

Energy Outlook and Challenges of Northeast Asia

- A Quest for Sustainable Development -

August 4, 2008

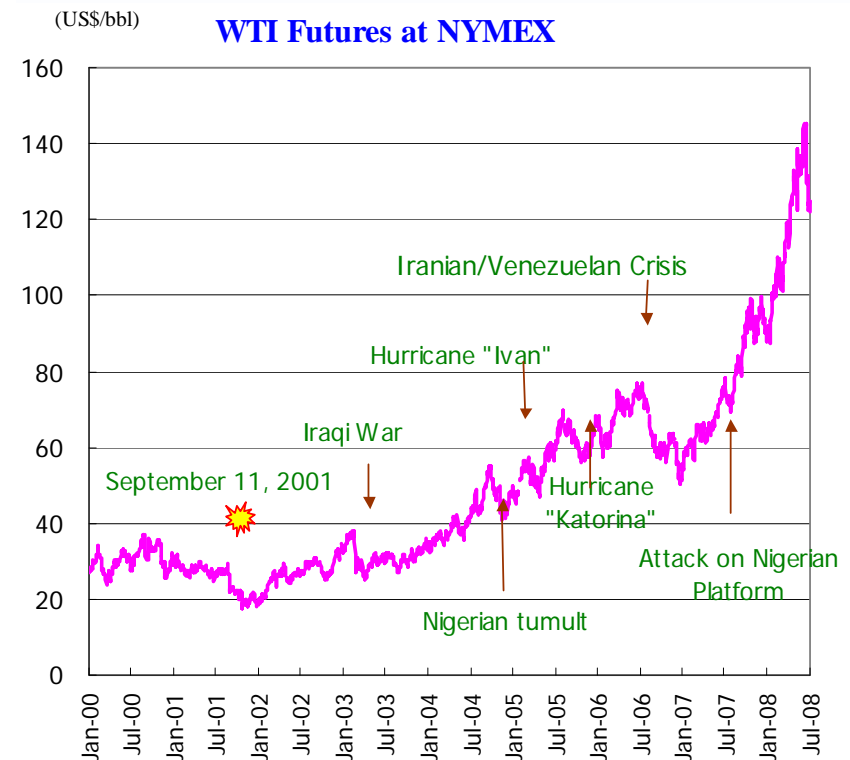
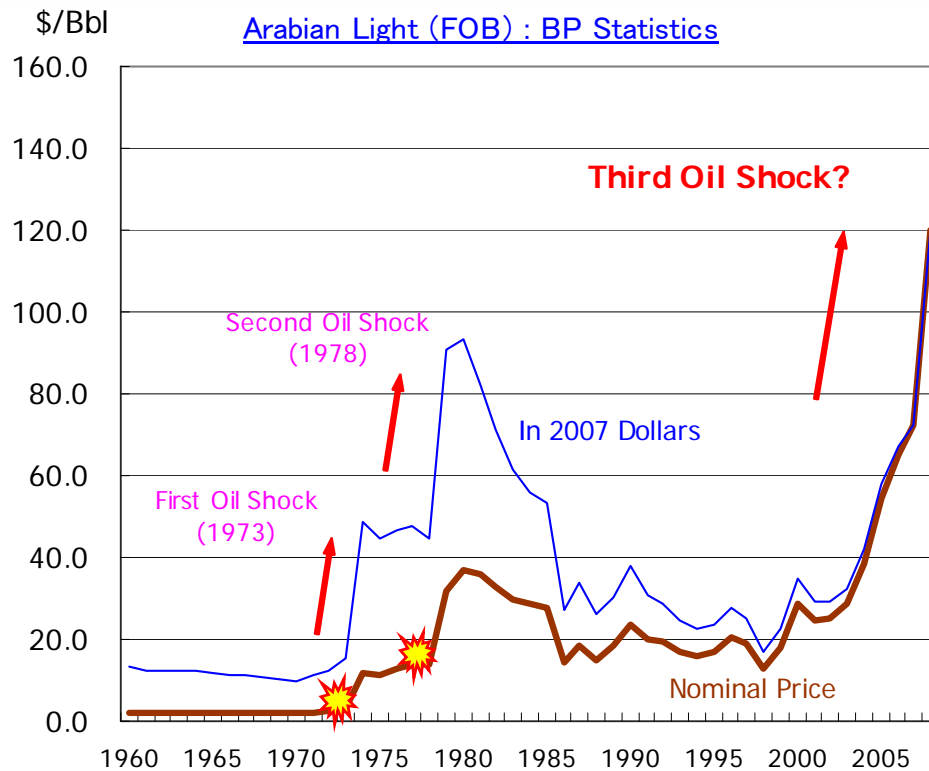
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1.1 Twin Challenges

1. Is this the 3rd oil shock? Or, is it possible to supply the increasing energy demand at affordable prices?
2. With increasing energy consumption, is it possible to control environmental pollution and global warming?

→ Energy prices are soaring fast and fluctuating violently

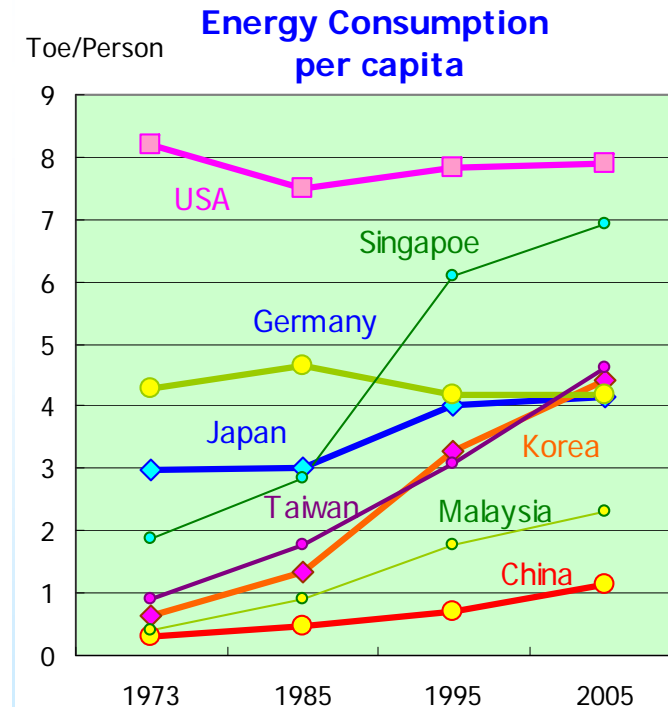
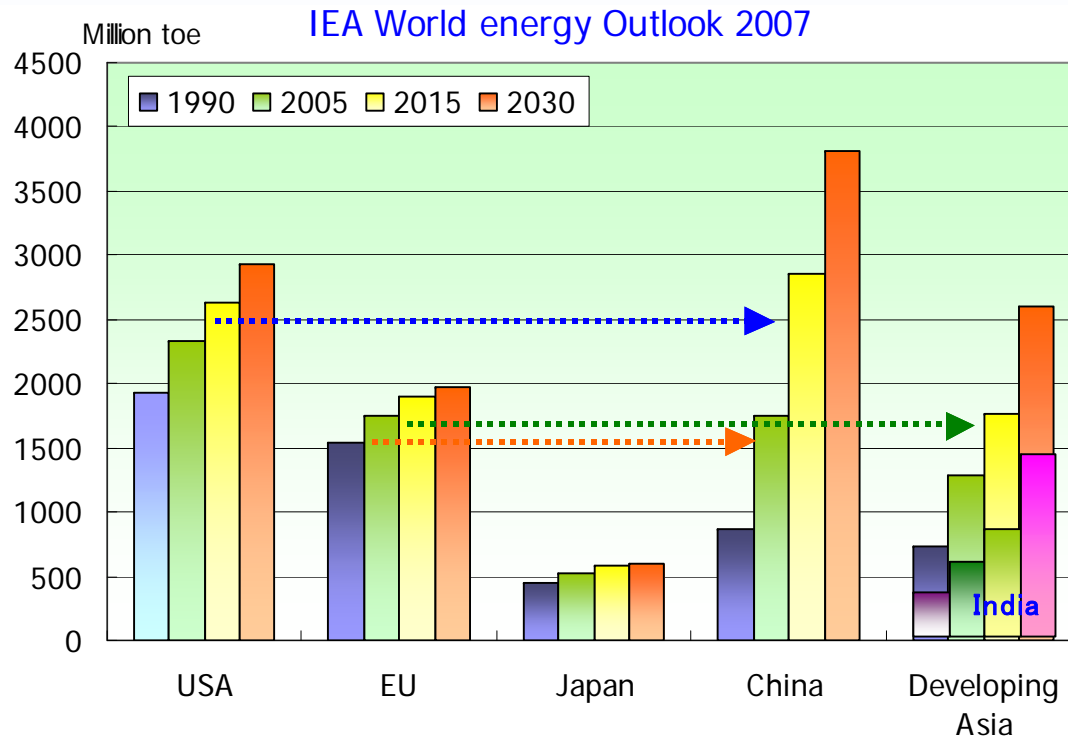


