIF
DU FONDS MULTILATÉRAL AUX FINS
D'APPLICATION DU PROTOCOLE DE MONTRÉAL
Trente-cinquième réunion
Montréal, 5-7 décembre 2001

PROPOSITION DE PROJET : CHINE

Ce document comporte des observations et des recommandations du Secrétariat du Fonds sur les propositions de projet suivantes :

Mousse :

• Élimination du CFC-12 dans la fabrication de mousses de polystyrène extrudé (PSE), en utilisant le butane comme agent de soufflage dans 7 entreprises (projet cadre final)	ONUDI

Halons :

• Programme annuel 2002 pour le secteur des halons : cinquième tranche	Banque mondiale

Production :

• Secteur de production de CFC – Programme annuel 2002	Banque mondiale

Réfrigération :

• Remplacement du CFC par du HC dans la fabrication de thermostats à Foshan Tongbao Co., Ltd.	Allemagne

Plans sectoriels :

• Élimination de la consommation de CFC-11 et de CFC-12 dans le secteur de la réfrigération commerciale et industrielle	Banque mondiale
• Plan du secteur des solvants pour l'élimination des SAO en Chine : Programme annuel de mise en oeuvre 2002	Banque mondiale

FICHE D'ÉVALUATION DU PROJET
CHINE

SECTEUR : Mousse Utilisation des SAO dans le secteur (1999) : 23 143 tonnes PAO

Seuil de coût-efficacité des sous-secteurs : 8,22 $ US/kg

Titres des projets :

a) Élimination du CFC-12 dans la fabrication de mousses de polystyrène extrudé (PSE) en utilisant le butane comme agent de soufflage dans 7 entreprises (projet cadre final)

Données de projet	**Polystyrène/polyéthylène**
	7 entreprises
Consommation de l'entreprise (tonnes PA	359,00
Impact du projet (tonnes PAO)	359,00
Durée du projet (mois)	24
Montant initialement requis ($ US)	2 825 113
Coût final du projet ($ US)	
Coût additionnel d'investissement a)	3 089 300
Coût d'imprévus b)	291 680
Coût additionnel de fonctionnement c)	-630 867
Coût total du projet (a+b+c)	2 750 113
Pourcentage de la propriété locale	100 %
Pourcentage des exportations	0 %
Montant requis ($ US)	2 450 123
Efficacité du coût ($ US)	6,82
Le financement par la contrepartie confirmé?	
Agence nationale de coordination	SEPA
Agence d'exécution	ONUDI

Recommandations du Secrétariat	
Montant recommandé ($ US)	2 450 123
Impact du projet (tonnes PAO)	359,00
Efficacité du coût ($ US)	6,82
Coût de soutien (frais d'agence) à l'agence d'exécution ($ US)	279 514
Coût total pour le Fonds Multilatéral ($ US)	2 729 637

DESCRIPTION DU PROJET

Contexte sectoriel*

- Dernière consommation totale de SAO disponible (1999)	67 580,0 tonnes PAO
- Consommation de référence de substances du groupe I de l'annexe A (CFC)	57 818,7 tonnes PAO
- Consommation de substances du groupe I de l'annexe A en 1999	42 983,4 tonnes PAO
- Consommation de référence des CFC dans le secteur des mousses	non disponible
- Consommation de CFC dans le secteur des mousses en 1999**	23 143,0 tonnes PAO
- Fonds approuvés pour les projets d'investissement dans le secteur des mousses à la fin de juillet 2001	95 756 189 $ US
- Quantité de CFC à éliminer par les projets d'investissement dans le secteur des mousses à la fin de juillet 2001	15 777,6 tonnes PAO
- Quantité de CFC éliminés par des projets d'investissement approuvés dans le secteur des mousses à la fin de juillet 2001 (incluant l'élimination des CFC dans des projets non encore indiqués comme étant achevés)	10 197,4 tonnes PAO
- Quantité de CFC dans des projets d'investissement en cours dans le secteur des mousses à la fin de juillet 2001	5 580,2 tonnes PAO
- Quantité de CFC restant à éliminer dans le secteur des mousses à la fin de juillet 2001***	14 479,0 tonnes PAO
- Quantité de CFC à éliminer dans des projets d'investissement présentés à la 35e ExCom (décembre 2001).	359,0 tonnes PAO
- Quantité de CFC restant à éliminer à la fin de 2001	14 120,0 tonnes PAO

* Au 30 octobre 2001, les renseignements reçus du Secrétariat de l'ozone indiquaient que la Chine n'avait pas présenté de données sur sa production et sa consommation en 2000 conformément à l'article 7 du Protocole de Montréal. La Chine n'avait pas non plus présenté de rapport sur sa consommation par secteurs en 2000 au Secrétariat du Fonds.

** Basé sur les données fournies par le gouvernement de la Chine.

*** Basé sur une estimation fournie par le gouvernement de la Chine, puisque la consommation de CFC par secteurs en 2000 n'est pas disponible.

Mousse de polyéthylène/polystyrène

Projet cadre : sept entreprises

Contexte général

1. L'élimination des CFC-12 du sous-secteur du polyéthylène et du polystyrène fait partie d'un plan stratégique présenté par l'ONUDI au Comité exécutif à la 33e réunion. C'est le quatrième d'une série de cinq projets cadres inclus dans le plan stratégique. Deux projet cadres

dans le sous-secteur du polyéthylène ont été approuvés aux 28e et 31e réunions, tandis qu'un projet cadre pour le sous-secteur de la mousse de polystyrène a été approuvé à la 34e réunion.

2. Les sept entreprises incluses dans le projet cadre (Guandong Shenzhu Defengsheng, Guandong Zhufai Xinfuhua Fast Food, Tianjin Yuxin Plastics Packaging, Jinan Hongli Food Containers, Harbin Duona Plastics Industry, Daqing Lindian Food Containers, Chengdu Plastics Packaging) ont consommé en tout 359 tonnes PAO de CFC-12 par année en 2000 pour la production de mousse de polystyrène extrudé. L'entreprises utilise des extrudeuses pouvant produire 50 kg/h.

3. Les entreprises remplaceront le CFC-12 par du butane comme agent de moussage. Le projet comprend des coûts d'investissement additionnels pour les sept entreprises, totalisant 3 380 980 $ US et couvrant le coût du reconditionnement de 10 chaînes d'extrusion existantes, des installations de stockage du butane et du matériel de protection et de sécurité, ainsi que des frais de consultation, d'essais et de formation. Des économies d'exploitation additionnelles de 630 867 $ US sont déduites des budgets respectifs en fonction du niveau de consommation du CFC-12. Le coût unitaire de la conversion est de 275 000 $ US par chaîne d'extrusion et le rapport coût-efficacité, de 7,65 $ US/kg pour le projet.

OBSERVATIONS ET RECOMMANDATIONS DU SECRÉTARIAT

OBSERVATIONS

Mousse de polystyrène extrudé : Projet cadre : 7 entreprises

4. Le Secrétariat et l'ONUDI ont clos la discussion du projet cadre et se sont entendus sur ses coûts, tel que l'indique le tableau ci-dessous montrant les coûts de chaque entreprise faisant partie du projet.

N°	Entreprise	Incidence du projet (tonnes PAO)	ICC* ($ US)	Imprévus ($ US)	CEA Économies ($ US)	Subvention requise ($ US)	Coût-efficacité ($ US/kg)
1	Guandong Shenzhu Defensheng Co.	85	544 700	53 720	(161 303)	437 117	5,14
2	Guandong Zhufai Xinfuhua Fast Food	88	544 700	53 720	(167 319)	431 101	4,90
3	Tianjin Yuxin Plastics Packaging Co.	68	544 700	53 720	(106 476)	491 944	7,23
4	Jinan Hongli Good Containers	31	333 800	32 630	(51 575)	254 820	8,22
5	Harbin Duona Plastics Industry Co.	28	333 800	32 630	(45 558)	230 160	8,22
6	Daqing Lindian Food Containers Co.	31	333 800	32 630	(52 327)	254 820	8,22
7	Chengdu Plastics Packaging Co.	28	333 800	32 630	(46 310)	230 160	8,22
	TOTAL GLOBAL	***359***	***3 303 100***	***291 680***	***(630 867)***	***2 450 122***	***6,82***

* Comprend l'assistance technique et le coût de la certification en sécurité s'élevant à 172 500 $ US pour le projet cadre, réparti entre les entreprises selon le nombre de chaînes d'extrusion et par entreprise respectivement.

RECOMMANDATIONS

5. Le Secrétariat du Fonds recommande une approbation générale du projet cadre final de mousse de polystyrène extrudé pour sept entreprises au niveau de financement et au coût d'appui associés indiqués ci-dessous :

	Titre du Projet	Financement du Projet ($ US)	Frais d'agence ($ US)	Agence d'exécution
a)	Élimination du CFC-12 dans la fabrication de mousses de polystyrène extrudé (PSE) en utilisant le butane comme agent de soufflage dans 7 entreprises (projet cadre final)	2 450 123	279 514	ONUDI

FICHE D'ÉVALUATION DU PROJET
CHINE

SECTEUR : Halons — Utilisation des SAO dans le secteur (2001) : 16 131 tonnes PAO (production de 3 317 TM de halons 1211 et de 618 TM de halons 1301)

Seuils de coût-efficacité des sous-secteurs : S.O.

Titre du projet :

a) Programme 2002 annuel - Secteur des halons

Données de projet	**Secteur des halons**
Consommation de l'entreprise (tonnes PA	S.O.
Impact du projet (tonnes PAO)	2 889—consommation et 2 169—production
Durée du projet (mois)	
Montant initialement requis ($ US)	3 700 000
Coût final du projet ($ US)	
Coût additionnel d'investissement a)	S.O.
Coût d'imprévus b)	S.O.
Coût additionnel de fonctionnement c)	S.O.
Coût total du projet (a+b+c)	3 700 000
Pourcentage de la propriété locale	100 %
Pourcentage des exportations	S.O.
Montant requis ($ US)	0
Efficacité du coût ($ US)	S.O.
Le financement par la contrepartie confirmé?	S.O.
Agence nationale de coordination	SEPA/MPS
Agence d'exécution	IBRD

Recommandations du Secrétariat	
Montant recommandé ($ US)	3 700 00
Impact du projet (tonnes PAO)	2 889—consommation et 2 169—production
Efficacité du coût ($ US)	S.O.
Coût de soutien (frais d'agence) à l'agence d'exécution ($ US)	370 000
Coût total pour le Fonds Multilatéral ($ US)	4 070 000

DESCRIPTION DU PROJET

a) **Programme annuel 2002 pour le secteur des halons**

6. En raison de l'approbation par le Comité exécutif du plan de secteur pour l'élimination des halons en Chine (Décision 23/11), la Chine demande qu'on lui remette la cinquième tranche de 3,7 millions $ US pour la mise en oeuvre du programme annuel 2002. Grâce à ce financement, la production et la consommation de halons 1211 en Chine seront réduites chacune à un maximum de 2 654 TM. La production de halons 1301 sera réduite à un niveau maximal de 600 TM et la consommation, à 150 MT. Ces réductions permettront d'éliminer en 2002 quelque 2 169 tonnes PAO de halons produits et 2 889 tonnes PAO de halons consommés. Les détails du programme annuel sont fournis dans la demande présentée par la Banque mondiale qu'on peut consulter sur le site Web du Secrétariat du Fonds, www.unmfs.org. Le programme annuel 2002 comprend les activités suivantes :

a) 1,4 million $ US à être employés pour racheter des quotas et permettre d'éliminer un producteur de halons 1211;

b) 800 000 $ US à être employés pour fermer et reconvertir 8-10 fabricants d'extincteurs d'incendie;

c) 300 000 $ US à être employés pour reconvertir 1-2 fabricants de systèmes de lutte contre l'incendie; et

d) 890 000 $ US à être employés pour des activités d'assistance technique afin de soutenir le programme d'élimination des halons et de s'assurer de répondre aux exigences existantes en matière de lutte contre l'incendie.

7. Le gouvernement de la Chine continuera de mettre en oeuvre et d'améliorer les demandes pour des contrats de fermeture/remplacement d'activités visant à éliminer les halons, en fonction de l'expérience acquise à partir des quatre premiers programmes annuels. Il continuera de mettre en place des quotas de production commercialisable et de renforcer l'interdiction visant l'installation d'extincteurs avec halons pour des utilisations non essentielles, en resserrant graduellement la définition des utilisations essentielles. Dans le but de soutenir l'exécution de l'interdiction des utilisations non essentielles au plan local, le gouvernement s'assurera que les détails de l'interdiction seront communiqués aux clients éventuels, entre autres par le truchement des bulletins de nouvelles et des journaux. Le gouvernement demandera que les bureaux locaux de la protection contre les incendies présentent régulièrement des rapports au ministère de la sécurité publique et à la SEPA (State Environmental Protection Agency) et qu'un contrôle strict soit exercé sur la vente des halons.

8. Les activités d'assistance technique prévue en 2002 comprennent : l'étude des méthodes d'évaluation des applications techniques; du matériel d'essai et du matériel de lutte contre l'incendie fonctionnant avec du gaz inerte et du gaz propane au heptafluorure; l'élaboration de normes nationales pour le dioxyde de carbone à basse-pression pour le matériel de lutte contre l'incendie et les agents d'extinction au gaz inerte et en aérosols; la mise en place de centres de

démonstration pour la gestion des halons afin de gérer les ventes et le recyclage des halons; et la poursuite de la formation du personnel engagé dans des activités d'élimination.

OBSERVATIONS ET RECOMMANDATIONS DU SECRÉTARIAT

OBSERVATIONS

9. La décision 23/11 a établi un calendrier pour la réduction de la production et de la consommation pour la durée du projet d'élimination des halons en Chine jusqu'à 2010. Les réductions indiquées dans le programme annuel 2002 correspondent au calendrier établi.

Vérification technique

10. Pour la deuxième année consécutive, la Banque mondiale a demandé une vérification technique indépendante. Le Comité exécutif a approuvé la vérification technique comme faisant partie des coûts d'appui de la Banque mondiale pour le programme annuel de travail 2001 (Décision 32/61). Les membres peuvent obtenir une copie de cette vérification sur demande.

Principaux résultats

11. Les vérificateurs ont confirmé que la production réelle de halons 1211 et de halons 1301 en Chine n'atteignait pas les objectifs fixés, tandis que la consommation réelle de halons 1211 et de halons 1301 dépassait l'objectif indiquée dans le programme annuel 2000 du secteur des halons. Ils ont aussi pris note que cette situation pourrait confirmer une certaine réduction de la capacité de production. La définition de la consommation employée pour le programme des halons est que la consommation égale la production plus les importations moins les exportations. Bien qu'on ait réduit la production, les quantités visées pour l'importation ne se sont pas matérialisées comme on l'avait prévu.

12. Le gouvernement et la Banque mondiale ont indiqué à la 34^{e} réunion du Comité exécutif qu'il était possible que la consommation visée ne soit pas atteinte, et le Comité a pris note, dans la décision 34/9 i), que l'Accord de la Chine et de la Banque mondiale sur les mesures visant à corriger la question des exportations en rapport avec le plan du secteur des halons en Chine et l'Accord visant à réduire en 2001 les quotas du programme des halons en 2001 d'une quantité équivalente à l'excédent de la consommation nationale en 2000 à être déterminé par la vérification technique indépendante.

13. Les vérificateurs ont indiqué que, en raison de la faiblesse des exportations, on avait dépassé de 80 TM de halons 1301 et de 70 TM de halons 1211 le niveau de consommation convenu. Le gouvernement a scellé ces quantités. Les vérificateurs ont confirmé que ces quantités étaient scellées.

Autres résultats et recommandations

14. Les vérificateurs ont indiqué que « les visites des usines n'ont duré que de 1 à 2 jours et que, étant donné cette durée limitée, le degré d'assurance des données et des conclusions de la vérification de la production est beaucoup plus faible que celui d'une vérification financière complète ».

15. Ils ont aussi indiqué que les renseignements sur les usines productrices de halons en Chine leur avaient été donnés par la Banque mondiale. Les vérificateurs ont souligné qu'ils « ne pouvaient exprimer aucune opinion à savoir si la production de halons a lieu ailleurs en Chine, ou si l'on consomme en Chine des halons importés ». Le gouvernement de la Chine a indiqué à la Banque qu'il n'est au courant d'aucune importation pouvant être identifiée par le truchement du système de surveillance et de contrôle des importations/exportations. En outre, la Banque a indiqué qu'il y a seulement un autre pays produisant actuellement des halons, la Corée du Nord, et les producteurs de halons en Chine formuleraient des plaintes s'ils s'apercevaient qu'on procède à des importations.

16. Pour vérifier les quantités de halons exportées, les vérificateurs ont employé la définition suivante des exportations fournie par la Banque mondiale : « Les exportations ne comprennent ni l'exportation ni la vente 'indirecte' vers les entreprises commerciales d'import-export, mais seulement celles qui peuvent être justifiées par des documents douaniers officiels ou autres comme ayant quitté le pays ». Les vérificateurs ont indiqué que les [directeurs] d'« usine » ont expliqué qu'il n'est pas possible d'obtenir des copies des formules de douane des entreprises commerciales, car elles jugent que les renseignements qu'ils contiennent sont confidentiels. Par conséquent, une grande partie de la documentation ne correspond pas à la [définition]. » Il faut toutefois prendre note que le niveau maximal de consommation et de production est égal pour les années qui restent avant l'achèvement du plan de la Chine pour les halons. Ils ne dépend donc pas d'un niveau présumé d'exportations, ce qui a pour effet de réduire le niveau maximal de consommation en deçà de celui de la production.

17. L'accord entre le Comité exécutif et la Chine exige de réduire les quantités produites et consommées et ne vise pas la capacité de production. La réduction des taux de production a découlé de la destruction de la capacité, mais principalement en 2000 à la suite de la réduction du nombre de jours de production. En certains cas, les usines cessent de produire des halons plusieurs mois par année. La cessation temporaire des activités peut avoir une incidence sur l'état de l'équipement, en raison de la nature corrosive des matières utilisées. Les vérificateurs ont indiqué que, pendant leur visite aux usines restantes pouvant produire des halons plus tard, ils « ont remarqué que les usines semblaient bien entretenues et qu'elles pourraient aussi fonctionner à une capacité nominale à moyen terme ». La Banque a indiqué qu'en vertu des conditions de l'accord, elle peut procéder à une visite des lieux avec le gouvernement de la Chine sans en avoir informé l'usine au préalable. La Banque a indiqué avoir procédé à des missions de supervision dans les usines en avril et en septembre 2001.

18. Dans une usine produisant des halons, le nombre et la dimension des réacteurs tubulaires est un indicateur de la capacité de production. Sur la base des renseignements obtenus lors de la vérification et fournis dans le programme de travail 2002, les trois producteurs de halons 1211 qui restent possèdent ensemble 12 réacteurs tubulaires, et le producteur de halons 1301 qui reste,

2 de ces réacteurs. L'équipe de vérification a recommandé que « le nombre de réacteurs tubulaires [devrait] être utilisé à l'avenir comme un indicateur clé de la réduction réelle de la capacité de production ». Le plan annuel 2002 comprend la fermeture d'un producteur. Ce qui suggère la destruction de 3 à 5 réacteurs tubulaires dans des usines fermées fabricant des halons 1211. La Banque a indiqué toutefois qu'elle s'attend, alors que la production de halons en est à ses dernières années, à ce que la tendance veuille qu'on sélectionne les techniques de réduction dont le coût est le plus faible, c'est-à-dire qu'on utilise pour la production à la fois les deux réacteurs qui restent afin de prolonger leur durée, ou procéder à des arrêts temporaires de la production suivis de la fermeture totale et du démantèlement.

Frais d'agence

19. La décision 23/11(j) indique que les frais d'agence pour la mise en oeuvre des programmes annuels seraient convenus entre le Comité exécutif et l'agence d'exécution. Dans les années qui ont précédé, ces frais comprenaient le coût de la vérification technique. La Banque requiert des frais d'agence de 10 %, soit 370 000 $ US

RECOMMANDATIONS

20. Le Comité exécutif pourrait souhaiter :

a) Approuver le programme de travail 2002 du plan de la Chine pour les halons, au niveau convenu de 3 700 000 $ US.

b) Prendre note que le gouvernement de la Chine a convenu de réduire de 80 MT de halons 1301 et de 70 TM de halons 1211 les objectifs de production visés en 2001.

c) Approuver des frais d'agence de 370 000 $ US pour la Banque mondiale, y compris les coûts de la vérification technique, sous réserve de pouvoir poursuivre les contrôles aléatoires des usines non actives et que la vérification technique indépendante comprenne une vérification financière et des renseignements complets sur le nombre de jours de production de halons pendant l'année, le nombre de réacteurs tubulaires qui restent, et le niveau des importations.

SECTEUR DE PRODUCTION DES CFC
PROGRAMME ANNUEL 2002

Description du projet

21. Conformément à l'Accord pour le secteur de production de la Chine, qui requiert que des programmes annuels soient présentés pour examen à la dernière réunion de l'année précédant l'année du programme, la Banque mondiale a présenté son programme annuel 2002 pour la mise en oeuvre de l'Accord (Annexe I), étant précisé que le financement pour le programme 2002 sera approuvé à la première réunion de cette année, sur la base d'une performance satisfaisante du programme en 2001 conformément à cet Accord.

22. La proposition comprenait deux parties :

a) La Partie I est un rapport périodique sur la mise en oeuvre par la Chine du programme 2001 à la fin d'août 2001. Les points suivants sont les plus saillants du rapport périodique :

i) La mise en oeuvre des programmes annuels 1999 et 2000 en vertu de l'Accord de la Chine a permis de réduire le nombre d'usines productrices de CFC de 37 en 1997 à 10 en 2000, et la production de CFC, de 50 351 tonnes PAO à 39 000 tonnes PAO en 2000. Le programme annuel 2001, en cours de mise en oeuvre, réduira encore la production à 36 198 tonnes PAO et le nombre de producteurs à 7. On a indiqué une production de 20 397 tonnes PAO au cours des six premiers mois de production de CFC en 2001, et ce résultat a été obtenu par la fermeture de 3 autres usines et la mise en oeuvre de quotas de production commercialisable. Le rapport a fourni une liste des usines, avec les facteurs suivants : noms, production de CFC, capacité et état de l'usine (fermée ou active) en 2001. Le résultat de la mise en oeuvre du programme 2001 serait vérifié par la Banque mondiale et présenté à la première réunion du Comité exécutif en 2002.

ii) Le rapport périodique sur le programme annuel 2001 comprend aussi une liste des politiques de contrôle qui ont été édictées par le gouvernement de la Chine, notamment la « Circular on Strengthening Management of ODS Importation and Exportation » émise en avril 2000 afin de renforcer la politique contenue dans la « Circular on Control Mechanism of Importation and Exportation of ODS » promulguée en décembre 1999 afin de contrôler le commerce illégal des SAO. En vertu de ces contrôles, il est interdit d'importer du tétrachlorure de carbone, et les CFC sont réglementés par des permis.

iii) On a fourni une mise à jour sur la mise en oeuvre du programme biennal d'assistance technique (2000-2001), qui comprend la formation d'agents de douane, du personnel qui effectuera la vérification du rendement, une

étude sur l'évaluation des risques, une étude des possibilités de marché pour les entreprises fermées et d'autres activités.

b) La Partie II de la proposition de la Banque mondiale est une description des éléments du programme 2002, qui comprend des plans d'action en matière de politiques, des quotas pour la réduction de la production, et des activités d'assistance technique. Le principal élément, le quota pour la réduction de la production, exigerait d'éliminer 3 300 tonnes PAO en 2002 afin de respecter les objectifs de l'Accord qui stipulent que la production nationale de CFC ne doit pas dépasser 32 900 tonnes PAO en 2002. La Chine continuera de mettre en oeuvre le quota de production commercialisable en combinaison avec la proposition, ainsi que la mise en oeuvre du mécanisme de contrôle des exportations/importations qui a été édicté.

23. La proposition de la Banque mondiale comprend une liste de 18 entreprises productrices de HCFC en Chine selon l'Accord. L'une d'elles, Fujian Flouro-Chemical Plant, a cessé la production des HCFC en même temps que celle des CFC.

24. La proposition de la Banque mondiale demandait 13 millions $ US pour la mise en oeuvre du programme de 2002 et les coûts de soutien à la première réunion en 2002.

