

Japan's Approach to Three Global Economic Challenges : The Brain Race, Energy & Environment, and Market & Government

Kiyohiko Fukushima

Synopsis :

Barring unexpected crisis, the Japanese economy is poised to grow by some 2% in the next few years, gaining from global economic integration and strong innovation and investment at home. Though the outlook for the short term looks bright, Japan must cope with three major, global economic challenges: brain race, energy and environment and the proper role for market and government. The strength and weakness of the Japanese approach becomes clear by comparing it with that of Europe and the United States. On the whole, Japan has been a relatively successful player in the global integration and keener competition; Japan managed to do relatively well in the global brain race and in the global quest for better energy and environment. However, regarding the basic vision on what kind of capitalism Japan wants to build, Japan is yet to find an adequate consensus.

Table of Contents :

- 1 . Outlook for 2007 and Medium Term
- 2 . Growth Outlook and Global Issues
- 3 . Global Issues on Sustainable Growth
 - 1) Brain Race
 - 2) Energy and Environment
 - 3) Market and Government
- 4 . Making Globalization Work
 - 1) Another World is Possible
 - 2) Economic Policies of Koizumi and Abe

List of Tables

- A. Outlook for 2007 and Medium Term
 - 1. 2007 Outlook
 - 2. Forecast toward 2010
- B. Basic Concept of the Macro Economy
 - 3. Equation
- C. Global Issues
 - 1) Brain Race
 - 4. Economic Concept of the Brain Race
 - 5. Global race among the Major Powers
 - 6. Comparison of RD/GDP
 - 7. Government share in RD
 - 8. Number of Engineers
 - 9. Summary on RD and Equipment Investment for US and Japan
 - 2) Energy and Environment
 - 10. Global Warming
 - 11. Three Doubts on Oil Scenarios
 - 12. Ominously Rising CO₂ Density
 - 13. Global Carbon Circulation
 - 14. History of Energy Use
 - 15 1 Concept of Energy Use in a Round Earth
 - 15 2 Atmosphere made of Four Strata
 - 15 3 Concept of Global Warming
 - 15 4 Problems with Fossil Energy
 - 16. Solutions for the Short Term
 - 17. Solutions for the Longer Term
 - 18. Japan's Initiative on Energy and Environment
 - 19. Energy and Environment as EU's Priority Issues
 - 20. US: Advanced Energy Initiative
 - 21. Global Tasks and Outlook
 - 3) Market Government and Civil Society
 - 22. Market Government and Civil Society
- D. Making Globalization Work
 - 23. Making Globalization Work

1. Outlook for 2007 and Medium Term

Economic outlook for 2007 seems relatively good. The Japanese government forecast puts the real growth rate and nominal growth rate at 2.0% and 2.2%, respectively, while the average forecast numbers of the 15 major forecasters in the private sector (Blue Chip figures) is slightly higher than the government figures.

Another private think-tank, JCER (Japan Center for Economic Research) is less optimistic than the government. (See Table 1)

Outlook and Policy Issues for the Japanese Economy	
Prof. Kiyohiko FUKUSHIMA, Rikkyo U., Tokyo	
	Table No.
A. Outlook for 2007 & Medium Term	1,2
B. Basic Concept of the Macro Economy	3
C. Global Issues	
1)Brain Race	4-9
2)Energy and Environment	10-21
3)Market and Government	22
D. Gaking Globalization Work	23

The main factors contributing to growth are investment and export. The increase of consumption by the household is believed to be mild in 2007.

Looking into the medium term toward 2010, the government draws a more optimistic picture : average real annual growth rate is expected to be 2.5%, while the JCER puts 2.2% for the same period. The government optimism is based upon the assumptions that more women and aged people will be working and productivity will rise by some1.5% annually (in 2005 it was 0.9%). (Nihon Keizai Shinbun 2007

A. Economic Outlook 1. 2007				
FY fm April,%	Real Gr. Rt.		Nominal Gr. Rt.	
(Year)	06	07	06	07
Govt.	1.9	2.0	2.0	2.2
Blue Chip	2.4	2.1	1.8	2.4
JCER	1.8	1.7	1.2	1.8

Observations: 1)The deflation is about to end.
2)Launching toward the 2% plus growth orbit.

1 19)

Both of those forecast numbers are higher than the European Union's forecast number for the EU economy in the new Lisbon Strategy, 2.0%. Though the population is decreasing both in the EU and Japan, the policy makers in the two regions expect higher labor participation ratio and continuous innovation that would bolster the economic growth rate.

In the US, the population is still increasing. The US population topped 300 million in late 2006 and will reach 400 million by 2050. This population factor is the decisive one that contributes to the higher growth rate in the US than it is in the other developed countries. (See Table 2)

2 . Economic Outlook and Global Issues

1) Theoretical background for the brain race

Economic growth for the medium term is decided by the number of working population and the productivity per worker.

$$P = L \times L/P \quad (P : \text{Product}, L : \text{Labor})$$

In order to raise productivity under demographic constraints, better and more equipment investment in machinery and technology is needed. Raising productivity by introducing better machinery that embodies new technology is the right way for achieving higher economic growth. For the purpose of creating new technology, more people and money must be allocated for R&D (research and development), mainly in the private sector. For the R&D spending to bear tangible fruits, scientists and engineers must be trained and their brains must be used more effectively for practical purposes.

The successful results of R&D spending will be embodied in new equipment investment of corporations.

The new investment will create higher investment expenditure in the GDP,

2. Forecast toward 2010

Gr. Rt. in %	real Gr. Rt.	Population Gr.
Jpn (JCER)	2.2	-0.1
US(CEA)	3.1-3.3	1.0
EU (Lisbon Strgy)	2.0	0.1

Rough Size of Major Economies:

Gross World Product=\$40 Trill. In 2006.