1.2 World Energy Outlook

IEA World Energy Outlook 2007 : China and India Insights

1. In 2005, China reached Europe in terms of energy consumption and will overtake the USA by 2015, becoming the world biggest energy consumer.
2. India and other southeast Asian countries are also increasing energy consumption fast. They, combined, will catch up Europe by 2015.

→ There are several countries in Asia whose per capita energy consumption has already exceeded that of Japan.



1.3 Peak Oil

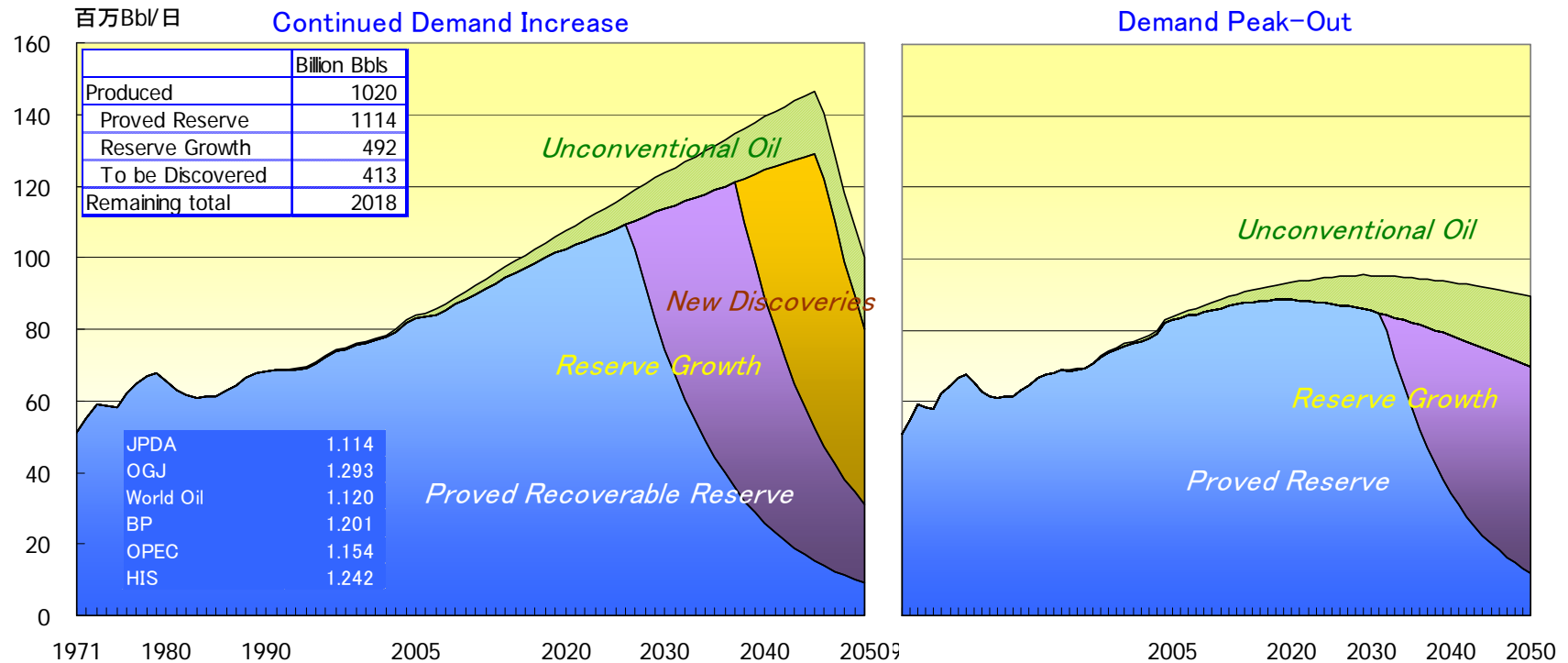
Remaining recoverable reserve of oil is 2 trillion barrels

(The 2007 Estimation by Japan Petroleum Development Association)

1. As the oil demand continues current increasing trend, oil production would face difficulties to keep pace with it before 2020.

(Graph is drawn assuming annual demand growth of 1.6% and R/P=10 years)

2. More views are coming up that the world oil production currently at 86 million BD would not exceed 100 million BD.

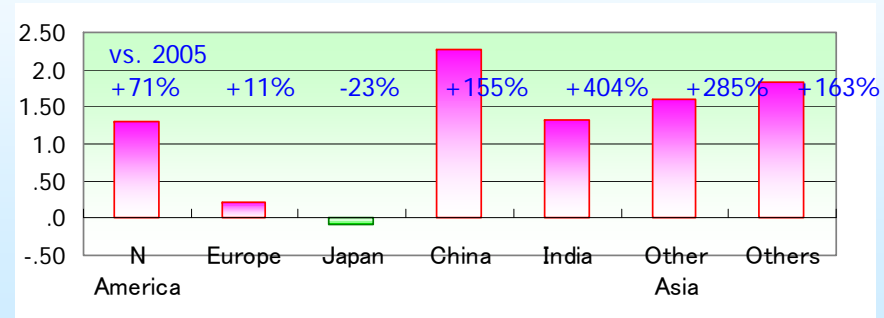
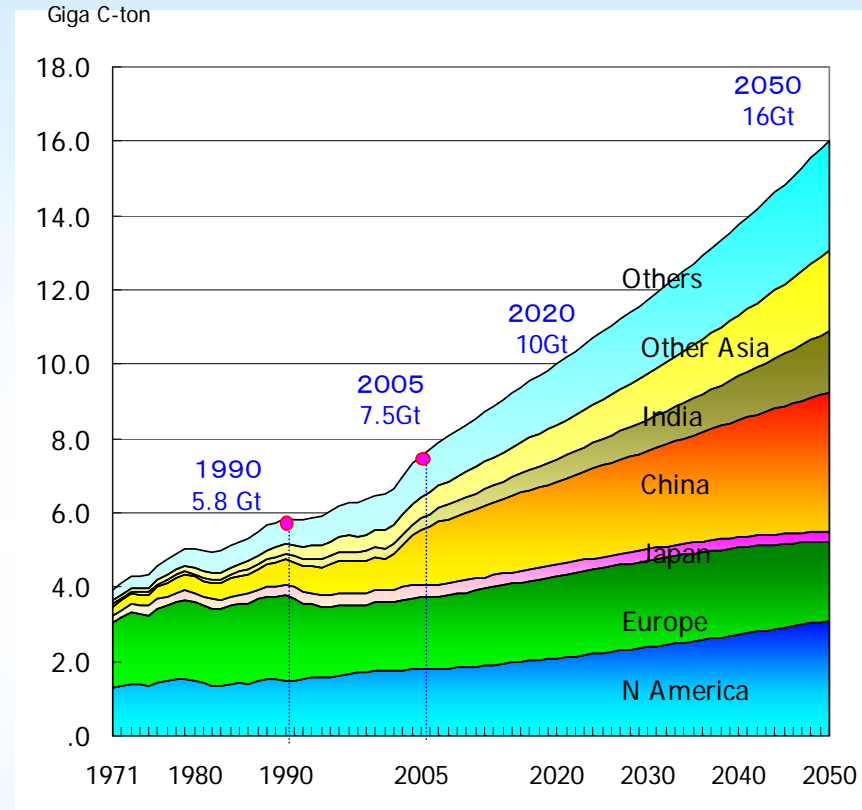