RECOMMANDATIONS

25. Le Secrétariat recommande que le Comité exécutif approuve le programme de travail 2002 du programme de cessation de la production de CFC en Chine et qu'elle retienne le financement demandé jusqu'à ce que la Banque mondiale présente à la 36^{e} réunion un rapport de vérification satisfaisant sur la mise en oeuvre du programme annuel 2001.

FICHE D'ÉVALUATION DU PROJET
CHINE

SECTEUR : Réfrigération Utilisation des SAO dans le secteur (1999) : 6 300 tonnes PAO

Seuils de coût-efficacité des sous-secteurs : Domestique 13,76 $ US/kg

Titres des projets :

a) Remplacement du CFC par du HC pour la fabrication de thermostats chez Foshan Tongbao Co., Ltd.

Données de projet	**Domestique**
	Foshan
Consommation de l'entreprise (tonnes PA	
Impact du projet (tonnes PAO)	11,48
Durée du projet (mois)	27
Montant initialement requis ($ US)	229 976
Coût final du projet ($ US)	
Coût additionnel d'investissement a)	207 500
Coût d'imprévus b)	20 750
Coût additionnel de fonctionnement c)	1 726
Coût total du projet (a+b+c)	229 976
Pourcentage de la propriété locale	100 %
Pourcentage des exportations	0 %
Montant requis ($ US)	213 271
Efficacité du coût ($ US)	18,58
Le financement par la contrepartie confirmé?	
Agence nationale de coordination	SEPA
Agence d'exécution	Allemagne

Recommandations du Secrétariat	
Montant recommandé ($ US)	213 271
Impact du projet (tonnes PAO)	11,48
Efficacité du coût ($ US)	18,58
Coût de soutien (frais d'agence) à l'agence d'exécution ($ US)	27 725
Coût total pour le Fonds Multilatéral ($ US)	240 996

DESCRIPTION DU PROJET

Contexte sectoriel

- Dernière consommation totale de SAO disponible (1999)	67 580,00 tonnes PAO
- Consommation de référence de substances du groupe I de l'annexe A (CFC)	57 818,00 tonnes PAO
- Consommation de substances du groupe I de l'annexe A en 1999	42 983,00 tonnes PAO
- Consommation de référence des CFC dans le secteur de la réfrigération	non disponible
- Consommation de CFC dans le secteur de la réfrigération domestique en 1999 incluant l'entretien	6 300,00 tonnes PAO
- Fonds approuvés pour les projets d'investissement dans le secteur de la réfrigération en 2000	150 893 871 $ US
- Quantité de CFC restant à éliminer dans des projets d'investissement dans le secteur de la réfrigération à la fin de 2000	11 313,00 tonnes PAO

26. Le Comité exécutif a approuvé environ 152,3 millions $ US pour des projets d'élimination de 11 487 tonnes PAO de CFC dans le secteur de la réfrigération domestique en Chine.

27. Un projet pour une entreprise fabricant des thermostats principalement utilisés dans les réfrigérateurs domestiques a été présenté par GTZ pour examen à la 35e réunion du Comité exécutif.

Foshan Tongbao

28. L'entreprise a consommé 11,48 tonnes PAO of CFC-12 et CFC-11 pour fabriquer 8 497 300 thermostats pour réfrigérateurs (moyenne 1998-2000). L'entreprise emploie des postes de remplissage, des pompes volumétriques et des détecteurs de pertes pour la production de thermostats dans les opérations de référence.

29. Le projet proposé permettra d'éliminer la consommation de CFC en les remplaçant par une technologie aux hydrocarbures dans la production de thermostats. Le projet comprend la conversion de 8 postes de remplissage, le remplacement des pompes volumétriques existantes par des appareils antidéflagrants, l'installation de matériel de sécurité, de systèmes de contrôle de la teneur en gaz, et un nouveau détecteur de pertes. Les autres coûts comprennent le transfert de la technologie, les activités techniques, la formation et la certification en sécurité. Des coûts d'exploitation additionnels (CEA) sont requis pour un an afin de compenser le coût plus élevé des produits chimiques.

OBSERVATIONS ET RECOMMANDATIONS DU SECRÉTARIAT

OBSERVATIONS

30. Le Secrétariat a discuté avec GTZ des coûts additionnels des postes de remplissage, du détecteur de pertes, du prix des produits chimiques employé pour calculer les coûts d'exploitation additionnels, ainsi que le classement du projet dans le sous-secteur de la réfrigération domestique. Par la suite, le montant de la subvention a été déterminé en appliquant le seuil de coût-efficacité au sous-secteur de la réfrigération domestique, avec une allocation pour les coûts de la sécurité. La durée du CEA a été établie à six mois.

RECOMMANDATIONS

31. Le Secrétariat recommande l'approbation générale du projet au niveau de financement indiqué ci-dessous.

	Titre du projet	Financement du projet ($ US)	Coût d'appui ($ US)	Agence d'exécution
a)	Remplacement du CFC par du HC dans la fabrication de thermostats chez Foshan Tongbao Co., Ltd.	213 271	27 725	Allemagne

32. Le Trésorier est autorisé à déduire le montant approuvé du solde de la contribution bilatérale du gouvernement de l'Allemagne au Fonds multilatéral.

Plan de secteur pour l'élimination de la consommation du CFC-11 et du CFC-12 dans le secteur de la réfrigération commerciale et industrielle en Chine

Introduction

33. En 1995, la Chine a élaboré sa stratégie en vue d'éliminer la consommation de CFC-12 dans le secteur de la réfrigération commerciale et industrielle. La stratégie décrivait l'état du secteur en 1993 et envisageait l'élimination complète des CFC dans le secteur d'ici 2004, sur la base de la compensation demandée uniquement pour la conversion de 24 fabricants de compresseurs parmi les 73 indiquées dans la stratégie.

34. Par la suite, la Chine a présenté des projets pour 19 de ces entreprises, que le Comité exécutif a approuvé entre 1995 et 1999, à un coût total de 43 6 millions $ US. La technologie sélectionnée était basée sur le HCFC-22 et la capacité envisagée pour la conversion de ces entreprises était d'environ 185 000 appareils par année.

35. Six des entreprises sont maintenant entièrement reconverties à la technologie sélectionnée, et quatre d'entrée elles ont été visitées dans le cours de l'évaluation autorisée par le Comité exécutif dans le contexte de son approbation de la surveillance et de l'évaluation du programme de travail pour 2001. Le rapport d'évaluation a été présenté à la 34e réunion, à laquelle le Comité exécutif a décidé inter alia :

b) De demander au gouvernement de la Chine d'évaluer les besoins supplémentaires de compresseurs sans CFC pour la réfrigération domestique et industrielle au-delà des capacités déjà converties qui étaient partiellement sous-utilisées. L'évaluation devrait tenir compte de la stratégie existante du secteur de la réfrigération commerciale, du rythme de conversion de l'industrie des frigorigènes, de la demande actuelle et future pour des compresseurs avec CFC à des fins d'entretien, et aussi de la viabilité financière des entreprises bénéficiaires potentielles;

c) D'examiner les propositions futures dans ce secteur à la lumière de cette évaluation et, en particulier, avant d'approuver d'autres projets dans le secteur des compresseurs pour la réfrigération commerciale en Chine, de déterminer si la Chine :

i) a inclus des engagements fermes et à partir d'un moment précis de la part du gouvernement, afin de réduire la production de compresseurs avec CFC et d'interdire leur importation et de mettre en place des politiques précises pour s'assurer que le projet permettra d'en arriver à des réductions, en tenant compte de l'objectif formulé dans la stratégie du secteur de la réfrigération commerciale et industrielle visant à cesser la production de réfrigérateurs avec CFC d'ici le 1 janvier 2004;

ii) a examiné les résultats de l'évaluation à l'effet qu'on pourrait réaliser une conversion plus durable, à moindre coût, en encourageant les fabricants de compresseurs pour la réfrigération commerciale à combiner les efforts de développement en cours, en se fiant aux renseignements disponibles à l'international et au réseau local d'universités et d'instituts, avec l'aide d'un consultant pour entreprendre la mise en valeur technologique des compresseurs sans CFC de fabrication locale;

d) Demander au Comité d'État pour la protection de l'environnement d'examiner, de concert avec la Banque mondiale, la possibilité de réinstaller, chez des fabricants de compresseurs pouvant obtenir une meilleure capacité d'utilisation et un meilleur rapport coût-efficacité, les centres d'usinage non actifs ou sous-utilisés inclus dans les projets de compresseurs pour la réfrigération commerciale, en portant une attention particulière au projet CPR/REF/15/INV/107;

(de la Décision 34/13)

36. Conformément à cette décision, la Banque mondiale a présenté à la 35e réunion un plan de secteur pour l'élimination de la consommation de CFC-11 et de CFC-12 dans le secteur de la réfrigération commerciale et industrielle en Chine (Annexe II), ainsi que des propositions de projet pour les 5 entreprises qui restent.

OBSERVATIONS SUR LE PLAN DE SECTEUR

37. Le Secrétariat a échangé des observations avec la Banque mondiale sur le plan de secteur, particulièrement en rapport avec la mise en oeuvre des dispositions ci-dessus de la décision 34/13, dont le résumé suit :

Décision 34/13 (b)

38. La question du faible niveau de production des entreprises converties et le faible taux d'utilisation de la capacité de production installée demeure un point important dans le secteur des compresseurs pour la réfrigération commerciale. Le plan de secteur ne contient pas d'évaluation des besoins additionnels, au-delà des capacités converties, pour des compresseurs sans CFC dans les sous-secteurs de la réfrigération commerciale et industrielle en Chine. On peut déterminer à partir du plan de secteur et des renseignements supplémentaires fournis par la Banque mondiale que la demande totale pour des compresseurs dans le secteur de la climatisation et de la réfrigération commerciale et industrielle a été de 2,23 millions d'appareils en 2000, ce qui est couvert de façon prépondérante par l'importation et la production de compresseurs sans CFC par des co-entreprises ou des entreprises appartenant entièrement à des étrangers établies en Chine.

39. La production totale des 19 fabricants de compresseurs qui ont déjà reçu du financement du Fonds multilatéral est d'environ 47 000 appareils (avec ou sans CFC) ou environ 2 % de la demande totale et 25 % d'une capacité installée totale de 185 000 appareils.

40. Six des dix-neuf entreprises ont terminé leur conversion à la technologie HCFC-22 et ont cessé de produire des compresseurs avec CFC. Dans le cadre de leur conversion, 15 centres d'usinages numériquement contrôlés ont été installés dans ces entreprises pour remplacer l'équipement d'usinage traditionnel. Malgré d'amélioration importante du procédé de production, ils n'ont produit ensemble que 6 202 compresseurs sans CFC, ce qui représente environ 10 % de la capacité installée totale des six entreprises. On ne prévoit aucune augmentation importante de la production dans un proche avenir.

41. La production de compresseurs a été arrêtée à l'une des entreprises financées (Beijing Refrigeration Machinery Works) dans l'attente d'une réorganisation future. On ne sait pas exactement quand la production reprendra, ou si elle reprendra. Une autre des entreprises financées (Anhui Refrigeration Machinery Works) est au bord de la faillite. Le plan de secteur indique que sans un important apport de fonds, l'usine fermera probablement, car aucune banque ne consentira à lui faire crédit dans sa situation actuelle.

42. L'évaluation des quatre projets achevés a indiqué que le coût de production élevé des produits sans CFC, la forte concurrence exercée par les compresseurs importés et ceux produits par des co-entreprises locales, ainsi que la faiblesse des marchés, ont été les principales raisons ayant entraîné une situation aussi défavorable. Le plan de secteur ne comprend pas d'analyse ou d'explications quant à la capacité de production sous-utilisée. La Banque mondiale a expliqué dans ses observations que le scénario le plus probable pour la production de compresseurs en Chine pourrait être qu'après une période de transition pour la restructuration industrielle, et après d'autres développements dans l'économie de marché et l'amélioration de la technologie et de la qualité du produit, la production de compresseurs reprendra en Chine et remplacera les importations.

43. En ce qui concerne la viabilité financière des entreprises bénéficiaires potentielles, cinq d'entre elles ont été sélectionnées pour reconversion. La Banque mondiale a présenté des propositions de projet pour les cinq entreprises et indiqué qu'elles étaient commercialement viables et possédaient une grande capacité d'utilisation et que la production de compresseurs fait partie intégrante des activités des entreprises en réfrigération, et qu'elle auraient à faire concurrence tant aux autres entreprises chinoises de réfrigération qu'aux entreprises étrangères établies en Chine.

44. Le plan de secteur offre des renseignements sur l'état de la conversion dans les entreprises financées par le Fonds multilatéral, quatre entreprises ont achevé la conversion mais produisent principalement des compresseurs avec CFC, deux entreprises ont à toutes fins pratiques cessé leur production en raison de problèmes de financiers et administratifs, et les 13 qui restent en sont à diverses étapes de la conversion, qui devrait être achevée d'ici la fin de 2002.

45. Le plan de secteur donne aussi une liste de 17 entreprises qui produisent toujours des compresseurs avec CFC, y compris les 5 entreprises sélectionnées comme bénéficiaires potentielles d'assistance du Fonds multilatéral. Quatre entreprises sont indiquées comme se convertissant elles-mêmes ou par l'établissement de co-entreprises avec des partenaires étrangers. On ne mentionne aucun chiffre ni aucune capacité de production détaillée pour ces deux groupes d'entreprises.

Décision 34/13 c) i)

46. Le plan de secteur comprend, de la part du gouvernement de la Chine, des engagements à partir d'un moment précis afin de réduire la production de compresseurs avec CFC et d'interdire leur importation. Il mettra en place des politiques précises afin de s'assurer que le projet permettra d'en arriver à des réductions, en tenant compte de l'objectif formulé dans la stratégie du secteur de la réfrigération commerciale et visant à cesser la production de réfrigérateurs avec CFC d'ici le 1 janvier 2004.

Décision 34/13 c) ii)

47. Dans le plan de secteur, on propose une réduction des coûts pour le transfert de la technologie dans les propositions de projet futures, grâce à un échange de renseignements sur la mise en valeur de la conception basée sur les HCFC-22 entre les entreprises bénéficiaires et les fournisseurs nationaux de technologie en regroupant les efforts de développement.

Décision 34/13 (d)

48. La question de la relocalisation des centres d'usinage non actifs ou sous-utilisés n'est pas traitée dans le plan de secteur. En outre, le Secrétariat a pris note que l'équipement fourni à Anhui, y compris deux centres d'usinage numériquement contrôlés (coût total approuvé de 1 054 000 $ US), semble aussi non actifs. La Banque mondiale a indiqué dans ses observations qu'on s'attend à ce que les centres d'usinage soient entièrement utilisés dans toutes les entreprises à l'avenir. La Banque mondiale a de plus expliqué que « Bien que les entreprises puissent en principe consentir à relocaliser les centres d'usinage, certaines questions restent à régler. Chacune des 19 entreprises de réfrigération financées par le Fonds multilatéral a fourni un financement de contrepartie important pour la mise en oeuvre de son projet de conversion. Le matériel de production traditionnel de référence a été démantelé et détruit (dans les six entreprises) conformément aux règles et lignes directrices du Comité exécutif. La relocalisation des centres d'usinage des entreprises financées par le Fonds multilatéral entraînerait, en réalité, l'arrêt de la production de compresseurs à ces entreprises. Le question serait alors de savoir comment traiter la question des effectifs associés à l'arrêt de production de la chaîne de fabrication des compresseurs. Enfin, il y aurait des coûts pour le démantèlement, l'expédition, et la réinstallation. En outre, des questions comme les garanties et autres obligations des fournisseurs devraient être traitées. Le prix d'un centre d'usinage va de 400 000 $ US à 550 000 $ US. Comme l'indique le plan de secteur, la relocalisation d'un centre d'usinage coûterait probablement davantage que le centre d'usinage même ».

49. La Banque mondiale a convenu de reporter la présentation des 5 propositions de projet en attendant l'examen, par le Comité exécutif, du plan de secteur pour l'élimination de la consommation de CFC-11 et de CFC-12 dans le secteur de la réfrigération commerciale et industrielle en Chine.

RECOMMANDATIONS

50. Le Comité exécutif pourrait souhaiter examiner le plan de secteur ci-joint ainsi que les observations du Secrétariat et :

a) Établir les priorités qu'il désire accorder au financement de cinq projets de conversion additionnels pour les compresseurs dans le secteur de la réfrigération commerciale en Chine.

Rapport sur la mise en oeuvre du programme annuel 2002
selon le plan de secteur pour les solvants en Chine

OBSERVATIONS ET RECOMMANDATION DU SECRÉTARIAT

OBSERVATIONS

51. Au nom du gouvernement de la Chine, l'UNDP a présenté au Comité exécutif pour examen le programme annuel 2002 de mise en oeuvre pour le secteur de solvants en Chine (Annexe III du présent document).

52. Le programme annuel 2002 de mise en oeuvre offre un aperçu des progrès réalisés par le programme 2000-2001 de mise en oeuvre et indique que les objectifs de consommation pertinents pour 2000 ont été atteints (Sections B et C du programme de mise en oeuvre). Un rapport complet sur ces aspects sera fourni à la 36e réunion, avec la demande de financement pour le programme 2002. Aucuns fonds ne sont demandés à cette réunion. L'aperçu suggère que le programme 2000-2001 avance comme prévu.

53. Le reste du document (Sections D à J et tableaux) décrit les activités proposés pour 2002. Les objectifs d'élimination visés et les autres activités proposées s'insèrent dans le plan de secteur, l'Accord approuvé par le Comité exécutif dans la Décision 30/56 et l'amendement à la première mise en oeuvre plan. (Cet amendement a été présenté à la 33e réunion du Comité exécutif en même temps que la demande de paiement pour la deuxième tranche du premier plan de mise en oeuvre approuvé dans la décision 33/56).

RECOMMANDATION

54. Le Comité exécutif pourrait souhaiter approuver le programme annuel 2002 de mise en oeuvre pour le secteur des solvants en Chine, comme base d'évaluation du financement du programme à une réunion future.

Annex I

THE CFC PRODUCTION SECTOR

CHINA

2002 ANNUAL PROGRAM

September 11, 2001

TABLE OF CONTENTS

Introduction

1. In accordance with the Executive Committee's approval of "The Sector Plan for CFC Production Phaseout in China (Closure Part)" (UNEP/Ozl.Pro/ExCom/27/45/Corr.2), China is hereby requesting release of the fourth tranche of US$13 million for the implementation of the 2002 Annual Program. With this funding, China's CFC production will be reduced to a maximum of 32,900 MT by the end of 2002, and China will have phased out 3,300 MT in ODP terms during the year compared to the 2001 quota. Details of the 2002 annual program are provided in Section B.

2. Following the approval of the China CFC Production Sector Plan at the 27th Meeting of the ExCom in March 1999 and the release of funds for the first (1999) Annual Program, China has implemented the phaseout project according to the agreed phaseout plan. Through this period, China has also developed supporting policies and regulations. There were 37 CFC production plants in China in 1999; the number has been reduced to 7 producers in 2001; CFC production has been reduced from 50,351 MT in 1997 to 39,990 in 2000 in terms of ODP, and will not exceed 36,198 MT in 2001.

3. ***China's CFC phaseout obligations.*** Within the Sector Plan, China agreed to the following phaseout schedule for CFCs in Annex A and Annex B in Group I.

1. CFC Production Phaseout Schedule and Annual Grant

	Agreed schedule [1/]		Planned			
Year	Phaseout Amount in the year	Maximum production in the year	Phaseout Amount in the year	Maximum planned production [2/]	Actual Production[3/]	Annual grant funding
	(Metric Tons, ODP)					*(US$ million)*
1999	5,420	44,931	5,498	44,853	44,793	20
2000	4,931	40,000	4,855	39,998	39,990	13
2001	3,800	36,200	3,800	36,198		13
2002	3,300	32,900				13
2003	2,900	30,000				13
2004	4,700	25,300				13
2005	6,550	18,750				13
2006	5,250	13,500				13
2007	3,900	9,600				13
2008	2,200	7,400				13
2009	4,200	3,200				13
2010	3,200	0				0[4/]
						150

Note: The baseline year for CFC production phaseout is 1997. Baseline year production of CFCs (comprising CFC-11, CFC-12, CFC-113, CFC-114, CFC-115, CFC-13) was 50,351 MT (ODP).

1/ As provided in the agreement.

2/ The sum of quotas issued in the year to the enterprises remaining in production.

3/ Actual total production by the remaining enterprises, as confirmed by the World Bank's verification team.

4/ Savings from earlier years would be used for funding the 2010 phaseout.

4. Eighteen technical assistance activities have been started, including activities to strengthen the implementation capacity and conversion capacity of closure enterprises, and preparation of standards to ensure quality and reliability of CFC substitutes.

5. One special initiative project, construction of a facility to produce HFC-134a, has been taken up.

6. The detailed implementation status of the 1999 - 2001 Annual Programs is provided in Part A.

PART A

IMPLEMENTATION STATUS OF PREVIOUS YEARS' ANNUAL PROGRAMS

As of September 1, 2001

Phaseout Target

1. Starting with a baseline production of 50,351 MT in 1997, China has issued production quotas each year that have enabled its producers to successfully meet the annual production targets specified in the agreement between China and the ExCom. The annual production in each year has been confirmed by both a national audit (conducted by the China National Audit Office) and an international verification team commissioned by the World Bank. The annual phaseout targets, production quotas issued to meet those targets, and the verified actual production for the first two years' annual programs are summarized in the table 1 above. In the year 2001, there are seven remaining CFC producers, and quotas for production of **36,198 MT** have been issued to them to meet the production phaseout reduction target of **3,800 MT.**

Enterprise Phaseout Activities

2. Details regarding the enterprise phaseout activities in the 1999--2000 Annual Programs are provided in Tables A1 and A2. The impact of closures is summarized as follows:

Date of contracts	No. of lines closed	Enterprises closed	Capacity closed (MT)	Enterprises remaining
No. of enterprises at start of program (36 in Sector Plan, 1 identified later)**:**				37
Plant closures in the 1999 Annual Program				
1. April & May 1999	17	14 (all complete closures)	22,630	23
2. April & May 1999	3	1 (2 enterprises closed one line each, and the 3rd enterprise was completely closed)	4,000	22
		Total	26,630	
3. June 1999	8	7 (all complete closures)	23,800	15
Closures under 2000 Annual Program				
December 1999 to March 2000	6	5 (complete closures); a sixth enterprise has accepted a reduction of quota.	15,500	10
Closures under 2001 Annual Program				
November 2000	5	3(all complete closures)	7,500	7

3. The 1999 Annual Program comprised three sets of closures. *Firstly,* under the production sector agreement, China committed to close and dismantle production facilities at 14 enterprises (listed in the

agreement between China and the ExCom) that had not been in production in 1997 (though one of these lines did produce some CFCs in the early part of 1999, prior to the agreement). SEPA signed closure contracts with these 14 enterprises, resulting in a reduction of production capacity of 22,630 MT (Table A2, Part 1). *Secondly,* contracts were also signed with 3 other enterprises for closing down production lines that had no production in 1997, resulting in a further reduction of production capacity of 4,000 MT (Table A2, Part 2). *Finally,* after the quota regulation and bidding for 1999 quotas (see below), contracts were signed with 7 enterprises to phase out additional production capacity of 23,800 MT (Table A2, Part 3).

4. Under the 2000 Annual Program, contracts were signed in December 1999 with 6 enterprises, 5 enterprises to close and dismantle production facilities and one enterprise to accept a reduction in quota, so as to enable a phase out of production capacity totaling 15,500 MT in 2000 (Table A2, Part 4). By the end of March, 2000, all the closing production lines and plant facilities had been dismantled and their primary CFC production equipment had been destroyed

5. Under the 2001 Annual Program, three producers were closed by administrative measure, and contracts for complete closure were signed in November 2000 with these three enterprises, enabling a total reduction in production capacity of 7,500 MT. The baseline production at these enterprises was 4,235 MT CFC, or 435 MT beyond the required reduction of 3,800MT for the year. This additional quota was therefore allocated to another producer in the program.

6. CFC production for 1999 and 2000 was audited by the China National Audit office, and has been verified at 44,768.12 ODP MT and 39,989.83 ODP MT; details for 2000 are at Table A.3[1]. Reported (un-verified) CFC production in 2001 (up to June 30) was reported at 20,395.7 ODP MT . Details are provided in Table A.1.

