

International Energy Seminar

Date: 18 November 2003

Venue: Pink Pearl Ball Room, Capitol Tokyu Hotel, Tokyo

Facilitator: Now it is time to start the International Energy Seminar, organized by the Institute of Energy Economics, Japan (IEEJ). Soon, Mr. Masahisa Naitoh, our Chairperson and CEO, will make an opening remark.

You are kindly requested to turn off your mobile phone or switch it to silent mode. You will find a receiver set, which you can use for listening to the simultaneous translation: please select Channel 1 for Japanese, Channel 2 for English.

Masahisa Naitoh, Chairman and CEO, the Institute of Energy Economics, Japan: Good afternoon, ladies and gentlemen. You are welcome to the International Energy Seminar. Today we have invited: Mr. Claude Mandil, executive director of the International Energy Agency (IEA); Dr. Ian Bremmer, president of the Eurasia Group; and Dr. Crispin Hawes, also representing the Eurasia Group. We are very happy to have had this opportunity to discuss with them about international energy affairs and energy sector investments in Asia.

As you know, we are amidst the 30th year after the First Oil Crisis. In this commemorative year, we have seen a number of major events that affected international energy affairs. Many of such events happened in the Middle East, e.g., the America's war against Iraq that started in March and the unrest in Iraq after the war; terrorism in Saudi Arabia by Moslem extremists; a suspicion about nuclear weapon development in Iran; and the failure of the roadmap to the peace of Middle East which was finally being established.

Speaking briefly about Russia, the country has been rapidly displaying its presence thanks to the significant recovery in recent years of its crude oil production. In addition, it has made some significant changes in its foreign policy, like a positive attitude toward energy sector cooperation with the United States and the unprecedented enhancement of political relations with OPEC nations such as Saudi Arabia. In these respects, the Russian situation is very important. As you know, the Putin administration, while maintaining the existing relationships with European nations, is currently promoting the export of oil and natural gas to the United States and Asian nations.

In Asia, a notable increase in energy demand is taking place in China. In this movement, it will surely increase its dependency on Middle Eastern oil. With this in view, the North-East Asian nations, like Japan, Korea and China, are trying to secure energy

supply by expanding the variety of supply sources and by promoting the development and utilization of oil and natural gas resources in such regions as Sakhalin and East Siberia.

However, I am doubtful about the merit of competition among the downstream countries. A few moments ago, I agreed with Mr. Mandil, executive director of IEA, that the North-East Asian consuming nations, under the original spirit of the IEA, should cooperate with each other in dealing with the situation, thereby eliminating the problems like the Asian Premium. I strongly feel now we need to return to the original spirit of the IEA.

The situation we are facing now naturally calls for a great amount of energy sector investments in varied areas ranging from production to transportation and conversion. In terms of business, such demands translate as business opportunities. We require analytical studies of global politics if we wish to determine: the potential shape of such investments; whether or not a particular energy producing country has a sufficient level of political stability that would allow practical implementation of projects; how the conditions for accepting international investments are being prepared; and whether or not we may be able to really gain from the business opportunities.

The first part of the seminar today will center on a speech from Mr. Claude Mandil, executive director of the IEA. With the aforementioned global situation in view, Mr. Mandil will speak on the Global Energy Investment Outlook released by the IEA earlier this month, with emphasis on issues concerning the Asian region. The second part of the seminar will be a joint session, which combines initiatives from the Eurasia Group and IEEJ. It will start with a keynote address by Dr. Bremmer on the new oil regime after the Iraqi War. The speech will be followed by a panel discussion.

As I have been involved in energy businesses in Japan, France and America, and as I have worked in an advisory board for President Putin of Russia, I was repeatedly impressed by the practical importance of activities for collecting information from over the world and analyzing it accurately, particularly such information that pertains to the promotion of oil, natural gas and other energy industries. In my friendship with Dr. Bremmer, I have been greatly impressed by his youth, potentiality and his ability in collecting and analyzing information. To those of you who are interested, I recommend that you take this opportunity to have a prolonged direct contact with him.