1.4 Outlook of CO₂ Emission

Estimation by IEEJ: BAU Case

1. World CO₂ emission will increase more than double by 2050.
2. More than 80% of the incremental demand will occur in developing countries.
3. Japanese emission may decrease slightly.
4. Emission increase of China will be largest sharing 27% of the world increase. India and US each shares 17%. Asian developing countries combined will share more than 60% of the world increase.

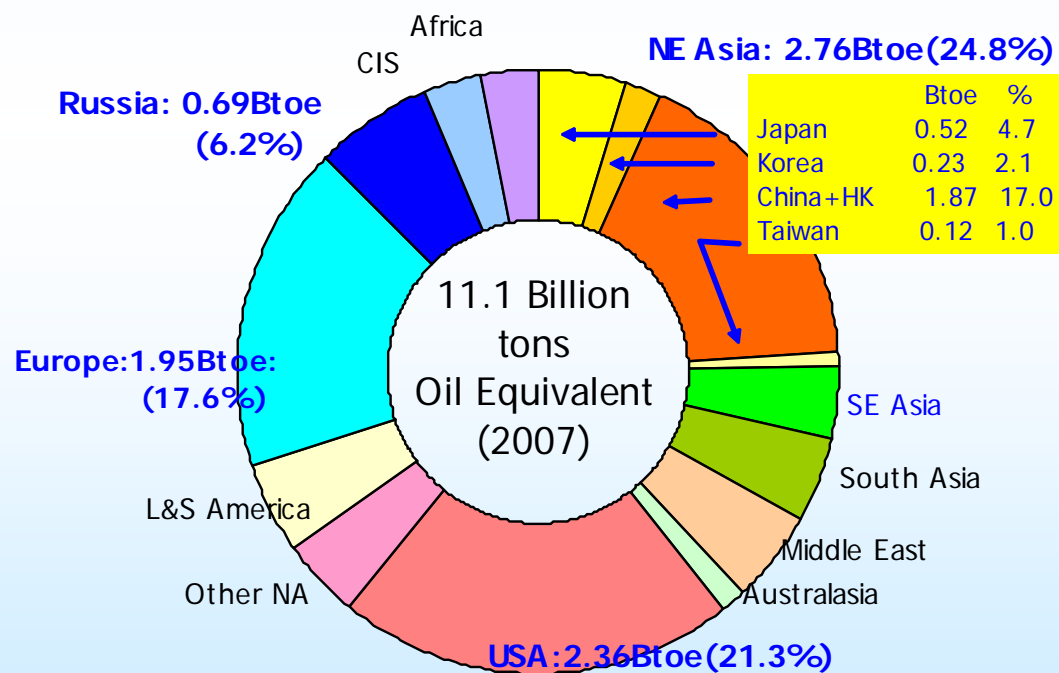
CO₂ emission of 2050 estimated above could be reduced more than 20% with enhanced technology development, greater EEC efforts and promotion of non-fossil fuel.



Source: IEEJ

2.1 Asia in the World

1. Northeast Asia is the world largest energy market exceeding the United States.
2. Asian energy consumption is expanding rapidly driven by the fast growth of China and India.



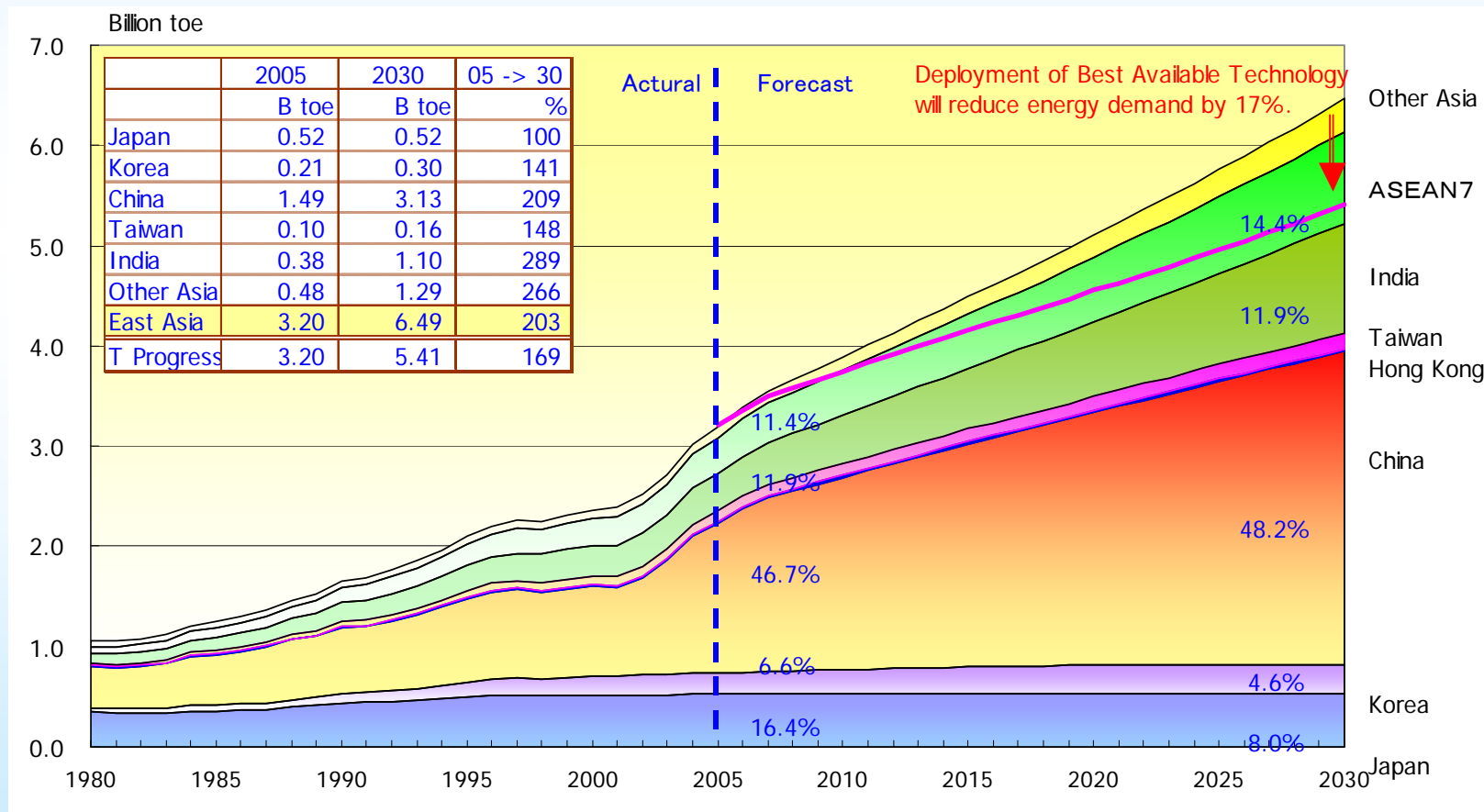
Source: BP Statistical Review of World Energy 2008

