はじめに

本報告書は、平成 16 年度に財団法人環日本海環境協力センターが、環境省からの委託を受けた「環日本海環境協力推進事業」により、平成 16 年 12 月 20 日(月)から 22 日(水)に韓国ソウル特別市において開催された「第 13 回環日本海環境協力会議」（The 13th Northeast Asian Conference on Environmental Cooperation）に参加し、その結果をまとめたものである。

本会議は韓国環境部及びソウル特別市が主催し、韓国国会環境経済研究会(National Assembly Environment & Economy Forum)の協力により、中国、モンゴル、韓国、ロシア連邦及び日本の 5 カ国並びに国連アジア・太平洋経済社会委員会(UNESCAP)の参加の下に開催された。

会議は、初日のシンポジウム「都市部における大気環境管理政策」で幕を開け、各国の専門家及びカリフォルニア州大気資源委員会(ARB)から各国における取り組みが紹介された。パネルディスカッションでの意見交換により、持続的な経済発展と環境の保全を行っていくためには、成功例だけでなく失敗例も共有していくことが大切であると認識された。

引き続き本会議では、参加各国及び UNESCAP の代表者による基調講演の後、「種の回復」、「地方自治体における環境回復」、「工業団地における持続可能な管理」についてのセッションが開催され、活発な討議が行われた。

国、地方公共団体、NGO などのあらゆる主体が連携して環境問題に取り組むことが、今後ますます重要となり、地球規模での持続可能な社会の実現へとつながっていく。その意味においても、北東アジア地域の環境協力を推進する環日本海環境協力会議の果すべき役割は、ますます大きくなってきている。

平成 17 年 3 月

財団法人　環日本海環境協力センター
理事長　　平　野　　敏　行

１．会　議　概　要

会　議　概　要

1. 会議名称　　第 13 回環日本海環境協力会議
The 13th Northeast Asian Conference on Environmental Cooperation

2. 日程　　平成 16 年 12 月 20 日（月）― 22 日（水）
20 日（月）　公開シンポジウム
21 日（火）　セッション１、セッション２
22 日（水）　セッション３、エクスカーション

３．場所　　公開シンポジウム：国会議員会館講堂
セ ッ シ ョ ン：ソウル教育文化会館

４．主催　　公開シンポジウム：韓国国会環境経済研究会、韓国環境部、ソウル特別市
セ ッ シ ョ ン：韓国環境部、ソウル特別市

５．参加者

日本	6 名
中国	7 名
モンゴル	2 名
韓国	12 名
ロシア	1 名
UNESCAP	1 名
シンポジウムパネリスト（韓国）	5 名

６．議題　　公開シンポジウム：都市部における大気環境管理政策
セ ッ シ ョ ン 1：種の回復
セ ッ シ ョ ン 2：地方自治体における環境回復
セ ッ シ ョ ン 3：工業団地における持続可能な管理

会　議　日　程

12月20日 (月曜日)　公開シンポジウム　テーマ:「都市部における大気環境管理政策」

13:00 ~ 14:00	登録	国会議員会館
14:00 ~ 14:15	開会挨拶	H.E. Ms. PARK, Sun-Sook Vice Minister, Ministry of Environment, Korea
	歓迎挨拶	Mr. LEE, Ho Woong Member of National Assembly, Chairman, National Assembly Environment & Economy Forum (NAEEF)
14:20 ~ 14:40	プレゼンテーション (各5~10分)	
	中国	「中国におけるSO_2排出権取引」
	日本	「日本におけるディーゼル排出規制」
	アメリカ合衆国	「都市部における大気環境管理政策」
	モンゴル	「ウランバートル市における大気環境管理政策」
	ロシア	「モスクワ市における政府環境監視システム」
	大韓民国	「都市部における大気環境改善のための特別措置」
15:50 ~ 16:10	コーヒーブレイク	
16:10 ~ 17:30	パネルディスカッション	NEAC参加者、聴衆、パネリストによる質疑応答
17:30 ~ 17:40	まとめ及び閉会	司会　Dr. SHIN Boo Shig, NAEEF
18:00 ~ 19:30	歓迎レセプション	立食パーティー 韓国環境部主催

12月21日 (火曜日)　セッション１及び２

09:00 ~ 09:50	登録	ソウル教育文化会館
10:00 ~ 10:10	開会挨拶及び基調講演	Dr. PARK, Young Woo Director General, International Cooperation Bureau, Ministry of Environment, Korea

10:10 ~ 10:15	祝辞	Mr. JIN, Ik Chul Director General, Seoul Metropolitan Government
10:15 ~ 10:40	各国代表による基調講演	中国、日本、モンゴル、ロシア、 UNESCAPの代表
10:40 ~ 11:00	コーヒーブレイク	

セッション1: 種の回復 議長　Dr. PARK Young Woo

11:00 ~ 11:30	プレゼンテーション (各5~10分)	
	中国	「トラ」
	日本	「ツシマヤマネコ」
	モンゴル	「モウコノウマ」
11:30 ~ 12:00	質疑応答	
12:00 ~ 12:10	コーヒーブレイク	
12:10 ~ 12:30	プレゼンテーション (続き)	
	ロシア	「ヒグマ及びツキノワグマ」
	大韓民国	「ツキノワグマ」
12:30 ~ 13:00	質疑応答	
13:00 ~ 14:30	昼食	

セッション 2: 地方自治体における環境回復 議長　Mr. XU, Qinghua

14:30 ~ 15:00	プレゼンテーション (各5~10分)	
	中国	「都市のエコ再生」
	日本	「北東アジア青少年環境シンポジウム2004」
	モンゴル	「地域管理及び生態系再生」
15:00 ~ 15:30	質疑応答	
15:30 ~ 15:50	コーヒーブレイク	

15:50 ~ 16:20	プレゼンテーション (各5~10分)	
	ロシア	「都市生態系における小河川の再生（モスクワ）」
	大韓民国	「都市河川再生（CheongGye-Cheon）」
16:20 ~ 17:00	質疑応答	
18:00 ~ 19:30	夕食	ソウル教育文化会館 ソウル特別市主催

12月22日 (水曜日)　セッション3

セッション3: 工業団地における持続可能な管理　　議長　Dr. PARK Young Woo

09:00 ~ 09:30	プレゼンテーション (各5~10分)	
	中国	「循環経済に関するケーススタディ」
	日本	「北九州エコタウンにおける持続可能な管理活動」
09:30 ~ 10:00	質疑応答	
10:00 ~ 10:30	プレゼンテーション(続き)	
	ロシア	「JSCノリルスク鉱業会社における管理の実施」
	大韓民国	「持続可能な工業団地設立のための戦略」
10:30 ~ 11:00	質疑応答	
11:00 ~ 11:30	議長総括 閉会	議長　Dr. PARK Young Woo Director General, International Cooperation Bureau, Ministry of Environment, Korea
12:30 ~ 14:00	昼食	
14:00 ~ 17:00	エクスカーション	清渓川（CheongGye-Cheon）復元事業現場及び資料館視察
18:00 ~ 20:00	夕食	

２．議　長　総　括

Chairperson's Summary

The 13th Northeast Asian Conference on Environmental Cooperation

20-22 December 2004, Seoul, Korea

1. The 13th Northeast Asian Conference on Environmental Cooperation was held in Seoul, Korea. The conference was jointly organized by the Ministry of Environment and Seoul Metropolitan Government. Delegates from central and local authorities of Korea, China, Japan, Mongolia, Russia and representatives from academia and UN ESCAP participated in the conference.

2. On the first day, the conference held a symposium on the theme of "Air Quality Management Policy in Metropolitan Areas" at the National Assembly Member's Building, where representatives of the participating countries shared and exchanged views and experiences on metropolitan air quality management. During the next conference days participants heard keynote speeches and held discussions on the following session topics:
   1) Species Restoration
   2) Ecological Restoration in Local Governments
   3) Sustainable Management of Industrial Complex

3. At the Open Symposium on Air Quality Management in Metropolitan Areas, the Vice Minister of the Ministry of Environment of Korea delivered the welcoming address followed by the congratulatory remarks from a member of the Korean National Assembly. The Symposium was attended by government representatives, members of the National Assembly, NGOs, professors and environmental experts. Presentations were made by China, Japan, the US, Mongolia, Russia and Korea on topics including SO_2 emission trading, diesel vehicles emissions control, responses to emerging pressures, state ecological monitoring system and special measures for metropolitan air quality improvement.

4. Through panel and floor discussions at the Symposium, participants noted the importance of developing an accurate database and emission modeling prior to adopting new measures for air quality control. Furthermore, they highlighted that the countries should not only share the successful policy experiences but also the unsuccessful ones, in order to minimize policy errors while increasing the mutual benefits for all. In this recognition, they agreed to further enhance regional

cooperation for efficient exchange of information and experiences.

5. The Sessions started with the opening address and congratulatory remarks by the hosting organizations followed by the keynote speeches by the head of delegations from each participating country, and UN ESCAP. The Ministry of Environment and Seoul Metropolitan Government addressed the importance of Northeast Asian regional cooperation for resolving regional and global environmental problems and highlighted the role of NEAC in facilitating such efforts. UN ESCAP introduced the Fifth Ministerial Conference on Environmental Development in Asia and the Pacific, 2005(MCED 2005).

6. At session 1 on "Species Restoration," there were presentations on the various species restoration initiatives promoted by each participating country. The topics included the restoration of tigers by China, tushima leopard cats by Japan, wild horses by Mongolia, brown and asian black bears by Russia and asiatic black bears by Korea. Participants reaffirmed the importance of joint cooperative activities among neighboring countries for effective species restoration and conservation due to the fact that wildlife habitat is transboundary by nature. Also, the important role that awareness, education, and appropriate legislation play in anti-poaching efforts was raised. Participants noted that a variety of measures to prevent habitat loss, such as the establishment of ecological corridors between protected areas, are desirable. Also discussed were the challenges faced in the reintroduction of species into the wild.

7. At Session 2 on "Ecological Restoration in Local Governments," there were reports on the diverse ecological restoration initiatives that are presently undertaken by local governments of the participating countries. The importance of partnership and information exchange between central and local governments was stressed. Case studies on urban environmental management as well as experiences in environmental education and stream restoration were shared. Participants showed particular interest in the CheongGye-Cheon Restoration Project in Seoul, Korea.

8. At Session 3 on "Sustainable Management of Industrial Complex," there were reports on how participating countries have been pursuing the sustainable management efforts in various industrial and social settings. Participants introduced ongoing initiatives including the construction of eco-town and environmentally

friendly parks, and shared concrete measures such as clean production programs and eco-efficient management systems. There were dynamic discussions on the co-relation of economic and environmental values in promoting such efforts, and the roles of central and local authorities. Participants noted that the successful model cases of environmentally friendly towns or industries should be further introduced and expanded across the region.

9. The participants expressed their deep appreciation to the Ministry of Environment and the Seoul Metropolitan Government for their warm hospitality and their successful organization of the 13th NEAC.

10. The next venue of the 14th NEAC will be later decided through consultation among the participating countries.

議長総括(仮訳)

第 13 回環日本海環境協力会議
2004 年 12 月 20 日～22 日、韓国・ソウル

1. 韓国のソウルにおいて、第 13 回環日本海環境協力会議が開催された。本会議は韓国環境部及びソウル特別市が共同で主催した。韓国、中国、日本、モンゴル、ロシアの中央政府及び地方自治体の代表並びに学術関係者及び国連アジア・太平洋経済社会委員会(UNESCAP)代表が本会議に参加した。

2. 初日は、「都市部における大気環境管理政策」のテーマで国会議員会館(National Assembly Member's Building)においてシンポジウムが開催され、参加国の代表が大都市の大気環境管理に関する意見及び経験を共有・交換した。2 日目以降、参加者は基調講演を聞き、次のテーマについてセッション別に話し合った。
   1) 種の回復
   2) 地方自治体における環境回復
   3) 工業団地における持続可能な管理

3. 都市部における大気環境管理に関する公開シンポジウムでは、韓国環境部副大臣が歓迎の辞を述べ、続いて韓国の国会議員が祝辞を述べた。このシンポジウムには政府代表、国会議員、NGO 団体、学術関係者、環境専門家が参加した。中国、日本、米国、モンゴル、ロシア、韓国が、SO_2 排出権取引、ディーゼル車の排出規制、生じつつある圧力への対応、国による生態系モニタリング・システム、大都市の大気環境改善のための特別措置を含むテーマで発表を行った。

4. シンポジウムでのパネル及びフロア・ディスカッションを通じて、参加者は大気環境管理の新たな措置を採用するに先立ち、正確なデータベースの構築と排出モデルの策定の重要性を指摘した。さらに、参加者は、政策の成功体験だけでなく、各国が、あらゆる人々の相互利益を増大すると同時に政策の誤りを最小限に抑えるために、失敗例も共有すべきであることを強調した。この認識において、参加者は情報及び体験を効率的に交換するために地域協力をさらに強化することで合意した。

5. セッションは主催団体による開会の辞と祝辞で始まり、参加各国及び UNESCAP の代表による基調演説が続いた。韓国環境部及びソウル特別市は、地域及び世界の環境問題を解決するために北東アジア地域の協力の重要性を述べ、そのような努力を推進するに当たって NEAC の役割を強調した。UNESCAP は 2005 年の第 5 回アジア太平

洋環境と開発に関する閣僚会議(MCED 2005)を紹介した。

6. セッション１の「種の回復」では、参加各国が推進する様々な種の回復イニシアティブに関する発表が行われた。テーマとしては、中国のトラ、日本のツシマヤマネコ、モンゴルの野生馬、ロシアのヒグマとツキノワグマ、韓国のツキノワグマの種の回復が含まれた。参加者は野生動物の生息地が本来、国境を越えて存在するという事実から、有効な種の回復及び保存のために隣国相互の協同活動の重要性を再確認した。また、意識高揚、教育、適正な法律が密猟対策に果たす重要な役割が提起された。参加者は保護区の間に生態的回廊を設けるなど、生息地の喪失を防ぐために様々な施策が望まれることを指摘した。さらに、野生への種の再導入において直面する課題も話し合われた。

7. セッション２の「地方自治体における環境回復」では、参加国の地方自治体が現在取り組んでいる様々な環境回復イニシアティブに関する報告がされた。中央政府と地方自治体の協力及び情報交換の重要性が強調された。都市環境管理に関する事例研究に加え、環境教育及び河川の再生での体験を共有した。参加者は韓国、ソウルの清渓川（チョンゲチョン）復元計画に特に関心を示した。

8. セッション３の「工業団地における持続可能な管理」では、参加国が様々な産業及び社会環境において持続可能な管理努力をどのように実施してきたかについて報告された。参加者はエコタウンや環境にやさしい公園の建設を含む継続中のイニシアティブを紹介し、また、クリーン生産プログラム及び環境効率の高い管理システムなど、具体的な対策を共有した。そのような努力を進める上で経済価値と環境価値の相互関係、さらに中央と地方当局の役割についてダイナミックな議論がされた。参加者は環境にやさしい町又は産業で成功を収めたモデル・ケースを一層導入し、北東アジア地域全体に拡大しなければならないと指摘した。

9. 参加者は韓国の環境部とソウル特別市に対して、心からのもてなしと第 13 回 NEAC 開催の成功に深い感謝の意を表した。

10. 次回、第 14 回 NEAC 開催地は後日、参加国間の協議により決定される。

3. 公 開 シ ン ポ ジ ウ ム

Opening & Welcoming Address

H.E. Ms. PARK, Sun-Sook ---------- 17
Vice Minister, Ministry of Environment, Korea

Mr. LEE, Ho Woong ---------- 21
Member of National Assembly,Chairman, National Assembly
Environment & Economy Forum

Presentations

China "Practice on SO_2 Emission Trading in China" ---------- 25
Mr. YANG, Jintian
Senior researcher fellow, Environmental Planning Institute, SEPA

Japan "Diesel-Vehicles Emission Control in Japan" ---------- 55
Mr. KOIWA,Masayuki
Section chief, Environmental Control Technology Office,
Environmental Management Bureau, MOE

United State of America "Air Quality Management Policy in Metropolitan Areas" ---------- 69
Mr. MANJIT, Ahuja
Chief, Stationary Source Testing Branch, California Air Resource Board

Mongolia "Air Quality Management in Ulaanbaatar City" ---------- 99
Mr. ENKHBOLD, Anar
Officer, International Cooperation Department, MONE

Russian Federation "State Ecological Monitoring System of Moscow-City" ---------- 107
Dr. PETROVA, Tatiana
Senior Specialist, Department of International Cooperation, Ministry of
Natural Resources

Republic of Korea "Special Measures for Metropolitan Air Quality Improvement" ---------- 117
Mr. PARK, Kwang Suk
Director, Regional Air Quality Management Division, MOE

축 사

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오늘 여러분들을 모시고 대도시 대기환경 관리정책에 관한 토론회를 개최하게 된 것을 기쁘게 생각하며,

바쁘신 가운데도 참석해주신 참석자 여러분과 회의를 준비하여 주신 국회환경경제연구회, 환경부 및 서울시 관계자분들께 감사드립니다.

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그런 의미에서 동북아 여러나라, 그리고 미국의 전문가들이 이처럼 한자리에 모여 "대도시 대기질 관리정책"을 논의하는 기회를 갖게 된 것은 우리 모두에게 더 없이 소중한 기회가 될 것이라 생각합니다.

그리고 동북아에서 오신 손님들께 한 말씀드리겠습니다. 내일부터 이틀간 동북아 5개국의 종 복원사례, 지방정부의 생태복원사례 및 지속가능한 산업단지관리 방안 등에 관해 서로의 정책 및 경험을 공유하는 동북아환경

협력회의가 계속됩니다.

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참가하신 여러분 모두의 건승을 빌며, 다가오는 새해가 희망찬 날이 되길 기원합니다.

감사합니다.

祝　辞（仮訳）

韓国環境部副大臣　Ms. PARK, Sun-Sook

尊敬するイ・ホウン国会環境経済研究会長、そして中国、日本、モンゴル、ロシア、米国等から参加して下さった各国政府代表および内外の貴賓の皆様！

今日皆様にお集まりいただき、都市部における大気環境管理政策に関するシンポジウムを開催することになったことを喜ばしく思い、お忙しい中にもかかわらずご参加いただいた参加者の皆様と、会議を準備して下さった国会環境経済研究会、環境部およびソウル市関係者の方々に感謝申し上げます。

内外の貴賓の皆様！

大韓民国は永い歳月、錦繍山河と呼ばれてきました。青い空は特にきれいで、韓国の秋を象徴する言葉でした。

しかし、産業化が本格化して30余年が過ぎた今日、韓国、特に首都圏は深刻な大気問題に直面しています。程度の差はありましょうが、全世界のすべての大都市が同じ問題を抱えています。工場が建ち人口が集中し、自動車が増え都市が成長すればするほど、問題は深刻化します。

世界的にも人口と自動車の集中の面で屈指のソウルの問題は、さらに深刻です。私たちは昨年、「首都圏大気環境改善特別法」を制定することによって、その突破口を探そうと努めています。

低公害車の普及、排出ガス低減装置装着義務、超低硫化軽油の供給等が始まり、首都圏の大気汚染を総量管理するために準備中です。こうした対策に今後10年間、計６兆ウォンの予算を投資する計画です。

全世界の都市の人々は、きれいな空気を吸える権利をなくしているといっても過言でありません。

韓国政府は、今後10年内にソウルのどまん中に位置する南山から西海岸の仁川近海までひと目で見渡せるように、大都市ソウルと首都圏の住民がきれいな空気を吸えるようにするという大きな覚悟を固めました。可能なあらゆる努力をしようと思います。しかし、まだ私たちには完璧な解答はありません。可能な限り早いうちにその目標に達するためには、世界の様々な国と経験を交換し知恵を借りなければならないでしょう。

そうした意味で、北東アジアの様々な国、そして米国の専門家らがこのように一堂に集まり、「都市部における大気環境管理政策」を議論する機会を持つことになったことは、私たちすべてにとってこれ以上ない大切な機会になるものと考えます。

そして北東アジアから来られた皆様に一言申し上げます。明日から２日間、北東アジア５ケ国の種の回復、地方自治体における環境回復および工業団地

における持続可能な管理等に関して、お互いの政策および経験を共有する環日本海環境協力会議が続きます。

北東アジアの環境協力議論の機会はたくさんありますが、特に今回の会議は、政府及び地方自治体、そして市民団体、研究団体等、多様な利害関係者が参加する政策フォーラムです。今日の討論会と明日から続く環日本海環境協力会議が、政策経験を共有し友誼を固める機会となるよう願います。

参加された皆様すべての健勝を祈り、迫りくる新年が希望に満ちた日となることを祈ります。

ありがとうございます。

국제토론회 인사말

국회환경경제연구회 회장 이 호 웅

국회 환경경제연구회와 환경부, 서울시가 공동 주최한 "대도시 대기환경 관리정책 국제토론회"에 참석해 주신 내외 귀빈 여러분과 주제발표자 및 토론자 여러분에게 깊은 감사의 말씀을 올립니다.

아울러 바쁘신 와중에도 불구하고 본 심포지엄을 빛내주시기 위해 축사의 말씀을 해 주신 환경부 박선숙 차관님께도 감사의 말씀을 드립니다.

먼저 국회환경경제연구회에 대한 간단한 소개를 올릴까 합니다. 본 연구회는 지난 제16대 국회에서 창립되어 최우수 연구단체상을 수상하는 등 명실공히 국회 정책연구개발의 산실로 자리매김 했으며, 제17대 국회에서도 뜻을 같이하는 여야 국회의원 45명이 참여하여 활동하고 있는 국회의원 연구단체입니다.

본 연구회는 지속가능한 사회를 위한 범국가적인 대응방안을 모색하고, 그 성과를 바탕으로 국회차원의 역할을 수행함으로써, 환경과 경제의 조화로운 발전을 통한 국민의 삶의 질 향상을 목적으로 하고 있습니다.

바로 지난주 17일까지 아르헨티나 브에노스아이레스에서 제10차 기후변화협약 당사국 총회가 개최되었습니다. 189개에 걸친 협약당사국 정부대표 외에 국제기구, 민간단체 대표 등 7천 여명이 참가하여 교토의정서 이행, 기후변화 영향과 적응, 국가보고서, 개도국 능력 형성 및 재정지원 등의 폭넓은 논의가 이루어 졌으리라 믿습니다.

오늘 이 자리에서는 당사국총회에 이어서, 더 풍부한 논의를 가져올 수 있으리라 생각됩니다.

요즘 웰빙이라는 말이 크게 유행입니다. 그 만큼 삶의 질을 높이고자 하는 관심과 노력은 사회 곳곳에서 나타나고 있습니다. 정부나 국회도 그러한 국민적 관심에 부응하기 위해 다양한 노력을 기울이고 있습니다. 본인도 이번 17대에 이르러 실내공기질 개선 등의 삶의질 향상을 위한 다양한 입법활동을 추진하고 있습니다.

그럼에도 불구하고, 여전히 우리에게 남겨져 있는 과제들은 많습니다. 지난 10여 년간 맑은 공기를 되찾기 위한 노력이 진행되었으나, 현재 수도권의 대기오염으로 인한 사회적 피해는 더욱 악화되는 추세입니다.

오늘 이 자리에서는 중국, 일본, 미국, 몽골, 러시아에서 어렵게 자리해 주신 전문가들을 모시고, 대기오염과 관련한 각 국가별 연구 및 사례를 통해 고견을 나누고자 합니다.

토론을 통해 여러분이 제기해 주신 고견들을 참고하여 정책을 수립하고 필요할 경우 의원입법도 추진할 것을 약속드리면서, 끝으로 국회환경경제연

구회는 환경과 경제의 조화로운 개발, 인간과 자연의 상생의 발전을 위해 최선을 다하겠습니다.

앞으로도 지속적인 관심과 격려 부탁드리며, 바쁘신 와중에도 불구하고 참석해 주신 내외귀빈 여러분께 다시 한번 깊은 감사를 드립니다.

감사합니다.

Welcome to International Forum on 'Managing Policy of atmosphere for an metropolitan area'.

I am very thankful that so many of you have come here for our international conference out of your tight schedules, especially representers. Mr. YANG, Jintian from China, Mr. KOIWA, Masayuki from Japan, Mr. MANJIT, Ahuja from the US, Mr. ENKHBOLD, Anar from Mongol, Ms. BOYARCHUK, Nadezhda from Russia, and Mr. Park Kang Seok from the Department of Environment in Korea.

Thank you very much.

挨拶の言葉（仮訳）

国会環境経済研究会会長　Mr. LEE, Ho Woong

国会環境経済研究会と環境部、ソウル市が共催する公開シンポジウム「都市部における大気環境管理政策」に参加された内外の貴賓の皆様と、主題発表者およびパネラーの皆様に深く感謝の言葉を申し上げます。

併せて、お忙しい中にもかかわらず、本シンポジウムのために祝辞のお言葉をいただいた環境部のパク・ソンスク次官にも感謝の言葉を申し上げます。

まず、国会環境経済研究会に関する簡単な紹介を申し上げようと思います。本研究会は第１６代国会で創立され、最優秀研究団体賞を受賞する等、名実ともに国会政策研究開発の産室と位置づけられ、第17代国会でも志を同じくする与野党国会議員45名が参加して活動している国会議員研究団体です。

本研究会は、持続可能な社会のための国家的な対応策を模索し、その成果を土台に国会次元の役割を遂行することによって、環境と経済の調和のとれた発展を通した国民の生活の質向上を目的にしています。

まさに先週17日までアルゼンチンのブエノスアイレスで気候変動枠組条約第10回締約国会議が開催されました。189にわたる条約当事国政府代表のほかに、国際機関、民間団体代表等７千名余りが参加して、京都議定書の履行、気候変化の影響と適応、国家報告書、開発途上国の能力形成および財政支援等の幅広い議論がなされただろうと信じます。

今日この席では、当事国総会に続いて、さらに豊富な議論がもたらされるだろうと思われます。

最近、well beingという言葉が大流行しています。それだけ生活の質を高めようとする関心と努力は、社会のあちこちに現れています。政府や国会もそうした国民的関心に対応するために、多様な努力を傾けています。私も今回の17代国会に至り、室内空気の質改善等の生活の質向上のための多様な立法活動を推進しています。

それにもかかわらず、相変わらず私たちに残されている課題は多いです。過去10余年間、きれいな空気をとりもどすための努力が進められましたが、現在首都圏の大気汚染による社会的被害はよりいっそう悪化する傾向にあります。

今日この席では、中国、日本、米国、モンゴル、ロシアから、困難な中お越し下さった専門家らを迎え、大気汚染に関連する各国別研究および事例を通してご高見を分かち合おうと思います。

討論を通して皆様が提起して下さったご高見を参考にして、政策を策定し、必要な場合、議員立法も推進することをお約束しつつ、最後に国会環境経済研究会は環境と経済の調和がとれた開発、人間と自然の共存の発展のために最善を尽くす所存です。

今後も持続的な関心と激励をお願いし、お忙しい中にもかかわらず参加して下さった内外の貴賓の皆様に、いま一度深く感謝申し上げます。

ありがとうございます。

「都市部における大気環境管理政策」に関する公開シンポジウムにようこそ。

多くの方々が過密なスケジュールの中、ここにお集まりいただいたことに深く感謝するとともに、特に、中国のMr.YANG, Jintian、日本のコイワ マサユキ氏、米国のMr.MANJIT, Ahuja、モンゴルのMr.ENKHBOLD, Anar、ロシアのMs.BOYARCHUK, Nadezhda、韓国環境部のMr.Park Kang Seokをはじめ代表者の方々に感謝いたします。

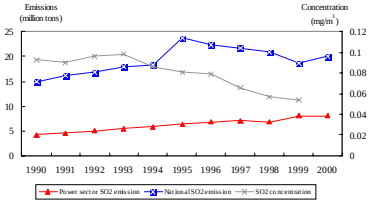
どうもありがとうございました。

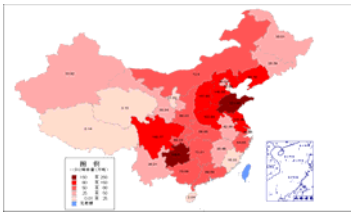
Practice on SO2 Emission Trading in China

Yang Jintian
Chinese Academy for Environmental Planning

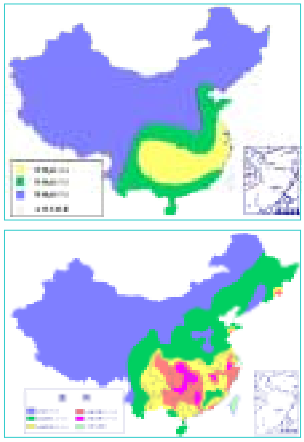
1. SO2 Emission in China

- Coal burning brings about a large amount of SO2 emission.
  - total SO2 emissions: 19.95 million tonnes, and 85% were from direct coal combustion
  - power sector is the major source of SO2 emissions: 8.90 million tonnes, account for 45% of total emissions





2. Acid rain and Environmental Impacts



- Acid rain are serious
  - Acid precipitation covers around 30 percent of the land areas
  - 48.9% of the cities suffer from acid rain
  - high stack sources contribute an increasing percentage of emissions
  - economic loss: more than 110 billion yuan

3. Control Policies

- Identifying Critical Control Zones
- Limiting the Extraction and Use of High Sulphur Coal
- Promoting SO2 Total Emission Control
- Levying SO2 Emission Charges
- Requiring Cities to Comply with National Ambient Standards for SO2 Concentrations
- Adjusting the Composition of the Power Sector
- Encouraging Desulphurisation

4. Requirements and Existing Foundations for Introducing ET

- **Foundations**
  - **Compatibility of Emission Trading and the TEC Policy**
  - **Flexible Approach to Meeting Management Requirements**
- **Conditions**
  - **Variation of Marginal SO2 Abatement Costs**
  - **Regional Problem (Long distance transportation)**
  - **Emission Measurement**
  - **Legal Basis**

5. Emission Trading Pilots

- **Early in the 1980s, China began discussing and piloting emission trading**
- **Pilots in three stages:**

(1) 1990 to 1995 – establishing the concept;

(2) 1996 to 2001 – exploring the theory and methods of emission trading; and

(3) 2002 to present – piloting and designing emission trading programs.

SO2 Emission Trading in Jiangsu Province

Scope:	**Power sector, 196 power plants in Jiangsu Province**
Region:	**The province**
Cap:	**TEC limits for the Tenth Five-Year Plan period**
Allocation Method:	**Emission performance Standards (EPS)**
Legal Basis:	**Document of provincial EPB and Economic and Trade Commission**
Trading Situations:	**Two power plants carried out a trade**
Monitoring and Measurement:	**CEMs, periodic source monitoring, and material balance**

SO2 Emission Trading in Taiyuan City

Scope:	**23 key pollution sources accounting for 50% of total SO_2 emissions**
Region:	**Urban area (excluding suburb districts and counties)**
Cap:	**Cap for year 2005: 125,000 tonnes**
Allocation Method:	**Historical emissions**
Legal Basis:	**Regulation on TEC in Taiyuan City and administrative regulation for SO_2 emission trading in Taiyuan City**
Trading Situations:	**Training, trading simulation, and implementation beginning January 1, 2003**
Monitoring and Measurement:	**CEMs, periodic source monitoring, and material balance**
Management:	**Emission and allowance tracking systems**

6. Opportunities and Obstacles to Implementing Emission Trading in China

- **Feasibility of National Implementation**
- **Issues and Barriers**
  - **Legal Authority**
  - **Uniform Allocation Method Uniform Allocation Method**
  - **Monitoring and Verification**
  - **Coordination with Other Policy Instruments**

7. Proposed framework

- **National SO2 TEC Targets**
- **Proposed Implementation Phases by Experts:**
  - ***Phase 1:*** **a pilot phase with trading limited to large power plants (i.e., annual SO2 emissions greater than 5,000 tonnes) in the TCZs;**
  - ***Phase 2:*** **an expanded pilot with trading between all power plants in the TCZs on the basis of phase I;**
  - ***Phase 3:*** **a nationwide program including all power plants in China; and**
  - ***Phase 4:*** **an expanded nationwide program including other types of high stack sources.**

8. Conclusions

- **SO2 TEC in China should be combined with a national emission trading policy to help attain the control target at lower social cost.**
- **After nearly 10 years of analysis and emission trading pilots, several cities and regions have practical experience that provide the necessary foundation for introducing emission trading nationwide.**
- **There are issues and barriers to overcome before implementing a nationwide emission trading program, including legal authority, policy coordination, allocation issues, emission measurement and verification, and supervision and management systems.**

9. Suggestions

- **Establish an explicit legal basis for emission trading.**
- **Strengthen measurement and verification of SO2 emissions to improve accuracy.**
- **Design an equitable allocation method that provides proper incentives for sources to take action to reduce SO2 emissions.**
- **Strengthen education and outreach on emission trading.**

Thanks

PRACTICE ON SO2 EMISSION TRADING IN CHINA

YANG Jintian, CAO Dong, GE Chazhong, GAO Shuting
(Chinese Academy for Environmental Planning)

Jeremy Schreifels
(U.S. Environmental Protection Agency)

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EXECUTIVE SUMMARY

Over the past 10 years, the Chinese State Environmental Protection Administration (SEPA) has actively investigated the potential to use emission trading to reduce sulphur dioxide (SO_2) emissions from electricity generators and industrial sources. In 1999, SEPA partnered with the U.S. Environmental Protection Agency (U.S. EPA) to cooperate on a study to assess the feasibility of implementing SO_2 emission trading in China. SEPA has also pursued emission trading pilot projects in several cities and provinces. The authors, using information from the feasibility study and pilot projects, introduce the circumstances necessary for SO_2 emission trading in China, outline the experience to date, and analyse implementation opportunities and barriers in China. The contents of the paper are: (1) SO_2 emission control policies in China; (2) institutional requirements and the basis for introducing SO_2 emission trading in China; (3) case studies of emission trading in China; (4) opportunities and barriers to implementing emission trading in China; (5) recommendations to transition from pilot projects to a nationwide SO_2 emission trading program; and (6) conclusions and suggestions.

1. INTRODUCTION

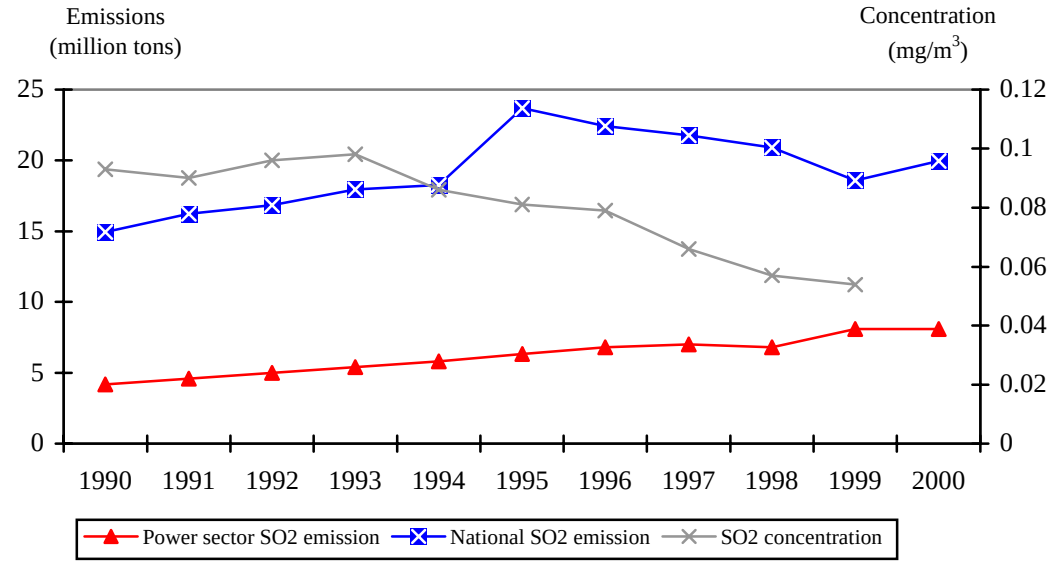
1. Acid rain and sulphur dioxide (SO_2) pollution in China are very severe – ambient concentrations in some regions are several times higher than air quality standards – and have significant impacts on human health, ecosystems, and cultural resources. The toll on human health and the economy from air pollution is estimated to cost as much as 2% of GDP annually (Xie, 1998). As a result, since 1995 the Chinese government has placed great importance on controlling acid rain and SO_2 pollution. In order to accomplish this, the government has identified key geographic areas where the problem is particularly severe and adopted a series of policies and measures to abate SO_2 emissions. Emission trading is one of the instruments the government is investigating. This paper analyses the opportunities and barriers to implementing SO_2 emission trading in China considering current institutional and legal conditions.

1.1 SO_2 Emission Trends

2. Coal is the principal energy source in China; it is used to meet approximately 69% of China's total primary energy demand (IEA, 2002). Due to a dramatic increase in China's coal consumption over the last two decades from rapid industrialisation and population growth, SO_2 emissions have increased and created serious environmental and human health problems. According to Chinese government statistics, SO_2 emissions in China were 19.95 million tonnes in 2000; of which, 85% were from direct coal combustion (Yang et al., 2002). The largest consumer of industrial coal is the Chinese power sector. As a result, the power sector is a major source of SO_2 emissions, leading to acid rain and acid deposition across China. These high-stack sources emit 8.9 million tonnes of SO_2 annually, 45% of total emissions.

3. Government data show that total SO_2 emissions in China increased between 1980 and 1995 to 23.7 million tonnes. Since a series of SO_2 control measures were implemented in 1995, SO_2 emissions have declined each year with a small increase in 2000. Figure 1 illustrates the annual SO_2 emissions trend in China during the 1990s.

Figure 1: Historic SO_2 Emissions in China



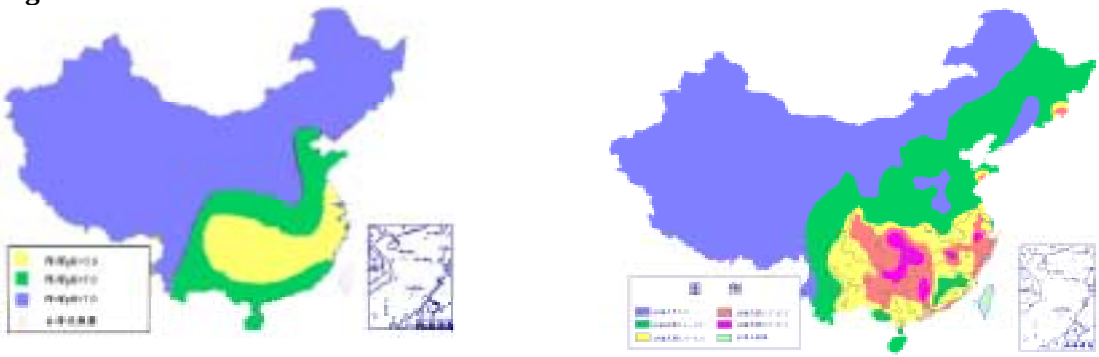
Source: China Environment Yearbook, 1990 to 2001

4. Emission projections through 2010 show a steady increase in energy demand in China. Much of this demand will continue to be met through coal combustion. By 2010, total annual coal consumption will reach 1.44 billion tonnes and SO_2 emissions are estimated to be 26.3 million tonnes (Yang et al., 2002). Therefore, the task of bringing SO_2 emissions under control is crucial though challenging.

1.2 Acid rain and Environmental Impacts

5. SO_2 emissions and the resulting acid rain have serious impacts on human health, visibility, agriculture, forestry, architecture, and cultural resources. From the 1980s to the mid-1990s, the area affected by acid rain increased by more than 1 million km^2. Currently, approximately 30% of China experiences precipitation with annual average pH values below 5.6 (Yang et al., 2002). The distribution of areas affected by acid rain is shown in Figure 2.

Figure 2: Distribution of Acid Rain in 1980s and 1990s



6. While overall emissions are still high, China's total SO_2 emissions have decreased since 1995. As a result, the number of cities meeting the SO_2 concentration standards has increased. But the problem of acid rain has not diminished and the area affected by acid rain and the degree of acidification have not

been effectively controlled. Precipitation monitoring data from 530 cities in 2002 showed that 48.9% of the cities suffer from acid rain, 171 cities or 32% have average annual pH values from precipitation below 4.5, and the number of cities with average annual pH values from precipitation below 4.5 is increasing (Qu, 2003). The main reasons are: (1) although total SO_2 emissions have decreased, high stack sources that transport emissions over long distances and contribute to acid rain are responsible for an increasing percentage of emissions ; (2) SO_2 emissions from the power sector, which is composed of primarily high-stack sources increased; and (3) there was an increase in emissions of nitrogen oxides (NOx) – another acid rain precursor.

2. SO_2 EMISSION CONTROL POLICIES

7. In an effort to control SO_2 emissions and lessen the effects of acid rain, China has adopted a series of control policies and measures since 1995.

2.1 Identifying Critical Control Zones

8. Based on areas affected by acid rain and high SO_2 concentrations in 1998, the government identified key acid rain control and SO_2 pollution control zones known as the "Two Control Zones" (TCZs). The first zone, the Acid Rain Control Zone, consists of areas with average annual pH values for precipitation less than or equal to 4.5, sulphate deposition greater than the critical load, and high SO_2 emissions. The second zone, the SO_2 Pollution Control Zone, consists of areas with annual average ambient SO_2 concentrations exceeding Class II standards, daily average concentrations exceeding Class III standards, and high SO_2 emissions. The TCZs are key areas for controlling acid rain and SO_2 emissions in China and receive priority for investment and management to control emissions.

2.2 Limiting the Extraction and Use of High Sulphur Coal

9. In 1998, China instituted policies to restrict the extraction of high sulphur coal and limit its use in the TCZs. Most cities now use low sulphur coal and have adjusted their energy structures to decrease urban SO_2 concentrations. The State Council explicitly requested in a national industrial policy that local governments shut down small, high-sulphur coalmines. Because of this policy, the sulphur content of coal combusted by the power sector has decreased every year (see Table 1 for average sulphur content values from coal combusted by the power sector).

Table 1: Average Sulphur Content of Coal Combusted in the Chinese Power Sector

1990	*1991*	*1995*	*1999*	*2000*	*Change*
1.20%	1.17%	1.09%	1.05%	1.00%	17%

Source: YANG, 2002.

2.3 Promoting SO_2 Total Emission Control

10. In the Ninth Five-Year Plan Period (1996 – 2000), the Chinese State Environmental Protection Administration (SEPA) began to promote a policy of total emission control (TEC). National SO_2 TEC targets were established. SEPA then assigned individual TEC targets to provinces, autonomous regions, and municipalities. The regional governments subsequently assigned TEC targets to local governments and/or emission sources.

2.4 Levying SO_2 Emission Charges

11. In order to promote SO_2 abatement, SEPA piloted SO_2 emission charges in 1992 in 2 provinces and 9 cities where acid rain was severe and SO_2 emissions were high. The SO_2 emission charges were extended to the entire area of the TCZs in 2000.

12. In 2002, the national SO_2 emission charges generated RMB 1.15 billion (U.S. $140 million). Much of the money is used to install pollution controls and for general environmental improvement. In addition to providing revenue for environmental protection agencies, the charges have played an effective role in encouraging emission sources to assess the economic implications of SO_2 emissions, advancing the use of emission controls at new and existing sources, promoting SO_2 pollution prevention, raising funds for pollution treatment, and, as a result of these incentives, controlling SO_2 emissions and acid rain.

13. The current emission charge of RMB 0.2 per kilogram of SO_2, however, is less than the average marginal abatement cost of SO_2 . As a result, the charges are insufficient to effectively stimulate pollution abatement to the necessary levels. To correct this, the government is gradually adjusting and enhancing the rate of the SO_2 emission charge.

2.5 Requiring Cities to Comply with National Ambient Standards for SO_2 Concentrations

14. To speed up urban air quality improvements, SEPA promulgated requirements that all cities should meet air quality standards and emission standards for key pollutants by 2000. Under this policy, urban SO_2 concentrations have improved significantly and more cities meet the air quality and emission standards.

2.6 Adjusting the Composition of the Power Sector

15. Beginning in 1997, the State Council and the State Economic and Trade Commission (SETC) started requiring power enterprises to shut down small generating units below 50 MW – units that are typically inefficient and emit significant pollution. By the end of 2000, small generating units with a total capacity of 10,000 MW were shut down. The resulting reduction in coal consumption and SO_2 emissions was 10 million tonnes and 400,000 tonnes, respectively. By 2004, an additional 25,000 MW of small generating units will be shut down, including 14,000 MW from the State Power enterprise.

2.7 Encouraging Desulphurisation

16. Research into desulphurisation began in the 1970s in China. Experimental facilities were set up in the mid-1980s, but desulphurisation equipment was not installed on large capacity generating units until the 1990s. By the end of 2000, desulphurisation equipment was installed and operated on 5,000 MW of generating capacity in China, about 70% of the units with controlled units were operated by State Power. State Power is currently expanding its use of desulphurisation equipment and has a total of 10,000 MW of generating capacity with desulphurisation equipment in operation or under construction.

3. REQUIREMENTS AND EXISTING FOUNDATIONS FOR INTRODUCING EMISSION TRADING IN CHINA

3.1 Foundations for SO_2 Emission Trading in China

17. The SO_2 problem in China is characterised by the following: (1) approximately 45% of total SO_2 emissions are from high-stack sources in the power sector; (2) energy demand is growing rapidly and, as a result, coal consumption is expected to continue increasing; and (3) many areas in China are suffering from SO_2 pollution and acid rain. There are many policies and measures in place to address the problem. There is, however, a need to explore additional mechanisms and management instruments to reduce emissions cost effectively without constraining economic growth. In addition to powerful regulatory instruments, the government is interested in introducing economic and market-based policies to address the problem. Among the current control policies and measures, most are regulatory command-and-control policies; the only economic instrument is the emission charge. Due to the low charge rate, however, the effect is limited and adjusting the rate to the economically efficient level is difficult because of political, social, and other factors. Therefore, SEPA is pursuing experiments with emission trading as another way to promote SO_2 emission reductions.

