



IIASA Conference '07

To Establish a Sustainable and Harmonious World

Prof. Jiang Zhenghua



International Institute for Applied Systems Analysis
Schlossplatz 1, A-2361 Laxenburg, Austria
Tel: +43 2236 807 Fax: +43 2236 71313
www.iasa.ac.at

Summary

The Second half of the 20th century was an important period of time in human history. The century was characterized with unparalleled fast socio-economic development, population growth, depletion of natural resources, deterioration of environment and international conflicts. What will be the future of our human society in the new century? How do we guide the world toward the direction of sustainable and harmonious one? There are many problems for us to find an optimum solution. We are facing a lot of opportunities and challenges. But the future is in our hands.

A 1. Energy Consumption

In the last 50 years, the annual consumption of petroleum increased by more than 6 times. The annual consumption of coal and natural gas increased by 2.6 and 13.5 times respectively in the same period. We are running out of the world fossil fuel. New energy resources should be put into use no matter the high exploitation cost we have to pay.

A 2. Energy Consumption

The modern economy growth is closely related to the fossil fuel consumption. The petroleum is the most important energy resource today. According to some international energy research institutes, when the price of petroleum rises by 10 U.S. dollars/barrel, the world economy growth rate declines by 0.5%. Table 1 gives the world economy growth rates over last 55 years. Although the world made great efforts to increase the efficiency of energy use(see Table 2), the demand of energy supply will increase quickly in next 25 years (see figure1 and figure2).

At the same time, the supply of oil will also rise. But the reserves of oil will decline to a dangerous level. The price of petroleum may rise to a critical level which will be unsafe to the world. The actions could be:

- upraise the efficiency of oil use
- control the demand on oil
- develop replaced energy and renewable energy
- establish oil strategy storage system

Table 1. World Economic growth by Decade

Decade	Annual Growth of World Economy (per cent)	Annual Growth per person (per cent)
1950-60	4.9	3.1
1960-70	5.2	3.2
1970-80	3.4	1.6
1980-90	2.9	1.1
1990-2000	3.4	1.9
2001-2005	4.2	2.9