World Energy Consumption (2007)
Energy Total

	Oil Equiv. Mmtoe	Comparison	
		2000 %	1990 %
Japan	517	101	120
China	1890	185	271
India	404	136	224
Other East Asia	851	123	224
USA	2361	105	120
EU	1745	100	106
Others	3331	118	118
World	11099	119	137
Oil	Mmtoe	%	%
Japan	229	92	92
China	385	161	323
India	129	120	222
Other East Asia	394	111	197
USA	943	105	121
EU	704	100	106
Others	1874	108	107
World	3953	111	125

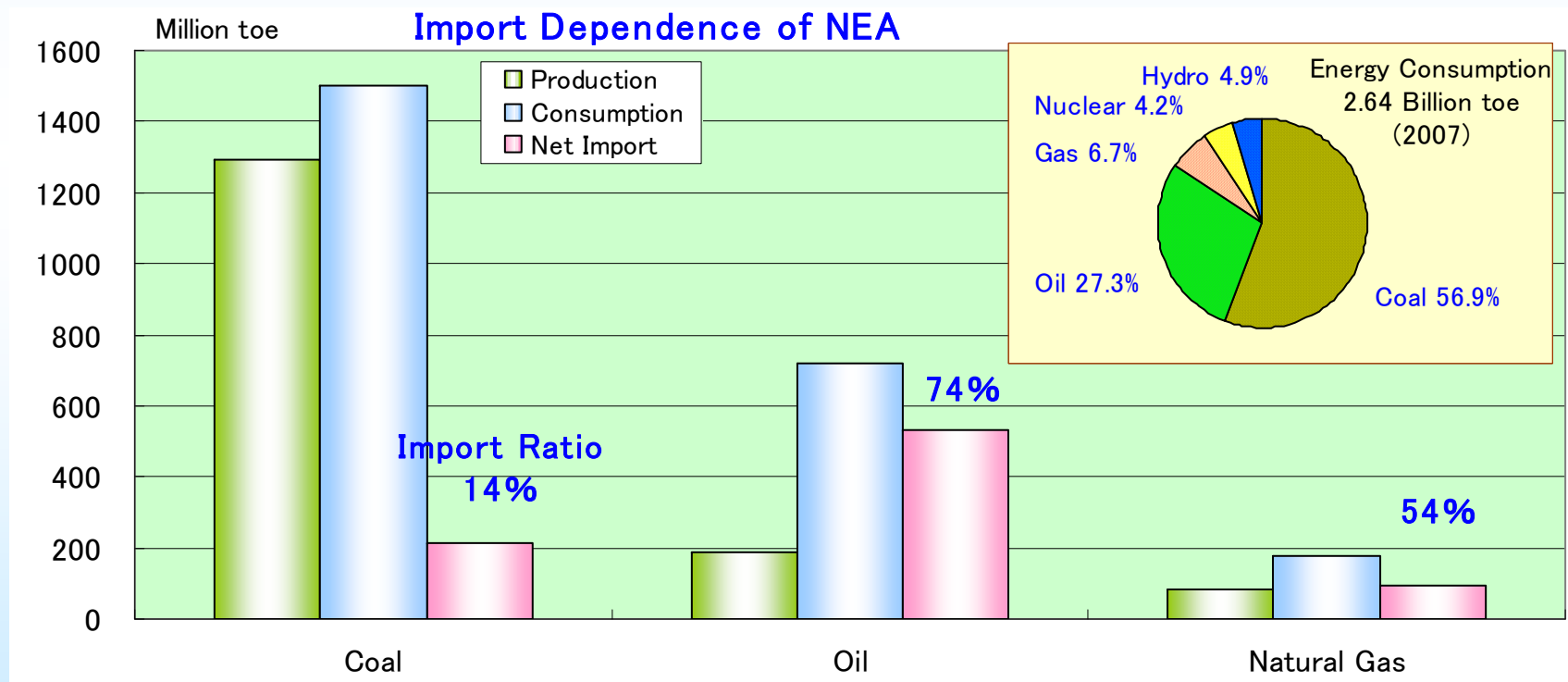
2.2 Energy Outlook of Asia

1. As energy consumption is peaking out in Japan (peak in 2004), it will more than double in developing Asia by 2030.
2. Energy demand of East Asia may be reduced by 17% with full deployment of the Best Available Technology (BAT).



2.3 Energy Import Dependence

1. China is the world largest coal producer. But, China is becoming a net coal importer as southern provinces are increasing coal import. Japan and Korea fully depend on import.
2. Oil and gas import dependence is high in Northeast Asia. China's oil import is expanding rapidly, casting serious security concern.



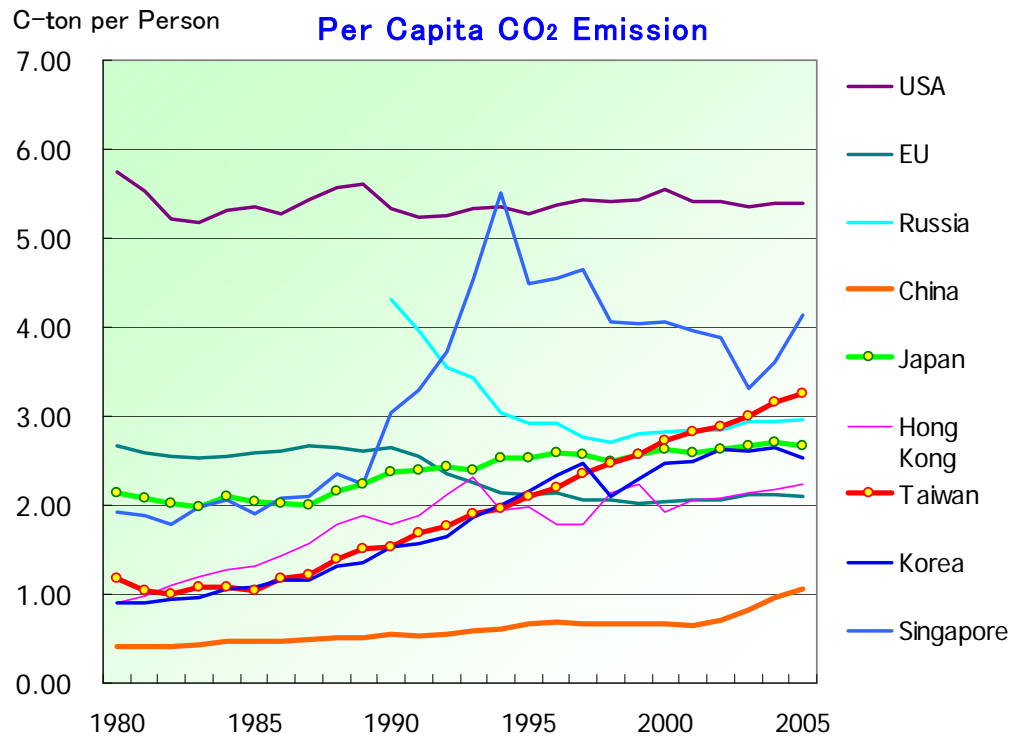
2.4 Per Capita CO₂ Emission

1. America's per capita CO₂ emission is by far the largest in the world.

Is it sustainable?

Competition between the poor in the developed countries and the rich in the emerging countries may become severe.