US=\$13, EU=11euro(\$14), Jpn=\$5,RoW:\$8

and higher consumption in the next stage, because the new products from the new investment must ultimately be spent by the consumers. This is the basic relationship between R&D spending and a country's economic growth, using the equipment investment of corporations as conduits.

Generally speaking, higher R&D spending ratio in a country's economy is likely to lead to higher investment in order to utilize the results of the R&D. Japan's investment ratio is some 3.4% of the GDP, highest among the major developed countries.

While the US economy is a heavily consumption oriented economy, the Japanese economy is an investment oriented economy.

2) Economic background for Energy and Environment

From the earliest times, mankind has been using more and more energy for a better life. The hunter-gatherers used energy obtained from woods and plants for collecting and cooking food in a primitive way. The early agricultural man began using animal power for ploughing (the cattle and horses were fed with grass, which is also a product of sun's power and energy), enabling him to raise and feed more children. The use of coal energy since the industrial revolution in the late 18th century changed the energy picture completely. (See Table14)

The introduction of steam engine by burning coal brought revolutionary changes in transportation and machineries. Burning coal and/or using water power can generate electricity. Electricity is a much more efficient form of energy than coal. As mankind entered the 20th century, coal has been largely replaced by oil because oil was an even more efficient source of energy than coal. Since the late 1970s, natural gas came to play an increasingly important role as a source of energy.

By consuming more and more energy for food production, transportation, commerce, building and manufacturing, the material wellbeing of mankind has dramatically improved, global population multiplied and the average life expectancy became much longer worldwide.

However, the unprecedented prosperity of mankind using more energy had some problems: those new sources of energy (coal, oil and natural gas) are fossil fuels. They are not renewable, limited in supply and are doomed to be depleted sooner or later.

A new source of energy must be found or developed that is reusable and almost unlimited in supply, if mankind is to keep the economy growing. The limits to growth brought about by the energy constraints is the major challenge, for the entire world; the developed countries of US, Japan and the EU are expected to play major roles in realizing the anticipated technological breakthrough for finding a new source of energy.

Another related problem with the fossil fuel is the global warming. Because the process of energy generation through fossil fuel is, essentially, to burn the carbon element in the fossil fuel, the act of getting energy itself causes global warming. In the process of incineration, the carbon will become carbon dioxide (CO₂) and the CO₂ is exhausted and released into the air. The CO₂ will go up higher into the highest end of the atmosphere, linger there, and create the green house gas (GHG) zone. The sunlight reaching the surface of the earth is usually reflected into the air again, thereby leaving the surface of the earth. However, the GHG will repel the sunlight that came back from the earth, and the sunlight will make another reflection at the GHG and goes back to the surface of the earth. The earth is warmed twice.

This twice warming mechanism creates the higher temperature everywhere on earth, resulting in melting of the arctic ice, giving birth to more often and powerful typhoons, hurricanes, rising sea level, abnormal weather, flood and draught. More environmental disasters, earth degradation, food shortage and even an economic stagnation is forecast and feared.

The population explosion in the developing countries is also a factor contributing to more consumption of fossil fuel. It creates more green house gas.

How to decelerate the speed of global warming caused by the excessive use of fossil fuel by 6.5 billion people on earth? That is the most nagging economic question that we face today.

3) Market and Government

There are certain roles in a nation's economy for a government to play. To name just a few, income redistribution, providing infrastructure and public goods, setting and enforcing rules for the market economy, creating social safety net in the form of pension and medical care, minimum wage, and regulations on safety and standard of products and services. Since the onset of the conservative revolutions in America in 1980s, the drive for smaller government, tax cut and lessening the burden on business cost is gaining momentum. Though the smaller cost for business creates an advantage for business, at the same time it could lower the standard of living for many workers that could lead to social instability and tension. There is a trend for "race to the bottom" in the developed countries; setting the proper roles of the Government sector and the Market sector is the question often asked. The tension between the social market economy of Europe and the market fundamentalism of America is rising to a new high. This is becoming one of the most important issues for international policy debate.

3 . Global Issues on Sustainable Growth

1) Brain Race

It might be possible to argue that the focal point of global competition has shifted to the brain race among the developed countries in the 21st century, in a sharp contrast to the arms race between the United States and the Soviet Russia during the cold war era. In order to create and introduce new products and services

B. Basic Concept of Macro Eco

3. Equation : $GDP = C + I + G + (X - M)$

C: Consumption, I: Investment, G: Government,
X: Export, M: Import

Figures in % of GDP

US: $100 = 72 + 10 + 24 + (8 - 16)$, big spending & debt
Income account.: minus less than 1

Jpn: $100 = 60 + 15 + 22 + (10 - 7)$, High E.I., Huge Asset
Income account: plus 2

EU (euro 12 in 2005):

$100 = 57 + 21 + 20 + 2$, Income Account: 0

that would be demanded by the consumers and corporations, companies must spend more money for research and development; in order to spend the R&D fund more efficiently, companies need good engineers with a keen interest on market trends. A swarm of good engineers are produced by the high quality of general education, in science and mathematics, in particular. The quality and quantity of a country's total brain thus becomes the decisive factor in the global economic competition.