7. All the closed production lines for all the years (1999 to 2001) have been visited each year by a World Bank verification team that has confirmed that they are no longer capable of producing CFCs and their primary production equipment has been fully dismantled. The World Bank team has also verified and analyzed the production data recorded at the enterprise, and has confirmed that the production in 1999 and 2000 was within the targets established under the Agreement.

Implementation of Policy Instruments

8. *Key instruments.* The key policy instrument of the program is the regulation promulgated for the introduction and implementation of an annual tradable quota system, entitled "Circular on Implementing the Quota System for CFC Production", by the State Environmental Protection Administration (SEPA) and the State Administration of Petroleum and Chemical Industry (SAPCI) on May 31, 1999. A bidding system was also introduced together with the promulgation of the tradable production quota. Under this regulation, some CFC producers were awarded grants through bidding in 1999 and 2000 to close their production, while a national CFC production quota within the annual target was issued to the remaining CFC producers in order to ensure that the national production for the year did not exceed the agreed target. In year 2001, administrative measures were adopted to meet the agreed target; 3 CFC

[1] These numbers were also verified by the World Bank's verification team, which found the production to have been 44,793 and 39,990 MT ODP respectively. While the recorded production verified by this team for 1999 was higher than that reported in the CNAO audit, it was well within the annual target for 1999.

plants were closed, amounting a production phaseout of more than 3,800MT CFC , and CFC production quota of 36,198MT was issued to the remained 7 producers.

9. *Other instruments relate to trade in CFCs*. A study on options for export/import management for halons and CFCs, which would help China to monitor trade in CFCs and prevent illegal CFC trade, was completed in July 1999. A "Circular on Control Mechanism of Import and Export of ODS" and a "Circular on Strengthening Management of ODS Import and Export" were promulgated on December 3, 1999 and in April, 2000 . The mechanism is implemented by the Management Office of ODS Import-Export Control jointly administered by SEPA, the General Administration of Customs (GAC), and the Ministry of Foreign Trade and Economic Cooperation (MFTEC), and helps China to monitor trade in ODS and eliminate illegal ODS trade. Two batches of *Export/Import Control List of ODS in China* have been promulgated in January 2000 and January 2001 respectively. Imports of Carbon Tetrachloride, a key feedstock for CFCs production, were banned on April 1, 2000, and imports of CFCs are regulated by a permit system administered by the MFTEC.

Technical Assistance Activities

10. Twenty three technical assistance activities have so far been identified under the year 1999--2001 annual programs, and eighteen have either been completed or are underway.

11. The *1999 Annual Program* originally had ten technical assistance activities . One TA project, "ODS export/import management and monitoring study", was cancelled because its objectives were covered under a similar study conducted under the Halon Sector Phaseout Program. Another project, "a survey on the ODS application as chemical process agents in China", was added to the annual program. Some activities have already been completed and the rest are being conducted. Similarly, there were six technical assistance activities taken up in the *2000 Annual Program*. Of these, a TA for verification of HCFC-22 producers was moved to the next year. Finally, seven TA activities were approved in the *2001 Annual Program*; 3 of these were cancelled and, in addition to the TA for HCFC-22 producers verification which was added, a new training for customs staff has been taken up in the year. All the TA activities have commenced, and are expected to be completed within two years.

12. The status of the 1999 technical assistance activities as of July 2001 is as follows:

a) Production of an ODS phaseout video. An ODS Phaseout video was prepared and broadcast for public information during the 11th meeting of the Parties in Beijing in November 1999. The video, as well as six TV advertisements prepared under the activity, have been broadcast on national TV to raise awareness of the general public and authorities in China concerning the necessity for ODS phaseout and the urgency of phaseout activities. All activities have been completed.

b) Development of a Management Information System (MIS). An MIS has been established and is now in place, and has been used to generate the final 1999, 2000 production data and program progress reports. This project was complete. But modifications will be made to the MIS continuously over the implementation of the program to reflect the changing requirements of the program.

c) Development of a substitute strategy. TORs were agreed with the World Bank in January 2000. After a bidding process, a contract was signed in June 2000, and the study is under way. It is expected to be completed in October 2001.

d) Formulation of Standards for Cyclopentane, HCFC 141b, and HFC 134a. A TOR was agreed with the World Bank and a contract was signed in April, 2000; preliminary sampling of HCFC-141b and HFC-134a has been completed for testing, and preliminary content and parameters of the standards have been confirmed with the Government's administrative unit for standards. The draft standards report has been completed in June, 2001. This TA is expected to be completed by the end of 2001.

e) Evaluation of bids for a feasibility study for setting up of a HFC 134a production facility. Funding was provided to an evaluation of four proposals bidding to win the opportunity to undertake a feasibility study for the construction of a HFC 134a production facility. Bid evaluation was finalized and a winner was selected. The contract was signed with the winner on January 14, 2001. This TA activity is complete.

f) Training of personnel involved in phaseout activities. Two training workshops were conducted in 1999 for CFC producers, local Environmental Protection Bureaus and local Chemical Industry Bureaus. An audit training workshop was also conducted in April 2000. All activities under this TA have been completed.

g) Initial review of the consumption of ODS in the Chemical Process Agents Application sector in China. This project was carried out in January, 2000 and the Report of Preliminary Survey on the ODS Application as Chemical Process Agents in China has been used as the basis for further preparations on the proposed preparation of the Process Agent Sector Phaseout Plan in China.

h) Market prospects for closure enterprises. Nine enterprises submitted applications and eight were funded. The first disbursement was made to enterprises in February 2000, and all enterprises submitted their completion reports to the sector team by May 2000. A report of the project activities was submitted to the World Bank on June 5, 2000, reporting on the generally useful results of this experience. This TA activity has been completed.

i) National Workshop on substitute development. This workshop was conducted on June 7, 8 and 9, 2000. 35 representatives from 30 CFC enterprises attended the workshop, and 11 experts from four domestic famous research institutes and universities made presentations at the conference. The experts introduced research topics relating to nine categories of CFC substitutes, fine fluorine chemicals, electrical fluorinated chemicals, electronic pure chemical reagents, special fluorine-containing drugs and agrochemicals (herbicide, insecticide etc.); production of these chemicals, and their potential market prospects. Many enterprises expressed an interest in seeking assistance and collaboration from these institutes and universities.

j) Recruitment of International Technical Consultants. No technical consultants were recruited internationally for TA activities in 1999.

13. The status of the 2000 technical assistance activities as of July 2001 is as follows:

a) Formulation for standards for HFC-152a, and isobutane: Draft TORs were agreed with the World Bank in August 2000. A bid winner was selected in November, 2000 and contract was signed on June 15, 2001. This TA is expected to be completed in the middle of 2002.

b) Training of personnel involved in implementation of phaseout activities (including performance audit training). A TOR was submitted to the World Bank on April 25, 2000, and agreement was reached in early August 2000. Training activities for producers of CFC and for the Audit were conducted in October, 2000 and March, 2001. Training for local Environmental Protection Bureaus, Petroleum Chemical Industrial Bureaus or relevant institution and auditors, were postponed to 2001 under the 2001 Annual Program as a national institutional reform of EPBs and PCIBs was under way. A workshop for Customs staff has been added and was moved to 2001 Annual Program. This TA was completed.

c) Studies of market prospects for closure enterprises. Based on the generally successful experience of this activity in 1999, a similar TOR enabling such studies for both closure and production enterprises, has been reviewed with the World Bank and agreed in early August 2000. Six of 8 bidders were selected to sign contract to carry on the activities. This TA is expected to be completed by the end of 2001.

d) Performance Audit. A Performance audit was required under the CFC sector plan. The China National Audit Office (CNAO) has informed SEPA that, as the content of this audit is more substantive than the conventional financial audits, additional expenditures are necessary to finance this activity annually. A TOR has been agreed between the Bank and SEPA for this purpose. The 1999 Performance Audit has been completed.

e) Verification of HCFC-22 Producers. The preliminary list of producers of HCFC-22 in China has been provided along with the annual program. A survey will be conducted to validate the list and verify whether there have been any changes. This TA has been moved to 2001 Annual Program.

f) Recruitment of international technical consultants. No technical consultants were recruited in 2000.

14. The status of the 2001 technical assistance activities is as follows:

a) Feasibility Study of Industrialized Technology for CTC Conversion to Chloro-hydrocarbons other than CTC. This TA was canceled as the technology was still under development.

b) Training of Personnel Involved in Phaseout Implementation Activities. A Customs staff training workshop attended by sixty officials from various regions in China was held in August, 2001. Training was provided by external experts including from UNEP. Another training for local officials to assist in enforcement of production regulations is being developed and the terms of reference are expected to be agreed by the end of September 2001.

c) Risk Assessment Study. The World Bank has recently cleared the selection of consultant, and this study has begun. This project is expected to be completed within 15 months after signing of the consultant contract.

d) Verification of HCFC-22 Production. SEPA has provided an updated list of HCFC-22 producers in China. Meanwhile, a study is being taken up suggest a suitable mechanism to certify that no diversion of HCFC-22 production capacity to CFC production takes place.

e) Recruitment of international technical consultants. No technical consultants are expected to be recruited in 2001. This TA will be activated when necessary.

f) Market prospects for closure and production enterprises. This TA was canceled.

g) SNAP. This TA will be moved to a future Annual Program.

Special Initiatives

15. As the phaseout of ODS production proceeds, the demand for substitutes in the consumption sector has increased rapidly. The impact of the first two years of implementation of the CFC sector plan equals a phaseout of more than 10,361 tons of CFC 11, 12 and 113. The phaseout of CFC-11, which is the major foaming agent, has had an impact in the foam sector, and there is an urgent need to move into production of substitutes such as Cyclopentane and HCFC-141b. The use of CFC-12 as refrigerant in air-conditioners installed in all newly produced cars will be banned from January 1, 2002. It is estimated that the demand for HFC-134a, presently the only substitute of CFC-12 in the MAC sector in China, will exceed 7,500 tons in 2005 in this sector alone, and could reach 19,000 tons by 2010. China therefore envisages an urgent need to initiate special initiatives to produce such substitutes to ensure that there is no shortfall in their supply. Under the provisions of maximum flexibility in section (d) of the Agreement for the China Production Sector, China has reviewed the scope of adequate domestic production of HFC134a. In the 1999 annual program, a TA activity was included to evaluate the bidding proposals on establishing a HFC 134a production facility. A bid winner was selected in June 2000, a feasibility study for HFC-134a production was submitted to SEPA in November , 2000 and an experts group was organized to evaluate the feasibility study in December, 2000. On January 14, 2001 a contract for funding the establishment of a production facility for HFC-134a was signed. The project is on going in accordance with national procedures.

Plants producing HCFC-22 in China

20. As required by the agreement on the production sector, China has provided an updated list of the plants producing HCFC-22 in China, attached in Table A.4.

Table A.1: Overall Status of CFC Production in China (MT ODP)

SRI No.	Name of CFC producers	1999 Production	2000 Production	2001 Production (to 6-01; unverified)
A3	Shangdong Dongyue Chemical Co. Ltd.	1,042	Closed 1999-approval condition	Closed in 1999
C2	Hunan Yiyang Chlor-Alkali Chemical Co. Ltd.	0	Closed 1999-approval condition	Closed in 1999
C5	Inner Mongolia Baotou Chemical Plant #1.	0	Closed 1999-approval condition	Closed in 1999
C1	Jiansu Jianhu Phosphate Fertilizer Plant	0	Closed 1999-approval condition	Closed in 1999
B4	Sichuan Zigong Fujiang Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
B9	Zhejiang Linhai Jianxin Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
A14	Guangdong Huiyang Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
A1	Henan Hebi Chemical Plant #1	0	Closed 1999-approval condition	Closed in 1999
C3	Hebei Longwei Fluorochemical Plant #1	0	Closed 1999-approval condition	Closed in 1999
C4	Guizhou Wuling Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
A15	Guangdong Zhaoqing Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
C6	Shanxi Shangzhou Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
B10	Zhejiang Linhai Shuiyang Chemical Plant	0	Closed 1999-approval condition	Closed in 1999
A12	Shanghai Shuguang Chem. Plant	0	Closed 1999-approval condition	Closed in 1999
A2	Shangdong Jinan 3F Chemical Co. Ltd.	0	Additional 1999 closure	Closed in 1999
Not audited by SRI	Liaohe Chemical Group Chlor-Alkali Plant	0	Additional 1999 closure	Closed in 1999

B2	Chongqing Tianyuan Chemical Plant.	14	Closed in 1999 Annual program	Closed in 1999
B5	Hubei Wuhan Changjiang Chemical Plant	0	Closed in 1999 Annual program	Closed in 1999
A5	Jiangsu Wuxian Juxing Chemical Plant	0	Closed in 1999 Annual program	Closed in 1999
A6	Jiangsu Wuxian Union (City Link) Chemical Plant.	0	Closed in 1999 Annual program	Closed in 1999
B1	Jiangxi De'an Refrigeration Plant	0	Closed in 1999 Annual program	Closed in 1999
B6	Shanghai Chlor-Alkali Chemical Plant Co. Ltd.	687	Closed in 1999 Annual program	Closed in 1999
A9	Jiangsu Wuxi Hushan Refrigeration Plant	560	Closed in 2000 Annual program	Closed in 2000
B3	Sichuan Zigong Refrigerant Plant	198	Closed in 2000 Annual program	Closed in 2000
B13	Zhejiang Lanxi Refrigeration Plant	785	Closed in 2000 Annual program	Closed in 2000
B7	Zhejiang Rui'an Haitian Chem. Co. Ltd.	617	Closed in 2000 Annual program	Closed in 2000
A4	Shandong Xuecheng Xinxing Chemical Plant	0	Closed in 2000 Annual program	Closed in 2000
B15	Fujian Shaowu Floro-chem. Plant	979	1158.6	Closed in 2001 Annual program
A7	Suzhou Xinye Chemical Co. Ltd.	7,408	2,532	Closed in 2001 Annual program
A11	Jiangsu Changsu Yudong Chem. Plant	545	544.6	Closed in 2001 Annual program
A8	Jiangsu Meilan Electric Chem. Plant	3,631	2,842	1,742
B14	Zhejiang Juhua Florochem. Com. Ltd.	9,698	12,098	7,119
A10	Jiangsu Changsu Refrig. Plant (Changsu 3F)	13,664	16,027	8,998
B8	Zhejiang Linhai Limin Chem. Plant	1,215	1,392	905
B12	Zhejiang Dongyang Chem. Plant	2,051	2,219	931
A13	Guangdong Xiangsheng Chem. Co. Ltd.	1,601	1,098	675
B11	Zhejiang Chemical Research Institute	72	79.1	27
	TOTAL ANNUAL PRODUCTION	**44,767**	**39,989**	**20,397**

Table A.2: Status of All CFC Producing Plants under the Production Sector

SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified [2]
Part 1: Production lines closed as part of approval conditions (contracts 4&5/ 1999)				
A3	Shangdong Dongyue Chemical Co. Ltd. (1 CFC-12 production line only)	CFC-12	5,000	*Aug 16-20, 1999*
C2	Hunan Yiyang Chlor-Alkali Chemical Co. Ltd. 1 CFC 12 production line.	CFC-12	1,000	SRI report + *Aug 16-20, 1999*
C5	Inner Mongolia Baotou Chemical Plant #1. 1 CFC-12 production line.	CFC-12	700	*Aug 23-27, 1999*
C1	Jiansu Jianhu Phosphate Fertilizer Plant 1 CFC-12 production line.	CFC-12	500	*August 8-13, 1999*
B4	Sichuan Zigong Fujiang Chemical Plant 1 CFC-11 production line and 1 CFC-12 production line.	CFC-11 CFC-12	1,500 1,000	*August 8-13, 1999*
B9	Zhejiang Linhai Jianxin Chemical Plant 1 CFC-12 production line.	CFC-12	800	SRI report + *August 16, 1999*
A14	Guangdong Huiyang Chemical Plant 1 CFC-11 production line and 1 CFC-12 production line.	CFC-11 CFC-12	1,000 3,000	*August 8-13, 1999*
A1	Henan Hebi Chemical Plant #1. 1 CFC-12 production line.	CFC-12	1,500	*Aug 16-20, 1999*
C3	Hebei Longwei Fluorochemical Plant #1 2 CFC-12 production lines.	CFC-12	1,080	SRI report + *Aug 16-20, 1999*
C4	Guizhou Wuling Chemical Plant. 1 CFC-12 production line and 1 CFC-13 production line.	CFC-12 CFC-13	1,500 50	SRI report + *August 8-13, 1999*
A15	Guangdong Zhaoqing Chemical Plant. 1 CFC-12 production line.	CFC-12	500	*August 8-13, 1999*
C6	Shanxi Shangzhou Chemical Plant1 CFC-12 production line	CFC-12	2,000	*Aug 16-20, 1999*
B10	Zhejiang Linhai Shuiyang Chemical Plant 1 CFC-12 production line.	CFC-12	500 MT	SRI report + *August 8-13, 1999*
A12	Shanghai Shuguang Chem. plant	CFC-113	1,000	*August 8-13, 1999*
	Total Production capacity dismantled through these closures	CFC-11 CFC-12 CFC-13 CFC-113 **Total**	2,500 19,080 50 1,000 **22,630**	
Part 2: Additional Production lines closed in 1999 (contracts 4&5/99)				

[2] Exact date of verification visit to plant by the Bank team. References to the SRI report in this column indicate that, according to the technical audit report, the plant had already been dismantled.

A2	Shangdong Jinan 3F Chemical Co. Ltd. 1 CFC-11 production line	CFC-11	1,500	*Aug 16-20, 1999*
Not SRI	Liaohe Chemical Group Chlor-Alkali Plant. 1 CFC-12 production line.	CFC-12	1,000	*March 5-8, 2000*
B15	Fujian Shaowu Fluorochemical Plant. (one CFC-11 production line only; CFC12 line remained in production.)	CFC-11	1,500	*March 5-8, 2000*
	Total Production capacity dismantled through these closures	CFC-11 CFC-12 **Total**	3,000 1,000 **4,000**	
Part 3: Plants closed in 1999 at approval in accordance with quota regulation (contracts 6/ 99)				
B2	Chongqing Tianyuan Chemical Plant. 1 CFC-11 production line,1 CFC-12 production line	CFC-11 CFC-12	500 *	*January 16, 2000*
B5	Hubei Wuhan Changjiang Chemical Plant 1 CFC-11 production line,1 CFC-12 production line	CFC-11 CFC-12	1,500 4,500	*January 15, 2000*
A5	Jiangsu Wuxian Juxing Chemical Plant 1 CFC-11 production line	CFC-11	2,000	*January 14, 2000*
A6	Jiangsu Wuxian Union (City Link) Chemical Plant. 1 CFC-11 production line	CFC-11	1,800	*January 14, 2000*
B1	Jiangxi De'an Refrigeration Plant 1 CFC-12 production line	CFC-12	3,000	*January 12, 2000*
A2	Shangdong Jinan 3F Chemical Co. Ltd. 1 CFC-12 production line	CFC-12	3,500	*August 17, 1999*
B6	Shanghai Chlor-Alkali Chemical Plant Co. Ltd. 1 CFC-12 production line	CFC-12	7,000	*January 13, 2000*
	Total Production capacity dismantled through these closures, production 'quota' (derived from baseline) and actual production	CFC-11 CFC-12 **Total**	5,800 18,000 **23,800**	
Part 4. Permanent plant closures and quota reductions after 2000 annual quota bids (contracts 12/99)				
SRI No.	**Name of CFC producers**	**CFC produced**	**Capacity (MT /Y)**	**Status/Date Dismantling verified**
A9	Jiangsu Wuxi Hushan Refrigeration Plant 1 CFC-11 production line	CFC-11	4,000	*September 6, 2000*
B3	Sichuan Zigong Refrigerant Plant 1 CFC-11 production line, 1 CFC-12 production line	CFC-11 CFC-12	1,500 1,500	*September 3, 2000*
B13	Zhejiang Lanxi Refrigeration Plant 1 CFC-11 production line	CFC-11	2,500	*September 5, 2000*
B7	Zhejiang Rui'an Haitian Chem. Co. Ltd. 1 CFC-11 production line	CFC-11	5,000	*September 4, 2000*
A4	Shandong Xuecheng Xinxing Chemical Plant 1 CFC-12 production line	CFC-12	1,000	*September 2, 2000*
A10	Jiangsu Changshu Ref. Plant (Changshu 3F) **reduction – quota reduced by 50 MT**	CFC-113	50 (quota reduction only)	*September 8, 2000*
	Total impact on national capacity, production quota, and	CFC-11	13,000	

	actual production	CFC-12 CFC113 **Total**	2,500 **15,500**	

Part 5. Permanent plant closures after 2001 annual quota bids (contracts 11/00)

SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)	Status/Date Dismantling verified
B15	Fujian Shaowu Floro-chem. Plant 1 CFC-12 production line	CFC-12	3,500	*June 12-13, 2001*
A7	Suzhou Xinye Chemical Co. Ltd. 2 CFC-11 production line	CFC-11	3,000	*June 18, 2001*
A11	Jiangsu Changsu Yudong Chem. Plant 2 CFC-113 production line	CFC-113	1,000	*June 17, 2001*
	Total impact on national capacity, production quota, and actual production	CFC-11 CFC-12 CFC113 **Total**	3,000 3,500 1,000 **7,500**	

Part 6. Plants remaining in 2001

SRI No.	Name of CFC producers	CFC produced	Capacity (MT /Y)
A8	Jiangsu Meilan Electric Chem. Plant 1 CFC-11 line and 1 CFC-12 line	CFC-11 CFC-12	3,000 3,000
B14	Zhejiang Juhua Florochem. Com. Ltd. Produce CFC-11 and CFC-12 in 1 production line	CFC-11 CFC-12	4,000 8,000
A10	Jiangsu Changsu Refrig. Plant (Changsu 3F) 1 CFC-11 production line, 1 CFC-12 production line, 1 CFC-113 production line and 1CFC-115 production line	CFC-11 CFC-12 CFC-113 CFC-115	10,000 5,000 4,000 200
B8	Zhejiang Linhai Limin Chem. Plant 2 CFC-12 production line and 1 CFC-13 production line	CFC-12 CFC-13	3,000 50
B12	Zhejiang Dongyang Chem. Plant 1 CFC-12 production line	CFC-12	5,000
A13	Guangdong Xiangsheng Chem. Co. Ltd. 1 CFC-12 production line	CFC-12	3,000
B11	Zhejiang Chemical Research Institute 1 production line to produce CFC-114 and CFC-115	CFC-114 CFC-115	100 100
		CFC-11 CFC-12 CFC_13 CFC-113 CFC-114 CFC-115 **Total**	17,000 27,000 50 4,000 100 300 **48,450**
		Grand Total of Parts 1 through 6	

Table A.2: CFC Production in 2000 verified by CNAO Audit (Figures in MT ODP)

SRI no.	CFC producers	CFC 11	CFC 12	CFC 113	CFC 114	CFC 115	CFC13	Total
A8	Jiangsu Meilan Electric Chemical Plant	1,048.8	1,793					2,841.8
B14	Zhejiang Juhua Florochemical Company, Ltd.	4,338.8	7,758.7					12,097.5
A10	Jiangsu Changsu Refrigerant Plant (Changsu 3F)	8,192	5,019	2,756.3		60		16,027.3
B12	Zhejiang Dongyang Chemical Plant		2,218.3					2,218.3
A13	Guangdong Xiangsheng Chem. Plant		1,097.9					1,097.9
B11	Zhejiang Chemical Research Institute				7.3	71.8		79.1
B8	Zhejiang Linhai Limin Chemical Plant		1,364.7				26.9	1,391.6
A11	Jiangsu Changsu Yudong Chemical Plant			544.6				544.6
B15	Fujian Shaowu Floro-Chemical Plant		1,158.7					1,158.7
A7	Suzhou Xinye Chemical Co. Ltd.	2,532						2,532
	Total	16,111.6	20,410.3	3,300.9	7.3	131.8	26.9	**39,988.8**

Table A.3: Updated List of HCFC-22 producing plants in China

Sl.	Name
1.	Guangdong Huiyang Chemical Plant
2.	Hunan Zhuzhou Chemical Corporation (Group)
3.	Jiangsu Changshu Refrigeration Plant
4.	Jiangsu Changshu Elf Atochem 3F Co., Ltd.
5.	Jiangsu Meilan Electric Chemical Plant
6.	Liaoning Fuxin Fluoro-chemical Plant
7.	Shanghai Chlor-Alkali Chemical Co. Ltd.
8.	Sichuan Chenguang Chemical Research Institute Plant No.2
9.	Sichuan Zigong Refrigeration Plant
10.	Shandong Jinan 3F Chemical Co. Ltd.
11.	Shandong Dongyue Chemical Co. Ltd.
12.	Shandong Fire Extinguishing Agent Plant Shouguang Division
13.	Sichuan Zigong Fujiang Chemical Plant
14.	Wuhan Changjiang Chemical Plant
15.	Zhejiang Juhua Fluoro-chemical Co. Ltd.
16.	Zhejiang Dongyang Chemical Plant
17.	Zhejiang Linhai Limin Chemical Plant
18.	Zhejiang Yingpeng Chemical Co. Ltd.