3.1.1 Compatibility of Emission Trading and the TEC Policy

18. The situation in China is particularly suitable for emission trading. Because a significant percentage of SO_2 emissions are from high-stack sources, the problem has become more regional in scope as SO_2 is transported to neighbouring regions. The TEC policy is aimed at controlling such pollution - it establishes a cap on total emissions, a key attribute of an emission trading program. The TEC limit for 2000 was 23.7 million tonnes but SO_2 emissions were only 19.95 million tonnes with additional abatement planned. During the Tenth Five-Year Plan period (2001 – 2005), the TEC limit is set to decline an additional 10% from 2000 emissions. In the TCZs, the TEC limit is even more ambitious with a 20% reduction from 2000 emissions. National and regional experts have acknowledged that emission trading can effectively lower the cost of achieving the TEC limits.

3.1.2 Flexible Approach to Meeting Management Requirements

19. Controlling SO_2 emissions will require an enormous investment of capital, a great deal of time, and long-term planning. Emission sources, according to medium- and long-term requirements, have the flexibility to determine how to control emissions. Emission trading formalises this flexibility and also enables emission sources to choose whether to invest in large-scale treatment and/or buy emission allowances in order to meet environmental requirements. In addition, revenue from the sale of surplus emission allowances can be used to offset investments in control equipment. Emission trading can further reduce costs by spurring innovation and encouraging competition between control options as demonstrated in the U.S. SO_2 and NOx emission trading programs (Burtraw, 2000).

3.2 Basic Conditions for Emission Trading

20. The U.S. experience has shown that emission trading can be an effective instrument to reduce emissions at lower cost than traditional regulatory policies. For it to be successful, however, several key conditions should be in place. Emission trading works best when:

    (1) marginal SO_2 abatement costs differ among emission sources;

    (2) the problem is regional or global in scope;

(3) emissions can be accurately and consistently measured;

(4) there is a strong legal basis for emission trading; and

(5) administrative institutions have sufficient capacity to administer the program.

3.2.1 Variation of Marginal SO_2 Abatement Costs

21. Based on a survey conducted by the Chinese Research Academy of Environmental Sciences (CRAES), there are major differences in marginal SO_2 abatement costs among SO_2 emission sources. Some of the difference is due to age and type of equipment, access to technologies, technical capacity, location, and fuels. The difference in costs can be as great as 30-50% between regions and 40% between different sectors (Wang et al., 2002). Emission trading has enormous potential to reduce overall costs to industry because of the differences in marginal SO_2 abatement costs (low-cost sources could reduce emissions greater than required and sell surplus allowances to high-cost sources, allowing all sources to attain the emission goals and saving money for high-cost sources.)

3.2.2 Regional Problem

22. Although overall SO_2 emissions have been decreasing in China, emissions from high-stack sources are increasing. As a result, sulphates are transported over a larger area creating regional acid rain problems.

3.2.3 Emission Measurement

23. An effective emission trading program is based on accurate emission measurement and consistent, effective enforcement. Accurate emission measurement from all sources is critical to determine compliance with SO_2 TEC policies. For the U.S. emission trading program, the U.S. Environmental Protection Agency (U.S. EPA) requires most emission sources to install continuous emission monitors (CEMs) for SO_2, NOx, and CO_2. The U.S. EPA created a data registry to collect, audit, manage, and disseminate emission data. In China, the introduction of SO_2 emission trading will necessitate the establishment and improvement of emission measurement and data management.

24. Presently, China has mechanisms in place to support SO_2 emission measurement. The current emission reporting program stipulates "sources must complete a 'Form of Emission Reporting' and provide all necessary data within the time specified by the local Environmental Protection Bureau (EPB)." The emission reporting program forms the basis of the EPBs pollution management. The problem, however, is that most of the SO_2 emission data reported by sources are calculated with material balance based on coal consumption and sulphur content of the coal. This approach can be relatively accurate and cost effective when the fuel inputs and production processes are stable. However, when control equipment is installed, material balance does not provide sufficient accuracy for emission trading programs. For a small percentage of enterprises the data are based on monitoring, but only periodic monitoring (e.g., once per quarter or once per year). This, however, is insufficient for emission trading programs because it represents operating conditions over a very short time period and may not adequately reflect conditions during the rest of the year.

25. Because SO_2 emission sources are numerous – power sector sources and various industrial and heating boilers – it is neither feasible nor necessary to require all sources to install CEMs. Therefore, it is important to classify SO_2 emission sources and determine the most appropriate measurement techniques, considering technical, scientific, and economic factors as well as the type and scale of control equipment.

3.2.4 Legal Basis

26. Emission trading is a market-based instrument to achieve the TEC limit already established in China. An emission trading program requires significant upfront work to ensure that the program's design is comprehensive and provides the proper incentives for sources to reduce emissions. Designing and operating a program involves setting the TEC target; allocating portions of the target to emission sources in the form of emission allowances; designing trading rules; collecting, verifying, and managing emissions data; managing allowance transactions; and enforcing the program and pursuing punishment for non-compliance. Unless the laws and regulations are clear and complete, the system may be difficult to implement and enforce.

27. A new amendment to the Air Pollution Prevention and Control Law further clarifies the TEC policy and requires local governments within the TCZs to check and approve total emissions from sources and issue emission permits in accordance with the conditions and procedures the State Council has stipulated, taking into consideration the principles of openness, fairness, and justice. The emission permit program explicitly defines emission rights for sources. When one enterprise obtains an emission permit, it receives the authorisation to emit the amount stipulated in the permit. The establishment of emission rights establishes a fundamental condition for emission trading – explicit or *de facto* property rights.

28. The current Air Pollution Prevention and Control Law does not contain provisions for a national emission trading program, but future amendments may create such a program.

3.2.5 Administrative Institutions

29. Regardless of the type of policy instrument, a control program will only be effective if the proper institutions are in place to adequately administer and enforce the program. SEPA is engaged with project partners to enhance the capacity to administer emission trading programs. In addition, pilot projects will help identify deficiencies in local environmental protection bureaus. A special division within SEPA should be set up to administer the program once the national program for SO2 emission trading is in place. This division will be responsible for overseeing the program, managing data systems to make sure the program on track and transparent to every stakeholder involved. [YANG – did you want to add more here on institutional issues following the discussions on this at the Forum? It is up to you.]

4. EMISSION TRADING PILOTS

30. Early in the 1980s, China began discussing and piloting emission trading in combination with new projects. The government carried out case studies on the compensated transfer of emission quotas. However, due to legal and regulatory constraints, limited experience, and implementation issues, these experiments were primarily conceptual. In the Ninth Five-Year Plan period, significant progress was made when TEC was promoted nationwide. Interest in emission trading had grown noticeably by the Tenth Five-Year Plan period when TEC became more formal.

31. Emission trading has made the transition from concept to pilot stage. SEPA is increasingly attentive of the issue of introducing nationwide emission trading. This transition has occurred over three stages: (1)

1990 to 1995 – establishing the concept; (2) 1996 to 2001 – exploring the theory and methods of emission trading; and (3) 2002 to present – piloting and designing emission trading programs.

4.1 Progress in Piloting Emission Trading in China

32. In 1994, SEPA conducted policy experiments in air pollutant emission trading in six cities (Baotou, Kaiyuan, Liuzhou, Taiyuan, Pingdingshan and Guiyang) on the basis of air pollutant emission permit pilots in 16 cities.

33. The pilot trades took many different forms, including:

- Allowance transfers within an enterprise;
- Environmental compensation fees to obtain additional emission rights;
- Investments in non-point source pollution control to obtain additional emission rights; and
- Allowance transfers from sources with surplus allowances to new or existing sources with insufficient allowances.

34. The trading during these pilots was influenced by political considerations and was not emission trading in the true sense. The pilots were combined with new, expansion, and technical innovation projects arranged by local EPBs. As there was no legal foundation for emission trading, the emission trading policy was implemented through the pollutant permit system that was not adopted nationwide.

35. In 1999, SEPA and the U.S. EPA began to cooperate on a study to assess the feasibility of introducing SO_2 emission trading in China. This study began with significant discussions about the theories, conditions, foundations, and methods of emission trading. The project further explored the opportunities and barriers to implementing SO_2 emission trading in the Chinese power sector. Through the cooperation, the countries have conducted several workshops and training activities. As a result, a number of Chinese management and research personnel have a much better understanding of how emission trading works and the conditions necessary for an effective program. The cooperation has promoted emission trading in China.

36. With financial assistance from the Asian Development Bank (ADB) and technical assistance from Resources for the Future (RFF) – a U.S. think tank – and the Chinese Academy for Environmental Planning (CAEP), Taiyuan city established an SO_2 emission trading program in 2001 to achieve their SO_2 TEC limit at least cost.

37. In 2002, in order to gain more experience and facilitate nationwide promotion of emission trading, SEPA organized pilots in seven provinces. After one year of preparatory work, some conditions necessary for emission trading were developed. For instance, two power plants in Jiangsu Province reached an agreement to trade SO_2 allowances to meet TEC limits.

4.2 Case Studies of Emission Trading

4.2.1 SO_2 Emission Trading in Jiangsu Province

38. Located in Eastern China, Jiangsu is a province with a relatively advanced economy and effective management institutions. SO_2 emissions in the province are significant – 1.2 million tonnes in 2000 – and acid rain has had serious effects on the region. In order to control total SO_2 emissions and attain the TEC limit (1 million tonnes) allocated by the central government, Jiangsu introduced an emission

trading program to promote cost-effective SO_2 abatement in the power sector. The policy framework is outlined in Table 2.

Table 2: The Emission Trading Framework in Jiangsu

Scope:	Power sector – 196 power plants in Jiangsu Province
Region:	The province
Total Emission Target:	TEC limits for the Tenth Five-Year Plan period
Allocation Method:	Emission performance standards
Legal Basis:	Document by provincial EPB and Economic and Trade Commission
Trading Situations:	Two power plants conducted a trade
Monitoring and Measurement:	CEMs, periodic source monitoring, and material balance

Source: Jiangsu Provincial EPB, 2003

39. Jiangsu focused on the power sector for the pilot study. The sector makes the largest contribution to SO_2 emissions in the province. The two power plants that participated in the allowance trade were located in different cities; thereby making the transaction the first inter-city allowance trade in China. Some of the reasons for the program's initial success where: (1) total allowable SO_2 emissions from the power sector are controlled by the provincial EPB; (2) allowances were allocated according to uniform standards set by the provincial EPB; and (3) allowances were allocated based on an emission performance standard, or generation performance standard, which is an advanced concept that promotes efficiency ; (4) the provincial EPB is capable to decide the total emission cap for the sector, identify the uniformed allocation method to facilitate the breakdown of cap to individual power plants involved and have the authority to give a go-ahead to this trade. [YANG – in paragraph you mentioned effective management institutions in Jiangsu province – did you want to mention the influence of these on the success of the program?]

4.2.2 SO_2 Emission Trading in Taiyuan City

40. SO_2 pollution in Taiyuan is very severe – ambient SO_2 concentrations were 0.2 mg/m3 in 2000, three times higher than the Class II standards of 0.06 mg/m3. In an effort to improve urban air quality, the city formulated an ambitious TEC target of 50% below 2000 emissions by 2005. With financial assistance from ADB and technical support from RFF and CAEP, Taiyuan initiated the emission trading project to attain the TEC target at lower cost. After one year of preparation and study, Taiyuan promulgated the "Administrative Regulation for SO_2 Emission Trading in Taiyuan City" in 2002 as a local regulation to conduct emission trading. Twenty-three major sources were identified to participate in the first phase of the emission trading program. On the basis of a detailed survey and analysis of SO_2 emissions from the sources, allowances were allocated using historic emissions or performance agreements with the city EPB as the basis for the new allocations. The U.S. EPA held training classes for the local EPB and the enterprises participating in the program. In addition, the U.S. EPA helped RFF and CAEP create SO_2 emission and allowance tracking systems. The policy framework for the Taiyuan emission trading program is outlined in Table 3. The training conducted by USEPA, RFF and CRAES had brought local officials and power plants representatives together to see simulation cases which facilitated their understanding the real emissions trading program and helped to build up the institutional capacities for the success of the Taiyuan program. The training also suggests that further extension training be held to clarify issues related to emissions trading such as the right of an allowance. [YANG – did you want to refer to some of the comments made by Ruth Greenspan-Bell at the Forum, and expand on any issues relating to the importance of the training held bu USEPA and building institutional capacities for the success of the Taiyuan program?]

Table 3: The Emission Trading Framework in Taiyuan

Scope:	23 key pollution sources accounting for 50% of total SO_2 emissions
Region:	Urban area (excluding suburban districts and counties)
Total Emission Target:	TEC limits for the Tenth Five-Year Plan period – 125,000 tonnes
Allocation Method:	Historic emissions
Legal Basis:	Regulation on TEC in Taiyuan City and administrative regulation for SO_2 emission trading in Taiyuan City
Trading Situations:	Training, trading simulation, and implementation beginning January 1, 2003
Monitoring and Measurement:	CEMs, periodic source monitoring, and material balance
Management:	Emission and allowance tracking systems

Source: Cao et al, 2002.

41. The Administrative Regulation for SO_2 Emission Trading in Taiyuan City creates a strong foundation for emission trading and provides detailed implementation requirements. There are seven key aspects of the regulation:

- Identifies Taiyuan city EPB as the supervising institution for SO_2 emission trading.
- Stipulates that enterprises participating in the emission trading program are not exempt from other environmental protection responsibilities.
- Specifies the allowance allocations for each year of the Tenth Five-Year Plan period. New sources must obtain allowances through purchases from the city EPB or other sources.
- Allows for the trading and banking of allowances. Surplus allowances from the current year can be banked for use in the future or sold to other sources. If surplus allowances are sold, the trading parties determine the price based on market conditions.
- Authorises an allowance auction by the Taiyuan EPB. Auction income is set aside for improving urban environmental quality.
- Requires the implementation of an emission tracking system and allowance tracking system to manage emission data and allowance transactions.
- Specifies the legal liability of enterprises and financial penalties for non-compliance.

5. OPPORTUNITIES AND OBSTACLES TO IMPLEMENTING EMISSION TRADING IN CHINA

5.1 Feasibility of National Implementation

42. Although current conditions are far from perfect for an efficient emission trading program, they create the foundation for pilot emission trading programs that can help further develop necessary conditions and institutions. Prevailing conditions include:

- Wide acceptance of the emission trading concept: The role of emission trading in decreasing costs to achieve an environmental goal is well understood.
- Implementation of SO_2 TEC limits: The TEC limits establish the environmental goal, while emission trading and market-based instruments provide the means to achieve the goal at a lower cost.
- Experimentation with emission trading pilots: Pilots in some provinces and cities have provided valuable experience and forged the path to expand emission trading nationwide.
- Outreach and capacity building for emission trading: SEPA has organized a series of studies and has developed technical capacity in the design of emission trading programs.

5.2 Issues and Barriers

43. Although there are favourable conditions for promoting nationwide emission trading, there are still some issues and barriers to overcome, including legal authority, policy coordination, allocation issues, emission measurement and verification, and supervision and management systems.

5.2.1 Legal Authority

44. There are currently no explicit legal provisions authorising emission trading at the national level. The current Air Pollution Prevention and Control Law supports the TEC policy but does not directly assist in the adoption of emission trading programs. The law indirectly requires the application of economic and technical measures to control air pollution, implying that emission trading is feasible. However, in the new amendment of the law there are still no explicit provisions for emission trading.

45. Some pilot provinces and cities have local regulations on emission trading but corresponding national regulations are vital if nationwide emission trading is to be pursued.

5.2.2 Uniform Allocation Method

46. The current TEC targets are allocated to administrative districts and then further allocated by the local governments to emission sources. Each of these levels of government is free to create their own allocation method. If a nationwide emission trading program is implemented, the TEC management system and allocation method should be adjusted to create a uniform TEC allocation method. Once a uniform allocation method is established, the allocation process will involve three steps: (1) identify sources participating in the emission trading program; (2) determine the TEC limit of the community of participating sources; and (3) allocate allowances to individual sources in accordance with uniform allocation principles and methods. Whatever allocation method is chosen, it should embody the principles of sound science, reasonableness, and equity.

5.2.3 Monitoring and Verification

47. The primary method for measuring and verifying SO_2 emissions is material balance. Few sources have installed continuous emission monitors (CEMs). For emission trading, however, it is important to provide accurate emission measurement to create a credible, effective emission trading program. Although material balance can provide the same level of accuracy as CEMs in certain circumstances (e.g., small units that are frequently cycled on and off), there are significant gaps between current measurement approaches and a system with the appropriate level of accuracy for an emission trading program. Emission measurement could be improved with standards for CEM installation and operation and alternative measurement methods. As the U.S. experience shows, sources participating in emission trading programs can rely on CEMs. However, because the SO_2 emission sources in China are numerous and CEMs are expensive, it would be difficult to install CEMs on all sources in the near

term. Therefore, when identifying sources to participate in the first phase of an emission trading program, SEPA and local environmental protection bureaus should consider measurement capabilities as a priority.

5.2.4 Coordination with Other Policy Instruments

48. The introduction of emission trading should be coordinated with existing regulatory policies to ensure that current protection policies are not diminished. In the U.S., emission trading is combined with traditional command-and-control policies and other market-based instruments to protect against emission hotspots that could occur if sources purchased allowances to increase emissions, causing a deterioration of local air quality. In China, emission standards and emission charges can integrate with an emission trading program to promote emission reductions. The emission charges are particularly important for raising revenue for general environmental protection. Therefore, consideration should be given to the design of an emission trading program to ensure that policies are compatible. Theoretically, the low charges for the emission charge system should not impede the effectiveness of an emission trading program (Ellerman, 2001).

49. In addition to environmental policy instruments, the power sector is faced with other policies that may affect the efficiency of an emission trading program. Some of these issues are discussed in the next section.

6. RECOMMENDATIONS FOR NATIONWIDE SO_2 EMISSION TRADING

50. SO_2 emission trading has the potential to lower the cost of attaining the TEC targets nationwide. Pilots and research demonstrate that implementing and operating a program within China is feasible. It should, however, be implemented in stages and applied more broadly after pilots are used to test different aspects of the policy. This section outlines some strategies to help nationwide adoption of emission trading.

6.1 National SO_2 TEC Targets

51. Emission trading is compatible with the national TEC targets. To ensure that the policies complement one another, the design of the emission trading policy should be integrated with the national TEC limit so as to facilitate the attainment of the TEC target.

52. SEPA has already established the national SO_2 TEC target for the Tenth Five-Year Plan period. The target limits SO_2 emissions in 2005 to 10% below 2000 emissions and 20% below 2000 emissions in the TCZs. Detailed TEC targets are presented in Table 4.

Table 4: SO_2 TEC Targets in 2005

	2000 ('000 tonnes)	*2005 ('000 tonnes)*
China	19,950	17,950
TCZs	13,164	10,536
SO_2 Control Zones	5,296	4,234
Acid Rain Control Zones	7,868	6,302

Source: State Council, 2001

6.1.1 The Power Sector SO_2 TEC Target

53. According to a CAEP research report on long- and medium-term emission control plans in the power sector, the TEC target for the power sector over the next 20 years will continue to decline (Yang et al., 2002). See Table 5 for the power sector TEC targets.

Table 5: SO_2 TEC Targets in the Power Sector – 2000 to 2020

Year	*TEC Target ('000 tonnes)*
2000 (base year)	8,900
2005	8,000
2010	7,300
2015	6,700
2020	6,300

Source: Yang et al., 2002

6.2. Implementing the TEC

54. The circumstances for SO_2 emission trading policies in China and the U.S. differ significantly, including:

- The composition, distribution, and contributions of the emission sources;
- The structure and role of central management institutions;
- Ownership – private versus state owned;
- Experience with markets for commodities like electricity;
- Access to capital and control equipment; and
- Existing policies and measures.

55. SO_2 emission sources in China are primarily classified as industrial or social. Alternatively, the sources can be classified into regions, such as the acid rain zone, the SO_2 control zone, and the general zone. They can also be classified by emission source, such as high-stack sources, low-stack sources, and non-point sources. High stack sources are found mostly in the power sector. There are a limited number of sources, they are often controlled centrally, and they are easier to manage. The low stack sources are various types of boilers and furnaces. They are numerous, widely distributed, and difficult to manage. The non-point sources are primarily diffuse residential stoves.

6.2.1 Power Sector

56. Promoting SO_2 emission trading in the power sector provides many advantages. The sector accounts for 45% of national SO_2 emissions, sources primarily use high stacks, and, as a result, are key contributors to the regional acid rain problem. Decreases in their emissions should significantly improve regional pollution problems. Other important conditions for emission trading exist in the power sector, such as strong management, good emission data, and a relatively high economic efficiency.

57. There are still, however, some key barriers to implementing emission trading in the power sector, such as:

- *Ownership:* The enterprises in the power sector are mainly state-owned and currently undergoing restructuring. The progress of restructuring will directly affect the implementation of a SO_2 emission trading policy.
- *Electricity pricing*: The price of electricity is an important factor limiting SO_2 abatement in the power sector. The government fixes prices and the sector cannot pass environmental costs to ratepayers. If the electricity pricing policy is not adjusted, sources of funding will be limited and it will be difficult for the sector to adopt effective abatement measures. However, the government is currently reforming national electricity price policy.
- *TEC limit allocation:* The allocation of TEC limits is a two-stage process. First, portions of the national target are allocated to the power sector. Second, portions of the power sector target are allocated to individual sources. There is currently no standard allocation methodology for sources. In addition, allocations are often for short periods (e.g., five-year plan periods) and may not provide enough information for sources to develop investment plans.
- *Emission measurement:* Few enterprises in the power sector, some 10 to 19 new plants, have CEMs. Even in the new plants, CEMs often fail to operate normally. In order to promote SO_2 emission trading, it is important to establish standards for certification, installation, operation, maintenance, and calibration of CEMs.
- *Data management systems:* It is critical to establish management systems to collect, verify, manage, and disseminate emission data. It is also important to develop data standards for reporting.

6.2.2 Two Control Zones

58. Sixty percent of national SO_2 emissions occur in the TCZs. Since the TCZs are identified as areas of national focus for controlling SO_2 and acid rain, the promotion of SO_2 emission trading in the TCZs can be a part of a national SO_2 control strategy. There are abatement targets and emission caps already defined for the TCZs. Therefore, it is practical to conduct SO_2 emission trading pilots in the TCZs. In these pilots the following issues should be considered:

  – There are several types of sources in the TCZs and it is impossible to implement emission trading for all source types. It is therefore necessary to classify sources in the TCZs and select the key ones for an emission trading pilot before broadening the scope.

  – In the TCZs it is necessary to distinguish between high-stack sources and low-stack sources. The former have regional pollution impacts and can therefore trade in a larger area while the latter have primarily local impacts and should therefore only trade with other local sources.

6.3 Implementation Phases

59. The feasibility study on SO_2 emission trading in China prepared by CAEP, U.S. EPA, and other experts recommends implementing SO_2 emission trading at the national level in four stages (WANG et al. 2003):

- *Phase One:* a pilot phase with trading limited to large power plants (i.e., annual SO_2 emissions greater than 5,000 tonnes) in the TCZs;
- *Phase Two:* an expanded pilot with trading between all power plants in the TCZs on the basis of phase one;
- *Phase Three:* a nationwide program including all power plants in China; and
- *Phase Four:* an expanded nationwide program including other types of high-stack sources.

60. A pilot restricted to sources in the TCZs is consistent with China's current SO_2 management framework. Limiting the pilot to power plants focuses SO_2 control in China and facilitates management of emission trading. From the standpoint of the power sector, it is feasible to establish a national SO_2 emission trading program as it may help balance the cost differences in pollution abatement among different sources.

7. CONCLUSIONS AND SUGGESTIONS

In summary, the following conclusions and suggestions are provided:

7.1 Conclusions

- SO_2 TEC in China should be combined with a national emission trading policy to help achieve the control target at lower social cost.
- After nearly 10 years of analysis and emission trading pilots, several cities and regions have the practical experience that provide the necessary foundation for introducing emission trading nationwide.
- There are issues and barriers to overcome before implementing a nationwide emission trading program, including establishment of a legal authority, policy coordination, allocation issues, emission measurement and verification, and supervision and management systems.

7.1 Suggestions

In order to support national implementation of emission trading, some basic conditions should be improved, including:

- Establish an explicit legal basis for emission trading. SEPA should draft emission trading provisions that are integrated with the TEC regulation.

- Strengthen measurement and verification of SO_2 emissions to improve accuracy. Major stationary sources of SO_2 should install CEMs. Those sources without CEMs should be encouraged to apply more accurate emission measurement methods. SEPA should draft standards and/or guidelines for CEM certification, installation, operation, maintenance, calibration, and verification to ensure accurate emission measurement. SEPA should also develop procedures for measuring and verifying emissions from sources without CEMs.
- Design an equitable allocation method that provides proper incentives for sources to take action to reduce SO_2 emissions.
- Implement management systems to collect, verify, manage, and disseminate emission and allowance data. The management systems should complement existing systems already in place for the TEC policy.
- Strengthen education and outreach on emission trading.
- Implement emission trading in phases, with high-emitting, high-stack sources in the TCZs participating in the first phase and a gradual expansion as capacity increases.

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Diesel-Vehicles Emission Control in Japan

Environmental Management Bureau,
Ministry of the Environment, Japan

Masayuki KOIWA

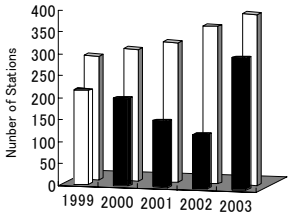
Presentation Overview

1. Background of Motor Vehicle Emission Control
2. Framework of Emission Control
3. Tightening Emission Standards for New Models
4. Automobile NOx/PM Reduction Law
5. Promoting Low Emission Vehicles

Background of Motor Vehicle Emission Control

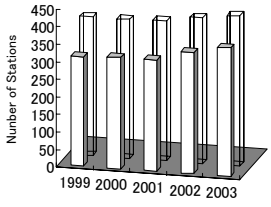
Attainment rate of EQS for air pollution (Road side)

（SPM）



	1999	2000	2001	2002	2003
☐ Number of Attained Stations	215	199	151	123	301
☐ Total Number of Monitoring Stations	282	301	319	359	390
Attainment rate(%)	76.2	66.1	47.3	34.3	77.2

（NO_2）

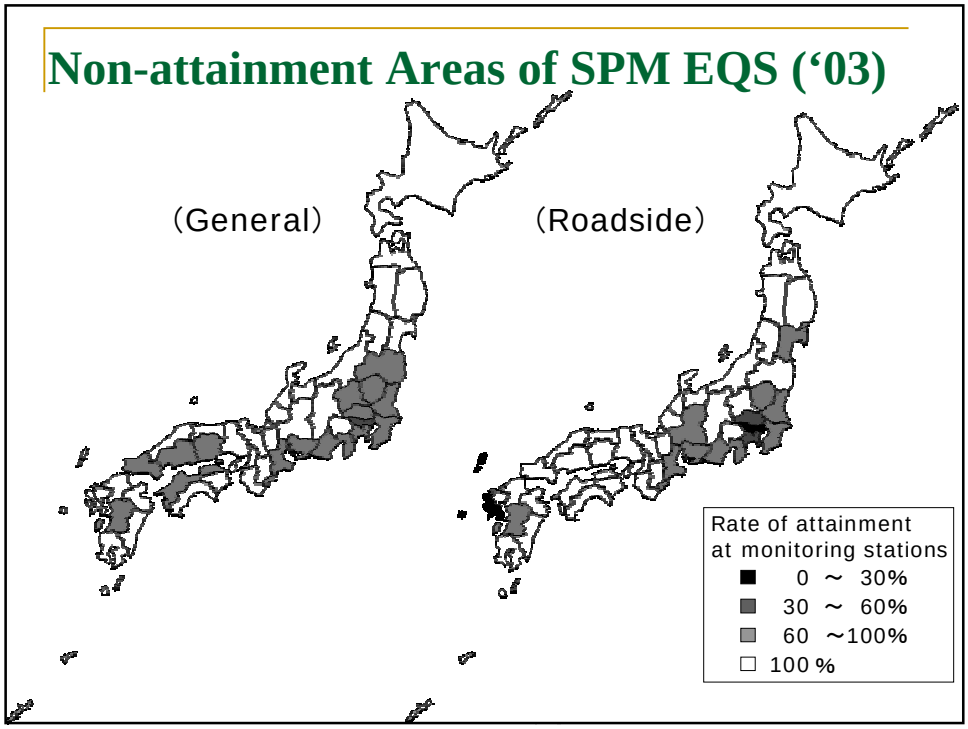


	1999	2000	2001	2002	2003
☐ Number of Attained Stations	310	316	317	345	365
☐ Total Number of Monitoring Stations	394	395	399	413	426
Attainment rate(%)	78.7	80.0	79.4	83.5	85.7

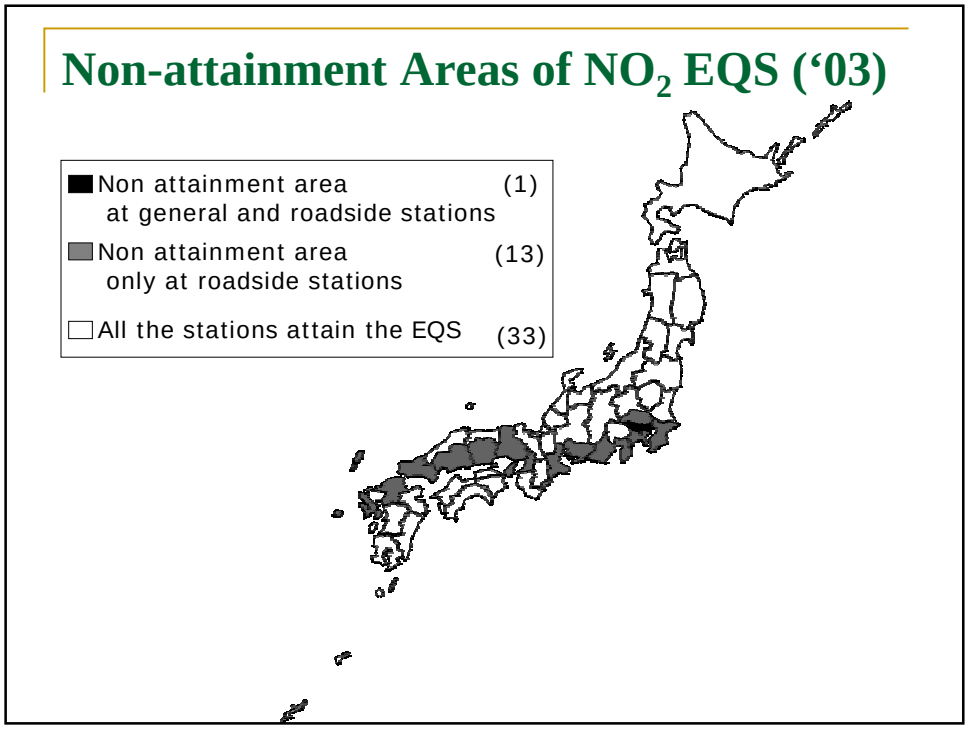
（EQS:Environmental Quality Standards)

- **SPM... Daily average is 0.10 mg/m^3 or less**
- **NO_2…Daily average is in a range from 0.04 to 0.06 ppm or below**

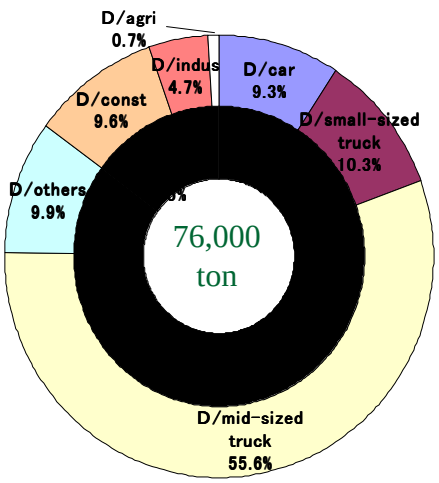
Non-attainment Areas of SPM EQS (‘03)



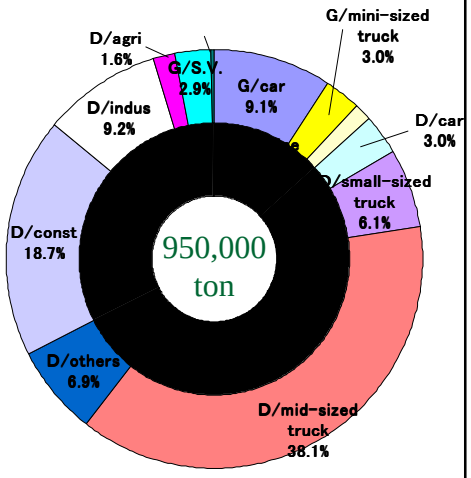
Non-attainment Areas of NO_2 EQS (‘03)



Emissions by Source Category (‘00)



PM



NOx

- Roadside PM & NOx pollution remains severe.
  →The national government aim is to meet NO2 & SPM standards mostly by 2010.
- Prime minister Mr. Koizumi is promoting the most advanced environmental measures in the world.
- A Governments have lost in several judgment at courts about health impact of air pollution by diesel-vehicles emission.

Diesel vehicle emission control shall be promoted more strongly

Framework of Emission Control

Motor Vehicle Pollution Control Measures in Japan

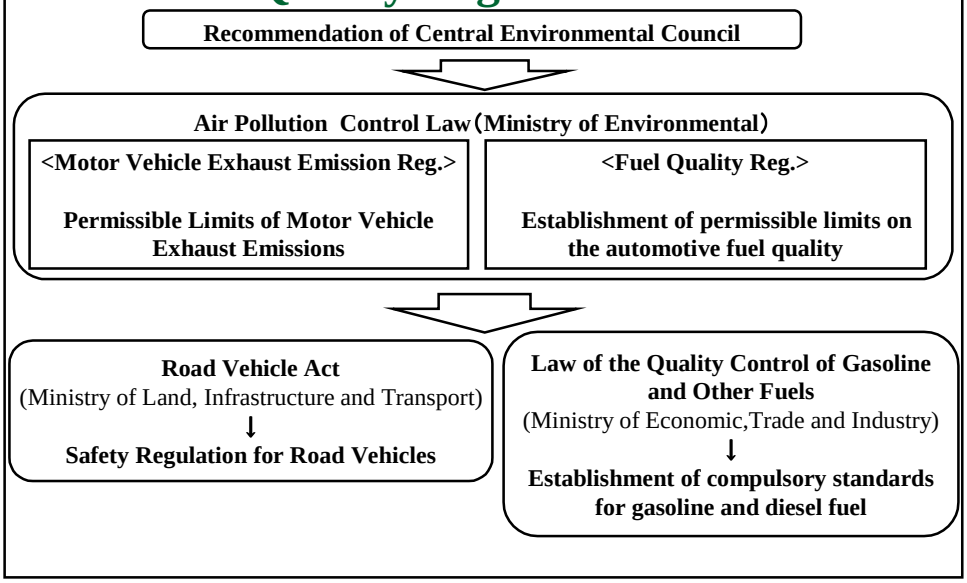
1. Tightening Emission Standards for New Models
2. Automobile NOx/PM Reduction Law

   (to ban old vehicles to be registered in Metropolitan areas)
3. Promoting Low Emission Vehicle

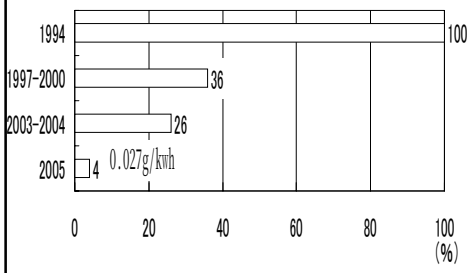
   (Hybrid, CNG, FCV, etc.)

Tightening Emission Standards for New Models

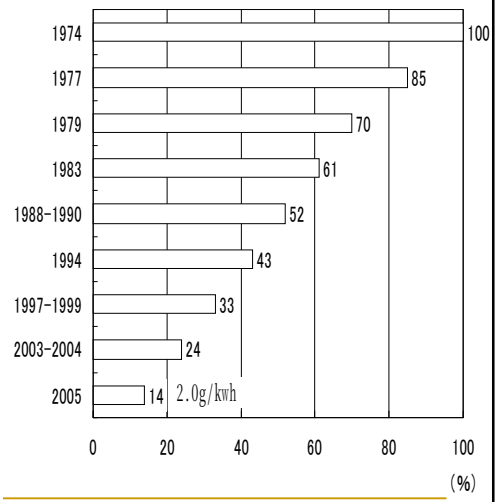
Systems for Exhaust Emission and Fuel Quality Regulation



History of Emission Standards (Heavy Duty Diesel Vehicles)

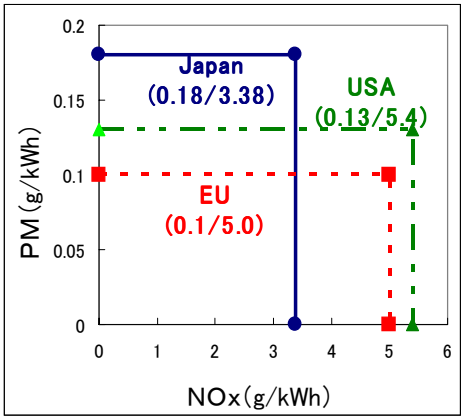


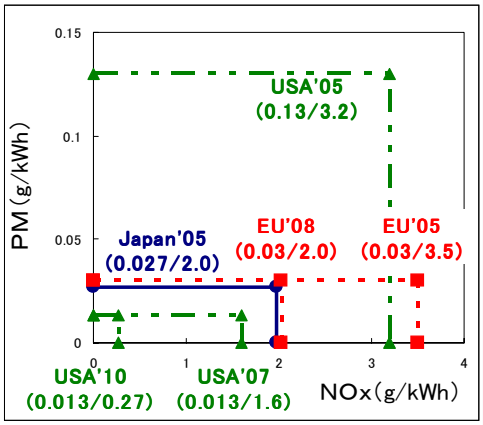
（Particulate Matters）



（Nitrogen Oxides）

International Comparison of Future Emission Standards on HD vehicles

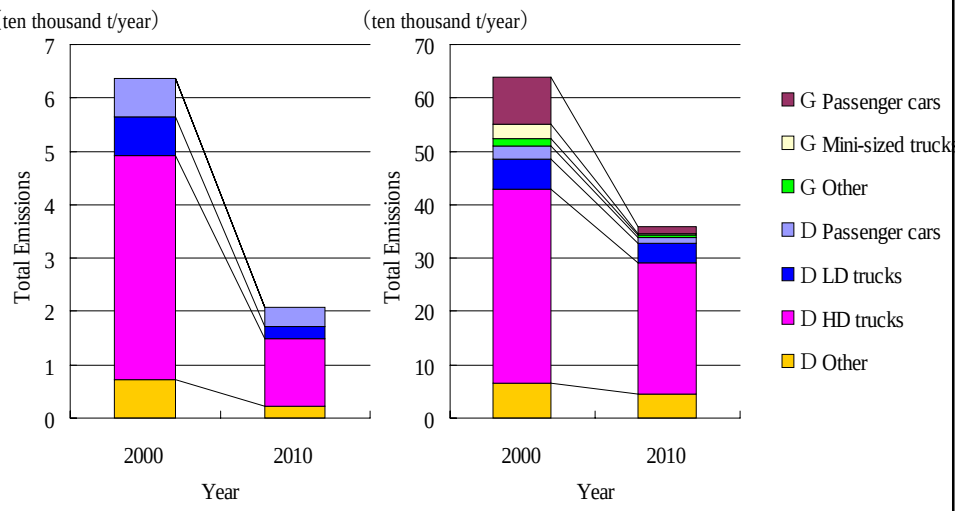




Around 2003

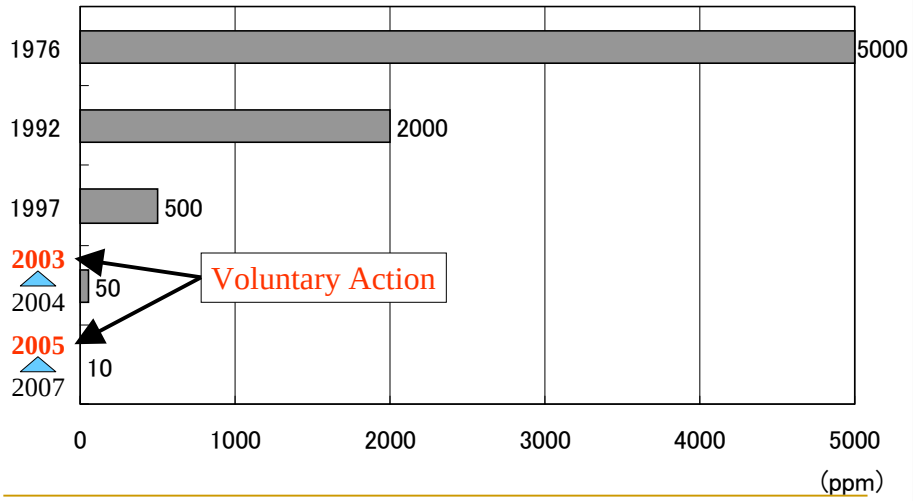
2005 - 2010

Estimated Effect of Tightening Standards

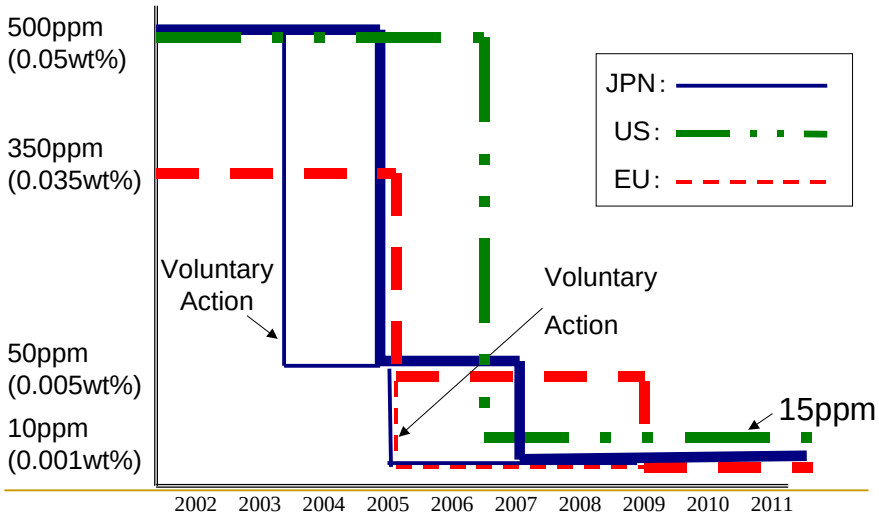


(Particulate Matters) (Nitrogen Oxides)

History of maximum sulfur content in diesel fuel



International Comparison of Future Maximum Sulfur Contents in Diesel Fuel



Discussion in CEC for Future Emission Standards

- July 2003 The 7th report of CEC
- Oct. 2003 Start of discussion about diesel-vehicle emission reduction beyond 2005
- Jan. 2004～ Hearing from
  - Motor vehicle manufacturer
  - Motor vehicle equipment manufacturer
  - Catalyst manufacturer

  .....e.t.c.
- Early 2005? 8th report of CEC?

Points of this discussion

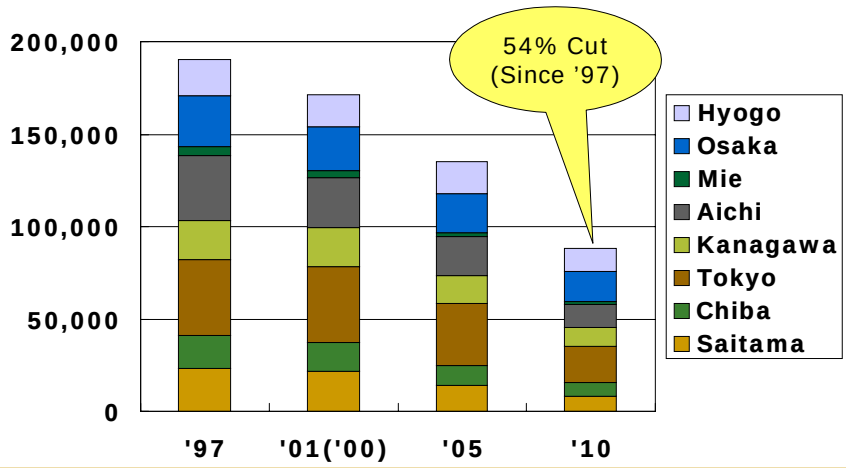
- NOx emission level at engine out
- NOx reduction ratio by NOx absorber catalyst
- Durability of NOx absorber catalyst
- Possibility of urea-SCR
  - Who arrange urea supply facility?
  - How to protect of tampering?
- When beyond 2005 regulation start to enforce.