2. In Asia, some countries are emitting more CO₂ than Japan in per capita basis, maybe reflecting their energy intensive industry structure.



	C-t	%
USA	5.4	202
EU	2.1	79
Russia	3.0	111
China	1.1	40
Japan	2.7	100
Hong Kong	2.2	84
Taiwan	3.2	122
Korea	2.5	95
Singapore	4.1	155

Source: IEA & IEEJ

2.5 Challenges facing Northeast Asia

1. Challenges caused by increase of energy consumption, admiration for better quality of life.

1) Energy Security

→ How to secure energy supply that is stable in quantity and price in order to safe guard national interest for sustainable economic development.

2) Global Warming

→ How to take responsible action as citizen of the earth against the global warming issue that is the common disaster for the human being.

2. Counter Measures

1) Reduce energy requirement as much as possible

→ Energy efficiency and conservation

→ Reform of industrial structure, change of life/business style

2) Reduce consumption of import energy and fossil energy

→ Promotion of nuclear and renewables

3) Reinforcement of fossil energy security

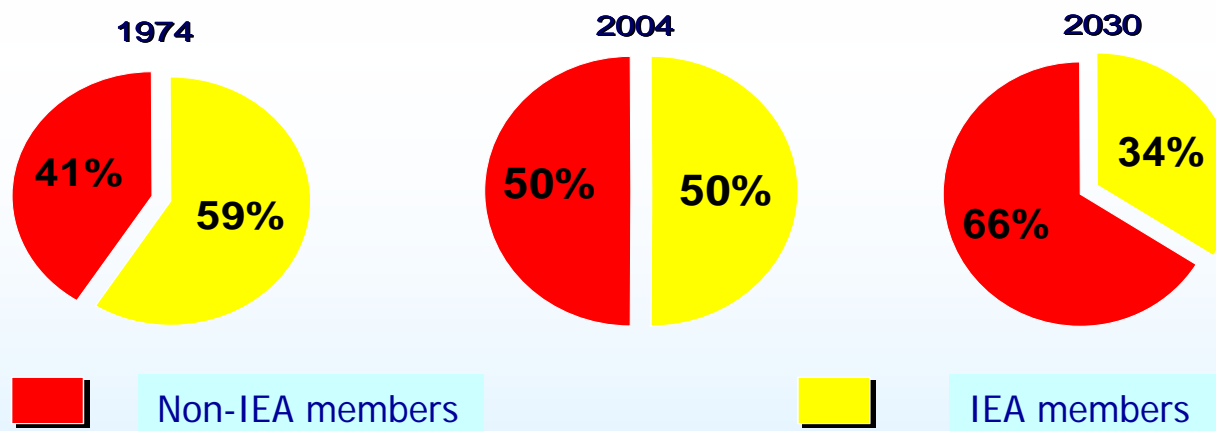
→ Strategic energy selection : best mix of energy types and supply sources

→ International dialogue, alliance and regional cooperation

Above measures will produce win-win, synergistic effects.

3.1 Message from IEA

1. World is facing twin energy challenges
 - x Stable energy supply at affordable prices
 - x Environmental issues accompanying energy production and consumption
2. Five steps for future stable energy supply
 - More investment, efficiency, diversification, transparency, social safety net
3. To secure sustainable energy use solving environmental concerns, we need to make revolutionary change of the global energy production and consumption system.



Actions only by the IEA members are no more sufficient to realize true energy security or sustainable energy use of the world. Engagement of non-member countries is essential.