Sources: World Bank

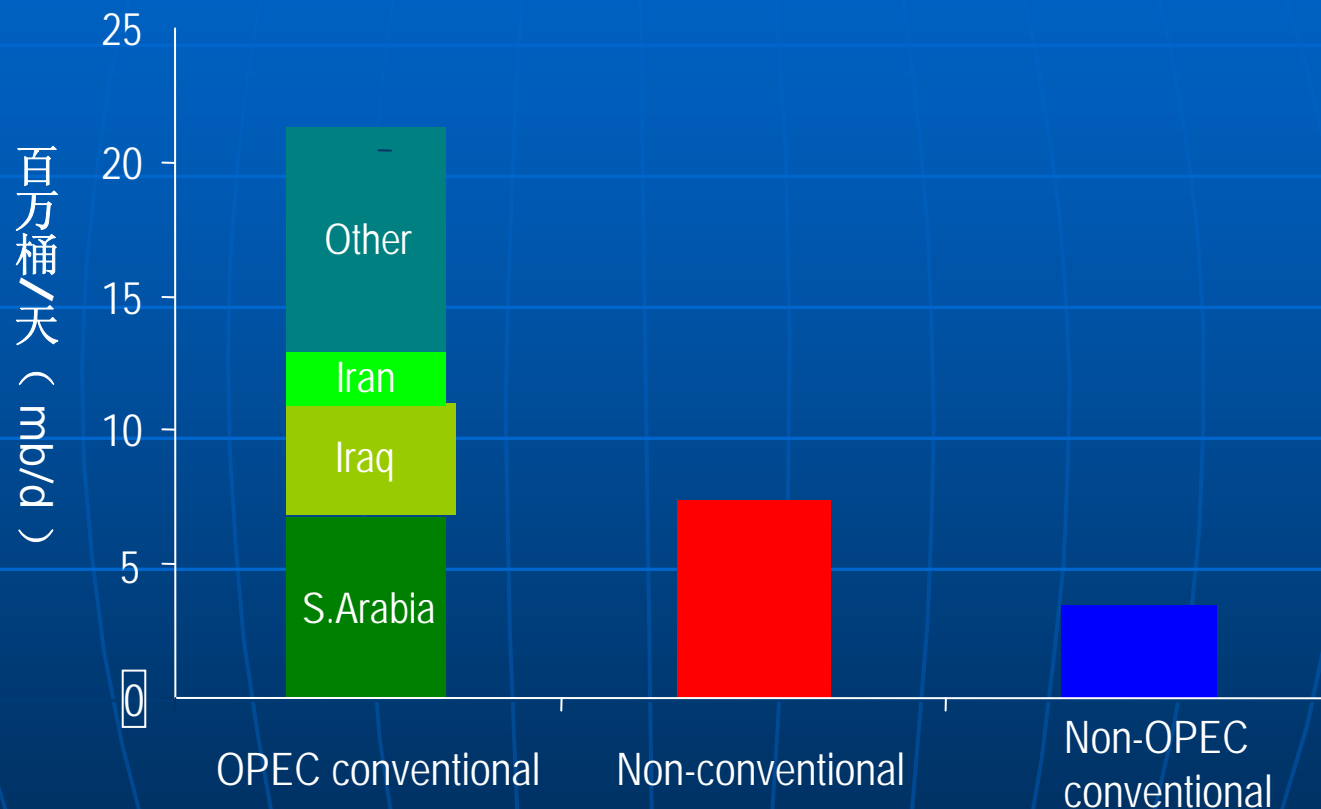
IMF: World Economic Outlook

Table2. Energy Efficiency

country	GDP per Unit of Energy Use (ppp \$per Kg of oil equivalent)					
	1990	1995	2000	2001	2002	2003
World	3.88	4.09	4.55	4.65	4.70	4.72
China	2.06	3.19	4.35	4.73	4.75	4.54
India	3.96	4.21	4.76	4.93	4.97	5.23
Japan	6.54	6.28	6.29	6.38	6.36	6.48
Korea,Rep	4.53	4.15	3.98	4.06	4.41	4.22
Canada	3.04	2.98	3.33	3.45	3.54	3.44
United States	3.67	3.85	4.16	4.29	4.35	4.51
France	5.48	5.52	5.88	5.81	5.94	5.86
Germany	4.69	5.53	6.10	6.01	6.15	6.10
Russian federation	1.79	1.50	1.69	1.73	1.84	1.93
United kingdom	5.93	6.06	6.75	6.81	7.04	7.09