PART B

2002 ANNUAL PROGRAM

Phaseout Objectives

1. The phaseout objective of the 2002 Annual Program is to ensure that CFC production in the year does not exceed 32,900 MT. China is requesting the release of the **fourth annual tranche** of **US$ 13 million** as agreed in the overall CFC Production Sector Phaseout Plan to achieve this objective. It is envisaged that the US$ 13 million will be allocated for closing CFC production lines or reducing production levels in some CFC enterprises which received production quota in 2002, for technical assistance activities, and for activities relating to substitute development.

Program Activities During the Year

2. *Policy actions.* In 2002, the following policies and measures will continue to be implemented by the Government. These policies are considered necessary for the success of a total CFC production phaseout in China.

a) Tradable production quota – The regulation has been under implementation since 1999, and will continue.

b) Export and import control mechanism – The Management Regulation on Export/Import Control of ODS, promulgated in December 1999 by SEPA in collaboration with Ministry of Foreign Trade and Economic Cooperation (MFTEC) and General Administration of Customs (GAC), covers all ODS as well as related equipment and facilities that produce or consume ODS. ODS Export/Import quota and permit systems have been adopted, and all enterprises wishing to export or import ODS must hold both a quota issued by SEPA and MFTEC, as well as specific export/import permits. GAC supervises exports and imports of ODS. China has also promulgated the Export/Import Control List of ODS in China ,the First Group in January, 2000, the Second Group in January 2001 . Under this regulation, China has banned imports of CTC, and introduced quota and permit requirements exports and imports of CFC 11, 12, 113, 114 & 115, CFC 13, halon 1211 and halon 1301.

3. *Enterprise activities.* Through the interaction of production quota and administrative measure, closure plant would be granted funds for closure. All CFC reduction or closure contracts are expected to be signed by the end of November not later than the end of 2001, but in any case will be signed no later than the end of the first quarter of 2002. Closure projects are expected to take effect from January 1, 2002 and to be completed by the end of June 2002. Facilities should be dismantled by the end of January 2002.

4. *Technical assistance* (TA) activities. TA activities envisaged under the Sector Plan concentrate on strengthening: (a) the overall institutional framework for phaseout; (b) substitute chemical development; (c) management, monitoring & evaluation capabilities of participating institutions; (d) skills of enterprise managers involved in CFC production phaseout activities; and (e) information exchange. These are all essential to the success of the phaseout. All terms of reference

and detailed work programs will be agreed with the World Bank before implementation. Most of these activities are expected to be completed within two years. Proposed 2002 TA activities include:

a) *Training* of personnel involved in implementation of phaseout activities. To implement the phaseout plan effectively, it is necessary to train staff in: (i) local environmental protection bureaus and local industry management agencies, which have replaced the previous PCIBs, to properly supervise CFC production; (ii) CFC producers; and (iii) audit agencies. Training is also needed for enterprises to understand the closure regulations. This type of training will need to be repeated every year in the first few years of implementation.

b) *Performance Audit*. A Performance audit is required under the CFC sector plan. The China National Audit Office (CNAO) has informed SEPA that, as the content of this audit is more substantive than the conventional financial audits, additional expenditures are necessary to finance this activity annually. A TOR for the 2001 performance audit will be agreed between the Bank and SEPA for this purpose by November 2001, and the audit is expected to be completed by June 30, 2002.

c) *Study Tour on methods of controlling smuggling of ODS.* A study tour to some industrial countries is being planned, with the aim of exchanging information and experience on efficient management of ODS import and export, and measures to control illegal trade in ODS.

d) *Integration of ODS MIS into electric monitoring system at the Border.* An electronic monitoring system is maintained by GAC at the national border, with seven other ministries having access to it. The system is designed to monitor the movement across the border of all imports and exports. This TA will enable design and implementation of a supplementary system to enable PMO to obtain access to the mainframe, as also to check the status of export licenses issued by the MFTEC, etc. collect the data, see which trader is violate the regulation, etc.

e) Recruitment of international technical consultants. Consultants will be recruited as necessary.

f) Other TA activities that are necessary for effective phaseout may be developed during the year.

Special Initiatives

5. Screening of the alternative to Methyl Bromide in soil fumigation in China. The bidding document for this study will be sent to a short-list of consultants in September, 2001. The contract is expected to be signed in November 2001, and the project to be completed by end of 2002.

6. The above policy initiatives, enterprise-level and technical assistance activities are summarized in Table B.1 below.

TABLE B.1: 2002 ANNUAL PROGRAM

(AMOUNT IN US$ MILLION)

CFC production phaseout targets						
	Funding (US$ mill.)	2001 Quota[3] (MT)	Phaseout in 2002 (MT)	Allowed Production in 2002[4] (MT)	Performance Indicators	Key Dates
CFC in terms of ODP	13	36,198	3,298	32,900	1. Closures of current producers and reduction in production in remaining producers 2. Implementation of TA activities to help phaseout. 3. Production level not more than 32,900 MT	1. Dec. 2001-June 2002 2. Dec. 2001-Dec. 2002 3. Dec.31, 2002
Policy Initiatives						
Initiatives	Funding	Performance Indicators				Key Dates
1. Administrative measure	Incl .in TA n.a. n.a. n.a. incl. in TA	1. Training remaining enterprises for closing in 2002 2 Determine closing enterprises for 2002 3. Sign closure contracts with closing enterprises 4. Implement closure contracts 5 Train enterprises for closing preparation for 2003 reduction target				1. Sept. 2001 2. by Oct. 2001 3. Dec. 2001 4. Dec. 2001-June 2002 5. Oct. 2002
2. Tradable production quota for CFC producers	n.a.	1. Establish 2002 annual CFC production quota 2. Issue annual production quota to CFC producers for 2002				1. Feb. 2002 2. Feb. 2002
3. Import/export trade management	n.a.	1. implement the import/export trade management mechanism.				1. January 2002-December 2002
Enterprise activities						
	Funding (US$ million)	Existing lines	# of lines targeted	# of lines at end of 2002	Performance Indicators	Key Dates
Closure of CFC11/12/113 production lines	12.00	12	t.b.d.	t.b.d.	1. Training of enterprises 2. To determine grant funds 3. Selection of closing plants 4. Contracts signed 5. Facilities dismantled, and reports completed	1. Sept. 2001 2. Oct. 2001 3. by Dec.. 2001 4. end-Dec. 2001 5. no later than June 2002

[3] Total quota issued for 2001, compared with the amount allowed under the Phaseout Plan of 36,200 MT.
[4] Maximum production quota that can be allocated for calendar 2002.

TABLE B.I: 2002 ANNUAL PROGRAM (CONT.')
(AMOUNT IN US$ MILLION)

Technical assistance activities			
Activities	Funding [1/] (US$ Million)	Performance Indicators	Key Dates
1. Training of personnel involved in implementation of phaseout activities.	0.10	1. TOR to be agreed with the Bank 2. Training on supervision and evaluation of CFC production, bidding system, management of CFC production quota system, and CFC Project Implementation Manual	1. Oct.2001 2. Start in Jan. 2002. Specific schedules to be detailed in TORs
2. Performance audit	0.06	1. TOR to be agreed with the Bank 2. Audit implementation. 3. Audit is completed.	1.1. November, 2001 2. April, 2002 3. By June 30, 2002
2. Recruitment of international consultants	0.10	1. Finalization of TORs for consultant assignments 2. Signing of contracts 3. Completion of work and submission of reports by consultants	Throughout 2002 Throughout 2002 3. Throughout 2002
3. Study tour on management of ODS trade	0.03	1. TOR to be agreed with World Bank 2. Overseas survey	1. January, 2002 2. July, 2002
4. Integration of MIS into the electronic monitoring system at the national border.	0.07	1. TOR to be agreed with World Bank 2. Develop the monitoring system 3. Training	1. January, 2002 2. By October, 2002 3. By November, 2002
6. others	0.70		
Subtotal	1.00		
TOTAL for phaseout activities	**13.00**		

[1/] These are estimated costs. After bidding for TA contractors, these costs will be adjusted to reflect contractual amounts for each TA. All TA activities are expected to be completed on schedule.

Annex II

Sector Plan

Phaseout of CFC 11 and 12 Consumption

in the Industrial and Commercial Refrigeration Sector

CHINA

October 5, 2001

Content

I. INTRODUCTION

Background

1.1 China has actively participated in global action to protect Ozone Layer. It joined the Vienna Convention for the Protection of the Ozone Layer in September 1989, and ratified the London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer in 1991 (hereafter Montreal Protocol or MP). Since then, China has been committed to the phaseout of Ozone Depleting Substances (ODS) in accordance with its designation as an Article 5 country under the Montreal Protocol. In 1992, the Government of China established a Leading Group for Ozone Layer Protection with overall responsibility for organizing and implementing all phaseout activities. In January 1993, the Government approved the China Country Program for phaseout of Ozone Depleting Substances (hereinafter Country Program or CP), and began implementation of ODS phaseout actions in China with the support of the MP Multilateral Fund (MLF) . The Leading Group has assigned the State Environmental Protection Administration (SEPA) to be in charge of the implementation of the ODS phaseout program in China. SEPA has established a Project Management Office (PMO) with administrative responsibility for implementing phaseout programs/projects through the four MLF Implementing Agencies.

1.2 In November 1999, the State Council approved the update Country Program that guides future phaseout activities in China. As the program has matured, the sector approach established on the experience gained from project-by-project and umbrella approaches has proved to be the more effective way to phase out ODS. By the end of 2000, the ExCom had approved 5 sector plans for phaseout of ODS in China, all of which are under implementation. The implementation of these five sector plans in the halon, MAC, tobacco, solvent and CFC production sectors will result in complete phase out of ODS in these sectors by 2010.

1.3 The Industrial and Commercial Refrigeration Sector (ICRS) in China has made great progress in implementing phaseout of CFC. In 1995, the "Strategy for phasing CFC out in industrial and commercial refrigeration sector in China" was established, based on the status of the sector and the demand for compressors. An industrial restructuring plan was proposed as a means of achieving significant cost savings in phaseout of CFC. Based on the strategy, 24 enterprises are scheduled for converting to produce non-CFC based compressor through MLF assistance. The remaining enterprises would cease CFC-based compressor production by the end of 2004, either by closing down or by conversion to other processes and products.

1.4 Based on the 1995 strategy, 19 enterprises and one research institute have already received conversion / TA funding assistance from the MLF. The total amount of MLF resources provided isUS$44,320,000, and the total projected indirect CFC phase out is 3,938 MT. Of the 19 enterprises, 7 projects (Taizhou, Yantai, Nanjing, Beijing, Shanghai, Chongqing and Anhui) have been physically completed as of December 2000. Of the remaining 12 enterprises, 2 projects will be completed in 2001, and the remaining 10 projects will be completed in 2002. Most of the activities in the technical assistance project financed by the MLF to establish standards and provide testing facility of non-CFC compressors (for Hefei General Machinery Research Institute) have also been completed.

1.5 In addition, with the implementation of Strategy for phasing CFC out in industrial and commercial refrigeration sector in China, the Government has successfully arranged, at China's own cost (estimated in the 1995 strategy study at aboutUS$83.79 million), for

31 producers to stop CFC based compressor production by closure or conversion to other business. There are presently 8 compressor manufacturers (with 9 producing lines), which have no MLF-supported projects, and still produce CFC-based compressors; another 10 enterprises (with 11 producing lines) still have the capacity to produce CFC-based compressors, but have a very small current amount of production.

1.6 It is worth noting out that the phaseout action at the enterprises that have been implementing projects has provided other enterprises with CFC-based production (specially those with low capacity utilization) a chance to exhibit higher growth rates and obtain more market share, and it is estimated that they achieved an annual growth of 8.7% of CFC-based compressor from 1997~1999. It is therefore very important to control and phase out CFC-based compressor production under a sector approach.

1.7 The refrigeration equipment used in industrial and commercial sector needs servicing and regular refilling of CFC, so a plan for recovery and recycling of CFC should also be considered. This strategy assumes that an appropriate phaseout plan for the service sector will be developed in the future.

1.8 The experiences and lessons learnt from implementation of CFC phase out projects and TA activities in ICRS include the following:

a. **Import non-CFC based compressor manufacturing technology from foreign suppliers.** One of the major problems encountered by Chinese enterprises is that it is extremely difficult to source the appropriate technology. Some famous international technology suppliers either refused to transfer technology to China at reasonable rates, or imposed difficult conditions of joint venture, including unreasonable royalty claims. Some international suppliers agreed in principle to cooperate but set a very high price for their cooperation, and technology transfer fees quoted at the start of negotiations were far above the technology transfer fee approved by the ExCom . The delay of obtaining suitable technology transfer is a major reason in project implementation delay.
b. **Source of counterpart fund.** Some ODS-consuming enterprises have low profitability and do not have the financial resources to convert into non-CFC technology without substantial financial resources. Counterpart funding is necessary for the cost of technology upgrade (enterprises have to put in about 20% of investment costs) , and substantial equipment imports to accommodate the machining requirements of HCFC-22 based compressors and HFC-134a based turbine compressors production.
c. **Compressor Production level and technical expertise**. Many enterprises in the sector are producing at low levels of output and lacked the technical expertise for conversion.

1.9 The Sector Plan has been developed to overcome these difficulties, and achieve full phaseout of CFC in the sector,. The plan targets the following:

a. ensure phaseout of CFC consumption at the sector level,
b. implement a timely and cost-effective action plan that can be completed and monitored with measurable indicators at the sector level,
c. improve efficiency of use of MLF resources by reducing management and implementation costs and achieving cost savings on a sector scale through the establishment of bidding mechanism under the Sector Plan, and

d. improve implementation of economic incentives and policies.

Preparation for the Sector Plan

1.10 According to the 1995 Strategy, the ICRS has adopted a two stage approach to ODS phaseout, with the first stage being a switch to HCFC-22 (21 out of 24 projects). HCFC-22 is shown to be the least cost option available to China, considering the availability of materials, the technical status of the service industry, and the overall cost considerations. The subsequent switch to non-ODS will be undertaken when appropriate technology is available and will be at own China's cost. A major restructuring of the industry is being proposed as a means of achieving significant cost savings in the conversion to non CFC production. The industry profile of 68 enterprises with 73 compressor producing lines in 1995 would be reduced to a smaller numbers of compressor producers, while keeping up with national demand of compressors in future years. There will be closure of the compressor enterprises , conversion of compressor production to other types of production, and conversion to non-CFC compressor at China's own costs.

1.11 The State Environmental Protection Administration (SEPA), State Administration of Machinery Industry (SAMI) and State Administration of Internal Trade (SAIT) jointly established a working group for CFC Phaseout in the Sector. With support from the working group and World Bank, a team that was set up with experts from Center for Environmental Science of Peking University, and compiled the sector plan in 2001.

1.12 The Sector Plan has been developed on the basis of a survey and analysis of current status, including all remaining enterprises that are still in CFC based compressor production and targeting phaseout of CFC in the entire sector.

1.13 The guiding principles in the preparation of the Sector Plan are:

a. The Government's obligations under the MP's London Amendment ;
b. The principles addressed in the Country Program, completed in 1993 and updated in December 1999;
c. The national strategy and planning for economic and social development;
d. The 1995 strategy of ODS Phaseout Plan of the Industrial and Commercial Refrigeration Sector, particularly keeping in mind that the development of the sector itself must not be jeopardized by ODS phaseout activities.

1.14 Phaseout of CFC in this Sector Plan is limited in CFC-11 and CFC-12-based compressor production, and recovery, recycling and refilling of CFC in the service sector is excluded. China will develop a separate sector plan for the service sector. Regarding other CFCs used in China, the total consumption of CFC-13, CFC-114 and CFC-115 in 1999 was 202 tons ODP, spread over uses such as refrigerants, medical appliances and military applications. The production of these CFCs will be phased out under the CFC production Sector plan. This sector plan does not include the phaseout strategy and incremental cost for phaseout of consumption of these other CFCs.

II. THE REFRIGERATION INDUSTRY AND THE INDUSTRIAL AND COMMERICAL REFRIGERATION SECTOR (ICRS)

The Refrigeration Equipment Industry

2.1 In China, the refrigeration equipment industry is divided into three categories, mandated by the former State Planning Commission in 1984:

a. **Industrial and commercial refrigeration equipment.**
   - Food freezers above 500 liters (include food exhibition cabinet) and cold storage below 20 M^3, cold drink dispensers for commercial use, popsicle machine, humidifier, ice cream machine, refrigeration truck, etc. with a small open or small semi-hermetic compressor (cooling capacity 2-15KW);
   - Cold storage above 20 M^3 (-15^{0}C to -18^{0}C), food fasting freezing equipment (-23-30^{0}C), ship vessel refrigeration equipment (–23^{0}C to -30^{0}C), ice making machine, railway refrigerating car, low temperature equipment used by electronic and pharmaceutical industry with the temperature lower than -40^{0}C, using medium sized open and/or semi hermetic compressors with the cooling capacity over 15 kw;
   - Any refrigeration equipment, such as chillers, refrigeration units for centralized air conditioning system, compressor's cooling capacity from 25-1200 kw; and
   - Unit air-conditioners with small and medium semi-hermetic or hermetic compressor with the cooling capacity over 7 – 50 kw.

b. **Household refrigeration appliances.** Room air conditioners with cooling capacity below 7 kw, refrigerator and freezers with the volume below 500 liters are classified as the household refrigeration appliance. The production of household refrigeration equipment is mainly managed and coordinated by China Household Electric Appliances Association (CHEAA).

c. **Mobile air conditioner (MAC).** In 1992, the former Automobile Industry Department of Ministry of Machine Industry and State Environmental Protection Administration agreed to separate the MAC sector from the Industrial and commercial Refrigeration Industry. Thus all air conditioning units used for passenger cars and buses are now be categorized as the MAC sector.

2.2 Over the past ten years, China's refrigeration sector witnessed significant development in the areas such as enterprise reforms, utilization of foreign investment, import of technologies, technical renovations, enhancement of production quality, and elimination of ODS consumption. According to the 1989-1999 10th anniversary report of China Air Conditioning and Refrigeration Industrial Association (CACRIA), there were only 217 manufacturers of various kinds of refrigeration equipment and products in 1989, with a total annual industrial output of merely 6.5 billion Yuan. While in 1998, there were about 1,000 manufacturers of different sizes with total annual industrial output of 40 billion Yuan (exclusive of domestic refrigerators), representing some 20% of annual growth in the 10 year period. Meanwhile, the foreign investment companies including joint ventures and fully foreign owned exploded from 6 enterprises in 1990 to 110 enterprises in 1998. Nowadays, China's refrigeration sector is supported by a comprehensive and integral combination of products of all types including large, medium and small refrigeration products, with much higher quality, performance and technical standards as compared with those made in earlier years. The technical gap between products made in China and other developed countries has been narrowed. China is now the third largest refrigeration equipment manufacturer in the

world, following USA and Japan. The demand and production of compressors are expected to increase alongside with economic development.

The Industrial and Commercial Refrigeration Sector (ICRS)

2.3 **Structure of the ICRS.** In 2000, based on information from CACRIA , there are about 1,000 enterprises engaged in the production of chillers, dispensers, different types of compressors (reciprocating, screw type, scroll, centrifugal), air coil units, air conditioning units, food display cabinets, food storage, transport refrigeration, low temperature equipment for electronic and medical industry, and various components. Some of them are very small size companies. CACRIA has 543 listed enterprises, among which 347 are registered members of the CACRIA. Among the 543 enterprises, about 420 enterprises are 100% Chinese ownership, (56 enterprises are State Owned Enterprise, 364 are private owned enterprises), 110 Sino-foreign joint ventures and 13 wholly-owned foreign enterprises in China. Out of these 543 enterprises, 52 enterprises are engaging in the production of compressors for the ICRS, details in Chapter 2. Since China's economic system is changing from planning to marketing system, the ownership structures of enterprises have been changing in recent years, and will continue to change in the foreseeable future.

Table 1. Ownership Structure of ICRS Enterprises

No. of the Enterprises with 100% Chinese ownership			Joint Ventures	100% owned Foreign Enterprise	Total number of enterprises in CICRI
State Owned Enterprises	Private Enterprise	Total			
56	364	420	110	13	543

2.4 Today, most enterprises are concentrated on manufacturing of refrigeration systems and refrigeration equipment. In the refrigeration industry, most have in-house production of components for refrigeration equipment, and only very few are solely producing components like compressors, evaporators, condensers, valves, etc. Compressors are either produced by the enterprises themselves or bought from other suppliers (domestic or international suppliers). Many also have their own engineering departments for the design and installation of refrigeration systems. In addition, most of the enterprises are also servicing refrigeration equipment.

Market Composition of Refrigeration Compressors of ICRS

2.5 According to the information provided by the CACRIA and Hefei General Machinery Research Institute (GMRI), the market for refrigeration equipment covering the following subsectors and their situations are described below:

a. Air conditioning equipment and systems
b. Commercial refrigeration equipment
c. Industrial refrigeration equipment

2.6 **Air conditioning equipment and system.** This subsector consists of central air conditioning system and unit air conditioners-

a. ***The central air conditioning system ~80,000 sets.*** The subsector covers refrigeration equipment, such as chillers, refrigeration units for centralized air conditioning system with compressors with a cooling capacity ranging from 25 kw to-1,200 kw and unitary air-conditioners with small and medium semi-hermetic or hermetic compressor with the cooling capacity over 7 kw– 50 kw.

- Around 50,000 centralized air conditioning system, including around 600 domestically produced chillers, are sold annually in China. A total of around 80,000 compressors with cooling capacity from 7kw-50 kw are used in those refrigeration systems. 80% of the compressors are imported and non-CFCs based. The rest 20% (16,000 set) are produced in China, among which, 6,000 are non-CFCs based and produced by joint ventures, 10,000 CFC based compressors are still produced by Chinese enterprises.

- Of the 600 chillers domestically manufactured and sold in China, 200 was using Chinese CFC based compressors and the rest on imported non-CFC compressors. The cooling capacity is in the order of 25 kw-1,200 kW. HCFC-22 is the main refrigerant in this subsector. All compressors from foreign suppliers and JV are designed for non-CFC refrigeration systems, while some Chinese suppliers are selling domestically made HCFC-22 modified compressors[1] and other are selling CFC based compressors.

- The 24 enterprises included in the 1995 sector strategy supply around 4,838 compressors to this segment of the market. The 200 large compressors for chillers are produced by Chongqing General Machinery Factory, Tianjin Tianshan, Beijing Refrigeration Machinery Factory, and Yueyang Hengli. The remaining 5,000 will be addressed through this updated sector plan.

b. ***Unitary air conditioners*** **~2 million sets.** In addition to the larger air conditioning systems**,** about 2,000,000 unitary air conditioners with compressors with cooling capacity of 7 kw to 50 kw are produced and sold annually in China. Compressors used for this application are all HCFC-22 based. The compressors used are semi-hermetic, hermetic and scroll. Of the 2,000,000 compressors used annually for this application, about 1,380,000 sets are imported and the rest are produced in China.

- The semi hermetic compressors account for less than 10% (200,000 units), among which 50% are imported from Copeland and Bitzer. The other 50% are produced by joint ventures (Shenyang Copeland and Shanghai Carrier). The rest of the semi-hermetic compressors are produced by four of the 24 companies included in the sector plan; Taizhou, Beijing, Tianshan, Yueyang.

- The hermetic compressors account for more than 69% (1,380,000) of the units. Only one 100% Chinese owned company, Chunlian, are producing this type of

[1] Larger Chinese CFC based compressor can with some modification be used for HCFC-22 as a transitional measure to maintain their compressor business. The modification include use of water for cooling instead of air and some other minor modifications The result is higher investment costs and energy consumption for the users, which again has impacted the local producers market share. Many of the domestic suppliers of larger AC systems has imported compressors instead of using their own modified Chinese compressors to maintain their business.

compressors. They are producing three models (3 hp, 5 hp and 10 hp) and the total production is 200,000 set/year. The rest are imported or produced by JV companies.

