Session 3 Is a global alliance feasible to reduce the air pollution of East Asia?

Chair

Eiichi Yamaguchi
Deputy Director of Institute for Technology, Enterprise and Competitiveness (ITEC), Doshisha University

Discussion Leadears

Holger Robert Bungsche
Associate Professor, Institute for Industrial Research, Kwansei Gakuin University

Zhidong Li
Professor, Department of Management and Information System Science, Nagaoka University of Technology, Japan

Masayoshi Sadakata
Professor, Dept. Environmental Chemical Engineering, Kogakuin University

Lin Sun
Research Associate Professor, Institute of National Economy of Shanghai Academy of Social Sciences, China

Hiroyuki Watanabe
Senior Technical Executive, Toyota Motor Corporation

Overview

Eiichi Yamaguchi

I originally intended for this session to draw a concrete picture of industry 10 years into the future. I actually wanted to draft a future vision of the high technology industries which are Japan's greatest strengths—such as the devices and telecommunications industry, the automobile industry and the environmental industry – and then draw a strategic path leading to that vision. I subsequently realized, however, that such an effort to link technological intelligence with industry futurology is so large a subject that an entire international conference could be devoted to that theme alone.

So within that theme I decided to center the discussion on the environment, which is of the highest priority from a global perspective, and in particular to focus on air pollution in East Asia. I want us to discuss what Japan can do to prevent air pollution in China, and what sort of global alliance structure we can create to eliminate the SOx which are discharged from factories that use coal as fuel as well as the NOx and PM (Particulate Matter) from automobile emissions.

The former type of air pollution (sulfur oxides) is already a problem as transborder pollution along the coast of the Sea of Japan. The Kansai Region is frequently subjected to yellow sand, and some nursery schools have temporarily closed their doors because of outbreaks of asthma. So this is certainly an urgent issue that requires immediate consideration. The latter type of air pollution (automobile exhaust) is a problem that remains within China, so some believe it should not be addressed together with the sulfur oxides issue. But PM is spread throughout the globe by the prevailing westerly winds, causing global pollution. Thus both of these issues should be viewed as important problems that demand transnational solutions.

Hereafter, Prof. Sadakata will discuss how to view the first issue and what sort of global innovation ecosystem should be established. Next Dr. Watanabe will discuss how to grasp the second issue and how a global alliance can be constructed to stop the pollution from automobile emissions in China. Then Prof. Li will mostly comment on solutions to sulfur oxides pollution and Prof. Sun will mostly comment on solutions to the automobile emissions problem. Finally Prof. Bungsche will present comments on all our deliberations, providing lessons from the experience in Europe. We will conclude with overall discussions and from these we will propose a resolution on how Japan can take the initiative toward enhancing the value of the air resources of East Asia.

Introduction of Desulfurization Processes Appropriate for China

Masayoshi Sadakata

June 30, 2007

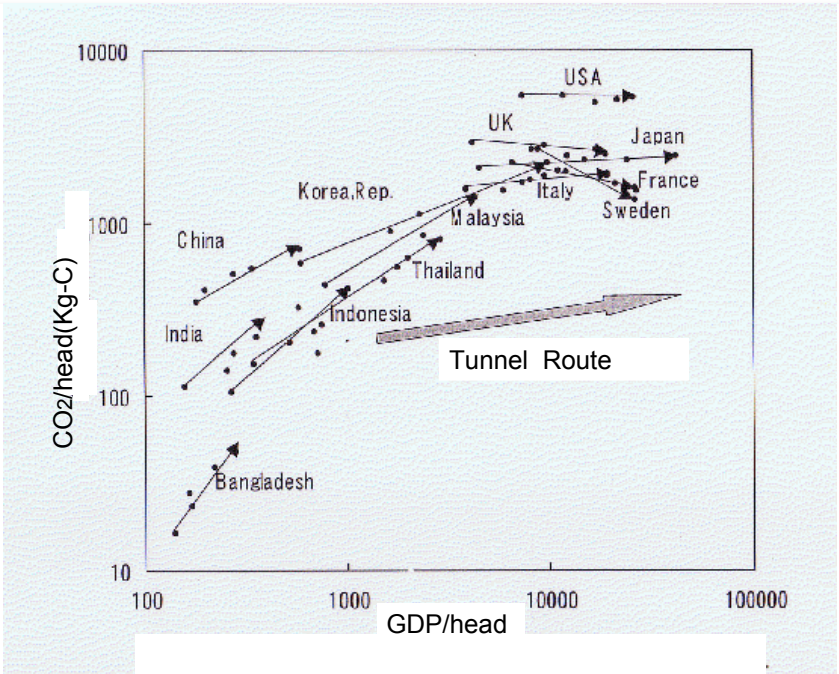
International symposium on Global Innovation Ecosystem 2007

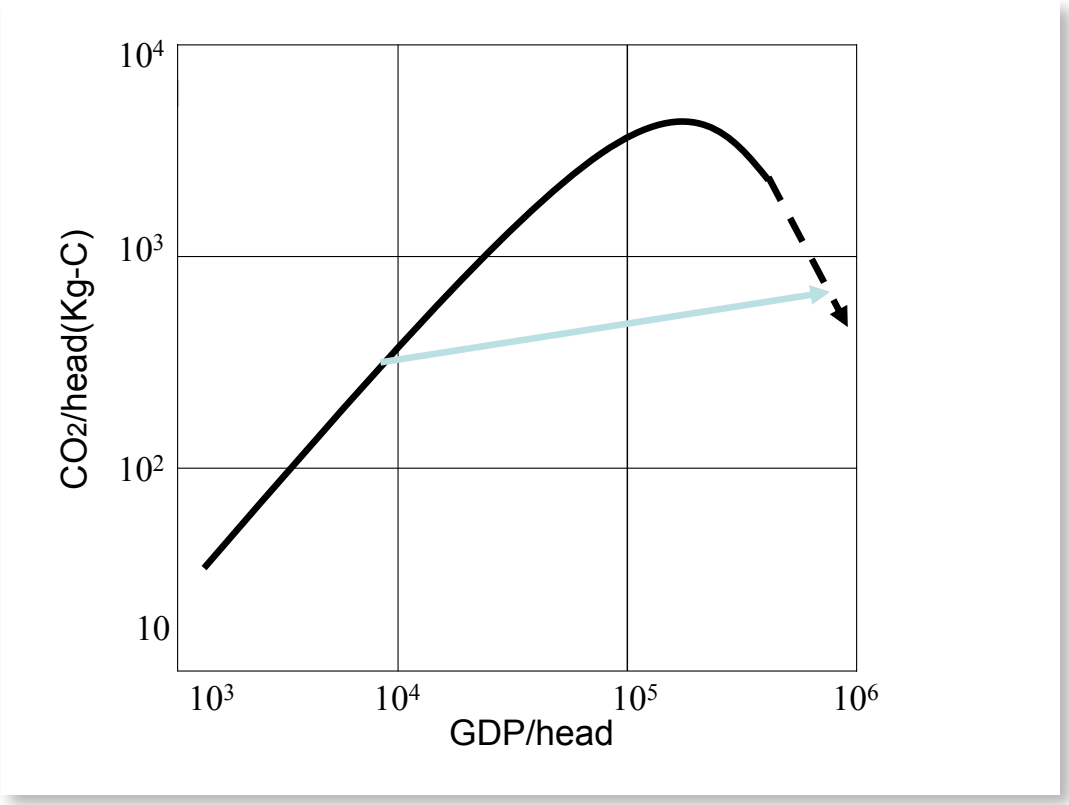
Introduction of Desulfurization Process Appropriate for China

KOGAKUIN UNIVERSITY

Masayoshi Sadakata

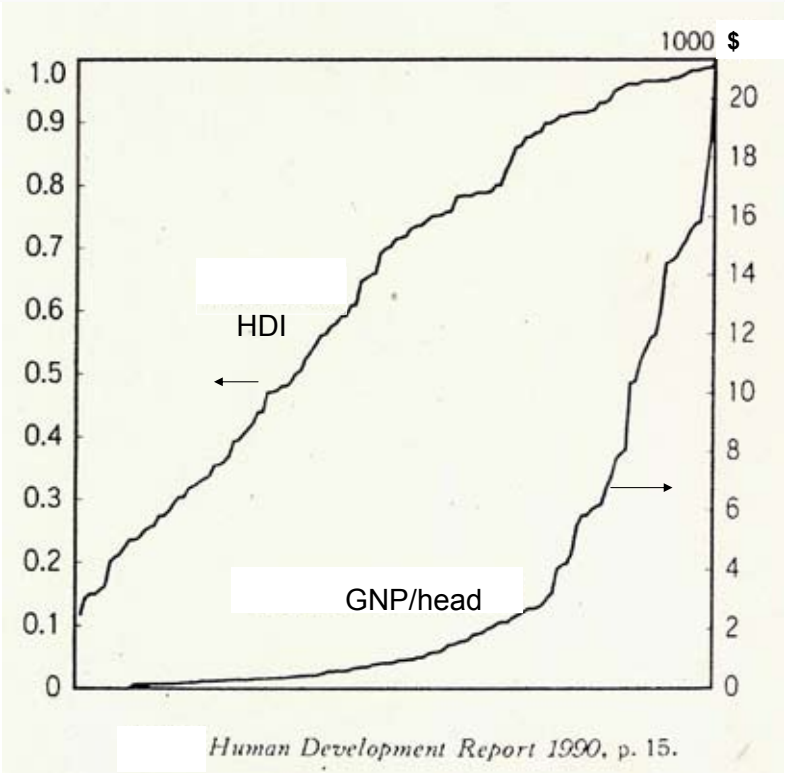
I would like to speak simply about desulfurization technologies which are appropriate for China, while sharing some experiences. There are examples of both successes and failures.





First I would like to explain the tunnel route theory. This figure shows the relationship between GDP and CO2 emissions in each country over the 1990s. The horizontal axis shows per capita GDP and the vertical axis per capita CO2 emissions. CO2 emissions rose along with increases in GDP, but in some countries that trend was reversed and CO2 emissions declined once per capita GDP approached $10,000. Nevertheless, CO2 emissions did not decline in Japan and the U.S.

CO2 emissions in China and other developing nations will have to reach 10 times their current levels before they begin to decline. The earth cannot absorb that much CO2, so the industrialized nations need to provide a "tunnel" to bypass the peak emissions from China and other developing countries.


1000 $
1.0
0.9
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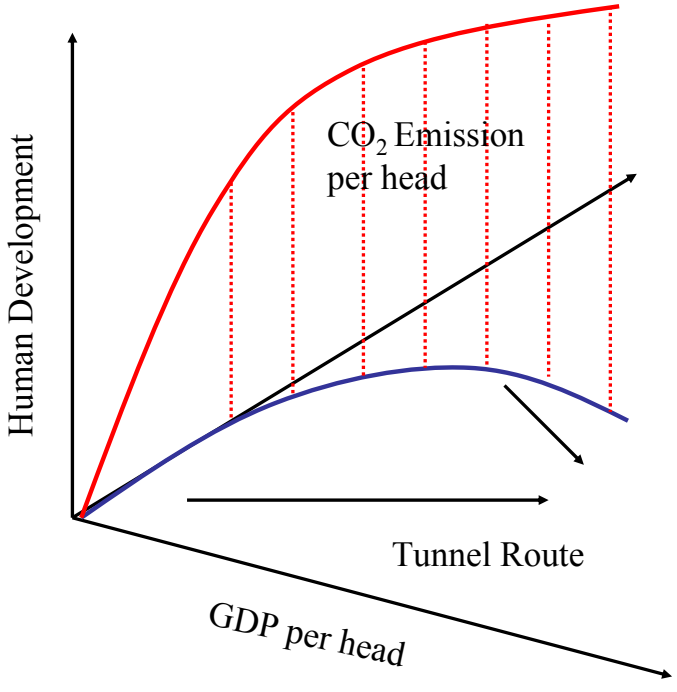
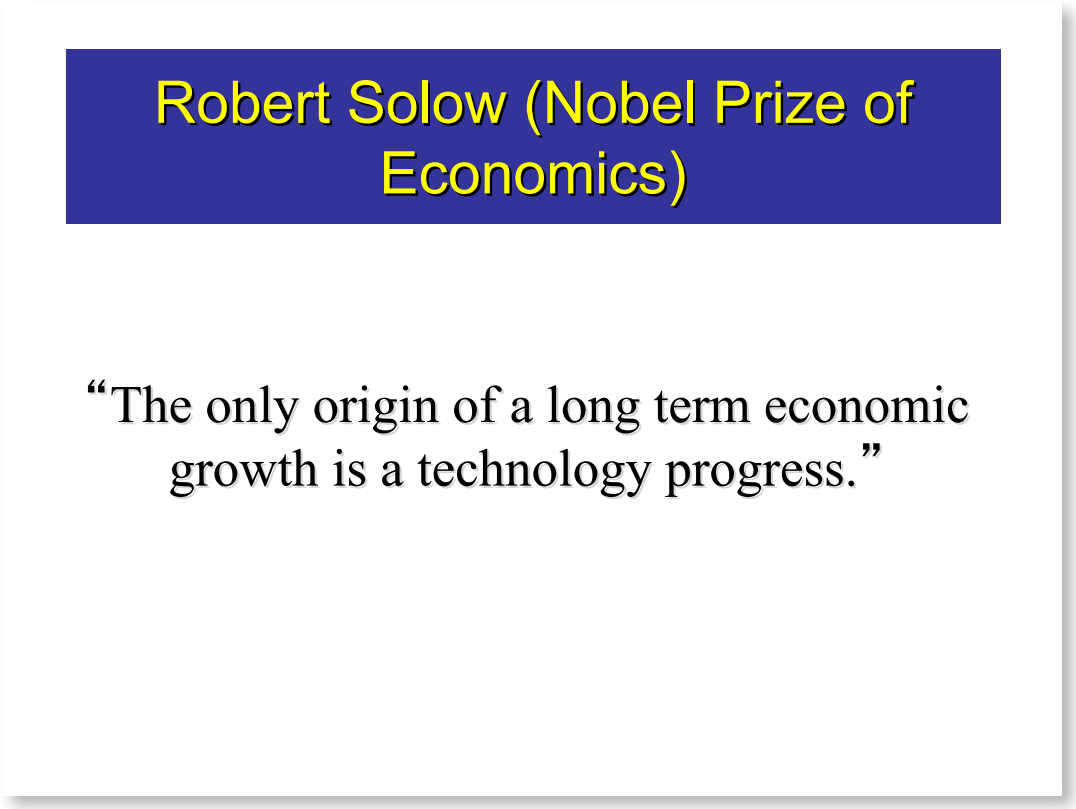
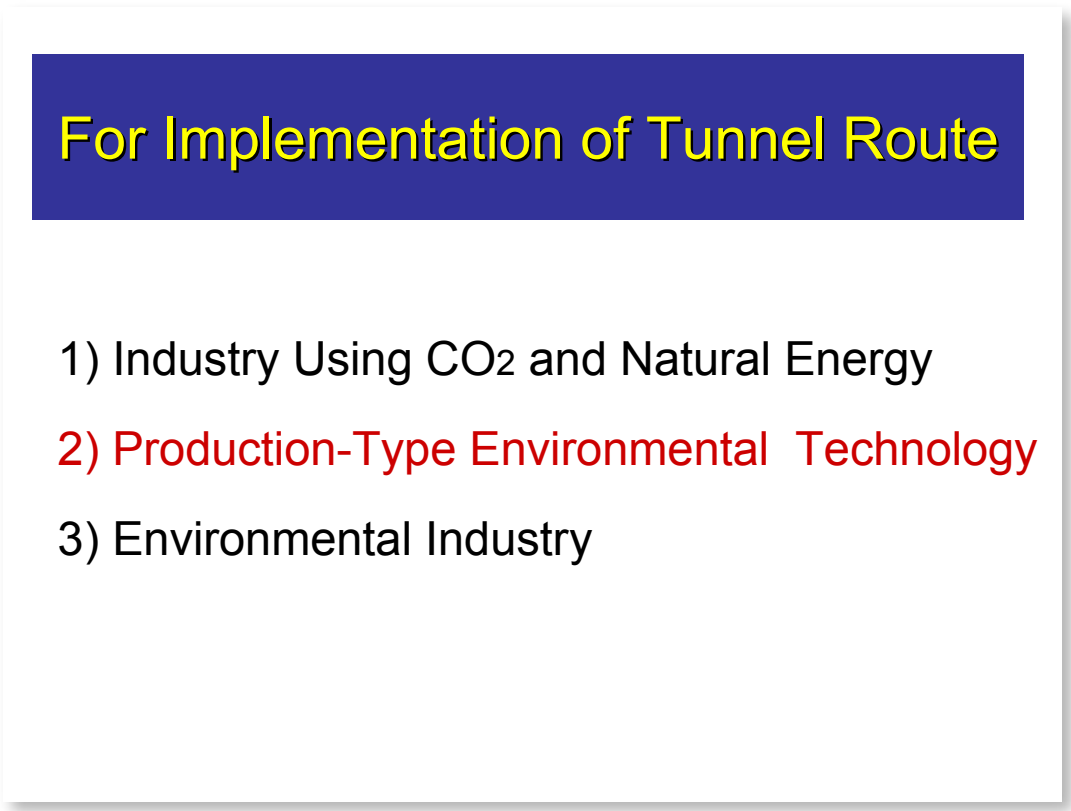
HDI
GNP/head
Human Development Report 1990, p. 15.