Automobile NOx/PM Reduction Law

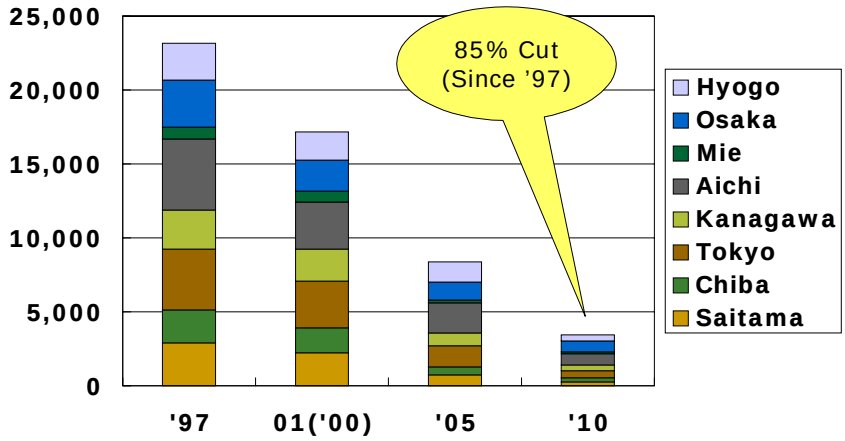
Emission Standards of Automobile NOx/PM Reduction Law

		The standards are equivalent to…	That means…
Diesel passenger cars		NOx: 1978 Gasoline vehicle PM: ***2005 Diesel vehicle***	To use **gasoline** Vehicles (You can also choose CNGV, LPGV) *Nowadays, few diesel vehicles meet the standard*
Buses, trucks, etc. (diesel, gasoline, LPG)	-1.7t (GVW)	NOx: 1988 Gasoline vehicle PM: ***2005 Diesel vehicle***	
	1.7-2.5t	NOx: 1994 Gasoline vehicle PM: ***2005 Diesel vehicle***	
	2.5-3.5t	NOx: 1995 Gasoline vehicle PM: ***2005 Diesel vehicle***	
	3.5t-	NOx: ***1998-99 Diesel vehicle*** PM: ***1998-99 Diesel vehicle***	To use **recent diesel** vehicles (You can also choose CNGV, LPGV)

Emission Reduction Plans (for NOx)



Emission Reduction Plans (for PM)



Promoting Low Emission Vehicles

Low Emission Vehicles

- Definition
  - Electric, Natural gas, Methanol, and Hybrid Vehicle
  - Low emission and low fuel consumption GV,DV
  - Next generation vehicle (i.e. Fuel cell vehicle)
- Tax incentive for 50%,70% reduction from standards in 2005 and low fuel consumption
- Prevailing rapidly

  (71% of new vehicle sold in 2003 is LEV)
- All major auto-makers announced most of GPC become LEV before 2005

Fuel Cell Vehicles

- Most promising clean cars for future
- Zero emission
- First cars are on the market in Japan and US
- Japanese government introduces 8 FCVs

Thank you for your attention!!

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CALIFORNIA REPUBLIC
Public Symposium on Air Quality Management Policy in Metropolitan Areas
Seoul, Korea - December 20, 2004
California Air Resources Board
Sacramento California

Thank you for inviting me to the symposium.

Topics to Discuss

- About ARB
- Regulatory development disputes
- LEV/ZEV program
- Reducing in-use gasoline vehicle emissions
- Reducing diesel vehicle emissions
- Impacts of regulations

Topics to Discuss

- **About ARB**
- Regulatory development disputes
- LEV/ZEV program
- Reducing in-use gasoline vehicle emissions
- Reducing diesel vehicle emissions
- Impacts of regulations

About ARB
Air Quality Agency Relationships

- U.S. EPA (Federal)
  - Sets deadlines for clean air, e.g. Clean Air Act
  - Oversight of state programs
  - Control mobile sources nationally
- ARB (State)
  - Lead air agency in California
  - Control emissions from mobile sources, fuels, and consumer products
- Air Districts (County)
  - Control industrial sources
  - Implement programs at local level

About ARB
State Implementation Plan (SIP)

- U.S. EPA (Federal)
  - Clean Air Act/SIP
    - Establishes national ambient air quality standards (NAAQS)
    - Deadlines for SIP attainment based on the severity of the pollution problem
  - Approval of state SIPs
- ARB (State)
  - Develop SIP for California
  - Compilation of federal, state, and local control strategies
- Air Districts (County)
  - Prepare local SIP elements and submit them to ARB for review and approval

About ARB
Primary Legal Mandates

- Ensure continuous progress toward attaining health-based air quality standards
- Reduce public exposure to toxic air contaminants

Topics to Discuss

- About ARB
- **Regulatory development disputes**
- LEV/ZEV program
- Reducing in-use gasoline vehicle emissions
- Reducing diesel vehicle emissions
- Impacts of regulations

Regulatory Development Disputes
Fulfilling Mandate

- Established regulatory process in California with proactive mechanisms to address opposition
- Clearly defined steps for regulatory development
  - Public workshops
  - Technical analysis
  - Economic analysis
  - Public comment period
  - Staff Report
  - Open Board hearing

Regulatory Development Disputes
Stakeholder Involvement

- Identification and involvement of affected parties at the earliest possible point in the regulatory process
- Understanding of industry operations
- Environmental groups and other regulatory agencies included
- Special consideration to small businesses
- Seek buy-in of all parties

Regulatory Development Disputes
Scientific Understanding

- Problems identified through research, monitoring, surveys, and modeling
- Solutions
  - Available and emerging technologies
  - Economically and technologically feasible
- Consequences of no action
  - Costs increase with inaction
  - Impact on living standard
  - Drastic measures may become necessary

Topics to Discuss

- About ARB
- Regulatory development disputes
- **LEV/ZEV program**
- Reducing in-use gasoline vehicle emissions
- Reducing diesel vehicle emissions
- Impacts of regulations

LEV/ZEV Program
Goals

- Goal is near-zero and zero emissions
- LEV/ZEV provides a mix of technologies
  - Very clean ULEV 2
  - Near-zero emission PZEVs
  - Advanced technology PZEVs (e.g. hybrids)
  - ZEVs (e.g. fuel cells)
- Lifetime emissions PZEV = 4 kg
  - Cars with no controls = 2000 kg

LEV/ZEV Program
Status

- First PZEVs sold in 2003
  - 200,000 sales this year (2004)
  - Regulation: ~40% of sales by next decade
- Advanced technology PZEVs
  - Many AT-PZEV models being introduced
  - Regulation: ~10% of sales by 2015
- ZEVs
  - Small number of fuel cells required
    - Pre-commercialization through 2012
  - Infrastructure e.g. H_2 Highway; Fuel Cell Partnership

Topics to Discuss

- About ARB
- Regulatory development disputes
- LEV/ZEV program
- **Reducing in-use gasoline vehicle emissions**
- Reducing diesel vehicle emissions
- Impacts of regulations

Reducing Gasoline In-use Vehicle Emissions: Smog Check

- Inspections every 2 years
- Dynamometer test (for NOx)
- Evaporative system check (pressure)
- Newer cars exempt (4 years and newer)
- Inspection ~$45; Repair averages $145
- Strong enforcement needed to reduce fraud
  - Inspections done in private garages
- Large, cost effective emission reductions

Reducing Gasoline In-use Vehicle Emissions: Scrap

- Voluntary
- Limited scale so far
  - Scrapped 55,000 vehicles since 2000
  - Replacement cars average 8 years newer
- Pay $500-1000 per vehicle
  - No reuse of engine or emission parts
- Cost effective

Reducing Gasoline In-use Vehicle Emissions: Reformulated Gasoline

- Reformulated Gasoline Phase 1 (Jan. 1992)
  - Lowered Reid Vapor Pressure (RVP) and sulfur content
  - Required additives in gasoline
- Reformulated Gasoline Phase 2 (Mar. 1996)
  - Reduced
    - benzene
    - aromatics
    - olefins
    - distillation temperatures T50 and T90

Reducing Gasoline In-use Vehicle Emissions: Reformulated Gasoline

- Reformulated Gasoline Phase 2 continued
  - Lowered previously regulated RVP and sulfur
  - Required the use of oxygenates year-round
- Reformulated Gasoline Phase 3 (Dec. 2003)
  - Removal of MTBE
  - Refinery limits
  - Cap limits

Topics to Discuss

- About ARB
- Regulatory development disputes
- LEV/ZEV program
- Reducing in-use gasoline vehicle emissions
- **Reducing diesel vehicle emissions**
- Impacts of regulations

Reducing Diesel Vehicle Emissions
Overall Health Impacts

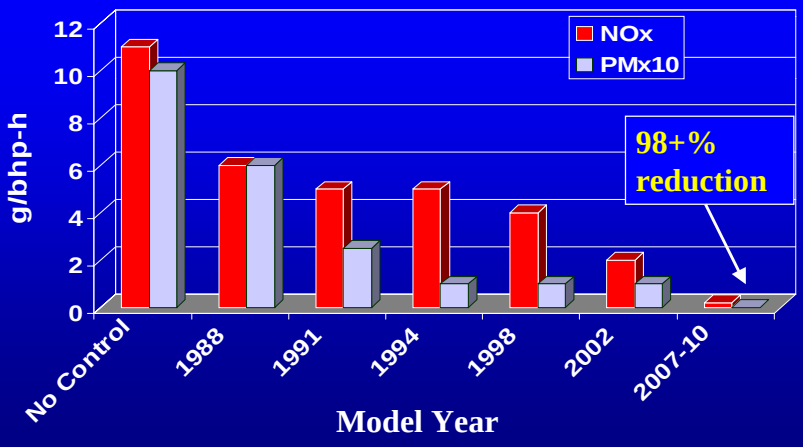
- **Annual health impacts**
  - 2,900 premature deaths
  - 3,600 hospital admissions
  - 240,000 asthma attacks/respiratory symptoms
  - 600,000 lost days of work
- **By comparison**
  - 3,700 deaths from car accidents
  - 2,000 homicides

Reducing Diesel Vehicle Emissions
General Approach

- Technology-forcing exhaust after-treatment for new engines: NOx and PM
- Clean up current diesels
  - Regulatory
  - Incentives
- Ultra-low sulfur fuel (<15 ppm S)
  - Enables use of after-treatment

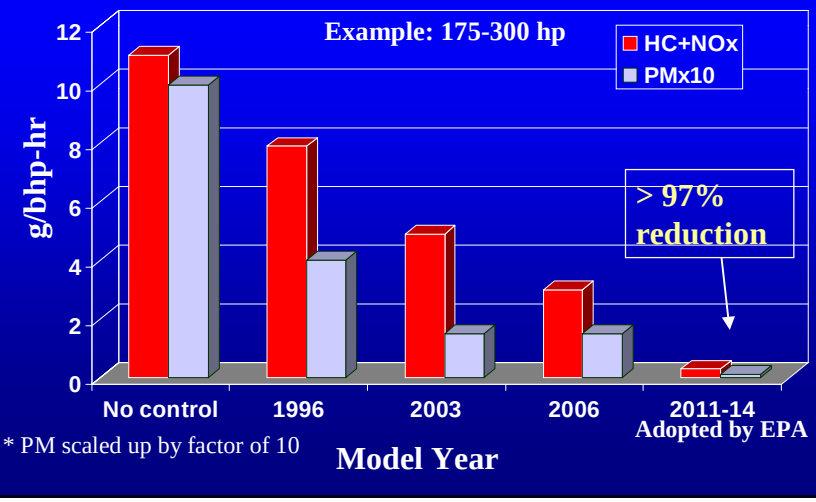
Reducing Diesel Vehicle Emissions

New On-Road Engine Standards



Reducing Diesel Vehicle Emissions

New Off-Road Engine Standards



* PM scaled up by factor of 10

Reducing Diesel Vehicle Emissions
Schedule for Additional In-use Regulations

- 2004
  - Public fleets
  - Idling restrictions
    - School busses effective July 2003
    - Commercial Motor Vehicles approved July 22, 2004
- 2005+
  - Private on-road fleets
  - Private off-road fleets
  - Harbor craft

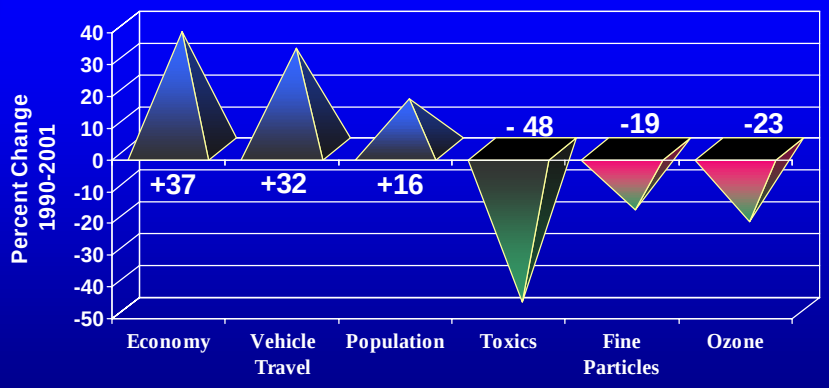
Topics to Discuss

- About ARB
- Regulatory development disputes
- LEV/ZEV program
- Reducing diesel vehicle emissions
- Reducing in-use gasoline vehicle emissions
- **Impact of regulations**

Impact of Regulations
General

- Strong public support for air pollution control
- Technology forcing has worked
  - New technologies
  - Costs much lower than expected
- Industry less resistant now
- Most difficult are programs that affect public, such as Smog Check, Gas Cans, Motor Vehicle Vapor Recovery

Impact of Regulations
Air Quality Is Improving
Statewide Average



Impact of Regulations
Economic Benefits Exceed Costs

(benefit to cost ratios)

- California SIP: $3 to $1
- Clean Air Act: $4 to $1
- Carl Moyer program: $10 to $1
- ARB diesel retrofit rules: $10-20 to $1
- US EPA new diesel rules: $24 to $1

Impact of Regulations
The Future

- Near-zero emission technologies
  - Assures clean air
  - Consistent with growth, sound economy
- Reduce greenhouse gas emissions
- Clean, stable, sustainable, economical transportation fuel

Summary

- The ARB functions at the State level to protect the public health by improving air quality
- Disputes arising in regulatory development are addressed through a well established process
- The LEV/ZEV program will reduce vehicular transportation emissions to zero or near-zero
- Smog Check and Scrap are cost effective for reducing in-use gasoline vehicle emissions
- There are significant health benefits from reducing diesel vehicle emissions

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Public Symposium on Air Quality Management Policy in Metropolitan Areas

Seoul, Korea - December 20, 2004

California Air Resources Board

Sacramento California

Topics to Discuss

- ZEV Program Questions
- Smog Check Questions

Topics to Discuss

- **ZEV Program Questions**
- Smog Check Questions

ZEV Program Questions

"What were policy procedures in legislating ZEV goals? (such discussions with auto makers, legislative procedures, etc.)"

ZEV Program Questions

- ZEV was added to LEV program in 1990 when Automakers began to demonstrate feasibility of battery electric vehicles
  - 10 percent production requirement established as part of LEV to begin the commercialization of zero emitting vehicles
  - Subsequently modified several times in recognition of technology readiness and marketability.
- Goals of the ZEV Regulation:
  - Achieve significant air quality benefits
  - Push research, development and deployment of zero emission vehicles
  - Encourage ZEV commercialization through introduction of ZEV-enabling technology

ZEV Program Questions

"How did CARB determine ZEV goals? The level of technology and length of development? Was the goal setting based on "scientific" study or a number that was reached through negotiation with auto makers?"

ZEV Program Questions

- Vehicle production obligations are established through public regulatory process
  - Meetings with Automakers, technology companies, researchers
  - Public Workshops
  - Board Hearing
- Board has utilized "Expert Panels" to review technology readiness
  - Batteries (1995 and 2000)
  - Fuel Cells (1998)

ZEV Program Questions

"Do you feel that CARB set ZEV goals more aggressive than the technology level of automakers at the time of goal-setting in order to promote the development of clean vehicles?"

ZEV Program Questions

- To some extent, the ARB set ZEV goals more aggressive than the technology level of automakers at the time of goal-setting in order to promote the development of clean vehicles
  - At time of goal setting, pre-commercial vehicles have been demonstrated
  - Ambitious *commercialization* requirements have been part of ZEV goals
- Automakers have been innovative in reaching performance and technology goals
  - Internal combustion engine vehicles reaching emissions levels comparable to upstream emissions of battery electric cars in response to ZEV requirement
  - Introduction of hybrid electric vehicles in response to experience with electric drive and batteries.

ZEV Program Questions

"The method for determining the credit system for ZEV? Is there a different weight system for different kinds of vehicles, such as different weights for buses, heavy-duty vehicles, and passenger cars. Or does ZEV program apply only for passenger cars?"

ZEV Program Questions

- ZEV program applies to
  - passenger cars
  - light duty trucks
    - smaller pick-up trucks
    - larger pick-up trucks
    - SUVs
- ZEV program does not apply to
  - buses
  - large commercial trucks

ZEV Program Questions

"The method for determining credits among ZEV, AT PZEV, PZEV? Is there any?"

ZEV Program Questions

- ZEVs
  - Greatest amount of credit awarded to full function, fast refueling ZEVs (Fuel Cell Vehicles) (40 credits)
  - Less credit for Full Function, slow fueling ZEVs (Battery electric vehicles) (12 credits)
  - Less credit for lower performance ZEVs (Neighborhood electric vehicles) (0.625 credits)
- AT PZEVs (0.2 to 2.5 credits)
  - Credit awarded based on ZEV enabling technology included in the vehicle (electric drive power, voltage, use of compressed gas fuel tanks, zero emissions range capability)
- PZEVs (0.2 credits)
  - All PZEVs earn the same amount of credit

ZEV Program Questions

"What are the penalties (amount of fine, etc.) for not meeting the goal?"

ZEV Program Questions

- According to the Motor Vehicle Code, failure to comply with the regulation results in a $5,000 penalty per vehicle not produced.

ZEV Program Questions

"Mandatory compliance starts from 2005. How are automaker preparing for 2005. How does CARB find out the level of preparation by automakers?"

ZEV Program Questions

- Substantial production of PZEVs has already begun
  - over 13 models of PZEVs have been certified and are for sale in California
- A few ATPZEVs already available
  - Three Hybrid EVs (Toyota Prius, Honda Civic and Ford Escape) available for sale in California
  - Honda Compressed Natural Gas Civic also a PZEV
- ZEV Activity
  - Automakers are members of the California Fuel Cell Partnership and are actively demonstrating Fuel Cell Vehicles which may be used to comply with the ZEV regulation
  - Past battery electric vehicle production has established a bank of credits towards compliance with the regulation which manufacturers may use as the program is implemented.
- Automakers report production quarterly to ARB

ZEV Program Questions

"MoE plans to introduce emission level rating systems in 2005. (difference between the legal emission standard and the emission level of a particular vehicle) Does CARB have similar program and any suggestions you can provide for our development of this program."

ZEV Program Questions

- The ARB does not have a rating system or similar program.
- Under AB 965, manufacturers certified limited numbers of federal vehicles in California if they could offset the emissions of these vehicles using credits that were calculated from the difference between the emission standard and certification emission levels of their California vehicles.
  - The Corvette of the 1980's is one prime example.
  - This approach eliminated in 2000.
  - Now the credits are required to be earned by exceeding the fleet average requirements for NMOG, and by association, the expected fleet average for NOx.
- Problems using certification levels to calculate credits
  - Even though they meet the standard, production vehicles may emit well above certification vehicles.
  - This could also be true for any rating system.

Topics to Discuss

- ZEV Program Questions
- **Smog Check Questions**

Smog Check Questions

"As I know, Smog-Check is conducted on a regular basis(biannually). Do you have any supplementary system to control vehicle emission during the in-between periods, such as an occasional check program?"

Smog Check Questions

- **On-Board Diagnostic II (OBD II)**
  - 1996 and newer vehicles equipped with OBD II
  - monitors every emission performance component
  - assists technicians in diagnosing and fixing problems
- **Remote Sensing Device (RSD)**
  - ARB is currently conducting a RSD Project
  - to identify high emitting vehicles in between regular smog check inspections
- **Annual Inspection**
  - for both older and high-mileage vehicles
  - in 2004 ARB recommended Legislature modify State law

Smog Check Questions

"As I know, a vehicle model can be subjected to a RECALL if 4% of the total vehicles put in operation fail the emission testing. We would like to find out what determines this percentage that triggers vehicle RECALL."

Smog Check Questions

- **4% Recall**
  - Emissions warranty claims based
  - Specific emissions control component exceeds 4% level
  - Manufacturers must report warranty activity at 1% level
- **ARB In-Use Testing**
  - At ARB facility in El Monte, CA
  - 10 vehicles of a specific engine family
  - Manufacturer is subject to corrective action (recall)
- **CAP 2000**
  - Manufacturers must test a small sample of its vehicles
    - 10,000 miles
    - 50,000 miles
    - 75,000 miles
  - Report the results to the ARB and the U.S. EPA
  - Comprehensive manufacturer testing program for failure

Smog Check Questions

"What are the efforts made to collect the accurate information on the failures founded in emission-related components during the auto-reparing, and/or inspection?"

Smog Check Questions

- Bureau of Automotive Repair (BAR) collects all information regarding smog check inspection results
- Vehicle repair information typed into database by smog check technicians (http://www.smogcheck.ca.gov/StdPage.asp?Body=/exsummary/archivescontents.asp)
- ARB field staff routinely visit
  - new car dealers
  - smog check stations
  - auto repair facilities
- ARB reviews the quarterly emission warranty information reports

Summary

- Automakers have been innovative in reaching ZEV performance and technology goals
- Production of ZEVs, PZEVs, and AT-PZEVs is already well underway
- Vehicles equipped with OBD II since 1996
- ARB currently conducting RSD study
- Annual Inspection for older and high-mileage vehicles proposed
- Recall at emissions control component exceeds 4% level
- Specific engine families tested by ARB In-Use program
- Manufacturers test Cap 2000 sample of vehicles
- Accurate failure information collected by ARB and BAR

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The 13th Northeast Asian Conference on Environmental Cooperation (20-22 December 2004, Seoul, Korea)

Mr. Enkhbold ANAR,
Ministry of Nature and Environment of Mongolia

AIR QUALITY MANAGEMENT IN ULAANBAATAR CITY

PRIMARY SOURCES OF AIR EMISSIONS

- 3 Thermal Power Plants,
- About 200 small and medium sized boilers,
- About 100.000 household stoves in traditional “ghers” and wooden houses,
- Approximately about 80.000 auto vehicles

PRESSURE

Energy:

1. In Winter Season three large thermal diesel power plants release into the air:

- 4.5 million cubic meters of smoke,
- 4.14 tons of ash,
- 6.762 kilograms of carbon monoxide every hour

The energy sector accounts for roughly 64 % of Mongolia’s greenhouse gas emissions.

2. More than 250 steam boilers burn over 400,000 tons of coal every year.
3. Mongolia's ghers and wooden houses with manual heating in which 48 % of the city's population lives, use per year over 200, 000 tons of coal and more than 160,000 cubic meters of wood for fuel.

For the cold seasons, the atmospheric content of carbon monoxide exceeds the permissible norm by 2-4 times.

Transportation:

- Transport is a significant source of air pollution.
- The number of motor vehicles has increased dramatically in big cities and settlements in a short period of time.

In 1995, it was estimated that over 60 % of the vehicles emitted pollutants above the maximum allowable level.

Industry:

- According to some computations, approximately one fourth of greenhouse gas emissions comes from industrial activities.

STATE

Urban air quality is monitored for sulfur dioxide and nitrogen dioxide contents.

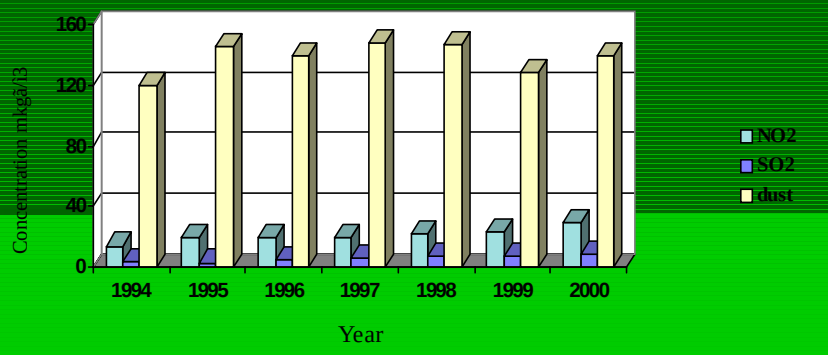


Figure 27. Level of air pollution in Ulaanbaatar

Concentration of nitrogen dioxide (NO2) has been increasing year by year depending on vehicles number. Figure 28 shows level of NO2 in comparison with the increase in vehicle numbers.

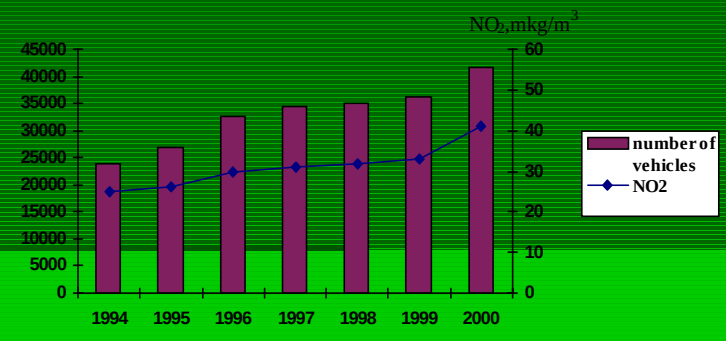


Figure 28. NO2 concentration and number of vehicles.

Air pollution patterns repeat themselves every year, which are shown on SO2 and NO2 of 1998-2000 years in Figures 29 and 30.

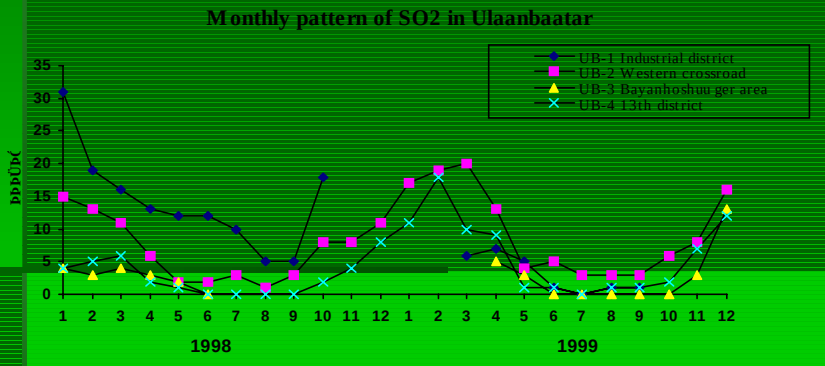
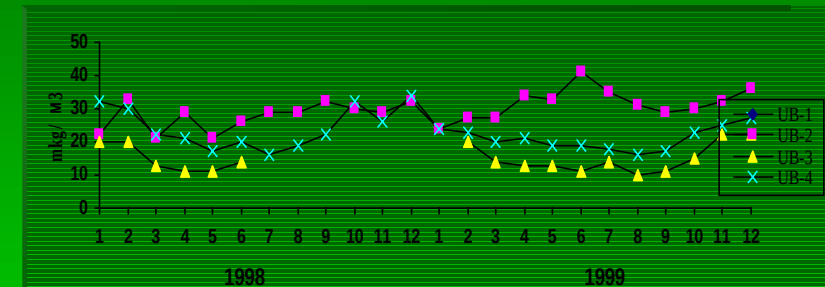


Figure 29. Monthly pattern of SO2 in Ulaanbaatar

Figure 30. Monthly pattern of NO2 in Ulaanbaatar



Dust concentration reaches its maximum in April, when strong winds take place /Figure 31/.

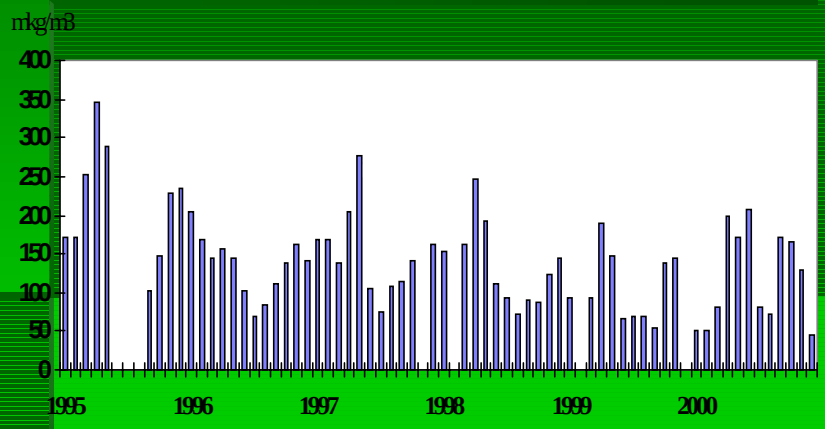


Figure 31. Changes in dust concentration in Ulaanbaatar

IMPACTS

It is widely known that air pollution in Ulaanbaatar and other cities impacts on human health. It is said that air pollution in Ulaanbaatar during wintertime causes acute respiratory diseases, tuberculosis and other lung diseases. However, no accurate studies have been done so far.

RESPONSES

Mongolia adopted Law on Air in 1995. Under the Act, the government is mandated to regularly undertake air quality monitoring and provide information to concerned organizations and the public. The provisions in the Act include permit for air pollution discharge and hazardous impacts based on the volume of discharge, restrictions on air pollution discharge and hazardous impacts, and provisions for the actions to reduce Greenhouse Gas discharges and ozone layer protection .

MEASURES TAKEN BY THE GOVERNMENT

- **Substantial activities are being taken to replace old household stoves with advanced ones under the assistance of GEF/World Bank.**
- **Emissions from all vehicles were measured in 2000 and this activity will continued over the years.**
- **The government has also planned to seek donor assistance for the reduction of air pollution in capital city and other towns through:**

1/. local manufacturing and utilization of gas emission filters and catalyzing tools, establishment of special laboratory for control and analysis of transport emissions.

2/. Manufacturing, promotion and distribution of cost efficient and low smoke stoves for household living in a gher.

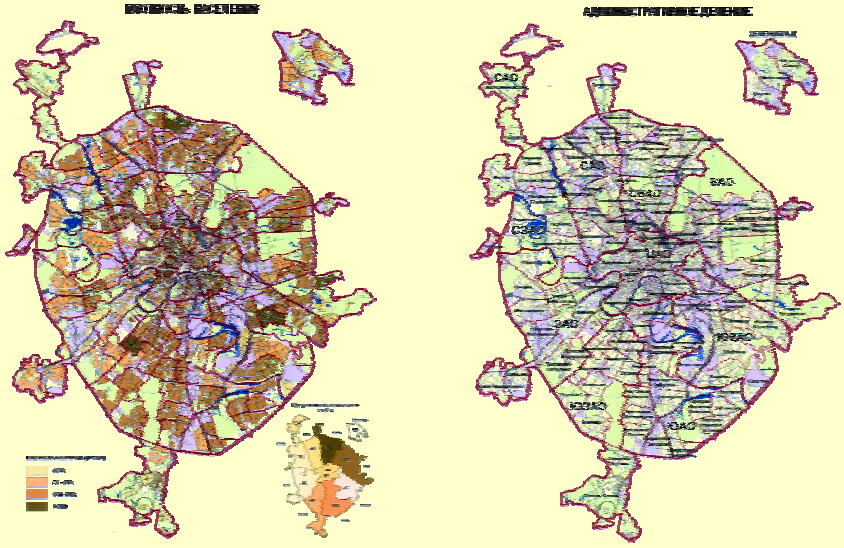
3/. Establish local set up for manufacturing pollution control devices.

THANK YOU FOR YOUR ATTENTION

State ecological monitoring system of Moscow-City

Общие сведения

Москва – столица Российской Федерации, один из крупнейших городов мира. Численность населения на 01.01.2002 г. составила 8539,2 тыс.чел.



The metrpolitan area of Moscow is 1080 km2

- 4 thousands industrial enterprises
- 71 industrial zone
- 14 large energy stations
- 63 small energy stations
- 1 thousand of boilers

MAJOR POLLUTORS

The total volume of airborn emissions is 1,084 mln.**tons in 2003**

The transport pollution **is** 900 th. **tons (83%)**

transportation – 2,6 mln units

to 2010 – increase to 3,3 mln units

the fuel consumed – 4,290 mln.tons

The industrial pollution – 184 th. **tons (17%)**

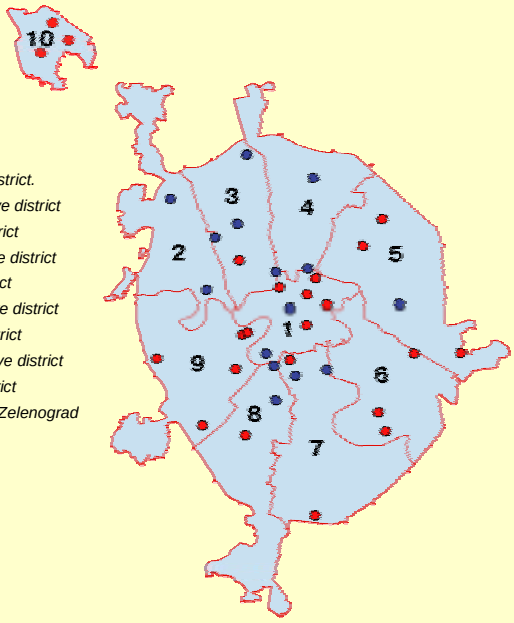
Development of the State ecological monitoring system of Moscow-City

year		Number of automatic stations for air pollution monitoring
1993 - 1996		3
1996 – 1998		7
1999		8
2001		11
2003		32

Types of territories where Automatic stations for air pollution control are situated	Description	Number of Stations (2004)
Nearby highways	pavements	**8**
Center of City	Quarters, which are removed from immediate impact of transport	**6**
Periphery	Disposition on territory of dwelling quarter on outskirts of City	**16**
City background	Disposition on the City border far from pollution sources	**2**

The network of automatic stations of atmosphere pollution control

1. *Central Administrative district.*
2. *North-West Administrative district*
3. *North Administrative district*
4. *North-East Administrative district*
5. *East Administrative district*
6. *South-East Administrative district*
7. *South Administrative district*
8. *South-West Administrative district*
9. *West Administrative district*
10. *Administrative district of Zelenograd*



Mobile laboratory for air pollution&noise control

Передвижная лаборатория контроля выбросов и уровня шума

ИЗМЕРЯЕМЫЕ ВЕЩЕСТВА
Оксид углерода
Диоксид азота
Оксид азота
Аммиак
Диоксид серы
Сероводород
Озон
PM10
Суммарные углеводороды
Метан
Неметановые углеводороды
Кислород
Уровень шума
Температура воздуха
Скорость и направление ветра
Атмосферное давление
Относительная влажность воздуха

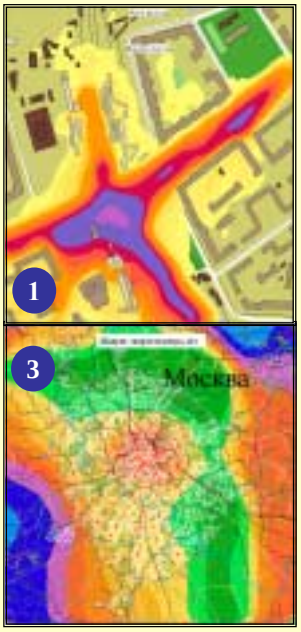
Typical objectives of environmental monitoring

Objectives of Monitoring	Analysis of effectiveness of objectives achievement in Moscow
To control forcomplience to the State & international standards	+
Inform of population on ambient air quality & development of warning systems about dramatic increase of pollution level	+
Obtain the initial data, that serve as basis for securing of management of ambient air quality & planning of traffic systems	+
Determination of population exposure & carry out of assessment of impact to population	+
Identify the pollution sources & their contributions	+
Identify the factors, that are threat for the health	+
Creation & assessment of application of calculation models of geographic information systems	+
Development of policy & organization of priority tasks in management sphere	+

Computer programs permitted for use at present

	Name	Developer	Restrictions in use
1.	ADMS 3	Cambridge Environmental Research Consultants (CERC)	
2.	AIRVIRO	Indic AB, SMHI	At presence of digital map & database of pollution sources for concrete territory
3.	EnviMan	OPSIS AB	At presence of digital map & database of pollution sources for concrete territory
4.	OML	Датский национальный институт исследования окружающей среды (Danish National Environmental Research Institute, NERI)	At presence meteorological data need format at agency
5.	ПК «Zone»	Sankt-Peterburg Institute of meteorology	At presence of digital map & database of pollution sources for concrete territory

Моделирование загрязнения

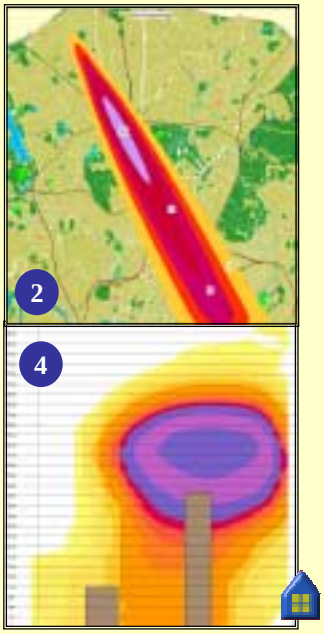


1. Расчет загрязнения воздуха выбросами автотранспорта

2. Расчет загрязнения воздуха выбросами стационарных источников

3. Расчет неблагоприятных метеорологических условий

4. Трехмерный расчет рассеивания загрязняющих веществ в атмосфере



Modelling of pollution

- The space model of transport air pollution
- The space model of the stationary source
- The effect of the unfavorable weather condition
- The 3-dimentional model of dispersion

Inventory of ambient air pollution

SEI "Mosecomonitiring" has annually actualized

- **Data base of industrial pollutions**
- **Data base of car pollutions**

Data base on the industrial emissions

211 industrial enterprises registered

The registration form –2TP. Annually reconsidered

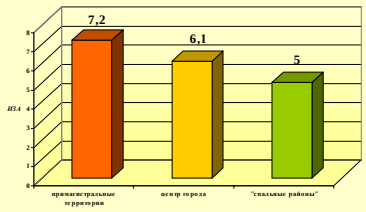
They do not represent actual situation on the vilume of emission, emergency emission and the offencive emissions.

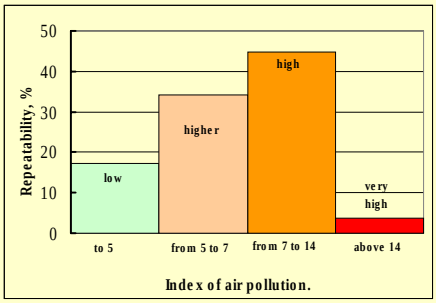
The direct measurements needed

82 large enterprises are to be equipped with the direct measurement system

20 – already equipped

Monitoring of ambient air quality .
Average level of air pollution in Moscow in 2003 year.





Nearby highways

The Center of City

"sleeping" districts

Integrated Index of ambient air pollution is calculated as sum of ratio concentrations of five main pollutiants (NO, NO_2 , CO, O_3, formaldehyde) to limited accessible norm.

In 2003 year in average for Moscow the Index value was about 6 (higher level of air pollution)

At 50% cases its value is high because of data from Automatic stations situated nearby highways.

Индекс загрязнения атмосферы (ИЗА) подсчитывался для 5-ти веществ: оксид азота, диоксид азота, оксид углерода, формальдегид, озон.
Среднее по Москве значение ИЗА в 2003 году равно 6, уровень загрязнения - повышенный.

The application of monitoring data

- - urban development and construction projects
- - asessment of the environmental effectiveness of the patterm of energy supply of the city
- - development of the norms of consruction activity and patterns of transportation routs
- - prevention and response measures of emergency situation
- - assessment of health effect

Average concentrations of main air pollutants in share of limited accessible concentrations in 2003 year

pollutant	Average concentrations in share of limited accessible concentrations			
	Nearby highways	The Center of City	"sleeping" districts	average
Carbon	0,6	0,57	0,33	0,4
Nitrogen dioxide	1,3	1,1	1	1,1
Nitrogen oxide	1,2	1,2	0,6	0,9

Subscribers of Moscow City system of ecological monitoring

Data of Ecological monitoring are received rapidly by Municipal organizations and are presented to people through Mass media.

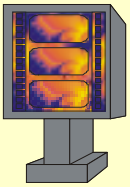
Данные экологического мониторинга получаются оперативно муниципальными организациями и предоставляются СМИ населению

Municipal organizations : Government of Moscow-City, Department of Civil defense & emergence, Prefectures, State service of Sanitary surveillance (weekly)

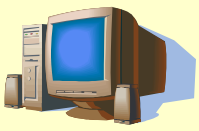
Broadcasting companies: "Mayak", "Echo Moscow", "The Open Radio", "Autoradio" weekly)

TV channels : RTR, TVC (weekly) Meteo TV (daily).

Subscribers of Moscow City system of ecological monitoring



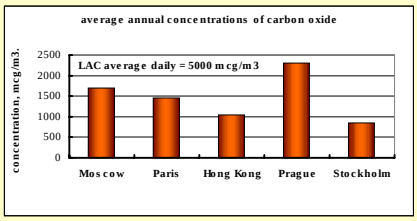
Video screens on the streets
Новый Арбат д.1
Театральная пл.
Кудринская пл.
Пушкинская пл.
Москворецкая набережная
(ежедневно)

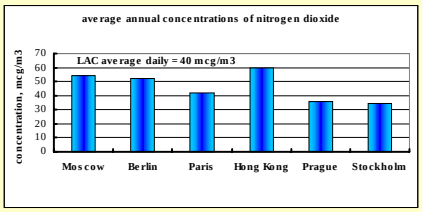


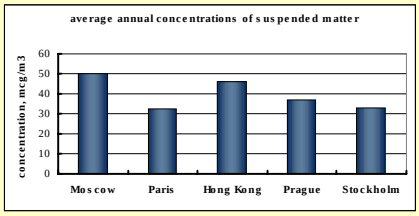
www.mosecom.ru
www.moseco.ru
www.ria-novosti.ru
www.rbc.ru
www.itar-tass.ru
www.ecoinform.ru

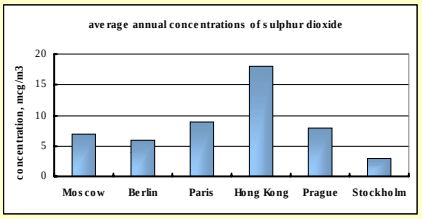
Press
Московский комсомолец»
«Известия» «Вечерняя Москва»
«Московская правда» (ежемесячно)
«Тверская 13»

Average annual levels of pollution ambient air in the big cities









Special Measures for Metropolitan Air Quality Improvement
20. Dec. 2004
Ministry of Environment of Korea (www.me.go.kr)
http://bluesky21.me.go.kr

www.bluesky21.me.go.kr
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Ⅱ. Major Causes of Air Pollution
Ⅲ. Special Measures for Air Quality Improvement

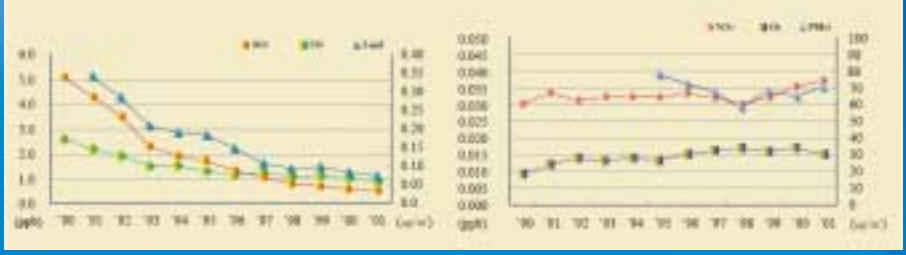
www.bluesky21.me.go.kr

Ⅰ. Current Air Quality Status in Seoul Metropolitan Area

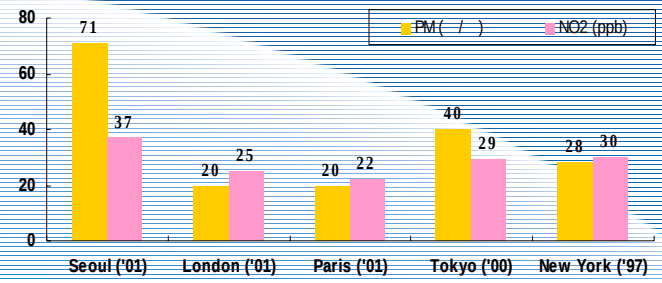
Air Quality Condition

- SO_2 and CO concentrations mark below the Air Quality Standards
- Steady increase in PM_{10} concentration due to rising vehicle emissions and dust & sandstorms (DSS) transporting from China
- Steady increase in NO_2 and O_3 also caused by vehicle emissions

Trends in Air Pollutant Levels in Metropolitan Area



Air Pollution Level Compared to Other Major Cities of the World



" The Worst Level among OECD Countries"

- ***1.7~3.5 times higher in PM***
- ***1.7 times higher in NO_2***

Ⅰ. Current Air Quality Condition in the Metropolitan Area

Air Quality Status in the MTA and Other Areas

Category	NO_2 (ppm)	Number of O_3 Warning	PM_{10}(/)
Metropolitan Area (Seoul)	31(37)	24(5) times	67(71)
Other Areas	22	5 times	53

Serious Health Problems

- **Increasing number of deaths caused by PM pollution**
  ※ 2000: 1,940 persons ⇒ 2020: 4,000 persons
- **Cerebral Infarction caused by air pollution may have aggravated the death rate by 6 %**
- **The early death rate caused by air pollution records 3 times higher than the rate caused by traffic accidents**

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Ⅰ. Major Causes of Air Pollution

Soaring Emission Sources in a Small Land Area

- Population Density (468 persons/km²) records the 3rd in the world and the 1st among OECD countries
  ※USA: 29 persons/km², France: 107 persons/km², Japan: 335 persons/km²
- 2~10 times higher air pollutants emission per unit area than the average amount of OECD countries

Rapidly Increasing Number of Cars

- 93 times increase from the 1970's level
  ※ '70yr: 0.13M ⇒ '80yr: 0.53M ⇒ '90yr: 3.40M ⇒ '00yr: 12.05M
- Increasing emissions by urban mobile sources
  ※ '85yr: 25% ⇒ '00yr: 80% (Ratio of Air Pollution Sources)

II. Major Causes of Air Pollution

Rapid Increase in Energy Consumption

- 9 times increase from the 1970's level

Energy Consumption (million ton)	'70	'80	'90	'99
	26	44	93	181

- Energy Consumption Rate 〉 Economic Growth Rate

Low Usage of Public Transportation

- During rush hours, public transportation usage rate in metropolitan appears to be lower than that of other major cities globally

Subway Usage Rate	Seoul	Tokyo	London	Paris
	35%	92%	75%	68%

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Ⅲ. Special Measures for Metropolitan Air Quality Management *(Blue Sky 21)*

1. Special Act on Seoul Metropolitan Air Quality Improvement
2. Control Measures for On-Road Mobile Sources
3. Air Pollution Control in Industrial Sectors
4. Other Control Measures

III. Special Measures for Metropolitan Air quality Improvement

1. Special Act on Seoul Metropolitan Air Quality Improvement

Purpose

"To develop an institutional framework for the effective Implementation of special measures for air quality improvement in Seoul and its vicinities"

Legislation Process

- Required Over 100 consultation meetings
- Task Force Team: consisting of government bodies (MOE, MOCIE, MOCT, MPB, MOFE and OPC), industries, experts and civil groups

Entry into Effect

- The Special Act takes effect starting in January 2005
- Total Air Pollution Load Management System (Cap & Trade Program) for the industry sector takes effects from July 2007

III. Special Measures for Metropolitan Air quality Improvement

1. Special Act on Seoul Metropolitan Air Quality Improvement

Summary of the Special Act

	2001	2014
Improvement Target	PM (71 /)	40 /
	NO_2 (37ppb)	22ppb
Control Measures	Concentration Control	Total Air Pollution Load Management System
	Support of LEVs Supply	Emission Trading System
		Mandatory LEVs Purchasing
Investment	US$ 78 million (2003)	US$ 5.4 billion (for 10 yrs.)