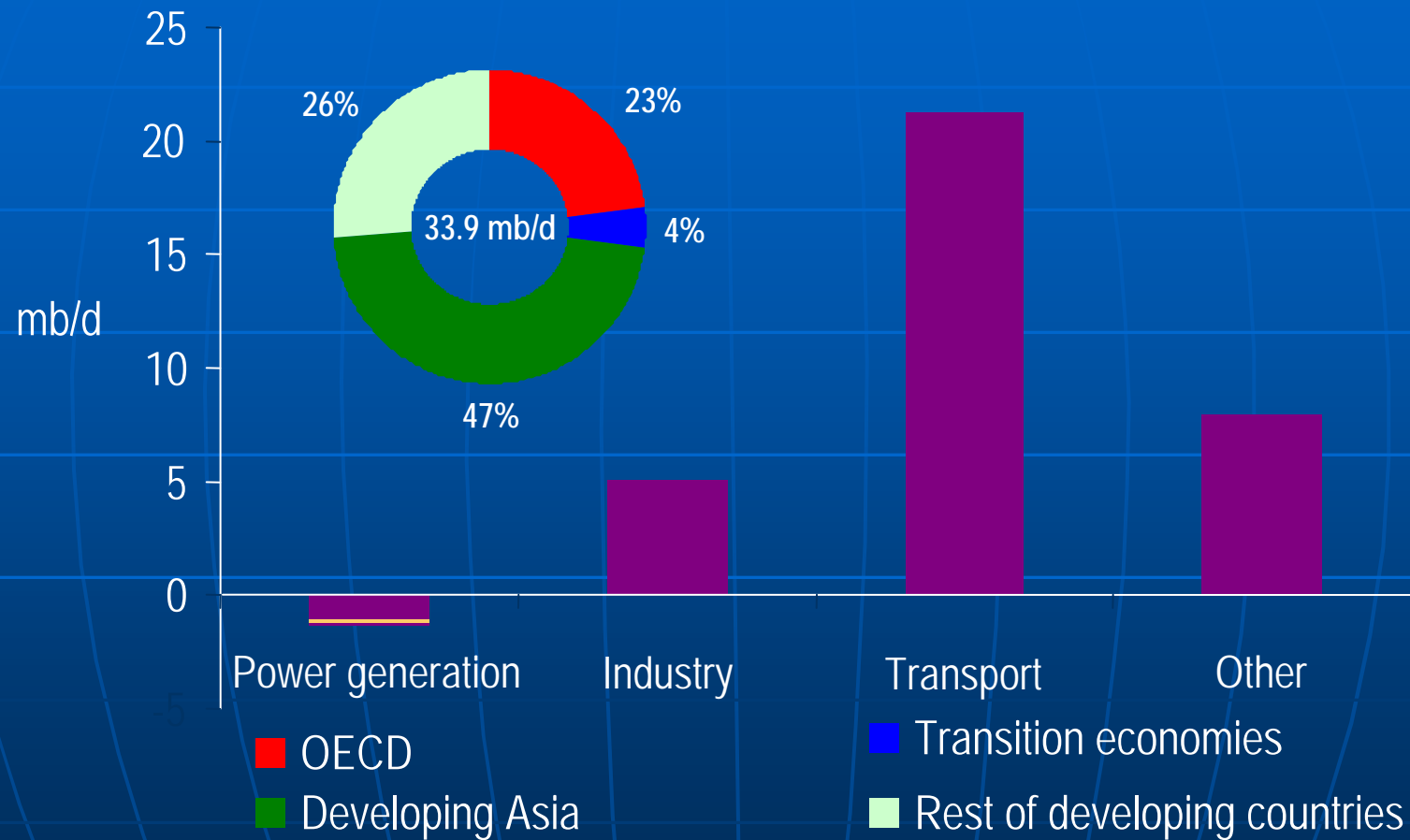
Source of data : selected from World Bank

Figure 1. Reference Scenario: Increase in World Oil Supply, 2004-2030



The share of OPEC in world oil supply increases sharply as conventional non-OPEC production peaks towards the middle of next decade

Figure 2. Reference Scenario: Oil Demand Growth, 2004-2030



Most of the increase in oil demand comes from transport sector – driven by developing countries

B 1. Population Growth

In the past 50 years, the world population had increased from 2.5 billion in mid 20th century to more than 6 billion. However, the high growth rate of population was repressed in recent years. But new population issues request the international society to cooperate.

B 2. Population growth

Population growth rate used to be very high in most time of the 20th century. This trend was curbed in recent years. The world population growth rate reduced from 12.5‰ in 2000 to 11.6‰ in 2004. The regional difference of fertility and mortality is quite big. Even in regions with high birth rates and death rates, the situation is changing for the better. It seems that the detonator of population burst was moved away.

New population problems:

— Ageing problem in many countries is already there. But the situation may change to worse in the future. Actions should be taken to establish a sustainable social security system to protect the welfare of aged people not only for pension system but also for special service arrangement.

— Employment issues :Along with the economic development, the employment problem is getting serious. Globalization causes industry transition among different regions and countries. It may have negative impacts to some groups like older workers or workers with limited education. The solutions are: to create new position, to improve education system, to enhance social service etc.