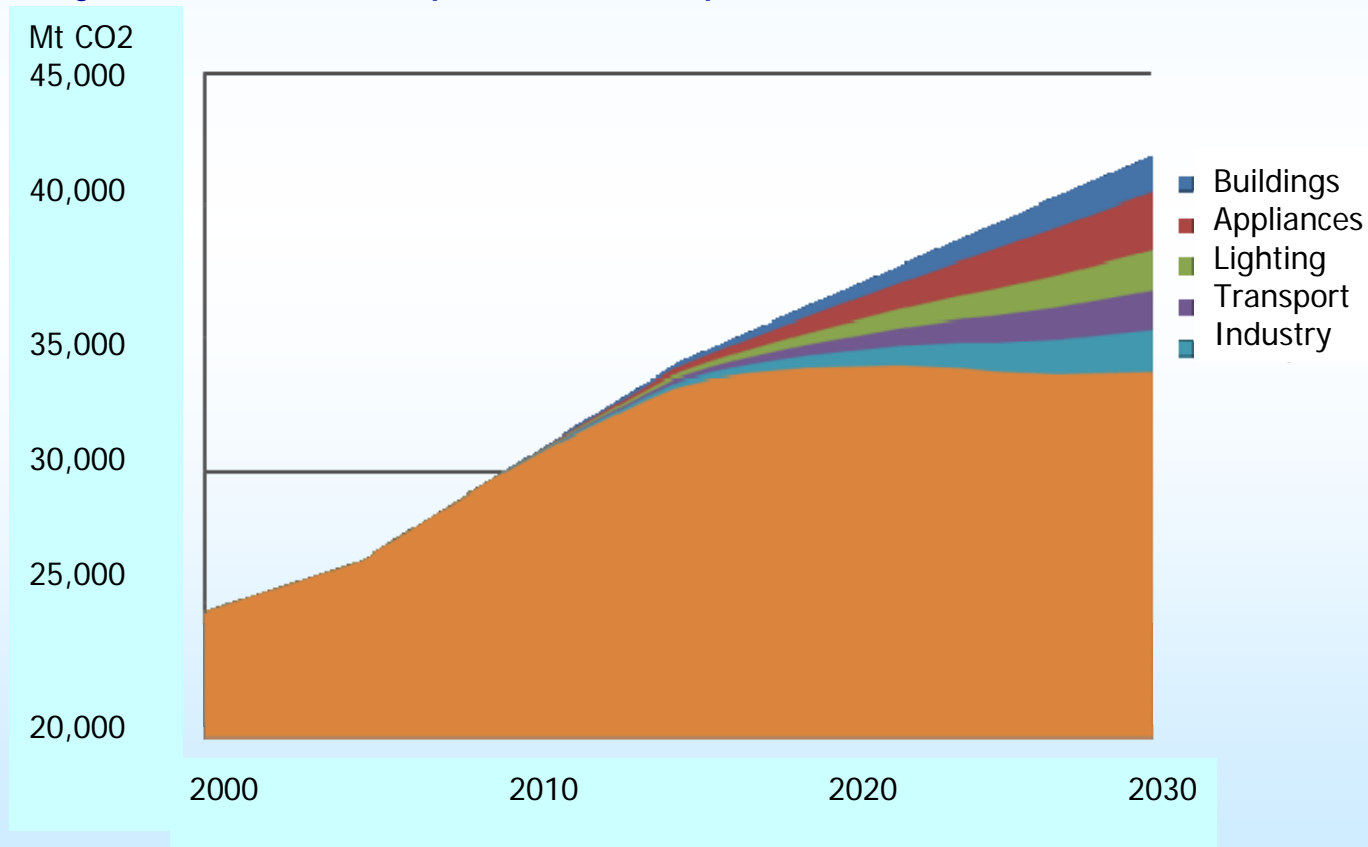
3.2 IEA's Recommendation of EEC

1. Recommendation of EEC: 7 priority areas and 25 items

x Cross sector management : Targets, strategies, audit and enforcement

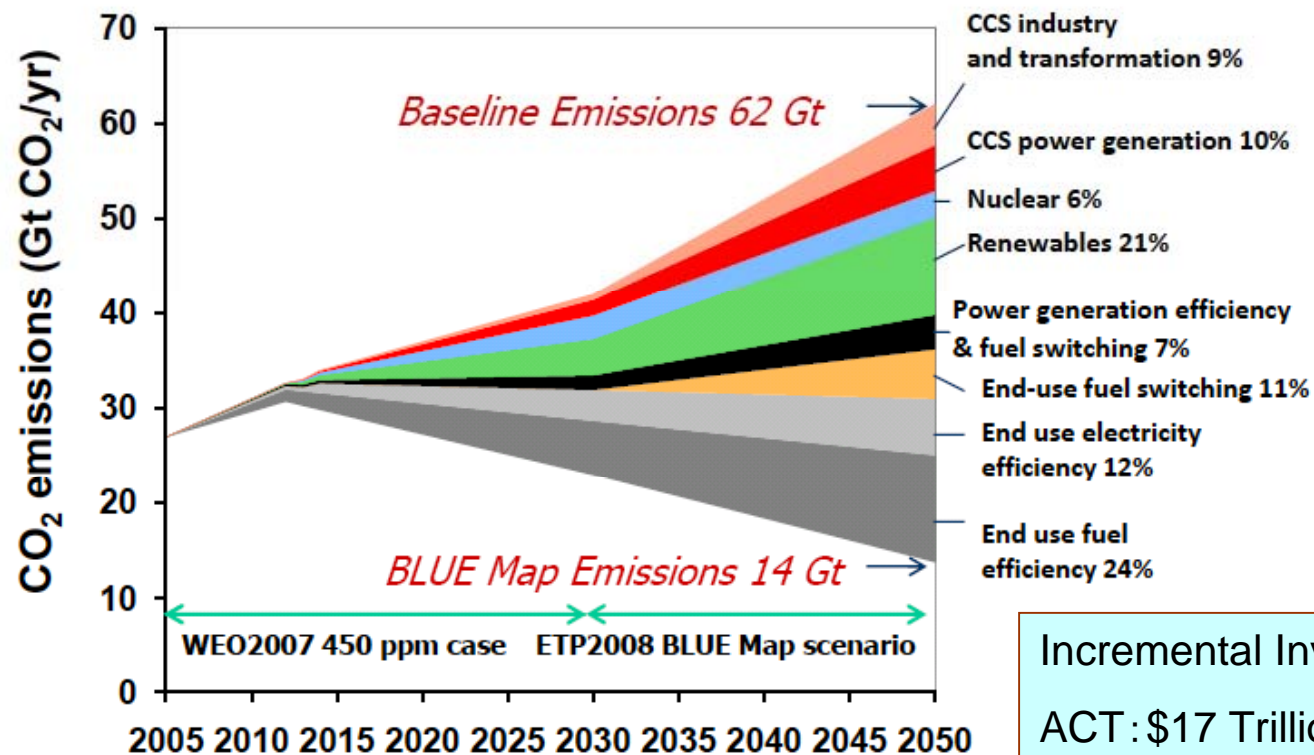
x Building, Electric Appliances, Efficient Lighting, Transport, Industry, Energy Sector

2. Implementing the above recommendation worldwide, reduction of 8.2 Gt-CO₂ (20%) by 2030 could be possible compared with Reference Case.



3.3 Energy Technology Perspective 2007

1. **Baseline Scenario:** Extension of the current trend or BAU scenario
2. **ACT Scenario** (Accelerated Technology Scenarios)
 - Reduce CO₂ emission of energy origin to the level of 2005
3. **Blue Scenario**
 - Reduce CO₂ emission of energy origin to 1/2 of the level of 2005
 - Aiming stabilization at 450 ppm



Incremental Investment

ACT: \$17 Trillion

Blue: \$45 Trillion

4.1 Energy Structure of Northeast Asia

1. In Japan, Korea and Taiwan, **oil** shares the largest portion of energy consumption. In China and India **coal** shares the largest portion, causing serious air pollution.
2. Japan, Korea and Taiwan depend most of the energy supply on import, while Chinese overall import dependence is only 10% with world biggest coal production.
 - Japan, Korea and Taiwan need stable suppliers for import.
 - China needs to secure volume for additional supply.

2007	Primary Energy Supply(Million toe)						Consumption Ratio				
	Oil	Gas	Coal	Nuclear	Hydro	Total	Oil	Gas	Coal	Nuclear	Hydro
							%	%	%	%	%
Japan	229	81	125	63	19	517	44.2	12.6	23.5	12.6	4.4
Korea	108	33	60	32	1	234	46.0	14.2	25.5	13.8	0.5
China	385	63	1318	14	109	1890	20.4	3.3	69.8	0.8	5.8
Taiwan	52	11	41	9	2	115	45.6	9.2	35.7	8.0	1.5
NE Asia	721	178	1503	110	129	2641	27.3	6.7	56.9	4.2	4.9
SE Asia	211	110	84	0	18	423	49.8	26.0	19.8	0.0	4.3
India	129	36	208	4	28	404	31.8	8.9	51.4	1.0	6.8
World	3953	2638	3178	622	709	11099	35.6	23.8	28.6	5.6	6.4

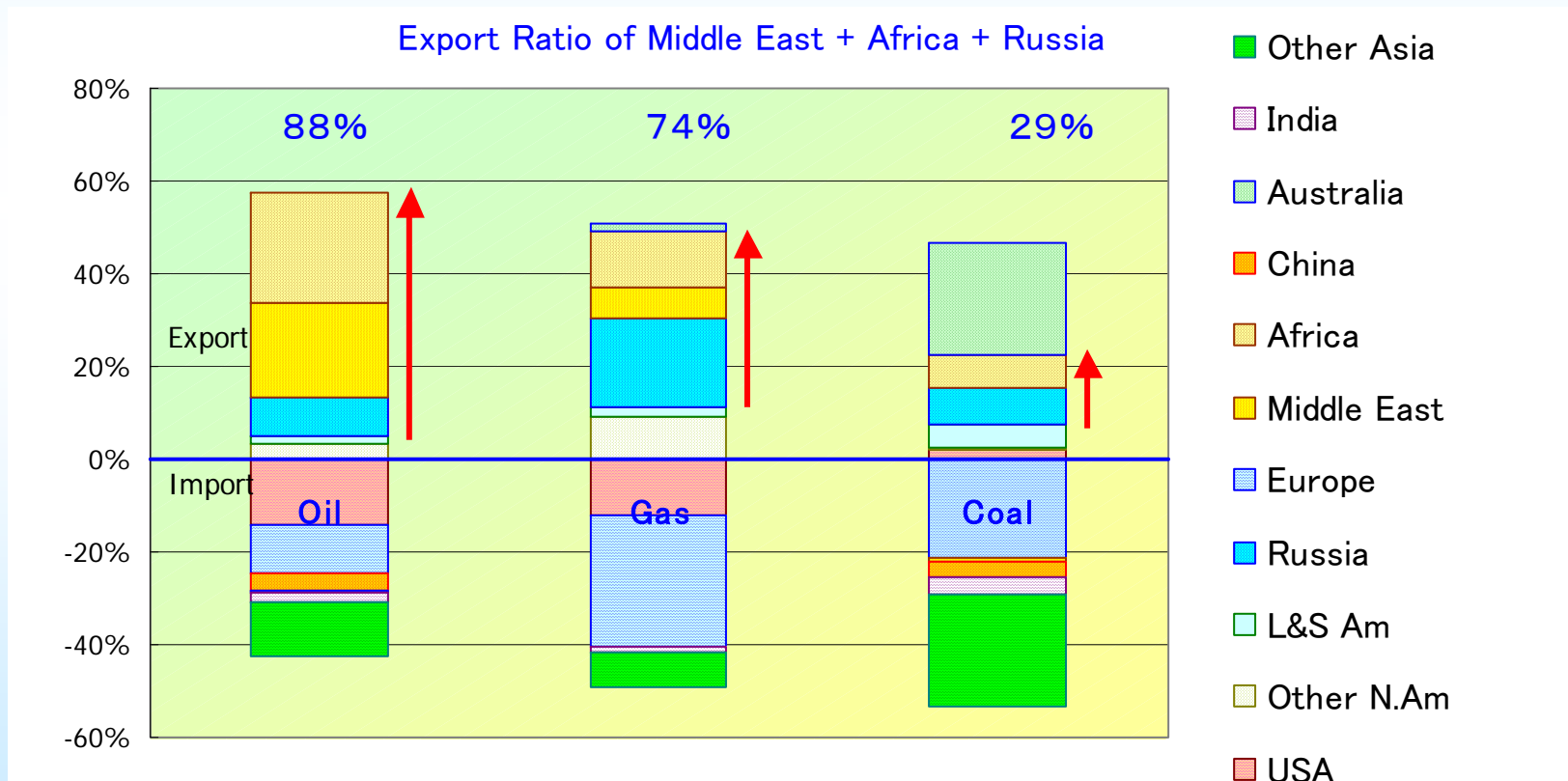
Source: BP Statistical Review of World Energy 2008