Human Development
CO_2 Emission per head
Tunnel Route
GDP per head

However, the era of emphasizing GDP has probably already passed. Today it is considered more desirable to increase the HDI (Human Development Index). In that sense, the tunnel route demands technology development and economic systems to boost the HDI.



The economist Robert Solow presented the theory that technological development leads to economic growth. In fact, he said that technological progress is the only origin of long-term economic growth. Similarly, the tunnel route also requires technological innovation.

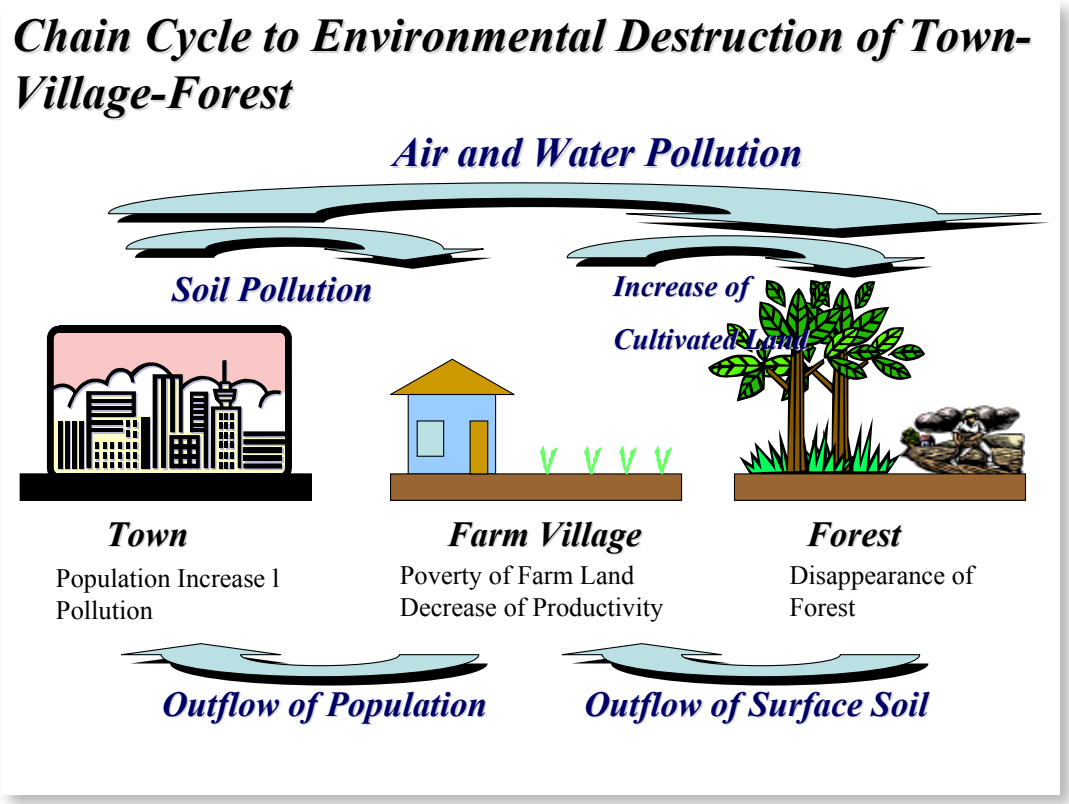


To these ends, there are three conceivable technologies. The first are industries based on natural energy and industries which use CO2 as a raw material. These include traditional agriculture (but not contemporary agriculture). However, there are problems with this approach. For example, traditional agriculture does not generate very high value added. Technologies and industries that can resolve these problems will contribute to the tunnel route.

The second are productive environmental technologies. Environmental technologies have been viewed as a negative investment and have not been given much consideration in developing nations, but if they generate profits they are likely to spread in developing nations as well.

The third is the environmental industry itself.

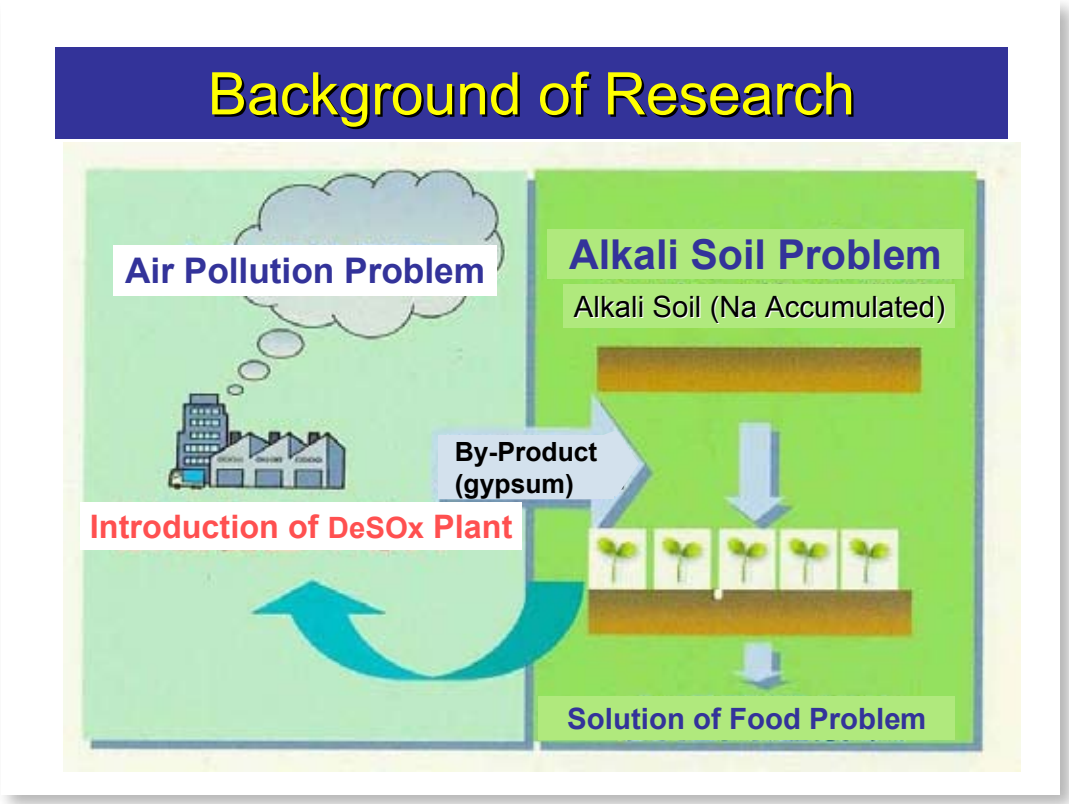
I will now introduce a few examples of technologies that contribute to the realization of the tunnel route.



The first example is research on the improvement of alkali soils. In China the use of coal as the primary fuel source has led to the problems of acid rain and air pollution from sulfur oxides. I researched desulfurization technologies that are appropriate for China for 20 years, but I ran into a deadlock. The byproduct gypsum is utilized for plasterboard and other applications in Japan, but has no uses in China. However, China's environmental challenges include desertification. This is a major issue linked to the food problem. Reflecting on the situation, I thought of a technology that could help resolve both issues at the same time.

(Photographs showing the progress of desertification).

One of the causes of desertification is the alkalization of soil. As water content evaporates, salinity remains in the soil making it difficult for vegetation to grow. I thought of an approach to restore alkali soil to cropland.



Spreading gypsum is one of the countermeasures to desertification. It is known that this makes the soil soft. So I came upon the idea that spreading gypsum (which is a byproduct of the desulfurization process) on alkali soil would restore it to cropland and prevent desertification. If this worked it would make the desulfurization process extremely profitable and provide an incentive for desulfurization.

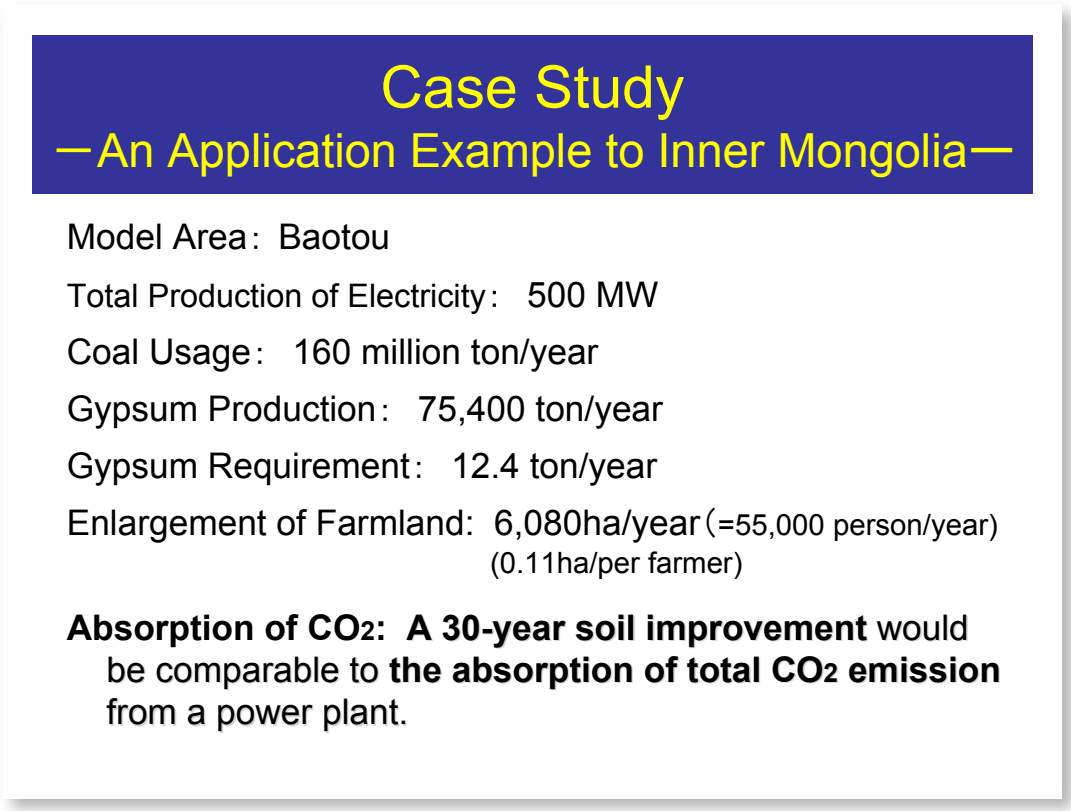
Effect of Gypsum on the growth of the wheat

0% 0.5% 1.0% 1.5% 2.0% 2.5% 5.0%

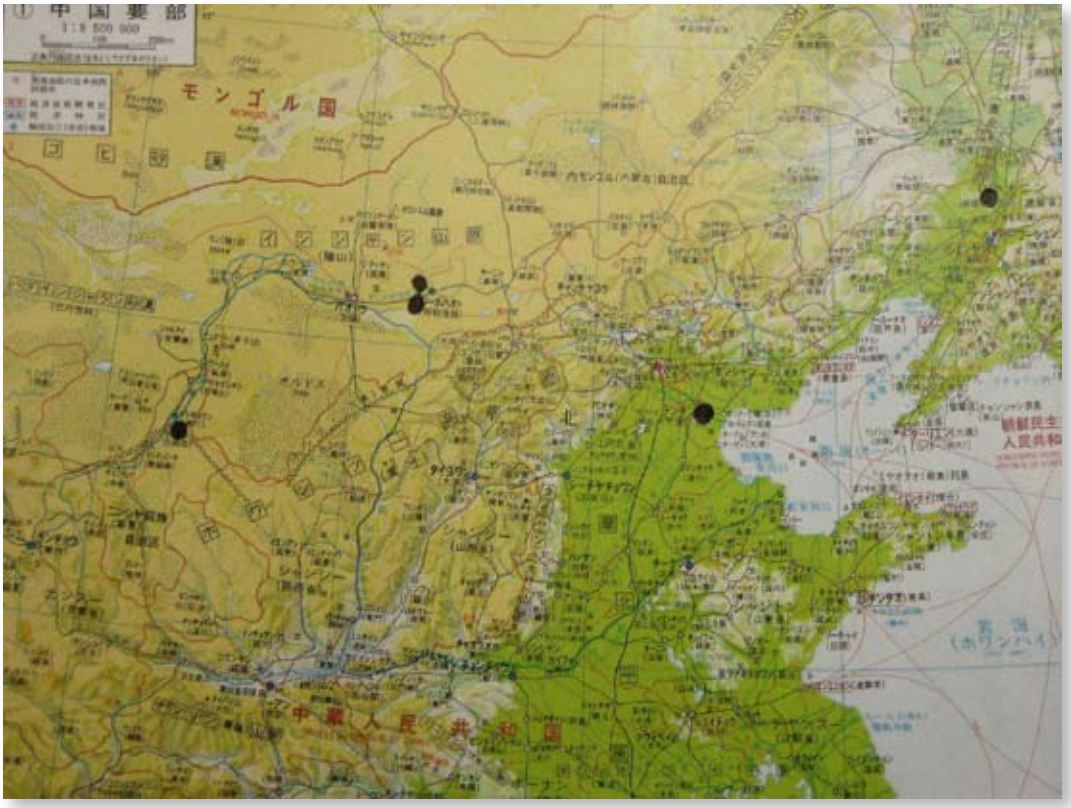
Performed by Fukuya Iino

Recent Situation (2004)

A laboratory experiment confirmed that mixing gypsum into Chinese alkali soil improved the growth of wheat. We then decided to conduct a field experiment nearby Shenyang. We cultivated corn in soil with and without added gypsum, and gained the same results as the basic experiment. We learned that the effects from a single application of gypsum continue for seven years. We also gained the voluntary cooperation of local farmers.



Then what extent of economic effect can be expected? We examined this using an electric power plant in Inner Mongolia. We installed desulfurization equipment on a 500MW plant and recovered gypsum to determine how much land could be improved. The gypsum was sufficient to improve the soil on approximately 6,080 hectares per year, increasing agricultural land (by an amount sufficient for 55,000 farmers) and increasing land which could be used for afforestation, and thus facilitating CO2 absorption.

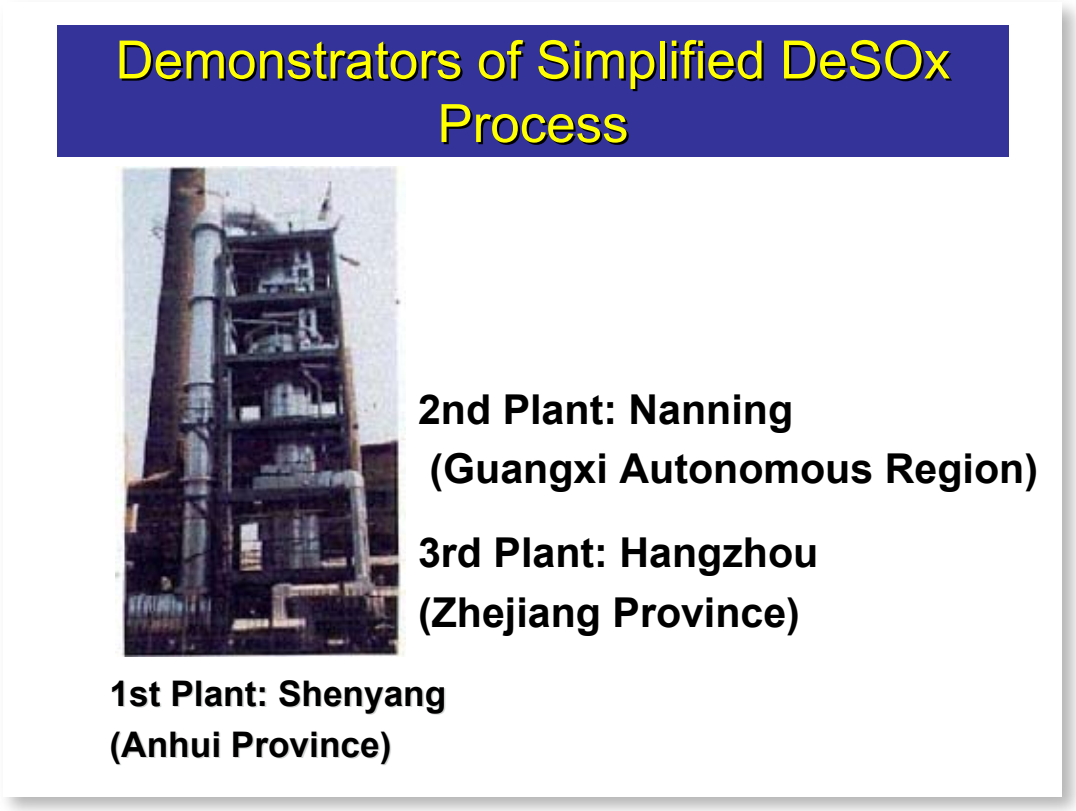


Comparison of alfalfa cultivation areas with and without application of desulfurization residuum in the science and technology garden of Inner Mongolia Agricultural University (2005)

Our experiments spread from Shenyang to inner Mongolia (Baotou), where we sowed alfalfa for use as cow fodder. The technology was successful there as well. For the past three years we have also succeeded in using the technology for irrigated rice fields. We have successfully applied this approach to other crops such as sunflowers and the health food Chinese wolfberry.