- Scroll type compressors for unit air conditioner constitute the remaining 21% (420,000 units) and are produced by the joint venture companies; Suzhou Copeland with a production of the 1st phase of 200,000 compressors, Wanbao Hitachi with a production 20,000 compressor and Qingan Daikin with a production of 200,000 compressors.

2.7 **Commercial refrigeration equipment ~100,000 sets.** This segment of the refrigeration sector covers food freezers and food display cabinet larger than 500 liter and cold storage less than 20 m^3, cold drink dispensers for commercial use, popsicle machine, humidifier, ice cream machine, refrigeration truck, cooling unit, fast frozen machine, low temperature equipment for medical and electronic industrial application etc. with a small open or small semi-hermetic compressor with cooling capacity of 2 kw to 15 kw. About 100,000 refrigeration units are sold annually.

2.8 Of the 100,000 compressors used for these units, 10,000 compressors are produced by a Chinese joint venture company and about 90,000 small open and small semi hermetic compressors are produced by 100% owned Chinese producers. The 90,000 Chinese produced compressors are presently all CFC-based. The 24 enterprises produces about 56,500 sets, or about 57% of the total demands of this market segment.

2.9 **Industrial refrigeration equipment ~ 50,000 sets.** These are medium size cold storage more than 20 m^3 (-15C to -18C), food fasting freezing equipment (-23-30C), ship vessel refrigeration equipment (–23C to -30C), ice making machine, railway refrigerating car, low temperature equipment used by electronic and pharmaceutical industry with the temperature lower than minus 40C. The low temperature refrigeration system for the industrial market is dominated by Chinese refrigeration equipment manufacturer using Chinese produced compressor. Medium size open and/or semi hermetic compressors (including ammonia, medium sized compressors)with cooling capacity over 15 kw are used for this segment of the market. The total number of refrigeration system sold annually is estimated to be about 50,000, of which around 5,000 are used for train refrigeration systems and 2,000 for low temperature systems.

2.10 The 24 enterprises in the 1995 sector strategy produce around 10,332 sets; or about 21% of the total market demands. Beijing, Tianshan and Yueyang had some production, but did not report the numbers.

2.11 Of the 50,000 compressors, about 10,000 compressors are ammonia based and the CFC-based compressors are about 40,000. The compressors are mainly manufactured by Yantai, Bingyang, Wuhan New World, Dalian #2, Shangleng #1, Yueyang Hengli, Chunhui, Tianshan, Beijing, Dalian #1 Refrigeration Equipment Factory.

Table 7. Compressors produced in China[1/] in 1995 and in 2000

Subsectors	Cooling capacity	Units of compressors produced in 2000	Units of compressor produced in 1995
Air conditioning equipment & system			
Larger AC systems [2/]	50 kw< X < 1,200 kw	~ 6,000	~80,000
Medium AC systems [2/]	7kw < X < 50 kw	~50,000	~75,000
Chillers[3/](centrifugal compressors)		~200	~200
Small AC units	< 7kw	~579,800	~25,000
Commercial refrigeration	< 15 kw <20 m^3 2 kw to 15 kw	~100,000	~100,000
Industrial refrigeration	> 15 kw, > 20 m^3 4.1 larger than 15 kw	~50,000	~175,000
Total		**786,000**	

1/ Includes all compressors produced in China, including those produced by 100% Chinese owned, joint ventures and 100% foreign-owned enterprises in China.

2/ Some larger Chinese compressor manufacturers can modify their CFC compressor production to produce HCFC 22 compressors as a transitional measure to maintain their compressor business. The modification include use of water for cooling instead of air, and other minor modifications. The result is higher investment costs and energy consumption for the users. This has affected market shares of these producers. Many domestic suppliers of larger air conditioning systems have imported compressors instead of using their own modified Chinese compressors to maintain their businesses.

3/ Centrifugal compressors production: In 1999, 583 centrifugal chillers were produced in China, among which, 220 centrifugal compressors are manufactured by Chinese enterprises, and rest of 363 compressors are imported. In addition, additional centrifugal chillers were imported directly into China, but no exact figure is available

Table 2. Summary of Compressor Production in ICRS in 2000

	Air conditioning equipment & systems		**Commercial refrigeration equipment**	**Industrial refrigeration equipment**
	Centralized air conditioning system	Unit air conditioner (packaged air conditioner)	Food storage and low temperature facilities	Medium sized cold storage (15 kw and 20 M^3 above)
Compressors [1/](sets) sold	**~80,000**	**~2,000,000**	**~100,000**	**~50,000**
By%				
Produced in China (%)	20%	31%	100%	100%
Imported (%)	80%	69%	0%	0%
By number of sets				
Imports	~64,000	~1,380,000	~0	~0
Produced by enterprises in China[2/]				
Produced by 100% Chinese-owned companies	~10,000 [3/]	200,000 [4/]	~90,000 [5/]	~50,000 [6/]
Produced by joint venture and 100% foreign-owned enterprises	~ 6,000	420,000	~10,000	~0
Numbers of sets produced by the MLF-financed and candidates enterprises in the sector plan				
Produced by the 19 MLF projects (sets)	115	~0	41,400	8,300
Of which CFC based (sets)	100	~0	37,300	3,500
Of which non-CFC Based (sets)	15	~0	5,100	4,800
4.2 Produced by the candidate enterprises (sets)			21,600	6,600
Of which CFC based (sets)			21,600	5,800
Of which non-CFC Based (sets)			0	800

1/ Estimated number of units of refrigeration equipment sold was reported to the CACRIA and GMRI

2/ The total non-CFC based compressors production is about 90% in CICRS in 2000.

3/ CGMC

4/ Beijing, Tianshan and Yueyang

5/ HCFC based ~6,279 – Taizhou, Nanjing, Anhui

6/ 20% are non-CFC based, HCFC-based (~3,654)– Yantai, Shanghai, Beijing, Shengleng. Ammonia based (~400) – Dalian Bingshan

2.12 Based on CACRIA information, the compressor production is shown above. The CFC based compressors are about 80,000 sets with CFC consumption about 3,000 tons in 2000. The non-CFC based compressors are about 706,000 sets.

CFC Consumption at the Sector Level

2.13 The total CFC consumption in the sector was 7,556 MT in 1999, accounting for 16.2% of China's total CFC consumption. It is the second largest CFC consumption sector, next only to the foam sector. About 50% of the consumption is for servicing of refrigeration equipment in the sector and it is the largest CFC servicing demanding sector in China. CFC

consumption of the sector from 1995-2000 is given below.

Table 3. CFC-11 and CFC-12 Consumption in Recent Years in CICRS (in MT)

Type of CFCs	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
CFC-11	720	730	706	650	606	606
CFC-12	12,884	11,680	9,500	12,729	6,950	6,950
Total	13,604	12,410	10,206	13,379	7,556	7,556

Table 4 Classification of CFCs Consumption in 2000 (in MT)

		Consumption
Total CFC-11 consumption		**606**
Of which	New production	160
	Estimated Service amount	446
Total CFC-12 consumption		**6,950**
Of which	Projects under implementation [1/]	1,524
	8 candidate enterprises	1,023
	Estimated consumption by small enterprises and service	4,403
Total CFC consumption		**7,556**

1/ Total phaseout target in the 19 project summaries totals 4,256 MT at project completion.

III. THE 1995 STRATEGY AND ITS IMPLEMENTATION

3.1 **Background of the 1995 strategy.** When the sector strategy was developed in 1993 and 1994, there were about 300 refrigeration enterprises existing in the sector, and 68 compressor producing enterprises with 73 compressor production lines. The 68 enterprises produces various types of refrigeration equipment for different segments of the refrigeration market. Some had their own in-house production of compressors with manufacturing facilities and other workshops for other components and parts for the refrigeration equipment they produced. Many of them did not fully utilize their production capacity and their output was low. All of them are state-owned enterprises, and some larger enterprises had strong technical expertise, while many smaller enterprises lacked sufficient technical expertise. With this as the background, China proposed an industrial restructuring plan as a means to achieve a significant cost savings in the phaseout of CFC in compressors used in the sector. In 1994, China presented a strategy for phasing out CFC in the Commercial and Industrial Refrigeration Sector (ICRS) in China to the Executive Committee of the Multilateral Fund. The sector strategy was discussed with the Executive Committee and the Secretariat of the MLF and presented at the Xi'an meeting in June 1995. The sector strategy addressed only the key component of the refrigeration systems – the compressors. Other conversion costs, such as re-design, testing, and certification of the refrigeration system would have to be carried by the enterprises themselves at their own costs. In addition to the conversion of selected enterprises, the implementation of the sector strategy would result in complete closure of some enterprises and closures of compressor lines in other enterprises. After reviewing the sector strategy -- the first sector strategy plan within the MLF of the MP addressing a complete sector in a country—the ExCom endorsed the plan and agreed to provide financial and technical assistance.

3.2 **Agreements between the MLF and China to address the sector.** The Multilateral Fund would finance 24 enterprises to convert CFC-based refrigeration compressor production into non-CFC based compressor production. China would ensure that the remaining enterprises would cease CFC-based compressor production through closure or other methods at its own cost. China would also develop and introduce necessary supporting policies to support and ensure a sustainable conversion to non-CFC compressors for new refrigeration equipment in the refrigeration sector. Specific elements in the 1995 sector strategy can be summarized in the following categories.

a. The Multilateral Fund would assist in:
   - the conversion of compressor production at 24 companies out of a total of 73 production lines at 68 companies;
   - the transfer of modern non-CFC compressor technology from industrial countries;
   - replacing existing old dedicated machines and tools with modern production equipment, allowing China's manufacturers to meet the more stringent requirements of non-CFC compressors produced by industrial countries;

   These activities would allow a complete phaseout of ODS use in the sector through a two-step conversion. The first step would be a conversion to HCFC-22, HFC-134a and NH_3 refrigerants. The next step – when suitable candidates become fully mature - would be a conversion to fully non-ODS substances.

b. In return, China would:
   - close down or convert at its own cost, compressor production at the remaining 44 refrigeration companies;
   - finance from its own resources the technical upgrade costs associated with more production equipment necessary to allow the two step approach, (national costs related to technical upgrade were initially agreed as 20%, but were reduced to 12% at the 28th meeting because of the costs associated with lower quality machining centers); and
   - develop and introduce necessary supporting policies to support and ensure a sustainable conversion to non-CFC production for new refrigeration equipment in the refrigeration sector from 2002 onwards.

c. In addition, China outlined the following policies that it would consider:
   - banning the production of CFC based refrigeration equipment from 2000;
   - establishing a taxation system for CFC in order to support the use of substitutes; and
   - developing necessary standards and licensing system to support and control the production of non-CFC based compressors.

d. China also agreed not to request MLF funding for otherwise eligible incremental costs related to:
   - conversion costs of the commercial and industrial refrigeration equipment manufacturing companies,
   - conversion costs of end-users, and
   - incremental operating costs related to conversion of compressors, commercial refrigeration equipment producers and incremental operating costs associated with non-CFC substitutes.

3.3 **Current status of the 68 enterprises**. Since implementation of the sector strategy began, only 41 of these 68 enterprises remain in the sector. Some are still producing compressors, while some are idle. The current status of the original 68 enterprises is as follows:

a. 12 enterprises with 13 compressor production lines have been closed,
b. 15 enterprises with 16 compressor production lines had converted to non-compressor business,
c. 4 enterprises with 5 production lines have converted to non-CFC based compressor production at their own cost,
d. 10 enterprises with 11 compressor production lines are idle with no production, but retain the capacity and facilities for compressor production ,

e. 19 enterprises with 19 production lines have received funding for conversion from the MLF; of these, 7 companies have completed the conversion, 2 will complete their conversion in 2001, and 10 in 2002; and
f. 8 enterprises with 9 production lines are still producing CFC compressors and these are the candidate enterprises for funding under this sector plan.

3.4 The detailed status of the 68 enterprises and their 73 compressor production lines is provided in Annex 1. In addition to investment activities, the MLF has funded TA activities to the Hefei General Machinery Research Institute to support conversion from CFCs to other refrigerants (details in Chapter IV).

3.5 **Composition of compressor enterprises in China in 2000.** After 1995, 8 joint ventures and 3 enterprises wholly owned by foreign capital have been established for producing compressors, but these compressor manufacturers produce only non-CFC compressors. In all, there are thus currently 52 enterprises producing or capable of producing compressors for the commercial and industrial refrigeration sector.

Table 5Number of Compressor Enterprises in ICRS

MLF funded conversion project enterprises	Compressor enterprises converted at own cost	Candidate enterprises for MLF funding in this sector plan	Enterprises with idle production	Joint ventures	Wholly foreign owned enterprise	Total number of enterprises
19	4	8	10	8	3	52

3.6 **Compressors sold and production of compressors in China in year 2000.** Total compressor sold in China in 2000 was about 2.23 million sets (details in Table …), of which only ~350,000 compressor units were produced by compressor manufacturers in China. These included CFC and non-CFC based compressors units as summarized below:

a. Production by 19 MLF-funded conversion projects -
   - Production capacity - 177,600
   - Actual Production in 2000 - 43,881 CFC-based compressor, and 8,149 non-CFC compressor;
b. Production of the compressors by 5 candidate enterprises in 2000 among the remaining 8 producers -
   - Production Capacity: 29,500,
   - actual production: 27,399
c. Production by the 3 remaining producers - information not available; and
d. Production of the non-CFC compressors by 4 self-converted enterprises in 2000 - information not available.

3.7 In submitting the request for funding for the remaining phaseout activities in the sector, including conversion for the remaining 5 enterprises, China and the World Bank have reviewed the status of the sector and the experience gained from implementation of other sector strategies and what remains to be done to complete phaseout in the sector as per the agreement with the Multilateral Fund.

3.8 In order to prepare for the sector plan, an investigation team, which was jointly formed by PMO of SEPA, SAMI, SAIT and Center for Environmental Sciences, Peking University, had conducted a the survey in this sector. The survey consists of the CFC compressor producers which have not start conversion yet and the enterprises implementing MLF-financed conversion projects. Up to now, most production enterprises in ICRS have already stopped production of CFC-based compressors by conversion, mergers, changed to other business or closure. In addition to the 19 MLF-financed conversion projects, of 7 have completed and 12 projects are under implementation, there are only 8 enterprises that are still producing CFC compressors. Their date information is in Table 6 below, and their detailed information is included in the individual project summaries.

Table 6 Indirect CFCs Consumption by the Candidate Enterprises (in MT)

Name of enterprises	Established in	Ownership	Compressors produced	CFC Consumption[1/]		
				1998	1999	2000
Shanghai #1	1981	State-owned	Large/medium open	96	115	139
Minhang	1968	Private	Medium open	135	142	125
Zhejiang Yuhuan	1992	Collective	Small open	171	236	204
Dalian #2	1953	Collective	Large/medium open	96	115	154
Zhejiang Chunlian.	1980	Private	Small open	115	108	147
Beifeng				164	164	150
Luoyang						25
Shijiazhuang						79
Total						**1,023**

[1/] Estimated CFC consumption based on production of compressors.

3.9 From the table above, the projected amount of phasing out CFC indirectly is 1,023 tons in this sector plan. This consumption amount is excluding the service and the enterprises that will not be sponsored.

IV. DETAIL IMPLEMENTATION STATUS OF MLF-FUNDED PROJECTS

Implementation Status of MLF-financed Investment projects

4.1 Based on the 1995 sector strategy, ExCom agreed to support China 24 enterprises to convert to non-CFC based compressor production. Up to now, there are total 20 MLF projects in ICRS; of which 19 enterprises are conversion projects and one TA project with total amount of MLF isUS$44,320,000. The total projected CFC phaseout amount is 3,938 tons for the 19 projects. Of the 19 enterprises, 7 projects (Taizhou, Yantai, Nanjing, Beijing, Shanghai, Chongqing and Anhui) have been physically completed as of December 2000. Of the remaining 12 enterprises, 2 projects will be completed in 2001, 10 projects will be completed in 2002. An MLF-supported technical assistance project for establishing standards and for testing of non-CFC compressors (for Hefei General Machinery Research Institute) is also in process.

Table 7 Financing for ODS Phaseout in ICRS

	ODS Phaseout (Tons)*	Grant (US$1000)	Av. Cost Effectiveness
MLF	3,938	44,320	
Of which investment projects	3,938	43,627	11.08 US$/kg
Of which TA		692	

* ODS phaseout data come from MLF database by December 2000. According to the database, after these projects completed, ODS will be phased out 1,297 tons directly and 2,641 tons indirectly.
** All projects will be completed by the end of 2002.

Table 8 Summary of Technology Transferred to 19 Projects Under Implementation

Enterprise	Project No. (World Bank & ExCom)	Requested Amount	Approved Amount	Contract Amount	Contract No.	Technology Supplier	Date of Signing
1. Nanjing	A-10-CIB CPR/REF/16/INV/113	$560,000	$519,000	$523,057	96BMSJ/200014CE	Arctic Circle, UK	Dec. 1996
2. Anhui	A-11-CIB CPR/REF/16/INV/111	$250,000	200,000	$250,000	96BMSJ/200015MR	Blissfield, US	March 1996
3. Shanghai Refrigeration	A-12-CIB CPR/REF/16/INV/110	$250,000	$200,000	$200,000	97BMSJ/200JK039NL	Grasso, Holland	October 1997
4. Yantai	A-13-CIB CPR/REF/16/INV/114	$750,000	$272,000 + (US$474,300 royalty)	$370,000	96FPM-530033CZ/CIB	CKD Chocen, Czeke	
5. Taizhou	A-14-CIB CPR/REF/16/INV/112	$550,000	$512,550	$523,057	96UMXH/501007GB	Arctic Circle, UK	Mar. 13, 1996
6. Beijing	A-15-CIB CPR/REF/15/INV/107	$550,000		$471,225	96BMSJ/200013CE	Arctic Circle, UK	May 1997
7. Chongqing. General Mach. Fact	A-35-CIB CPR/REF/20/INV/182	$750,000	$621,100	$668,000	97BMSJ/200JK001US	NREC, U.S.	Sept. 4, 1997
8. Zhenjiang Fact.	A-37-CIB CPR/REF/20/INV/183 CPR/REF/22/INV/209	$550,000	$543,800	$186,000 $200,000	98BMSJ/200JK007US 97BMSJ/200JK004DE	Blissfield, U.S. HKT, Germany	July 12, 1998 July 9, 1998
9. Tianjin Tianshan Ref. Eq. Co	A-40-CIB CPR/REF/20/INV/175	$450,000	$370,000	$347,580	97BMSJ/200JK003GE	HKT, Germany	Sept. 7, 1997
10. Shanghai General Mach. Co.	A-42-CIB CPR/REF/20/INV/180	$400,000	$358,000	$344,840	97BMSJ/200JK004GE	HKT, Germany	Sept. 7, 1997
11. Ningbo Refr. Mach. Factory	A-46-CIB CPR/REF/22/INV/215	$200,000	$185,000	$186,000	98BMSJ/200JK005US	Blissfield, U.S.	July 12, 1998
12. Chongqing Bingyang Refr.	A-47-CIB CPR/REF/22/INV/214	$250,000	$200,000	$200,000	98BMSJ/200JK062DE	HKT, Germany	July 12, 1998
13. Zhejiang Chunhui Co.	A-48-CIB CPR/REF/22/INV/210	$400,000	$385,000	$186,000 $200,000	98BMSJ/200JK007US 98BMSJ/200JK064DE	Blissfield, U.S. HKT, U.S.	July 12, 1998

14. Guangzhou Ref. Mach.Fact.	A-49-CIB CPR/REF/22/INV/198	$280,000	$200,000	$200,000	98BMSJ/200JK063DE	HKT, Germany	July 12, 1998
15. Wuhan New World Ref. Ind.	A-51-CIB CPR/REF/22/INV/208	$300,000	$200,000	$200,000	98BMSJ/200JK061DE	HKT, Germany	July 12, 1998
16. Subei Ref. Mach. Factory	A-52-CIB CPR/REF/22/INV/200	$200,000	$185,000	$186,000	98BMSJ/200JK006US	Blissfield, U.S.	July 12, 1998
17. Zhejiang Com. Machinery	A-69-CIEC CPR/REF/28/INV/300	$200,000	$200,000	$200,000	2000BMSJ/200JK216DE	HKT, Germany	May 9, 2000
18. Yueyang Hengli Air-Cool	A-75-CIEC CPR/REF/28/INV/303	$200,000	$200,000	$200,000	2000BMSJ/200JK217DE	HKT, Germany	May 9, 2000
19. Wuhan Com. Machinery	A-76-CIEC CPR/REF/28/INV/298	$200,000	$200,000	$200,000	2000BMSJ/200JK215DE	HKT, Germany	May 9, 2000

Table 9 Summary of Machining Center Contract of 19 Projects Under Implementation

Enterprise	Project No. (World Bank & CPR/REF/)	Requested Amount	Approved Amount	Contract Amount	Contract No.	Technology Supplier	Date of Signing
1. Nanjing	A-10-CIB 16/INV/113			$1,580,000	96BMSJ/120JK054US	Cincinnati, US	Oct. 21, 1996
2. Anhui	A-11-CIB 16/INV/111	$1,054,000	$1,054,000	$1,210,000	97BMSJ/120JK056IT	Niigata, Japan	Nov. 25, 1996
3. Shanghai Refrigeration	A-12-CIB 16/INV/110	$1,765,400	$1,765,400	$1,840,000	97BMSJ/120JK106US	Cincinnati, US	Nov. 11, 1997
4. Yantai	A-13-CIB 16/INV/114	$1,330,000	$1,330,000	$1,400,000	97FPK-530007JP/CIB	Niigata, Japan	Mar. 11, 1997
5. Taizhou	A-14-CIB 16/INV/112	$805,000	$805,000	$	GJPNT-93029	Niigata, Japan	Nov. 9, 1993
6. Beijing	A-15-CIB 15/INV/107	$1,330,000	$1,240,000	$1,697,386	96BMSJ/120JK053US	Cincinnati, US	Oct. 15, 1996
7. Chongqing. General Mach. Fact	A-35-CIB 20/INV/182	$881,000	$881,000	$851,175	97BMSJ/12JK108DE	Deckel Maho GMBH.	Dec. 8, 1997
8. Zhenjiang Fact.	A-37-CIB 20/INV/183 22/INV/209	$1,017,750 $1,205,000	$1,017,750 $1,205,000	$904,500 $1,137,000	98BMSJ/12JK112JP 98BMSJ/12JK111JP	Niigata, Japan	May 11, 1997 Dec. 1, 1997
9. Tianjin Tianshan Ref. Eq. Co	A-40-CIB 20/INV/175	$1,200,000	$1,200,000	$1,435,900	97BMSJ/120JK105US	Cincinnati, US	Nov. 11, 1997,
10. Shanghai General Mach. Co.	A-42-CIB 20/INV/180	$1,115,500	$1,115,500	$1,121,840	97BMSJ/120JK106US	Cincinnati, US	Nov. 11, 1997
11. Ningbo Refr. Mach. Factory	A-46-CIB 22/INV/215	$920,000	$920,000	$933,930	98BMSJ/21JK106DE	MAHO	Nov. 5, 1998
12. Chongqing Bingyang Refr.	A-47-CIB 22/INV/214	$1,102,000	$850,000	$1,010,000	98BMSJ/12JK192IT	Mandelli, Italy	Dec. 3, 1998
13. Zhejiang Chunhui Co.	A-48-CIB 22/INV/210	$1,025,000 $1,204,000	$1,025,000 $1,204,000	$995,780 $1,167,780	98BMSJ/12JK089US 98BMSJ/12JK173US	Cincinnati, US	Oct. 21, 1998 Nov. 20, 1998