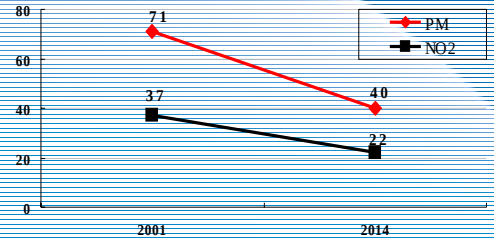
III. Special Measures for Metropolitan Air quality Improvement

Special Act on Seoul Metropolitan Air Quality Improvement

A 10-year Framework Plan for Air Quality Improvement

Length of Implementation	10 Years (includes 5- year Implementation Plan by Local Gov.)
Subjected Areas	Seoul Metropolitan Air Quality Management District (SMAQMD)
Subjected Air Pollutant	PM 10, NOx, SOx, VOCs

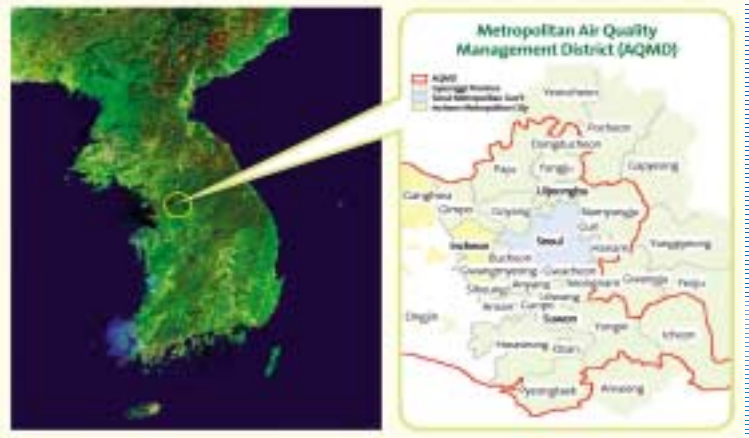
TARGET:



III. Special Measures for Metropolitan Air quality Improvement

Special Act on Seoul Metropolitan Air Quality Improvement

SMAQMD



Special Act on Seoul Metropolitan Air Quality Improvement

Total Air Pollution Load Management System

- Estimation of the Environmental Carrying Capacity for SMAQMD
- Allocation of the allowable emission loads to the Local Governments on the basis of the carrying capacity
- Local Governments to overlook emission sources (facilities, mobile and etc) and comply with the emission cap
  - Cap and Trade Program for point sources
  - Supply of LEVs
  - Control measures for mobile pollution sources
  - VOCs reduction in paints

Special Act on Seoul Metropolitan Air Quality Improvement

Control Measures for Newly Manufactured Vehicles

- Measures for LEVs (Low Emission Vehicles) Supply
  - Automakers selling more than 3,000 vehicles/yr in Seoul MTA are required to supply LEVs beyond a fixed rate
  - Economic Incentives given to manufacturers and buyers of LEVs
- Mandatory LEVs Purchasing
  - Government bodies and Public institutions that have at least 10 vehicles in the metropolitan area required to purchase a certain portion of newly purchased vehicles with LEVs

Special Act on Seoul Metropolitan Air Quality Improvement

Control Measures for On-Road Vehicles

- **Special Control Measures for Diesel Vehicle Emission**
  - Those who fail to comply with the emission standards required to install diesel particulate filter (DPF) or diesel oxidation catalyst (DOC), or to retrofit with “cleaner engines”.
    ** Diesel Vehicle exhaust emissions account for 100% of PM and 75% of NOx Discharged by cars in Seoul MTA
- **Vehicle Inspection System**
  - Extended subjects of vehicle inspection program

※ large vehicles (wt. ≥ 5.5 ton): a load test

	2002	2004	2006
Vehicle Age	12 yrs.	7 yrs.	4 yrs.

Special Act on Seoul Metropolitan Air Quality Improvement

Cap and Trade Program for Industry Sector

- **Introducing the Cap and Trade Program**
  - Subjected Pollutants: NOx, SOx, TSP
  - Type 1 Industry: Starting in Jul. 2007, Type 2 Industry: Starting in Jul.2009

※ Implementation timeline was decided upon the emission discharge amount in each industrial site

- **Method of Emission Monitoring**
  - Smoke Stack Telemetry Monitoring System (TMS)
- **Introduction of Cap and Trade Program to minimize emissions reduction cost**

2. Control Measures for On-Road Mobile Sources

CNG Bus Supply Program

- Mandatory Purchasing of CNG Buses
- Expanded Supply of CNG Buses in Major Cities

< The Target of CNG Bus Supply >

	Total	~ 2004	2005 2007
CNG Bus	20,000	7,400	12,600
Fuel Station	400	183	217

- Dissemination of CNG Vehicles
  - Garbage trucks (80), Gas company vehicles (100), Commuting buses for environmentally friendly companies

Control Measures for On-Road Mobile Sources

CNG Bus Supply Program

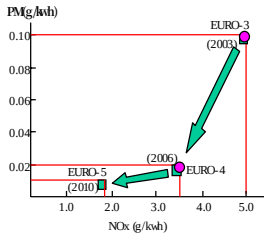
- Wider Installation of CNG Fueling Station
  - Loosening restrictions for the installation of CNG fueling stations
  - Installation of fueling equipment suitable for a small garage
- Increasing Awareness on the safety of CNG
  - Public Information activities through various media
  - Academic conference and exhibitions on CNG bus

III. Special Measures for Metropolitan Air quality Improvement

Control Measures for On-Road Mobile Sources

Low Emissions of Manufacturing Vehicles

- **Strengthening the emission standard on diesel vehicles in accordance with the EU standard**



- **Diesel Vehicles Control (by vehicle type)**
  - Replacement of metropolitan buses to CNG buses
  - Engine replacements for medium & small-size vehicles
  - Passenger cars: Standards will be developed with considerations on air pollution status, fuel prices and others

III. Special Measures for Metropolitan Air quality Improvement

Control Measures for On-Road Mobile Sources

Low Emissions of Manufacturing Vehicles

- **Restriction on Vehicle Engine Idling in Terminal, Garage, Parking lot, etc**
- **Promotion of Detailed Inspection System across the Capital Region**
  - ※ Failure rate : 12% (existing method) ➡ 35% (new inspection system)
- **Stronger Enforcement of Emission Testing**
  - Expanded number of vehicles subjected to the emission testing
  - More stringent inspection on vehicles with high failure rate

Control Measures for On-Road Mobile Sources

Fuel Restrictions

- **Strengthening Standard on Fuel Quality**
  - Petrol: S Contents 130 ⇒ 30 ppm
  - Benzene 1.5 ⇒ 0.8%
  - Light Oil: S Contents 430 ⇒ 30ppm
  - New standards on Polycyclic Aromatic (8%)
- **Promotion of Bio-Diesel Supply**
  - Technology verification and establishment of quality standards
  - Creating a market for Bio-Diesel, and consideration of economic incentives

3. Air Pollution Control in Industrial Sectors

Strengthening Emissions Standard

- Differentiated enforcement of emissions standard according to the local air quality conditions

Emission Charge System

- **SOx, PM10:** Those who discharge less than 30% of the allowed amount are exempted from the General Charge, and additional charges are imposed on those who exceed the standard
- **NH_3, HF, HCl, Odor, etc (10 pollutants):** Emission Charges are imposed on those who exceed the standard
- Consideration of a New Emission Charge System
  - Decrease in the number of pollutants subjected to emission charge
  - Integrated charge system that solely considers the amount of emission discharge, instead of enforcing both general and additional charges

Air Pollution Control in Industrial Sectors

Environmental Management Guideline by Sector

- The Guideline will introduce: Special features of facilities, Pollution Reduction Equipments, Equipment Management Methods, etc.

VOCs Reduction

- Making efforts to develop standards on VOCs Contents targeting paint and ink products
- Signing of the Agreement on Voluntary VOCs Reduction

4. Other Control Measures

Control Plans for Severely Polluted Areas

- Special Control Area
  - Includes Industry Complexes; Stringent VOCs Control
    *** Ulsan, Onsan, Mipo and Yeocheon*
- Air Pollution Control Area
  - Areas where air pollution level exceeds the environmental carrying capacity as well as the areas that require special attention

※Capital Region (Seoul, Incheon and Gyeonggi), Busan, Daegu, Gwangyang)

4. Other Control Measures

Expanded Use of Low-Sulfur and Clean Fuels

- **Promotion of Low Sulfur Fuel**
  - Mandatory use of ultra-low sulfur fuel (S contents ≤ 0.3%) from July '01
    ※ *7 cities: Seoul, Busan, Daegu, Incheon, Ulsan, Suwon, Ansan*
  - Daejeon, Gwangju and others (71 cities/district): S Contents ≤ 0.5%
  - Other Area: S Contents ≤ 1.0%
- **Air Pollution Control Area: Restriction on the use of solid fuels**
  - Apartments and power plants in the capital region are required to adopt clean fuels like LNG

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The 13th Northeast Asian Conference on Environmental Cooperation (NEAC)

Welcome Address

Mr. Chairman,/ representatives of countries in the Northeast Asian region,/ ladies and gentlemen,/

I would like to start by saying/ that it is a great honor and a pleasure/ for Seoul City to be hosting/ the 13th Northeast Asian Conference on Environmental Cooperation (NEAC) in 2004,/ and I would like to extend a warm welcome/ and express my appreciation/ to the representatives of Northeast Asian countries and participants/ who have visited Seoul to attend the conference./

Today,/ the globe has come to share a great number of policies and experiences/ regarding environmental issues,/ and all nations around the world are working/ toward developing a stronger sense of identity/ as members of a common environmental community/ by building a solid human resource network./ I believe/ this realization that humankind is a single community/ is a great evolution.

In this regard,/ I hope the 13th NEAC conference/ will provide an opportunity/ to introduce the developments and new ventures/ in environmental policy achieved by participating nations/ and to share policy experiences,/ thereby enhancing mutual understanding and improving relevant policies. /

Seoul City is exerting great efforts/ to protect and preserve the environment./ Such efforts are evident/ in the numerous environment-related projects/ undertaken by the city,/ including the restoration of Cheonggyecheon,/ an inner city stream,/ the forest building project in the Ttukseom area,/ and the city's activities/ to create more green space in the city for citizens./ We are also trying to control the use of passenger cars,/ encouraging the use of public transportation/ - especially buses -/ and doing all we can/ to reduce the use of fossil fuels. /

Seoul City is attempting to deal with environmental problems/ prevalent not only around the globe,/ but also specifically in the Northeast Asian region,/ such as the dust storm phenomenon,/ by taking bolder and more aggressive approaches and action/ in the future./ The studies to be discussed during this meeting/ will provide an excellent opportunity/ for an exchange of information/ among participating nations./ I would also like to kindly ask all participants/ with abundant experience and extensive knowledge/ to provide Seoul with abundant advice and suggestions/ so that the city of Seoul can become/ an environmentally friendly city/ on a global level./

Once again,/ I offer my warmest welcome/ and express my appreciation to all of you/ and hope/ that your stay in Seoul will be a pleasant one.

Jin, Ik Chul

Director-General of Environment Bureau

Seoul Metropolitan Government

Keynote Speech

Dr. PARK Young-Woo
Director-General, International Cooperation Bureau
Ministry of Environment, Republic of Korea

Distinguished delegates! Ladies and gentlemen!

It is a great honor and pleasure to welcome you to the 13th Northeast Asian Conference on Environmental Cooperation.
To each and every one of you, I extend my sincere appreciation for joining this meeting. I also thank the City of Seoul for hosting this conference together with the Ministry of Environment.

As you know, a quarter of the world's population lives in the Northeast Asian region which accounts for 13% of world trade. No doubt in the past but also in the present and future, our Northeast Asian region is the most dynamically growing areas in the world. Such economic growth leads to the destruction of ecosystems as well as pollution in our waters and air and excessive waste generation. Overcoming the challenge of appropriately addressing these environmental issues is not simple matter.
Countries in Northeast Asia share a common environmental sphere. Problems in one nation often have impacts on a regional scale and even become recognized as global environmental issues. In this way I believe that regional cooperation is the first step in resolving today's environmental problems.

It has already been 13 years since the Northeast Asian Conference on Environmental Cooperation was created to address such important matters of our region. As we look back, NEAC stands out as a policy forum where multiple stakeholders from central government, local government, citizen groups and research institutes have been able to hold candid discussions and to gather best practices and experiences for developing joint response measures.

Yesterday, the Open Symposium on "Air Quality Management Policy in Metropolitan Areas" was successfully held in the National Assembly. Today and tomorrow, we will discuss the key topics for this year's NEAC: species restoration, ecological restoration in local governments, and

sustainable management of industrial complexes. It is my hope and expectation that our deliberations will lead to better understanding of our current environmental issues and characteristics as well as to a variety of suggestions on how best to resolve our problems

Ladies and gentlemen!

It has recently occurred to me yet again that Korea's winters have gotten warmer. Such skin-felt changes in the weather are clear tell-tale signs of the gravity of global environmental issues such as climate change, air pollution and biodiversity loss. Therefore I place great importance on NEAC because I believe our efforts on-ground at the regional level have immense impacts on alleviating these global pressures.

This past week I was at the 10th Conference of the Parties to the UN Framework Convention on Climate Change in Buenos Aires. Many nations put their heads together in Argentina on climate change issues. With the Kyoto Protocol coming into effect next February thanks to Russia's ratification, this important first step in a globally coordinated response to climate change will finally be launched.

Ladies and gentlemen!

Next March, Seoul will host the Fifth Ministerial Conference on Environment and Development. This UN ESCAP conference will have as its theme environmentally sustainable economic growth. I cordially request all of your deep interest and support.

In closing, I would like to encourage everyone to make the most of the opportunity before us and work to produce feasible action items form the lively discussions. Please enjoy your stay in Seoul to the fullest

Thank you for your attention.

Opening Remark
at 13th Northeast Asian Conference on Environmental Cooperation

December 20-22, 2004, Seoul

Mr. Xu Qinghua, Director General
International Cooperation Dept./SEPA, China

Dear Mr. Chairman, ladies and gentlemen,
Good morning.

I'm very glad to come to the Republic of Korea once again for the 13th Northeast Asian Conference on Environmental Cooperation (NEAC), which reminds me of four years ago, when I attended the Tenth NEAC held in Incheon. It was also the first time for me to learn about this important dialogue and exchange mechanism among environmental departments of the five countries. We held the twelfth NEAC in Toyama, Japan last November, when we exchanged our opinions on the progress of environmental policies, DSS monitoring and pollution prevention and control in respective countries. Since then, new progress has been made in regional environmental cooperation, especially in that of Northeast Asia.

Availing myself of this opportunity, I'd like to show our gratitude towards Korean Ministry of Environment for the elaborate organization and arrangement of this meeting on behalf of Chinese delegation. I also hope to make more new friends so that we can promote environmental cooperation in Northeast Asia through joint efforts.

Since 1992, NEAC has set up a platform for exchange and sincere dialogue between the five countries and relevant international organizations. It has drawn high attentions from each party.

At present, environment is one of the main regional issues confronting this region. The process of environment protection and sustainable development in China, Japan, Republic of Korea, Mongolia and Russia is crucial to the future development of the entire region. The conservation of eco-environmental and promotion of

sustainable development in this region calls for concerted efforts and actions from the five countries and other relevant neighboring countries. The five countries are neighbors belonging to Northeast Asia, so we should make joint efforts and promote cooperation in environmental protection and ecological conservation.

In my opinion, environmental protection and sustainable development have become key elements in regional cooperation. As one of the most active areas in global economic and social development, Asia Pacific Region faces great challenges as how to promote the implementation of sustainable development policies and protect the environment on which human beings are dependent for survival through strengthening regional cooperation.

The experience of the past years reveals that in the process of regional economic and social development, effective solution to environmental problems and the enhancement of capabilities in sustainable development mainly lie in the decisions and actions of every government as well as the cooperation at regional or even global level.

China attaches great importance to regional environmental cooperation and believes that: Enhancement of regional cooperation has positive influence on the settlement of such global problems as climate change, biodiversity conservation, fresh water resources and desertification.

We agree to enhance regional dialogue on environmental policies and are committed to further understanding and practical cooperation through dialogue;

We are in support of extensive public participation in the process of regional environmental cooperation; listen to policy recommendations on the issues of environment and development in this region from various experts through communications at all levels.

We are willing to enhance the capabilities of China and other countries in region in terms of decision-making, management and technical support to address both regional and global environmental problems through cooperation.

I’d also like to take this opportunity to put forward the following basic principles about regional environmental cooperation for your reference:

First, we must enhance dialogue and deepen mutual trust in regional environmental cooperation. We should take advantage of various existing multilateral dialogue mechanism in the region to enhance mutual exchange, understanding and trust.

Second, we must stick to the principle of openness, tolerance and making steady progress in regional environmental cooperation. Development conditions of every country in this region vary, and so do the environmental problems and focal fields for cooperation. Therefore, we should adhere to the attitude of tolerance, openness and progressive development in regional environmental cooperation and the principle of more communications, better understanding, seeking for common ground while reserving differences in order to promote cooperation.

Third, we should seek for equality, mutual benefits and win-win cooperation. Equal treatment is the basis for sustained regional environmental cooperation. Equal attention should be given to the considerations and interests of each country irrespective of its size. The win-win situation should be regarded as the top priority in pursuing regional cooperation. Only when various parties achieve common agreement and progress can the environmental protection in this region enjoy the development in an all-round way.

Lastly, I wish this meeting a complete success and look forward to thorough exchanges on relevant problems with you all.

Thank you.

The 13th Northeast Asian Conference on Environmental Cooperation

Ministry of the Environment
Japan

Recent Policy Development

- Climate Change
- Sound Material-cycle Society
- Environmental Education
- Biodiversity
- Environment and Economy

Climate change

To attain the reduction of
greenhouse gases by 6%

Light Down Campaign

Sound Material-Cycle Societies

- 3R initiative
  "Reducing" of wastes
  "Reuse" + "Recycling"
  of resources + products
- 3R Ministerial Conference
  Tokyo, in April 2005.

Environmental Education

- The Law for
  - Encouragement of Willingness for Environmental Conservation
  - Promotion of Environmental Education
- United Nations
  Decade of Education for
  Sustainable Development

Biodiversity

- New National Strategy on Biodiversity
- Invasive Alien Species Act

Environment and Economy

- Law for promoting environmental considerations
  - National Government
  - Government related entity
  - Large scale business

➡ Environmental Reports

International Cooperation

- TEMM and Ministers Meeting on DSS
- Acid Deposition / Dust and Sandstorms
- Marine Pollution Prevention
- Local Governments' Initiatives
- Environmentally Sustainable Transport

The 13th Northeast Asian Conference on Environmental Cooperation
Keynote Speech

YATSUMOTO Aya
Environmental Cooperation Office
Global Environment Bureau
Ministry of the Environment

1. Introduction

2. Recent Policy Development in Japan
    1) Climate Change
    2) Sound Material-cycle Society
    3) Environmental Education
    4) Biodiversity
    5) Environment and Economy

3. International Cooperation
    1) TEMM and Ministers Meeting on Dust and Sandstorm
    2) Acid Deposition / Dust and Sandstorms
    3) Marine Pollution Prevention
    4) Local Governments' Initiatives
    5) Environmentally Sustainable Transport

4. Conclusion

1. Introduction

First of all, on behalf of Government of Japan, I would like to extend my sincere thanks to The Ministry of Environment of Korea and The Metropolitan Government of Seoul, for inviting our delegation to this meeting.

It is my honor to have this opportunity to present Japanese view on the environment and development policies and issues concerning Northeast Asia. My statement will focus on progress in domestic and international environmental management of Japan since last NEAC which was held in Toyama, Japan, in November last year.

2. Recent Policy Development in Japan

1) Climate change

Japan welcomes Russian ratification which will bring the Kyoto Protocol into force in February 2005.

In assuring the attainment of our commitments under the Protocol which is reduction of greenhouse gases by 6%, the government of Japan is considering strengthening domestic measures to curb the emissions of greenhouses gases from various sources.

Also, to reconsider our lifestyle, we have promoted the “Light Down Campaign” in cooperation with NGOs and private sectors since last year. In this campaign, we encourage people to turn off the lights on the summer solstice night and spend candle night. Next year we will conduct this campaign with Ministry of Environment of Korea. We hope all of the world will join us in the future.

2) Sound Material-Cycle Societies

Conversion to a sustainable production and consumption pattern has been a common subject regardless of a developing country and a developed nation.

“3R” which represents “reducing” of wastes, “reuse” and “recycling” of resources and products, , will be the key to establish a “Sound Material-Cycle Society.” As a first step, we will have the 3R Ministerial Conference in Tokyo in April 2005.

3) Environmental education

The "Law Concerning the Encouragement of Willingness for Environmental Conservation and the Promotion of Environmental Education" was established in July 2003, and we will promote spontaneous efforts by citizens and private organizations.

The United Nations General Assembly adopted the launch of "Decade of Education for Sustainable Development" from 2005. The Government of Japan will strongly promote environmental education at a global scale.

4) Biodiversity

Along with the "New National Strategy on Biodiversity" decided at the Cabinet-level Task Force in 2002, a new law 'Invasive Alien Species Act' was enacted in June 2004 to cope with alien species. This act is to regulate various actions such as raising, planting, storing, carrying and importing invasive alien species in addition to decrease them that are already existing in Japan.

5) Environment and economy

In order to support a variety of voluntary and proactive environmental considerations by businesses and other actors in the economy, and to create a virtuous cycle of environment and economy, Japan enacted a new law "Law for promoting environmental considerations" in June 2004. Under this law, the national government and government related entities are required to make publicly available annual reports of their environmental considerations. Large scale businesses are also encouraged to publicize environmental reports.

3. International Cooperation

(1) TEMM, Ministers Meeting on DSS

Japan, China and Korea have had Tripartite Environment Ministers Meeting (TEMM) since 1999. In the framework of TEMM, we have several projects such as environmental education and environmental industry. This year, we held TEMM6 in Tokyo this month, and on the occasion of this, the Ministers of the three countries and Mongolia met to talk about Dust and Sandstorm issues.

(2) Acid Deposition / Dust and Sandstorms (DSS)

Japan will continue to support projects such as The Acid Deposition Monitoring Network in East Asia (EANET) and the ADB-GEF project on DSS

in Northeast Asia with relevant countries in this region.

(3) Marine Pollution Prevention

It is very important to implement the Northwest Pacific Action Plan (NOWPAP) for the conservation of marine environment in this region. Regional Coordinating Unit (RCU) offices were opened in Toyama and Busan last month and they are expected to start activities in near future.

With regard to the regulation of waste dumping, the 1996 Protocol under London Convention is likely to enter into force in a couple of years. Japan amended “the Law Relating to the Prevention of Marine Pollution and Maritime Disaster” to prepare to ratify the Protocol.

(4)Local Governments’ Initiatives

It is noted that local governments play an important role in developing international cooperation. The Association of Local Governments in North East Asia Region (NEAR) is a good example. The Association consists of 39 local governments from six countries. NEAR Sub-committee of Environment was held in Toyama, in July of this year, and activities in local communities were reported.

(5) Environmentally Sustainable Transport

International Conference on Environment and Transport in AICHI will be held in Aichi, Japan, in August 2005 as a partnership program of the 2005 World Exposition. It will be the first regional forum to discuss the desirable harmonized form of environment and transport in Asia.

4. Conclusion

Japan has made remarkable progress in developing environmental policies. However, we still have many agenda in front of us to achieve sustainable development. NEAC has given us good opportunities to get cues to tackle with problems we share through exchanging our views.

Finally, I would like to conclude my presentation by wishing a fruitful meeting through active interactions among us.

Thank you.

KEY ISSUES IN THE ENVIRONMNETAL POLICY IN 2004

The year 2004 in Russia was notable for the radical administrative reforming of the system of the executive bodies of the Federal government.

The general idea of this reforming was to share the competence in the following spheres: legislation and strategy development, direct implementation of the activities and supervision for the compliance of this activity with the adopted laws and norms. This process involved all the ministries and agencies. Accordingly in this year the system of the governance of the environmental protection natural resources management has been transformed.

Actually the 4 governmental executive bodies have a competence in this sphere:

- the Ministry of Natural Resources of the Russian Federation,
- the Federal Supervisory Natural Resources Management Service (under the Ministry),
- the Federal Supervisory Ecological, Technological and Atomic Service (under the Federal Government of the Russian Federation, the Rostechnadzor). (At present the issues on the antropogenic impact on the environment - pollution, emergencies - are transferred to the Rostechnadzor).
- the Federal Service of Protection of Rights of the Consumers and Well-being of Population (under the Ministry of the National Health).

Some functions in the environmental sphere are also provided by:

- the Federal Agency for the Land Cadaster,
- the Federal Agency for the Water Resources,
- the Federal Agency for the Forestry,
- the Federal Service for the Hydrometheorology and Environmental Monitoring.

The final sharing of the competence, the establishment of the territorial bodies and adoption of the necessary regulations will proceed for about half a year.

Nevertheless the output of the new legislative acts and environmental norms has not been stopped.

On 16th November the Russian Federation has ratified the Kyoto Protocol. It is a strategic decision. This political decision will provide the opportunity to enter the international system of transfer of the advanced industrial and energy production technology.

The Kyoto Protocol – is aimed not only at the reduction of the GNG. It is an integrated indicator of the progress in the environmental management. If it facilitates the reduction of the energy output per unit of production in our country, reduction of the energy losses in the municipal sector, and a greater use of the alterernative energy source it will conrtribute to the growth of the economy in general.

At these stage the major efforts are addressed to the establishment of the legislative base of the implementation of the Kyoto Protocol including the national system of the GNG emission trading. It will be based on the definite sharing of competence and functions between the executive governmental bodies responsible for the certain tasks.

The issues of the international market of the carbon credit, the property rights on reduction of GNG emissions will be referred to the competence of the Ministry of economic development RF.

The issues on the GNG inventory of the emissions and sinks, the compilation of the list of sources and the emissions cadaster will be referred to the competence of the Ministry of Natural Resources of RF wih participation of the Roshydromet.

In comlience with the articles of the Kyoto Protocol (and Marakesh document) the Russia is obliged to impemenet the following

- establish the national system for the inventory of emisions and sinks.
- the submission annually the cadaster of the GNG emissions and sinks for the period 2008-2012
- the compilation of the National List of GNG sources and sinks for future «Joint Implementation» projects and emission trading
- the approval at the national level of the instructions and procedures on inventories of GNG emissions and estimations of their absorbion by forests and fytomass.

The year 2004 was noticble for the progress in bilateral relations with the NEAC countries. In March we had NEASPEC Meeting in Moscow and the 3rd Meeting of the Russian-Korean Joint Environmental Commission.

We had two important meetings with the Chinese part – in Moscow and Beijing, where we had contacts also with other environmental and natural resources management agencies.

There was a very important initiative of the Chinese Part with the bilateral Memorandum of Understanding on Joint Monitoring of transboundary Water Objects. We have reached the agreement with the Chinese part to sign this Memorandum, to establish a special joint

Commission and Expert Group and develope a Plan of Actions that will be a base for the next joint initiatives.

We develope contacts with Japan on issues of the Kyoto Protocol and Mongolia on biodiversity protection.

The year 2005 will be important important for Russia as it will become a leader of the Arctic Council and will finish the preparotory work for becoming a Leading Country in the Great 8 in 2006.

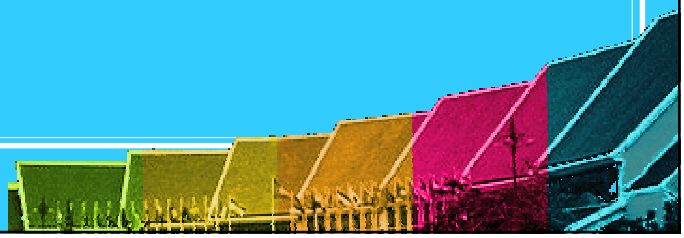
It is very encouraging that all the NEAC countries show interest to the most acute environmnetal issues in the region like the environmental threat to the Amur River.

I wish that our joint efforts will contribute to the integartive processes in the region as much as the economic activity does.

ESCAP

Ministerial Conference on Environment and Development in Asia and the Pacific 2005

Main Theme, Format



ESCAP

Background on MCED

- The Ministerial Conference on Environment and Development (MCED) in Asia and the Pacific is being held every 5 years since 1985.
- MCED serves as a Forum for:
  - Assessment of the State of the Environment;
  - Formulation of Policy and Strategic Response to imperatives posed by important Global Forums;
  - Synthesis of Regional Perspectives;
  - Formulations of Priorities and forward-looking Agendas.

ESCAP

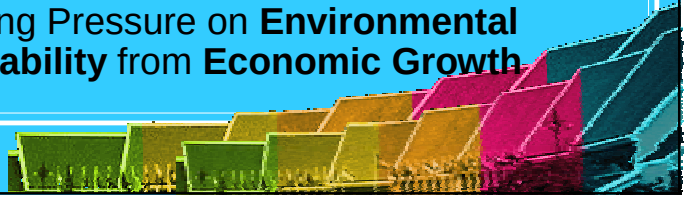
Previous MCEDs

- MCED 1985: Asian Action Plan for Human Environment
- MCED 1990: Regional Strategy for ESSD Input for '92 Rio Earth Summit
- MCED 1995: Toward a Sustainable Model for Asia and the Pacific
- MCED 2000: Clean Environment / Kitakyushu Initiative

ESCAP

The 5th MCED 2005

- 24-29 March, Seoul, Republic of Korea
- Forum of ENV & *Development* : not only of Environment: **should aim to integrate Environment & Economy**
- Basis for action:
  - Increasing Pressure on **Environmental Sustainability** from **Economic Growth**



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Background for the 5th MCED

- Asia-Pacific: Fastest Growing Region Increasing Production & Consumption
- Economic GROWTH:
  - Basis for achieving MDG, WSSD
  - Source of Serious Threat to Environmental Sustainability in Asia & Pacific Region
- Challenge: How to improve Environmental Sustainability of Economic Growth?

ESCAP

Main Theme of the 5th MCED

- "Achieving Environmentally Sustainable Economic Growth"
  - How to improve Environmental Sustainability of Economic Growth?
  - How to promote effective Environmental Governance & Performance?
  - How to harness Environment as Growth Driver & Business Opportunity?

ESCAP

MCED 2005 – Paradigm Shift

- From “Growth First and Clean Up later”
  → to a new paradigm of **“Green Growth”** (leapfrog)
- Environment: from extra cost/constraint to economy
  → to Business Opportunity / Driver of Economic Growth
  → Integration of Environment & Economy/
  Mutually Reinforcing Interaction
- Introduce **Demand-side Management: Consumption Pattern (**licensing purchase of car, Railroad VS Highway, energy/water efficiency VS Power plants/dams etc.)

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Issues for Discussion

- Environmental Sustainability:
  - Clean Production, Consumption Pattern
  - Eco-efficiency, Internalization of Env. Cost
- Environmental Performance:
  - Effective Regulation, Economic Instrument,
- Linkage of Environment and Economy:
  - Infra Investment, Market, EST, Industry,

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MCED 2005 – Conference Format

- **Senior Officials Segment: 24-26 March 2005 :** Drafting of Ministerial Declaration
- **Ministerial Segment: 27-29 March 2005**
  - Country statements/ Adoption of Declaration
- Roundtable: 1 each for SOM & Ministerial Experts of Major Groups & Delegates

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Round Table I: Environmental Sustainability

- Reducing Environmental Pressure from
  Economic Growth/increasing Production & Consp.
  - Clean Production
  - Sustainable Consumption Pattern: linkage with
    Cultural Values and Traditional Life-style.
    Stronger Role of NGO/civil Society
- Internalizing Env. Cost: Economic Instrument, Eco-Efficiency, Indicator Development: ESI, ERI

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Roundtable Discussion II

- Focus: Env. as new Business Opportunity & Driver of Growth, not as burden or cost
  - Mutually reinforcing relationship between economic growth and the environment:
  - Increasing Demand for Clean Env/Quality of Life; Emerging market for Environment Goods & Services
  - Role of market and private sector in promoting clean growth
    - Issues: Environment Infrastructure Investment, Financing, Environment Market/ Industry/ Technology

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Private Sector Forum: Corporate Responsibility for Environmental Performance

- Objective: to enable the private sector in Asia and the Pacific to voice their commitment to increased responsibility for environmental performance in the region and globally.
- Organizers: ESCAP, ADB, Korea Business Council on Sustainable Development (KBCSD)
- Expected Outcome: Input to the Ministerial Declaration on corporate responsibility for environmental performance.

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MCED 2005 – Side Events

Associated Side Events

- Civil Society Forum (UNEP/ADB)
- Multi-stakeholder forum (APFED)
- Science Symposium (IGBP, APN, others)
- Launching of the Decade on Education for Sustainable Development (UNU, UNESCO, UNEP)

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MCED 2005 – Proposed outcomes

- Ministerial Declaration on “Green Growth”
- Implementation plan for *Sustainable Economic Growth* :
- Expected Follow-up Initiatives & Projects:
  - Promotion of New “Green Growth” Paradigm
    Env as business opportunity, eco-efficiency, eco-tax reform,
  - Consumption Pattern: linking with Asian Culture & Traditional Life Style(‘99,UN Meeting, Korea)

ESCAP

Thank You.

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UNESCAP

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Assistant Professor, Beijing Normal University

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Ministry of Natural Resources

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Researcher, Wildlife Biology Division, National Institute of
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Tiger Conservation in China

Li Zhang Ph.D. & Associate Professor

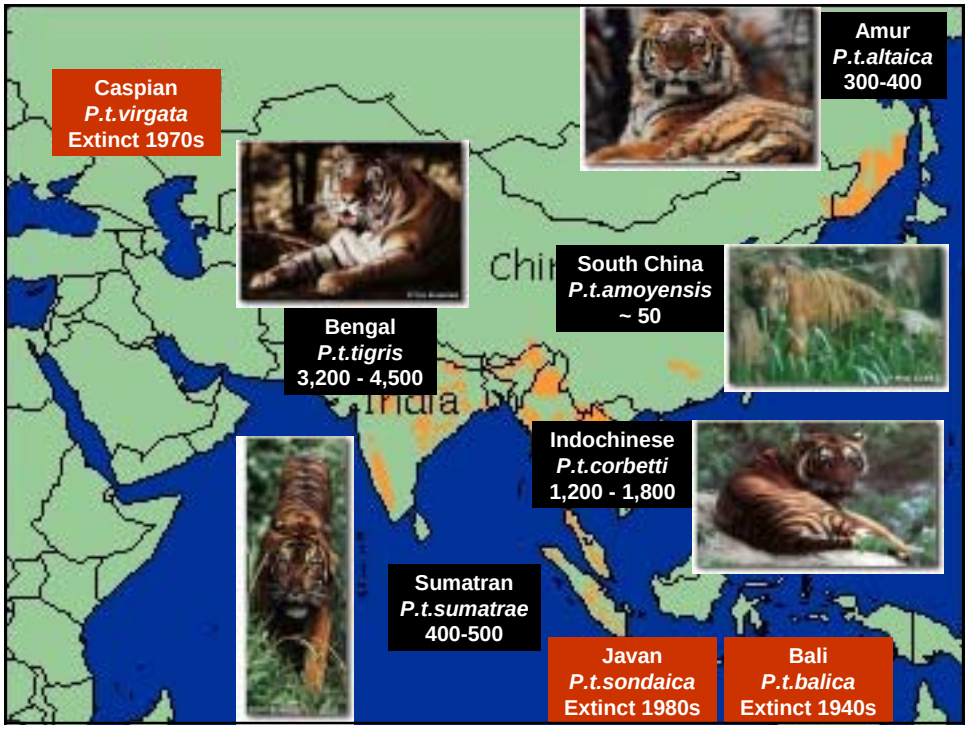
Institute of Ecology
Beijing Normal University

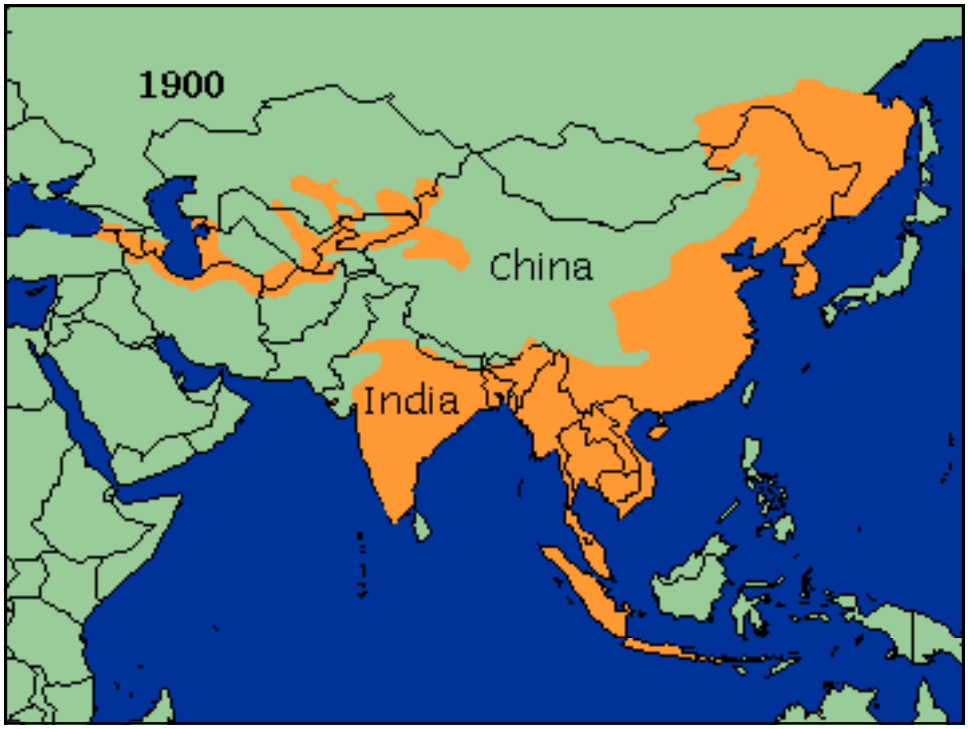
December 21, 2004 Seoul

TIGER

Panthera tigris

- Largest cat in the world
- Solitary, secretive behavior
- Long-distance dispersal
- Various habitats, highly adaptive
- Charismatic and endangered


Caspian
P.t.virgata
Extinct 1970s
Amur
P.t.altaica
300-400
South China
P.t.amoyensis
~ 50
Bengal
P.t.tigris
3,200 - 4,500
Indochinese
P.t.corbetti
1,200 - 1,800
Sumatran
P.t.sumatrae
400-500
Javan
P.t.sondaica
Extinct 1980s
Bali
P.t.balica
Extinct 1940s


1900
China
India

Threats to Tiger Survival

- Poaching
- Habitat loss and population fragmentation
- Loss of prey

Amur Tiger Habitat in Russia

Anti-poaching in the Russian side
СПЕЦИНСПЕКЦИЯ ТИГР
FEDERAL SERVICE FOR CONTROL AT THE NATURE USE SPHERE

The Tigers In China
Heilongjiang
Russia
China
Xinkai Lake
Jilin
Hunchun Nature Reserve
North Korea
The distribution area of tigers
200 0 200 Kilometers
Changbaishan NR, 1960
Qixinglazi NR, 1980
Huichun NR, 2001
Estimated wild population:
Heilongjiang Province:
10~14, 1992
5~7, 1999
Jilin Province:
55 confirmed tiger tracks
4~7, 2004

Measures Taken by Chinese Government to Protect Tigers

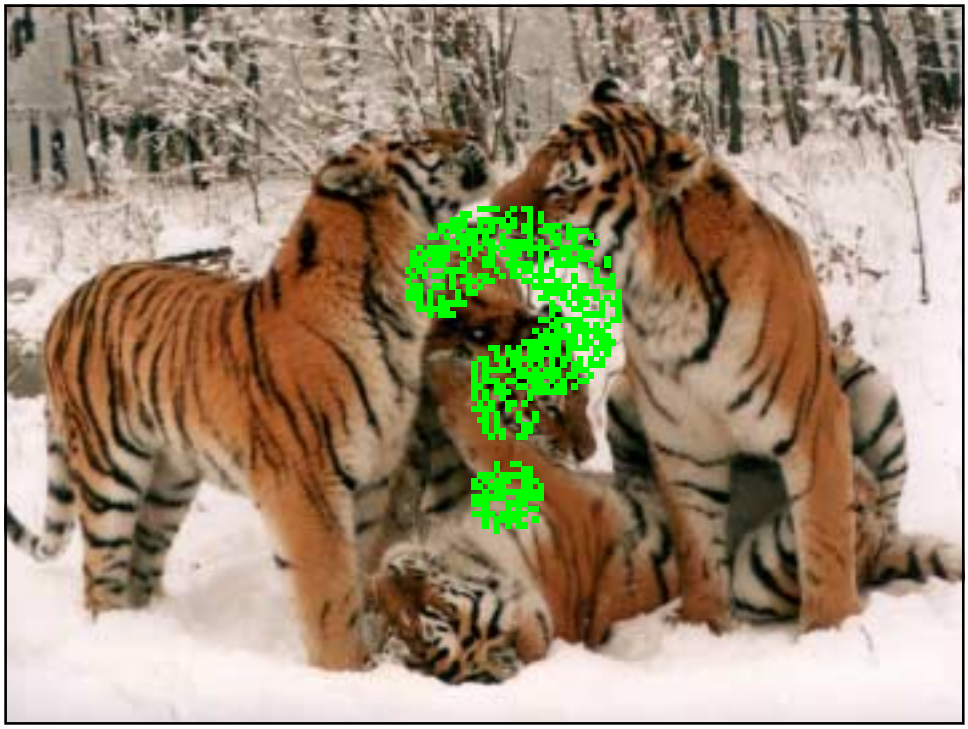
1959, Tiger was listed into the rarity species list by Ministry of Forestry
1962, The first tiger reserve was established in China
1977, Amur tiger was listed as first class protected species, Bengal tiger and South China was listed as second class protected species
1988, The People's Congress passed the National Wildlife Protection Law, and all tiger sub species were listed as first class protected species.
1990, Ministry of Forestry issued a legislation to strictly control the trade of tiger parts for TCM utilization in China
1993, China banned all kinds of utilization of tiger bone and rhino horn in TCM, and any international trade of tiger parts was prohibited.
1998, Wild Tiger Recovery Action Plan was issued by SFA

Recommendations:

1) Establish ecological corridors to link the fragmented tiger habitat
2) Strengthen the anti-poaching patrolling
3) Promote international collaboration and establish cross-border nature reserve to protect the transboundary population
4) Take measures to manage and control the logging activities in the tiger range area
5) Monitor the wild tiger population as well as their prey
6) Establish a national compensation mechanism

Acknowledgement

- State Environmental Protection Administration, China
- State Forestry Administration, China
- Tiger and Rhino Fund, Fish & Wildlife Service, USA
- International Fund for Animal Welfare, Russia
- Phoenix, Russia.
- Wildlife Conservation Society, China
- Beijing Normal University, China



Wild Amur Tiger Conservation in China

Li Zhang
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Beijing, 100875
P.R. China

Tigers (*Panthera tigris*):

- Largest cat in the world
- Solitary, secretive behavior
- Long-distance dispersal
- Various habitats, highly adaptive
  Charismatic and endangered

Threats to Tiger Survival:

- Poaching
- Habitat loss and population fragmentation
- Loss of prey

By far, three nature reserves have been set up for Amur tigers in China:

1. The Changbai Mountain Nature Reserve was established in 1960, though no tiger occurred in the area after 1994.
2. The Qixinglazi Nature Reserve for Amur tiger in Heilongjiang province was established in 1980. No evidence shows that there are still wild tigers in the area. It seems the existence of the nature reserve already lost its meaning.
3. The Huichun Nature Reserve for Amur tiger and Amur leopard. There are still wild tigers in the nature reserve.

1. Population and distribution of Amur tigers in Heilongjiang province

Research was conducted during the period from 1988 to 1992. The result suggests that around 12(10-14) tigers were present in Heilongjiang(Fig 1).

Fig. 1 The distribution of wild Amur tigers in Heilongjiang province

A survey developed during the period from October 1998 to November 1999 showed that only 5-7 tigers were present in Heilongjiang.

The latest investigation indicates that the remaining range of Amur tigers is along the China-Russia borders. Three isolated tiger ranges are Southern Laoyeling region, Eastern Wandashan region and Southern Zhangguangcailing region. No evidence showed that tiger exists in Western Wangdashan region and Northern Zhangguangcailing forest region. More investigation is needed to verify the existence of tiger in Morthern Laoyeling region. It is believed that two male tigers live in Southern Laoyeling region. In Eastern Wangdashan region, there are at least one female tiger and one subadult tiger. The other two tigers could be female. The gender of the tiger in Southern Zhangguangcailing remains unknown.