As for the desulfurization process, unfortunately the method used in Japan is too expensive and not appropriate for China. A low cost approach is needed, and in particular the northern regions require a dry process that does not use water. And of course, the desulfurization must produce gypsum.

In China, the government charges a tax of some tenths of a yuan for each kilogram of sulfur oxide. However, this tax is less expensive than the cost of installing desulfurization equipment. Thus China requires systems at one-third to one-fourth of the cost of Japanese desulfurization technologies. To address this, we developed a system with one-fourth the cost and installed it at a Shenyang chemical plant. (Unfortunately, it does not use a dry process). This system simultaneously removes dust. We received support from NEDO initially and from JST thereafter. The plant was a fertilizer factory, and faced difficulties as low-cost fertilizer from the U.S. entered the market. While we encountered various problems, we ultimately managed to install the system with a support from the City of Shenyang.



Our second system was installed at a non-ferrous metals plant in Nanning, slashing that city's sulfur emissions by two-thirds in a single stroke. The next system was installed at a steel factory in Hangzhou.

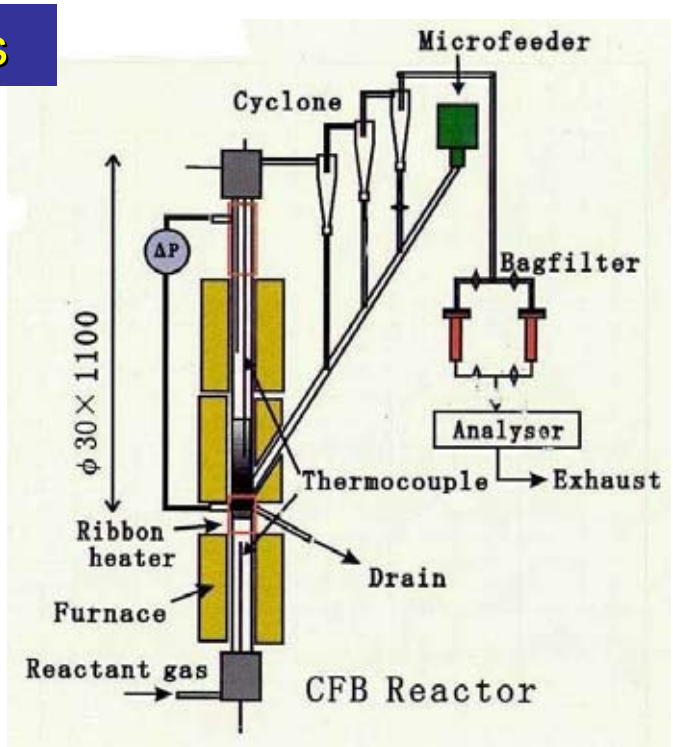
The basic design was prepared by Kogakuin University, and Tsinghua University was in charge of the detailed design. We emphasized the autonomy of the Chinese side.

TT Process

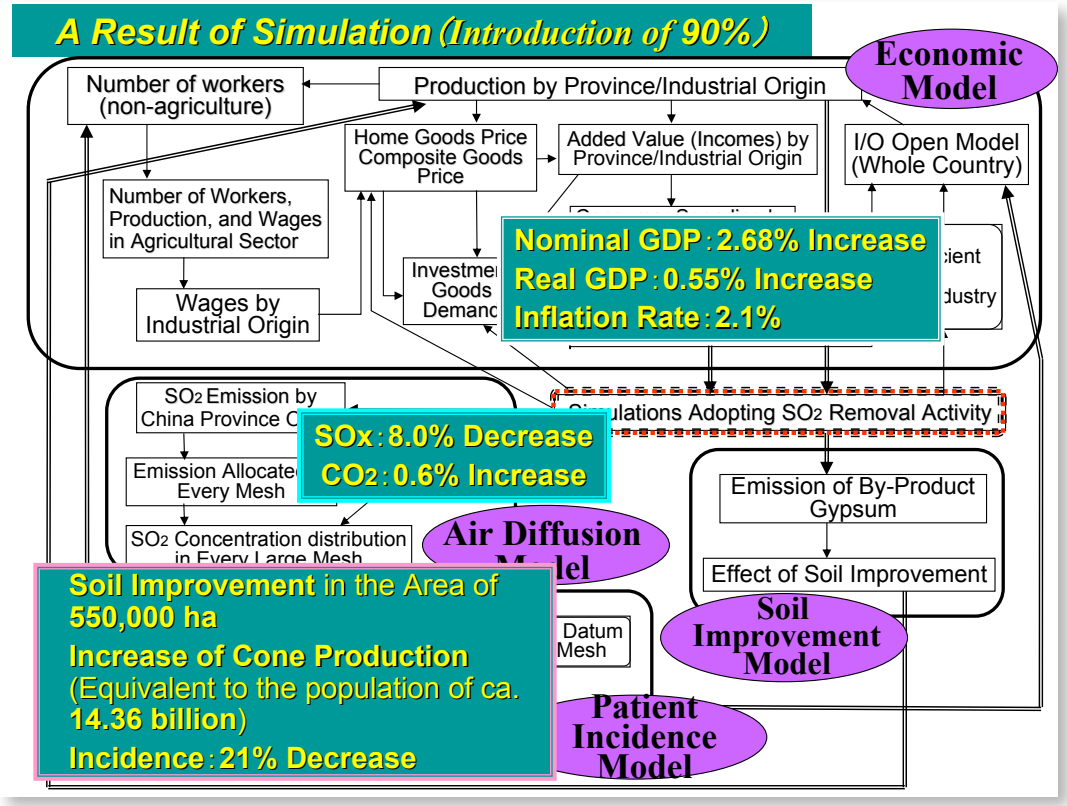
Features

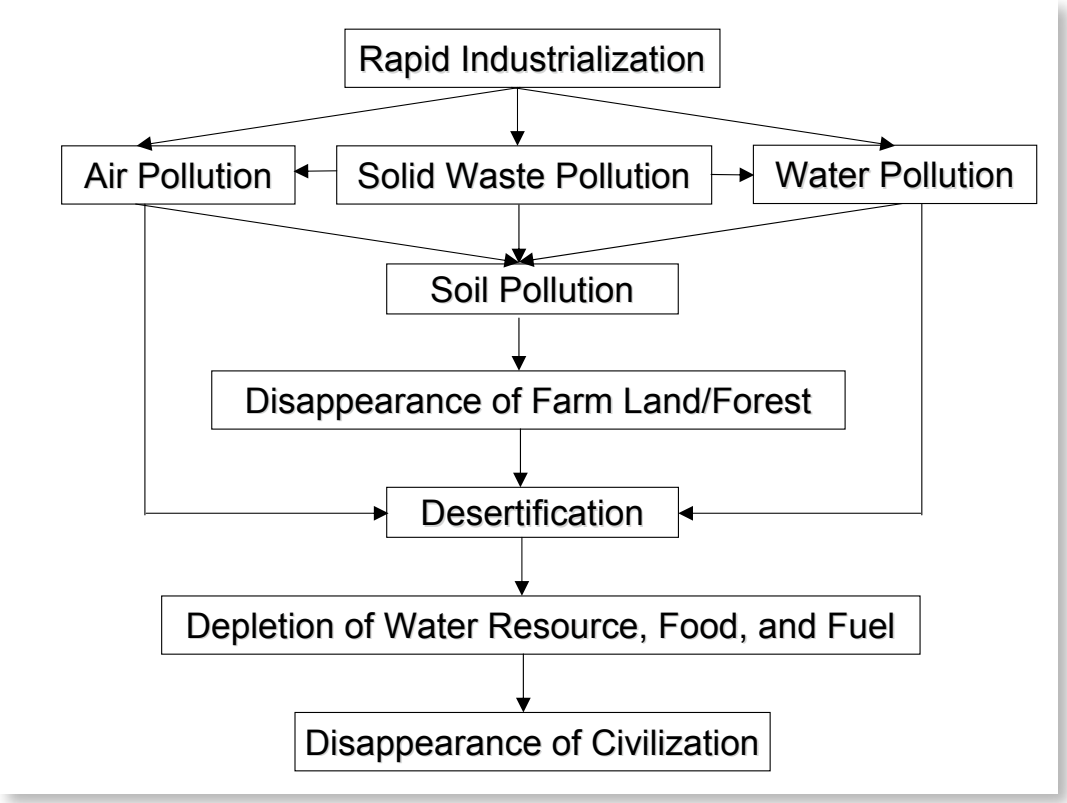
- Higher SOx Removal Efficiency (>70%) in the dry process
- Auto-Isolation of By-Product

  Because of pulverization, generated gypsum is automatically isolated in the cyclone.



However, the present system does not adopt a dry process, so it is not suitable for northern China. We began basic research on a low-priced dry process about 10 years ago and have succeeded in developing a new desulfurizing agent which enables desulfurization at a low temperature of around 350°centigrade. A pilot plant has been installed at Tsinghua University, and has produced similar results to the basic research. Practical scale verification is now required, with construction costs on the order of \1.0 billion. We are conducting negotiations with the Japanese and Chinese governments, but the outlook is still unclear.


A Result of Simulation (Introduction of 90%)
Economic Model
Number of workers (non-agriculture)
Production by Province/Industrial Origin
Home Goods Price Composite Goods Price
Added Value (Incomes) by Province/Industrial Origin
I/O Open Model (Whole Country)
Number of Workers, Production, and Wages in Agricultural Sector
Wages by Industrial Origin
Nominal GDP : 2.68% Increase
Real GDP : 0.55% Increase
Inflation Rate : 2.1%
SO2 Emission by China Province
Simulations Adopting SO2 Removal Activity
SOx : 8.0% Decrease
CO2 : 0.6% Increase
Emission Allocated Every Mesh
SO2 Concentration distribution in Every Large Mesh
Air Diffusion Model
Emission of By-Product Gypsum
Effect of Soil Improvement
Soil Improvement Model
Soil Improvement in the Area of 550,000 ha
Increase of Cone Production (Equivalent to the population of ca. 14.36 billion)
Incidence : 21% Decrease
Datum Mesh
Patient Incidence Model


Rapid Industrialization
Air Pollution
Solid Waste Pollution
Water Pollution
Soil Pollution
Disappearance of Farm Land/Forest
Desertification
Depletion of Water Resource, Food, and Fuel
Disappearance of Civilization

Change of CO_2, SO_2, GDP, Corn Production and Soil Reclamation Area in each Scenario

Table1 CO_2 and SO_2 change rate and the change of real GDP in each scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
CO_2 change rate (%)	△ 2.97	△ 1.90	▼ 5.69	▼ 4.18
SO_2 change rate (%)	▼ 27.6	▼ 23.9	▼ 8.75	▼ 35.3
Real GDP (%)	△ 4.62	△ 1.16	△ 0.08	△ 1.61

Table2 Effect of alkali soil reclamation in each scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Reclaimed Alkali Soil Area (10^3km^2/year) (Ratio %)※1	15.7 (3.14)	18.2 (3.64)	17.5 (3.50)	34.2 (6.85)
Proportion in production (%) (upper: corn, lower: rice)※2	2.94 10.7	4.91 12.4	4.08 7.34	7.81 18.7

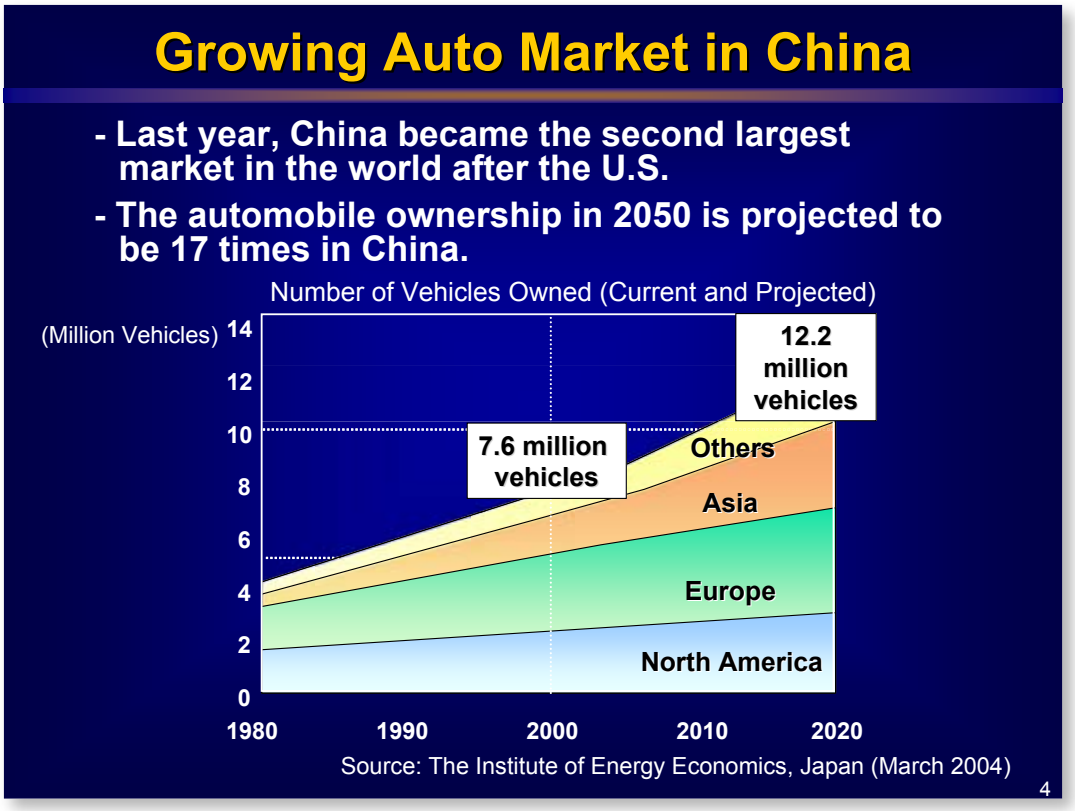
※1 Total Area of Alkali Soil : 5.0×10^5 km^2. (Wang et al., 1991)
※2 Total Corn and Rice Production is based on National Bureau of Statistics of China 2004.

In relation with our proposal to the government, we prepared a model for China jointly with Keio University. This economic model incorporates models covering atmospheric dispersion, soil improvement, and illness. It simulates the effects on the economy, the environment, health and other areas from introducing the desulfurization process. The simulation provides quantitative evaluations of the dual effects on economic development and environmental improvement. Specifically, it indicates that introducing the wet desulfurization process to 90% of China's factories would result in a nominal GDP increase of 2.68% and a real GDP increase of 0.55% (assuming an inflation rate of 2.1%), together with a reduction of 8.0% in SOx emissions and an increase of 0.6% in CO2 emissions.

China-Japan Alliance Against Air Pollution: the Auto Industry's View

Hiroyuki Watanabe

I would like to speak about the expansion of the automobile market in China, a comparison of environmental policies in China and Japan, a China-Japan alliance to prevent air pollution, and the approach of the automobile industry.