4.2 Security of Fossil Fuels

Supply ratio of the Middle East, Russia and Africa combined over the world net fossil fuel export

Oil : 88%, Natural Gas : 74%, Coal : 29%

→ Coal is superior in energy security



4.3 Energy Projects in Eastern Russia

1. Operating & Near Completion

	Oil	Natural Gas (LNG equiv.)
Sakhalin-1	250 MBD (2005)	6.0 MTPA
Sakhalin-2	150 MBD (1998 EP)	9.6 MTPA (2009)

2. Under Construction

East Siberia to Pacific Oil Pipeline (ESPO) **Oil 1,600 MBD**

x In April 2006, Russia started construction of Phase-1: P/L from Taishet to Skovorodino and shipping port at the Kozmino Bay on the Pacific coast.

Completion by the end of 2009 may further delay.

x Phase-2 construction will follow immediately after Phase-1

x Branch line for China is being discussed

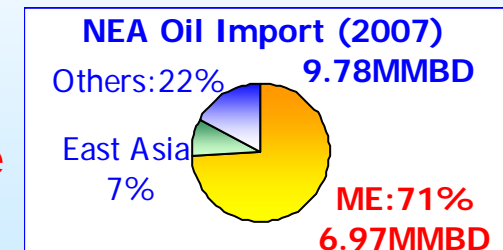
3. Stage of Negotiation

Northeast Asia Natural Gas Pipeline 34 billion cubic meters (20 MTPA)

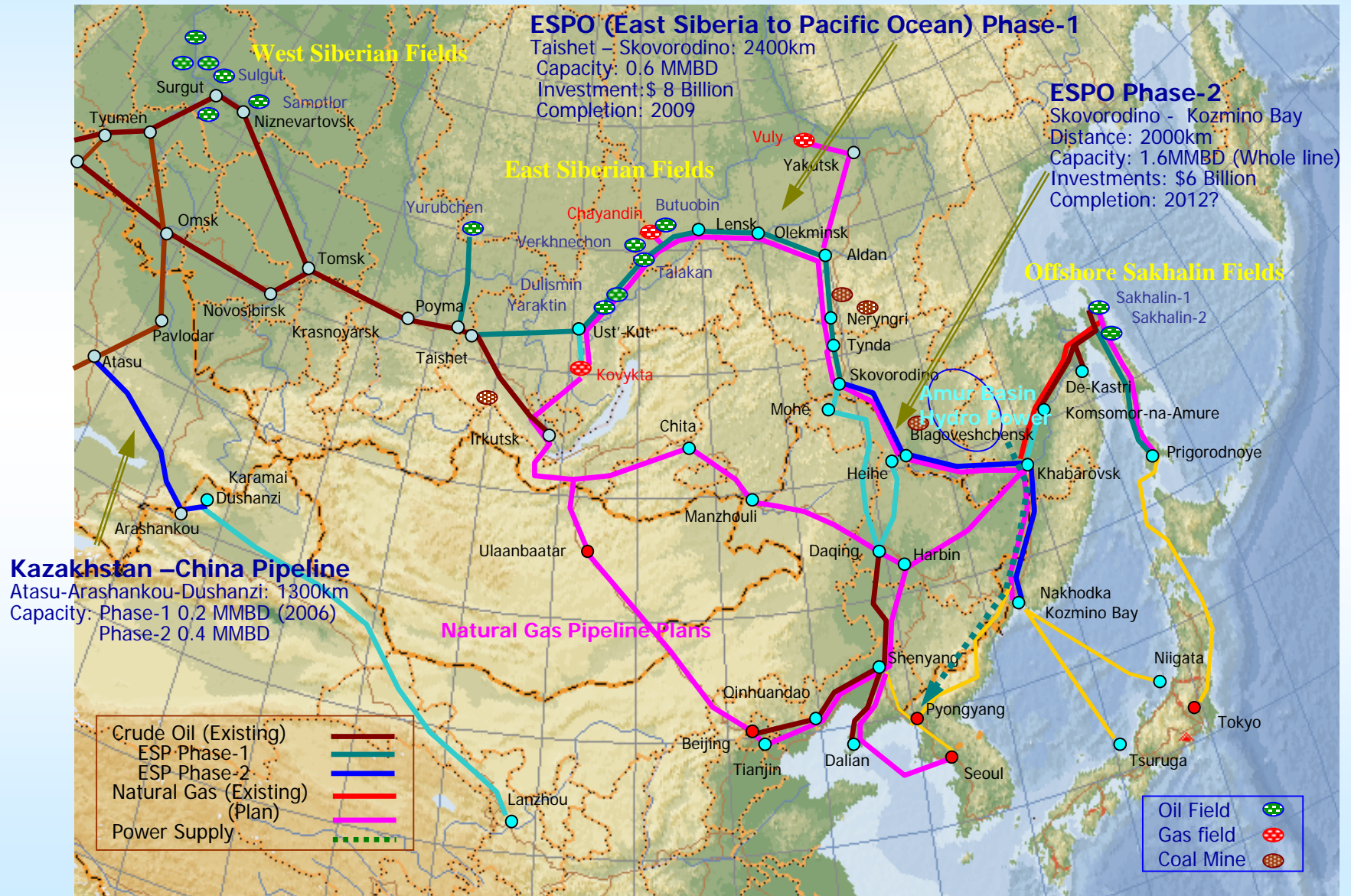
x Gazprom offering Sakhalin-1 natural gas to China

x Kovykta gas is now designated for domestic use

Oil Supply from Siberia and Sakhalin (2 MMBD) will reduce the Middle East dependence of Northeast Asia by 20%.



4.4 Potential Energy Flow from Eastern Russia



5.1 World Challenges after Toyako Summit



1. Role of Toyako Summit : A Middle point through to the 2009 final agreement

x Gleneagles : Turning point for USA from the withdrawal of 2001

x Heiligendam: Recognition of direction with a remote target for 2050

x Toyako: Guidance toward discussion for Target Setting

1) Reconfirmation of the long-term target:

G8 and MEMs sharing the vision toward 50% reduction

2) Participation of Major Emission Members (US, China, India)

3) Confirmation of will to set out practical target and action plan

x Developed countries will implement mid-term target in 2009

x Mobilize international institutions (IEA, ICAO, IMO, IAEA, MDB)

x Participation of developing countries: sharing the vision

2. Post-Kyoto Framework: The world will continue dialogue

1) Is the USA able to produce effective policy after the presidential election?