14. Guangzhou Ref. Mach.Fact.	A-49-CIB 22/INV/198	$1,120,000	$850,000	$917,570	98BMSJ/12JK096US	Cincinnati, US	Sept. 11, 1998
15. Wuhan New World Ref. Ind.	A-51-CIB 22/INV/208	$1,650,000	$1,650,000	$1,335,000	99BMSJ/200JK111US	Cincinnati, US	June 8, 1999
16. Subei Ref. Mach. Factory	A-52-CIB 22/INV/200	$920,000	$920,000	$858,000	98BMSJ/12JK163US	Cincinnati, US	Jan. 29, 1999
17. Zhejiang Com. Machinery	A-69-CIEC 28/INV/300	$700,000	$700,000	$865,000	2000BMSJ/12JK045DE	Cincinnati, US	July 9, 2000
18. Yueyang Hengli Air-Cool	A-75-CIEC 28/INV/303	$700,000	$700,000	$935,000	2000BMSJ/12JK048DE	DMG, Germany	July 8, 2000
19. Wuhan Com. Machinery	A-76-CIEC 28/INV/298	$700,000	$600,000	$740,000	2000BMSJ/12JK049JP	Niigata, Japan	July 6, 2000

Table 10 Summary of Three-Coordinate Measuring Machine Contract of 19 Projects Under Implementation

Enterprise	Project No. (World Bank & CPR/REF/)	Requested Amount	Approved Amount	Contract Amount	Contract No.	Technology Supplier	Date of Signing
1. Nanjing	A-10-CIB 16/INV/113			$214,198.6	96MBSJ/280JK048US	Brown & Sharpe	May 27, 1996
2. Anhui	A-11-CIB 16/INV/111	$174,000	$174,,000	$214,625	96BMSJ/280JK050US	Brown & Sharpe, US	May 27, 1996
3. Shanghai Refrigeration	A-12-CIB 16/INV/110	$208,100	$208,100	$210,534	96BMSJ/280JK029US	Brown & Sharpe, US	May 27, 1996
4. Yantai	A-13-CIB 16/INV/114	0	0	$259,700	96FPK-530035US/CIB	Brown & Sharpe, US	Oct. 11, 1996
5. Taizhou	A-14-CIB 16/INV/112	0	0	0			
6. Beijing	A-15-CIB 15/INV/107	$	$200,000	$201,200	96BMSJ/280JK047US	Brown & Sharpe, US	May 27, 1996
7. Chongqing. General Mach. Fact	A-35-CIB 20/INV/182	$467,400	$467,00	$325,000	97BMSJ/12JK110E	Zeiss, Germ	Nov. 28, 1998
8. Zhenjiang Fact.	A-37-CIB 20/INV/183 22/INV/209	$180,000	$180,000	$183,332	97BMSJ/28JK033US	Brom & Sharpe	May 11, 1997
9. Tianjin Tianshan Ref. Eq. Co	A-40-CIB 20/INV/175	$190,000	$190,000	$195,873	97BMSJ/28/JK031US	Brown & Sharpe, US	May 11, 1997
10. Shanghai General Mach. Co.	A-42-CIB 20/INV/180	$180,000	$180,000	$193,662	97BMSJ/28JK032US	Brown & Sharpe, US	May 11, 1997
11. Ningbo Refr. Mach. Factory	A-46-CIB 22/INV/215	$180,000	$180,000	$140,000	98BMSJ/28JK062US	Brown & Giddings, US	Mar. 5, 1999
12. Chongqing Bingyang Refr.	A-47-CIB 22/INV/214	$190,000	$95,000	$142,000	99BMSJ/28JK011GB	IMS, UK.	Jan. 20, 1999
13. Zhejiang Chunhui Co.	A-48-CIB 22/INV/210	$190,000	$190,000	$131,116	98BMSJ/28JK173US	Brown & Giddings, US	Oct. 20, 1998

14. Guangzhou Ref. Mach.Fact.	A-49-CIB 22/INV/198	$190,000	$95,000	$140,000	99BMSJ/28/JK012GB	IMS, UK	Jan. 20, 1999
15. Wuhan New World Ref. Ind.	A-51-CIB 22/INV/208	$190,000	$190,000	$134.500	2000BMSJ/28JK053GB	IMS, UK	Feb. 19, 2000
16. Subei Ref. Mach. Factory	A-52-CIB 22/INV/200	$180,000	$180,000	$141,000	98BMSJ/28JK193GB	IMS, UK	
17. Zhejiang Com. Machinery	A-69-CIEC 28/INV/300	$95,000	$83,412	$103,000	2000BMSJ/28JK212US	Giddings & Lewis	July 8, 2000
18. Yueyang Hengli Air-Cool	A-75-CIEC 28/INV/303	$95,000	$123,000	$180,580	2000BMSJ/28JK213GB	IMS, UK	July 8, 2000
19. Wuhan Com. Machinery	A-76-CIEC 28/INV/298	$95,000	$56,000	$84,850	2000BMSJ/28JK211US	Giddings & Lewis	July 7, 2000

Status of the Technical Assistance Project Implemented by Hefei General Machinery Research Institute (GMRI)

4.2 This purpose of this technical assistance project is to establish new standards, set new safety requirements, and provide testing equipment for non-CFC compressors in China. The project is implemented by the General Machinery Research Institute (GMRI). The completion of this project is essential to the eventual success of conversion activities in the sector as GMRI is charged with the responsibilities of ensuring in standard setting and new compressors met all national standards and requirement. It is also responsible to help enterprises in technology and technical issues.

4.3 This project was approved in November 1997 by the 23rd ExCom for a grant amount ofUS$692,400. A sub-grant agreement was signed between SEPA and the GMRI in 1999, reflecting delays resulting from major reorganization of concerned ministries. GMRI is a state owned institute which functions as the Quality Monitoring and Testing Center of Refrigeration Products. Implementation of the four project components is shown below.

4.4 **Component 1- Revision of Standards.** The project had initially envisioned eleven standards to be revised. In August 1999, SEPA and the Bank agreed that the number of revision standards be reduced from eleven to seven. as the Government had reorganized the permissible categories of compressors by widening the ranges, and eleven categories no longer existed. The 7 standards to be revised were as follows:

GB10871-89: Type and Basic Parameters of the Small Single Stage Reciprocating Compressors
GB10872-89: Technical Conditions of the Small Single Stage Reciprocating Compressors
GB10873-89: Testing Methods of the Small Single Stage Reciprocating Compressors
GB10874-89: Type and Basic Parameters of Medium Single Stage Reciprocating Compressors
GB10875-89: Technical Conditions of the Medium Single Stage Reciprocating Compressors
GB10876-89: Testing Methods of the Medium Single Stage Reciprocating Compressors
ZBJ73040 : Centrifugal Chiller.

4.5 Though the seven standards were drafted for review by experts in late 1999, China undertook another round of reorganization, and the State Administration of Technical and Quality Supervision (SATQS) reduced the number of National Standards by further combining several relevant standards together. As a result, the first 6 standards of reciprocating compressors (from GB10871-89 to GB10876-89) were merged into one standard, for a Single Stage Reciprocating Compressor, covering all the technical requirements and specifications of the previous 6 separate standards. The previous 7th standard of ZBJ73040 was merged into the standard category of “Water chilling (Heat pump) package for industrial & commercial and similar application”, but the technical requirement remains unchanged. The work specified in the TOR has been completed, and revised standards were submitted to SATQS in November 2000, but have not yet been approved. The required procedure for applying the revised standards requires that the standards be approved by SATQS, and they are then to be published by the Standards Publishing House

(SPH). GMRI has submitted the completion report and disbursement request to SEPA on 08/02/01 for its review.

4.6 **Component 2 -- Retrofit of testing facilities**: This component envisions complete retrofit of the two testing facilities which started in April 2000. As the costs of equipment exceeded the grant allocation by a marginal amount, there have had to be some adjustments in providing for counterpart resources, but GMRI has signed the contract with the equipment supplier in January 2001 and has agreed to provide the balance from its own resources. The equipment is expected to be delivered shortly after these formalities are completed and contract approval is given, and installation and testing could be completed in four months. The testing facilities will be first used to carry out the "entrust testing" (not required by Government) and the verification testing for the HCFC-22 compressors of the 19 commercial refrigeration compressor projects financed by MLF, since the approval and publishing of revision standards have been delayed.

4.7 **Component 3-- Licensing and quality control systems:** This component includes the procurement of two optical measuring devices and a technical assistance subcomponent. The contract for the two optical measuring devices procured through International Competitive Bidding was approved by the Bank in July 2001, and the optical measuring equipment was shipped in August from the German supplier. The equipment installation, testing, training and commissioning is expected to be completed within about four months of delivery. Provided that testing and adjustment of the devices proceeds smoothly, the two optical measuring devices could be commissioned by April 2002. The TA subcomponent of this project relates to the revision of the production license and quality control system. As part of the above-mentioned reorganization, SATQS has decided to unify such clearances under a Safety Certification System(SCS) to most industry products, to verify if the products can enter the market. The government functionary has also changed. However, though the nomenclature has changed, the technical requirements for SCS remain the same as before. GMRI remains the actual implementation agency for safety certification of refrigeration compressors. Under this TA, GMRI has formulated "The Detailed Implementation Regulation on Safety Certification for Refrigeration and Air Conditioning Products". This sub-component is therefore complete, and GMRI has submitted its completion report to SEPA. All new products to enter the market would need to follow this safety certification.

4.8 **Component 4 --Technical support (no grant attached)** to facilitate the satisfactory technology transfer to all 24 projects GMRI is obliged to provide technical guidance and support to enterprises in their conversion activities. This component is extremely important, and was the justification for providing the entire TA in the first place. GMRI has provided its technical services and advice to all the approved enterprises.

4.9 The project is expected to be completed before June 2002.

V. PHASEOUT STRATEGY

5.1 Based on current project implementation status and the updated Country Program for ODS Phaseout in China, the CFC consumption phaseout in this sector would be implemented through a sector plan. The new production of CFC based compressors will be completely phased out by the end of 2004. The CFC consumption control targets are shown as follows.

a. Dec.31, 2002 - Completion of the remaining on-going 12 projects
b. 2002 – Dec.2004 to - Implementation of the sector plan for the last five enterprises reach full output
c. 2002 - 2003 - Issue and enforce the new standards and technical norms
d. Dec 31, 2002 - Issue production ban for CFC based compressor
e. Dec 31, 2002 - Issue import ban for CFC based compressor
f. Dec 31, 2004 - Implementation production ban for CFC based compressor
g. Dec 31, 2004 - Implementation import ban for CFC based compressor
h. Dec 31, 2004 - Production and import of all CFC equipment in ICRS ceases

5.2 The CFC 11/12 consumption in the sector involves two activities: new production and servicing. The phaseout CFC tonnage included in this sector plan is only for new production, i.e., 1,023 MT of CFC-11/CFC-12. Therefore, the main control indicator for this sector plan is CFC consumed by new equipment.

5.3 The substitute technologies to be considered by China are:

a. HCFC 22 instead of CFC 12 for food freezers and cold storage facilities with a semi-open compressor (1-15KW), and facilities with small open compressor (7-15KW);
b. HCFC-22 or NH_3 for facilities with open compressor (12-72KW);
c. HCFC-123 or HFC-134a for turbine-type refrigeration units;
d. HCFC-22 for unit air-conditioners with medium semi-open compressor (22-140KW); and
e. HCFC-22 or HFC-134a for refrigerated transport.

5.4 For existing equipment, China will promote to reduce and prevent CFC emission. China will also promote CFC recycling, and encourage replacing CFC refrigerants with mixed refrigerants, or Huffs. Through demonstration projects, China will gradually popularize these practices to expedite substitution.

5.5 HCFC-22 as a transitional substitute is used in this sector widely. It will be an issue for Chinese enterprises to face the second phaseout on production and servicing at own costs. Therefore, it is important to encourage enterprises to choose 100 non-CFC alternative technologies.

5.6 To carry out the Sector Plan, the Government will take effective actions and measures. Phaseout actions include:

a. **Control of CFC Consumption in new equipment:** Speed up implementation of ongoing conversion projects and insure their early completion. Provide CFC consuming enterprises with alternative technologies to convert to non-CFC technologies. According to the phaseout schedule in 5.1, it is important to start

phaseout activities in the last few enterprises, including the five potential candidate enterprises from the 8 remaining enterprises with MLF support. Through raising public awareness and ban measures, China aims to phase out CFC consumption for new equipment by the end of 2004.

b. **Training and awareness campaigns:** Develop training and promotion activities, based on generalization and popularization of completed projects, to encourage remaining enterprises to actively participate in CFC phaseout.

c. Formulation of technical specifications and implementation of standards.

d. Formulation and issue policies to ensure implementation of phaseout projects.

e. **Supervision and monitoring.** Set up an effective system of supervision and implementation, including introduction of management information system to ensure enforcement of phaseout plans.

VI. POLICIES

6.1 The PMO of SEPA is responsible for managing the ICRS sector plan. The special working group established in early 2000 consists of officers from PMO, SAMI and SAIT. They will organize, manage, implement and supervise the phasing out activities in the sector.

Policy Objectives

6.2 The objectives of phaseout policies are:

a. To achieve the phaseout targets both set in Country Program and the sector plan, follow the general policy framework designed in Country Program. The policies and regulations established and enforced by government, should promote the enterprises to convert technologies, ensure implementation of the sector plan;
b. To provide incentive measures to facilitate enterprises phase out CFC based equipment production;
c. To provide an effective policy and technical support for CFC phaseout process;
d. To force remaining enterprises phase out CFC by closure or conversion, avoid transfer of CFC based equipment production from one factory to another;
e. To encourage production of non-CFC based equipment and using substitutes;
f. To ensure normal development of Industrial and Commercial Refrigeration Sector and improvement of living standards of their employees, meet demand for refrigeration equipment, at the same time fulfilling phaseout goals.

Existing Policies

6.3 A large number of phase out activities have been developed in ICRS in the past ten years, a series of measures have been taken. These measures include Various existing policies will contribute to facilitate the industrial and commercial refrigeration sector phaseout targets being achieved. Key policies include the following:

6.4 **November 1997 -- Circular on bans of establishment of new production sites for production and consumption of ODS** was issued by SEPA, SPC, SETC and ICA. The ban requires all regions not to build, enlarge or renovate ODS-producing equipment and other equipment using ODS as material. The measures will be adopted to ensure that new non-CFC compressors products become established in the market place at a sufficient rate for the phase-out goals to be achieved. Ever since 1990s, there is no such investment for construction or expansion of CFC based refrigeration compressor production. Therefore, the production capacity of CFC based compressor has not been increased.

6.5 1997 -- SEPA issued a **Circular on Enforcement of Declaration and Registration of Pollutants.**

6.6 **May 1999 - Production quota system.** ExCom approved the Sector Plan for Phaseout CFC Production in March 1999. Subsequently, SEPA and SPCIA had issued a Circular on production quota and Permit system for CFCs in May 1999. Annual ODS production quotas are issued to ODS producers, and are reduced annually based on the CFC production sector plan. The system will effectively reduce the uncertainty in implementing

the ICRS sector plan. The shortage of CFC supply will also encourage the move to use of substitutes and alternative technology.

6.7 **December 1999 - Import & export license system.** SEPA, SETC and GCA issued a Circular on for management ODS of import and export. This circular has entered into force in April 2000. The regulation requires ODS import and export activities to be registered. Annual import is controlled by a national import quota which is determined every year. Combined with the production quota, the management of ODS import and export effectively regulates the national supply of CFCs and encourages the development and production of substitutes.

6.8 **Other measures** over the years include a series of large scale education and dissemination campaign launched by means of conferences, television, newspaper, radio and other media.

6.9 Domestic research institutes and enterprises have begun to develop substitutes and alternative technologies and have made some progress that will lay a foundation for ODS phaseout in ICRS. However, the refrigeration equipment manufacturers and buyers still prefer compressors made with imported technologies or imported compressors as their qualities are perceived to be better and technologies more advanced.

6.10 In addition to the financial assistance it receives from the MLF, the Chinese Government has and will continue to establish policies, promote conversion, stop CFC-based equipment production, and force remaining enterprises to phase CFC out by closure or conversion. Thus policies, regulations and their enforcement are considered to be essential to influence activities of enterprises and consumers to encourage their active participation in phaseout activities. Since implementation of the 1995 sector strategy, many policies and measures have been adopted and new one are under consideration and development.

Policy Design

6.11 China will adopt a package of various policy instruments to ensure achievement of a cost-effective CFC phaseout. The policy instruments under design include control and command instruments, market-based instruments and voluntary agreements. China's policy design for CFC phaseout will be based on:

a. The law for prevention and control of air pollution issued on April 29, 2000;
b. Chinese situation, especially economical system reform and characteristics of Industrial and Commercial Refrigeration Sector;
c. Framework of policies for ODS phaseout in Country Program and "Strategy of ODS Phaseout in Commercial Refrigeration Sector" established in 1995;
d. The need to maintain continuity and consistency of these policies with the existing policy and regulation system;
e. Ensuring feasibility of the policies, as also continued supervision and management; and
f. Economic efficiency and fairness must be considered.

Policies Under Development for this Sector Plan

6.12 **Establishment of standards and technical norms:** Technical standards and product specifications are the basis for production quality control. New standards and technical norms consistent with alternative technology will be set up (reference to 4.7), which will make CFC-based compressor unqualified. The new quality standard for compressor used in industrial and commercial refrigeration sector will be issued by the State Bureau of Quality and Technology Supervision, and will become effective in 2002.

6.13 **Product Quality attestation System**: As substitute of the Production License system described in the strategy in 1995, the Product Quality attestation System should be established. According to the new quality standard (reference to 4.7), the sample of compressor should be tested and evaluated; qualified product was permitted to sale. This measure will be used to ensure that HCFC-22 based equipment becomes established in Chinese market.

6.14 **Production ban**: By the end of 2002, production ban of CFC based compressor will be promulgated by SETC and SEPA. CFC based compressor production will be banned from December 31,2004, which will force remaining enterprises to close or convert. The aim of the measures is to cease production of all CFC-based refrigeration equipment.

6.15 Sale of CFC-based Industrial and Commercial Refrigeration equipment will be banned by implementing new product quality standards: From January 1 2005, New Quality standards that consistent with alternative technology will be implemented to forbid sale of CFC-based industrial and commercial refrigeration equipment. Only sale of non CFC-based industrial and commercial refrigeration equipment that meet New standard is permitted, which will be enforced and monitored by sample spot-check conducted by technology and quality supervision administration (that possess of authority to seal up and sequestrate unqualified products) authorized by government.

6.16 **Publicity policy:** Through various media, such as broadcast, TV and newspapers, disseminate knowledge of depletion of Ozone Layer by ODS and to raise public awareness (such as TV advertisement). Encourage end-user to use alternative technologies, substitutes and equipment as early as possible, accelerate phasing out CFC in refrigeration sector by relative policies. To summarize and popularize the experience obtained from implementing phaseout of ODS, hold up training and propaganda (such as net information, workshop, and honoring), and encourage enterprises to take part in phaseout activities.

Policies Under Consideration for this Sector Plan

6.17 **Import and Export Controls:** Ban for import and export of CFC based refrigeration equipment will be issued by SEPA and the General Customs Administration by 2004, which will prevent the import of CFC based equipment from 2005.

6.18 **Tax Policy/pollution charge**: The feasibility of tax policy/pollution charge would be conducted. If possible, differential tax/pollution charge rates would be applied to each to ensure that non-CFC based products become established in the market. SEPA would be responsible for the research.

VII. INCREMENTAL COST ANALYSIS

7.1 Based on the 1995 Sector Strategy, China would select 24 enterprises to apply for MLF support for CFC phaseout. Since 19 enterprises have already received MLF support, this chapter only includes incremental costs for another five enterprises. However, the action plan in this chapter includes all remaining required phaseout activities, excluding servicing, in the sector plan.

7.2 The total consumption of the remaining 8 identified enterprises is 1,023 tons in 2000. However, the incremental cost under the sector plan is calculated for 5 identified enterprises. With the implementation of this sector plan, China will have completely phased out CFC consumption for new equipment in this sector. This section describes the incremental phaseout costs for the remaining enterprises. The additional (counterpart) costs for supporting implementation of the sector plan are also included in the incremental cost table.

7.3 There are nearly 5,000 tons CFC-11/CFC-12 consumed for servicing in this sector. The current CFC production can meet the servicing requirements, but a strategy for recycling and servicing sector would be developed in the next few years with UNEP assistance as production is reduced. The incremental costs for the recycling and servicing sector are not included in this sector plan.

7.4 The total CFC consumption for the 8 enterprises has been provided above in Table 6. The one time investment incremental cost and operating cost for each conversion project under this sector plan are shown in Table 11. Detailed cost analysis is provide in the Annex.

7.5 As stated above, this sector plan will enable indirect phaseout of the total amount of 1,023 tons at eight enterprises.

Table 11 Incremental Costs for 8 Candidate Enterprises

	Dalian #2	Chunlian	Yuhuan	Minhang	Beifeng	Shangleng #1	Luoyang	Shijiazhuang	Total
Production Capacity (annual/shift)	1,500	8,000	6,000	6,000	8,000	1,500	1,100	1,500	**33,600**
Actual Production in 2000	325	8,193	5,938	5,400	7,543	91	Not available	Not available	**27,497**
ODS use (tons in the year 2000)	154.18	147	204	125	149.76	139	25	79	**1,023**
ODS Phase-out Amount (ODP tons/year**)**	**148.78**	**141**	**197**	**121**	**144.52**	**135**	**24.13**	**76.24**	**988**
Investment Capital Costs (US$)	1,827,326	1,535,197	1,581,282	1,566,219	1,513,312	2,097,635	2,080,500	2,261,800	**14,263,799**
Contingency (10%)	182,733	153,520	158,128	156,622	151,331	209,764	208,000	226,180	**1,426,331**
Total Investment Costs (US$)	2,012,059	1,688,717	1,518,011	1,722,841	1,664,643	2,307,399	2,288,500	2,487,980	**15,690,130**
Deduction for technology	-241,445	-202,646	-208,729	-206,741	-199,757	-276,888			**-1,336,206**

upgrade (12%)									
Incremental Operating Cost	123,582	361,120	354,400	262,320	348,640	587,801	753,012	198,900	**2,989,775**
Total Project Cost	**2,133,641**	**2,049,837**	**1,872,411**	**1,985,161**	**2,013,283**	**2,895,202**	**3,104,512**	**2,686,880**	**18,677,925**
Requested MLF grant (US$)	**1,768,852**	**1,546,071**	**1,395,399**	**1,576,100**	**1,524,886**				**7,811,308**
Self financing (US$)	364,789	503,766	477,012	409,061	488,397				**2,243,025**
Cost effectiveness (US$/kg)	11.9	11.0	7.1	13.0	10.6				7.9

7.6 Based on MLF guidelines, the funding requested from MLF is US$7,811,308 for the investment costs at five enterprises. The selected enterprises will have to finance all other ancillary costs for conversion, estimated at US$2,243,025, from their own resources.

7.7 In addition, the following technical assistance activities are proposed for facilitating phaseout in the sector.

Table 12 Incremental Cost for Technical Assistant Activities

Item	Cost (US$1,000)
4.10 Improvement of R-22 design technology and costs of technology transfer between the company and the national technology provider, allocated @ US$60,000 per enterprise for improvement of the Chinese compressor design to match performance and quality of imported compressors.	300

7.8 The total incremental cost for this sector plan is summarized in Table 13 below. The incremental cost applied to MLF under this sector plan is **US$8,111,000**, of which US$300,000 is for TA activities and US$7,811,000 for 5 enterprises to convert their CFC compressor production to HCFC.

Table 13 Incremental Cost for CFC Phaseout in ICRS (US$,000)*

Item	Incremental Cost provided by MLF	Total Incremental Cost to China	Total Incremental Cost of Conversion
Approved 19 projects	44,438	16,552	61,682
Approved TA project	692		
Total present estimated costs for phaseout in 49 enterprises	0	83,790**	83,790
Of which for five enterprises	7,811	2,243	10,054
Of which for supporting activities	300	0	300
Total funding request	8,111	2,243	10,354
Total Phaseout Cost for This Sector	53,241	102,585	145,472

* Incremental Cost in above table includes phaseout cost for new production consuming CFCs in ICRS.
** The cost is estimated based on the ACTION PLAN FOR THE PHASEOUT OF CFC SUBSTANCES CHINA INDUSTRIAL AND COMMERCIAL REFRIGERATION INDUSTRY.