With regard to the IEA, I am sure that you already know about its activities. I am in complete agreement with what Mr. Mandil told me about the IEA's policies. As he mentioned, the purpose of deregulation should not be limited to the promotion of competitions; it should establish a set of market rules, preparing a ground on which the players shall compete with each other. He also mentioned that the establishment of market rules does not necessarily preclude governmental regulations; we should establish a certain set of necessary regulations under an excellent vision so that the whole system may work well. From this point of view, he also shared to me some of his sincere opinions including his doubts about the current Japanese nuclear policy and other issues. I think that he is willing to share to us more of his sincere opinions on these issues in response to questions from the audience. So we are expecting very fruitful discussions today. This is the end of my short opening speech. Thank you for listening.

International Energy Seminar
Part I: World Energy Investment Outlook by IEA

Facilitator : Now we shall proceed to the first part of the seminar concerning the IEA's World Energy Investment Outlook. A presentation will be made by Mr. Mandil, Executive Director of the IEA, and by Dr. Birol, Chief Economist and head of the IEA's Economic Analysis Division.

Now let me briefly introduce Mr. Mandil. Mr. Mandil graduated from France's École Polytechnique and École des Mines. He has over 30 years of experience in energy policy, both at the national and international levels and has been holding an important post in the French Government and energy and research sectors. He has served as Technical Advisor to the Cabinet of the French Prime Minister, where he was responsible for industry, energy and research. Mr. Mandil was successively Chief Executive Officer and Chairperson of the Institute for Industrial Development (IDI), then Director General of the Bureau of Mines and Geology (BGRM). From 1990 to 1998 he served as Director General for Energy and Raw Materials at the Ministry of Industry. In this post, he was instrumental in the adhesion of France to the IEA in 1991. Mr. Mandil was named Executive Director of the IEA on 1 February, 2003. Now, Mr. Mandil, I invite you to start your presentation.

Mr. Claude Mandil, Executive Director, International Energy Agency: Good afternoon, ladies and gentlemen. Thank you very much to President Naitoh for his very kind words and for his hospitality. I have to say that I am very much honored and a little bit impressed to speak today to such a prestigious organization, and with so many people in front of us. I will share my presentation with Dr. Fatih Birol, who is the chief economist of the International Energy Agency (IEA) and who was the main author of this book, which we will now present to you. It is an extensive study and to my knowledge unprecedented, which has been conducted by the IEA on the global energy investment requirements across the energy sector and across geographic regions over the next three decades. It has been released last week, two weeks ago actually in London. It is the result of a broad collaborative effort involving not only people inside the IEA staff but also organizations like OPEC for instance, we worked extensively with the OPEC Secretariat, the World Bank, energy companies, bankers, academics, experts, governments... I would like specially to thank Mr. Sakamoto, who I think is the former president of IEEJ, for his input and for his support.

A few words to explain why we decided to go to this study. Each year, we publish *World Energy Outlook* on a different topic. Last year, in 2002, we looked forward to the year 2030, projecting energy trends to 2030. We made one very important assumption: the assumption that existing government policies remain in place and do not change. In other terms, we took the energy and environment policies in 2002 and we supposed there will be no other change in the future. Of course it is not what actually happened, but it is very important to have this base case scenario to see how actual scenarios in the future will be far of the base case scenario.

Of course, we found the demand for energy will continue to grow during these periods, at the rate of 1.7 percent per year. Perhaps I can show you something... this slide shows you how the increase of energy consumption and of energy production breaks down among large regions, both in the past three decades and then in the next three decades. And in the next three decades, you can see that the increase in production is almost more than 90 percent outside OECD countries. OECD countries are in blue, and almost all the increasing production is in red and yellow. Red is developing country and yellow is transitional economies. That is two-thirds of the increase in consumption will be also in developing countries and transition economies. The total amounts of consumption in 2030 should be in that projection, 15.3 billion tons of oil equivalent.

We found that fossil fuels of course will remain dominant with oil, which will remain the largest single fuel in the energy mix, although the amount for natural gas will grow more quickly. We thought that these results led to a difficult investment challenge, raised investment concerns. And investment concerns mean security of supply concerns of the long term. As you know, the IEA was been created 30 years ago, primarily to cope with supply disruption and supply security. So we thought we were totally in our role to address this question of investment and to see where, how much investment was needed, in which form, in which area, on which fuel mainly, and how to mobilize this investment.