Few sightings of wild Amur tigers in Heilongjiang were reported ever since. Some people think the existence of the nature reserves in Heilongjiang province already lost its meaning.

2. Population and distribution of Amur tigers in Jilin province

2.1 The Changbai Mountain Nature Reserve was established in 1994. No evidence shows there is wild Amur tiger left in the area.

2.2 The Huichun Nature Reserve was established in 2001 for protection and conservation of Amur tiger and Korean (Amur) leopard (Fig 2).

Due to short history of the Nature Reserve and lack of specialized techniques, communications and scientific research equipments, also the difficulties to monitor Amur tigers, a total of 55 confirmed tiger tracks were reported from January 2002 to October 2004 in Huichun Nature Reserve. Tigers were found in the following districts:

2.2.1. Qinglongtai Region. Qinglongtai situated in furthest east of Huichun nature reserve, covers 30,000 hectares (including some areas inside Heilongjiang province). No permanent residents live in the area. The highest density of wildlife and the highest concentration of Amur tiger tracks were found here. In recent three years, it was recorded that 11 people spotted tigers and the remains of wild boar and deer were found for four times. The fresh tracks can be found all over the region.

2.2.2. Fenshuiling Region. Fenshuiling covers 20 kilometers in the north-south direction and 6 kilometers in the east-west direction. Human activities are concentrated in respect that there are 3 villages, 3 stock farms and large area agriculture lands in the region. A total of 10 tiger tracks were reported in 3 years (not including some unreported activities), 18 cows/horses were killed by wild Amur tigers. Evidences showed that tigers occurred during 2002 and 2003 in Xiacaomao Village stock farm. In each incident, 4 cows were killed during a 10-day period.

A 9.3-kilometer long and 2.5-meter high wire netting fence was build to restrict the wildlife to cross the international border. Though existing evidence shows that one tiger cross the China/Russia boundary frequently.

2.2.3 Lishugou Region. Lishugou covers less than 20,000 hectares. Only 7 tiger tracks were reported, 8 cows/horses were killed. On September 5th and 6th 2002, it was reported both in Lishugou and Fenshuiling that cows/horses were killed by tiger. On June 27th 2004, a horse belonging to Lishugou resident Liu Chengfu was reported missing, and the rotten bones of the horse were found on July 4th. A cow and a calf belonging to Fenshuiling resident Shang Shaoyu were killed at the same day (the distance between two locations is about 13 kilometers). Evidences show that those are two different individual tigers.

There exists evidence that tigers cross the international boundary from Russia into China.

2.2.4 Xibeigou region. A Amur tiger accidentally died in January 2002 in the area. Tigers were present again at the end of this year. A total of 18 tiger tracks were

discovered. 14 cows/horses and 3 dogs were killed by tigers. During the period of December 2004, Liu Yu, East China Normal University graduates, conducted an investigation to track down Amur tigers in the area. The outcome of the investigation was the report of a tiger entering Southern Xibeigou from Russia, heading north for around 7 kilometers, and then moving towards the west. It is believed that the habitat of this tiger is mainly in Russia. Almost at the same period, another Amur tiger occurred at the north-east side, run around most of Xibeigou, Huangshugou regions, and Sidaogou,Shuguang, Yangjingou in Jixi city, Heilongjiang province. On January 24th 2004, this tiger killed a mule in Naozhigou. The prey process was recorded by nature reserve management bureau by a far infrared automatic camera.

The occurrences of tigers were discovered in Xibeigou and Fenshuiling respectively on January 24th 2003, and in Xibeigou and Lishugou respectively on April 21st 2004. It shows that those are different individual tigers.

2.2.5. Taipinggou Region. Taipinggou situated in north-west of the nature reserve, covers more than 100,000 hectares with large area forest but few residents. The traditional tiger range is from Eastern Taipinggou to Lanjiatangzi. A total of 5 tiger tracks were reported, 7 cows/horses were killed. Cows were killed in Taipinggou and Fenshuiling respectively on Apri 21st 2003, the distance between two locations is 7.5 kilometers far. A photo of wild Amur tiger was taken for the second time by nature reserve management bureau on January 16th 2004. It is believed that it is a subadult female tiger as footprints are only 8 centimeters wide.

Footprints of a male tiger were found in west Taipinggou and foot of Shenlin mountain, and indicates that this area appears to be a tiger range.

Tiger tracks were also found occasionally in Western Huichun nature reserve, Southern Yangpao monitoring and protecting station.

Because no enough monitoring information was collected, and because the technique data is still rough, the accurate range, activities and relations of individual tiger is still uncertain. Though based on the habit of the Amur tiger, and the spot, time, frequency of the tiger occurred, it was concluded that tiger range in Huichun nature reserve has extended to twice as big as before and the population size increased to 4-7. (Li Zhixing, The Huichun Nature Reserve Management Bureau, October 20th, 2004)

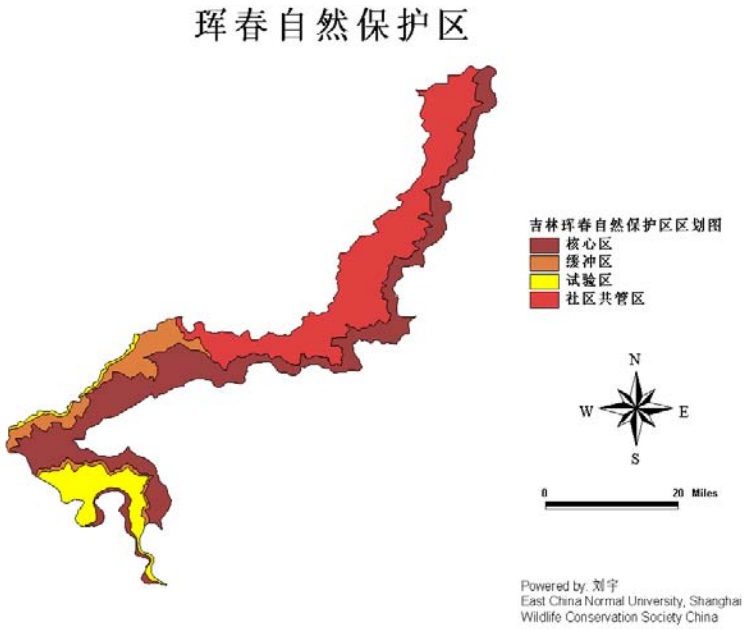


Fig 2. The distribution map of Huichun nature reserve

Poaching and smuggling

According to the historical data, Emperor Kangxi in the Qing Dynasty held “Autumn Hunting” every year and countless tigers were killed in the hunting. Ma Yiqing shows in the textual research that the biggest slaughter of Amur Tiger happened in the first 30 years in this Century and during the time, about 1300 to 1500 Amur tigers were killed.

This long-duration and large-scale hunting brought the fatal affect to the whole Amur Tiger Species.

In 1956, the total tiger skin purchasing amount in China is 1750 and there were over 10,000 of tigers in China in the early 50s. From the late 50s to 60s, for eliminate the "harmful" tigers, the government award the tiger hunting hero. As recorded, from 1955 to 1956, there are totally 171 tigers had been killed in Jiangxi Province. Jiangxi Province has the total area of 160,000 square kilometers, which is to say, a tiger was killed in every 940 square kilometers. After that, tigers have been greatly reduced and even disappeared. Tigers were extinct from Qinling area in 60s. As estimated, 30 years before the tiger hunting ban in 1977, there were about 3,000 tigers being killed. A survey, in the east mountain area of Heilongjiang Province in 1990s, shows that there are totally 12 tigers in the forests of Wanda Mountain(7), Laoyeling(3) and Zhangguangcailing(2). Comparing with the total of 81(from 1975 Survey), it has been reduced 86.2% in the 15 years and the annual reduce rate is 11.2%. The tigers in Changbai Mountain were extinct.

On November 14th 1989, a male Amur tiger was shot by three brothers. The tiger fought back desperately and hurt the poachers heavily before it died with 6 bullet holes. The night the skeleton of the dismembered tiger was driven away, his buddies (a female tiger and a tiger cub) found the bloody fighting site and wailing towards the truck. The helpless wailing from these two tigers lasted for several days in the chilly wind. Forests and mountains were sobbing for this. How about the people? Where are their conscience? What is even more miserable is that after killed the tiger, 6 forest wardens ate the tiger limbs immediately, the police knocked off the teeth of the tiger and took away the gallbladder, and some authorities even indicated to take the tiger away and asked for the bones… then for the next several days investigators keep coming down and having big feast with public fund.

In the end of 1993, a cross-border smuggling was uncovered in Tieling, Liaoning province. Authentication shows that this is a 5-year-old female wild Amur tiger. The bullet holes on its skin and bones shows that she was killed by gun and died in the year of 1993.

During the Spring Festival in the year of 1995, near the Wangjia mountain of Jiangqing county, Jilin Province, a 1.5 meter, 90 kilogram Amur tiger was trapped and hung on a tree branch to die right after it run out from the forest. The night the tiger was driven down the mountain, its two tiger buddies went to where it was killed and kept wailing…

In late June 1999, Kunming Custom uncovered a smuggling of wildlife products, which is the biggest smuggling after 1949. After a week sorting and classifying, custom officers tracked down over 2000 wildlife skins, among which 11 of tiger and over 100 of leopard. The yard was full of countless snake skin and the wildlife bones.

In the end of January 2002, in Xibeigou of the Huichun Nature Reserve, Jilin Province, a male Amur tiger was hurt be the steel wire trap, illegally set by the poacher. After 8 day and night rescuing and curing, it was died in the end. After this tragedy, the staffs of the Nature Reserve mamagement bureau work jointly with the forest police bureau to take a wide-range and large-scale action to fight against the poaching. This action uncovered 9 criminal cases, confiscated 5 guns, 200 bullets, 24 exploders, 5 tubes of dynamites, 5 grenades and over 3000 poaching tools, such as steel wire traps, clinchers and stylets, and tracked down 1 leopard skin, 3.7 kilogram leopard bones, 1 deer tail, 2 deer's penis, 21 roe deers, 1 boar, 1 muskiness, 1 bear gallbladder, wide geese, widgeons, vultures and hawks, totally over 60 wildlife and their products.

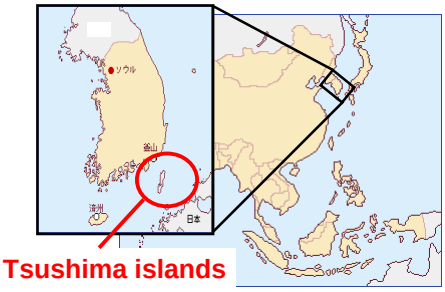
From January 2002 to March 2004, sponsored by The Wildlife Conservation Society (WCS), the Huichun Nature Reserve management bureau launched the "Mountain Cleaning" Project twice (each lasted for 2 months) to clean away the poaching traps, clamps and over 4000 of them has been cleaned away from the mountain.

On March 1st 2003,according to the clue provide by the detective, the police bureau of Chanbai Mountain Nature Reserve arrested 4 suspects, who are trading the tiger skin and bones, in the home of Luobaoxiang at the residential area of Baihe grain depot. 1 tiger skin, 1 pair of tiger bones was found there and another suspect was arrested near his home. After examination, they confected the crimes of trading tiger skin and bones. Suspect Cui Enhe bought a tiger skin and a pair of tiger bones at the price of RMB 10,000 yuan from a foreigner in 1992 and tried to sell at a profit in vain. On February 26th 2003, Cui Enhe, Gao Yuyin and Cuitao planed to smuggle the Amur tiger skin and bones to ErdaoBaihe county, Jilin province and sell them there at the price of RMB 500,000 yuan.

At noon on October 8th 2003, a blue truck from Ali was stopped by the high way checkpoint on 219 national road in Rikashi, Tibet for Epidemic Disease Inspection. Bundles of bags are full of the truck which was told are woolen cloth, but when the 50 cloth bags were opened, all the people was shocked: there are 31 Bengal tiger skins, 581 leopard skins, 778 otter skins and 2 lynx skins (Bengal tiger and Leopard are listed as Class I protected animals in China's Wildlife Protection Law, and otter and lynx are Class II protected animals). It is the first time allover the world to smuggle wildlife skins in such a high standard and large amount.

In February 2004, a tiger in Xinbin, Liaoning province hurt a man and that tiger was found died near the place where it hurt human in the snow mountain. The cause of its death cannot be identified, but there was a circle around the tiger's neck. According to the witness, half of the tiger neck had been "tied off". In the dissection of this Amur tiger, officials found that there was a bullet left in the tiger's skull and it took more than half a month from tying its neck tightly to strangling it to die.

Tsushima Leopard Cat

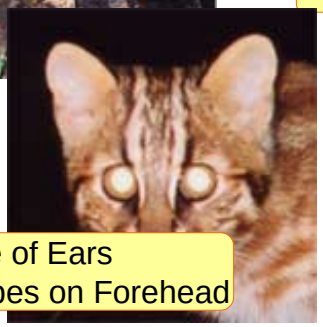


- Distributed in only Tsushima islands, South-East Japan
- Subspecies of leopard cats
- Domestic Endangered Sp.
- Red list of Japan : CR

Characteristics

Grayish-brown color with Dark Spot
Long Body & Short Legs

White Spot on Back of Ears



Round Edge of Ears
Vertical Stripes on Forehead

Long & Thick Tail

Habitat & Food

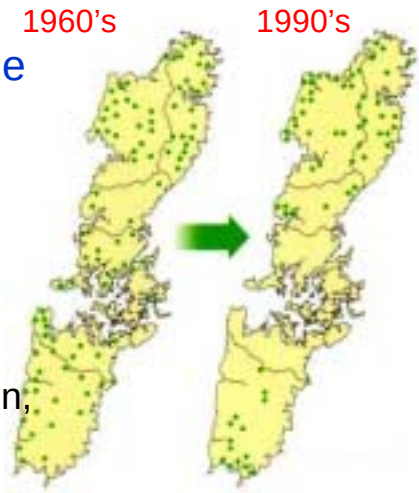
- Habitats : Forest, Farmland, Rice field, Wetland

- Foods : Small mammals, Birds, Reptiles, Amphibians, Insects

Decrease of Population Size

- Estimated Population Size
  1960's : 250~300
  1980's : 90~125
  1990's : 70~ 90

- Factors threatening the population
  Habitat Loss & Fragmentation,
  Traffic Accident
  and so on.



Distribution Map of Tsushima Leopard Cat

Protection & Breeding Program of Tsushima Leopard Cat

- Target

Stand alone Population existence in nature condition

- Objectives

- Monitoring Research of Current Status of Population & Habitat
- Prevention of Traffic Accidents
- Captive Breeding & Reintroduction
- Public Awareness

Research

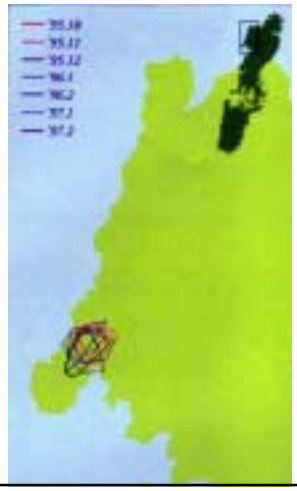
Current Status of Population & it's Habitat

Habitat Environment

Disease

……

♀X 1 cat



♂X 2 cats

Prevention Traffic Accident

Leaflet

Campaign

Road sign

Captive Breeding

- 1996 : Start recovery program: Captured founder
- 1999 : Breeding trial started with 5 founder cats
- 2000 : First kitten born

～2004 : 21 kitten born,
15 alive

Reintroduction procedure of Tsushima Leopard Cat

Goal : Establish viable population
Breeding : 30 before year 2007
100 before year 2023
Reintroduction would start in 200?

1. Intensive support from Zoos
(FUKUOKA-city zoo etc.)
2. Setting up Advisory Committee
* MOE, JAZA, FUKUOKA-city Zoo, Specialist etc.
* Genetic management ,pairing plan, and others
3. Participation of local community

Public Awareness & Education

Reforestation
by volunteer

Wild Life Center

Web Site (only Japanease)
http://twcc.cool.ne.jp/index.htm

Thank You

13TH NORTHEAST ASIAN CONFERENCE ON ENVIRONMENTAL COOPERATION
(20-22 December 2004, Seoul, Korea)

Honorary Chair,

Dear colleagues,

Species restoration

Mongolia's territory ranges from the super-arid desert in the South to moist Taiga forest in the North, and from rolling steppe grasslands in the East to alpine terrain and glaciated peaks in the West. This varied terrain contains a wide array of ecotypes; many exhibiting unique characteristics found nowhere else on the globe. This unique, varied, and substantially undisturbed territory supports a wide diversity of living organisms, many of which are endemic to Mongolia. Mongolia harbors the last remaining populations of a number of species internationally recognized as threatened or endangered, including the snow leopard, Argali sheep, wild ass, saiga, bacterian camel, Gobi bear, and others.

Mongolian fauna is relatively rich in animal species, which inhabit different habitats of the country's variable natural zones, such as forests, steppes, deserts, and high mountains forming communities according to their ecological requirements. The Mongolian fauna includes many species, which are common in the Siberian taiga, European forests, or West –Asian, and Turarian deserts. But, there are also species, which are endemic to the steppe and deserts of central and East Asia, and are common in Mongolia. In addition, Mongolia is one of the richest countries in the world in terms of prehistoric remains of various animal species.

Special attention paid to studies on Mongolia's fauna, its species composition, ecology and biology during the last 70 years has produced a large amount of data. This report is based on this data and is divided into the following sections: mammals, birds, amphibians, reptiles, fish, insects and other wildlife. Each sub-section gives information about species composition, their distribution and abundance, conservation, restoration, and use.

Altogether 138 mammalian species belonging to 73 genera, 22 families, and 8 orders, out of which, 13 are insectivorous, 12 chiropters, 6 lagomorphs, 69 rodents, 24 carnivores, 2 perissodectyls, 1 tylopods and 11 artiodactyls, exist in Mongolia.

There are several mammalian species whose population sizes and ranges have become smaller due to either the direct and indirect impact of human activities and the environmental and climate change. There are also several species, which exist, in small numbers in limited areas where the habitat loss may drive the species to extinction. Approval of the Mongolian Law on Nature Protection and the Law on Hunting in 1995 provide the base for all activities related to conservation, proper use and restoration of mammals.

According to Mongolian law, from 1930 onwards, the hunting of more than 10 species of mammals, including the Wild Horse, *Eguus prjevalskii*, Saiga Antelope Saiga tatarica, Beaver *Castor Fiber* birulai and the Otter Lutra lutra was to be prohibited. Today there is legislation concerning wildlife conservation. The Wild Horse, *Eguus prjevalskii*, The Wild ass Equus hemionus, the Wild Dog *Cuon Alpinus*, snow leopard Uncia uncia and the Otter Lutra lutra have been included in the Red Book of the World Conservation Union.

The new Mongolian Red Book, published in 1997, has 2 categories of endangered species, rare and very rare and it includes 30 species and sub-species of mammals such as Artiodactyls /33.3%/, Rodents /26.7%/, Carnivores /20%/, Insectivores /6.7%/, Perissocdatyls /6.7%/, Typolods /3.3%/, Chiropters and /3.3%/.

The protected areas network in Mongolia covers fully the range of the Wild Camel, Gobi Bear, Wild Horse, Saiga Antelope, Elk, Wild Boar, Beaver and Forest Dormouse. About 70 percent of the range of the Snow Leopard, Wild Ass, Eurasian Otter, Musk Deer, Wild Mountain Sheep and the Siberian Ibex have been placed under protection.

A few rodent species such as the Satunin's Jerboa, the Thick-tailed Pygmy Jerboa and Long-eared Jerboa have remained outside the protected areas network.

Mongolians have re-introduced and relocated certain species of mammals throughout history like the Red Deer Cervus elaphus and the Siberian Marmot Marmota sibirica, which are important hunting resources.

The Muskrat and Racoon Dog have spread into Mongolia from Russia and China, and the White tailed Gazelle, Saiga Antelope, Wild Horse, Beaver and Siberian Ibex have been re-introduced to the areas where they have become rare. 20 Wild Horses were re-introduced from Europe in 1992 in Khustain Nuruu and in Takhiin Tal.

Additional management activities like re-introductions are needed in the future for many more species, which have become endangered. The situation demands urgent policy measures and action plans in order to reserve the negative trends in a specific timeframe, such as:

- More emphasize needs to be given on conservation aspects while developing policy measures and action plans;
- Action plan could be developed to conserve the rare and endangered species of flora and fauna;
- Continuous monitoring of biodiversity uses would help in reviewing the results of implementation of policies and programs;
- Resources need to be raised for improvement and management of existing protected areas; and
- Eco-tourism could be developed to harmonize the human and ecology interaction, which in turn would provide an economic opportunity for the local people.

THANK YOU FOR YOUR ATTENTION

MINISTRY OF NATURE AND ENVIRONMENT

THE STATE OF THE POPULATIONS OF THE BROWN BEAR AND ASIAN BLACK BEAR AND REGULATION MEASURES

Russian Federation

BROWN BEAR

ASIAN BLACK BEAR

the CITES Convention

•The Brown Bear and the Asian Black Bear - are the species regulated by the CITES Convention.

•The Brown Bear is referred to the List 2, prescribing that the transboundary transfer of species and derivatives is to be licensed by the CITES management authorities (also for commercial use).

•The Asian Black Bear is referred to the List 1 prescribing that the trans-boundary transfer of species and derivatives is forbidden if it is for commercial use).

Ministries

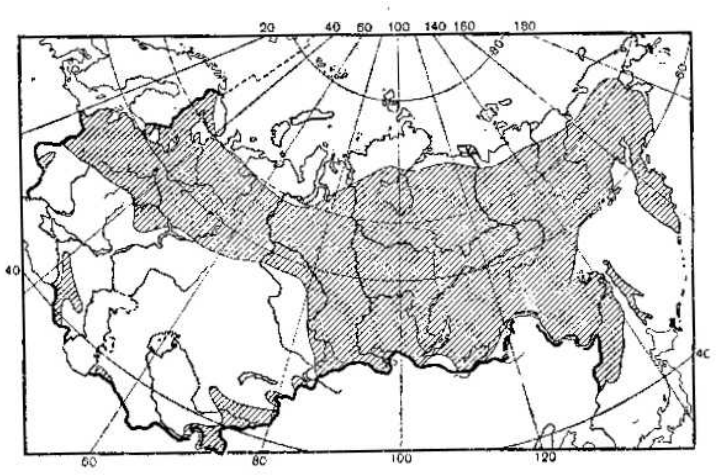
•Ministry of Agriculture

The State Agency on Agriculture of Russian Federation is responsible for Monitoring.The Federal Sevice for the Veterinary and Fito-Sanitary Supervision of the State Agency on Agriculture – is responsible for the control of populations and issue of licences.

•Ministry of Natural Resources RF

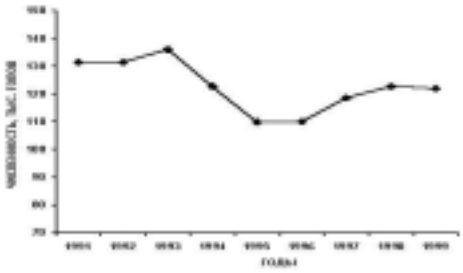
The administrative control (CITES) is performed by the Federal Supervisory Natural Resources Management Service.

Geographical distribution of the Brown Bear



Бурый медведь

Trends of the population size of the Brown Bear in Russia



	2000	2001	2002	2003
Thou	**125,93**	**133,49**	**135,70**	**137,26**

The information of Dr. Gubary Y.P.
Cited from the Book "The state of the resources of the game species in Russia for the 2002-2003"

Distribution and trends of total population of Asian Black Bear

Черный медведь

	2000	2001	2002	2003
Thou	**4,62**	**4,34**	**4,17**	**4,17**

The information of Dr. Gubary Y.P.

Cited from the Book "The state of the resources of the game species in Russia for the 2002-2003"

The major threats
for the Far East bear-populations.

-Habitats depletion (tourism and transport development in recent virgin areas)

- Overgrazing through illegal hunting

- Forest fires

- Althogh the threats are serious but the situation with both populations is nor critical

Measures on regulation

Each Subject of Federation has its own Rules of Hunting. They include the terms, means and methods of hunting.

Annually the limits of hunting are reconsidered (differ from region to region) basing on the inventory assessments obtained

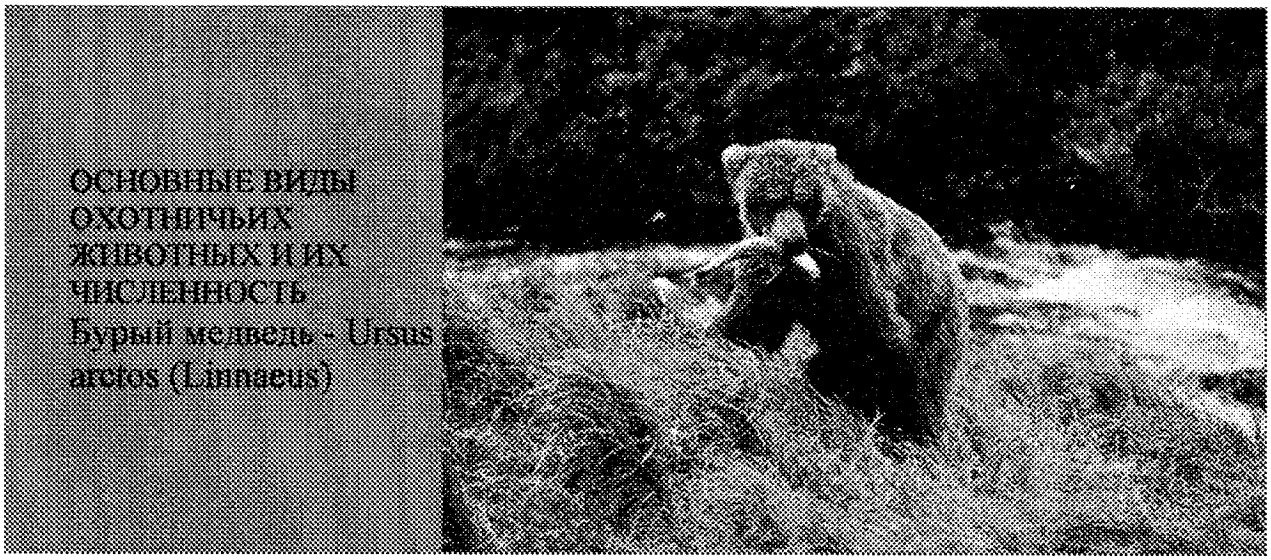
The Federal Supervisory Natural Resources Management Service is responsible for the State Environmental Expertize of these limits providing the sustainable use of the bear populations.

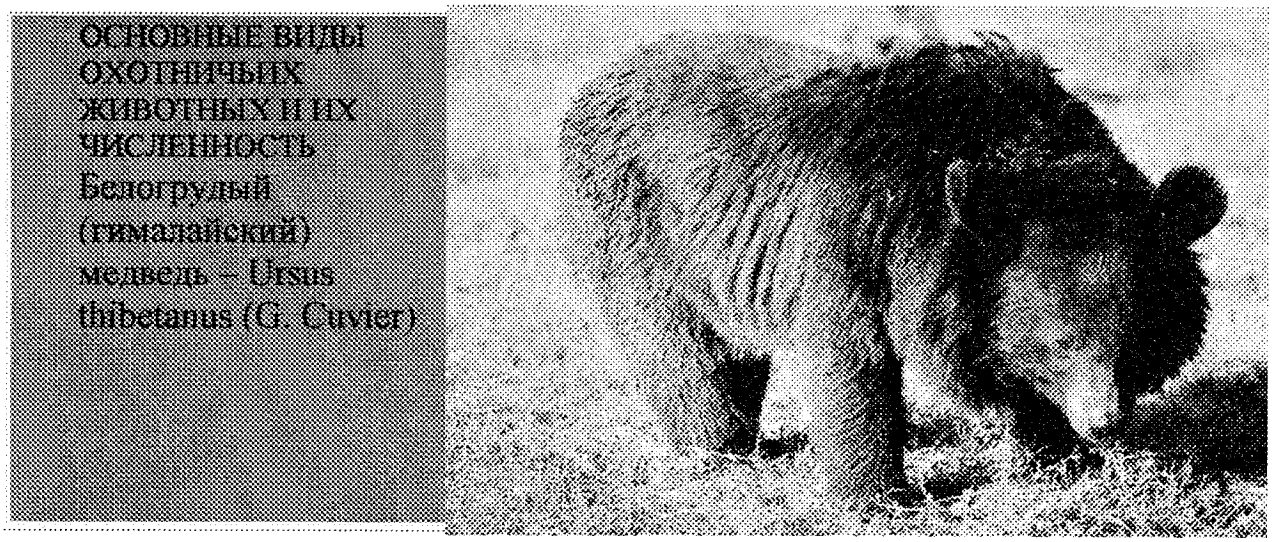
The regulation measures include:

- annual assassments of population size and aproval of the size of exempteion of bears,
- ssue of hunting licenses
- poaching control

THE STATE OF THE POPULATIONS OF THE BROWN BEAR AND ASIAN BLACK BEAR AND REGULATION MEASURES

Ministry of Natural Resources of Russian Federation
T.Petrova





1.The Brown Bear and the Asian Black Bear - are the species regulated by the CITES Convention.

The Brown Bear is referred to the List 2, prescribing that the transboundary transfer of species and derivatives is to be licensed by the CITES management authorities (also for commercial use).

The Asian Black Bear is referred to the List 1 prescribing that the trans-boundary transfer of species and derivatives is forbidden

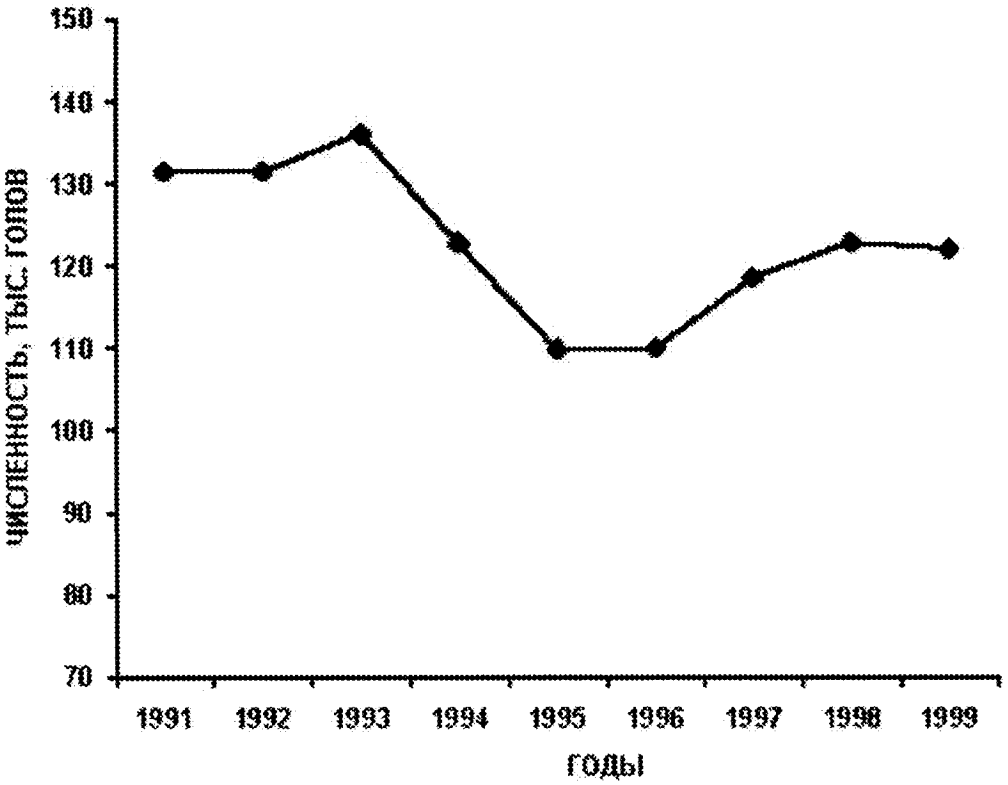
2. Both species are the object of hunting and being regulated by the national legislation on the game species.

The control and protection of the populations of the both species are regulated by the Law on the game species.

Ministry of Agriculture
The State Agency on Agriculture of Russian Federation is responsible for Monitoring.The Federal Sevice for the Veterinary and Fito-Sanitary Supervision of the State Agency on Agriculture – is responsible for the control of populations and issue of licences.
Ministry of Natural Resources RF
The administrative control (CITES) is performed by the Federal Supervisory Natural Resources Management Service.

3.Geographical distribution of the Brown Bear
The major portion of the territory of Russia is inhabited by the Brown Bear. (North West and North East and Center of the European Russia, the Volga-Kama region, the Caucausus, the Western, Middle Siberia, Baikal region and Yakutia, Far East Kamchatka, Sahkalin and Kuril Islands).
Actually the boundaries of the Brown Bear habitat coincide with the natural boundaries of the forest zone of Russia.
The Asian Black Bear habitat is limited to the Southern forests of the Russian Far East.

4. The dynamics of the size of the population is also encouraging and indicates a relatively stable situation for the recent 10-20 years. It is an indication of the well-being of these species in Russia. Although the situation differs from region to region.



Trends of the population size of the Brown Bear in Russia

	2000	2001	2002	2003
Thousands	125,93	133,49	135,70	137,26

The information of Dr. Gubary Y.P.
Cited from the Book "The state of the resources of the game species in Russia for the 2002-2003"

Trends of the total population size of the Asian Black Bear in Russia

	2000	2001	2002	2003
Thousands	4,62	4,34	4,17	4,17

The information of Dr. Gubary Y.P.
Cited from the Book "The state of the resources of the game species in Russia for the 2002-2003"

In the Caucasian and the Central regions there are registered the declining populations trends.The hunting in some SF is forbidden there.
There some indications of over hunting (illegal) in Kamchatka and the Far East.
All the assessments obtained through the inventories are approximate.

There have been implemented a number of projects on aircraft inventories also in parallel with the tiger inventories in the Far East. But these studies are expensive and are non sufficient to get a appropriate assessment on size population in different regions.

5. Far East bear populations is the major object in this presentation

The major threats for the Far East populations.
-Habitats depletion (tourism and transport development in recent virgin areas)
-Overgrazing through illegal hunting
-Forest fires.
Althogh the threats are serious but the situation with both populations is nor critical

6.Measures on regulation

Each Subject of Federation has its own Rules of Hunting. They include the terms, means and methods of hunting.
Annually the limits of hunting are reconsidered (differ from region to region) basing on the inventory assessments obtained.
The Federal Supervisory Natural Resources Management Service is responsible for the State Environmental Expertize of these limits providing the sustainable use of the bear populations.
The regulation measures include:
- annual assassments of population size and aproval of the size of exempteion of bears,
- Issue of hunting licenses
- Poaching control

7.1.Issue of hunting license
In 1950-1960 there was no control over hunting in Kamchatka. For this period the bear number diminished by two times. Introducing license in the mid 70s was aimed at establishing a regulated harvest. The number of the exemption species is strictly regulated. First it had a positive effect. Then the hunters started to use the same license to shoot several bears. The demand for bear hunting exceeds the number of issued licenses.
The more licenses are issued the income of the hunting estates is growing - the better opportunities for conservation measures arise.
200-250 foreign hunters visit the Kamchatka annually – basing on this cash inflow the local hunting estates perform the bear inventory activities.
The size on Kamchatka population – 8-10 th., while the licensed exemption is about 800-900.

There has beren taken the decision to ban the spring hunting in Kamchatka in 2005.

The Sakhaliskiy and Kamchatskiy bears are the largest and most attractive as trophies for forein hunters.

7.2 Habitats protection. The measures on conservation of the Brown Bear are performed in all natural reserves of the Far East (Lazovskiy zapovednik, Khinganskiy zapovednik, Sikhote-Alinskiy, Kronotskiy, etc). Not only federal but all other regional nature protected areas (altogether10 % of the territory)

9.Poaching control

The poarching has been generated by two facrors – the poverty and hunting for the commercial use and enrichment. Since 1990 the unstable economy in remote regions and poaching contributed to the size decrease but later on the previous level has been regained

In 1990 Kamchatka became open for foreigners and impoverishment of the population. Development of trade caused a great market demand for bear parts such as skins, gall bledders, fat. Two or three harvested bears can support a family for a year. Losing of ability effectively protect the wildlife by governmental bodies because lack of funding.

The control is beeing implemented.

The fines for the illegal hunting of the brown bear is less than the price of the skin.

The price for the medical products (bear bile) is growing in China and other NEA countries.

If the extraction of bio-products is arranged in a sustainable manner the profits can contribute to the bear population well-being

The poaching control is not sufficient on the Russian side. The measures should be of the more comprehensive character and based on the international efforts.

10.Breeding of cubs (both species)

During the hunting the bear can be shooted. The cubs are taken carefor consequent issue into nature. The Center of rehabilitation "Utyes" – some dozens of cubs. Recently the NGOs have been engaged in breeding of the small bears – orphans (Khabarovskiy krai, Central regions) and later – released into natural habitats.

11.The Asian Black Bear (Himalayan Bear, White Breast Bear)

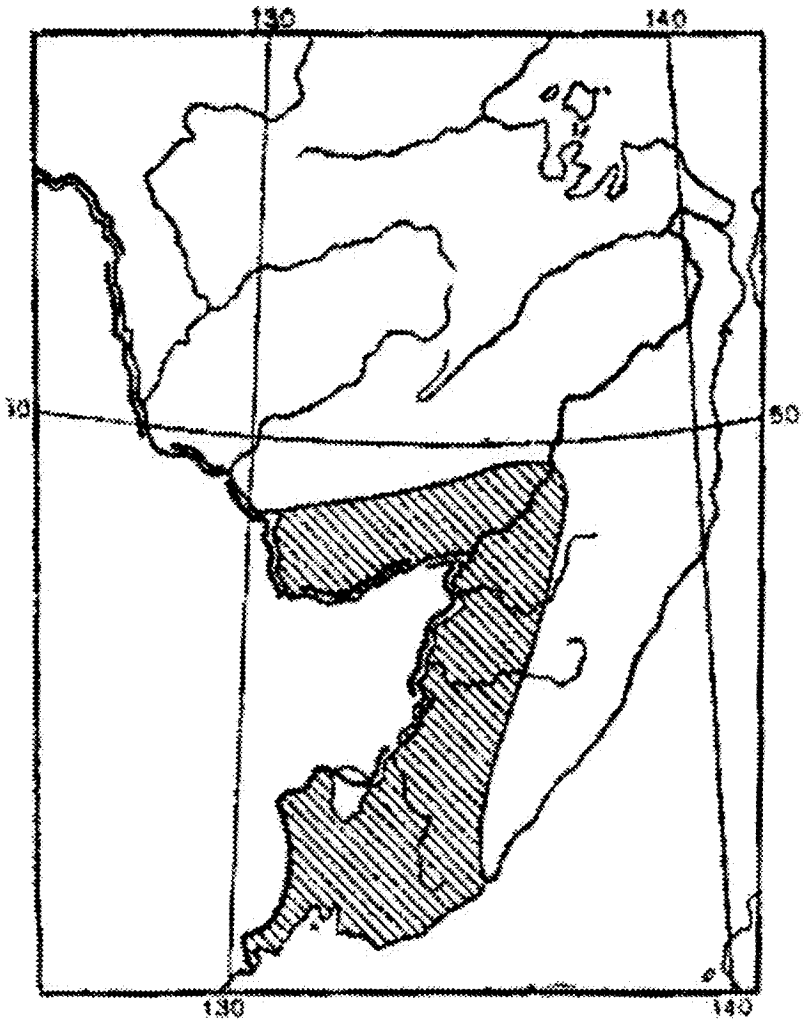
This species up to the 1997 has been included into the Red Data Book.

But on reason of improvement of the situation it has been permitted for licensing.

The geographical distribution of the species.

It extends to the north as far as the Russian Far East only utmost northern part lies within the Russian borders a very small part.

Южного Приамурья (***рис.***



Черный медведь

107).

In the early XX century the Asian Black Bear occurred over a much large territory. The area once being uninterrupted has been transformed into isolated parts due to decline of forests in the region and intensive land reclamation. The 4/5 of the habitat has been involved into economic activity.

But the transformation of habitats is compensated on reason of great adaptation capacity of the Asian Black Bear.

In the nearest future it can be expected the retreat of the boundaries (decrease of the habitat area) towards the mountains and later on this zone will be separated into small portions not providing the sustainability of the population

The destruction of the habitats is going on. The cutting of cedar forests for thinning is still permitted.

The hunting licenses are authorized only in Primorskiy krai - 15 bears annually.

The level of the illegal hunting is 6% (Khabarovskiy krai).

Contents

- **History of bear population**
- **Current status**
- **Population and Habitat Viability Analysis in Chirisan National Park**
- **Experimental bear release project**
- **Bear recovery plan**

History of Bear Population

- 1960's : Minimum Viable Population size
- 1970's : Intensive Hunting & Trapping
  'Natural Monument'(1982)
- 1980's ~: Poaching & Habitat loss
  Endangered Speies(1997)

Current Distribution Map of Bear Population

northern mountains in Gangwon province :
No more than **16** individuals

Chirisan National Park :
5~8 individuals

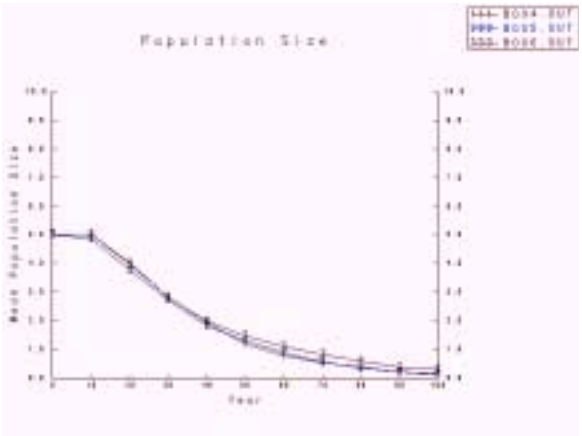
Population and Habitat Viability Analysis of the Korean

Asiatic Black Bear population in Chirisan National Park

Problems

- Wild population is too small to be viable no matter the carrying capacity
- Insufficient intact habitat for a viable population of black bears in Chirisan National Park.
- Human impacts on population reduce viability
- Lack of useful models to assist an adaptive management program

VORTEX SIMULATION MODELING



Experimental bear cubs release project

Goal : Develop adaptive bear recovery methods in the Republic of Korea

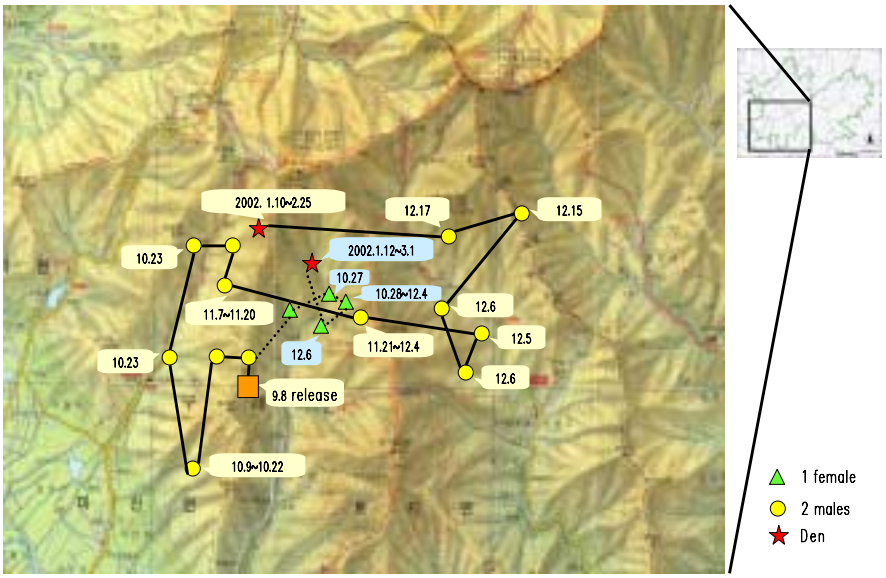
- Experimental Phase : 2001. 4 ~ 2002. 5
- Method : Adaptive releasing method using bear cubs
  - Weaning → Adaptive training → Releasing
- Experimental Size : Four bear cubs
- Support : Ministry of Environment
- Conduct : Wildlife Biology Division of Institute of Environment Research

Weaning : 26. April ~ 28. Jun

Adaptive training : 28. Jun ~ 7. Sep

재 생

Movements of Released Bear Cubs



Imprinted by human

Why Died?

Hibernating

Obtain & Lesson

Obtain

- Scientific data to restore bear population
- Stimulated bear recovery plan in action

Lesson

- Prevent bear from imprinting by human
- Eliminate mortality risk before releasing

Bear Recovery Plan

- Goal : Establish viable population size : 51 individuals
- Periods : 2004 ~ 2012
  six cubs release each year from 2004 to 2008 (total 30 cubs)
- Budget : 20,000millions won (. 19millions us dollars)
- Conduct : Asiatic Black Bear Conservation Team
  of National Park Authority : 18 staffs

Took the First Step!

6 bear cubs (. 3, . 3) released on October 21, 2004

thank you!

Recovery Program of Asiatic Black Bear (*Ursus thibetanus ussuricus*) in the Republic of KOREA

Wonmyong Kim
Wildlife Biology Division
National Institute of Environmental Research
Republic of Korea

1. Introduction

Asiatic black bear (*Ursus thibetanus ussuricus*) occupied all of high mountainous areas of the Korean Peninsula until the 1950s. However, as results of extensive hunting and trapping, the population of Korean's bear has dramatically shrunken and has been classified as endangered species since 1982. The population of Asiatic black bear in the Republic of Korea occupies only two distinct areas: the Mt. Chirisan and the northern mountains in Gangwon province.