Table 1

Legend:

Ia. 6 enterprises with MLF funded conversion projects – completed
Ib. 13 Enterprises with MLF funded conversion projects -- under implementation
II. 17 Production lines at 15 Enterprises That Are Still Producing CFC Based Compressors
III. 5 Production Lines at 4 Enterprises That Converted its Compressor Production
IV. 32 Production lines at 31 Enterprises who closed compressor production

List of 73 Compressor Production line in 69 companies in the IRSP

No.	Name of Enterprises	Category	Products
I (a) - 6 enterprises with MLF funded conversion projects – completed			
1	**Nanjing Refrigeration Machinery Works**	MLF funded Project	Small semi hermetic
	Project has been completed and submitted to 33rd ExCom. The plant produced 1,121 non-CFC compressors in 2000.		
2	**Taizhou Commercial Machinery Factory**	MLF funded Project	Small semi hermetic
	No JV or other affiliated companies. The high price of the new compressors is the real issue for its low production after conversion. It is to some extent the same reason for many other compressor producers. Three types of compressors have been introduced with HCFC 22 technology. Only some models have been produced. Other models have not yet been produced Remaining models has not been completed for trial production and testing and can therefore not be sold. It is only using its own compressor. Largest non-CFC producers. It produced 4,600 compressor units in 2000. It also assembles chillers and sells to other ref equipment manufacturers for food display and food storage. There has been no change in the ownership. Only the manager has been changed. Project team is still working there.		
3	**Shanghai Refrigeration Machinery Works**	MLF funded Project	Medium open and semi hermetic compressors
	One JV established around 1996 and 1998 with Grasso mainly for the production controls and valves of refrigeration equipment. It has another JV with Carrier for railway train air conditioning before the project was developed. They purchase compressors from foreign suppliers. Produces semi hermetic and semi open compressors. Production in 2000 was 648 units, 12kW to 72 kW. The production figure was low because the project was only in 2000. Customers need time to change to HCFC-22. Higher cost of the new compressors are also an issue. The company is a member of the **Shanghai Shangling Appliance Group Company** which is the controlling body for the group. It was originally a governmental bureau but it changed because of industrial restructuring in China., There are several companies within the group. SGMW is one of them. In addition, there are two JV and one food storage company within the group. Other products of that company is low temperature cabinets (minus 40 to minus 60). In addition, this factory also produces equipment for off shore oil platforms. Recently it supplies equipment for Bohai oil field near Tianjin. Previous director is now in the Shanghai Vacuum Factory, another company within the group. They did not test their compressors in Hefei institute as they are tested in Shanghai General Machinery Research Institute which is the local research institute. After provincial level testing and approval, they can be sold nationally. The proposed shift to a national certification is not yet in place, hence the provincial level testing is accepted. When the new system is in force, then they have to be tested at the certified testing centers certified by the national testing center (HEFEI). It is not HEFEI itself, but an administration set up in HEFEI, but not part of the testing institute. Capacity is around 6,000 units.		

4	**Beijing Refrigeration Machinery Works**	MLF funded Project	Medium semi hermetic
	The project has been completed and PCR was submitted to 33rd ExCom. The enterprise is presently under reconstruction. The company is not producing now but it is assumed that it could resume production when the restructuring has been completed in second half of 2001. The production for non-CFC compressor production in 2000 was only 3.		
5	**Yantai Refrigeration Machinery Works CPR/REF/15/INV/114**	MLF funded Project	Medium Ammonia
	The project has been completed and PCR was submitted to 30th ExCom . In addition to the four JV companies which have been already reported to the Bank, there are no change in the information. The director has been changed due to the retirement of the previous director. The plant has produced 3,003 non-CFC compressors in 2000.		
6	**Chongqing General Machinery Works CPR/REF/20/INV/182**	MLF funded Project	Centrifugal-large/medium
	Project has been completed. The draft PCR was submitted to the Bank, and is under review. The Chongqing General Machinery Group Company has four companies: (i) CGM Works, (ii) CGM Factory, (iii) Bingyang JV Jaralang Refrigeration Cooperation Limited (with HK), and (iv) Industrial service company. There has been no major changes in CGM Works. The CGM Factory is trying to establish a JV with York. However, it has not been agreed yet. Reason for no agreement is that York has set two conditions: (i) out of its present workforce of 3,000, only 200 would be needed for the new company. The rest would not be need. The 2,700 workers would not be allowed to work in the refrigeration sector in the future; and (ii) all assets of CGM should be belong to the JV, but they constitute only 20% of the total share of the company. Effectively, York would own 80% of the shares. The former manager has retired. Before that he was the one who committed to provide the counterpart funding for the project. As he has retired already, the new management does not honor his commitments. The company is only producing centrifugal refrigeration chillers units and related facilities. The compressors produced are only for their own chillers. Another products are industrial fans, Blowing air for tunnels, textile factories etc. Shenyang is the other larger fan company in China. The company also produces evaporators and condensers. Due to its size, they are covered by the pressure regulation and must be tested and approved accordingly. Evaporators and condensers are sold to other producers as well. South China Air Conditioners in Guangdong only produces centralized air condition system with evaporators and condensers from CGM Works. Previously they also tried to develop a lithium compressors, but they did not succeed due to quality issues. Another product was the Bitzer compressor for water chillers. This product failed. A third product MAC for small vans had also failed.		
I (b)-13 enterprises with MLF funded conversion projects -- under implementation			
7	**Anhui Refrigeration Machinery Works CPR/REF/15/INV/111**	MLF funded Project	Small open
	The enterprise had been in good shape financially when the project was prepared and approved. Unfortunately, the management made some wrong investments in the past few years and lost all the capital. The ownership restructuring was not supported by the local government. Key staff left the company and went to other ref companies and that include those who had been trained under the project. The only way to recover is through privatization and merger. Without a large fresh inflow of capital, the plant will probably die. No banks will give them credit in their current situation. China has set up a new modality for financially distressed companies since 1999. The debts can be		

	converted into shares by the companies. Anhui is now trying to get help under the new modality. If they are successful, they may have the possibility to recover. Its products are reciprocated compressors and freezers. Small compressors can be used for refrigeration trucks and should have a good market as all compressors for that segment are imported. They also produces icebars , freezers and cold storage for the rural area. Some truck makers also contacted the company in order to make refrigerated trucks, but Anhui did not have sufficient cash to enter the market. When they ordered the machining center, the Japanese supplied the Blissfield drawings. The Japanese suppliers provided tolls and jigs specifically for the Blissfield compressors. They should have been made by the Chinese and not by the supplier. Hence the company has no clue on how to specify the jigs and tools for other models. Much more expensive than allowed and necessary. OverUS$150,000 in extra costs. The domestic model is based on a self development. 1950 Soviet model original from the Nanjing factory. CFC-12 model modified for HCFC-22. In 1980 they bought it privately from Nanjing. Above the cover of the compressor they built a double layer for water cooling. With the additional cooling, it can be used for R22. Water tower and circulation of water is needed. The rural area do not care about the water consumption as the price is the issue. Energy consumption of the compressors are the same, but the re-circulation take extra energy. Price difference on the compressors is not correct and does not take into account the water cooling. The compressors will not be accepted under the new standard. Only 3 to 4 years more, then they will have to be replaced them anyhow. Market is not big enough for such old design. Water recycling and water uses is an issue regarding water cooled HCFC-22 compressors. Old compressors can not be produced on the machining centers and the new equipment can not be used for the production of the old models. Only blissfield compressors can be produced without new drawings, re-programming and tools and jigs. The prototype of first model of Blissfield, TT supplier, passed the test done by Hefei General Machine Institute in May 2000. The plant is preparing small scale production. CH model compressors have reached the standards stipulated in the contract and 100 CH compressor sets and parts for 200 sets have been produced. The plant has not produced the prototypes of the other two models (HGB and CG) of Blissfield compressors, due to its serious shortage of working capital and other financial difficulties. The plant has retrofitted its own CFC-12compressor into HCFC-22 compressors(two cylinder) partially using Blissfield technology, and put into production since 1999. Meanwhile, the enterprise is consulting for the manufacturing of second proto type model(two cylinder) with the assistance of Zhenjiang Ref. Mach. Plant which has similar TT contract with the same supplier, Blissfield, for the same compressor models. Second training under the TT contract in Blissfield has not been carried out yet, which should be mainly focused on the quality control , product testing and compressor assembling. The project is expected to be completed by June 2002.		
8	**Subei Refrigeration Machinery Factory CPR/REF/22/INV/200**	MLF funded Project	Small open
	Project is under implementation but it is behind schedule. The enterprise with three other enterprises has signed a joint contract with the supplier, HKT. The contract stipulates that all four plants are to be covered in a single visit by the company's engineer, so unless four enterprises are ready to receive the supplier's engineer, technical support will not be available until the slowest of the four is ready for the technical visit. This has caused implementation delay. Machine center and 3-D measuring instruments are being installed. Technical documents procured from USA have arrived at the plan and have been translated. The casting part for the specimen have been prepared for the production. The factory intended relocation delayed the project. Recently, the workshop has been relocated into the economic development area. The project is expected to be completed around June 2002.		
9	**Ningbo Refrigeration Machinery Works CPR/REF/22/INV/215**	MLF funded Project	Small open
	The installation of the machine center and three coordinate measuring system and the training for		

	these two machines have been completed. The translation of technical documents has been finished. The training included in the contract to acquire the technology has been completed. The bid documents for the tool of the machine center is being prepared. The mould of compressor was prepared, and the production process is being designed now. But some workers' training to be done according to the technology transfer contract was postponed due to staff changes in Blissfield company and the fact that the new staff were not familiar with the technology transfer contract and implementation status. Also, the technology transfer contracts were signed for a group of 4 factories. As the 4 projects were in different progress stages, this caused difficulties in organizing the works, such as training time and the experts' working schedule, since all works had to wait for 4 of them together. The project is still behind its schedule. Relocation of the workshop in the economic development area has been done in January 2001. Some old equipment were left at the original site. There has also been ownership change in the enterprise. The name of the enterprise has been changed to Ningbo Yunshen Refrigeration Industry Ltd. Co. A new implementation plan to complete the project by June 2002 is under review.		
10	**Zhenjiang Refrigeration Machinery Works CPR/REF/20/INV/183 and CPR/REF/22/INV/209**	MLF funded Project	Small open /Semi hermetic
	There is two subprojects at ZREF. There has been a delay in the projects mainly due to Technology transfer issues. First subproject: Technology Transfer contract was combined contract for the three enterprise and the contract had contractual weaknesses. TT process has been delayed due to i) an outsourcing problem for the electric motor with HKT, ii) the British measuring system used in Blissfield's (supplier) drawings and documents which have created additional work for the plant iii) HKT's and Blissfield's (suppliers) attempt to combine overseas training and technology support for the three plants (Zhenjiang, Tianjin Tiansan and Shanghai General Machinery) together which caused a delay as each of the participants were at different stages of implementation. Second subproject: The technical documents for semi-opened compressor have been received, and the plant is translating the document to prepare the technical training. The supplier, HKT, did not provide the blue print of the electric motor and the prototype encountered some problems because of the compressor model's small size. The problem was, however, solved by the electric motor manufacturer. A sample semi-closed compressor has been assembled. Technical documents for small-opened compressors have been received and translation of the blue-print has been carried out. Initial training for compressor production and use of the machine center also completed and casting-models for small-opened compressors have been completed. The casting dies for 3 out of four compressors specimen have been completed and fourth one is under preparation. One of four imported machines has been passed the acceptance by both parties, supplier and the plant. Other three are at the adjusting and trial stage. The function -testing facility has been procured and installed. The pressure testing is underway. The project is expected to be completed around June 2002.		
11	**Zhejiang Chunhui Refrigeration Machinery CPR/REF/22/INV/210**	MLF funded Project	Small/Medium open
	The enterprise, along with 3 other enterprises, signed a joint contract with the supplier, HKT which stipulates that all 4 plants are to be covered in a single visit by HKT's engineer meaning that technical support will not be available until the slowest of the 4 is ready for the technical visit. This has caused implementation delays. Contracts for imported equipment, except the cutting instruments for the machine center and tooling pre-setter, have been signed. The machine center has been installed and training conducted. The plant is preparing bid documents for domestic equipment. The machining centers were installed and have being trial operating. The imported 3- D coordinating machine and local digital control lathe were installed. The Chinese translation for all the technology documents of small- and middle-opened compressors was finished. Contracts for crankshaft and boring and milling machine have been signed. The casting dies for small-opened compressors were finished. The plant is entering in the trial production of the casting parts for the		

	small-opened compressors and expect to assemble the specimen of small-opened compressors. The casting dies for middle opened compressors have been in process. The procurement for other equipment is underway. The project is expected to be completed around June 2002.		
12	**Tianjin Tianshan Refrigeration Machinery CPR/REF/20/INV/175**	MLF funded Project	Semi hermetic
	There has been implementation delay due to technology transfer. All imported equipment and 4 pieces of local equipment has been procured and installed; other local equipment, including cylindrical grinding machine, square bench surface grinder and milling machine are being procured. Training completed for the machine center and the CNC milling machine. Since HKT did not provide blue print of the inside of the electric motor, prototype production encountered great difficulties due to size differences and incompatibility. Use of a local-electric motor requires changes in the compressor's design which is a change from HKT's technology. The factory will import electric motors from Germany and expects to test the prototype after that. Since HKT did not provide blue print of the inside of the electric motor, prototype production encountered great difficulties due to size differences and incompatibility. Use of a local-electric motor requires changes in the compressor's design which is a change from HKT's technology. The factory has imported electric motors from Germany recently. The enterprise is doing the internal testing process and it is going to be sent to Hefei Institute for formal testing . Trial production has not been done yet. Due to the financial difficulties, the enterprise could not provide counterpart finance for domestic equipment purchase and testing facilities timely. The plant expects to pass the test of prototype in late 2001 and start to do trial production after that. The project is expected to be completed around June 2002.		
13	**Shanghai General Machinery Works CPR/REF/20/INV/180**	MLF funded Project	Medium open
	There has been implementation delay due to technology transfer and product quality. Enterprise has encountered similar problems as Zhenjiang Ref. and Tianshan and its prototype did not pass quality tests at Hefei General Machinery Institute. The FA, CEB, has appointed a consultant to investigate the problem and asked the Shanghai Machinery Research Institute to help the factory. Formal testing by a qualified institute will be done when HKT (technology supplier) staff come to China. Technology transfer and product quality: The build-in motor of the compressor was not readily available in China, technical parameters and connection drawing and explanation provided by HKT are not clear and inadequate, to source such motor in China delayed the project for about 10 months. Change the project implementation enterprise from former Shanghai General Machinery Factory to current Shanghai Vacuum Pump Factory due to the relocation of Shanghai General Machinery Factory from downtown Shanghai to suburb area. Such beneficiary enterprise change delayed the project for about 1 years, and SVPF has financial difficulties and the pump factory is not profitable. 95% of the grant amount has been disbursed and there are several items left to be procured including the pressure testing device, performance testing equipment and two CNC drilling machines. Funding is required for the items to be procured and the trial production of the second prototype compressor and small batch production of the prototype compressors. The project is expected to be completed around June 2002.		
14	**Chongqing Bingyang Refrigeration Machinery**	MLF funded Project	Medium open
	There has been delay in the project implementation due to technical and financial difficulties. The training for the machine center included in the contract and the training TA were completed in Nov 2000. The three coordinate measuring machines were installed in September,2000 and the training for operator was completed in December 2000. The procurement contract for two sets of CNC lathe was signed between the enterprise and the local supplier in August, and these two lathes were delivered to the enterprise in December 2000. The local equipment procurement progresses slowly since the company is short of funds. Installation and training for the two CNC lathes has been completed in June 2001. Three more		

	equipment items remain to be procured. The undisbursed amount in the enterprise's account is not sufficient to purchase the remaining equipment to complete the project implementation. An implementation plan to complete the project by mid-2002 is under review, and the enterprise has been asked to deposit certain amount into the FI account to ensure that domestic procurement payments are not interrupted. The project is expected to be completed around September 2002.		
15	**Guangzhou Refrigeration Machinery Works CPR/REF/22/INV/198**	MLF funded Project	Medium open
	The enterprise, along with 3 other enterprises, signed a joint contract with the supplier, HKT which stipulates that all 4 plants are to be covered in a single visit by HKT's engineer meaning that technical support will not be available until the slowest of the 4 is ready for the technical visit. This has caused implementation delays. Enterprise has signed a contract for machine center tooling and tool pre-setter November 2000. CNC milling machine, vertical boring/milling machine and automatic programmer procured locally by October 2000. The 3-D measuring machine is being installed but the degree of precision has not met contract stipulations and the problem is being addressed. Training included in the contract for TA has been completed. Other local machines will be procured before the end of 2001. The enterprise completed its restructuring in late March 2001 and new management has strengthened its management on production and quality control. The imported tools, tool pre-setters and programmers have been delivered to the port and they are expected to be delivered to the enterprise in October, 2001. The plant is planning to start the manufacturing of prototype compressor with HKT technology from mid -November, 2001 and to have the prototype compressor for testing at Hefei Institute in January 2002. Meanwhile it would start the manufacturing the prototype of second model. The factory wishes to start small batch production of new compressor in March 2002 and complete the project by end of June 2002. Technical consultations and price quotation on performance testing equipment is ongoing. The casting and mould are under preparation. The enterprise will cooperate with the other plants which have the same technology and the same supplier to complete the project according to the recent implementation plan. During the visit to the enterprise in September, 2001 ,the enterprise stated that the compressors which is medium-open, reciprocating based compressor transferred by HKT under MLF project has become relatively outdated and the better one should be semi-hermetic and screw based compressors. The third generation is hermetic vortex compressor for the air-conditioning for train. It also stated that though HKT based compressor is not advanced, it can still be used in water-cooling system, central air conditioning, cold storage trucks and big passenger bus. The enterprise is considering to cooperate with the appropriate foreign partner to develop more advanced and profitable compressors. The project is expected to be completed around June 2002.		
16	**Wuhan New World Refrigeration Ind. Co. CPR/REF/22/INV/208**	MLF funded Project	Medium open-screw type
	Training for use of machine center is completed and installation of machine centers is finished. Training for HCFC-22 technology also completed. Technology is being assimilated. Retrofitting of the compressor production line is underway. However, the packing-case of the 3-D coordinate machine was broken upon arrival at the Shanghai port and some equipment was missing. Implementation is delayed due to the procedure for settling the problem with the insurance company. Recently, the enterprise has settled the equipment problem with the insurance company. Technology is being assimilated. Retrofitting of the compressor production line is underway. Project is expected to be completed by June 2002.		
17	**When Commercial Refrigeration CPR/REF/28/INV/298**	MLF funded Project	Small open
	Plant has signed two contracts for Machining Center & Coordinate Measuring Device in June and July,2000. The machining center and coordinate measure device have been arrived in May,2001. The new workshop has been built. But technology transfer is delayed due to duty-free problem in China.		

	Project is expected to be completed by August 2002.		
18	**Zhejiang Commercial Machinery Factory CPR/REF/28/INV/300**	MLF funded Project	Small/medium open
	Plant has signed two contracts for Machining Center & Coordinate Measuring Device in June and July2000. The machining center and coordinate measure device have been arrived in May,2001. The new workshop has been built. But technology transfer is delayed due to duty-free problem in China Project is expected to be completed by August 2002.		
19	**Yueyang Hengli Air Cooling Equipment Co CPR/REF/28/INV/303**	MLF funded Project	Medium semi hermetic
	Plant has signed two contracts for Machining Center & Coordinate Measuring Device in June and July2000. The machining center and coordinate measure device have been arrived in May,2001. The new workshop has been built. But technology transfer is delayed due to duty-free problem in China. Project is expected to be completed by August 2002.		
II -- 17 Production lines at 15 Enterprises That Are Still Producing CFC Based Compressors			
20	**Shanghai #1 Refrigeration Machinery Factory**	In production	Turbine type
21	**Henan Luoyang Commercial Refrigeration Factory**	In production	Small NH_3/2.5-35KW
22	**Zhejiang Chunlian Refrigeration Machinery Works**	In production	Small semi hermetic
23	**Zhejiang Yuhuan Refrigeration Equipment Co**.	In production	Small & medium open
	Project document with the Bank		
24	**Liaoning Dalian #2 Refrigeration Machinery Factory**	In production	Medium open
	Project document with the Bank The refrigeration equipment produced are Cold storage buildings for the fishing industry (refrigeration transportation) Capacity of 5000 is based on the production of small compressors. If they produce larger compressors, the production capacity is around 3,000. Compressor production presently only 302 units.		
25	**Shanghai Minhang Refrigerator Factory**	In production	Small open
	Project document with the Bank		
26	**Jiangxi Nanchang Commercial Machinery Factory**	In production	Small open
27	**Hebei Shijiazhuang Railway Rolling Stocks Works**	In production	Small semi hermetic .
	Conversion will be an issue as technology is not available in China and it would be difficult to get it from foreign suppliers		
28	**Zhenjiang Commercial Machinery Factory**	In production	Small open
	Information not available		
29	**Jianchuan Machinery Works**	In production	Small semi hermetic
	Has a small production of compressors and buy compressors from outside suppliers. They produce cooling system for trucks.		
30	**Zhejiang Sanbei Ref. Machinery Factory**	In production	Small semi hermetic
31	**Zhejiang Sanbei Ref. Machinery Factory**	In production	Small open

	Ongoing production		
32	**Shenyang Fan Factory**	In production	Turbine type
	Ongoing production of compressors		
33	**Guangxi Medical Equipment Factory**	In production	Small semi hermetic
34	**Guangxi Medical Equipment Factory**	In production	Small open
35	**Wuhu Refrigeration Machinery Factory**	In production	Medium open
	Produces refrigeration equipment and a small production of compressors		
36	**Hangzhou Refrigeration Machinery Works** [2/]	In production	Medium open
	Produces refrigeration equipment and a small production of compressors.		
III -- 5 Production Lines at 4 Enterprises That Converted its Compressor Production			
37	**Dalian Refrigeration Machinery Works**	Converted at own costs	Small semi hermetic
	JV with SANYO. A significant producer of compressors. Also producer of refrigeration equipment for the Chinese market.		
38	**Dalian Refrigeration Machinery Works**	Converted at own costs	Small open
	JV with SANYO		
39	**Dalian Maritime Ref. Machinery Factory**	Converted at own costs	Small open
	Produces refrigeration equipment for the fishing and shipping industry as well as compressors for their own refrigeration equipment.		
40	**Tianjin #2 Refrigeration Machinery Factory**	Converted at own costs	Srew type compressors
41	**Mudanjiang Refrigeration Machinery Works**	Converted at own costs	Change to MAC compressor production
	Still produces compressors.		
IV -- 32 Production lines at 31 enterprises who closed compressor production			
42	**Hebei Xinji Refrigeration Factory**	Stopped production	Small open
	The compressor production had been closed down. They now only provide repair and servicing of ref equipment. Also do refrigeration installation engineering.		
43	**Zhejiang Yiwu Ref. Machinery Factory**	Stopped production	Small open
	The company has been restructured and is now a private company and has changed to other production outside the refrigeration sector.		
44	**Ningbo Refrigeration Machinery Factory**	Stopped production	Small semi hermetic
	The company is the same as #9 A MLF funded project. The production line for small semi hermetic compressors had stopped and dismantled. Established a JV ago with another company 2 years ago. A new workshop housing the new production line established under the MLF project has been built producing small compressors.		
45	**Ningbo Refrigeration Machinery Factory**	Stopped production	Medium open
	Same as above and #9 The compressor production line had been dismantled		
46	**Fujian Mingjiang Ref. Equipment Plant**	Closed	Small open
	Hd been completely closed and the company does not exist any longer.		
47	**Shanghai Commercial Machinery Factory**	Stopped production	Small open

	The company is not affiliated with the other Shanghai companies and not part of any of the groups. The production of compressors had been closed down. Their main business sis still in the refrigeration sector designing and installing refrigeration systems for cold storage. They also act as dealer of cooling systems and provide servicing and repair of refrigeration systems		
48	**Jiaozuo Commercial Machinery Factory**	Stopped production	Small open Completely closed.
	The company has been completely closed and the compressor production has been stopped and equipment dismantled.		
49	**Wuxi Refrigeration Machinery Works**	Stopped production	Small semi hermetic
	This factory collapsed financially a couple of years ago when the director moved to another factory. The company produces large freezers and cold storage. Their refrigeration dept undertake refrigeration engineering work. The also provide repair and servicing of refrigeration installation Compressors are bought from other companies, mainly Chinese companies. It also buys compressors from the a German. JV.		
50	**Shandong Zibo Medical Equipment Plant**	Stopped production	Small open
	Stopped compressors production many years ago. Has changed to the production of components for refrigeration systems and to refrigeration engineering.		
51	**Taixing Refrigeration Machinery Factory**	Compressor production stopped	Small semi hermetic
	The production of compressors has been completely closed.		
52	**Xi'an Refrigeration Machinery Works**	Compressor production stopped	Small semi hermetic
	State owned Production at the company had stopped. The workshops are now used as a market for sale of refrigeration equipment. The workers are still employed by the factory, but are only getting a minimum salary. The machinery in the workshop are now used by the workers for the production of components for refrigeration systems and for servicing.		
53	**Xi'an Refrigeration Machinery Works**	Compressor production stopped	Small open
	Same as above		
54	**Hefei Commercial Machinery Factory**	Compressor production stopped	Small semi hermetic
	All activities stopped. Similar situation as the Xi'an, but no activity and no business		
55	**Nantong Refrigeration Machinery Factory**	Compressor production stopped	Small semi hermetic
	Completely closed down now. All equipment has been dismantled and sold. Previous business: Ref equipment plus compressors.		
56	**Wuhu Xueyuan Refrigerator Factory**	Compressor production stopped	Small semi hermetic
	There are no production any longer, however equipment still exists, but all workers have left the factory. The previous business of the company was cooling system, freezers and cold storage refrigeration equipment and compressors.		
57	**Dalian Commercial Machinery Factory** [2/]	Compressor production stopped	Small open
	The company is now closed and equipment dismantled. The company previously produced large freezers and compressors for such equipment.		