2) Is the Summit able to produce effective offer to take in MEM (China/India)?

3) Is the United nations able to make enforceable agreement?

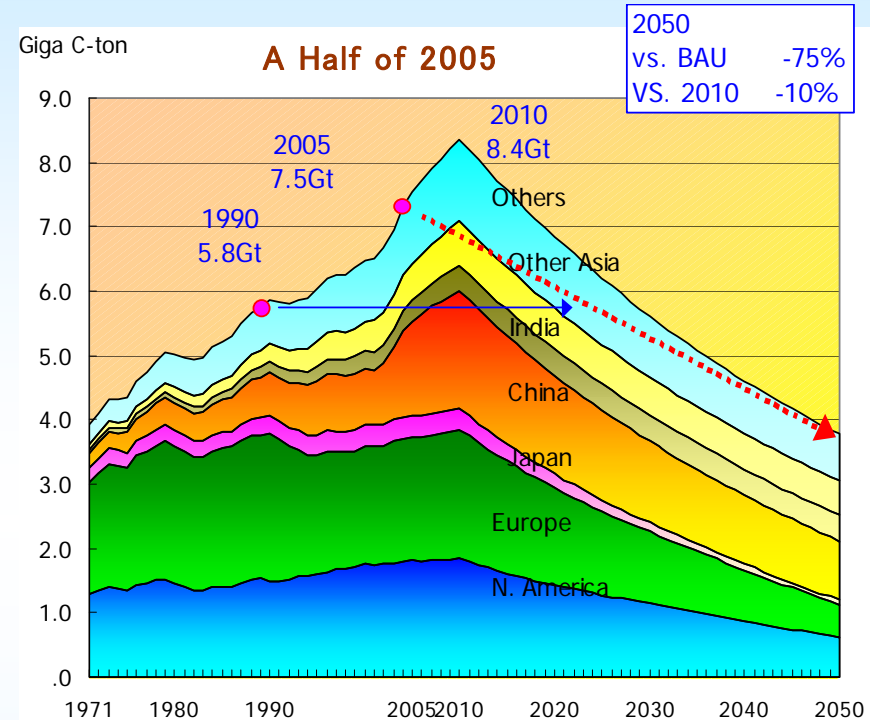
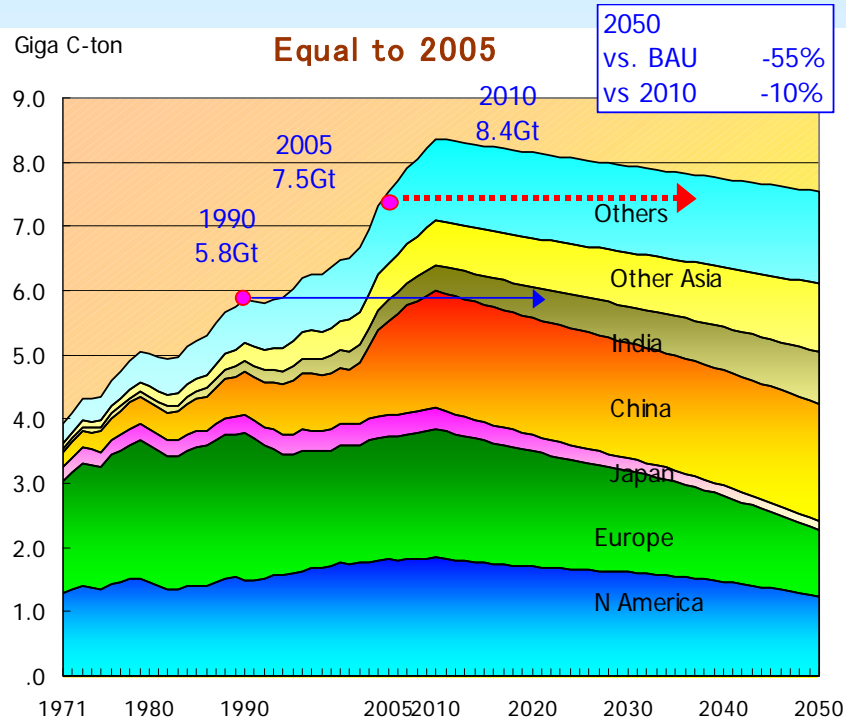
3. Elements necessary for PKF agreement

1) Practical and Objective Metrics

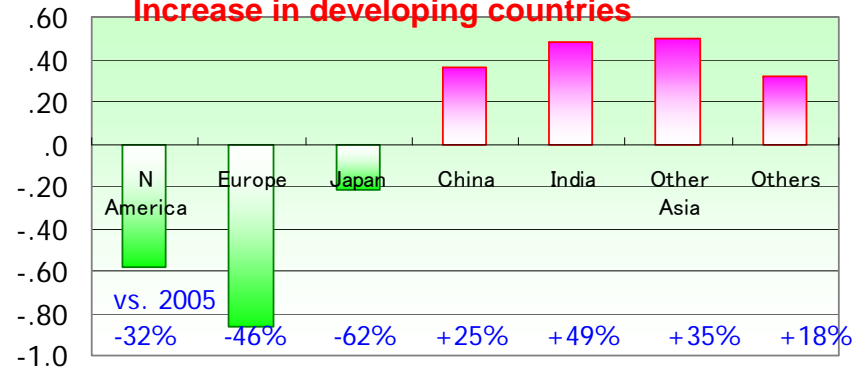
2) Practicable frame work

3) Fair and equitable responsibility

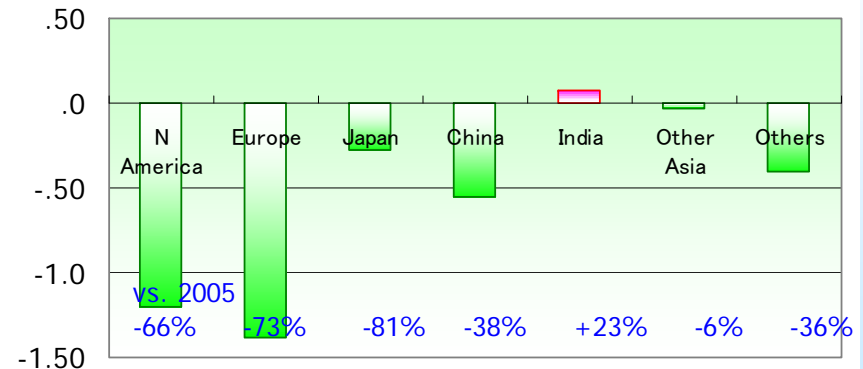
5.2 A Glance on CO₂ Reduction



**Reduction in developed countries
Increase in developing countries**



Reduction in most countries



5.3 Toward Sustainable Development

1. Anxieties : For Asia with mega-population, the fast increasing energy requirement is the shackles for sustainable development.

- 1) World economic system would collapse with high energy price.
- 2) World security system would collapse by rush for energy and resources.
- 3) World could not prepare effective answers to the global warming.

2. Actions required

- 1) Reduction of energy consumption → Energy Efficiency & Conservation
- 2) Reduction of fossil energy consumption → Strategic Best Mix
- 3) Engagement of mega-consumers → Regional Energy Partnership
→ Market information sharing, Technology R&D, Promotion of mega-sized energy projects, etc.

3. Revolutionary change of global energy system

- 1) Huge amount of investment, manpower and resources need to be mobilized
→ Increasing uncertainty on energy and environment, Challenges against unknown objects, Gigantic project size exceeding private sector capability
- 2) New initiative required under comprehensive social consensus

**Northeast Asia Energy Partnership to integrate human wisdom
and innovate a new driver for sustainable development!!**