Last year, China became the second largest automobile market in the world after the U.S. What is more, the Chinese automobile market is expected to increase to 17 times its present level in the year 2050, with the environmental load also increasing by the same amount. Consequently, drastic innovations are needed.

Emission Regulations in China

- Beginning from 2008, Beijing city will adopt regulations that are at the same level as those in Japan, the U.S., and Europe. (Euro4)
- Throughout China as a whole, regulations are equivalent to those seven years ago in Japan, the U.S., and Europe. (Euro3)

Changes in Emission Regulations in Different Countries

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012
Europe	Euro3		Euro4				(Euro5)		
U.S.	Tier2 (Gradual) ------>								
Japan	New Short-term		New Long-term Std				Post New Long-term Std		
China	Euro2			Euro3			(Euro4)		
Beijing	Euro2		Euro3			(Euro4)			
Guangzhou	Euro2		Euro3			(Euro4)			

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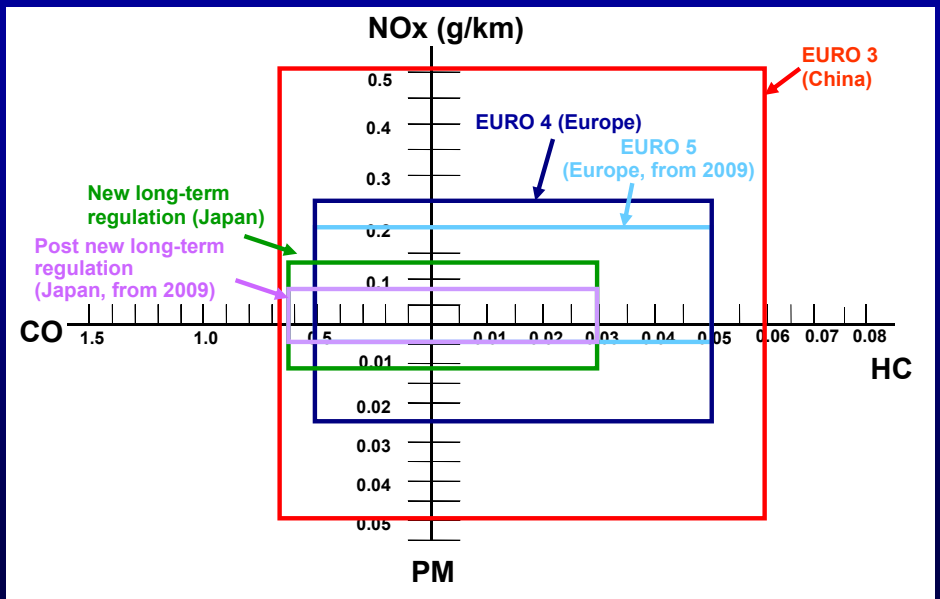
Emission Regulation for Diesel Passenger Vehicles



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This graph presents the Euro 3, Euro 4, Japan's new long-term regulations and other exhaust emissions regulations in different colors. Japan and Europe are implementing rather strict regulations.

China Fuel Regulations

- Emissions also depend on the quality of the fuel.
- High lead and sulfur content in gasoline, or high sulfur content in diesel fuel, impairs the emissions conversion performance of the catalyst.

Fuel regulations

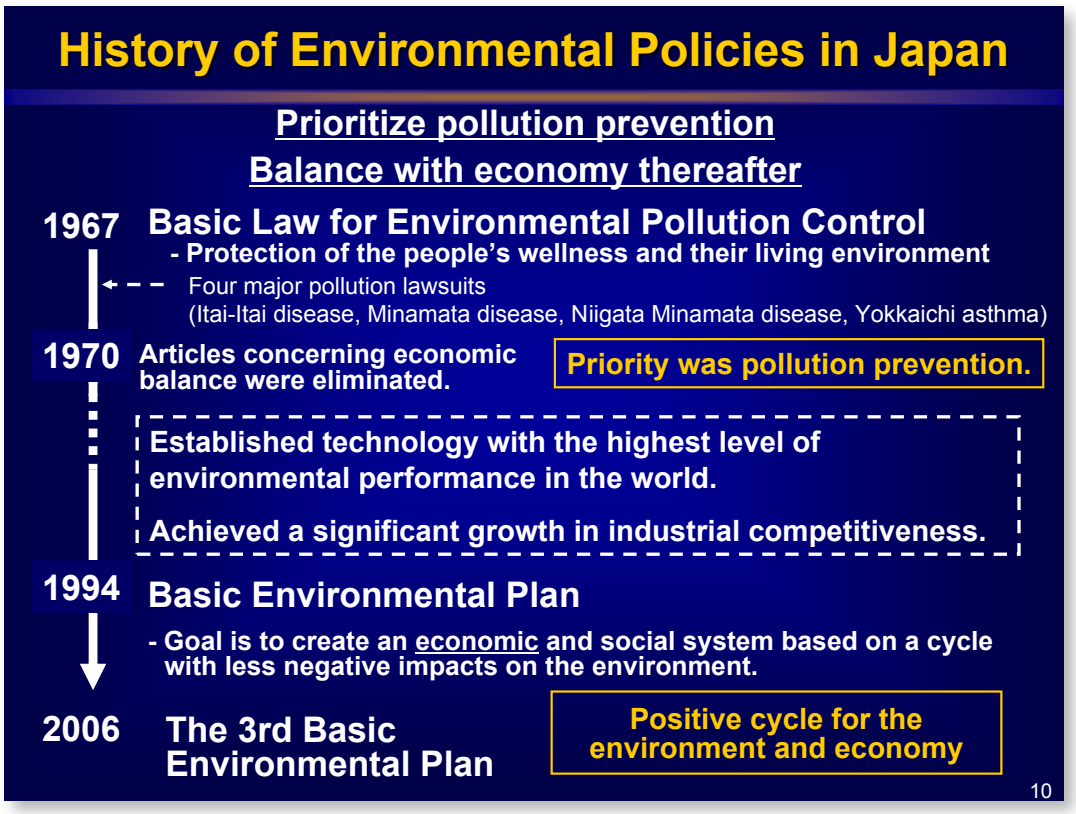
	Lead (g/L) (gasoline)	Sulfur (ppm) (diesel fuel)
Europe	0.005	50
U.S.	0	15
Japan	0	50 (10)
China	0.005	**350**
Beijing, Guangzhou	0.005	**50**

(Source: Dajiyuan FP/Getty Images)

7

To regulate exhaust emissions, it is first necessary to regulate fuels. Diesel fuel in China has an extremely high sulfur content of 350 ppm.

I listened to Premier Wen Jiabao's speech at the 2006 National People's Congress, and I was moved by his emphasis on the goal of a balanced and resource-conserving society and economy. According to this speech, China is aiming to reduce energy consumption per unit GDP by 20% and to otherwise realize an environmental cyclical economy. I was impressed by Premier Wen's determination to create a society that is different from those to date in Europe and the U.S.



Now, let us consider the history of Japan's environmental policies.

The Basic Law for Environmental Pollution Control came into force in 1967. This was the era of the three major pollution-related diseases including itai-itai disease cadmium poisoning. In Tokyo, some primary school pupils collapsed from photochemical smog.

In 1974, the phrases stipulating "balance with the economy" were removed from the Basic Law, placing clear priority on the environment. Initially many in the automobile industry opposed environmental regulations, insisting that they were impossible, but Toyota Motor's president embraced the challenge and consequently Toyota produced the word's first clean high-quality cars, which came to be accepted worldwide. In the end, this became a big plus for the Japanese automobile industry.

Japan announced its first Basic Environmental Plan in 1994. The third Basic Environmental Plan, which calls for a virtuous cycle between the environment and the economy, was announced in 2006. While the Japanese industry is now striving to protect the environment on a voluntary basis, in retrospect there was a time when government regulations were necessary.

Becoming a Leading Environmental Nation Strategy in the 21st Century

21st Century Environment Nation Strategy (End of May, 2007)

(1) Prevent global warming. (2) Construct a recycling-based society. (3) Protect biodiversity.

This plan incorporates the following primary programs.

(1) Work to *develop innovative technology* and *create a low-carbon society* in order to reduce global GHG emissions by half by 2050.

(2) Take international steps to create a sustainable resource cycle.

(3) Protect biodiversity in order to benefit from and maintain nature. Create vigorous local communities which make the best use of the benefits of nature.

(Source: JIJI Press)

-Engage in international cooperation that makes use of successful experiences in pollution prevention.

-Apply Japan's advanced environmental technologies to Asia and the rest of the world.

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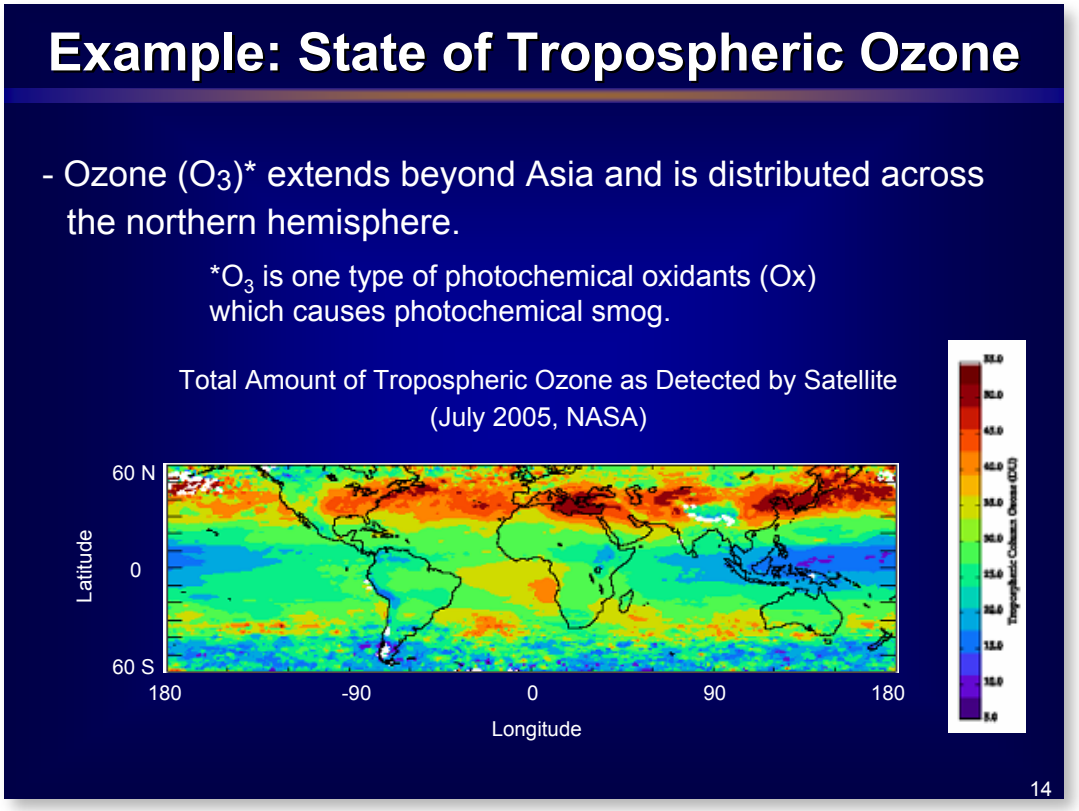
In 2007, the present Abe Administration announced a strategy for Japan to become a leading environmental nation. The plan includes making use of Japan's experience in overcoming pollution by advancing international cooperation with China and other nations.

This is what I would like to propose.

In the EU, each country is holding cabinet meetings in an effort to determine the feasibility of ideal figures (for CO2 emissions volumes, etc.) determined by the European Commission. In the same way, China and Japan should first hold discussions to set long-term targets and then develop an action plan toward achieving those goals. The next step would be to expand this theme to East Asia as a whole. What do you think of this approach?



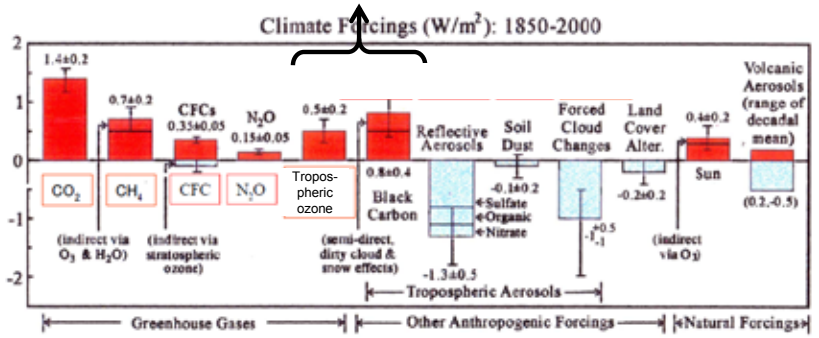
This figure presents the spread of ozone as detected by satellite. It shows that there is a band covering Japan, Europe and other areas with large ozone emissions, demonstrating that this is not a local problem. The time has come to consider ozone on a global scale.

Example: Greenhouse Effect of Tropospheric Ozone and Black Carbon Particles

What substances have caused global warming so far, and to what extent?

- Radiative forcings from 1850 to 2000 -

Tropospheric ozone and black carbon particles also have greenhouse effect.

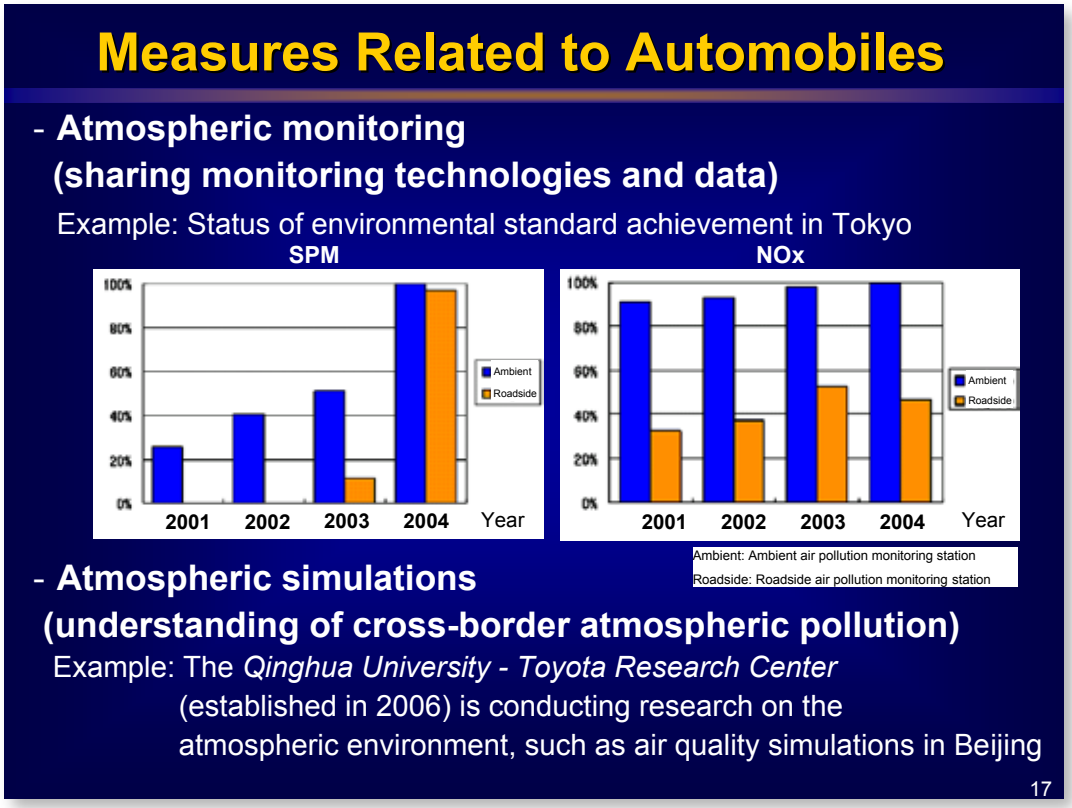


Sato and Hansen (2003)

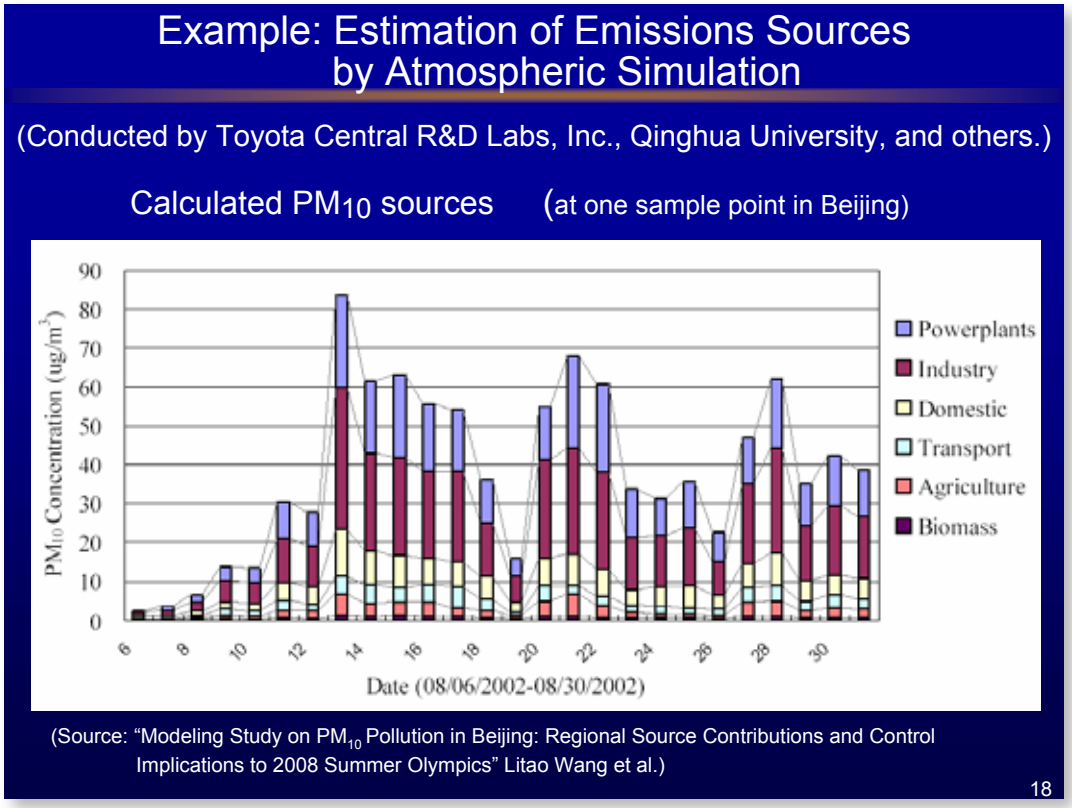
Need balanced monitoring!