58	**Ningbo #3 Refrigeration Machinery Factory**	Compressor production stopped	Small open
	The company is not related to the other Ningbo companies but located in the suburban of Ningbo The present business is assembly cooling system by themselves. Produce valves for air conditioners using the existing workshops		
59	**Harbin Refrigeration Machinery Works** [1/]	Compressor production stopped	Medium open
	The company was established by the municipality. It was a very simple workshop. Now the workshop is used for other products. The company produced cooling systems. However they had to close due to quality issues. The quality of the compressors and refrigeration equipment could not meet the national standards and they were forced to stop the production.		
60	**Jinan Xuesong Ref. Machinery Factory**	Compressor production stopped	Small open
	The company had stopped compressor production. The activities related to design and install refrigeration units on refrigerated trucks where they buy the compressors from outside.		
61	**Wujin Refrigeration Machinery Factory**	Compressor production stopped	Small open
	The company has been sold to a private company using the existing workshop for production of components. They are presently producing components for refrigeration systems and other sectors.		
62	**Guizhou Commercial Machinery Factory**	Compressor production stopped	Small open compressors. .
	The factory and all activities has been closed and all equipment dismantled and sold . The previous activities of the company consisted of compressor production and the production and assembling cooling system.		
63	**Changbaishan Refrigeration Machinery Factory**	Compressor production stopped	Small open
	All activities had stopped and production equipment has been dismantled The previous production consisted of production of refrigeration equipment and compressors.		
64	**Shanghai Air Conditioning Factory Qingpu Plant** [1/]	Compressor production stopped	Medium semi hermetic
	Compressor production had stopped. Equipment is now used for other businesses. The company is part of Shanghai Shangling Group and produces condensers and evaporators (called pressure tanks) and components for cooling and refrigeration systems.		
65	**Shanghai Global Ref. Machinery Factory**	Compressor production stopped	Medium semi hermetic
	The compressor production had stopped. Facilities are now used for the production of condensers and evaporators. They sell the condensers and evaporators to other companies.		
66	**Beijing Commercial Machinery Factory** [1/] **(Changcheng)**	Compressor production stopped	Small semi hermetic
	The company is not affiliated with the Beijing Refrigeration Company. The companies now has three types of business. • It has a JV with Japanese to produce supermarket display, • An engineering company for design and installation of cold storage projects, and A service company and sale of refrigeration system to restaurants.		
67	**Nanjing Jiangpu Medical Equip Factory** [2/]	Compressor production stopped	Small semi hermetic .
	The company had been closed for 3-4 years. The old equipment has been dismantled and sold as scrap. The workshops and buildings are now used as a construction material market.		
68	**Guangzhou Refrigeration Machinery Works** [1/]	Compressor production stopped	Small open
	The production of compressors had been stopped and it was to a private company for other business. The company is now engaged in servicing of refrigeration equipment and the production of components for refrigeration systems.		
69	**Guangdong Commercial Machinery Factory**	Compressor production stopped	Small compressor. Now only produces

			freezers and cold storage. Compressor both from #23.
	The plant is not affiliated with #15 and #67 and is in a different location. They had stopped the production of compressors and are now buying compressors from company # 23 (Zhejiang Yuhuan Refrigeration Equipment Co.) Production of freezers and cold storage have continued and the company is doing well.		
70	**Subei Refrigeration Machinery Factory** [2/]	Compressor production stopped	Small semi hermetic
	The company is the same as # 8 which had two production lines originally. The project for Subei only cover one type of compressors. The production of small hermetic compressors had been discontinued.. This compressor production line has been closed and the other line converted as project #7. The company also have other production activities (such as freezers and cold storage) and has good business.		
71	**Chongqing Ref. Machinery Factory** [2/]	Compressor production stopped	Medium semi hermetic
	This company is part of Chongqing Bingyang (#14) and it now belongs to a group company. The production line for compressors had been closed, but the workshop still exist. The equipment is used for production of components and parts for refrigeration equipment sold by the group company.		
72	**Fujian Great Wall Ref. Machinery Factory**	Compressor production stopped	Medium open
	The company is still in the business of producing and supplying refrigeration systems to the shipping industry The production of compressors has been closed and the company is buying the compressors from outside.		
73	**Lushun Refrigeration Machinery Works** [1/]	Compressor production stopped	Medium open
	It has maintained its business in the refrigeration industry, but compressor production had stopped.		

[1/] The phaseout for these four enterprises is related to Yantai phaseout project.

[2/] The phaseout for these seven enterprises is related to Taizhou phaseout project.

Helen Chan
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Annex III

SOLVENT SECTOR PLAN

FOR ODS PHASEOUT IN CHINA

2002 ANNUAL IMPLEMENTATION PROGRAMME

(January 1, 2002 – December 31, 2002)

October 10, 2001

Solvent Sector Plan for ODS Phaseout in China
Annual Implementation Programme for 2002

A. BACKGROUND

1. At its 30th Meeting, the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol (ExCom), by Decision 30/56, approved the 29 March 2000 "Agreement for ODS Phaseout in China's Solvent Sector" on the phaseout of ozone-depleting substances (ODS) in China's solvent sector at a total cost of $52 million to the Multilateral Fund (MLF).

2. The Agreement is for the phased reduction and complete phaseout of the consumption of trichlorotrifluoroethane (CFC-113) and 1,1,1 trichloroethane (TCA), as well as the consumption of carbon tetrachloride (CTC) used as cleaning solvents in China. China will phase out its CFC-113 consumption by 1 January 2006 and its CTC consumption by 1 January 2004, save for consumption of these two ODS for feedstock and process agent uses, and for CFC-113 consumption and CTC solvent consumption that may be agreed by the Parties to be essential for China after 2010. TCA will be totally phased out by 1 January 2010, save for any TCA solvent consumption that may be agreed by the Parties to be essential for China after 2015.

B. IMPLEMENTATION OF THE AMENDED 2000 – 2001 FIRST IMPLEMENTATION PROGRAMME

3. Upon approval of the Solvent Sector Plan for ODS Phase out in China, China and UNDP initiated preparatory and promotional activities to implement the Solvent Sector Plan. A Domestic Implementing Agency (DIA) was selected through competitive bidding to assist the State Environmental Protection Administration (SEPA) in undertaking the day-to-day operational activities to facilitate enterprise level phase out. Bidding process was initiated by the DIA in September 2000 and April 2001 to implement the phase out activities at the enterprise level through ODS Reduction Contracts. 16 ODS Reduction Contracts were signed in November 2000 to phase out by the end of 2001, 473.169 tons of CFC-113, 101.6 tons of TCA and 7.6 tons of CTC with a total amount of $4,132,353. In July and September 2001, another batch of ODS Reduction Contracts were signed with 21 enterprises to phase out by the end of 2002, 676.978 tons of CFC-113 and 105.973 tons of TCA with a total amount of $4,360,857.

4. The implementation of the 2000 ODS Reduction Contracts is now underway after ExCom deliberation at its 33rd Meeting in March 2001 on China's selection of an alternative containing n-propyl bromide. In April 2001, international competitive bidding for the equipment required for the 2000 ODS Reduction Contracts was advertised. By the closing date of 13 June 2001, 15 domestic equipment manufacturers purchased the bidding document, 12 of them submitted bids. A Bid Evaluation Committee of consists of 3 technical experts, one representative from the DIA and one representative from the procurement agent carried out bid evaluation. A Bid Evaluation Report and the recommendation of award were submitted to the Contracts Committee of the Foreign Economic Cooperation Office (FECO) of SEPA for review and approval. Contracts for the procurement of equipment were awarded to two lowest bidders

in July 2001. Equipment delivery is expected to take place towards the end of 2001, with installation and commissioned partly completed by December 2001 and the remaining to be completed in the first quarter of 2002. It is expected that the 16 ODS Reduction Contracts will contribute to the phase out in 2002. Bidding process for the equipment required for the 2001 ODS Reduction Contract will be initiated before the end of 2001.

5. With the implementation of the 2000 and 2001 ODS Reduction Contracts, China will be able to achieve the phase out targets stipulated in the Agreement to ensure that total non-exempt CFC-113 and TCA consumption in China, as well as the total consumption of CFC in the solvent sector in China for the year 2002 will not exceed 2,200 ODP tons, 605 ODP tons and 110 ODP tons respectively.

6. Throughout the period of the 2000 – 2001 First Implementation Programme, China has also initiated and effectively implemented policy actions and technical assistance activities stipulated in the Implementation Programme to facilitate ODS phase out and to strengthen technical support on alternative technology selection and implementation. In addition, China has also initiated investigation and feasibility study on the development and local production of alternative solvents.

C. 2000 CONTROL TARGETS

7. Based on the 2000 data and statistics on China chemical production, import and export, the total domestic consumption of CFC-113, TCA and CTC for the year 2000 has met the relevant targets specified in the Agreement signed between MLF and China:

	CFC-113		**TCA**		**CTC**	
	ODS	ODP	ODS	ODP	ODS	ODP
2000 Consumption Target	**4,125**	**3,300**	**6,212**	**621**	**100**	**110**
Production	4,371		809			
Import	19		6,796			
Export	88		29			
Raw Material Usage	245		1,863			
2000 Solvent Consumption	4,057	3,246	5,713	571	100	110

2002 ANNUAL IMPLEMENTATION PROGRAMME

D. PHASEOUT SCOPE AND APPROACH

8. The Solvent Sector Plan uses a phased, performance-based approached as described in detail in the final version of "Solvent Sector Plan for ODS Phaseout in China" (March 30, 2000, hereinafter referred to as the "Solvent Sector Plan") to phase out consumption of CFC-113, TCA and CTC as cleaning solvents. In accordance to the Solvent Sector Plan, China will continue to

phase out ODS of CFC-113, TCA and CTC used as cleaning solvents through well structured annual implementation programmes. The scope of work for 2002 Annual Implementation Programme will include the following:

(a) Further strengthening and optimization of the Alternative Technology Support System (ATSS);
(b) Start up and implementation of the Voucher System;
(c) Undertake, sign and initiate implementation of ODS Reduction Contracts with 20 - 40 large enterprises and redeem vouchers with about 100 small enterprises to phase out 500 ODP tons of CFC-113, 25 ODP tons of TCA and 55 ODP tons of CTC so as to realize the phase out at the end of 2003;
(d) Continue to undertake technical assistance activities as shown below; and
(e) Continue to formulate related policies as shown below.

E. ACTIONS AND PROPOSED FUNDING

9. Solvent consumption phaseout requires implementation of investment projects at the enterprise level. At the enterprise-level, the implementation period for contracts with large enterprises is about 18 months between funding approval at the enterprise level and commissioning of non-ODS technology system, while the implementation of phaseout through the Voucher System for small enterprises is about 12-18 months. Therefore China is applying to the Multilateral Fund for an amount of $6,330,000 to implement the 2002 Annual Implementation Programme, to cover the period of 1 January 2002 through 31 December 2002, with ODS phase out results being achieved by the end of 2003. It is expected that the funding request will be considered and approved in full with payment to UNDP account made upon approval at the 36th Executive Committee Meeting in March 2002.

Table 1. Phase out Activities and Proposed Funding (USD 1,000)

Enterprise-level ODS Phaseout	2002
ODS Reduction Contracts / Voucher System 2002: 20-40 large enterprises (Reduction contracts) 100 small enterprises (Voucher Payment) Estimated phase out of 500 ODP tons of CFC-113; 25 ODP tons of TCA; and 55 ODP tons of CTC to be realized at the end of 2003	5,830
Technical Assistance activities, establishment of policies including establishing and strengthening ATSS	500
Proposed Funding for 2002	6,330

F. ENTERPRISE-LEVEL ACTIVITIES

10. Enterprise level activities will continue to focus on the challenge of identifying, funding and implementing phase out activities with large and medium size enterprises through ODS Reduction Contracts and small size projects with small solvent consuming enterprises through Voucher System to phase out sufficient consumption to achieve the phase out targets at the end of 2003. Project identification will be carried out in several ways, with close cooperation of provincial and city level industrial associations, equipment manufacturers and solvent dealers. Principal focus will be the use of local resources including the Solvent Special Working Group (SWG), Domestic Implementing Agent (DIA), Ministry of Information Industry (MII) and ATSS agencies.

11. The following activities will be carried out in 2002:

(a) Complete implementation of 16 and 21 ODS Reduction Contracts signed in 2000 and 2001 to contribute to achieving the 2002 and 2003 consumption limits of CFC-113, TCA and CTC;

(b) Sign up about 20 - 40 ODS Reduction Contracts and issue vouchers to about 100 SMEs so as to realize the phase-out targets for the year 2004.

12. Projects to be commenced in 2002 will required that ODS Reduction Contracts be signed by June 2002 and vouchers be issued by October 2002. Project Management Office (PMO) of State Environmental Protection Administration (SEPA) will undertake planning action to identify, bid and negotiate these contracts and vouchers starting March 2002.

G. DEVELOPMENT OF ALTERNATIVE TECHNOLOGY SUPPORT SYSTEM (ATSS)

13. The ATSS and the associated Voucher System will be the principal vehicle for reaching the many small solvent users. During 2002, China will strengthen and optimize the functions of the three existing Technical Centers and other industrial associations as well as several alternative technology or equipment suppliers to make sure that they are capable of providing effective technical support on alternative solvent and technology to small enterprises, especially on the selection of the most appropriate options for moving to a non-ODS operation.

H. POLICY ACTIONS

14. The following activities will be undertaken to establish relevant policies and relevant solvent standards:

(a) Promulgate the Ban on Usage of CTC as cleaning solvent, starting 2004;

(b) Prepare and draft relevant sub-sector policies for stopping OD solvent usage, such as policy for the LCD sub-sector;

(c) Continue to establish relevant solvent standards and technical norms.

I. TECHNICAL ASSISTANCE (TA) ACTIVITIES

15. Technical assistance activities shall continue to be undertaken to:

(a) strengthen the overall institutional framework;

(b) improve the management, monitoring and evaluation capabilities of participating institutions;

(c) train enterprise managers, technical personnel and decision makers at various levels;

(d) strengthen the Alternative Technology Support System

16. All terms of references and work schedule of TA activities will be agreed with UNDP prior to signing contracts and initiate work.

17. The main TA activities to be carried out in 2002 include:

(a) *Optimize the Solvent Sector Management Information System (SSMIS)* for ODS phase out in the solvent sector and integrated it with the ODS MIS System of FECO to form a comprehensive and coordinated database of ODS phase out in all sectors;

(b) During the initial years of the Solvent Sector Plan, it is critical to continue the *Public Awareness Campaigns* to introduce and publicize country-wide the Solvent Sector Plan and ODS solvent phaseout schedule in newspaper and other media to make the public, especially the ODS solvent users, understand the phaseout plan and to attract participation in phaseout activities;

(c) With the wide geographical distribution of ODS solvent users in different regions and the many government and enterprise personnel involved in all aspects of the phase out activities, it is important to continue the *Training of personnel involved in implementation of phase out activities*. Training will be provided for 1) environmental staff and decision makers to increase their recognition and management capacity; 2) industrial managers and technicians to enhance their understanding of alternative technology and to master how to use it; 3) ODS and substitute solvent dealers to deliver information on update alternative non-ODS solvent technology to their users; and 4) ODS solvent consumers on how to participate in activities for Reduction Contract bidding process and voucher system and to get funding to undertake phaseout activities;

(d) *Strengthen the Alternative Technology Support System (ATSS)* – ATSS has been established with members from national experts group, relevant industrial associations, three technical support centers, alternative solvent and equipment dealers and manufacturers. Further strengthening of its technical capabilities will be required so that

the ATSS can better resolve the alternative technology issues and to provide sufficient support on the selection of alternative technology options and its subsequent implementation;

(e) *Development of a non-ODS solvent management plan:* Rapid phase out of ODS solvent production in China will cause demand after 2010 to be covered increasingly by substitutes. Preparation work for the development of ODS substitutes started in 2001 and will continue during 2002. Preparation of the plan will draw on experiences from developed countries. Essential and necessary usage in the solvent sector will be determined, survey, study, testing and tryout of alternatives will be carried out.

(f) *Establish standards and technical norms*: Terms of Reference are being prepared and will be finalized by the end of 2001. As this work involves many areas, in 2002, it will continue to carry on the work and scope initiated in the First Annual Implementation Programme and to expand to other areas;

(g) Recruit necessary national and international consultants to provide alternative technical services for training and technical conversion guidance to ODS solvent users, SWG, DIA and procurement agency.

J. DEVELOPMENT AND INVESTMENT OF ALTERNATIVE SOLVENTS PRODUCTION

18. To support the development of alternative solvents, US$ 2 million savings from the 2000 and 2001 ODS Reduction Contracts through the bidding process has been realized and reallocated to the development and investment of alternative solvents production in China. To ensure effective fund utilization, China is currently undertaking investigation and feasibility study on local alternative solvents. The development and investment in the local production of alternative solvents will follow the same set of Guidelines for Management of Investment on ODS Substitute Production which has been drafted by SEPA and World Bank for other sector plans, with selection of enterprises through bidding process to participate in the investment for local production.

19. A locally developed alternative HEP-2, containing n-propyl bromide as its components, has been chosen as alternative solvent by 28 of the 37 enterprises selected for the 2000 and 2001 phaseout projects. Development and investment on local production of HEP-2 will become the first priority for consideration. In view of the uncertain toxicity of nPB, China will supervise and guide the users on the use of HEP-2 in the safest condition possible. Regarding nPB's toxicity, ODP value and usage, China will abide by the decisions made by the Parties and the Executive Committee.

Table 2. Implementation Programme - Phaseout Targets and Enterprise Activities (January 1, 2002 – December 31, 2002)

SOLVENT CONSUMPTION PHASEOUT TARGETS & ACTIVITIES							
	MLF $ million Requested	**Start of programme (MT)**	**Reduction Target (MT)**	**Reduction Contract (MT)**	**End of programme (MT)**	**Key Actions Required**	**Key Dates**
Phase out of CFC-113 from 2001 ODS Reduction Contracts		3,375	677		2,698		July 1, 2001– Dec. 31, 2002
CFC-113	4.050		625	625		1. Conversion of ODS solvent enterprises to non-ODS cleaning technology 2. Ban on import and export of CFC-113 as cleaning solvent	January 1, 2002 – Dec. 31, 2003
CFC-113 Consumption Phaseout Target		3,375	1,302		2,073		By December 2003
Phase out of TCA from 2001 ODS Reduction Contracts		6,130	106		6,024		July 1, 2001 – Dec. 31, 2002
TCA	1.455		250	250		1. Conversion of ODS solvent enterprises to non-ODS cleaning technology 2. Ban on export and management on import of TCA as cleaning solvent	January 1, 2002 – Dec. 31, 2003
TCA Consumption Phaseout Target		6,130	356		5,774		By December 2003
CTC	0.325	100	50	50	50	1. Conversion of ODS solvent enterprises to non-ODS cleaning technology 2. Ban on import and export of CTC as cleaning solvent	January 1, 2002 – Dec. 31, 2003

ENTERPRISE-LEVEL ACTIVITIES				
	Estimated MLF US$ million requested	**No. of enterprises targeted**	**Key Actions Required**	**Key Dates**
Conversion of ODS consumers	CFC-113 4.050 TCA 1.455 CTC 0.325	1. L/M: 20-40 2. Small: 100	1. Sign ODS reduction Contracts (20-40) 2. Issuing vouchers to about 100 small users	1. Bid winners and contracts signed by the end of June 2002; 2. Vouchers issued by end of October 2002.

Table 3. Implementation Programme - Policies and TA Activities (January 1, 2002 – December 31, 2002)

POLICY INITIATIVES		
ACTIVITIES	**Actions Required**	**Key Dates**
1. Notice on banning use of CTC as cleaning solvent	Formulate and seek approval of the Ban; Promulgate such Ban at least one year prior to taking effect.	By the end of 2002.
2. Prepare and draft industry's policy on banning use of OD solvent in such sub-sector as LCD	Consult and discuss with relevant industrial associations; Study and determine the feasibility of promulgation and implementation of such sectoral policies; Prepare and draft a sectoral policy.	In the first half of 2002; 2.In the second half of 2002.
3. Controlling import and export of OD solvent	Ban on exporting of OD solvent through Import & Export Office; Implement strict management on TCA import by issuing quota; Promote to and train over the TCA importing dealers.	January – December 2002 First quarter of 2002

TECHNICAL ASSISTANCE ACTIVITIES			
ACTIVITIES	**MLF funding requested (US$1'000)**	**Actions Required**	**Key Dates**
a. MIS development	20	1. Further optimize SSMIS; 2. Integrate with ODS MIS.	January - June 2002
b. Public Awareness	20	Promote public awareness of enterprises on ODS solvent sector phaseout activities	From beginning of 2002
c. Training	60 90	Training on supervision of ODS solvent consumption and operating manual. China Policy Training Strategy	Start no later than April 2002 (Through UNEP/DTIE)
d. Strengthening ATSS	50		Started in June 2000
e. Establishment of third technology center		Optimize establishment of the third technical center.	Start in January 2002
f. Preparation for the development of a non-ODS solvent management plan and support to some necessary tests on alternative technology	115	1. Start to implement the project for strategy study on alternative technology development; 2. Support to tests and study on alternative technology on the basis of sub-sectors.	From the beginning of 2002 Start no later than June 2002
g. Establishment of standards and technical norms	100	By qualified institution	Start in January 2002
h. National and International Consultants	45		January – December 2002
Total 2000 TA Activities	**500**		

Table 4. Implementation Programme
(January 1, 2002 – December 31, 2002)

Performance Indicators

Solvent Phaseout Targets				
Solvent sub-sector	**Start of programme (MT)**	**Reduction Target (MT)**	**End of programme (MT)**	**Indicators to be reported on in semi-annual progress reports. Verified in annual performance audits**
CFC-113 Imports/exports	0	0	0	Ban on exports and imports in 2002
Domestic consumption and phaseout target	3,375	625	2,750	Consumption levels only be decided by domestic production.
TCA	6,130	>100	6,050	Realized by ODS Reduction Contracts
Number of ODS Reduction Contracts Voucher Redeem		L/M 20-40 SMEs 100		Number of contract signed. Number of voucher issued.
Development and Investment on alternative solvents production				Strategy developed and potential alternatives to be developed selected by June 30, 2002. Enterprises selected for investment through bidding process.
Policy and TA Initiatives				
Initiatives	**Indicators to be reported on in semi-annual progress reports**			
1. Bidding system	Bidding system's operating procedures finalized. Winning enterprises for 2002 selected. Enterprises trained for bid preparation for 2002 bidding.			
2. Public Awareness	Introduce Solvent Sector Plan and phaseout schedule on two newspapers. Invite ODS solvent users to take part in the reduction bidding and promote the enterprises to participate in the phaseout actions.			
3. Training	Provide personal training courses to ODS users, EPBs and local line ministries			
4. Notice on banning use of CTC as cleaning solvent	Promotional campaigns on the ban; ATSS, Local Electronic Bureaus and EPBs engaged in promotion and support to CTC solvent users			
5. Strengthen ATSS	Contracts issued, progress reports			
6. Establishment of standards and technical norms	Contracts issued, progress reports			