The research on the bear population status and its recovery in Chirisan National Park, adopted by the Ministry of Environment, was conducted by the Division of Wildlife Biology at the National Institute of Environmental Research from 1998 to 2001. As the results of the research, the bear population in Chirisan National Park was exactly unknown but no more than five to eight individuals survived and might not be a viable population for long-term survival because of isolated small population. As following the result of population and habitat viability analysis, reintroduction was the only method saving the bears in Chirisan National Park. Such as translocation or supplement of new population (gene pool) over minimum viable population for preventing genetic loss and becoming viable in long-term must be carrying out as soon as possible.

For recovering Asiatic black bears, a bear recovery pilot project with bear cubs was implemented in 2001. Following with the project results, recovery plan of the black bear in the Chirisan National Park has been currently worked on. In this report, I first document the results of the experimental bear cubs releasing project.

2. Experimental bear cubs release project

1) Weaning

Four bear cubs, three months old and originally from three different bear farms, had been growing in a small pen near bear farm since April, 26, 2001. The bear cubs had been weaned for two months, and were moved within the adaptive pen in forest before releasing to wilderness. The weaning pens were consisted with den with Φ50cm×1.5m PVC, water source, and other playing devices for bears' enrichment. Width 3.0m and height 1.8m fences were set up 5 faces and total measuring 26m^2. Metal plates were installed in upper part of fences block bears escaping by climbing up. The feeding program was started with weaning. Forages can be got in wilderness was the final formula for bears within adaptive pen. Surely, bears were supplied lots of soft foods, such as vegetables, after weaning and before feeding natural forage. Bear cubs adaptive programs processed step by step.

2) Adaptive releasing method

The adaptable pen, measuring about 1.0 ha, was set up in Chirisan National Park in June, 2001. The bears were introduced in the pen to adapt themselves to wilderness before releasing from June 28 to September 7, 2001. Eight wires electric fences of 10,000-54,000 voltage pulse current were installed 2m high in forest and dark camouflage net was covered around pen to control visitors' attention. In trees, height less than 2m, metal plates were surrounded in their trunk prohibiting bears' climbing up. Fifty centimeter diameter and, 2m length PVC pipe was supplied for a shelter and den. Fresh stream water supplied. Daily managements were followed; feeding the formula due to program steps from outside pen twice a day. Feeding locations were changed everyday for developing the ability of searching food in wilderness. Also, any holes or tunnels beneath fences by bear were checked. Worrying to be imprinted human-being through contact, appearance and our scent, researchers put gloves and black clothes on and did not talk during routine management.

3) Behaviors within the adaptable pen

In addition to eat artificial formula given, the bears had eaten natural bear formula such as arrowroot (*Pueraria thunbergiana*), strawberry, acorn, ants larva, frogs, and snake, etc., which could be taken inside pen naturally. Playing each others, resting on bear platform of trees, and sleeping on den were normal behaviors observed; otherwise they were engaged in feeding. Observation cases of escaping behaviors such as climbing trees up, running away from

intruders, etc. became more popular depended on adaptive program passed. Digging a hole beneath electric fences was observed on August 2, 2001 and starting spy behavior that is watching and wondering their habitat around in and outside the adaptable pen. They came back inside in the evening, in the first day when wondering outside pens. However, a week before releasing, they stayed in forest outside pens for two or three days. The longer adapting time passed the longer staying outside forest. All four cubs had been inhabited and stayed together within forest, 500m apart the pen.

4) Behaviors after released into the wilderness

The four eight months old bear cubs were released on September 8, 2001 in Chirisan National Park. All bears were fitted with transmitters for detecting and monitoring their location, behaviors, habitat, and mortality. They can get plenty of natural foods such as acorn, wild grapes, and the fruit of *Actinidia arguta*, etc. easily in habitat during the season, so, we could expect higher survival rates of the released bears. Until a month after released, four cubs inhabited forest within 500m apart their adapting pens. Then, three of them moved to Whaoum valley, and the other female moved to Munsoo valley. Home ranges of the bears were about 5km from releasing site and they inhabited and moved two groups as mentioned. Usually, staying for 1-2 weeks in one habitat, then moved to another better area, where is more available of natural food. The one female was observed. She was captured by national park's visitors and sent her back to national park office on October 23, 2001 after 50 days. She had been veterinary treatment for 10 days when 4 months old. Possibly, the hospital experience from veterinarian lead her more tamed behaviors to human-being than the other bears did. Another female was found as carcass during the recovery project. However, we could not expect mortality reason and death-day exactly. Poaching using snare might be fetal effect to her. On January 10, 2002, two males were identified in hibernation under rock outcroppings located elevation 950m within Whaoum valley. Hibernation of bear cubs in wilderness without mother's help might be recognized that the adaptive program can lead successfully bears survive in Chirisan. Since 2002, remnant two males separated and have occupied other areas individually. They were captured on spring 2004 and sent back to national park office. Now, the three bears live in the pen within national park office to educate public about bear ecology and recovery.

We can get lots of successful results and data through the recovery project of Asiatic black bears in Chirisan National Park during last couples of years. All these pilot project and data

might be important as basic, essential, and valueless information for systematic bear recovery and conservation programs in the future. And now, this recovery method has served as a prototype for subsequent bear recovery plan in the Republic of Korea.

3. Current Status

The Ministry of Environment has the long-term Recovery Plan of Asiatic Black Bears (*Ursus thibetanus ussuricus*) in Chirisan National Park till 2012. The minimum viable population of bears is expecting fifty individuals as following the population and habitat viability analysis. Reintroduction Bears into Chirisan National Park has been planned by the Ministry of Environment from 2004 to 2008. If support is adequate, stockings of six cubs will take place each year for the next two to four years. The bear cubs will be importing from Ussuriysk, in Russia.

First step was completed on October 21, 2004. The six cubs consisting of 3 females and 3 males were released fitted with transmitters after being adapted program in Chirisan National Park. Recovery programs are supported and completed by Asiatic Black Bear Conservation Team of National Park Authority.

4. Conclusion

The recovery project of Asiatic black bear (*Ursus thibetanus ussuricus*) in Chirisan National Park is the first official recovery plan for endangered species adopted by the Ministry of Environment. Therefore, awareness on nature of bear recovery and conservation was extremely high at the moment. At the same time, the successful recovery project offers hope and confidence that we can completely restore this population as sooner, and affect other endangered species recovery program crank in.

Recovery strategy with bear cubs is proved highly effective and successful program modified in the Republic of Korea. Also it can be taken respectively shorter time. Supplement of new gene pool and reaching up the minimum viability population is basic resolution in recovery animals from extinct situation. In addition to these advantages, sex ratio, breeding pool, genetic diversity, and translocation in extinct habitat and other recovery planning can be achieved systematically and effectively.

Biological information, scientific techniques, researchers' ability, and other component for the bear recovery are prepared in the Republic of Korea and it can be adjustable in a field.

However, there are still couples of problems to be solved before starting recovery assignments. There are in aspects of social, economic, and even politic problems. Nevertheless many people, NGOs, researchers in universities, government, and institute have an awareness and enthusiasm on nature currently, and doing our best effort to solve all problems in advance. The back bear recovery project can be proved successfully sooner or later.

Session 2 : Ecological Restoration in Local Government

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Mr. HU, Tao
Senor Researcher Fellow, Policy Research Center, SEPA

Japan "The Northeast Asian Youth's Environmental Symposium 2004" ---------- 231
Ms. MOTOE, Kaoru
Senior Researcher, Planning and International Cooperation Division,
Northwest Pacific Region Environmental Cooperation Center

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Mr. ENKHBOLD, Anar
Officer, International Cooperation Department, MONE

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President/professional Engineer, CA Landscape Design Co., Ltd.

China's Urban Environmental Management

Hu, Tao
Chief Economist
Policy Research Center of SEPA

XIE, Tian
Deputy Director-General
Sichuan Provincial Environmental Protection Bureau

Seoul, Korea
December 21, 2004

- How could ecological restoration be implemented at local level?
- What's the role of National Government to promote ecological restoration?
- Introduction to urban environmental management + a case in Chengdu City, Sichuan Province

Outline

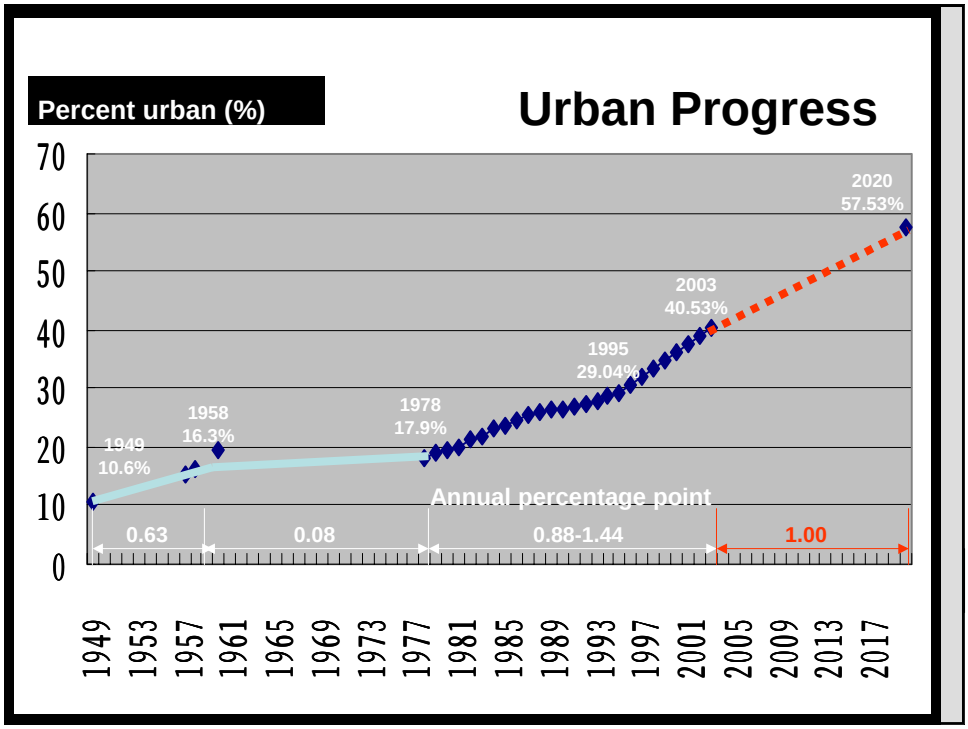
- Urbanization progress in China
- Goals of Urban Environmental Management
- Instruments of Urban Environmental Management
- Case Study of Chengdu City, Sichuan Province

Urbanization progress in China

- Importance of urban areas for China
  - 50% of total industrial products
  - 70% of total GDP
  - 80% of total taxes
  - 85% of tertieal industry
  - 90% of high education universities and colleges

Urbanization progress in China

- From 1978 to 2000, for China
  - number of cities increasing from 193 to 663
  - number of towns increasing from 2,173 to 20,312
  - total urban population increasing from 170 million to 456 million, taking up from 17.9% to 36.1% of total population



Goals of Urban Environmental Management

Goals of Urban Environmental Management

- In the period of 10th five year plan (2000-2005)
  - Ambient air quality of 50% major cities reaching the level of national class 2
  - Water quality of 70% major cities reaching the level of national functional standards
  - 80% of major cities reaching noise control level
  - Sewage treatment rate of cities reaching 45%
  - Natural gas/LPG using rate of households in cities reaching 85 .
  - Disposal treatment rate of cities reaching 65 .
  - Greening coverage rate in urban area reaching 35%

Instruments of Urban Environmental Management

- Quantitative evaluation of urban environmental performance
  - Purpose
    - Encouraging municipalities to improve their environmental performances by disclosure of city environmental image information to the public
  - Index of evaluation
    - Air, water, solid wastes, noise and ecological indicators
  - Evaluation
    - Merits system
    - Calculating indexes
    - Put weighted indexes and to integrate all of indexes into one indicator

Instruments of Urban Environmental Management

- Quantitative evaluation of urban environmental performance
  - Coverage of cities among more than 600 cities
    - 47 major cities
    - Expanding to more and more cities
  - Ranking series
    - To rank cities by their merits of environmental performances
  - Reactions of society
    - City images are highly concerned by their citizens and whole society

Instruments of Urban Environmental Management

- Quantitative evaluation of urban environmental performance
  - Effectiveness of environmental management
    - Pressures on cities to improve their environmental behaves by their citizens
    - Good environmental images of cities are used to attract tourists and investments
    - Bad environmental images of cities are blamed by citizens
    - Competition among cities
  - Role of national government, SEPA
    - Play a role as judger but players
    - no costs to invest to clean up and restore ecosystem
    - Use carrot rather than stick

Instruments of Urban Environmental Management

- Similar programs for city, town, corporate and product
  - Environmental model city Program
  - Environmental beautiful township Program
  - Environmental friendly corporate Program
  - Environmental Label Product Program

Case Study of Chengdu City, Sichuan Province

- A written paper is available to introduce the city's actions
  - to improve its environmental performances
  - to restore its ecosystem of Shahe River Basin

THANK YOU!!!

Merry Christmas and HAPPY NEW YEAR!!!

谢谢!

圣诞快乐! 新年快乐!

The Northeast Asian Youth's Environmental Symposium 2004

Dce.21,2004

MOTOE Kaoru
Northwest Pacific Region Environmental Cooperation Center（NPEC)

Background of the symposium

By exchanging information with the local governments in the Northeast Asia Region, we found;

Local governments of Northeast Asia Region

- **Consider that environmental education is important**
- **Want to promote the environmental conservation activities by youths**

Objective of the symposium

In order for the youths of Northeast Asia Region

- **To have environmental consciousness with broader perspective**
- **To raise the environmental awareness**
- **To form a network**
- **To promote the environmental conservation activities**

Outline of the symposium(1)

- **Date: 21-22 August 2004**
- **Venue: The Seaside Training House, Boryeong City, Chungcheongnam Province, Republic of Korea**
- **Co-organizers:**
  Japan: NEPC, Toyama Prefecture, Ministry of the Environment, Japan
  Korea: Korea Environmental Preservation Association Dae Jean Chung Nam Branch, Chungcheongnam Province, Ministry of the Environment, Republic of Korea

Outline of the symposium(2)

- **Theme:　Conservation of water environment**
- **Participants:**
  37 students from middle schools
  China:　4　(Shandong Prov., Jiangsu Prov.)
  Japan:　9　(Toyama Pref., Niigata Pref., Ishikawa Pref.)
  Korea: 22　(Chungcheongnam Prov., Gangwon Prov.)
  Russia:　2　(Primorsky Territory)
- **Working Language:**
  Chinese, Japanese, Korean, Russian
  Symposium materials are provided in 4 languages.

Contents of the symposium

(1) Learning

- **Keynote Speech**
- **Lecture**

(2) Presentation

- **Presentation by participants on their activities (9 groups)**

(3) Practice

- **Exercise of the water inspection**
- **Activity of environmental conservation**

Keynote speech

“The Environmental Situation and Challenges in the Northeast Asia”

by Mr. LEE, President of Kongju Communication Arts College, Korea

Lecture

“Our Water Environment”

by Dr. KAWAKAMI, Assistant Professor, Toyama Prefectural University, Japan

The students calculated and confirmed the quality of the indirect water in their own country

CONTENTS

- Water as a resource
- Water quantity
- Available water
- Concept of indirect water
- Our modern life is supported by global circulation of water
- Water quality
- What should we do for preserving water quality
- Think globally and act locally

Presentation titles

- **“Survey on Washed up Driftage on the Coast along the Yellow Sea, Shandong Province ”(China)**
- **“Preservation of Water Resources” (China)**
- **“The Activities to Protect Organisms Using Groundwater” (Japan)**
- **“Our Volunteer Activity of Cleaning Up ”(Japan)**
- **“Survey on the Water Quality in *Ushi-no-Kubi*, the Habitat of Fireflies” (Japan)**
- **“The Values of a Tideland and Its Conservation Methods ”(Korea)**
- **“Means of Saving Water ”(Korea)**
- **“Control of Water Contamination ”(Korea)**
- **“Protection of Lotus Flowers in Primorsky Territory ” (Russia)**

- **“Survey on Washed up Driftage on the Coast along the Yellow Sea”**

China (Shandong Province)

Place : Qing dao City, Yan tai City, Wei hai City, Ri zhao City
Period : Oct.9-Nov.11,2003
No. of participants : 198

Result :
- **comprehended the situation of washed up driftage**
- **found it would be useful to take measure in the future**
- **raised the awareness of the marine environmental protection**

"The Activities to Protect Organisms Using Groundwater"

Japan(Toyama Prefecture)

Place : Nakada middle School, Takaoka City
Period : 1970-2004
No. of participants : 190
(12 from the science club)

Result:

- **won high praise for their long term research of aquatic species**
- **made a biotope in a quad with the cooperation of PTA and local people.**
- **succeeded in growing, Ashitsukinori(*N. verrucosum (L.) Vaucher*), Tomiyo(*Pungitius pungitius sinensis*) and two kinds of fireflies (*Luciola cruciata*, *Luciola lateralis*) in the biotope**
- **have released many larvae of fireflies into local rivers**

"The Values of a Tideland and Its Conservation Methods"

Korea (Chungcheongnam Province)

Place : Boryeong City
Period : Jun.24-27,2004
No. of participants : 7

Result :

- **appreciated the important role of tideland**
- **learned the total area of tidelands decreased in Korea**
- **found it would be useful to reduce domestic wastewater for conservation of tideland**

- **"Protection of Lotus Flowers in Primorsky Territory "**

Russia (Primorsky Territory)

Place of activity :
Junior Naturalist station, Arsen'yef City
Period of activity : 2002-2004
Number of participants : 15

Result:

- **succeeded in growing lotus flowers in a pond which was artificially made**
  - **In 2002: planted 14 roots of lotus flowers in their pond**
  - **In 2003: found 12 roots established and 4 flowers bloomed**
  - **In 2004: found the area covered by leaves increased to 20 % and the number of buds increased, 4 to 9**
- **be due to grow lotus flowers in some local ponds next year**

Exercise of the water inspection

- **Exercise in the convenient test of water quality using the test kit (COD, pH)**
- **Exercise in measuring transparency**

Demonstration by the Japanese instructor

Activity of environmental conservation

- **Surveying on washed up driftage and cleaning up the beach**

Pamphlets of 4 languages

Thank you

13TH NORTHEAST ASIAN CONFERENCE ON ENVIRONMENTAL COOPERATION
(20-22 December 2004, Seoul, Korea)

Honorary Chair,

Dear colleagues,

LOCAL MANAGEMENT AND ECOLOGICAL RESTORATION

The basic principle for sustainable development, being as main tendencies of development in the 21st Century, forms balances relations between environment and economy and leaning upon this relations it is necessary to create the conditions for improving the livelihood of the people, for eliminating the poverty, for using the natural wealth and resources on a possible extent as well as for preventing the environmental pollution and deterioration.

The main ways and means for solving this issue will be development of methods of planning and management, definition of the state of environment and its capacity, fixation of the negative impacts beforehand, monitoring and assessment, and reduction of these negative impacts by controlling and studying resources. Parliament of Mongolia has adopted Environmental Impact Assessment Law and this law has created the legal basis for this activity.

Although necessary steps are being taken already in this direction, the measures mentioned in assessment report are still not enough for the nature protection and restoration.

The Government of Mongolia is following the policy for providing a normal condition for nature and environment, for their restoration, and guiding the principle for keeping the balanced proportion between utilization and restoration, for proper use of natural resources in line with its capacity and loading, for directing the citizen's activity for restoration of deteriorated environment, for widening the rights and obligation of the citizens in providing economic development with ecological orientation.

Since 1990 Mongolia has been transferred to the market economy and numerous legal acts and laws were adopted for widening the competence and independent activity of local administration and the principles for environmental management policy have been defined in the law on administrative units of Mongolia and their management, in the law on environmental protection and in other related law.

The local citizens' representatives meetings are the highest organ in the territorial units and they enjoy full rights in planning the measures for restoration

of nature and environment and for their proper use, in concentrating the financial means in the local budget, by opening a special account for this purpose.

However, nowadays, local administrations make their efforts only for the budget tasks and they do not make enough efforts for the protection and restoration of nature and environment.

8 percent of Mongolia's territory to forest area and 40 percent of them are influence negatively by human activity, pests and fire.

Works for the restoration of forest have been organized by the Government of Mongolia on 106.4 thousand hectares of land for the last 24 years. But not enough works have been done for the protection of forest, for restoration of forest area. Local organizations and farms are organizing measures for planting trees and preparing seedlings only by their own efforts and means, but they are in serious need of financial support and technical assistance.

90 percent of Mongolia's territory belongs to dry, semi-dry, land with less moisture and 41.3 percent of entire territory of Mongolia, specially 647.0 thousand squire km's of land are affected by desertification.

The Government of Mongolia has taken definite measures for reduction of the impacts of desertification. However, our government is in great need of financial sources for the implementation of National Program for combating desertification. The local administrations are doing their best in this direction, but the real potential is not enough for combating the increasing process of desertification.

Mining industry is now in full swing in Mongolia and they make tangible contribution to the development of national economy. On the other hand, these mining enterprises are influencing very badly on environment.

Every economic unity in the country shall have its own plan for the restoration of nature and environment and local administrations control the implementation of this plan. Most mining companies are ignoring the demand for restoration of natural landscapes and degraded soils after extracting the minerals.

The utilization of minerals and restoration activity should be proportional and the Ministry of Nature and Environment is guided by this principle in its activity.

But we shall note that sufficient measures have not been taken to control the whole process of activity of mining enterprises. We need complex mechanism for the control of activity, aimed at restoration of nature and reducing the negative impacts of mining industry on nature and environment.

For the last 2 or 3 years, the violations connected with the restoration have some tendencies towards reduction thanks to the adoption law on land and legal acts on minerals.

Now it is necessary to take the following measures:

- To organize a campaign for planting trees in order to combat the process of desertification with the help and support of foreign countries and donors.
- To take measures for increasing the participation of local people in protection of forests and to support the ownership of forests by involving local people.
- To organize a fund for forestation and to organize a nation-wide campaign in the country for the reforestation.
- To take measures for invalidating the licenses for extracting minerals if the mining enterprises do not take steps for the restoration of degraded land.
- To improve the controlling mechanism of ecological restoration and this issue should be included in the program of action of candidates for local election.

THANK YOU FOR YOUR ATTENTION

REHABILITATION OF THE SMALL RIVERS IN THE URBAN ECOSYSTEMS (MOSCOW)

T.Petrova

Russian Federation

The background of comprehensive environmnetal measures in Moscow

- In 1999 the Concept of the environmental safety of the Moscow city was adopted.
- In 2003 the draft law on the integrated nature management was approved by the Moscow Government
- The Moscow Environmental program for the 2003-2005 has been implemented.

The distribution of functions between Federal and Metropolitan authorities

- The new Federal Law on the Environmental Protection the municipal authorities were responsible for the provision of the favorable environment and environmental health
- In 2004 the Agreement between the Ministry of Natural Resources of Russian Federation was signed for sharing of competence.

- The **ecology restoration** is referred as the special activites aimed to restore the degraded ecosystems and their initial natural characteristics in respect of the relief, microclimate, hydrology, soil, vegetation and fauna.
- The **ecology restoration** is a vital activity to contribute to the natural territories network and the ecosystem frame.

The restoration activity

The long-term program on the size population increase of plants and animals included into Red Data Book of Moscow is being implemented.

There is a special program on the water birds, herons and cranes dissapeared in Moscow since the beginning of the 19 th century. In 2002-2003 there have been issued 12 captive bred chicks of herons into the natural conditions. We hope that in future 10 years these graceful birds will come back to the city.

In 2003 the Concept on rehabilitation of the small rivers and the Program on Rehabilitation of the small rivers in Moscow have been completed.

The expected results of the program –

- the significant improvement of the water objects,
- the improvement of the banks amenities and the diversified ecosystem services recreational,etc.

Objectives of river rehabilitation:

- the integrity of the natural ecosystem with the urban environment, its discontinuity,
- reduction of the geological risk,
- the enhanced esthetical value of the territory,
- better use of the degraded lands.

The concept of the integration

- the reconstruction of the valley portions basing the maximum use of the ecosystem and landscape potential, preservation of the existing bio-passages and biodiversity of plants and animals
- restoration of the valley within their natural spacial and geomorthology boundaries providing the self-regulation of the natural systems, restoration of the original river network, restoration of the water sources within natural ecosystems.
- clearance of the valley preserved sites (in case of closed water bed) basing on the options of restoration following (reconstructing) the original valleys configuration
- preservation of the hydrological conditions at the sites with risk of degradation of the vegetation cover in case of the underground water level decrease.

The option of the small rivers valleys and adjacent territories restoration

-Landscape design

1)greenery-open space territories, man-made landscape

2)creation of the water facilities(channels, fountains, cascades, vertical water walls; imitation of the natural water ways and objects

3) Direct restoration of the sites of open water way.

-Engineering works

1)reclamation projects stabilizing the geologic processes

2)vertical planning reconstruction of the lost landscape

3)erosion control

The activities on the river rehabilitation

- Conservation
- Reconstruction
- Reorganization

Conservation

Downtown

- Preservation of the traditional sight of the valley and visual links, of the traditional greenery, maintenance of the engineering facilities
- Efforts to stress visually the preserved elements of the valley

Nuclear area

- Comprehensive reconstruction.
- Restoration of the lost visual links and integrity of the natural base

Peripheral area

- Maintenance of the pure springs and natural territories generating the natural water flow, restoration of links with the suburbs

Reconstruction

Downtown

- Preservation of the historical and cultural heritage – careful reconstruction

Nuclear area

- Radical reconstruction, restoration of the lost visual landscape

Peripheral area

- Restoration of the lost water sources and natural territories

Reorganization

Downtown

- Careful restoration using the imitating technic

Nuclear area

- Radical schemes of the restoration of the natural base providing the integrity

Peripheral area

- Transformation of the planning structure, construction of new water ways

REHABILITATION OF THE SMALL RIVERS IN THE URBAN ECOSYSTEMS (MOSCOW)

T.Petrova
Ministry of Natural Resources of the Russian Federation

The background of comprehensive measures in Moscow

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The **ecology restoration** is referred as the special activites aimed to restore the degraded ecosystems and their initial natural characteristics in respect of the relief, microclimate, hydrology, soil, vegetation and fauna. The ecology restoration is a vital activity to contribute to the natural territories network and the ecosystem frame.

In Russia the ecology restoration is highly developed in connection with the restoration of the stepp ecosystems that have been practically destroyed in the natural conditions.

The going on decrease of the greenery area around Moscow makes important the restoration of natural ecosystems that have been destroyed in the course of the urbanization.
At present the natural ecosystem of Moscow comprises the one third (35,1 th.ha) of the territory, and it is to be extended to 45 th. hectars including the area of nature protected territores. The per capita greenery in Moscow is equal to 16 m2 (Tokyo – 5m2).

The extension of the nature protected area is planned to perform through the designation to the small river vallies the status of the nature protected areas restoration of the wastelands.

The biodiversity of the Moscow ecosystem is relatively high and is represented by 2 thousands plant species and 280 species of backboned animals.

The restoration activity

For the last two years the program on the restoration on the vegetation associations and size of rare species on the nature protected terittories (the primary pine, fir and broad leaf trees plantings) has been implemented.

Only in the park "Izmailovo" there have been planted 1300 of fir trees, 700 pine trees, 300 larc trees, 300 oak trees.

The long-term program on the size population increase of plants and animals included into Red Data Book of Moscow is being implemented.

There is a special program on the water birds, herons and cranes dissapeared in Moscow since the beginning of the 19 th century. In 2002-2003 there have been issued 12 captive bred chicks of herons into the natural conditions. We hope that in future 10 years these graceful birds will come back to the city.

There has been issued the Red Data Book of Moscow where 80 bird species are represented out of total 130.

The important ecosystem component is also the soil cover. The natural soil cover has been entirely destroyed exept small portions in city forests. The quality of the grounds brought from other natural sites is not of proper quality.

In 2003 the Concept on rehabilitation of the small rivers and the Program on Rehabilitation of the small rivers in Moscow have been completed.

The expected results of the program –

- the significant improvement of the water objects,
- the improvement of the banks amenities
- and the diversified ecosystem services – recreational,etc.

The boundaries of the major water protection zones (Kotlovka, Gorodnya, Yauza) have been defined. The other small rivers projects (Samorodinka, Ramenka, Ochakovka, Klyazma) are under way.

The rehabilitation of 10 municipal ponds (27,4 ha area) and the adjacent territories has been performed in 2003. There have been restored the 14 water springs.

There has been given a special attention to the rehabilitation of the small rivers captured in collectors. The length of the captured rivers is 313 kilometers The total length of small rivers is 492 km.

In the course of intensive urban development the small rivers have been used mostly for drainage of the surface water.

But still a huge portion of small rivers has retained its esthetic and recreational value as unique natural objects.

Objectives of river rehabilitation:

- the integrity of the natural ecosystem with the urban environment, its discontinuity,
- reduction of the geological risk,
- the enhanced esthetical value of the territory,
- better use of the degraded lands.

The concept of the integration includes:

- the reconstruction of the valley portions basing the maximum use of the ecosystem and landscape potential, preservation of the existing bio- passages and biodiversity of plants and animals
- restoration of the valley within their natural spacial and geomorthology boundaries providing the self-regulation of the natural systems, restoration of the original river network, restoration of the water sources within natural ecosystems.
- clearance of the valley preserved sites (in case of closed water bed) basing on the options of restoration following (reconstructing) the original valleys configuration
- preservation of the hydrological conditions at the sites with risk of degradation of the vegetation cover in case of the underground water level decrease.

The environmental function of the small rivers valleys has been appreciated greater than that of the wild nature site.

The assessment of the natural factors at the sites of the lost water ways with the preserved, transformed and destroyed valleys is under way

The factors studied:

- configuration of the river network presented in the old topographic plans,
- the preserved historical landscape,
- the availance of the altered valley forms.

The options of the small rivers valleys and adjacent territories restoration:

- landscape design: 1) greenery - open space territories, man-made landscape; creation of the water facilities (channels, fountains, cascades, vertical water walls; imitation of the natural water ways and objects, 3) direct restoration of the sites of open water way.
- engineering works: 1) reclamation projects stabilizing the geologic processes and natural drainage characteristics. 2) vertical planning –

reconstruction of the lost landscape, 3) erosion and landslide control measures.

The activities on the river rehabilitation can be classified under integrated approach into three types:
- Conservation
- Reconstruction
- Reorganization

Three major zones of the rehabilitation of the urban territory
1 - down town, monuments and nature protected territories
2 - nuclear area
3 – peripheral area

The 3 types of activities within special zones are the follwing:

Conservation

downtown	Preservation of the traditional sight of the valley and visual links, of the traditional greenery, maintenance of the engineering facilities Efforts to stress visually the preserved elements of the valley
Nuclear area	Comprehensive reconstruction. Restoration of the lost visual links and integrity of the natural base
Peripheral area	Maintenance of the pure springs and natural territories generating the natural water flow, restoration of links with the suburbs

Reconstruction

- Restoration of the traditional sight of the valley and the urban landscape, elimination of the unimportant dwellings and facilities, the panoramic sight of the valley,

-Clearance of the territory,reconstruction of the water objects, valuable species of flora and fauna.

-Rehabilitation of the existing ecosystems and complimentary greening of the buildings, roofs and balconies.

-Reconstruction of the existing and new engineering facilities,

downtown	Preservation of the historical and cultural heritage – careful reconstruction
Nuclear area	Radical reconstruction, restoration of the lost visual landscape
Peripheral area	Restoration of the lost water sources and natural territories

Reorganization

Establishment of the new open space, direct restoration of the surface waterway, creation of new water surface. Creation of new visual links, restoration of valuable landscape imitating the traditional sight of the valley

downtown	Careful restoration using the imitating technic
Nuclear area	Radical schemes of the restoration of the natural base providing the integrity
Peripheral area	Transformation of the planning structure, construction of new water ways

The Present Condition of CheongGye-Cheon Restoration

CHIN, Yang Kyo

CA Landscape Design Co., Ltd.

Seoul Metropolitan Government

Index

Ⅰ. History of Cheonggye-cheon
Ⅱ. Necessity of Restoration
Ⅲ. Progress in the Restoration Effort
Ⅳ. Measures for Transportation and Merchants
Ⅴ. Construction management
Ⅵ. Cheonggye-cheon 2005

I . History of Cheonggye-cheon

• **Location of Cheonggye-cheon**

1

• Chosun Period

- A stream running through the center of Seoul from west to east.
- Overflowed every time by heavy rain.

- Mobilized 200,000 people to widen the stream and build stone embankments in 1760.

2

• Early 20 century

1)

2)

1) An integral part of the common people's lives.

2) Homeless's shelter gathered along its banks.

3

• After Liberation from Japan

1)

2)

1) It took 20 years to complete covering the stream.

2) Construction of Cheonggye Elevated Highway started in 1967 and was completed in 1976.

4

II. Necessity of Restoration

- Needs to transform itself into a human-oriented and environment-friendly city.
- Recover its 600-year history and create cultural spaces.
- The safety of citizens to be threatened.
- Balanced regional development by revitalizing neglected city centers.

- Needs to transform itself into a human-oriented and environment-friendly city

- Environmental protection and respect for ecology

The covering of Cheonggyecheon Stream.

Focus on functionality and efficiency.

↓

Cheonggye-cheon Restoration. ← Green city where clear waters flow.

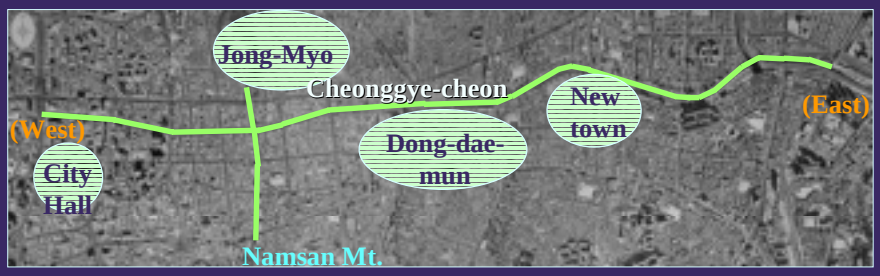
↓

Seoul will be re-born as a human-oriented environmental city, greatly increasing Seoul's'brand' value.

- **Re-establish Green Network**

The basic concept is to re-establish an uninterrupted tract of green space of 5.8 kilometers running across the city from west to east,

- Total amount of green : 276,650 ㎡



<Green Network>

- **Create green and pedetrian network**

Wind road ➡ Temperature falls about 1.

- Recovering its 600-year history and create cultural spaces

Recovers these artifacts of historic heritage.
Explores its cultural resources.

⇩

A cultural city for all citizens to share and enjoy.

9

- Balanced regional development

The neighboring areas to be revitalized

⇩

To realize their growth potential

⇩

Attracting important industries such as international financing, the cultural industry, and the fashion and tourism industry

⇩

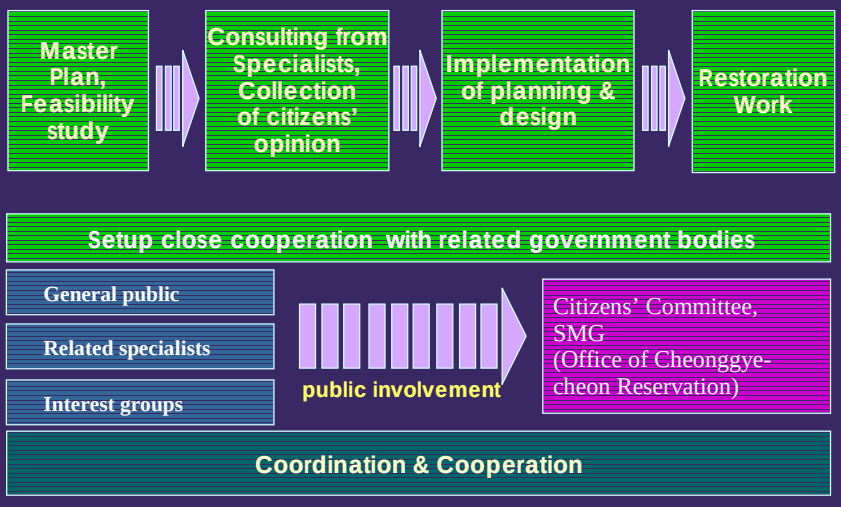
An international center of finance and business in Northeast Asia

12

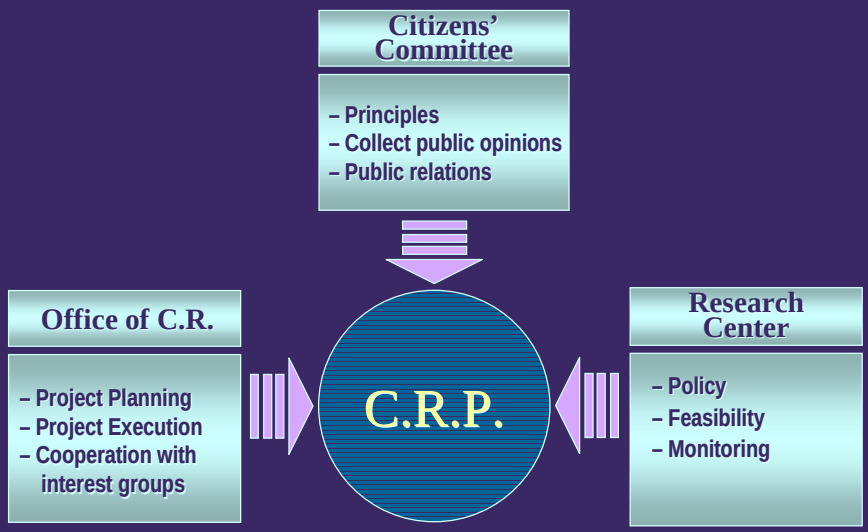
III . Progress in the Restoration Effort

- Implementation process
- System
- Details
- Budget
- Time schedule

❍ Implementation process



❍ System



15

• Details

● Sections of Cheonggyecheon stream to be recovered

Built facilities to restore Cheonggyecheon Stream, including the sewage system, road, bridges, landscaping and lighting as the master plan to dismantle the structures covering the Cheonggye-cheon Stream.

Divided the entire section into three construction sectors, considering the construction work within the inner city.

16

- **Dismantling the structures**

Used diamond wire saws and wheel saws, the most advanced technologies available in order to minimize noise, dust and other pollutions generated from dismantling.

17

- **Water sources for the Cheonggyecheon**

Water sources for the Cheonggyecheon

- The water for Cheonggyecheon to be supplied at four locations.(120,000 tons/day)
- The average water depth : 40 .

18

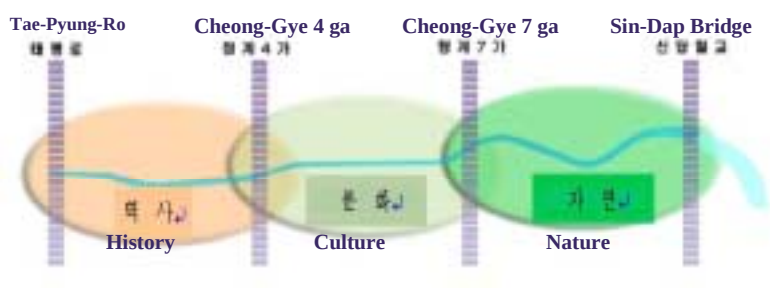
- **Sectional view of Cheonggye-cheon**

The sewer system to be designed to treat a totalof 1.95 million tons a day, three times the maximum sewage.

19

- **Basic Concept of restoration of ecosystem**

Basic concept	Re-establish an uninterrupted tract of green space from west to east Guarantee the movable passage of animals Increase the environment-friendly urban space with a waterfront and walks along the banks Increase total amount of green space



- **Pprincipal points of restoration of natural ecosystem**
  - willow marsh : 10 places
  - ecological watersides : 4 places 17,074.
  - rapids and swamps : 29 places
  - the habitat of birds : 1place 12,589.
  - the habitat of fish : 7,316. – 4 section of works
  - water bank : 50 places
  - big stone : 101places
  - clotheshorse : 152 places

A view of restoration of ecosystem

- **A viewpoint of upper stream**

A principal scenery of restoration

1 Cheong-Gye Madang

2 Cheong-Gye Neren-Madang

3 Su-Pyo_Gyo

4 Pattern watersides

5 Pal-Rae-Ter

6 The walls of paticipation

7 Ha-Nul-Mul-Ter

8 Willow Marsh

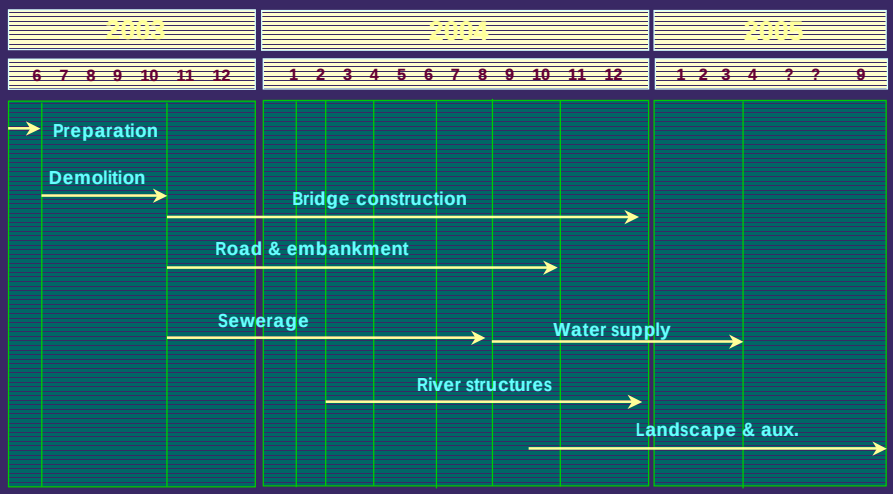
Budget

Total Project Cost : 305 million dollar (U.S)

- Design : 1.7
- Construction : 294.0
- Land acquisition : 2.3
- Project management : 6.1
- Admin. : 0.5

All budget is from Seoul Metropolitan Government

Time schedule



Ⅳ. Measures for transportation and merchants

- **Measures for transportation**

- **Measures for motorists using Cheonggye Elevated Highway**
  - Eencouraged the car owners to leave cars at home one out of every 7 days.
  - Expanded the variable lane system and designated the selected lanes for motorists.
  - Encouraged detours for motorists entering the center of Seoul.

23

- **Increased the transportation capacity of buses and subways to encourage citizens to use public transportation instead of their own cars**
  - Increased the transportation capacity of the subway.
  - Designated bus-only lanes.
  - Designated Shuttle bus service.

- **Control of downtown area traffic**
  - Continue to crackdown on illegal parking.
  - Raised downtown parking fee and staged a new PR campaign on public transportation.

24

Ⅳ. Measures for transportation and merchants

- **Measures for transportation**
- **Measures for merchants**

22

- **Traffic measures for visitors to Cheonggyecheon stores**
  - Opened two lanes on each side of the Cheonggyecheon to freight vehicles and designated road space for loading and unloading.
  - Allotted parking spaces for Cheonggyecheon store customers in the Dongdaemun Stadium Parking lot.
- **Measures for citizens visiting Cheonggyecheon**
  - Revised existing bus routes.
  - Offered free shuttle bus service.

25

• Measures for neighboring merchants

- **To collect opinions of merchants on the impact of business**
  - Held public hearings and presentation sessions for each commercial block.
  - It helped to organize the Cheonggyecheon Residents and Merchants Council and the Merchants Association.
  - The most advanced engineering technology was employed to minimize noise and dust.

26

- **To further stimulate business activity in the district**
  - Reduced the parking fees.
  - Promoting Cheonggyecheon stores by various means including advertising on electronic billboards on the streets, newspapers, hanging banners, and PR leaflets.
  - Giving priority to Cheonggyecheon stores when procuring supplies for Seoul Metropolitan Government and local district governments.
- **Providing financial support and subsidies to merchants**
  - Provided low-interest loans to small business operators suffering poor sales during the project.
  - Provided grants for the remodeling of existing markets, covering 80% of the costs for improving the business environment.

27

- **Measures for leaving**

  The city government is planning to create a special business section for businesses that intend to leave Cheonggyecheon to ensure that the nationwide business network continues to function in an uninterrupted manner.

- **Various measures so that the neighborhood of Cheonggye-cheon can be developed in systematic and efficient way in the long term**

  - Formulated plans to develop downtown and unit sections.

  - The downtown redevelopment project for the neighborhood.

28

. . Construction management

Elevated roads (Before 2003. 7)

Under demolition (2003. 7 ~ 2003.10)

29

The view of upper stream(Sector 1)
the progress of construction : 70.80%

30

The view of mid-stream(Sector 2)
the progress of construction : 74.98%

31

The view of downstream(Sector 3)
the progress of construction : 76.70 %

■ A sample of construction

Construction of Slope wall

33

Ⅵ. Cheonggyecheon 2005

Restoration of Cheonggyecheon

↓

Development of neighbor areas

↓

Balanced development of the northern and southern parts of the city

↓

Seoul will be a hub of northeast asia

34

Thank You

Session３：Sustainable Management of Industrial Complex

China "Case Study on Circular Economy" ---------- 285
Mr. ZHANG, Yutian
International Cooperation Office, CREAS, SEPA

Japan "Sustainable Management Activities in Kitakyushu Eco-Town" ---------- 295
Mr. MUTO, Yoshihiro
Manager, Office for International Environmental Cooperation,
Environmental Bureau, City of Kitakyushu

Russian Federation "JSC Norilsk Mining Company, in the Arctic of Norilsk" ---------- 305
Dr. PETROVA, Tatiana
Senior Specialist, Department of International Cooperation,
Ministry of Natural Resources

Republic of Korea "Strategies for Sustainable Development of Industrial Park" ---------- 311
Dr. PARK, Hung-Suck
Professor, Civil and Environmental Engineering, University of Ulsan

Case Study on Circular Economy

—State Demonstrated Eco-industry Estate (Sugar), Guigang, China

Zhang Yu-tian

Chinese Research Academy of Environmental Sciences

2004/12

Contents

- Background
- Project Introduction
- Target and Guideline
- Achievement
- Experience
- Suggestion

Background

- In the year 2000, accumulative total loss of sugar industry reached *10 billion Yuan* (RMB)
- Sugar industry is facing great challenge:
  Configurable Pollution & Regional Pollution
- Productivity of sugar manufacture is low:
  Poor Equipment & Technologies
- Sugar industry is the Pillar Industry in Guigang

Estate Introduction

- Being the largest sugar cane producing base in China, the sugar cane land in Guigang city is of *23,200* hectare with an output of *52.5~60 tons /hectare*.
- At present, there are five sugar manufacturing plants in Guigang City, among which Guitang Group is the largest sugar industry in China.