Source: Frontier Research Center for Global Change, "Causes of Climate Change: More than just Carbon Dioxide- Ozone, Aerosols, and Global Warming," from presentation materials of general lecture by Mr. Akimoto of the Japan Agency for Marine-Earth Science and Technology (Aug. 4, 2004)

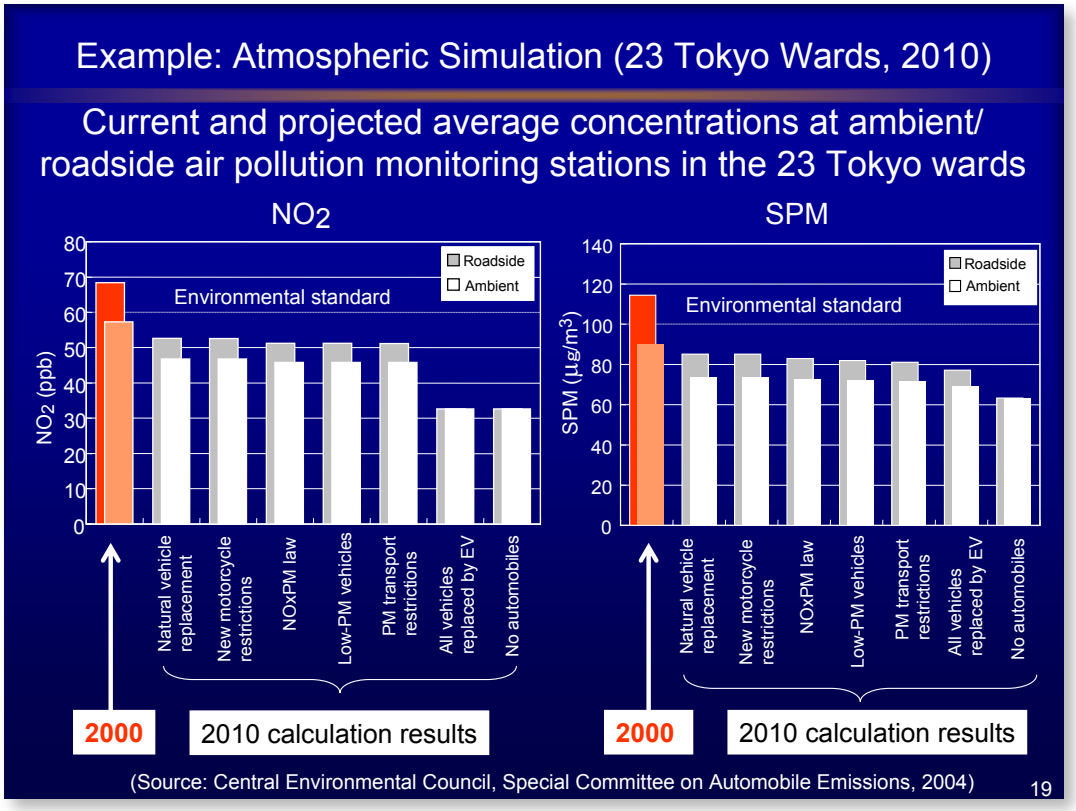
To date, there has been a tendency to only consider CO2 and other greenhouse gases, but black carbon particles are also an important problem.



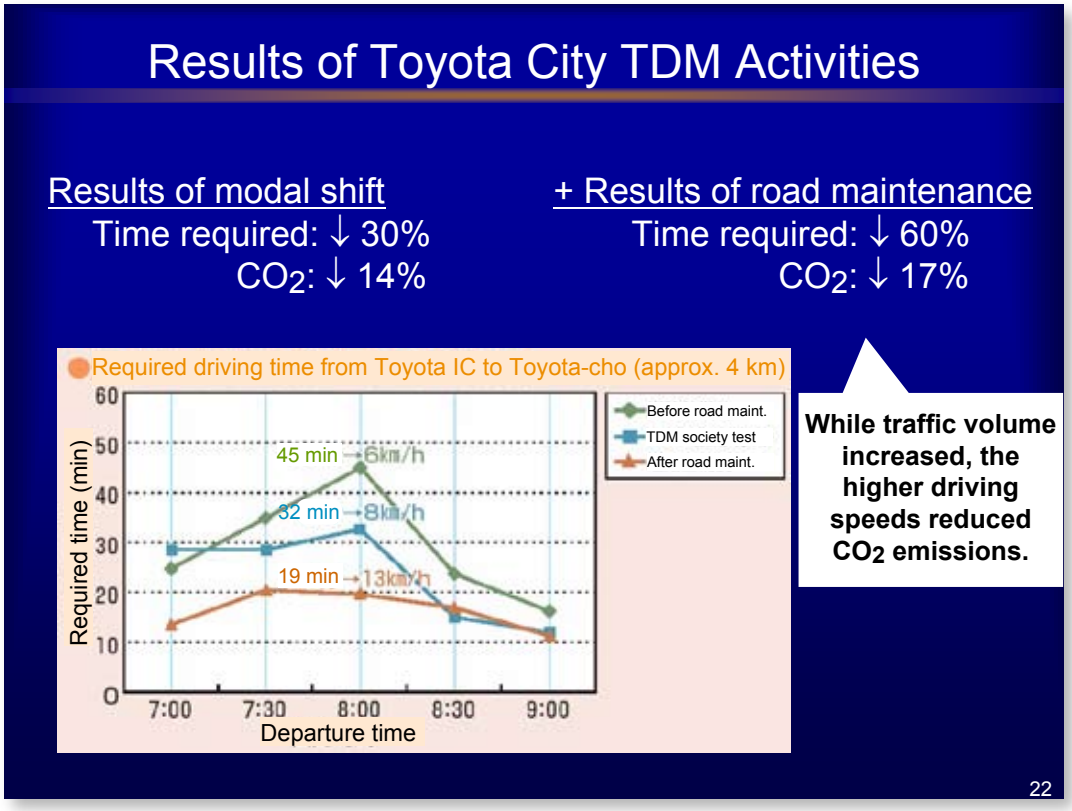
We are presently investigating the conditions and causes of air pollution in both China and Japan. This graph shows Tokyo data from automobile exhaust gas monitoring stations with sensors located alongside roads. The heights indicate the target achievement ratios, which are still very low.



We are also investigating the conditions and sources of air pollution in Beijing and conducting simulations in cooperation with Tsinghua University. This simulation, based on data from August 6 through August 30, 2002, indicates the amounts of pollution from automobiles, factories, power plants and other sources.

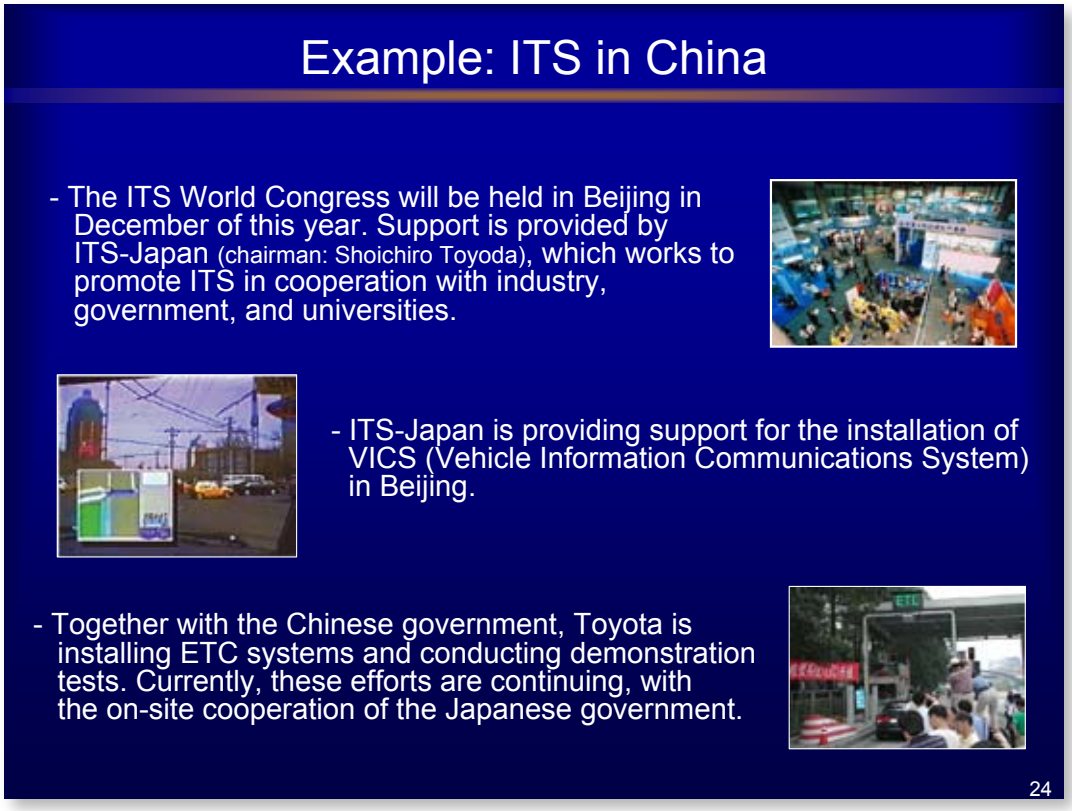


In Tokyo we conducted simulations on the air pollution conditions if there were no automobiles, or if they were all replaced by electric vehicles. The results indicate that we need to take countermeasures to address emissions from factories and power generation, not just vehicle exhaust. Moreover, automobile countermeasures must go beyond the vehicles themselves to address fuel, infrastructure (road improvement, etc.), ITS, etc.



Two thousand commuters shifted from private cars to public transportation as part of an experiment in Toyoda City. This modal shift resulted in a 30% reduction in travel time and a 14% reduction in CO2 emissions.

The research, which was conducted by the Japan Automobile Research Institute (JARI), also indicated that faster driving speeds contribute to reductions in CO2 emissions.



The ITS World Congress will be held in Beijing this October. Experiments are now being conducted in Beijing, including the installation of ETC systems.

Automobiles require maintenance and repairs. Toyota has opened 27 automobile maintenance schools in China, with over 30,000 graduates. Toyota is also providing support for youth education in China.

In a China-Japan atmospheric environment alliance, we would like to conduct atmospheric pollution simulations and help in selecting the best choices. It is also necessary to increase citizens' environmental awareness. The volume of emissions will decrease if cars are made smaller. We would like to spread the awareness that driving large cars alone with no passengers is an environmental sin.

Trends in China's Atmospheric Environment and Comprehensive Countermeasures Including International Cooperation

Zhidong Li

Trends in China's Atmospheric Environment and Comprehensive Countermeasures Including International Cooperation

Based on the Report *Is a Global Alliance Feasible to Reduce the Air Pollution of East Asia?*

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1. Present Conditions and Future Outlook for the Atmospheric Environment in China
2. China's Air Pollution Generation Mechanism and 'Comprehensive Countermeasures'
3. Approach to International Cooperation

Zhidong Li

(zhidong@kjs.nagaokaut.ac.jp)

Professor, Department of Management and Information Systems Science,
Nagaoka University of Technology
Visiting Researcher, The Institute of Energy Economics, Japan
Visiting Researcher, Energy Research Institute,
National Development and Reform Commission, China

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Global Innovation Ecosystem (GIES) 2007 Workshop
Session 3: "Is a Global Alliance Feasible to Reduce the Air Pollution of East Asia?"
National Graduate Institute for Policy Studies (7-22-1 Roppongi, Minato-ku, Tokyo)

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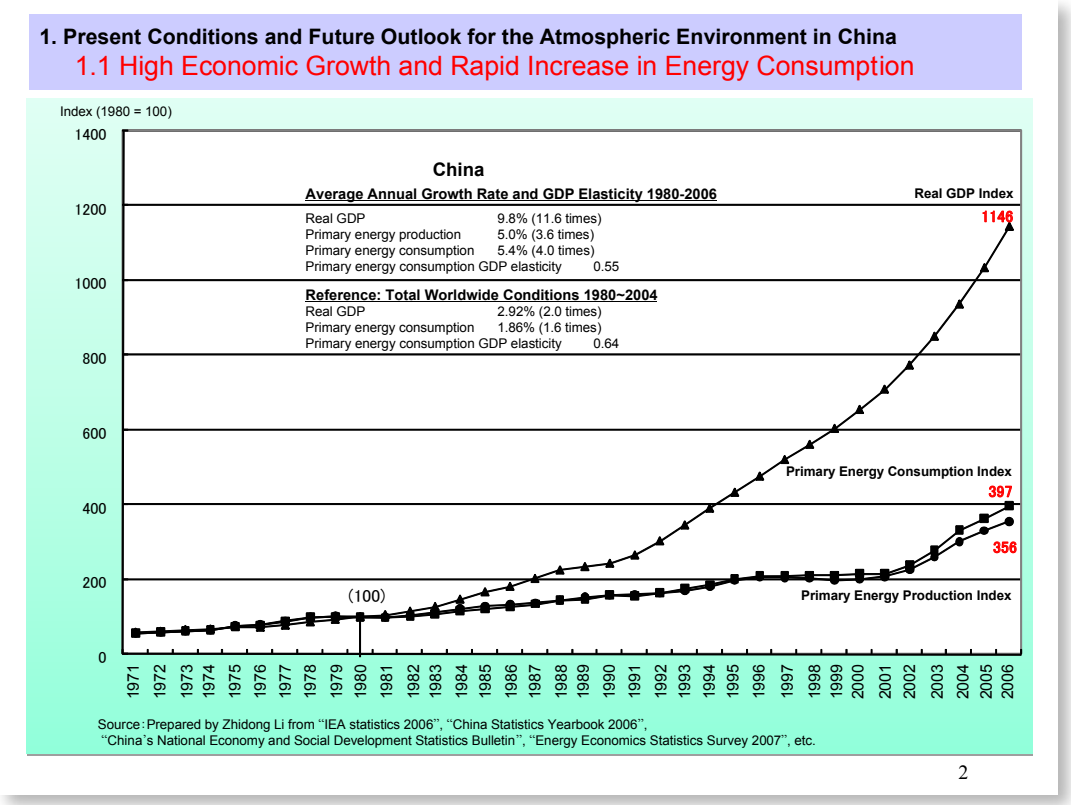
Having listened to the first two presentations, I feel grateful for the contributions being made to the prevention of air pollution through practical activities. I think the goal of this session is to examine how to spread such activities throughout Asia and across the globe.