Today, we will focus on Asia-Pacific, but with some specific results nonetheless on the global picture. Perhaps I can just show you the global picture, and then I give the floor to Fatih Birol. No, there is no global picture—after this one. So I prefer to give immediately to Fatih Birol, if you will allow me, and then I will come for conclusions.

Dr. Fatih Birol, Chief Economist, International Energy Agency: Thank you very much, Mr. Mandil. Good afternoon, ladies and gentlemen. Just to elaborate on this point that the world energy mix will change. Developing countries will play more important roles in the future, as Mr. Mandil mentioned, both as consumers but also as producers. In this context, a major player we wanted to highlight is China.

This picture shows you that in the long term, it is impossible to make energy policies without considering Chinese developments. For example, the first bar highlights that in the next 30 years, 20 percent of the growth in the world energy demand will come only from China. In the case of coal, about half of the world coal demand growth will come from China. The picture is not different when we look at other fields, for example in the case of oil, or if you look at the CO₂ emissions. China will be the single country which contributes in growing terms to CO₂ emissions. In the next 30 years, the increase in CO₂ emissions from China will be equal to that of OECD countries as a whole. So these trends put together, world energy demand is growing, particularly in developing countries. As Mr. Mandil said, we look at what are the investment implications of this growth and we came up with some surprises. Some surprises even for us.

First of all, energy investment is the big number, the magic number. We believe that in the next 30 years, for the expansion of the world energy system, there is a need to find out US\$16 trillion. This means that more than US\$500 billion per year needs to go to energy-related investments. A surprise for us is that when we are talk about investments and money for energy, we mainly think of oil and gas. But this picture shows you the very fact that 60 percent of the investments need to go to electricity investments. This is one surprise for us.

Perhaps the second surprise is the share of electricity. When you think about the electricity investments, one thinks directly about building new power plants. However, this picture shows you that more than half of the investments in the electricity sector go to transmission and distribution lines, building and maintaining those lines, which are again highlighted by the recent problems in the USA and Italy. When you look at the oil and gas sectors, they both have 19 percent of share, and in the oil sector, about three-fourths come from the upstream side, exploration and development, and the rest goes to refinery and transportation. In terms of gas, the transportation part is a bit higher, about 50 percent in LNG and others. This is mainly—this is one of the major results of our study—growing LNG trade in the future. The numbers we have shown for the

global picture highlight the very fact that LNG trade will grow more much faster than the gas consumption and the pipeline trade.

Another surprise is coal. Today, coal has about 25 percent of the energy mix. But it needs 2 percent of the energy investments, highlighting the less capital intensive nature of the coal industry.

To sum up two points again, half of these total investments go to the production side, and another half go to the transformation, transportation side. And another surprising result: more than half of the money goes to maintain the current capacity. Investment is needed not only to meet increasing the demand, but also to maintain the current capacity—gas fields, oil fields, etc.. In the OECD countries, the power plants are very old. They need to be replaced. For the energy sector as a whole, replacement and maintaining investment is a bit more than half, and the rest is needed to meet the increase in the demand. This finding surprised a lot at the International Energy Agency.

When we look at it by region, North America is by far the biggest region in terms of investment needs: US\$3.5 trillion in the next 30 years. China, as I mentioned before, is a major player and needs more than US\$2 trillion in the next 30 years, and the other countries come together. In economic terms, developing countries need slightly more than half of the total money, US\$16 trillion. OECD countries need about 40 percent, and 10 percent goes to transitional economies: Russia and others. Again, this highlights the very fact, the picture that Mr. Mandil showed you in the beginning, the increase in the developing countries' consumption and production patterns.

When we put this US\$16 trillion and investment requirements in context the context of the economic activity, it seems that in the OECD countries the challenge is less pronounced. Energy investment is, on average, about 0.5 percent of GDP in OECD over the next 30 years. But in Russia for example, the challenge is much bigger. It is about 5 percent of GDP. In Africa, it is about 4 percent of GDP. The challenge differs from country to country, according to the performance of the energy sector as well as that of their macroeconomy.