The cost of R&D spending each year is included in the current annual expense for production to be ultimately borne by the consumers. When the idea of a new promising product becomes concrete enough, a proto-type product is manufactured and tested. After making new investment for equipment and facilities, companies will launch into mass production of the product and marketing will be made in the next phase. This will increase the GDP by adding a new item in the investment (I) in the GDP; when the new product sells well, it will further increase the GDP by a new surge in consumption (C) in the GDP. The economic growth by higher R&D will result in this way. (See Table 3)

Based on the understanding on the linkage between R&D and growth, all the major economic powers are engaged in a global brain race. The Japanese government under Prime Minister Abe has set up a long term economic vision toward the year 2020, released on January 25th 2007, dubbed as "The Course and Strategy". bearing in mind a real growth rate of some what higher than 2 % annually to be made possible mainly by productivity increase bolstered by innovation. The pressing need for major

C. Global Issues: -1) 4. Brain Race

Brain Race: Competition for more R&D & Education

Economic Linkage: R&D → EI → new product, new services → consumption → growth

RD is included in the production cost, later to seep into new sales, new consumption

Examples:

Microsoft windows + Intel chips = more Info.,
speedier access, common Platform → Info. Society

Docomo mobile phone → 2G → 3G → super3G

innovation and higher R&D spending is stressed in the policy papers of the Japanese government. The Abe cabinet has appointed a Scientist (Mr. Kurokawa) as a special advisor to the cabinet on Science, Technology and Innovation, symbolizing its emphasis on R&D and innovation. (See Table 4)

In the United States, the Bush Administration has released a paper titled "American Competitiveness Initiative" in February 2006. In that policy paper, among many other proposals, doubling the fund for National Science Foundation and introducing 100,000 mathematics teachers are proposed. Some of the proposals are just showing goals for the future, while some others are fully funded by the budget of the federal government. The basic logic in this proposal is that though the US is still at the forefront of global innovation, the educational foundation of innovation is eroding. The erosion is verified by the poor performances of American students in science and mathematics in internationally authorized common tests while the children of many other countries, including China, Korea and Singapore are doing much better. Therefore, improvement in general education and greater efforts in R&D are needed for America to remain competitive and maintain global leadership in innovation.

The EU is also determined to make her the most competitive knowledge economy by the year 2010. To achieve that goal, all the EU member countries are asked by the European Commission to raise the level of R&D spending to 3% of the GDP by 2010. Given the current, relatively low level of R&D spending of the EU, 1.9%

5. Global race among major powers

Japan: Innovation strategy under Abe Gov't

2.2% real gr. With 4mill. Less workers

towards 2015, new generation cars, batteries, robotics, medical services, etc.

US: American Competitiveness Initiative 2006

NSF funding, 100,000 more math teachers

EU: new Lisbon Strategy (2006)

3% of GDP for RD by 2010; resulting in

3.6% more GDP in 2040

6. Comparison of RD/GDP

Japan: one of the highest at 3.4%; Sweden 4.3, Finland 3.5, outspending Japan, 2005

US: 2.61%, Korea: 2.63%, Germany: 2.51%

China: 1.44%, catching up fast and outspending Japan in 2006

EU average: 1.96 in 2003

Observations: Japan's RD highest in major eco. Powers.

Source: www.mext.go.jp/b_menu/hakusho/htm/hpaa200601/002/01010.htm

of GDP on the average, 3% is an ambitious goal. (See Tables 5, 6) If all the EU member countries attained the goal of 3%, the EU forecasts that the GDP of the EU will be 3.6% larger by 2040, with all the other things remaining unchanged. (the new Lisbon strategy, http://europa.eu.int/comm/enterprise/enterprise-policy/competitiveness/doc/industrial/_policy_and_economic_reforms_papers_1.pdf)

The international comparison on the role of the Government in R&D spending is provided in the Table 7. The role of the government is large in the continental European countries, while it is small in Japan. The United States ranks in the middle with the bulk of the R&D funding provided by the Defence Department.

7. Government share in RD

France: 40.8 % in 2004

EU 25: 35.5

EU 15: 34.9

UK: 32.9

Germany: 31.1

US: 31.0

Japan: 20.2

Source: www.mext.go.jp, ibid

8. Number of Engineers

“Asia today graduates more than three times the number of engineers and scientists than the United States does.” (Stiglitz, *Making Globalization Work* p44)

US: Highest number of lawyers, roughly 1.2 million

Japan: with 800,000 engineers, the highest number of engineers per 100,000 people (670); lowest ratio for lawyers (0.16 per 100,000), total lawyers:23,103 only

Another way to analyze the brain race is the number of engineers. Many countries in East Asia, Japan in particular, produce more engineers per 100,000 of its population than the US does. (See Table 8)

To conclude the elaboration on brain race, Japan can be regarded as one of the most innovative economy in the world with the high level of R&D (3.4% of GDP) and equipment investment (15% of GDP); the US is the leader in global competition receiving much help for R&D fund from the Pentagon. (See Table 9)

9. Summary on RD and equipment investment for US and Japan

Japan: arguably the most innovative eco with high RD ratio and investment ratio; many new business emerge fm the wombs of big business(Japan type venture capital)

US: the most innovative; lead in info tech, aero space and weaponry; independent, venture capital oriented (Fedex started fm SBA subsidy); many new business fm DOD RD (Internet, etc.)

2) Energy and Environment

The global warming is, first and foremost, the result of excessive emission of CO₂ into the atmosphere by burning more fossil fuel year after year. Since the onset of the industrial revolution shortly before 1800, mankind has been building a civilization based on energy from fossil fuel. Though the use of fossil fuel has brought about tremendous improvement in the quality of life for humans, it has become apparent in the 21st century that mankind is hampered by two serious problems by unlimited reliance on fossil fuel: one is the energy shortage by the depletion of fossil fuel and the other is the global warming.

The fatal consequences of the fossil-fuel-based world economy can be brought about either by severe energy shortage or by a calamitous climate change. Nobody can predict with certainty about which type of disaster comes first. What is certain is that mankind is moving fast towards both of the two disasters.

Energy

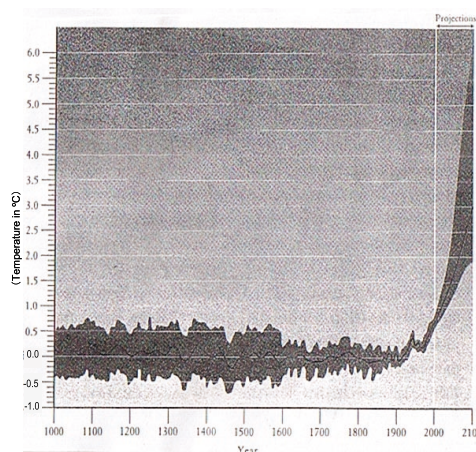
On the supply outlook of the fossil fuel, three major questions are raised on the availability of oil in the near future. The first one is the Peak Oil hypothesis. Because it is fossil fuel, essentially corpse of plants and animals transformed over a hundred million years or longer, oil supply is limited, never renewable, and will be depleted sooner or later. The only question is “when will we run out of oil?”