Composition of the Eco-industry Estate, Guigang

Introduction of **Guang Xi Guitang (Group) CO., LTD**

- It was put into production in 1956 with its stock system's reconstruction being finished in 1994.

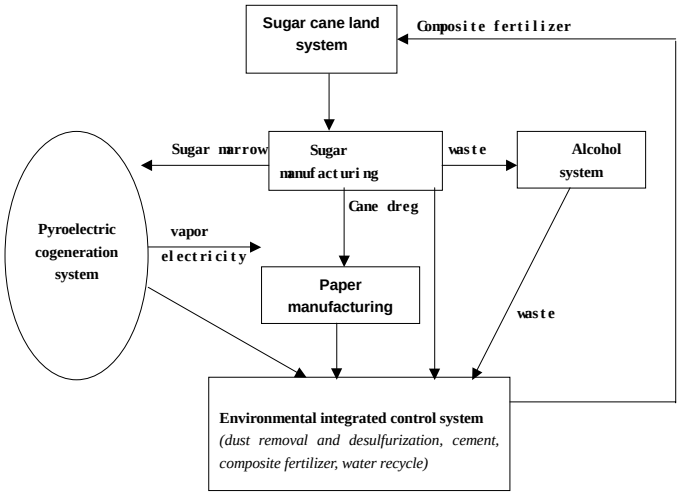
- Group covers an area of 1.5 km^2 with about 3000 registered staff .
- Up to the end of the year 2000, the accumulated investment had reached 14.029 million Yuan (RMB).

Income of Guitang CO., LTD

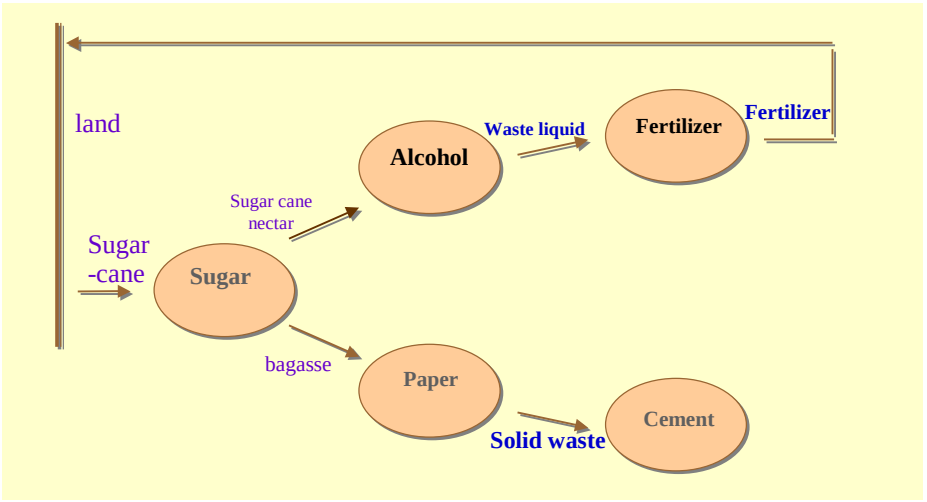
Income of different industries in 2003 (million Yuan)

Industry	Business income	Proportion	Profits	Profits proportion
		£ %£ ©		£ %£ ©
Refine sufar	375,97	49.73	2,799	2.88
Paper making	375,21	49.63	93,49	96.10
Chemical industry	4,81	0.64	0.993	1.02
Total	755,99	100.00	97,29	100.00

Constructing Frame of Guitang



Flow Chart



Target

- To ***retrieve*** traditional industry of China by developing a new production pattern;
- To ***realize*** harmonious development of both environment and economy by using ecological industry theory;
- To ***build*** a demonstrated eco-industry pattern for sugar manufacture.

Guideline

- Regional ***eco-efficiency Principle***;
- Solving environmental problems by ***keeping development***;
- Making ***overall plans*** to project's key-points;
- High technology and high benefit Principle;
- Equal attention to both ***hardware*** and ***software*** construction.

Project Achievement

- Economic Benefit

  Up to the year 2005, the whole sales income may reach 7.2 billion Yuan (RMB).

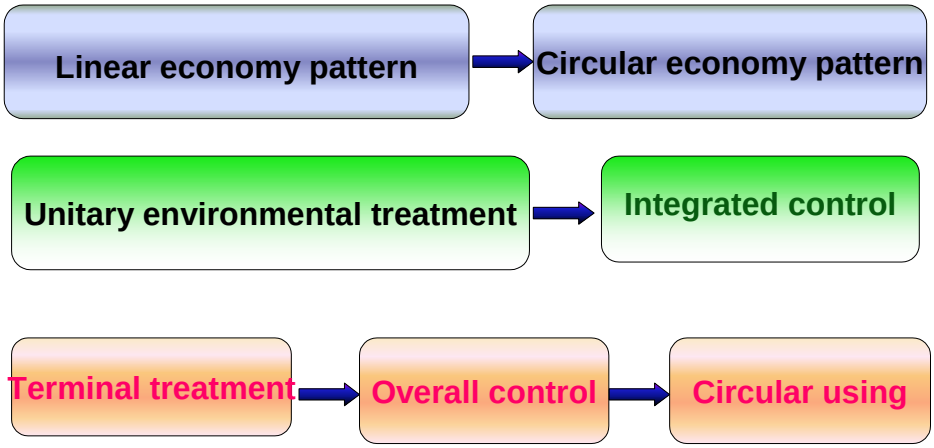
- Environmental Benefit

  In the year 2000, COD was reduced by 35% and 134,000 tons organics was decreased.

- Social Benefit

  A compacted network is built focusing on sugar industry, and people's living standard in Guigang City has been improved a lot.

Experience



Transfer Demand for Production and Consumption Pattern

Suggestion (1)

Establish and improve legislation system to promote development of circular economy and eco-industry:

- **Review and improve existing environment related laws and regulations in China;**
- **Establish circular economy-oriented legislation systems.**

Suggestion (2)

Highlight the R&D for the supporting systems of circular economy and eco-industry:

- **Environmental technologies**
- **Resource-reusing technologies**
- **CP technologies**
- **Evaluation technical systems**

Suggestion (3)

Strengthen the dissemination of the circular economy and eco-industry

- **The governments at all levels**
- **Enterprises**
- **Research institutes**
- **NGOs**

Suggestion (4)

Further demonstration projects of circular economy and eco-industry

- **at the enterprise level**
  - representative enterprises and large-scale enterprises
  - eco-design for the products, CP, etc.
- **at the region level**
  - existing and to be built industrial estate
  - the metabolic and symbiosis relationship among enterprises
- **at the society level**
  - public participation
  - the mechanism of reusing and recycling of used products and wastes

Thank you!

Merry Christmas!

Sustainable Management Activities in Kitakyushu Eco-Town

MUTO Yoshihiro

Office for International Environmental Cooperation,

Environmental Bureau, City of Kitakyushu

2004.12.22

City of Kitakyushu

Kitakyushu and Asia

City of Kitakyushu

First blast furnace in Asia (Completed in 1901)

Bringing Back Clean Environment

Polluted 1960s

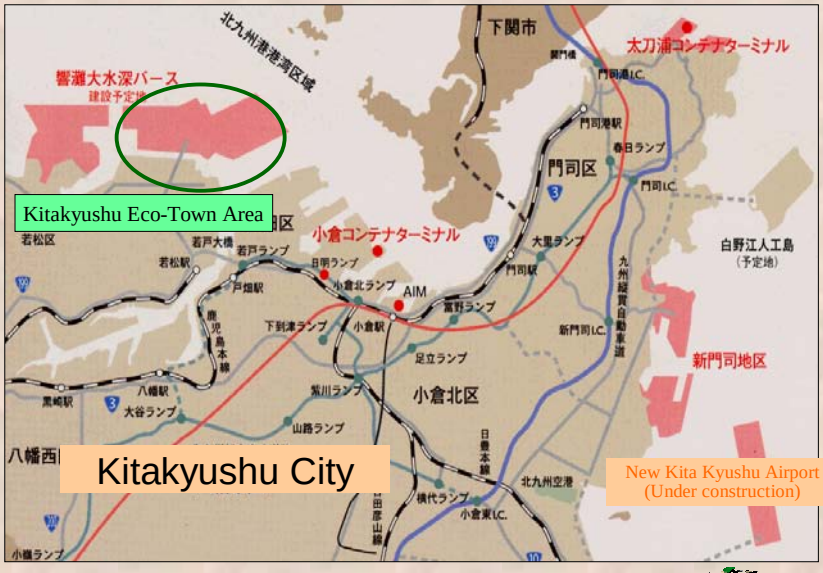
Present Environment

International Cooperation

Trainees Received :1,233 people from 87 countries
Experts Dispatched : Over 94 people to 25 countries

City of Kitakyushu

Kanmon Strait and Kitakyushu Eco-Town Area



City of Kitakyushu

Strategy on promotion of environment-related industry

Comprehensive development from basic research technology development, testing, and industrialization

I Education/ Basic Research

Conception of Science and Research Park

- Kitakyushu University, Faculty of International Environmental Engineering
- University/Research Institute
  - Kyushu Institute of Technology, Graduate School
  - Cranfield University (U.K.)
  - GMD-Forschungszentrum Informationstechnik GmbH
  - Waseda University, Advanced Research Institute for Science and Engineering
  - Fukuoka Research Center for Recycling Systems
- Other institutes
  - Institute for Global Environmental Strategies, Kitakyushu Office

II Technology/ Practical Research

Practical Research Area

- Fukuoka University, Institute for Resource Recycling & Environmental Pollution Control System
- Practical research in various areas
  - Waste disposal site management technology
  - Incineration ashes
  - Food refuse (kitchen garbage, tofu refuse, etc.)
  - Waste plastic
  - Fukuoka Research Center for Recycling Systems, practical research area
- Eco-Town Center/Anex
- Recycling plants
  - Tofu and Other Food Residue
  - Styrene Foam

III Industrialization

Comprehensive Environmental Complex

- Aggregation of recycling plants
  - Plastic PET bottles
  - Office equipment
  - Home appliances
  - Automobiles
  - Medical wastes
  - Fluorescent tubes
  - Demolition Waste(2)

Hibiki Recycling Area

- Local small, midsize, and start-up business
- Development of automobile scrap and used parts businesses

The Second Stage Area

- Recycle and Reuse plants
  - Toner Cartridge
  - Pachinko
  - Waste Wood &Plastic
- Wind-Power Project

City of Kitakyushu

Kitakyushu Eco-Town Project

- Investment: ¥50Billion
- Employee: 1000
- Visitor: 300,000

Comprehensive Environmental Industrial Complex

Practical Research Area

City of Kitakyushu

Plastic PET bottle recycling facility

- According to the “Containers and Packaging Recycling Law”, PET bottles separately collected by municipalities are recycled to produce recycled PET resin that is used as raw material for fiber
- Project leader: Nishinihon PET-Bottle Recycle Co., Ltd. (invested by Nippon Steel Corp., Mitsui & Co., Ltd., Nippon Steel Transportation Co., Ltd., Nippon Express Co., Ltd., Sankyu Co., Ltd. and the City of Kitakyushu)
- Operation commenced in July, 1998
- Processing capacity of approx. 18,000 tons/year
- Project with eco town subsidies of the Ministry of International Trade and Industry

City of Kitakyushu

Office equipment recycling facility

(Plant)

(At work)

- Used office equipment (copying machine, facsimile, printer, and PC) are dismantled, separated and recycled raw materials.
- Project leader: Recycle Tech Co., Ltd. (Invested by Shinryo Corporation, Ricoh Co., Ltd.)
- Operation commenced in April 1999
- Processing capacity of 450 tons/month (copying machine: approx. 3,600 per month, facsimile: approx. 5,400 per month)
- Project with eco town subsidies of the Ministry of International Trade and Industry

City of Kitakyushu

Used automobile recycling facility

(Plant)

(At work)

- Used cars are recycled with an improvement in the recycling rate and the promotion of proper treatment of oils and CFCs, producing quality scrap by advanced technology of dismantling and separation.
- Project leader: West Japan Auto Recycle Co., Ltd. (invested by Yoshikawa Kogyo Co., Ltd., Mitsui & Co., Ltd., Nippon Steel Corp., Nippon Steel Transportation Co., Ltd., Kyushu Metal Industry Company)
- Operation commenced in February 2000
- Processing capacity of 18,000 cars/year
- Project with eco-town subsidies of the Ministry of International Trade and Industry

City of Kitakyushu

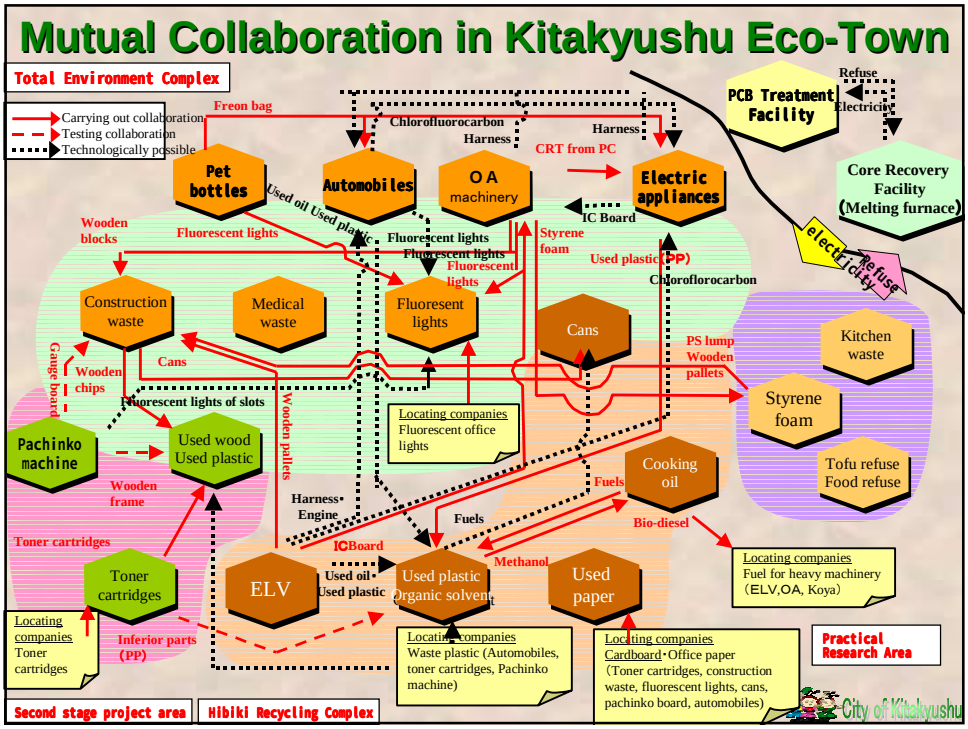
Home appliance recycling facility

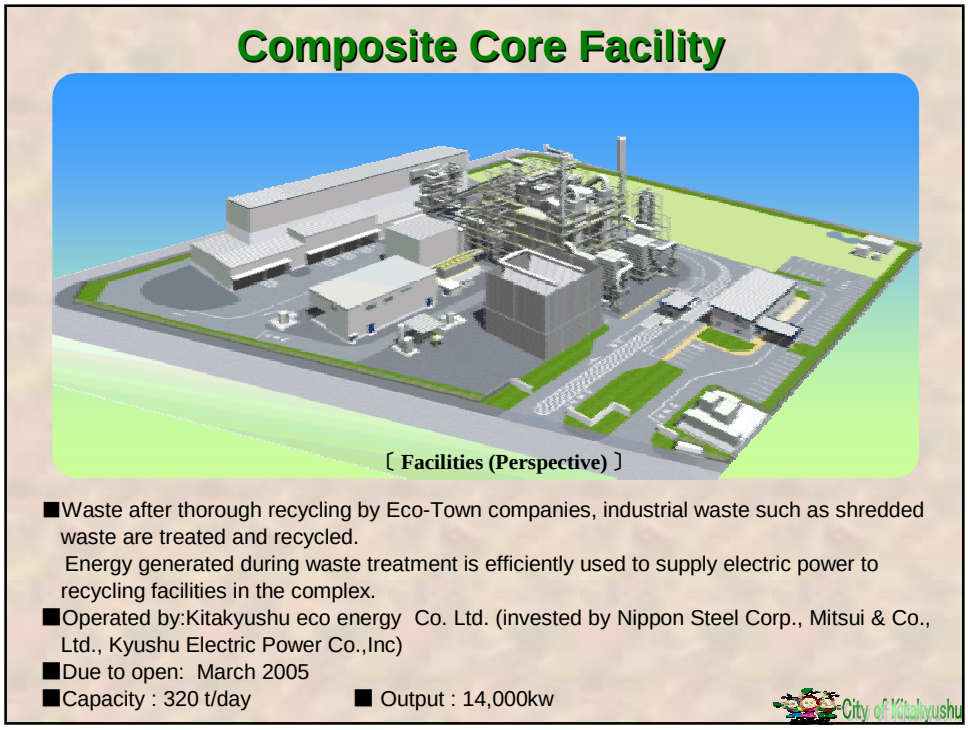
(Plant)

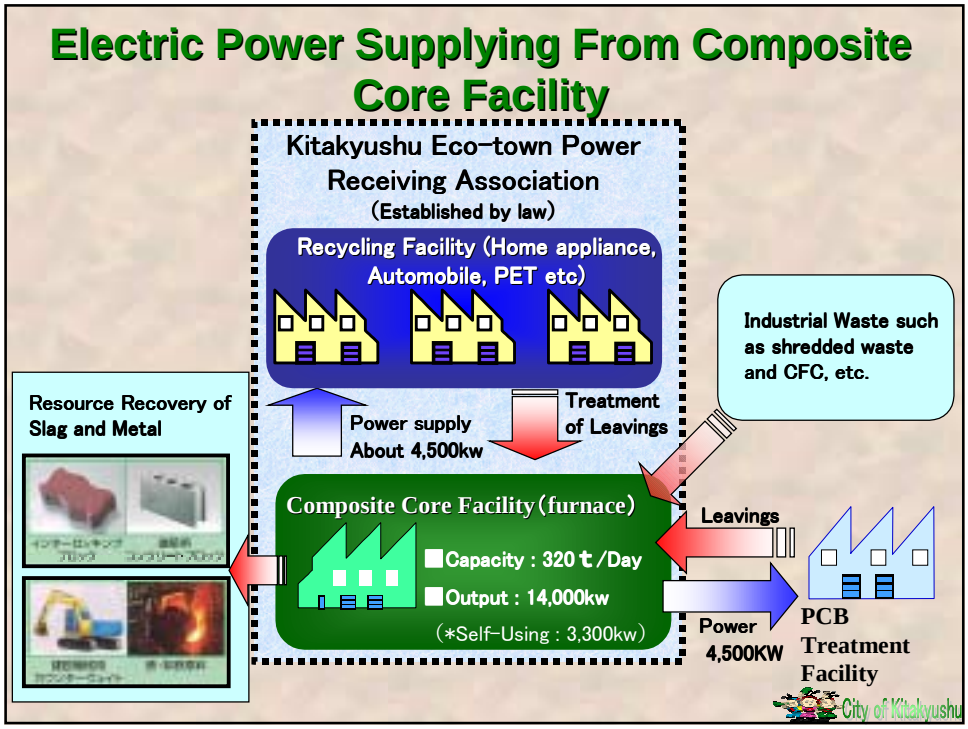
(At work)

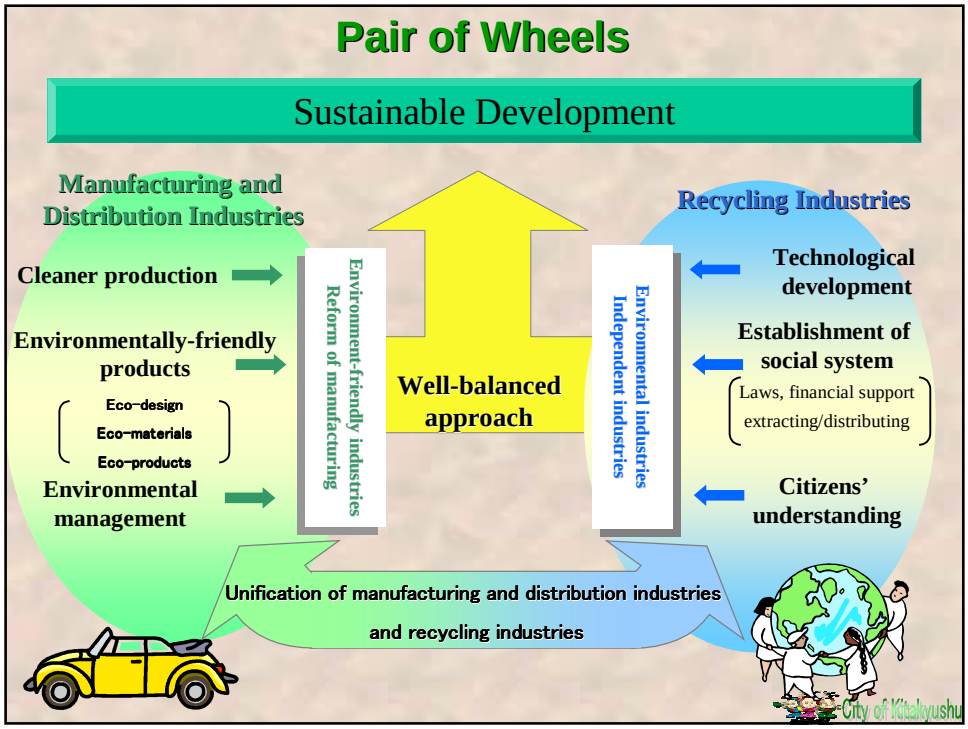
- According to the “Home Appliance Recycling Law,” electrical household appliances (TV sets, refrigerators, washing machines, air-conditioners, and freezers) are dismantled and separated to a high degree, producing quality recycled raw materials.
- Project leader: Nishinihon Kaden Recycle Corporation (Invested by Toshiba Corp., TERM Corp., Matsushita Electric Industrial Co., Ltd., Hitachi, Ltd., Mitsubishi Electric Corp., Sanyo Electric Co., Ltd., Sharp Corp., Sony Corp., and Fujitsu General Ltd.)
- Operation commenced in April 2000
- Processing capacity of approx. 700,000 per year
- Project with the eco-town subsidies of Ministry of International Trade and Industry

City of Kitakyushu


Mutual Collaboration in Kitakyushu Eco-Town
Total Environment Complex
Carrying out collaboration
Testing collaboration
Technologically possible
Freon bag
Chlorofluorocarbon
Harness
CRT from PC
PCB Treatment Facility
Refuse
Electricity
Core Recovery Facility (Melting furnace)
Pet bottles
Automobiles
OA machinery
Electric appliances
IC Board
Used oil Used plastic
Wooden blocks
Fluorescent lights
Styrene foam
Used plastic (PP)
Chloroflorocarbon
Construction waste
Medical waste
Fluoresent lights
Cans
Kitchen waste
Gauge board
Wooden chips
Fluorescent lights of slots
Wooden pallets
PS lump
Wooden pallets
Styrene foam
Tofu refuse
Food refuse
Pachinko machine
Used wood
Used plastic
Wooden frame
Harness・Engine
Fuels
Cooking oil
Bio-diesel
Toner cartridges
ICBoard
Methanol
ELV
Used oil・Used plastic
Used plastic
Organic solvent
Used paper
Inferior parts (PP)
Locating companies
Fluorescent office lights
Locating companies
Fuel for heavy machinery (ELV,OA, Koya)
Locating companies
Toner cartridges
Locating companies
Waste plastic (Automobiles, toner cartridges, Pachinko machine)
Locating companies
Cardboard・Office paper
(Toner cartridges, construction waste, fluorescent lights, cans, pachinko board, automobiles)
Practical Research Area
Second stage project area
Hibiki Recycling Complex
City of Kitakyushu


Composite Core Facility
〔 Facilities (Perspective) 〕
■Waste after thorough recycling by Eco-Town companies, industrial waste such as shredded waste are treated and recycled.
Energy generated during waste treatment is efficiently used to supply electric power to recycling facilities in the complex.
■Operated by:Kitakyushu eco energy Co. Ltd. (invested by Nippon Steel Corp., Mitsui & Co., Ltd., Kyushu Electric Power Co.,Inc)
■Due to open: March 2005
■Capacity : 320 t/day
■ Output : 14,000kw
City of Kitakyushu


Electric Power Supplying From Composite Core Facility
Kitakyushu Eco-town Power Receiving Association
(Established by law)
Recycling Facility (Home appliance, Automobile, PET etc)
Industrial Waste such as shredded waste and CFC, etc.
Resource Recovery of Slag and Metal
Power supply About 4,500kw
Treatment of Leavings
Composite Core Facility (furnace)
Capacity : 320 t /Day
Output : 14,000kw
(*Self-Using : 3,300kw)
Leavings
Power 4,500KW
PCB Treatment Facility
City of Kitakyushu


Pair of Wheels
Sustainable Development
Manufacturing and Distribution Industries
Cleaner production
Environmentally-friendly products
Eco-design
Eco-materials
Eco-products
Environmental management
Environment-friendly industries Reform of manufacturing
Well-balanced approach
Environmental industries Independent industries
Recycling Industries
Technological development
Establishment of social system
Laws, financial support extracting/distributing
Citizens' understanding
Unification of manufacturing and distribution industries and recycling industries
City of Kitakyushu

For People, the Earth and
Coming Generation
Thank you very much!

JSC Norilsk Mining Company, in the Arctic city of Norilsk

The implementation of cleaner production, eco-efficiency and environmental management systems in the production units and management

Open Joint Stock Company MMC Norilsk Nickel

- Is the world's largest producer of nickel and palladium and one of the largest producers of platinum.
- Market share: 10% of cobalt and 3% of copper production worldwide.
- JSC Norilsk Nickel is one of the leaders in the national economy. The share of Norilsk Nickel in the Russian GDP is 1.9 %, and 2.8 % in the industrial output of the Russian Federation, that is 27.9 % of the non-ferrous industry.

Preface

The Polar branch of JSC Norilsk Nickel Mining & Metallurgical Company (NNPB) is an enterprise that has a strong impact on the Arctic environment.

The company management has shown great concern in solving the whole complex of environmental issues

In October 2001 the ACAP Steering Committee decided to support by partial funding the above project, as proposed by the Norwegian-Russian Cleaner Production Programme (RNCPC). The project commenced in January 2002, as a demonstration project on the environmental and economic effectiveness following the Norwegian Cleaner Production Model.

During 2002-2004 the Russian-Norwegian Cleaner Production Centre, with financial support from the ACAP and from the Enterprise, and based on a signed agreement with the company, executed 3 Cleaner Production training Programmes in the NNPB.

Three training programmes have since been carried out in Norilsk, of which one has been funded by grants from ACAP members, while the two others have been funded by the Enterprise itself.

- **The first Programme** provided a basis for extending and adjusting the methodology of Cleaner Production to the specific conditions of the Enterprise and trying out relevant organizational arrangements in support of the CP activities.
- **The second and third Programmes** were arranged for high level experts, which became possible due to careful selection of specialists and support of the company administration.

The Programmes were carried out with in selected units of the Enterprise responsible for mining, beneficiation, sintering, metallurgy, electrolysis, transportation, building, maintenance, design and management.

R**esults**

74 company engineers have been trained and certified as Cleaner Production Advisers

274 economically feasible environmental improvement projects have been developed

87 projects have been implemented with the funding by the NNPB Enterprise.

Total investment of 6,5 mln. USD
Annual economic return of 6,8 mln. USD

The environmental effects of the project are similarly massive

Environmental effects per year:

Reduction in fresh water consumption	> 80 mln m^3
Reduction in technological water consumption	> 1 600 thou m^3
Decrease in waste discharge	> 3 600 thou m^3
Reduction in dumping on the terrain	> 2 800 mln m^3
Economy of natural gas	> 180 mln m^3
Economy of electric power	> 180 kWh
Economy of thermal energy	> 1500 Gcal
Economy of diesel oil	> 3800 tn
Reduction of solid waste generation	> 5 000 thou tn
Reduction emissions into air	> 1 500 thou tn

The projects developed by participants of CP Programmes are divided into three groups:

Group A: projects that need small investments with fast realization;

Group B: projects that need medium investments for realization;

Group C: projects with a long term perspective and that need a large-scale investments for realization. Implementation of the group A projects under the third programme is to be completed by the end of 2004.

To support the implementation of high investment projects resulting from the CP programmes, the Enterprise introduced “step by step” principle and gave priority to the implementation of economically significant low investment projects resulting from the CP programme.

Based on the results of the first two Programmes the administration of the Enterprise has adopted a resolution by which:

bonuses were awarded to specialists who developed the most effective project

heads of the units are obliged to implement the cleaner production programmes proposed by the trainees.

The effectiveness of the third Program, convincing and well-substantiated reports by the trainees, as well as technically and economically competent proposals and presentation slides have received high assessment and approval of the top management.

Based on the outcome of the Cleaner production Programme implementation, an agreement has been made with the management of the Norilsk Nickel Enterprise on the intention to carry out a 4th CP programme in the autumn of 2004.

The main conclusion drawn by the project management is that in order to enhance the environmental benefits achieved by this project, to exploit the momentum gained by the training of high level technical staff at the NNPB and ongoing project development, it is deemed advisable to follow up the success of this initial CP programme by continuing the work to develop a working and certifiable Environmental Management System according to the international standard ISO 14001 at the Enterprise.

This measure will ensure the continuation of environmental improvements on all levels of the Enterprise.

Strategies for Sustainable Development of Industrial Park

-EIP Pilot Project of Ulsan, Korea

Dec. 20, 2004

Hung-Suck Park, Soo-Mi Choi, Sang Yoon-Lee
Department of Civil & Environmental Eng. Univ. of Ulsan
Ulsan Development Institute

Outlines of Presentation

- Introduction of Ulsan City
- Sustainable Development and EIP
- Policies supporting EIP in Korea
- Pilot project for the development of EIP in Ulsan
- Conclusions

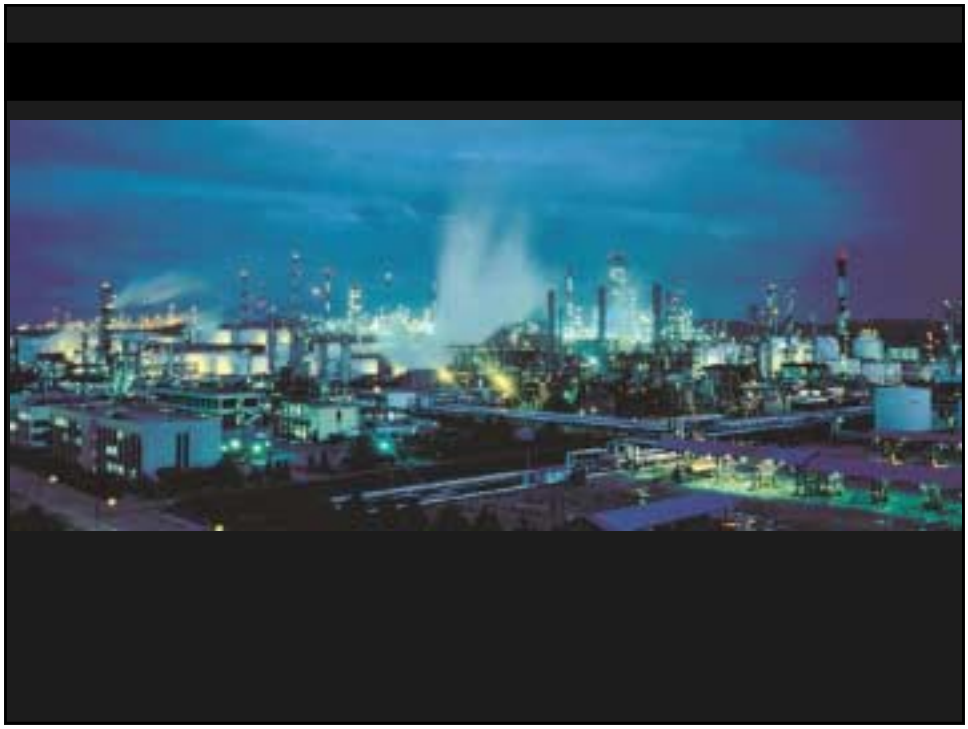
1. Ulsan Metropolitan City

- From Past to Present

- Ulsan was designated as a special industrial zone in 1962
  1962(pop. 85,000) -> 2003(pop. 1,070,000)
- Most Polluted city in ’70 – ’80
  Onsan disease -> residents relocation
  Special air pollution control regions (1986)
- Ulsan Metropolitan city(1997)
- Declaration of “Eco-polis Ulsan”(2004)
  based on “The Mater Plan for Eco-polis Ulsan”
  include renovation of industrial parks to EIP
  sustainable industrial capital of Korea

Village View of Ulsan Petrochemical Plant Site(1962)

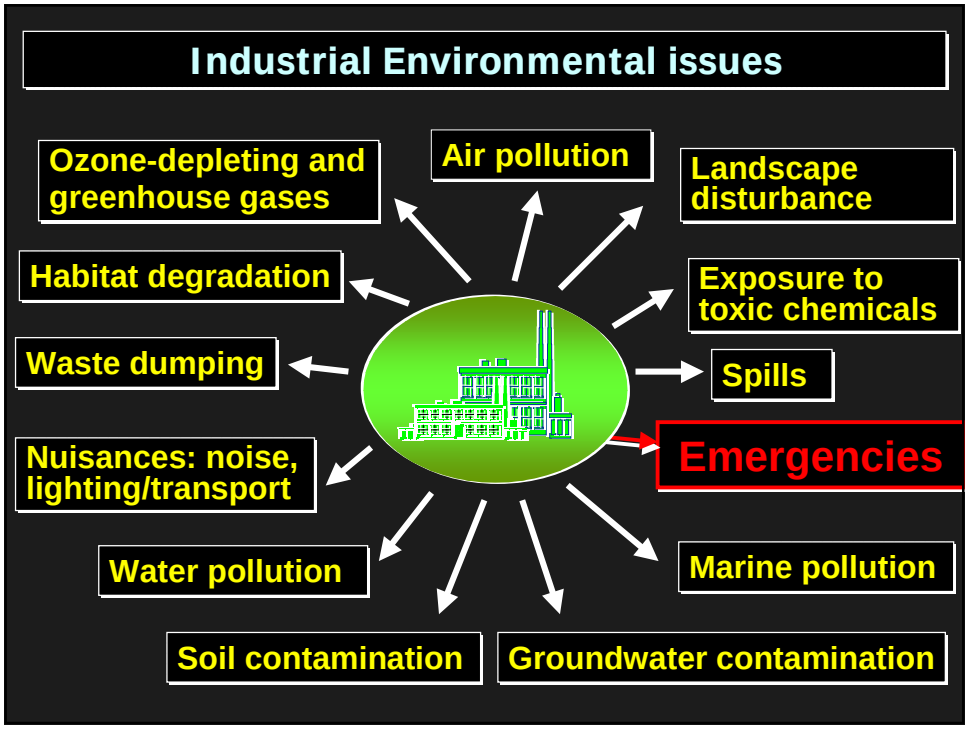
View of Onsan Industrial Park Site Preparation

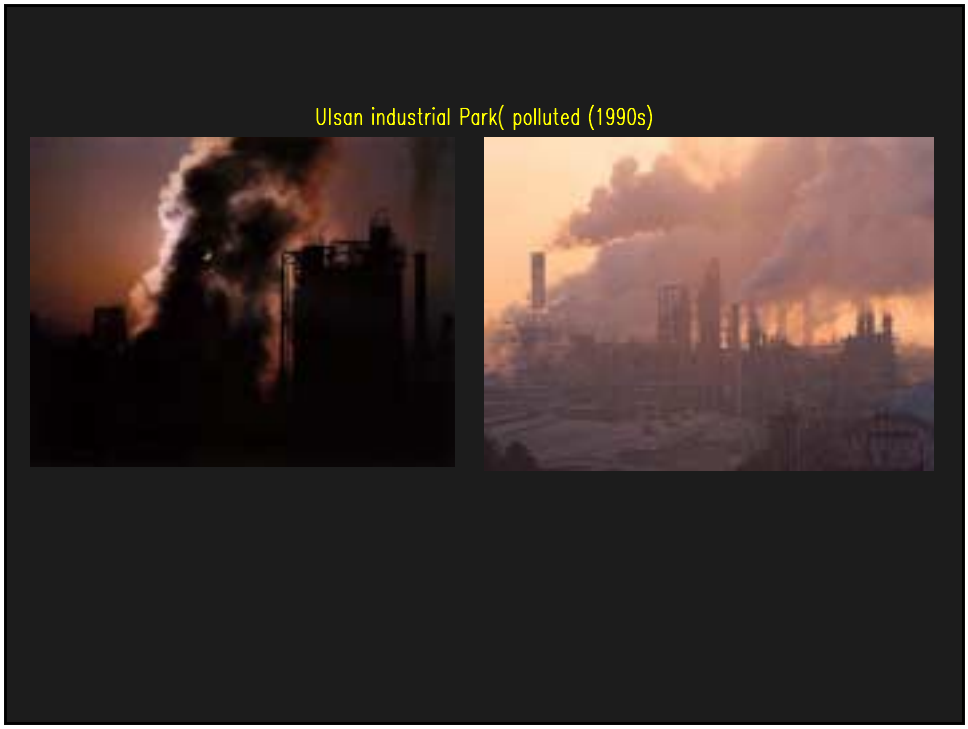


Industrial Park

- Industrial estate may be defined simply as "a tract of land, subdivided and developed for the use of several firms simultaneously, distinguished by its shareable infrastructure and the close proximity of firms.

- Though the industries located in industrial estate are afforded a number of benefits, including external economies of scale, reduced production costs, they also have disadvantages such as the increase of environmental issues.


Industrial Environmental issues
Ozone-depleting and greenhouse gases
Air pollution
Landscape disturbance
Habitat degradation
Exposure to toxic chemicals
Waste dumping
Spills
Emergencies
Nuisances: noise, lighting/transport
Water pollution
Marine pollution
Soil contamination
Groundwater contamination


Ulsan industrial Park(polluted (1990s)

Ulsan industrial Park(polluted (1990s)

2. Sustainable Development

❖ Development that meets the needs of present without Compromising the chance for future generations to satisfy theirs" [Brundtland Report, 1987]

Sustainable Industrial Development

❖ Agenda 21 chap 30 : Strengthening the role of business and industry

→ Promoting Cleaner Production

→ Promoting Responsible Entrepreneurship

Eco- Industrial Park Concept

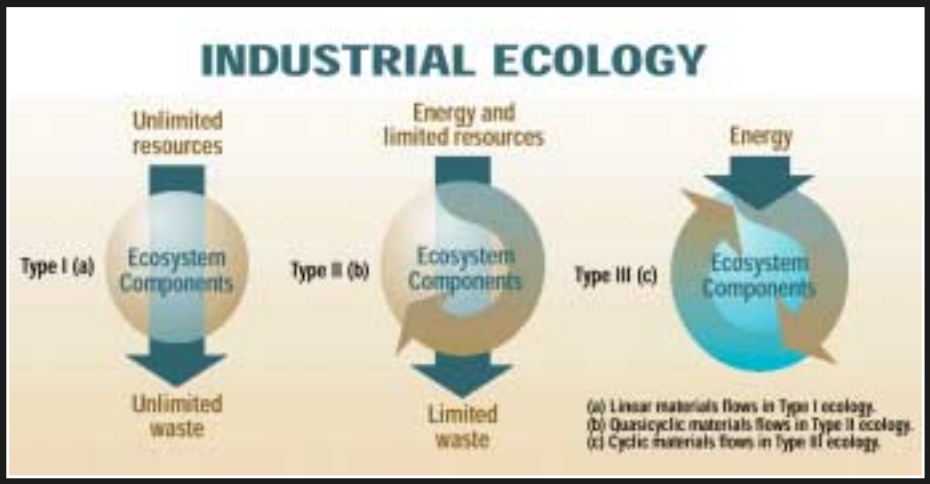
- Biological Ecology :
  The study of the distribution and abundance organisms and their interaction with physical world.
- Industrial Ecology :
  The study of technological organisms and their interactions with the natural world to enable sustainable development.
- Biological symbiosis :
  generally involves a long period of coevolution.
- Industrial symbiosis :
  may occur opportunistically or can be planned.

Definition of an EIP [Lowe, 2001]

An eco-industrial park or estate is a community of manufacturing and service businesses *located together on a common property*. Member businesses seek enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues including information, energy, water, materials, infrastructure, and natural habitat.

By working together, the community of businesses seeks a collective benefit that is greater than the sum of individual benefits each company would realize by only optimizing its individual performance.

Types of Industrial Systems



Source: Allenby

3. National policies driving IP to EIP

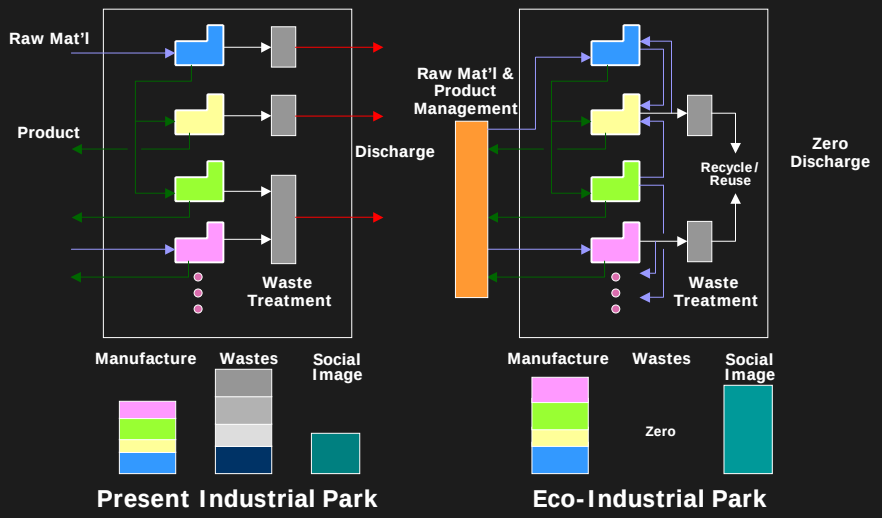
3.1 Industrial Policy(MOCIE)

- "Act to Promote Environmentally Friendly Industrial Structure" (1995)
- CP Technology development program(from 1995)
- CP Technology transfer and dissemination(from 1995)
- EIP development program(15 year 3-phase project)

3.2 Environmental Policies(MOE)

- Strengthening environmental regulation standard
- Environmental impact assessment system
- The prior environmental review system(PERS)
- Environment-friendly business management policy

Conceptual Diagram of KNCPC EIP

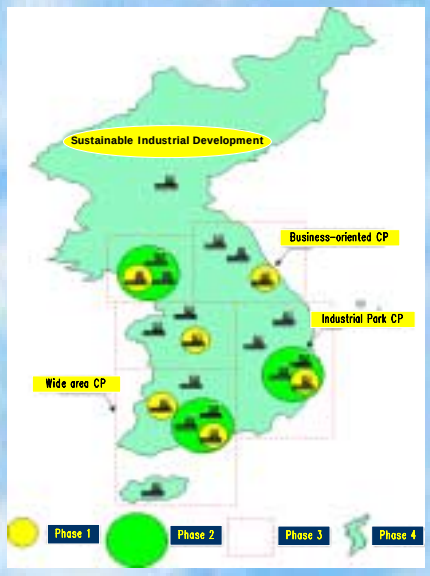


Source: Kwiho Lee, Korea NCPC

EIP Establishment Plan in Korea

Phase	Objectives	Scope	Term	Remark
Phase 1	EIP infrastructure Construction of existing IP	Eco-networking between plants for 5 national industrial parks	2005 -2009 (5y)	-Implementation by KNCPC & KICOX
Phase 2	Spreading EIPs. Success story	Transfer and disseminate to other industrial Parks(20 sites)	20010 -2014 (5y)	- Individual projects - Consortium
Phase 3	EIP Design (Zero emission IP)	EIP design on the basis of industrial ecology	2014 -2018 (5y)	- Voluntary participation

Stepwise EIP Establishment



4. EIP Pilot Project for Eco-Polis Ulsan

Objectives

- ❖ Maximum Utilization of Energy, Water and Resources
- ❖ Promotion of Environmental Industry
- ❖ Establishment of Korean EIP Model

Status of Ulsan Industrial Complexes

Ulsan/Mipo & Onsan Industrial complexes

Item		Ulsan	Onsan
Area (1000㎡)	Total (km²)	40,340	15,237
	Factory area (km²)	34,567	13,422
Construction		1975. 6. 23	1974. 4. 1
No. of Companies	Moved in	558	212
	In operation	485	158
Water Supply capacity		641,000/day	340,000 /day
Waste water		250,000/day	150,000 /day
Production (million $)		44,294	9,937
Employ (person)		87,494	9,716

Economic Status of ULSAN Metropolitan City

- Imports and exports

(unit : million $)

year	export			import		
	national	ulsan	%	national	ulsan	%
1992	76,632	9,137	11.92	81,775	11,893	14.54
1993	82,236	9,987	12.14	83,800	10,861	12.96
1994	96,013	11,417	11.89	102,348	13,205	12.90
1995	125,058	14,905	11.92	135,119	17,695	13.10
1996	129,715	16,079	12.40	150,339	20,001	13.30
1997	136,164	18,624	13.68	144,616	19,930	13.78
1998	132,313	17,289	13.07	93,282	13,336	14.30
1999	143,685	19,103	13.30	119,752	15,593	13.02
2000	172,268	19,972	11.59	160,481	14,268	8.89
2001	150,439	19,951	13.26	141,098	18,272	12.95
2002	162,471	24,177	14.88	152,126	18,943	12.45
2003	193,817	27,485	14.18	178,827	22,651	12.67

Classification of industrial structures in Ulsan/Mipo and Onsan National Industrial Estate

Category	Ulsan	Onsan	Total
Food Products	9	–	9
Textile Products	5	1	6
Wood Papers	13	3	16
Petrochemical	105	52	157
Nonmetallic	24	9	33
Steel	8	13	21
Machinery	149	43	192
Electric, Electronic	45	4	49
Transport Equipment	97	28	125
Others	13	2	15
Services	54	23	77
Total	522	178	700

(data : 2004)

Environmental Pollutants Generation from Ulsan Industrial Complexes

	Air[1)]				Waste Water		Solid Waste	
	SO_2	NO_2	TSP	VOC	Generation	Discharge	General[1)]	Hazardous
Ulsan (ratio)	82,971 (15.8)	63,569 (6.1)	22,849 (24.6)	82,666 (11.8)	367,216 (8.7)*	345,234 (23.4)*	6,672 (3.3)	296,611 (10.2)
Korea	526,599	1,045,33	92,720	699,214	4,226,321*	1,477,166*	204,428	2,914,546

Data: MOE(2003)

note: 1) Data for air and general solid waste are from 2001

2)* Neglecting generation ratio of Kwangyang complexes, accounting for over 50% of total and discharge ratio 3.4%, generation and discharge of waste water from Ulsan industrial complexes are accounting for 27.0% and 24.2%, respectively.