The rapid rise in GDP and the sudden increase in energy consumption constitute the background to China's air pollution. The Environmental Protection Law was enacted in 1979, but unfortunately the conditions have not improved. The volume of CO2 emissions remains at a high level, and the pollution in urban areas is rapidly advancing caused by the increase in automobiles.

1.3 Middle to Long-term Economic Outlook

☆Economic growth → ☆Many optimistic projections

	Actual	Middle to Long-term Projection			
	1980-2006	2000-2010	2010-2020	2020-2030	2030-2050
Generalized Range	9.8	5.1-7.0-8.9	4.0-6.0-8.0	3.9-5.1-6.3	3.2-3.4-4.8
ERI Project team (1996/11)		8.0-8.2-8.6	5.9-6.0-6.4	4.4-4.6-4.8	3.2-3.4-3.6
Chinese Academy of Engineering (1997/5)		8.0-8.3	5.9-6.1		3.3-3.5
Energy Research Institute (1999/2, p289)		7.3	6.6	6.3	
Energy Research Institute (2000)		7.2	6.2		
Development Research Center of the State Council (2003/11)		7.2	7.2		
State Information Center (2003/12)		7.5	7.3	5.5	5.0→4.5
Government target (2003/3) GDP scale of 4 times the 2000 level by 2020		7.2	7.2		
11th 5-Year Plan (2006/3)		(05-10) 7.5			
IEA (1998)		5.8	4.5		
IEA (2002)		5.7	4.7	3.9	
IEA (2004)		(02-10) 6.4		(10-30) 4.4	
IEA (2006)		(04-15) 7.3		(15-30) 4.3	
EIA/DOE/USA (2001)	(1997-2010)→	5.1-7.4-8.9	4.0-6.5-8.0		
EIA/DOE/USA (2003)		4.5-7.0-8.0	3.5-6.0-7.0	2.8-5.3-6.3	←(2020-25)
Li (2004/3)		6.2-7.8-9.0	5.0-6.6-7.7	4.0-5.5-6.5	
Li (2007/1)		(04-10)	(10-15)	(15-20)	(20-30)
		7.5-8.7-9.5	5.5-7.1-8.0	4.5-5.8-7.4	4.0-4.9-6.0

Notes: ERI Research team, "China's Energy Strategy Studies, 2000-2050", China Electric Power Publishing, 1996/11.
Chinese Academy of Engineering, "Comprehensive Report on Studies of Sustainable Energy Development Strategies in China, Ver. 1", 1997/5
Energy Research Institute (1999/2): Zhou Fengqi and Zhou Dadi, editors in chief, "China's Mid- to Long-term Energy Strategy", 1999/2
Energy Research Institute, "Report on Natural Gas", 2000
Development Research Center of the State Council (2003/11): High Level Forum on China's Development, Development Research Center of the State Council
(Ma Fei, Zhou Fengqi, Wang Qingyi), "Basic Framework of National Energy Strategies", 2003/11/17
State Information Center (2003/12): Liang Youcai, "Review and Outlook of China's Economic Development", 2003/12/7
IEA, World Energy Outlook, 1998, 2002, 2004, 2006; EIA/DOE/USA, International Energy Outlook, 2001, 2003
Research by Zhidong Li shows simulation analysis results using China 3E-Model Ver. 2004 and Ver. 2007.

Zhidong Li (2007) is a 3E-Model simulation using the latest data and considering the 11th Five-year Plan.

The economic growth rates for each case (2004-2030) are 6.4% base case, 7.5% high growth, and 5.2% low growth.

The likelihoods of each case are 60% base case, 30% high growth, and 10% low growth.

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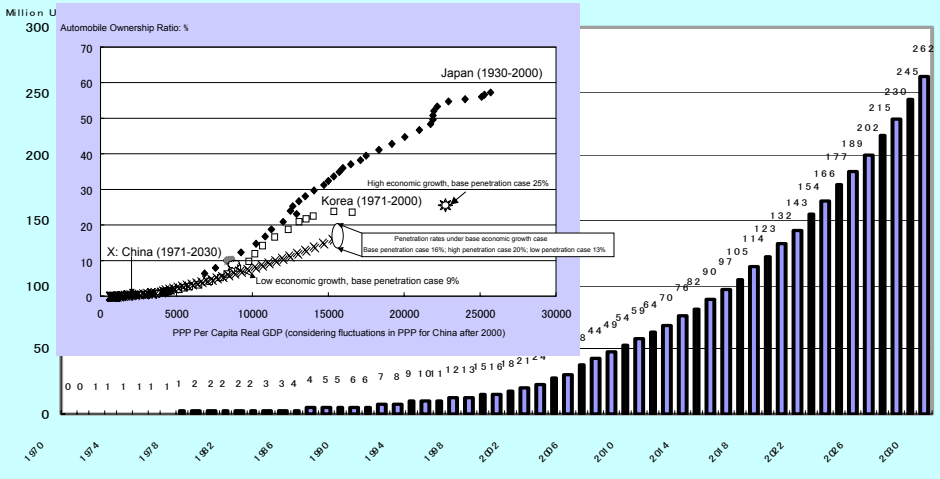
The 11th Five-Year plan target is 7.5%. ☆ Could become higher. For example, the Bureau of Energy assumes 8.5%.

- **Modernization of the industrial structure:** Primary industry 13% (2004) → 5% (2030); secondary industry 46% → 49%; tertiary industry 41% → 46%. 41%→46%
- **Sharp increase in high energy consumption products:** Cement 970 million → 1.24 billion tons; ethylene 6.30 million to 26.20 million tons; steel 300 million tons
- **Income levels rising to 15,000 PPP$ in 2030, reaching the level of medium-developed nations**
- **Popularization of automobiles:** Under the base case 132 million units with an ownership ratio of 9.3% in 2020 and 262 million units with an ownership ratio of 17.8% in 2030



Source: Prepared by Zhidong Li based on the base case simulation results using China

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The government of China aims to maintain high economic growth. However, the types of problems that would emerge with this have not been sufficiently examined. If China maintains an economic growth rate of nearly 7% for the next 30 years, it will reach the level of the medium-developed nations with approximately 260 million automobiles and an ownership rate of nearly 18% (the rate in Japan is presently 57%). The energy consumption volume would reach 3.0 billion tons in 2030, exceeding the 2003 levels in North America and Japan. SOx emissions would expand to over 60 million tons, while China's environmental capacity is only on the order of 18 million tons. Development will have to focus on electric power, industry, and automobiles.

Japan – China Comparison of Sulfur Oxides Pollution Countermeasures

	Japan	China
Environmental Countermeasures, Supervisory Systems		
Basic environmental regulations	Established	Established
Concentration regulations	Through 1967	Through 1997
Total volume regulations for specified areas	Since 1968, '70, '74	Since 1998
Fuel regulations	Since 1971	For specified areas; vague
Emissions tax	None	Established, but too low
Obligation to install desulfurization equipment	None	Established, but not enforced Strong
Administrative supervision, society's capacity for supervision (Consequent effectiveness of regulations)	Strong High	Weak Low
Environmental Energy Policies		
Energy Conservation Measures	Law enacted 1979	Regulations enacted 1986, law enacted 1997 Lacks specifics. Efficiency declined 2003~2005
Fossil fuels sulfur reduction measures	Cabinet resolution 1969	Air pollution control law 1995, coal law 1996 Lacks specifics.
Fuel conversion measures	Since 1974	Still firmly coal centered, renewable energy law in effect 2006
Energy policy	Agency of Natural Resources and Energy staff of 1,247	National Development and Reform Commission Energy Research Institute staff of about 30-50

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The SO2 Reduction Targets under the 10th Five-year Plan Were Not Achieved

	Actual		Level vs. 10th Plan Targets		Actual	Level vs. 11th Plan Targets	
	2000	2005	2005 Target	2005 Actual/Target	2006	2010 Target	2006 Actual/Target
	(10,000 tons)	(10,000 tons)	(10,000 tons)	(%)	(10,000 tons)	(10,000 tons)	(%)
SO2 Emissions	1,995	2,549	1,800	142	2,589	2,294	113
Mining & Manufacturing Emissions	1,613	2,168	1,450	150			
Household-related Emissions	383	381	350	109			
Particulate Matter Emissions	2,257	2,094	2,000	105			
Soot Emissions	1,165	1,183	1,100	108			
Mining & Manufacturing Emissions	95	949	850	112			
Household-related Emissions	212	234	250	93			
Mining & Manufacturing Dust Emiss	1,092	911	900	101			

Source: Prepared by Zhidong Li from the Environmental Five-year Plan, environmental conditions bulletins for each year, statistics bulletins for each year, etc.

China Industrial Sector and Thermal Power Generation SO2 Emissions and Desulfurization Rates (2000-2005)

	Industrial Sector				Thermal Power Generation			
	Volume Generated (10,000 tons)			Desulfurization Ratio	Volume Generated (10,000 tons)			Desulfurization Ratio
		Emissions Volume	Desulfurization Volume			Emissions Volume	Desulfurization Volume	
2000	2,206.4	1,612.5	593.9	26.9	794.6	720.0	74.6	9.4
2001	1,989.7	1,566.6	423.1	21.3	725.6	654.0	71.6	9.9
2002	2,259.8	1,562.1	697.7	30.9	751.5	666.8	84.7	11.3
2003	2,540.8	1,791.6	749.2	29.5	899.5	802.6	96.9	10.8
2004	2,636.3	1,746.3	890.0	33.8	1,169.3	994.9	174.4	14.9
2005	3,068.3	1,980.5	1,087.8	35.5	1,427.9	1,167.2	260.7	18.3

Source: Through 2003, "China Electric Power Generation and Environmental Issues" in *China Energy Resources*, Vol 27, No. 11, 2005. From 2004, prepared by Zhidong Li from China Statistics Yearbook.

Analysis of causes in accordance with the Coal-fired Desulfured Power Generation Cost and Desulfurization Facilities Operation Management Law (put into effect on May 29, 2007):
(1) Desulfurization equipment installation ratio is less than one-half; (2) Normal operations ratios are low; (3) Operations costs cannot be recovered;
(4) Excessive low-price competition in the desulfurization equipment industry. → Essential to strengthen regulations and management, and to internalize environmental costs.

In Japan, environmental countermeasures rapidly improved following the enactment of the Basic Law for Environmental Pollution Control, but countermeasures are not advancing in China. In particular the government and society have weak supervision capabilities, and the energy conservation measures are not concrete.
SOx emissions exceed the targets under the 10th Five-year Plan by as much as 40%. This is partially because desulfurization in the power generation sector is especially weak. However, government awareness of this problem is growing, and 2006 may have been a turning point. The efficiency of energy conservation, desulfurization and other measures has been poor, so comprehensive countermeasures are needed. There is now a plan to install desulfurization equipment on approximately 80% of the 500 million kW of coal-fired power plants. The marginal costs of desulfurization equipment are 1,300 yuan per ton, and the government plans to increase taxes to nearly that level by 2010. Thus there is a possibility that environmental countermeasures will rapidly progress from now on.

☆China's Mobile Pollution Sources Countermeasures

・Expansion of public transport ・Road maintenance and transportation management
・Fuel quality improvement ・Clean automobile strategy

☆China's Automobile Strategy (considering energy, the environment, and economic development)

Related documents: Socioeconomic Development Plan, Science and Technology Development Plan, Automobile Industry Plan, Energy Plan, Automobile Emissions Pollution Prevention Technology Policy (1999), Diesel Vehicles Emissions Pollution Prevention Policy (2003), Automobile Manufacturing Industry Policy (1994, 2004), State 863 Plan Electric Automobiles Project (including hybrid vehicles and fuel cell vehicles) (2001), etc.

<Points>

1) Petroleum vehicles to remain the mainstream over the short to middle term.
2) Petroleum substitute clean vehicles to be used when and where they are appropriate.
3) Use of fuel cell vehicles over middle to long term. All-electric and hybrid vehicles as appropriate.

<Perspectives>

Characteristics of automobiles, China's status, strategic objectives and strategic methods.
☆Can China achieve the kind of success realized for manned space flight? Can it leapfrog to the state of the art?

Fuel Cell Automobile "Excellence 1" (Aug. 2003)
Weight: 1.6-1.7t Fuel Cell: 40 kW Acceleration: 80 km/h in 14 sec.
Maximum speed: 110 km/hr Distance before refueling: 210 km

Fuel Cell Automobile "Excellence – Glory" (Dec. 13, 2006)
Acceleration: 100 km/h in 15 sec.
Maximum speed: 150 km/hr Distance before refueling: 300 km
☆Fuel cell unit price: 10,000 yuan (¥150,000) per kW; Total cost of a 50 KW capacity passenger car: 700,000-800,000 yuan (¥10 million).
→ Reduction of unit cost to 4,000 yuan (¥60,000) per kW by 2010

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The automobile technology is slightly behind Japan, but the gap is not that great. China is working hard, emphasizing the development of fuel cell vehicles.

3. Regarding International (China-Japan) Cooperation 3.1 Importance of Mutual Cooperation

Effects on Japan

☆Understanding of Issues (1)

Three impacts on the international community that cause concerns as threats

1) Energy supply shortage ➡ Deceleration of China's domestic economy (including foreign affiliates) ➡ Effect on the global economy
   - **China is Japan's largest trading partner**
   - **China has integrated into the global economy as a "factory" and a "market", and has become a driving force**
2) Rising dependence on foreign energy supply, and decrease of coal exports
   ➡ a. Tightened supply-demand balance on the global energy market, and large price increases. b. Geopolitical redrawing of the world energy map.
3) Weakening of China's and the world's sustainable development base from the worsening of domestic environmental problems, transborder pollution, and global environmental problems primarily caused by energy consumption.

☆⇒ **The resolution of China's energy and environmental problems would contribute to Japan's energy security, stable development and other national interests.**

☆Understanding of Issues (2)

Japan, China and South Korea face common **issues** (although the extents and priorities differ among the three countries), and **unilateralism has its limits.**

1) The issue of energy and other resource security caused by limited mineral resources and mass consumption.
2) **The issues of air pollution, acid rain pollution,** and the processing of solid waste.
3) The issue of restricting emissions of CO2, which is the leading cause of global warming.
4) The inability to compete with the EU, NAFTA and other regional communities because there is no Asian economic bloc and thus comparative advantages within the region cannot be linked to international competitiveness.
5) **Under unilateralism, it is difficult to resolve the problems and the costs are high (energy security, CO2 reductions, etc.).**

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3.2 Common Recognition of the Need for China-Japan Cooperation; Difficulty with Implementation

A. Security Cooperation: Stockpiling, domestic and foreign resource development, import negotiations, etc.

B. Technology Cooperation: Energy conservation, new energy, environmental protection, joint development of advanced technologies, etc.

- **Gratitude for the great benefits China has received from prior Japanese government green aid and present private sector basis aid.**
- **Ample leeway for further promotion.**
  - **Concerns of the Japanese side: If technologies are transferred they will be copied and Japan will lose its advantages.**
    → Strengthening China's intellectual property rights protections is an urgent issue.
  - **Understanding of the Chinese side: The quality is good, but the cost is high. The care and personnel training after introduction is weak.**
    → Survey the willingness to pay in China.
    → The Japanese side should consider the joint development, cost reductions, timing of local production, local procurement ratios, etc., based on the local needs.

Vague feeling that technology transfer benefits the Chinese side and disadvantages the Japanese sides. → Benefits for both sides

<<Consider the Demerits>>

- ☆ The competitors are Europe and the U.S. ➡ Unwillingness to sell means losing the market
- ☆ The technology gap between China and Japan is shrinking. ➡ Japan should not belittle China's technological progress
- ☆ Preventing the decline of industries and maintaining technological superiority (which is a resource for Japan) assumes that there is a market and that goods can be sold

C. Technological cooperation in the so-called "soft" aspects, including the management system, know-how, and personnel training.

- **Japan has the world's top energy conservation efficiency; Japan's domestic environment rapidly improved**
  Why? – Why and how does each body, legal system, market mechanism and type of measure function? Is this unique to Japan, or universal?
  → Systems research (finding the theoretical basis for Japan's experience) is necessary. This is an urgent research issue!
  ➡ Bilateral government discussions: Premier Wen Jiabao's April visit to Japan, ministerial dialog, etc.
- Reconfirm "win-win" as the common understanding (remove the suspicions of both sides), agree on cooperation

Proposals:
1) An air pollution alliance centered on Japan and China is one possibility.
2) Another idea is to establish an Asia Energy Agency which would include the prevention of air pollution as a touchstone toward the formation of a community.