History shows that when half of the proven, extractable oil reserve in a country

C-2) Energy & Environment 10. Global Warming

Global Warming is forcing us to end the age of fossil fuel, soon. The Hockey Stick Model used by the IPCC (International Panel on Climate Change at the UN)

**Time Flannery, *The Weather Makers*, p103
New York: Atlantic Monthly Press 2005**



is exploited, the price of oil from that country will rise up sharply. That was the case of oil production and price in the US when half of the proven oil reserve had been dug out in the early 1970s. The point at which half of the proven oil is extracted is called the peak oil. Among the many forecasts on the timing of the world peak oil, the common sense view is around the year 2030. If the continuous production of natural gas is considered even after the peak oil, the notion of the peak fossil fuel (oil + natural gas) becomes more important. Many experts believe that the peak fossil will come around 2040, only ten years after the peak oil. The bottom line is that mankind is inching towards the end of fossil fuel era. We need a new renewable source of energy supply.

The second one is the political oil. All the OPEC member countries have not changed the number of years during which the verified, exploitable reserve of oil will last. (William R. Clark, *Petro Dollar Warfare*, p.81, 2005, New Society Publishers) This is because the OPEC is a cartel that allocates the production quota for each country based on each country's own report on the number of years for sustainable oil production. If a country lowers the number of future years available for oil production, that country's production quota will be cut, accordingly. Since almost all the OPEC member countries want to maximize the current revenue from oil produc-

11. Three Doubts on Oil Scenarios

1. Peak Oil in 2030 (peak fossil fuel in 2040)
When half of the proven extractable oil is extracted, production plummets, prices soar. US experience in 1970.
2. Political Oil
OPEC allocates production quota by declared reserves of member countries.
3. Water Cut Oil: Saudi (& Iraq) pumping sea water in the well to keep production going.

tion, they have not changed the years of sustainable oil production to a lower range. As a result, the OPEC's capacity and reserves for oil production tend to be exaggerated. The political oil figures of OPEC may not be reliable.

The third question regarding oil is the duration of oil production in the existing large oil wells. The largest oil fields in Saudi Arabia and Iraq are showing signs of peaking out in their production capacity. In the Ghawar oil field in Saudi Arabia, the largest operating oil well in the world, sea water is pumped into the oil well to keep the pressure level high enough so that the current high level of oil production can be maintained. The Iraqis are doing similar operations in their oil production. Since the oil that was produced from these processes contains a lot of water, the water portion must be separated and taken out from the crude oil. It is the necessity of cutting water from oil in the late stage that gave the name "water cut oil" for this type of oil. The existence and increase of water cut oil is still another factor that makes the oil outlook gloomy and unpredictable. (See Table 11)

Global Warming

The often-cited model for forecasting global warming is the so-called Hockey Stick Model developed by the IPCC, International Panel on Climate Changes, at the United Nations. The model shows that the global average temperature, having been relatively stable since 1200, began to fluctuate more widely since around 1800, and it will start a sharp upward jump from the middle of the 21st century toward the year

Environment:12. Ominously Rising CO₂ Density

280 ppm: before the industrial revolution

380 ppm: as of now

540 ppm: level in 2100 with best effort for
population control and env'ment protection