Age Composition and Dependency Ratio of Population (2005)

Age Composition (%)

Country or Area	Persons ages 14 and below	Persons ages 15 to 64	Persons ages 65 and above	Dependency Ratios
World	28.2	64.5	7.4	56.5
China	20.2	72.2	7.6	42.9
India	32.1	62.7	5.3	59.6
Israel	27.8	62.1	10.1	61.1
Nigeria	44.3	52.7	3.0	89.7
South Africa	32.6	63.1	4.2	58.4
Canada	17.6	69.3	13.1	44.4
United States	20.8	66.9	12.3	49.4
Brazil	27.9	66.0	6.1	51.5
Italy	14.0	66.0	20.0	51.5
Spain	14.3	69.2	16.5	44.5
Australia	19.6	67.7	12.7	47.8

Sources: World Bank Database

Educational Composition of Economically Active Population (%)

Country or Area	Primary Education		Secondary Education		Tertiary Education	
	2000	2001	2000	2001	2000	2001
Israel	15.2	14.4	35.3	35.1	48.6	49.6
Korea, Rep.	14.8	14.2	43.5	43.7	24.0	24.9
Canada	18.0	17.2	31.0	30.3	51.0	52.5
Italy	47.6	46.7	39.8	40.2	11.4	11.9
Spain	53.9	52.0	19.0	19.6	26.6	27.9
Australia	29.3	35.5	43.0	35.3	27.6	29.0

Sources: World Bank World Development Indicators Database

Educational Composition of Unemployment (%)

Country or Area	Primary Education		Secondary Education		Tertiary Education	
	2003	2004	2003	2004	2003	2004
Israel	20.2		48.8		27.0	
Korea, Rep.	15.7	17.0	52.9	53.4	31.3	29.6
Canada	29.0		30.8		40.2	
United States	18.4		34.8		47.3	
Spain	56.0		20.4		22.7	
Australia	50.0	48.3	32.0	32.7	17.9	19.0

Sources: World Bank World Development Indicators Database

Strikes and Lockouts (2005)

Country or Area	Strikes and Lockouts (number)	Workers Involved (person)
Hong Kong, China	1	----
Korea, Rep.	287	117,912
India	458	2,295,183
Israel	57	103,666
South Africa	49	395,301
Canada	292	428,664
United States	22	99,700
Brazil	304	1,289,332
Italy	654	960,854
Spain	685	404,759
Australia	501	228,265

Sources: ILO, LABASTA
Some figures referred to 2004

C 1. Deterioration of Environment

The human being is suffered from the deforestation, water and air pollution, global warming, soil erosion and biological problems for long time. The situation seems to change into the worse. The international society is in the urgent need of making joint efforts to take actions from many aspects. It needs the mutual understanding and cooperation of different countries.

C 2. Deterioration of Environment

— Deforestation and Freshwater : The deforestation situation is different in different countries and areas .The freshwater distribution is very uneven. Generally, the situation is good in developed countries and very serious in low income areas.

Deforestation and Freshwater

Country or Area	Average Annual Deforestation 10,000km ² Rate % (1990-2005)		Total Freshwater Resource per Capita (cu.m) (in 2004)	Annual Freshwater withdrawals as percentage of Total Resource (%) (1987-2000)	Freshwater withdrawals in 1987-2002 (%).		
					for Agriculture	for Industry	for Domestic
World	8348	0.1	6872	9	70	20	10
High Income	-714	-0.1	9703	10.4	43	43	15
Middle Income	4228	0.1	8611	6.4	71	19	10
Low Income	4834	0.5	3456	15.5	88	5	6
China	-2677	-1.7	2170	22.4	68	26	7
India	-251	-0.4	1167	51.2	87	6	8
Israel	-1	-0.7	110	273.3	62	7	31
Mongolia	83	0.7	13839	1.3	52	27	21
United States	-296	-0.1	9535	17.1	41	46	13
Brazil	2822	0.5	29460	1.1	62	18	20
Italy	-106	-1.3	3170	24.3	45	37	18
Spain	-296	-2.2	2605	32	68	19	13
Australia	282	0.2	24464	4.9	75	10	15

Source: World Bank World Development Indicators 2006

— Biodiversity and Nationally Protection actions: We don't know exactly how much creature live in the world. However, the speed of animals eliminated in the world is accelerated greatly. Nationally protected areas are helpful to protect the threatened species .

— Air pollution in cities: The air pollution is a serious problem in many countries. Reforestation is an effective way to relief the problem. Also, change the pattern of energy application and set strict standard on automobile and industry emission will be very helpful.