9

Air Pollution Alliance Between Japan and China

Lin Sun

In response to Technical Advisor Watanabe's ideas regarding a Japan-China alliance against air pollution and a Japan-China alliance for cleaning up automobile emissions, I would like to discuss whether such alliances would be feasible from the Chinese viewpoint.

From Professor Li's presentation, you are now familiar with the conditions in China. I will restrict my comments to the perspective of policy simulation, which is my field of study.

Stance about alliance in Japan

- Position：Reducing the harm of air pollution
  Environmental business
- Merit：Improving the air pollution from China
  Making profits from outstanding environment-related technology
- Demerit：Technology spill and offset profits
- Choice of playmate： Only one

2

Stance about alliance in China

- Position：Serious problems of air pollution
  Falling behind in environment-related technology
- Merit： Improving air pollution
  Gaining the advanced technology
- Demerit：Leadership and cost of technology
- Choice of playmate：More than one

3

First, I would like to explain the different stances toward such alliances in Japan and in China.

On the Japanese side, air pollution from China has been spreading and there is a growing desire for protection against this pollution. The goal is cooperation using Japan's superior environmental technologies, but for Japanese industrial circles this has the demerit of providing such technologies without gaining profits.

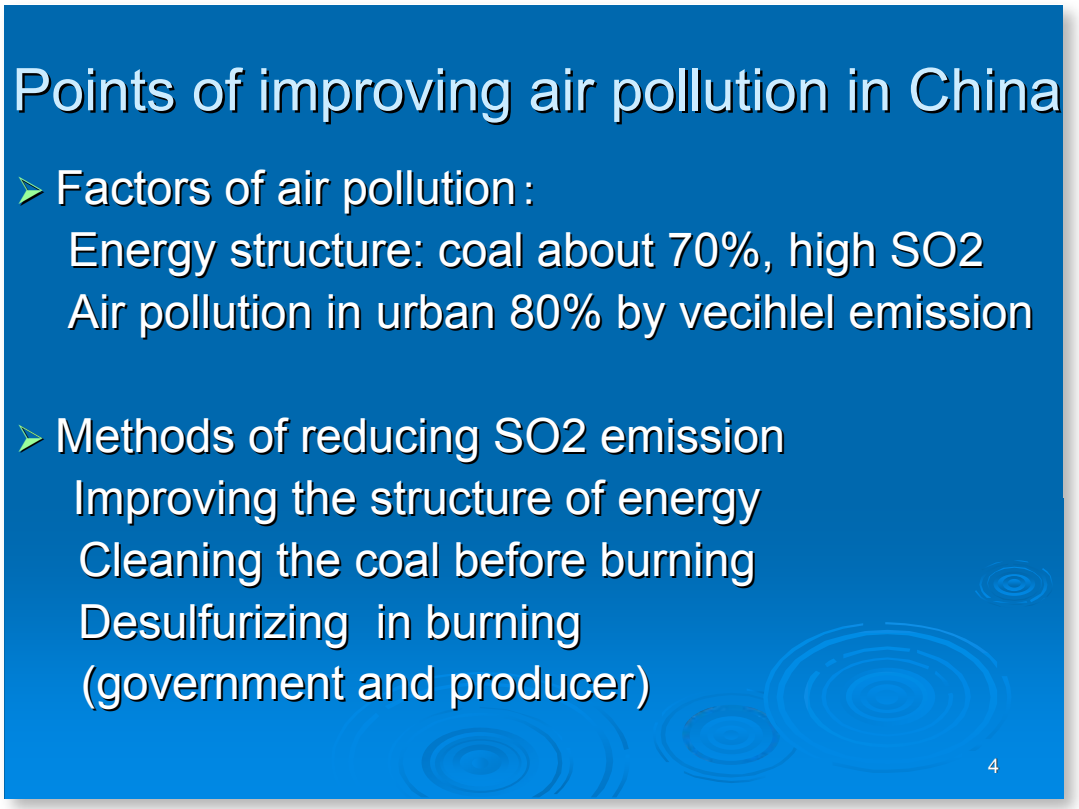
In China, environmental technologies lag behind the times, and the fact is that environmental pollution is extremely severe. The Chinese would like to take leadership since this concerns their own country, and they would also like to limit the costs.

Coal presently accounts for 80% of China's energy sources, and the coal used has a high sulfur content.

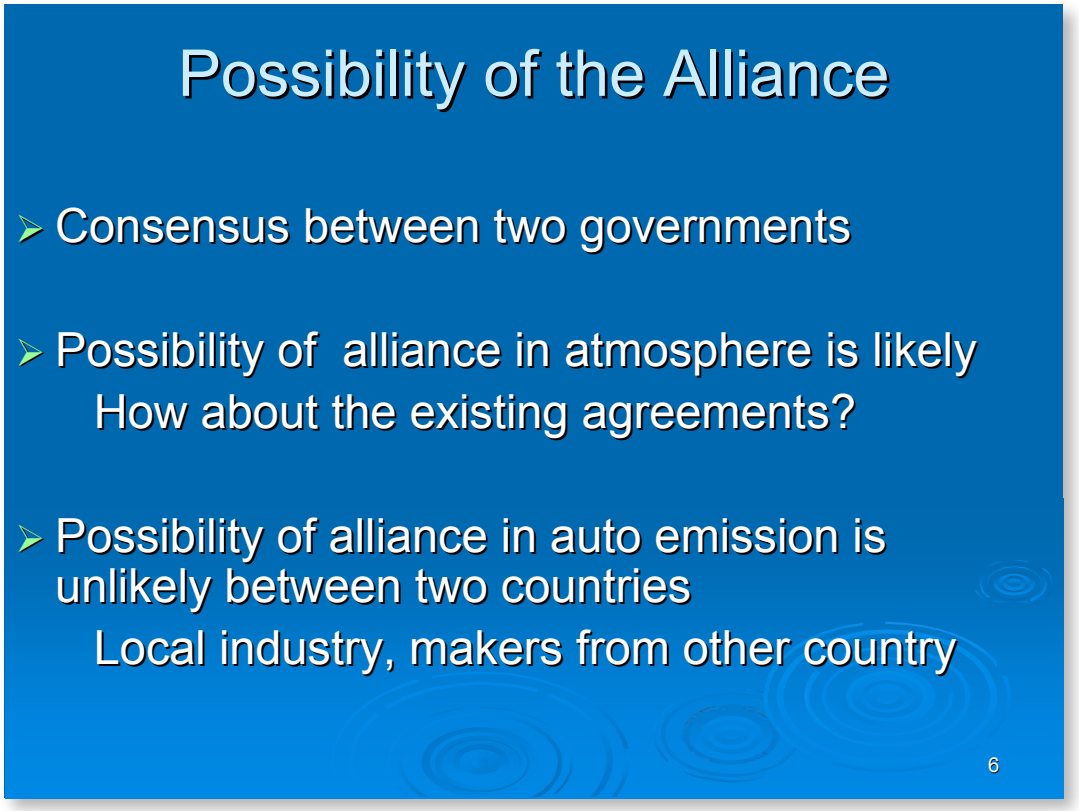
In the major cities, it is said that automobiles are responsible for 80% of the air pollution (but having listened to Technical Advisor Watanabe's presentation, the conditions may actually be somewhat different).

As a countermeasure to environmental pollution, China will have to change its energy composition over the long term. It will also be necessary to change the technologies used for coal combustion.

As for automobile emissions, along with developing vehicles which run on new types of fuel, hybrids should also be used. The fuel quality is a problem as well and needs to be improved, but good-quality fuels are expensive. Technologies which clean emissions need to be introduced.

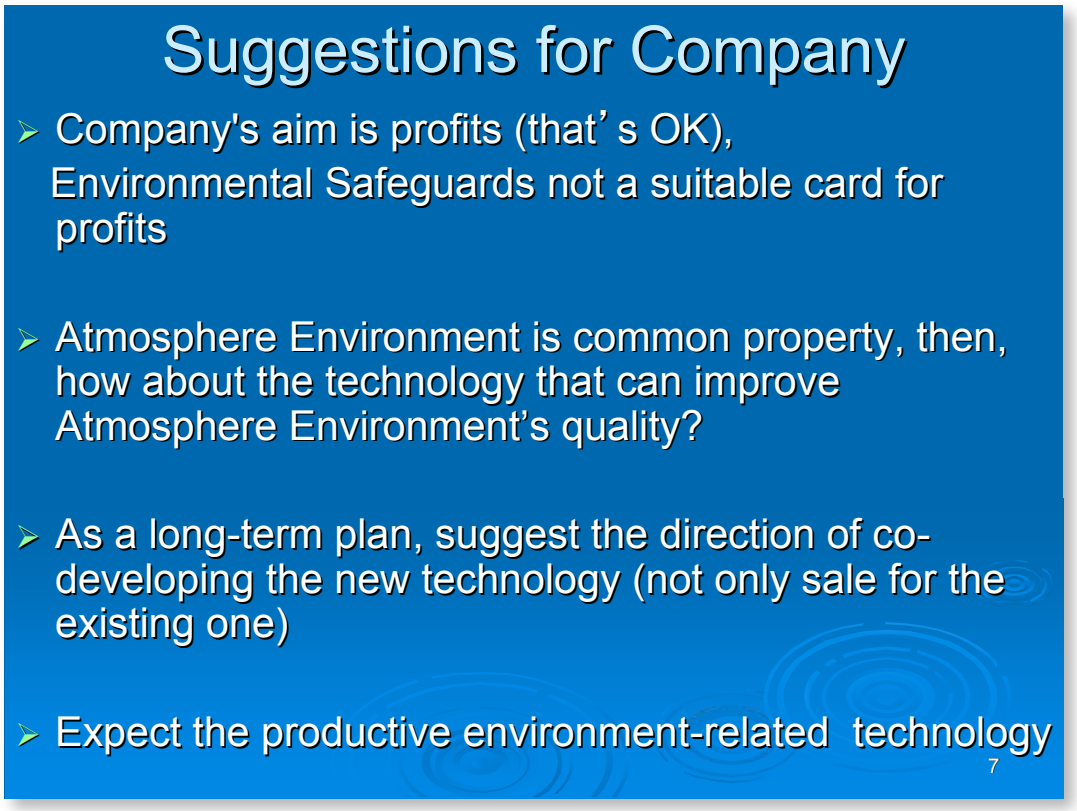


There are two policy approaches to the automobile emissions issue. On the one hand, emissions levels could be reduced and fuel efficiency improved though technology regulations. The other option is to implement controls through the tax system (this is my field of expertise). There are discussions of revising the tax system to give preferential treatment to fuel-efficient vehicles.



Next, I will speak about the feasibility of these alliances.

I think the likelihood of a bilateral alliance between Japan and China for cleaning up automobile emissions is low. China's National Development Commission recently delayed the proposed introduction of Euro 3 from July 2007, announcing that this would not be feasible because of the local oil quality.



Here are my proposals, beginning with suggestions for industry.

Companies operate to earn profits as a matter of course. On the other hand, the atmosphere is the common property of all humanity. So what about technologies that improve the atmosphere? Over the long term, cooperation in new fields is desirable, and this goes beyond just selling technologies that are advantageous for one's own company.

Prof. Sadakata spoke about desulfurization technologies, and China requires technologies with high productivity. Some locations do not operate desulfurization equipment even when it is installed because it increases costs. Low-cost technologies are needed.

Next, here are my proposals regarding assistance from the Japanese government.

Japanese government assistance is highly regarded. In the past Japanese aid, especially ODA, tended to entrust everything to the recipients, but I think the stance needs to be changing from now on, from simple waiting to active participation

China has also come to a position of taking responsibility for global atmospheric pollution. From the perspective of the global production system, however, as noted at yesterday's symposium, while the conversion to service industries has progressed in the advanced nations, the developing nations have to industrialize.

My proposal is as follows.

Japan switched to giving priority to the environment in its policies from the 1970s. Japan and the other industrialization nations are now seeking a balance between the environmental business and improving the state of environmental pollution. However, I believe that there is need to view the environmental business and technologies to improve the environment separately.

China: Automobile Industry and Sustainable Development

Holger Robert Bungsche

I am going to briefly introduce the Chinese data, and then present the EU's environmental policy. I will touch on what kind of vehicles should be developed and conclude with an introduction of the EU's new development plan CARS21. CARS 21 might serve as a blueprint for China.

The Chinese Car Industry

Some Facts, Figures and Development Targets:

- Since 1978, average increase in GDP of about 9% annually
- Annual average increase in sales of ordinary passenger cars since 2001 of about 40%.
- In 2006 : Automobile sales in China exceeded sales in Japan and China became the world's second largest car market
- Increase of the Chinese middle class from now 5% of the population (65 million people) to 45% (585 million) until 2015 (forecast of the National Statistical Bureau)
- Based on today's consumption behavior: market for 54 million cars per year in about 10 years time!

The Chinese Car Industry

Some Facts, Figures and Development Targets:

- Car owners per 1000 people
  - America: 800 people
  - Germany: 550 people
  - China: ~20 people (approx. the level of Europe in the 1930th)
- China's Targets (as expressed in the economic plans)
  - Automobile industry is declared 'Pillar Industry' for the whole industrial development of China
  - Become **the** worldwide production location for automobile parts (world market share over 25% until 2010)
  - Develop three manufacturers into global players

China's middle class presently comprises about 65 million people, and that figure could increase by 10 times over the next decade. Such an increase would roughly equal the total number of car owners in the world today. At present, the number of car owners per 1,000 people is 20 in China compared with 800 in the U.S.

The Chinese Car Industry

Considerations and Questions:

- China is only standing at the beginning of its motorization and its development into a stronghold of the automobile industry: ⇒ Therefore preventive actions are in need (other than in the developed countries)
- The Chinese authorities (central government, local government, party etc.) are not only issuing the development plans, but they are also directly involved in the companies: ⇒ Therefore: To what extent are they able to be 'independent' regulators?
- Europe's environmental movement started from the bottom (interest groups, Green Parties, alternative movements) ⇒ Therefore: Can and will the Chinese public be a driving force for environmental protection?

China's automobile industry is just now finally beginning to take off. The way of thinking of the automobile companies may differ from that of the government. What type of influence do average citizens in China have on this way of thinking?

The EU Environmental Policy

Development of Common EU Environmental Policy:

- March 1957: Foundation of the EEC (Treaty of Rome)
- First environmental concerns beginning in the late 1960s in developed countries (USA, Europe and also Japan)
- First Environmental Declaration of the EC at the Paris Summit in 1972
- 'First Environmental Action Plan' in 1973
- No legal foundation until 1987 (Single European Act)
- Aim of 'Sustainable Development' first formulated in 1992

The EU's environmental policy was finally launched from the 1970s. Environmental measures only entered EU-level policies from 1987, and automobile countermeasures from the 1990s. Euro 1 was introduced in 1992 and Euro 4 in 2005.