550 ppm: grave danger level, scientists view

800 ppm: level in 2100 under current trend

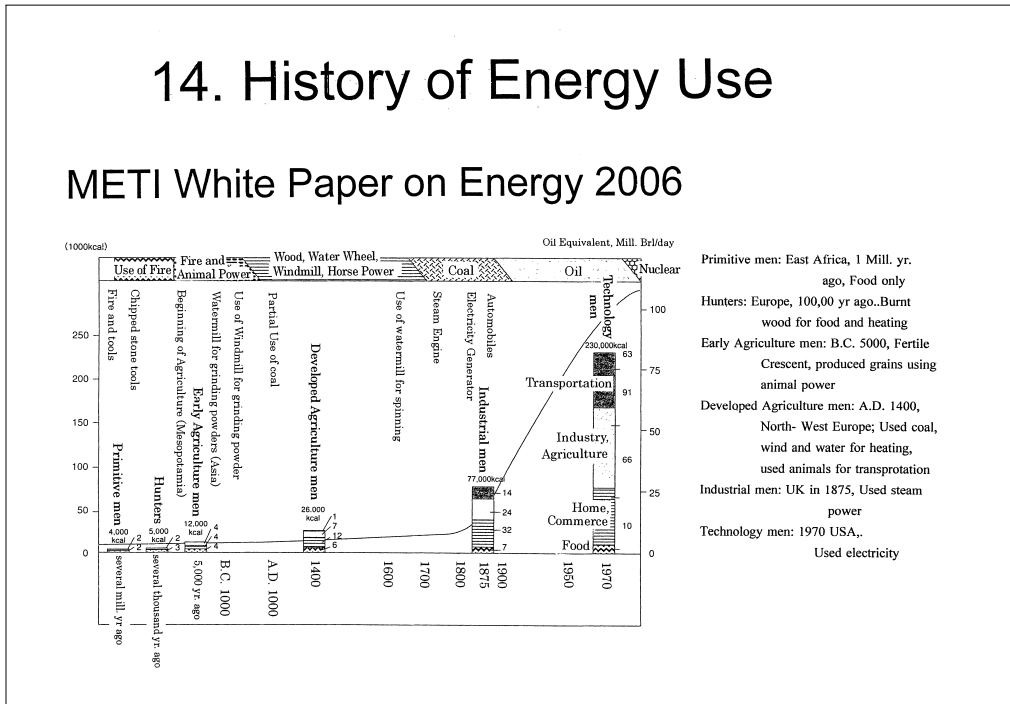
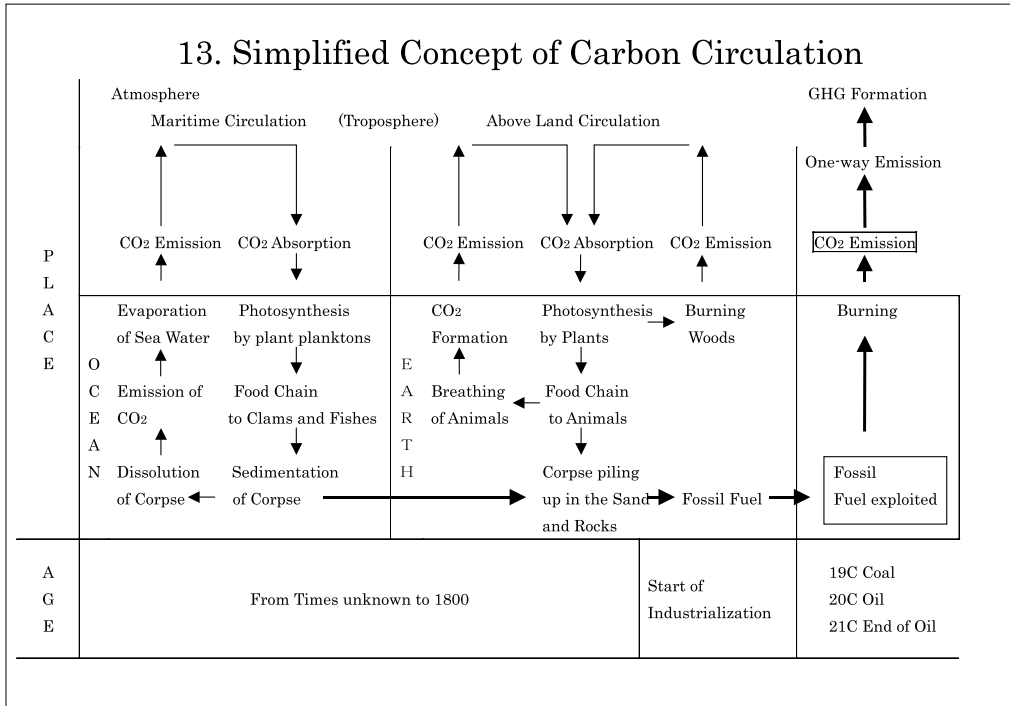
970 ppm: level in 2100 with no demographic
control and no environmental protection

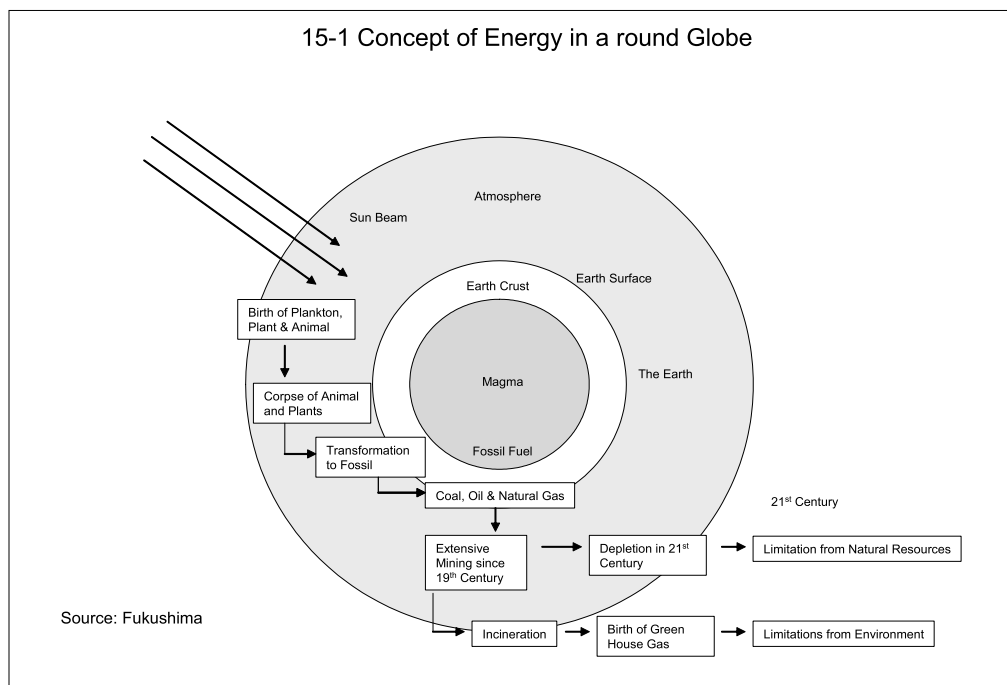
(Tim Flannery, *The Weather Makers* 2005)

2100, based on the observation of the relationship between the CO₂ level in the atmosphere and the temperature of the earth's surface over tens of thousands of years. The shape of the graph forecasting the fluctuation in global temperature resembles a hockey stick ; hence comes the name : the Hockey Stick Model on Global Warming. (See Table 10)

In the discussion on global warming, the most important indication to watch is the level of CO₂ in the atmosphere, as mentioned earlier. Table 12 shows the rising level of CO₂ since the industrial revolution to the present day together with some forecast into the future.