Nationally Protected Areas and Biodiversity (2004)

Country or Area	Nationally Protected Areas		Mammals		Birds		Higher plants	
	10000 sq .km	as Percentage of Total land(%)	Species	Threatened Species	Species	Threatened Species	Species	Threatened Species
World	1374.1	10.7						
High Income	583.4							
Middle Income	570.4	8.5						
Low Income	220.3	7.7						
China	72.7	7.8	502	80	1221	82	32200	443
India	15.5	5.2	422	85	1180	79	18664	246
Nigeria	3.0	3.3	290	25	899	9	4715	170
United States	237.2	25.9	468	40	888	71	19473	240
Brazil	56.7	6.7	578	74	1712	120	56215	381
France	7.3	13.3	148	16	517	15	4630	2
Russian Federation	131.7	8	296	43	645	47	11400	7
Australia	102.9	13.4	376	63	851	60	15638	56

Source: world bank world development indicators 2006

Air Pollution in Selected Cities of the World

country	City	Urban Population (million) 2005	Total Suspended Particulates (microgram per cu.m.) 2002	Sulfur Dioxide (mg per cu.m.) 1995-2001	Nitrogen Dioxide (mg per cu.m.) 1995-2001
China	Shanghai	12.67	81	53	73
	Beijing	10.85	99	90	122
India	Mumbai	18.34	74	33	39
	Delhi	15.33	177	24	41
Korea, Rep.	Seoul	9.59	46	44	60
	Taegu	2.51	50	81	62
South Africa	Gape Town	3.10	15	21	72
	Durban	2.64	29	31	—
United States	New York	18.50	22	26	79
	Los Angeles	12.15	36	9	74
Brazil	San Paulo	18.33	49	43	83
	Riode Janeiro	11.47	42	129	—
France	Paris	9.85	12	14	57
Australia	Sydney	4.39	22	28	81
	Melbourne	3.66	18	—	30

Source: World Bank World Development Indicators 2006.

— The Consequences of Climate Change:

- Reducing fresh water supply such as the decline of rainfall, withdraw of ice river, shrink of ice region in polar area.
- Spread of epidemics.
- Rise of sea level, about 70% of world population lived near sea. The rise of sea level will cause large scale migration which may turn to be a safety problem in some areas. Many islands may disappear.
- Increase the tension on food supply caused by decreasing in fresh water supply, sea level rise etc.
- Natural disaster such as flooding and drought in different areas etc.

D 1. International Conflicts

The 1st and 2nd World Wars happened in the 20th century. However, the international conflicts are increased in the last 30 years due to the serious competition in many fields. Globalization increased the conflicts among regions and different interest groups. A better arrangement in international organizations may be helpful to solve arguments.

All the problems are serious. We should have enough patience to solve these problems step by step. In this world, nobody could monopolize the international stage. To establish a sustainable and harmonious world is our common duty.

D 2. International Conflicts And New Challenges

People made great achievements in the 20th century but created more conflicts in this century too.

— Industry revolution caused serious struggle for land, raw material and lead to two World War in the 20th century. People try to build a mechanism so that the conflicts could be limited at certain degree. UN did reasonably well but need improvements.

— Culture, ideology and religion conflicts lead to a lot of regional war. The extreme form is the terrorism and disunion . We need toleration and political arrangement to solve disagreements.

— Internet is a good tool for socio-economic life. But the negative side of network should not be ignored. The negative impacts on privacy, piracy, pornography, pricing, policing and psychology become serious problem all over the world. Many countries made special laws and regulations to protect the network. Cyberspace is virtual but all the problems in real world occurred in the virtual space. Today, we need the international joint effort to finalize the protection of the network.

—What kind of world we expected:
a multipolar or monopole world?

A multipolar world will be safer and more comfortable for human being

- toleration to all people
- share achievement among societies
- solve conflicts peacefully
- to be fair among generations
- take responsibility to human being
- respect the soverienty of different countries.

We need a harmonious world



IIASA Conference '07

Thank You !



International Institute for Applied Systems Analysis
Schlossplatz 1, A-2361 Laxenburg, Austria
Tel: +43 2236 807 Fax: +43 2236 71313
www.iasa.ac.at