Project Summary

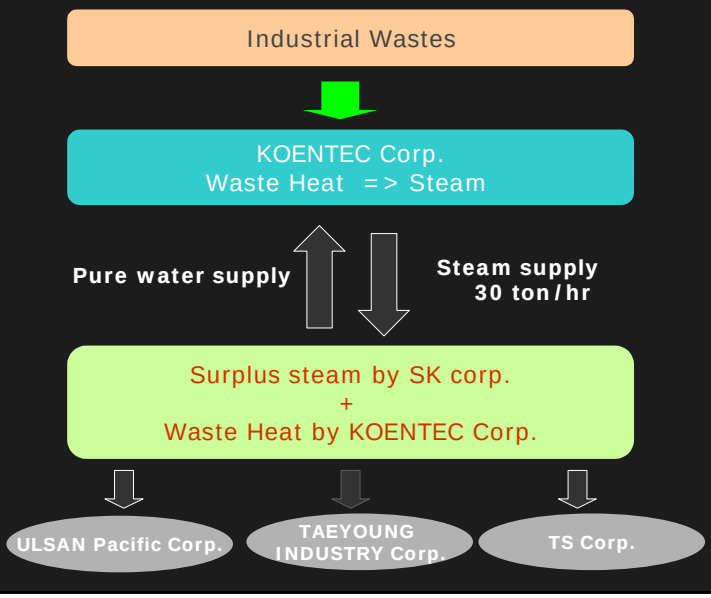
Title	Pilot Project for the development of Ulsan/Mipo, Onsan Eco- industrial parks
Periods	2004.7 2005.6 (planning), 1 st phase(2005 2009)
Host	Ulsan Regional Environmental Technology Development Center
Supervisor	Prof. Hung-Suck Park(Univ. of Ulsan)
Participants	Hyundai-motor car, SK Corp., SK Chemical Corp., LG-Nikko Corp., KOENTECH Ltd, Sunkyongwatech Ltd., Energy Ltd.
R&D	University of Ulsan, Ulsan Science college, Kyeungsung Univ.
Cooperation	Ulsan metropolitan city, Ulsan Regional Innovation Agency, KICOX Eastern chapter Ulsan office

Case study of Industrial symbiosis

Environmental Management in Ulsan

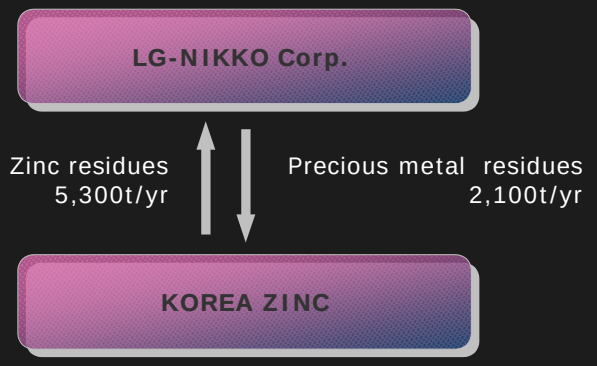
Case of Industrial Symbiosis(1)

KOENTEC-SK Corp. Industrial Symbiosis



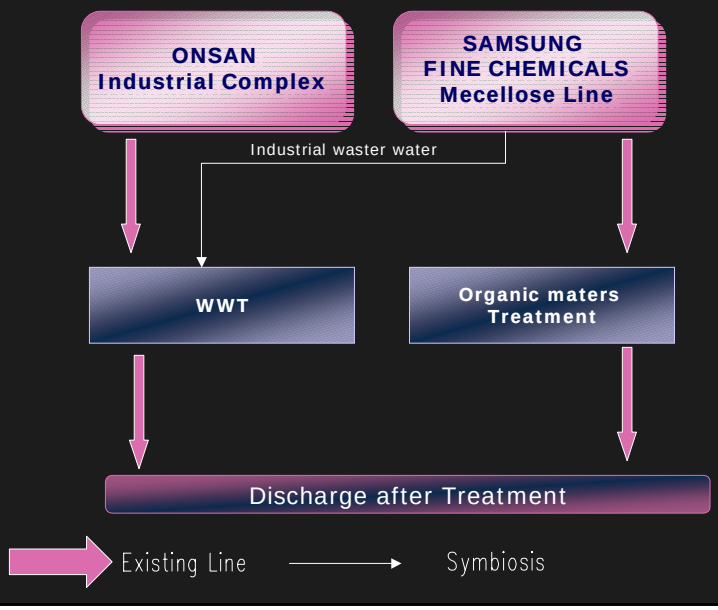
Case of Industrial Symbiosis(2)

LG-NIKKO Corp. - KOREA ZINC Residues Recycling

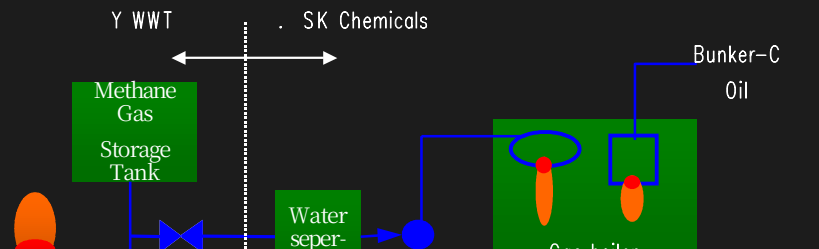


Case of Industrial Symbiosis(3)

SAMSUNG FINE CHEMICALS – ONSAN WWT Wastewater disposal System



Case of Industrial Symbiosis(4)



. Y WWT – SK Chemicals industrial symbiosis

Y WWT:

Digester(7,000 m3) 2 tanks,

Gas Storage tank(2,000 m3) 1 tank

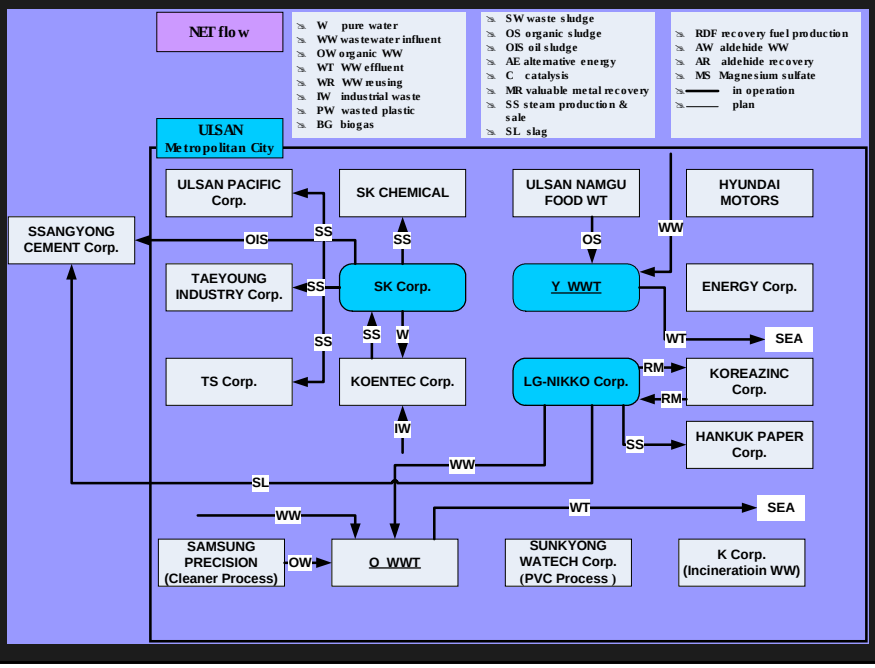
o SK chemicals:

Water seperater, gasline(Dia.150mm, Leng. 450 m)

Revenue 300 million won/yr

CO2 reduction 700 /yr

Industrial symbiosis in Operation at Ulsan Industrial Complexes

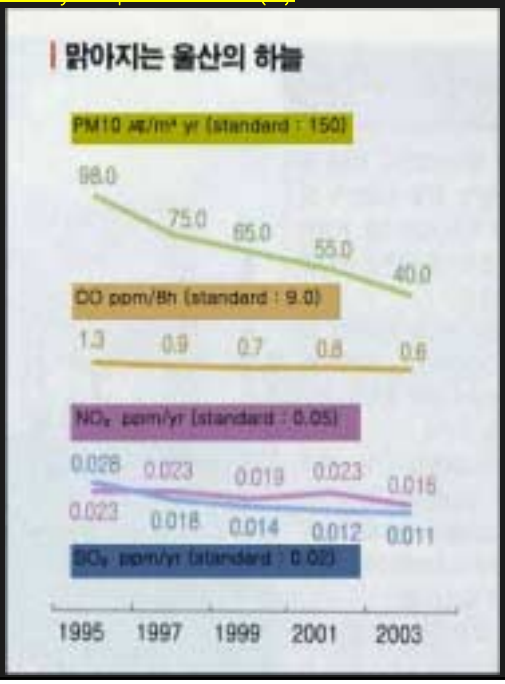


Case of Industrial Symbiosis(4)

Table 5 Material Exchanges in Ulsan Industrial Complexes

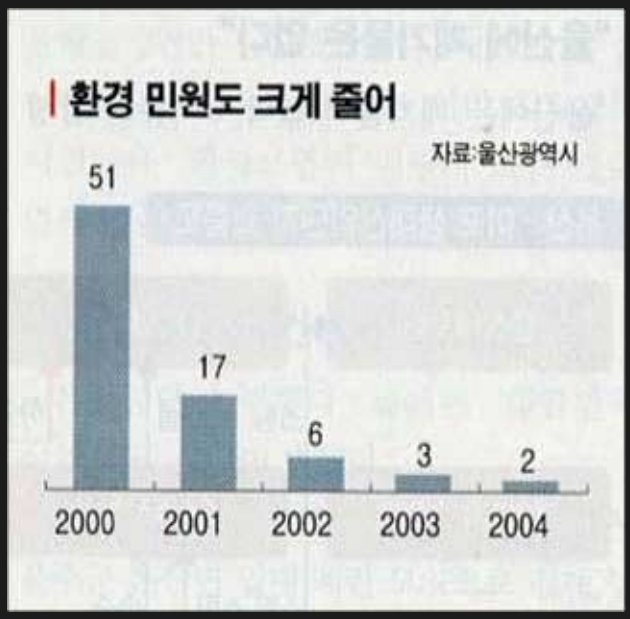
Material	From	To	Sold/ Free	Investment (10000$)	Revenue (10000$/year)
Pure Water	SK Corp.	KOENTECH	Sold	209	411
Stream	KOENTECH	SK Corp.			
Stream	SK Corp.	ULSAN PACIFIC TAEYOUNG IND. TS Corp.			
Recovery Zn	LG-NIKKO	KOREAZINC	Sold		461
Recovery Cu	KOREAZINC	LG-NIKKO	Sold		1,739
Steam	LG-NIKKO	HANKUK PAPER	Sold	696	261~348
Biogas	Y WWT	SK CHEMICAL	Sold		26
Waste MeOH	SAMSUNG	O WWT	Free		130

Environmental Quality Improvement(1)

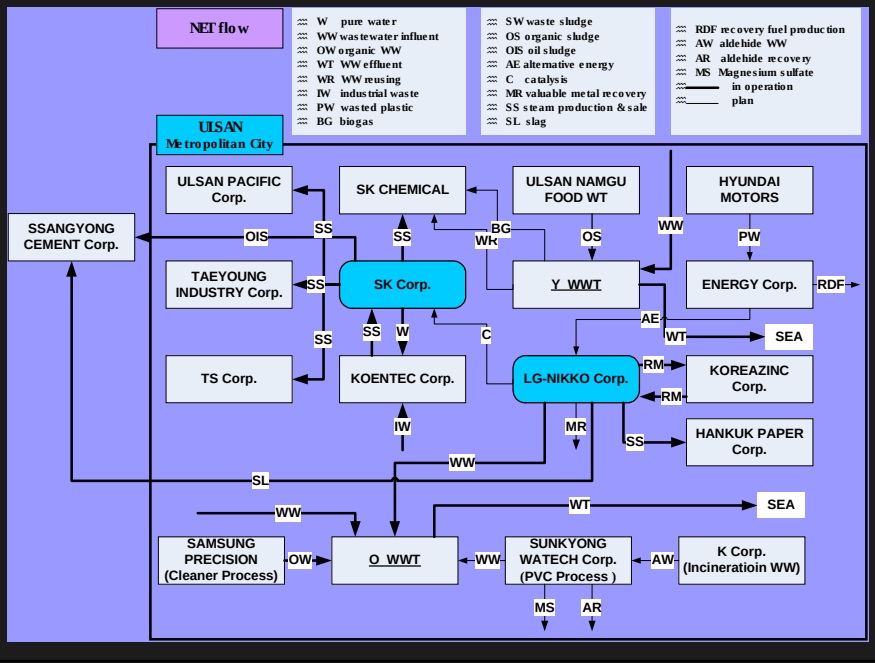


Environmental Quality Improvement(2)

Environmental Quality Improvement(3)



Conceptual industrial symbiosis at Ulsan Industrial Complexes



Strategies for the construction of EIP in Ulsan

How to develop ?
optimizes the use of available resources, materials, infrastructure, and human resource to reduce costs, increase profits, improve the environment.

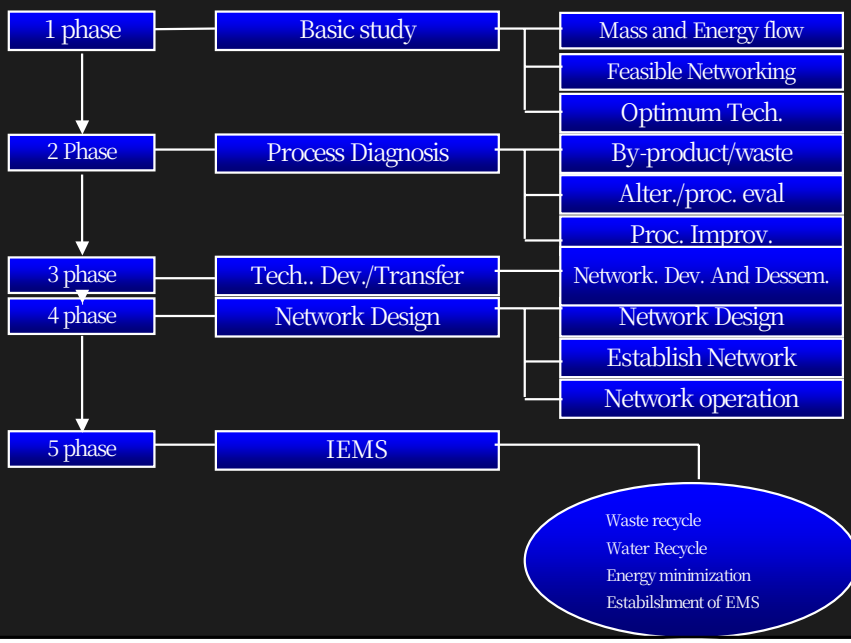
Transform the existing IP to EIP

- Industrial symbiosis : creates materials links, connects industries
- Community connections– involvement in Regional Planning
- Joint promotions (e.g.trade shows)
- Integrated logistics
- Common subcontractors
- Multi–media planning
- Wellness programs,
- Accident prevention
- Joint Benefits packages
- Flexible employee assignments

Eco-industrial Networking

(Local IP + National IP + EIN outside of Ulsan)

Procedure of Project



What are areas for further improvement

- Primary Component: Industrial – Metabolism
  - Resource Optimization
  - Product and Process Optimization
  - Information System
- Supportive Component
  - . How to carry out project ?. – Multi-stakeholder
  - Clean Policy in place among inter-agencies, Park-level Management, Programmatic actions on product and services, social needs.

Goal of Air quality Standard of Ulsan

	unit	Criteria	2001	2006	2011	2021
SO_2	ppm/year	0.02	0.012	0.008	0.006	0.005
CO	ppm/8hr	9	0.8	0.5	0.4	0.3
NO_2	ppm/year	0.05	0.023	0.02	0.015	0.01
O_3	ppm/8hr	0.06	0.02	0.018	0.015	0.01
PM_{10}	/(·year)	70	55	50	45	40

Goal of Water Quality Standard of Ulsan

		2001	2006	2011	2021
River	TEAHWA River	.	.	.	.
	HOEYA River	.	.	.	.
	DONG Stream	.	.	.	.
Coast	ULSAN	.	.	.	.
	ONSAN	.	.	.	.

5. Conclusions

. Existing industrial symbiosis in Ulsan industrial park are skewed to low-cost and no-cost approaches, or commonly termed as **"**low hanging fruit**"** approach in UNEP.

. Ulsan EIP project can lead the Korean EIP project by the support of new Ulsan regional strategic industry, . Environmental Industry. .

. Ministry of Environment must involve more actively in Korean EIP Project in cooperation with MOCIE.

. Exchanges of Asian EIP Experiences such as Japan, China and Thailand will be very helpful to the success of Korean EIP projects.

Thank you very much for you attention !

Strategies for sustainable development of industrial park

- planning for eco-industrial park in Ulsan, Korea

Hung-Suck Park, Soo-mi choi and Sang-Yoon Lee

1) Department of Civil and Environmental Engineering, University of Ulsan, Ulsan 680-749, Korea (*Corresponding Author, E-mail: parkhs@ulsan.ac.kr).

Abstract

An eco-industrial park or estate, alternatives of IE, is a community of manufacturing and service business located together on a common property, which seek enhanced environmental, economic, and social performance through collaboration in managing in environmental and resource. Korea National Cleaner Production Center(KNCPC) affiliated to Korea Institute of Industrial Technology(KITECH) has just started 15 year 3-phase Master EIP plan with the support of Ministry of Commerce, Industry, and Energy. 6 industrial parks, including industrial parks in Ulsan city, known as the industrial capital of Korea, are performing planning project to find the feasibility of shifting existing industrial parks to eco-industrial parks. This paper describes the Korean national policies to drive this global trends of innovation of industrial parks and existing inter-industry waste, energy, and material exchange developed in Ulsan industrial complexes. In addition, Ulsan EIP pilot project, which will be implemented for 15 years from 2005, is elaborated including regulatory issues and technologies to be applied.

1. Introduction

Ulsan was appointed as a special industrial zone in Korea in 1962 and, since then, industrial complexes have been built without considering of the environment. Though Ulsan city has grown up to be the industrial capital of Korea, as a stronghold of petrochemistry, nonferrous metals, ship building and auto mobile industries, Ulsan has been called "pollutants department store" and 'the worst polluted city' thereafter.

With the deteriorating environmental quality, Ulsan and Onsan industrial complexes were appointed as the special air pollution control regions in March '86. The special

emission standard 30 to 80% stricter than other areas was enforced and has been applied to newly-built factories since Oct. '91, thus these regulations were in operation 10 years earlier than in other areas. The 'stricter emission standard' 30 to 60% higher than other area has been applied in existing plants since Feb. '92, 5 years earlier than other areas. Enterprises have intensified investment on clean production, pollution prevention facilities and environmental management to meet the enhanced environmental standard. Without the efforts and investment of business enterprises, it may be almost impossible to improve the environmental quality of Ulsan, where heavy industrial and chemical plants are densely located.

Since the 1992 Earth Summit in Rio de Janeiro, local authorities are generally considered important actors in the transition towards sustainable development. In order to enhance the environmental quality drastically the Ulsan metropolitan city has commissioned "The Environmental Pollution Investigation and Comprehensive Environmental Master Plan" for ' 98 to 2002. , where seven environmental fields were included such as water, air, odors, ecosystem, waste, soil and the Taewha River. The comprehensive action plan for improving environment for '98 to 2002 was made based on the environmental investigation. It was planned to invest a total of 1,200 billion won including a municipal budget of 700 billion won on a 94 projects for the planned period.

In the mean while, to improve the urban infrastructure, environmental quality, educational and cultural conditions, Ulsan citizen and NGO's made a civic movement of the establishment of Ulsan metropolitan city, which resulted in raising metropolitan status June 15, 1997.

Ulsan industrial complexes has been continuously evolving from conventional industrial complexes to eco-industrial parks, based on sustainable development concepts imposed in industries after Rio Earth Summit in 1992. To change the Ulsan more environmentally-friendly ecology city where human and nature coexist, “Ecopolis Ulsan” was declared in 2004 based on “The Master plan of Ulsan”, which include the eco-industrial park as an action plan.

This article introduces the concets of eco-industrial park and describes the existing industrial symbiosis in Ulsan industrial complexes and evaluates the economic and environmental effects. In addition, Ulsan EIP pilot project, which will be implemented for 15 years from 2005, is addressed including regulatory issues and technologies to be required.

2. Eco-industrial parks

Industrial estate may be defined simply as “a tract of land, subdivided and developed for the use of several firms simultaneously, distinguished by its shareable infrastructure and the close proximity of firms. Though the industries located in industrial estate are afforded a number of benefits, including external economies of scale, reduced production costs, they also have disadvantages such as the increase of industrial pollution.

With the combined influence of increased awareness of environmental issues and more stringent regulations, estates are being obliged to look for cost-effective ways of improving their environmental performance.

An eco-industrial park or estate, emerging as an alternative of IE, is a community of manufacturing and service business located together on a common property, which seek enhanced environmental, economic, and social performance through collaboration in managing in environmental and resource issues. The goal of an EIP is to improving the economic performance of the participating companies while minimizing environmental impacts. Components of the EIP approach include green design of park infrastructure and plants(new or retrofitted); cleaner production; pollution prevention; energy efficiency; and inter-company partnering. An EIP is also seek benefits for neighboring communities to assure that the net impact of its development is positive.

There are three basic categories of eco-industrial project:

1. Eco-industrial park or estate(EIP) – an industrial park developed and amaged as a real estate development enterprise and seeking high environmental, economic, and social benefits as well as business excellence.
2. By-product exchange(BPX) – a set of companies seeking to utilize each other’s by-products(energy, water, and materials) rather than disposing them as waste.
3. Eco-industrial network(EIN) – a set of companies collaborating to improve their environmental, social, and economic performance in a region.

3. Policies supporting eco-industrial park in Korea

3.1 Sustainable development of industrial policy

The chapter 30 of Agenda 21, in which the role of business for the support of Agenda 21 is defined, states the involvement and cooperation of business are vital factors in achieving the objectives of Agenda 21, sustainable development.

Industrial environmental policy have drastically changed after the Ministry of Commerce, Industry, and Energy(MOCIE) enacted ‘APEFIS, Act to Promote

Environmentally Friendly Industrial Structure, in Dec. 1995.

Based on the APEFIS, MOCIE established institutional system for clean production (CP) and environmental management system(EMS) based on ISO 14001 as implementing tools, and “The first comprehensive master plan for environmental friendly industrial development” was made and operated based on APEFIS.

This plan included streamlining the supporting system, CP transfer and dissemination, promoting environmental industry, and stimulating environmental management.

1) Clean production program

Cleaner production is the continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment. Cleaner production can be applied to the processes used in any industry, to products themselves and to various services provided in society. This program supports the development of cleaner production technology that helps industry be eco-efficient.

O Cleaner production technology development

This program supports the development of cleaner production technology that helps industry be eco-efficient. It is classified into three categories; general project, shared project and consolidated project.

O CP Technology transfer and dissemination program

This program supports transfer of domestic and foreign technologies that increase productivity and reduce environmental load for the company. Supporting area are CP Assessment, technology transfer, international joints projects, information service, training and education, supply chain environmental management(SCEM), environmental management system(EMS), regional dissemination center, open laboratory, eco-industrial park(EIP)

2) EIP Project

Korea National Cleaner Production Center(KNCPC), Korea Institute of Industrial Technology(KITECH) started 15 year 3-phase project, 'Eco-industrial park(EIP) construction for infrastructure of cleaner production in Korea' with the support of Ministry of Commerce, Industry, and Energy.

In 2004, trial projects are performed for 6 industrial parks including Ulsan

industrial complexes to find the feasibility of applying industrial ecology to existing industrial parks. For inter-networking businesses, cleaner production assessment will be done before making by-products exchange network, that will characterize so called 'Korean Eco-Industrial Park Model' with the introduction of environmental management system. KNCPC and Korea Industrial Complex Corp. will be the main actors in implementing phase 1. In phase 2, the success stories in phase 1 will be transferred and disseminated to other industrial parks. This requires the active participation of institutes, colleges, and consultants. In phase 3, industrial parks will be designed on the basis of industrial ecology at the first stage and EIP construction model will be also applied.

Table 1. Korean EIP Construction Plan

Categories		1yr	2yr	3yr	4yr	5yr	Total
Technology Development	By-product exchange	174	348	348	348	435	**1652**
	Process analysis and optimization	87	174	130			**391**
	Alternative raw material	174	348	435	435	435	**1,826**
	Material cycle modeling	43	43	43			**130**
Technology Transfer	Waterpinch expansion	43	43	43			**130**
	Process diagnosis analysis	234	348	348			**930**
	Integrated EMS				87	261	**348**
	Inter – industry CMS				43	157	**200**
Infrastructure	By-product and waste recycle DB		87	87	87	87	**348**
	EIP professional education		87	87	43	43	**260**
	Integrated Recycling Pilot Plant		174	867	867	1,739	**3,652**
	Integrated resource recycling system			130	870	1,739	**2,739**
	Comprehensive Water reuse Network				870	1,304	**2,174**
Total		**757**	**1,652**	**2,521**	**3,652**	**6,200**	**14,783**

(unit : 10,000 $, $=1,150\)

3.2 Environmental policies stimulating sustainable development

The government has discarded the growth-driven policies of the past strengthening the environmental preservation and standards. It now strives to achieve sustainable development that pursues environmental preservation and economic development simultaneously. There are several environmental policies, which stimulate the sustainable development of industry such as environmental impact assessment(EIA), prior environmental review systems(PERS) and environment-friendly business management policies.

1) Environmental impact assessment system

The EIA has been focused on aims to promote or enforce environment-friendly development because it most deal with large-scale development project during the execution stage, after plans have been approved and confirmed. It also mainly reviews pollution reduction measures.

2) The prior environmental review system(PERS)

The PERS aims to balance development and preservation by identifying possible environmental impacts of development plans or projects in the early stages of planning. The system includes considerations of ways to carry out development plans while harmonizing the built and natural environments in an aesthetically pleasing manner.

3) Environment-friendly business management policy

Throughout the world, environment-friendly products and management structure of corporations are becoming overriding determinants of their competitiveness. Against this backdrop, first rate are endeavoring to raise their real corporate value through increased sales, cost reduction and investment efficiency via means of environmental management.

In parallel with this trend, Korea is implementing and environment-friendly business designation system to foster sound environmental management. The government designated businesses that practice prevention-oriented environmental management as “environment-friendly.”

The system promotes preventive solutions to environmental pollution that arises during production processes. The businesses handle pollutants in a responsible manner and make tangible contributions to environmental improvement.

Also, a corporate environmental information disclosure system and An eco-

labeling system has been introduced and implemented to stimulate the environment-friendly production and consumption.

4. The pilot project for eco-industrial parks in Ulsan., Korea

4.1 Status of industrial complexes.

There are two national industrial complexes, Ulsan/Mipo and Onsan industrial complexes, and 4 agricultural and industrial estates in Ulsan. Ulsan industrial complex, the core site for automobile, shipbuilding and petrochemical industries, and Onsan complex come together to form a horizontally integrated industrial system, leading Korea's economic development.(Fig. 2, Table 2 and 3).

Fig. 2 Map of Ulsan Industrial Complexes

Table 2. Status of Ulsan. Mipo and Onsan National industrial Estates

Item		Ulsan Mipo	Onsan
Area(1000㎡)	Total(km^2)	40,340	15,237
	Factory area(km^2)	34,567	13,422
Construction		1975. 6. 23	1974. 4. 1
No. of Companies	Moved in	558	212
	In operation	485	158
Water Supply capacity		641,000/day	340,000 /day
Wsate water		250,000/day	150,000 /day
Production(100 million $)		443	99
employ(person)		87,494	9,716

data) KICOX(2002)

Table 3. Classification of industries in Ulsan/Mipo and Osan national industrial park

Category	Ulsan	Onsan	Total
Food Products	9	-	9
Textile Products	5	1	6
Wood Papers	13	3	16
Petrochemical	105	52	157
Nonmetallic	24	9	33
Steel	8	13	21
Machinery	149	43	192
Electric, Electronic	45	4	49
Transport Equipment	97	28	125
Others	13	2	15
Services	54	23	77
Total	522	178	700

(April 2004)

4.2 Pollutants generated from Ulsan industrial complexes

Table 4 is summary of the pollutants generated from Ulsan industrial complexes, which are accounted for high percentage of total generation in Korea. Though

significant efforts have been made in many fields to improve the environmental quality, Ulsan is still suffering from environmental issues.

Due to the strengthening environmental regulations imposed on the stack industries, movement and shutdown of company are becoming another social problems in Ulsan. Thus, innovation of industrial complexes to eco-industrial park is urgently required for sustainable development of industrial parks.

Table 4. Pollutants generated from Ulsan industrial complexes(2002)

	Air[1)]				Waste Water		Solid Waste	
	SO_2	NO_2	TSP	VOC	Generation	Discharge	General[1)]	Hazardous
Ulsan	82,971	63,569	22,849	82,666	367,216	345,234	6,672	296,611
(ratio)	(15.8)	(6.1)	(24.6)	(11.8)	(8.7)*	(23.4)*	(3.3)	(10.2)
Korea	526,599	1,045,332	92,720	699,214	4,226,321*	1,477,166*	204,428	2,914,546

Data: MOE(2003)

note: 1) Data for air and general solid waste are from 2001

* Neglecting generation ratio of Kwangyang complexes, accounting for over 50% of total and discharge ratio 3.4%, generation and discharge of waste water from Ulsan industrial complexes are accounting for 27.0% and 24.2% of the total, respectively.

4.3 Industrial symbiosis at Ulsan industrial parks.

Ulsan industrial complexes were originally developed as conventional industrial estate, with a collective energy provider such as electricity, steam and water. The industrial collaborations in Ulsan complexes were spontaneously occurred by meeting the stringent environmental regulations and economic benefits.

As the concept of EIP has just introduced in Korea, the municipality and managers and citizen are gradually interested in by-product exchanges already operated in Ulsan complexes.

The Ulsan industrial collaboration now includes six partners:

Koentec Ltd. – Industrial waste treatment and disposal company with incinerator capacity of 300 ton/day and landfills

SK Corp. – Leading petrochemical industry in Korea, production capacity

of 4,500,000 tons of petrochemicals/yr (aromatics, olefins, PE, PP, solvent, etc). Total annual sale of 220 million barrels in 2003, grasping 34% of the domestic market share

SK Chemicals Corp. - SK Chemicals was the leader to develop high-performance PETG resin (SKYGREEN ®), and is making rapid and steady progress in the polyurethane business.

LG-Nikko Corp. - Leading Cu smelting industry with production capacity of Cu 200,000 ton/yr, Sulfuric acid 1,170,000 ton/yr, Au 100 ton/yr, Ag 230 ton/yr, Pt 60 kg/yr, Pd 500 kg/yr, Se 230 ton/yr

Koreazinc Corp. - Korea Zinc founded in 1974 and is the world No. 1 manufacturer of non-ferrous metals. Korea Zinc and its overseas subsidiaries are together producing 10% of the global zinc production.

The Ulsan metropolitan city – Operate the Ulsan Municipal Wastewater Treatment Plants (350,000 m3/day)

Table 5. Industrial symbiosis in Ulsan industrial complexes in 2004

Material	From	To	Sold/Free	Investment (10000$)	Revenue (10000$/year)
Pure Water	SK Corp.	COENTECH	Sold	209	411
Stream	KOENTECH	SK Corp.			
Stream	SK Corp.	ULSAN PACIFIC TAEYOUNG IND. TS Corp.			
Recovery Zn	LG-NIKKO	KOREAZINC	Sold		461
Recovery Cu	KOREAZINC	LG-NIKKO	Sold		1,739
Steam	LG-NIKKO	HANKUK PAPER	Sold	696	261~348
Biogas	Y WWT	SK CHEMICAL	Sold		26
Waste MeOH	SAMSUNG	O WWT	Free		130

Over very short periods of time, these partner spontaneously developed a series of bilateral exchanges, which also include a number of other companies. It simply evolved as a collection of one-to –one deals that made environmental and economic benefits for pairs of participant in each.

4.4 Feasible industrial symbiosis to be implemented in pilot study

The pilot project is to investigate the feasible industrial symbiosis by intra-plant innovations and approaches, and inter-plant collaboration in improving environmental and economic performance, both of individual companies and collective industrial system.

Fig. 2 is the the proposed EIP based on industrial symbiosis at Ulsan Industrial Complexes including existing industrial symbiosis. SK Corp, Y municipal wastewater treatment plant and LG-Nikko Corp are anchor businesses.

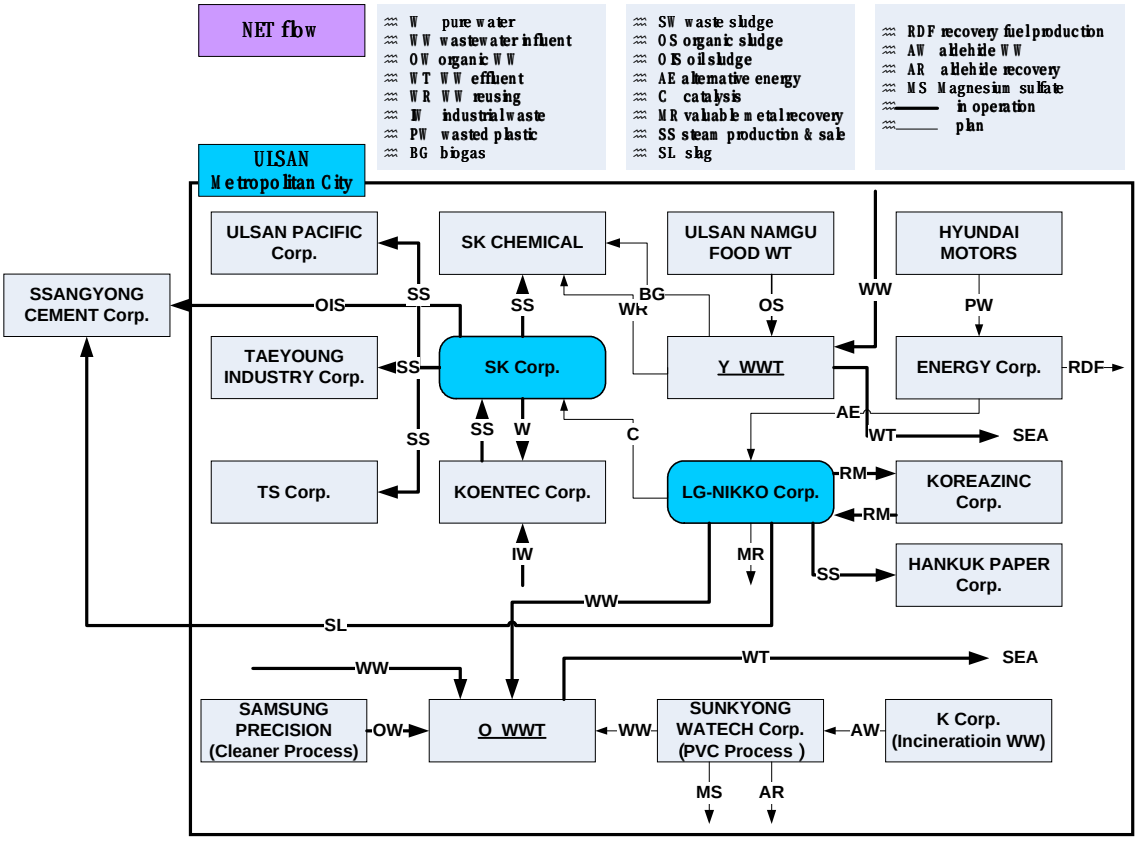


Fig. 2. The proposed EIP based on industrial symbiosis at Ulsan Industrial Complexes

Some technologies of interest to the Ulsan EIP pilot project are

1) plastic separation
2) solvent recycling and recovery
3) recovery of by products
4) RDF production and utilization
5) Wastewater treatment and reuse

5. Conclusions

An eco-industrial park or estate, emerging as an alternative of IE, is a community of manufacturing and service business located together on a common property, which seek enhanced environmental, economic, and social performance through collaboration in managing in environmental and resource issues.

Though Ulsan industrial complexes were originally developed as conventional industrial estates, with a collective energy provider such as electricity, steam and water, the concept of industrial ecology have been already applied due to the stringent environmental regulations and economic benefits.

In 2004, “Eco-polis Ulsan” was declared first in Korea based on “The Master plan of Ulsan”, in which Ulsan EIP Pilot project is included as an action plan. So, success of Ulsan EIP pilot project is key factor to be sustainable Eco-polis Ulsan. .

Ulsan eco-industrial development can be achieved by expanding existing by-product exchange(BPX) and eco-industrial network(EIN). However, system analysis including industrial metabolism, input-output analysis, environmental evaluation, flexibility analysis must be conducted in detail. In addition, Ulsan EIP project must be associated with the regional strategic environmental technologies and businesses to upgrade environmental technologies. To get the public support, education, publicity and leadership for Ulsan EIP are also highly required.

References

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6. Hung-suck park, Soo-mi choi and Sang-yooun Lee, Pilot project for the development of eco-industrial park in Ulsan, The proceedings of the first international environmental symposium for eco-polis Ulsan, Nov 8, 2004, Ulsan, Korea

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The 13th Northeast Asian Conference on Environmental Cooperation (NEAC)
20 ~ 22 December 2004, Seoul, Korea

PROGRAM

12.19 (Sunday) *Preparation*

20:00 ~ 22:00	Registration of Foreign Participants	Seoul KyoYuk MunHwa HoeKwan
21:00 ~	Preparation Meeting (Schedule, sessions, etc.)	One from each of NEAC member countries is to participate

12.20 (Monday) *Open Symposium: "Air Quality management policy in Metropolitan Areas"*

13:00 ~ 14:00	Registration	National Assembly Member's Building (1F, Auditorium)
14:00 ~ 14:15	Opening & Welcoming Address	*Speaker(s):* H.E. Ms. PARK, Sun-Sook Vice Minister, Ministry of Environment, Korea
		Mr. LEE, Ho Woong Member of National Assembly, Chairman, National Assembly Environment & Economy Forum (NAEEF)
14:20 – 15:40	**Presentations** (10~15 min. each)	
	China	*Speaker(s):* Mr. YANG, Jintian Senior researcher fellow, Environmental Planning Institute, SEPA
	Japan	*Speaker(s):* Mr. KOIWA, Masayuki Section chief, Environmental Control Technology Office, Environmental Management Bureau, MOE
	United States of America	*Speaker(s):* Mr. MANJIT, Ahuja Chief, Stationary Source Testing Branch, California Air Resource Board, U.S.A
	Mongolia	*Speaker(s):* Mr. ENKHBOLD, Anar Officer, International Cooperation Department, MONE
	Russia	*Speaker(s):* Dr. PETROVA, Tatiana Senior Specialist, Department of International Cooperation, Ministry of Natural Resources
	Republic of Korea	*Speaker(s):* Mr. PARK, Kwang Suk Director, Regional Air Quality Management Division, MOE
15:50 – 16:10	Coffee Break	
16:10 – 17:30	Panel Discussion	*Panelist(s):* 5 panelists are invited *Q&A:* Among NEAC participants, audience and panelists
17:30 – 17:40	Summation & Closing	*M.C.:* Dr. SHIN Boo Shig, NAEEF

18:00 – 19:30	Welcoming Reception	Standing Buffet ** Will be hosted by Ministry of the Environment of Korea, and all of participants are invited.*

12.21 (Tuesday) ***Session 1 & 2***

09:00 ~ 09:50	Registration	Seoul KyoYuk MunHwa HoeKwan (3F, Geomungo A Hall)
10:00 ~ 10:10	Opening Address & Keynote Speech	*Speaker(s):* Dr. PARK, Young Woo Director General, International Cooperation Bureau, Ministry of Environment, Korea
10:10 ~ 10:15	Congratulatory Remarks	*Speaker(s):* Director General Seoul Metropolitan Government
10:15 ~ 10:40	Keynote Speeches by head of delegations	*Speaker(s):* Head of delegations from China, Japan, Mongolia, Russia, and UN ESCAP
10:40 ~ 11:00	Coffee Break	

Session 1: Species Restoration *Chaired by Dr. PARK Young Woo*

11:00 ~ 11:30	**Presentations (**5~10 min. each)	
	China *Tigers*	*Speaker(s):* Mr. ZHANG, Li Assistant Professor, Beijing Normal University, China
	Japan *Tsushima Leopard Cat*	*Speaker(s):* Mr. SASAKI, Shinjiro Wildlife Division, Ministry of the Environment
	Mongolia	*Speaker(s):* Mr. ENKHBOLD, Anar Officer, International Cooperation Department, MONE
11:30 ~ 12:00	Q& A Session	
12:00 ~ 12:10	Coffee Break	
12:10 ~ 12:30	**Presentations** (Continued)	
	Russia *Brown Bear and Asian Black Bear*	*Speaker(s):* Dr. PETROVA, Tatiana Senior Specialist, Department of International Cooperation, Ministry of Natural Resources
	Republic of Korea *Asiatic Black Bears*	*Speaker(s):* Mr. KIM, Won Myong Researcher, Wildlife Biology Division, National Institute of Environmental Research
12:30 ~ 13:00	Q & A	
13:00 ~ 14:30	Lunch	

Session 2: Ecological Restoration in Local Governments *Chaired by Mr. XU, Qinghua*

14:30 ~ 15:00	**Presentations (**5~10 min. each)	
	China *Eco-restoration in Cities*	*Speaker(s):* Mr. HU, Tao Senor Researcher Fellow, Policy Research Center, SEPA

	Japan *Northeast Asian Youth's Environmental Symposium '04*	*Speaker(s):* Ms. MOTOE, Kaoru Senior Researcher, Planning and International Cooperation Division, Northwest Pacific Region Environmental Cooperation Center
	Mongolia *Local management and ecological restoration*	*Speaker(s):* Mr. ENKHBOLD, Anar Officer, International Cooperation Department, MONE
15:00 ~ 15:30	Q & A	
15:30 ~ 15:50	Coffee Break	
15:50 ~ 16:20	**Presentations** (5~10 min. each)	
	Russia *Rehabilitation of the Small Rivers in the Urban Ecosystems(Moscow)*	*Speaker(s):* Dr. PETROVA, Tatiana Senior Specialist, Department of International Cooperation, Ministry of Natural Resources
	Republic of Korea *Urban Stream Restoration*	*Speaker(s):* Dr. CHIN, Yang Kyo President/professional Engineer, CA Landscape Design Co., Ltd.
16:20 ~ 17:00	Q & A	
18:00 ~ 19:30	Dinner	Seoul KyoYuk MunHwa HoeKwan (3F, Geomungo B Hall) *Will be Hosted by the Seoul Metropolitan Government*

12.22 (Wednesday) *Session 3*

Session 3: Sustainable Management of Industrial Complex *Chaired by Dr. PARK Young Woo*

09:00 ~ 09:30	**Presentations** (5~10 min. each)	
	China *Case study on Circular Economy*	*Speaker(s):* Mr. ZHANG, Yutian International Cooperation Office, CREAS, SEPA
	Japan *Sustainable Management Activities in Kitakyushu Eco-Town*	*Speaker(s):* Mr. MUTO, Yoshihiro Manager, Office for International Environmental Cooperation, Environmental Bureau, City of Kitakyushu
09:30 ~ 10:00	Q & A	
10:00 ~ 10:30	**Presentations** (Continued)	
	Russia *The Implementation of Cleaner Production, Eco-Efficiency and Environmental Management system in the Production Units and Management of JSC Norilsk Mining Company*	*Speaker(s):* Dr. PETROVA, Tatiana Senior Specialist, Department of International Cooperation, Ministry of Natural Resources

	Republic of Korea *Strategies for Establishment of Sustainable Industrial Park*	*Speaker(s):*Dr. PARK, Hung-Suck Professor, Civil and Environmental Engineering, University of Ulsan
10:30 ~ 11:00	Q & A	
11:00 ~ 11:30	Selection of the Next Host Country Chairman's Summary Closing	Chaired by Dr. PARK Young Woo
12:30 ~ 14:00	Lunch	
14:00 ~ 17:00	Excursion	
18:00 ~ 20:00	Dinner	

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