In order to gain in-depth understanding on the rising level of CO₂, one must understand the carbon circulation on the earth and in the air. Table 13 shows the basic concept of the carbon circulation. The carbon dioxide in the air above the sea circulates through the ocean by the food chain starting from the algae and plankton to fish and clam; the corpse of those sea creatures will become sediments and pile up on the sea bed. In that process some CO₂ will seep into the sea water and will evaporate back into the air, as it is shown on the left hand side of the Table 13. In the middle of Table 13, the conditions of the land and the air above the earth are shown. A similar mechanism of food chain helps carbon dioxide to circulates between the surface of the land, deep beneath the earth and up in the air. This mechanism enabled the level of CO₂ to remain relatively stable for the good part of our planet'



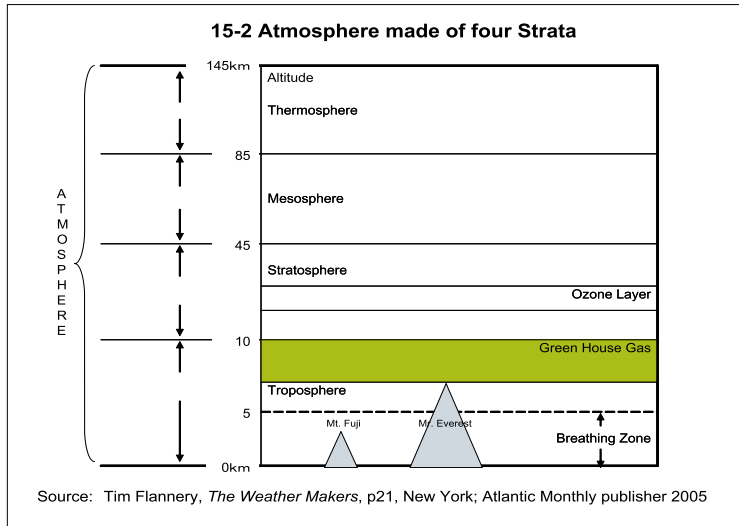


s long history.

However, with the introduction of fossil fuel, the mechanism has changed completely. By digging out highly transformed old corpse of plants and animals, incinerating them, and emitting the CO₂ into the atmosphere, mankind has altered the natural orbit of CO₂ circulation. The carbon in the fossil fuel, which required more than a hundred million years for formulation, is massively burned and released into the air in the form of CO₂ in just one way with almost no route for the CO₂ to come circulating back to the earth system or the ocean system.

The CO₂ began to accumulate in the highest zone in the atmosphere; the huge and dense pile of CO₂ constitutes the green house gas zone, making the temperature on earth higher, because the GHG lets the sun heat the earth twice. (See Table15 2, 15 3)

In order to find a way out of the coming crisis on energy and environment, a much longer historic perspective is needed. Table 14 shows the needed long term

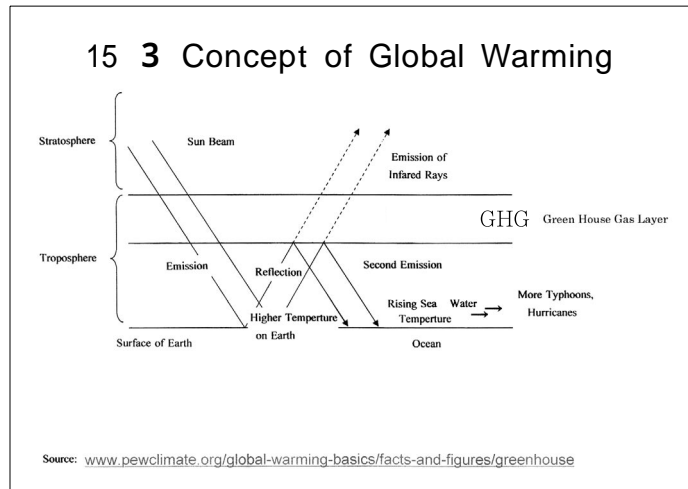


perspective on the history of energy use for mankind.

Based on this long term perspective, the basic problem with fossil energy becomes clear. With the use of more energy, it became possible for mankind to lead a better and affluent life. We need to use high volume of energy to keep the current standard of life.

As it is indicated in Table 15 1, mankind lives on a very thin crust of the earth, digging out the fossil fuel tucked here and there within the crust, while leaving most of the earth's innermost part of the globe, the magma, untouched. Though the fossil fuel has made life more enjoyable, its supply is limited and never renewable by definition. Throughout the long history of the earth, which is believed to be almost 4.5 billion years, our planet earth has never had such an extraordinary experience like today: 6.5 billion people burning more fossil each day and emitting more CO₂ with almost no back route for circulation. (See Table 15 4)

The substance of global warming and the related disaster is the energy problem. The solutions for this predicament on energy and environment should be elaborated not only for the short term but also for the long term. Table 16 shows some suggestions for the short term. For the short term, saving works. We can spend less energy and still maintain almost the same, high quality of life by wise energy



15-4. Problems with Fossil Energy

Digging out the corpse of plants tucked in the thin crust of the earth 1-2 hundred million years ago.
(Earth diameter: 6,000 km; mine-able crust: 0.2-0.3 km)

By nature non-renewable, limits in supply

Emitting CO₂ into the atmosphere by using fossil energy → blocking the reflection of sunlight going out into the outer space → reflection → earth heated twice by the sun → global warming

consumption. Though this method of energy saving will help mitigate the energy shortage, the net result will be just buying time before the more serious energy shortage. What is needed is to have a steady source of energy supply which will not emit any CO₂ into the atmosphere. The only readily available technology for energy production that meets such a requirement is nuclear power generation by building Light Water Reactors. Nobody claims that LWRs are completely safe or problem free.