The EU Environmental Policy

Development of Common EU Environmental Policy:

- 1990s begin of EC/EU active automobile policy and environmental legislation: Euro 1 norm (92), Euro 2 (96), Euro 3 (2000), Euro 4 (2005)
- 1999: Recommendation regarding CO2 emissions issued
- Target until 2004: Lowering CO2 emissions to 175g/km on average for all newly registered cars in the EU
- Free-will commitment of all producers belonging to ACEA, JAMA, and KAMA car producers associations

The EU Environmental Policy

Actual Issues Concerning the Car Industry:

- Introduction of Euro 5 norm decided for 2009 and Euro 6 norm for 2014
- Projected target for CO2 emissions for 2008 of 140g/km very likely not to be reached (only Renault's and Fiat's fleet might clear the hurdle on average)
- Target of 120 g/km to be reached until 2012 under discussion: Especially German premium maker are urging for a more flexible approach.
- Threat of the EU commission to push for a binding legislation if car makers fail to meet the targets

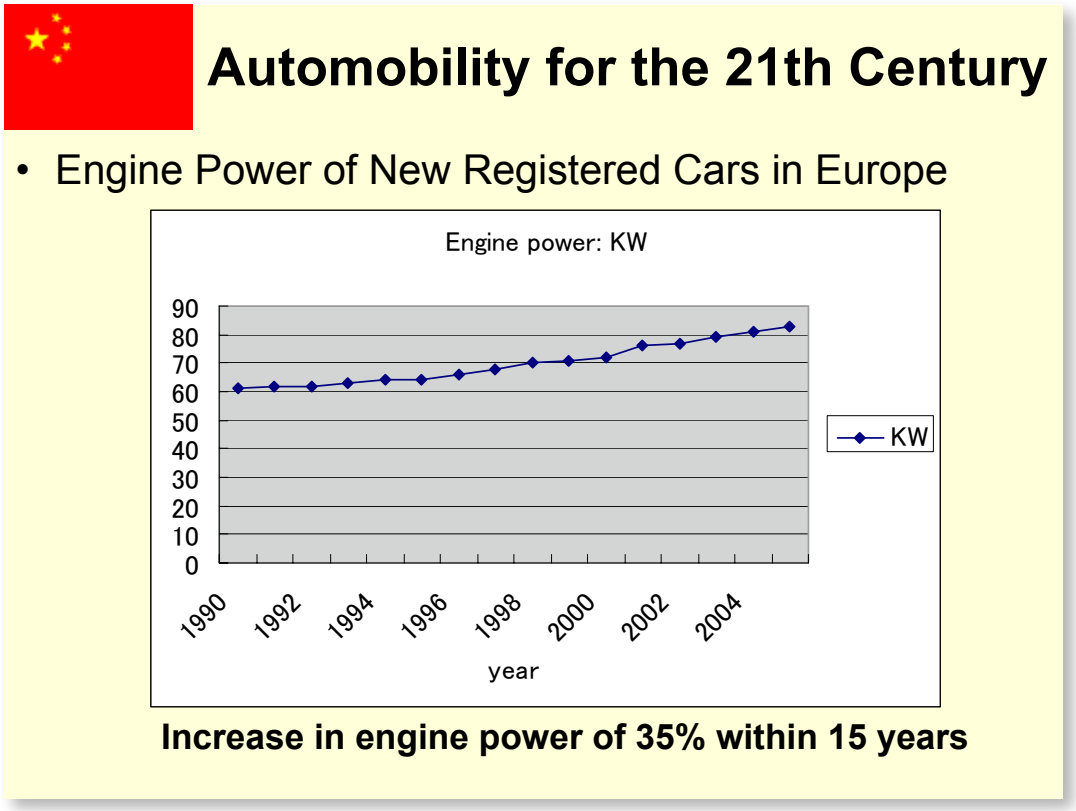
Euro 5 is scheduled for introduction from 2009 and Euro 6 from 2014. However, the 2008 target is not likely to be reached (only Renault, Fiat and other manufacturers of small cares are expected to achieve the target). The outlook is that automakers will not be able to achieve the target for 2012, either.

The EU Environmental Policy

- **Considerations and Questions:**
- The success of Europe's integration is based on commonly shared values: Western style democracy, social market economy, freedom and human rights: ⇒ What would be the shared values of an Asian Alliance?
- The (relative) success of the environmental policy of the EU is based on its supranational organization, especially the independence of the EU Commission and the Parliament: ⇒ Therefore: To what extent would the Asian nations be willing to give power to supranational institutions?
- Europe's environmental policy developed as a part of an ongoing market integration: ⇒ Therefore: What would be the basis of a common Asian policy?

While the EU is based on shared values, to what extent can Asian nations share a common understanding? The EU's environmental policy has succeeded because it stands above the governments of each nation, and is based on a unified market. What would the basis be for an Asian environmental policy?

Next, let us consider what is the ideal automobile. The answer to this changes with the times. During the 1930s, when there was no road infrastructure, it was the Ford Model T. During the '50s and '60s, it was the VW Beetle, a car without status. During the 60's it was the Mercedes 180, with its high level of safety. The popular cars for the 1970s were the Renault 4, family cars, women's cars, farmers' cars and cars for entertainment. Toyota was the car of choice during the 1980s. There were no ideal cars from the 1990s.



Technological advances have worked to increase engine power (the increase in power has been faster than the rise in engine displacement). There are many cars that are not ideal including SUVs, crossovers, light trucks, and vehicles with more than 300 horsepower. Today the ideal car may be the VW Polo, which runs 30 km on a single liter of fuel.

CARS 21: Blueprint for a Sustainable Development of China's Car Industry

CARS 21: Competitive Automotive Regulatory System for the 21th Century

- High level group of the EU to make recommendations for the public policy and regulatory framework for the European automotive industry that enhances
  - global competitiveness and
  - employment in the industry, while sustaining
  - further safety
  - environmental performance
  - and price competitiveness
- Formed in January 2005, final report in 2006
- Roadmap for a new regulatory system within 10 years

CARS 21 is an abbreviation for Competitive Automotive Regulatory System for the 21st Century. This plan is designed to protect both the environment and the competitiveness of EU industry. It goes beyond just development to cover all related areas including law, safety, research and the environment. It includes technological standards, severe environmental regulations, taxes based on CO2 emissions, and the promotion of small-sized vehicles. I think that CARS 21 might serve as a model for China.

CARS 21: Blueprint for a Sustainable Development of China's Car Industry

Considerations and Questions:

- With respect to developing its car industry, China's orientation is on Japan and Korea of the 1960s and 1970s respectively. With regard to motorization it is focusing on the American model that has developed even much earlier. ⇒ China should develop its own model focusing on sustainable development. CARS 21 could be a blueprint for that.
- The car will be also in the future **one** important means of transport, but it won't be the only one. ⇒ China as other developing countries with a very large population should focus on modern and effective public transport systems that are supplemented by the car, not the other way round.

In closing, I would like to say that while automobiles are certainly important, I think that trains and other means of mass transport will also be important for China.

Comments, Questions and Answers

Eiichi Yamaguchi

I found Professor Bungsche's point about Asia lacking a common will particularly impressive. In the future, the Chinese automobile market may grow by 17 times with 99% of the vehicles likely to be made in China, which apparently cannot achieve Euro 3. What should Japan do amid these developments? Please feel free to present your comments and questions.

Comment: Hisashi Hayashi (EQ Planning & Development Div., Toyota Motor Corp.)

As Prof. Bungsche noted, there may be no common will between Japan and China. The fact is that if we simply transfer Japanese emissions technologies, this will lower the competitiveness of Japanese enterprises. I have no answer to this point, but I think it needs to be considered.

Comment: Yuji Sakai (Kogakuin Univ.)

While I am not an automobile expert, considering air pollution in China, I learned that China has also given consideration to air pollution regulations covering SO2, NOx, etc. To date, Japan has only looked at this in terms of technology transfer, but by itself that does not provide any incentive to the Chinese side. We should recognize that China wants to manufacture environmental technologies itself and realize the economic effects. I have worked in the harsh field of atmospheric pollution and desertification. There are various problems involved with implanting technologies in the field. It is extremely difficult. Moreover, if we expand the viewpoint to Asia and the world, Chinese air pollution has a great impact on other countries. I think an approach adopting a broader framework is preferable in terms of both environmental health and economics.

Question: Shizuo Hoshiba (ESRI)

Professor Sadakata presented a system whereby desulfurization contributes to desertification countermeasures. I would like to ask Professor Li about the effective use of byproducts and the relation with water resources.

Answer: Zhidong Li

In addition to air pollution, China is also facing a serious water shortage. Northern China accounts for 40% of the population and 60% of the arable land supporting 1.3 billion people, but with just 20% of the nation's water. Thus the dry desulfurization process that Professor Sadakata presented, which also contributes to improving cropland, is truly a wonderful sustainable technology. With your help, Tsinghua University is improving the desulfurization technologies.

Yet I think it is a shame that even while European and Japanese industries have technologies these have not been widely introduced into China. China's desulfurization would be far more advanced if all of the Japanese industries were making the types of efforts being pursued by Professor Sadakata.

Europe is adopting a different approach from Japan. The Europeans issue licenses and have Chinese engineers sent to Europe, who then operate the systems in China and improve them to meet the local conditions. It is unfortunate that Japanese companies do not adopt that method.

China's environmental problems affect the entire world, not just China.

Japan has comparative advantages over China, and these are not being fully utilized out of the strong belief to date that if technologies are transferred they will be copied and that Japan will lose its advantages. Without a doubt, the Chinese side does need to improve its protection of intellectual property rights, but that alone does not account for why Europe's approach is more advanced than Japan's.

Japan should have a stronger sense of crisis. The technological gap between Japan and China is narrowing at an accelerating pace. Coal technologies are one example. If China can achieve domestic coal gasification technologies, costs will be reduced and China will no longer introduce Japanese technologies. If Japan does not properly bring forth its technologies to some extent and gain revenues, it will eventually lose its comparative advantages.

Question: Yamaguchi Eiichi

I understand that China has been introducing wet desulfurization technologies from Europe, and that Professor Sadakata has been advancing a dry method which is more appropriate for China because it does not require water. What are the present conditions of these efforts?

Answer: Masayoshi Sadakata

The operation of our dry method pilot plant is reaching its limits and we need to construct a practical-scale plant as the next step, but we are having difficulties in achieving this. For technology transfer, the orthodox style is via corporate bodies. So it is difficult to gain credibility and we are encountering various difficulties in advancing technology transfer depending on ties linking universities and individuals with Chinese professors.

Question: Junko Okayama (JST)

I would like to direct a question to Dr. Watanabe.

What is the likelihood that the alliance you proposed could successfully achieve cooperation like that of the EU which would surprise the entire world? Also, what types of organs should we work through in China to advance this alliance?

Answer: Hiroyuki Watanabe

I am also concerned about this. One of the presenters asked if East Asia has a venue for the exchange of information or for shared awareness, and I also think that is precisely the problem.

What should we do about problems with the atmosphere, which is our common property? Forming a shared

understanding would be the first step toward forming an alliance. We need a venue to recognize the present conditions.

Toyota has recently been transferring state-of-the-art technologies to China. In ITS as well, we have the Chinese government looking at our cutting-edge technologies. Today worrying about losing advantages is not a sustainable approach. The government and the private sector must give priority to what must be done, without getting caught up in the small stuff.

As mentioned before, the Chinese automobile market is projected to grow to 17 times its present level in the future. That means China will have the world's largest automobile industry. By that time, China will be manufacturing automobiles which are the global standard, and we may then have to learn from China. It is important to start building up an alliance from now.

Question: Shinya Numata (JST)

I would like to ask a question from the perspective of a global alliance. Sharing understanding may make it easy to share environmental problems, but I think Japan and China hold largely different goals. Although Japan is strict, I think China is quite lax. I wonder if this would differ depending on the formats used by Toyota and other large corporations, and for projects like those introduced by Professor Sadakata.

Zhidong Li

I think it is impossible to say across the board what the goals would be if a global alliance or Asian alliance were formed to prevent air pollution. Rather, the question is what we should do to move one step forward. I think that ultimately the future targets will be determined when China and Japan achieve the same type of standards. If the goals are set too high, there will be a lot of opposition and the alliance could collapse.

Eiichi Yamaguchi

What about setting goals for some years forward in the future, such as setting achievement goals for the year 2050. With that approach, we can then draw a line from there and set short-term goals.

Zhidong Li

We should clarify the goals for the far future and then hold discussions in line with our present capabilities.

Hiroyuki Watanabe

I agree with Professor Li's comment. I think we will draw the near-term goals from the long-term goals. Technologically, advances are achieved when the hurdles are high. In that sense, to benefit the competitiveness of East Asia, it is better to set rather high goals. We must think of innovations that will change everything – vehicles, fuels, and cities.

Masayoshi Sadakata

Among government, corporate and individual alliances, those at the individual level work best. While there may be slight conflicts of interest, there are also relationships of trust, so the conflicts can be overcome. The parties share common long-term goals. But alliances are no good outside the individual level. The government level is the worst. If you look at history, things have not gone well. It is very difficult to build up trust between governments. The individuals in charge change after a short time, and in particular long-term cooperation does not go well. Trust is the most important item, and then continuity becomes important. At the very least, I think the work will have to be maintained for 20 or 30 years. In my personal case, one generation will not be sufficient, and I am training successors.

Holger Robert Bungsche

I think there is potential at both the individual level and the company level. But for environmental problems, organizations are necessary and this also concerns competitiveness. I do not agree that an East Asian alliance is not feasible. For example, just after the conclusion of the Second World War no one would have thought that an alliance between Germany and France would become possible.

Hiroyuki Watanabe

For an alliance, above all the important thing is to start. Even this does not work out in our generation, there is always the next generation.

Lin Sun

While some have spoken about different values, I think that values are irrelevant to the practical solution of problems, although values will be relevant at the stage of actual problem resolution. There is a market-type framework for CO2, but what about SOx? Environmental technologies are born from the long years of suffering of a few people in the industrialized nations. We have gained them from the struggles of a handful of Japanese, but these tend to be viewed as the pride of the entire nation.

Itaru Yasui (UNU)

Today it has been noted that Japanese technologies are not moving into China, but this may be because Japan does not have technologies that are appropriate for China. Japan faces unique issues. We have strict environmental regulations, and our industrial electricity is extremely expensive. Japanese companies focus their efforts on this situation. For example, I think Toyota and other firms could quickly produce cars that meet the Euro 3 standards, but they have not been pressed by the necessity to do so. The scale of the Japanese market is not huge but substantial, and companies can survive by just supplying the domestic market. In Europe there are many small countries, so companies have to produce at the EU level.

Japanese enterprises have already developed technologies for the domestic market, and do not require new

technologies. While China may need technologies, Japanese firms have no incentives to develop technologies for China.

Eiichi Yamaguchi

If trust is the first step toward an alliance, I think the potential for an automobile emissions alliance is small. Perhaps China needs to consider its own approach. What do you think about this idea?

Lin Sun

The incentive for China to develop its own technologies is that Japan does not provide its technologies, and the licensing and other technical fees are too high. This is why China considers independent technology development. DVDs are a good example. Japan is thinking about how to use its advantages and how to preserve them.

Eiichi Yamaguchi

We need to establish some sort of alliance as quickly as possible. Do you have any suggestions on how we can take the first step? It is all right if we address the desulfurization and automobile emissions problems together or separately, but in the end our efforts will be meaningless unless both issues are covered.

Itaru Yasui (UNU)

I think the only approach is to begin with discussions of the long term. With SOx, acid rain is falling on Japan and the ozone layer is being depleted, but Japan has not actually suffered any fatalities. How much importance does the Chinese government place on the health of Chinese citizens? We may be at the stage where China needs to learn from Japan. Japan has overcome the belief that environmental measures do not pay, and Europe and the US have also largely gone beyond this.

Hiroyuki Watanabe

I think we can share a common understanding regarding the desired future conditions of East Asia. I think it is wonderful that the members of the European Commission can put aside thoughts of their individual countries for the benefit of the EU as a whole. Similarly with shared values individuals will come forth who will think for all of East Asia. Methods are appearing that will allow us to enjoy the convenience of automobiles without spending vast sums of money.

Motoki Korenaga (METI)

Personally, I agree with Prof. Sun's evaluation of the present conditions. We need to think about both long-term and short-term aspects. The East Asia Summit, APEC and other bodies can address the long term, but what about the short term? If there is a market, then the technologies can be bought. If a market cannot be formed because

of systems differences between China and Japan, I want to be taught about those differences. And even if there is no market in Japan, I want to know the reasons why Japanese firms are not targeting development for the Chinese market, which is larger than the market in Japan.

Itaru Yasui (UNU)

I think this is because we learned that the risk-reward balance in China is not as great as the Japanese thought it was at one time. While the situation in China has probably changed since then, there is a perception that Chinese systems are unstable based on past experiences, for example, all plans having ended up in failure at the regional government level.

Hiroyuki Watanabe

Those types of events occurred around 10 years ago, but the conditions are changing. For example in Tianjin a state-of-the-art factory and an old factory exist side by side. This is truly a masterly performance. When we conduct business in areas where the relationships of mutual trust are weak, however, we are subjected to damages when the Yasukuni Shrine and other problems emerge.

Lin Sun

I think that political issues are completely irrelevant now. The Toyota Prius is assembled in China, but only a few thousand units are sold. Toyota is receiving subsidies in Japan and I think their real intention is toward the same sort of business model for China.

Hisashi Hayashi

I understand the need to discuss both the short term and the long term. However, I think how to build up an alliance by transferring technologies to Chinese companies is a difficult point.

Masayoshi Sadakata

Some of the technologies that have supposedly been introduced to China have failed to spread. METI and other bodies do not really understand the depth of the environmental problems in China. Without actually traveling to China, living there for several months, and experiencing the situation directly, the projects will not be effective. Projects do not work just simply they are for the purpose of Japan-China friendship. Continuity is also important. We need a system of Chinese specialists who work for decades.

Makoto Watanabe (Nippon Keidanren)

I am responsible for international standards, and continuity is raised as a major problem. METI serves as Japan's representative, but the individuals in charge change every few years, and we see this as a problem. The intentions of the first individuals involved may not be carried forward to their successors.