How to deal with the plutonium accumulated as a by-product of the nuclear fission and the treatment of the nuclear waste are the two major problems that remain yet to be resolved. Partial solution to the problems associated with the nuclear fission technology is to build Fast Breeder Reactors. Many European countries and Japan

16. Solutions for the Short Term

1. Conservation and use more Renewables.
30-50% saving possible with the same quality of life; dig more oil to buy time
2. Build Light Water Reactors (LWR:GE-Toshiba), maybe Pressured Water Reactor (PWR: Mitsubishi; Westing House-Toshiba, too)
3. Plu(tonium)-Thermal: already in EU; Jpn
4. FBR (Fast Breeder Reactor): Japan, EU

17. Solutions for the Longer Term

International Joint Effort: ITER, to start building in 2007 in France, completed in 10 years; Goal is 100million Celsius degree for 400 seconds.

Japan has achieved it for 1,000seconds in its own reactor in spring 2006. Final Goal: to keep 200mill. Celsius to enable the fusion process.

What is Fusion: 2 Light atoms becoming a new one atom and thereby, emanating tremendous proton and energy. Such as: $H_2 + H_2 = H_3 + \text{Proton}$

have been trying to build a functioning FBR but they still face some technical problems. In the meantime, Plu Thermal Reactors have been introduced in France and in some other countries, and Plu Thermals are expected to mitigate the problem for quite some time.

However, over the medium and long term, we must build nuclear fusion reactors which are CO₂ free and waste free. An international consortium called ITER(International Thermonuclear Experimental Reactor) has been established for building a proto-type fusion reactor in southern France. Japan is a member of that consortium. Japan's own experiment for building a proto-type fusion reactor built in

18. Japan's initiative on Energy and Environment

Taking the lead in conservation for home appliances, cars, home heating, etc.

**World leader in Solar electricity generation
(Other leaders: wind for Germany,
biomass for the US)**

Going along the evolution of the nuclear fission technology (LWR→PTR→ FBR)

Moving ahead in the nuclear fusion research

Japan has already, in 2006, outperformed the goal of the ITER reactor to be built in Cadarache, France in 10 years starting from 2008. Japan has succeeded in maintaining the 100 million degree celius for 1000 seonds, while the goal of the ITER is set for 400 seconds.(Nihon Keizai Shinbun 2006 7 21) (See Table 17)

Summary on Japan

To summarize Japan's initiative on energy and environment, four points can be made. Japan is taking the lead in the quest for energy conservation for home appliances, fuel efficiency in cars, home heating devices and the other areas related to energy usage for consumers. As a general statement, Japan has become the leader in solar electricity generation, while Germany is the leader for using wind power for electricity and the US moving ahead in using biomass (mostly corn) for producing ethanol as a supplement for gasoline. Japan is following the global evolution in nuclear fission technology, and Japan is also moving ahead in the nuclear fusion research. (See Table 18)

International Comparison

Some international comparison on energy policy might be needed for understanding the features of Japan's energy policy. The EU is taking the issue of global warming more seriously than the rest of the world and she is trying to fully implement the Kyoto protocol for the reduction of green house gas emission. The EU is taking the lead in the global negotiation on the post Kyoto framework (after 2013)

19. Energy and Environment as EU's Priority Issues

Taking the Global Warming seriously:

Making the Kyoto protocol effective

Preparing for the next global agreement after 2013; EU Constitution requires it.

Regulation on emission from airplanes since December 2006

EU based carbon dioxide exchange system

Pursuing the sustainable development

for the prevention of further global warming. The EU has established the Sustainable Development Strategy as the overarching, most important design for the future which includes not only environmental improvement but also social protection for the weak and aid to the less developed countries. (See Table19)

The US approach is basically oriented towards higher economic growth and she tries to implement policies for further oil exploration and securing the oil supply from foreign countries. There have been gradual changes in American energy policy over time. At the outset in the National Energy Policy paper released in May 2001, less than four months after Bush came to power, the conservation of energy was neglected as a policy choice officially by vice President Cheney and securing oil through diplomatic measures have been stressed. However, after the disaster in the Iraq war became apparent, some changes were made and the Energy Policy Act was enacted in August 2005. In February 2006, another energy policy document, Advanced Energy Initiative was launched. In it the Bush Administration has acknowledged the need for energy conservation; the Administration has, though only implicitly and tacitly, admitted the earth is warming. (See Table20)

The Global tasks on the energy and environment are summarized in Table 21.

3) Market and Government

Another economic policy issue of global importance is the proper role of the

20. US: Advanced Energy Initiative

2001.5 National Energy Policy: Cheney denying conservation as policy; more oil exploration and securing oil through diplomatic means

2005.8 Energy Policy Act

1)infrastructure for electric power,2)cuts in oil imports,3)conservation,4)renewables

2006.2 Advanced Energy Initiative: essentially, changing the way we fuel vehicles and heat homes (ethanol, solar, wind, insulation, etc.)

market forces and the government sector. In a sense it is a philosophical debate on what kind of capitalism one wishes to build. Market forces can create efficiency but they will leave behind the weak and less capable people. The government can provide equality and social justice but at the same time it will sacrifice efficiency and will retard the competitiveness of the private sector by imposing tax and regulatory burden on the business sector. If one wants to build a society with more emphasis on equality, usually a society with a relatively big government will result. However, if one wants to build a society prioritizing economic efficiency and seeing less importance on social safety net, the result could be an efficient economy with high social tension and a wider income gap. The size of the government in the continental European countries is about 40%, while in the US and in Japan, it is in the lower range of the 20s percentage. The difference in the size of the government reflects the preference and value premise of people in each country. In principle it is an issue better left to the choice and decision of each country, not a subject suited for international negotiations or disputes.

However, big government can weaken a country's international competitiveness, while companies doing business in countries with small government can gain competitive edge by paying less for the cost of compliance and social welfare. As the global economic competition intensifies, and the factors of production start to move around the globe in search of a more advantageous location, the difference in the tax and regulatory burden can become an important factor in determining the

21. Global Tasks and Outlook

Environment: 1) Stop further increase in carbon emission 2) decrease other green house gases(methane, etc.) Americans emit 1 ton of CO₂ a year by driving cars.

Energy: More electricity generation by nuclear fission as a necessary evil. Use fuel cell battery, solar, wind, biomass as an appendix.

Develop nuclear fusion tech thru' Int'l effort

competitiveness and wellbeing of a country. Thus the difference in the type of capitalism becomes a very important issue for economic policy. Though issue needs further elaboration, in this article just pointing out the critical importance of it might suffice.

4 . Making Globalization Work

1) Another World is possible

The three main issues that had been discussed in this paper are results of global economic integration and competition. The power of the market forces in search of ever higher efficiency and larger market is essentially unstoppable. The market forces have brought tremendous benefit for the majority of mankind. It is not to be resisted.

However, globalization has run havoc to the social stability in many parts of the world. What is needed is to make a wiser use of the market forces and globalization. In his 2006 book, "Making Globalization Work", Prof. Joseph Stiglitz at the Columbia University maintains that by making a better use of the globalization, building another, better and more humane world is possible. Based on that positive perspective, we should be able to elaborate on many specific proposals for reform on the three major issues covered in this article: brain race, energy and environment, and market and government.

Professor Richard Layard at the London School of Economics makes a good point in presenting a European perspective on this subject.

“My conclusion about taxation is this. Taxes are clearly performing some useful function, beyond that of raising money to pay for public expenditure: they are holding us back from an even more fevered way of life.

If anyone replies that the average citizen should work harder, please ask him to think about it a little longer. In Europe we find it particularly irritating when American economists lecture Europeans about our shorter working week and our longer holidays. The majority of Europeans are happy with the hours they work, even though the GNP would be higher if they worked longer. A few may compare their incomes with those in America, but that is not a major problem so far.” (Richard Layard, *Happiness*, p. 157-158, 2005. London: Penguin Books)

2) Economic Policies of Koizumi and Abe

Mr. Koizumi has been the Prime Minister for five and a half years from April 2001 to September 2006. Mr. Koizumi has been fortunate because he was at the top of the government when the Japanese economy made a natural recovery at the long last thanks to the painful but rigorous cost cutting effort and investment for new product and services made by the corporations in the private sector. Mr. Koizumi's own contribution to the economic recovery in Japan can be in fact very small.

Mr. Koizumi's utmost priority was the privatization of Postal Service in Japan which was his life long goal bordering on obsession. Though Mr. Koizumi pursued the reform of the Postal Service single-mindedly, he did not show much interest in other important economic policy areas except for liquidating bad loan held by banks by pumping government money into banks and eliminating bankrupt companies through restructuring, attrition and mergers.

The campaign slogan during the election of 2005, which gave him a landslide victory, was “smaller government” and “from the public sector to the private sector”; he came to be perceived as the champion and enforcer for making government spending smaller and engrossing the role of the market forces in every corner of the Japanese economy and society. However, in reality under the Koizumi government, the ratio of total outstanding government debt over the GDP has risen from 78% in 2001

C.-3) 22. Market, Government and Civil Society

Basic consensus in Europe: market forces must be wisely utilized by Gov't rules.

US: Ever smaller government through deregulation; let market forces run havoc.

EU: Social Market economy; sustainable development strategy as an overarching, grand design. Gov't/GDP: 40-53%.

Japan: developed her own welfare state but moving wayward by Abe, US influence

(when Koizumi came to power) to nearly 110% in 2006 when he stepped down. Due to the aging of the population, the expenditures for social welfare actually increased steadily during his reign. Mr. Koizumi made the government's fiscal condition much worse by refusing to raise taxes.

Because of the longevity of the Japanese population, the rising cost of health care services, and the well established welfare state, it was inevitable that the government has become bigger even under Mr. Koizumi. It was the astute political acumen of Mr. Koizumi to portray his reform as really bringing about a smaller government in Japan and to let many people believe that the economy has moved out of deflation due to the structural reform that Mr. Koizumi has implemented.

Mr. Abe, who succeeded Mr. Koizumi in September 2006, has been the protege of Mr. Koizumi for many years and has largely inherited the reform agenda from his mentor, Mr. Koizumi. Though Mr. Abe has added a few reform agenda of his own, how and whether Mr. Abe will implement them remains to be seen.

Whatever may come out from Mr. Abe's drive for further domestic reform, Japan must face the global economic challenges and must play positive roles in resolving the three policy issues stressed in this paper: brain race, energy and environment, and the demarcation for the spheres of government and market.

Though many Japanese are well aware that Japan must substantially strengthen its brain base, the steps taken for educational reform under Mr. Koizumi and Mr. Abe have been tepid. The Japanese political leadership still does not seem to understand the critical, vital importance of the ongoing energy and environmental

23. Making globalization work

Definition of Globalization

US approach: Let market fundamentalism prevail.
Efficiency & Gr. > Equity, Fairness

EU approach: Harnessing globalization by rules
and regulations with concerns for the weak and
poor. Develop human capital.

Japan approach: Maintaining resiliency by①
innovation, ②education, ③Flexible Security,
④ Using Asian Human Capital by FDI network.

crisis. The basic budget and plan for the next five years adopted in July 2006 advocates to cut the government expenditures on energy over the next five years. Japan can be the only developed country in the world that has determined to cut energy budget in the face of mounting, global energy and environmental crisis. On the vision for the market and the government, though many changes in company laws were made toward making the Japanese companies work harder for short term profit maximization of share holders in recent years, a deep discussion on the basic concept and the role of corporations has not been organized yet.

Those three issues have critical importance. Proper understanding and coherent actions are needed if the Japanese economy is to achieve sustainable growth in the near future. It is true that the economic outlook look all right for the next two to three years. However, with the dwindling population and almost no domestic energy sources at home, the long term perspective on the Japanese economy warrants no euphoria. It seems that Japan can take a great lesson form the ongoing policy debate and competition of ideas between the United States and Europe. (See Table 22, 23)