Now let's have a look at the Asia-Pacific investments—when we talk about Asia-Pacific today, we mean the OECD Pacific countries which include Japan, Australia and New Zealand, China, India and the countries in the East and South Asia. This region requires

about one-third of the world energy investments, more than US\$5 trillion over the next 30 years. This includes, of course, the entire supply chains of fossil fuels and electricity. For oil, exploration and development, transformation, refineries, transportation and distribution. In terms of electricity, power plants, and transmission and distribution, etc. In Asia-Pacific, the role of electricity is even much pronounced. Eighty percent of the investments in the Asia-Pacific need to go to the electricity sector. This is mainly investments in the so-called developing Asia: China, plus India, and others. Even though there are major producing countries in the region, like China, India, Australia, coal's contribution is rather small and so is that of oil and natural gas.

When you look at the Asia-Pacific energy investments, the picture again highlights the importance of China. China itself needs about half of the energy investments in the whole Asia-Pacific region. It is almost close to US\$2.5 trillion. And the rest, OECD Pacific, the industrialized countries in the region, namely Japan, Australia, New Zealand and South Korea, account for about 20 percent; and other developing countries account for more than 30 percent.

Let me introduce you how we see the Chinese oil picture to develop in the next 30 years. China today consumes about 5 millions barrels per day. According to our projection, which is rather conservative compared to some other projections on China, the country's oil demand will grow substantially, and as a result of that, by 2030 China will need to import about 10 million barrels per day. This is an amount of oil which the United States imports today. It is very important to highlight this, because the demand is growing there, mainly driven by the transportation sector. Today in Europe, 550 people out of 1000 own a car, where it is about 8 people out of 1000 in China. There is a big room for demand growth in the transportation sector.

When we look at the production side in China, the prospects are rather sluggish; they are bleak. The eastern region, which is the major region where oil comes from, is rather mature and aging. We expect production to decline. We expect some gains in the offshore production, but they will not make it up for the decline in the oil production of existing major fields. As a result of that, China will emerge as a giant buyer, strategic buyer in the oil markets and gas markets. This point is not only important for China, but for all the countries in the region, as it can have a competition impact on the other countries in the region, and can have an influence on the oil and gas prices in the future.

I would like to give some flavor regarding energy investment in China. In terms of oil, refinery investments are becoming more and more important, perhaps as important as the upstream in this region. We expect in non-OECD Asia, which means China, India, and other developing Asia, about US\$120 billion in the next 30 years, or about US\$4 billion per year investment needed for the refineries. First, they need to build new refineries because namely of transportation sector growth. And second, as more and more Middle East heavy oil will be used in the region, you need to have a new conflagration in the refinery sector. This is in line with the increasing growth of Middle East oil in Asia in the future.

In terms of gas investments, we expect that several countries such as Australia, Indonesia and Malaysia would need more investments in the upstream sector. Also LNG investments are growing. Let me come back to the LNG point we made in the beginning of our presentation. Worldwide, we expect that in the next 30 years world gas demand will double. And we expect world gas trade will triple. It means gas will be used more and more in a traded manner. Further, we expect LNG trade will grow six-fold. It reflects LNG will be used more and more as a fuel mainly in the power generation sector worldwide, and this will have a significant influence on the energy balances worldwide as well as the investment needs. The recent reduction in the LNG unit cost is an important input and makes LNG economically viable in many cases, including the US markets.

Coal as I mentioned is a modest fuel in terms of the investment needs, and needs about US\$400 billion in the next 30 years, mainly for mining. China will play a very important role—a third of the money will go to China. China will need every year US\$4 billion in order to increase the capacity and the productivity and to maintain the safety in the fields, which is a huge challenge for China. In our assumptions, we do expect that in China the penetration of gas will increase, but that China will still rely substantially on coal, especially in power generation. Of course, in general we expect that coal investments are subject to several uncertainties, one of which is a key one: the environmental constraints.

Let me come back to the key sub-sector, electricity. This picture shows you that developing countries are the major players in terms of electricity investments in the next 30 years. China has about a US\$2 trillion needs, and developing Asia together almost US\$3.5 trillion—a huge amount of money. What does US\$2 trillion mean in China?

China has to fund 2 percent of its GDP to invest in the electricity sector only, both in the power plants and mainly transmission and distribution, which were lacking behind in power generation in the last years.

In the OECD countries, the challenge is rather less. About 0.3 percent of GDP needs to go to electricity investments. But the challenge is different in the OECD countries, mainly because of market reforms and their adverse impact on investments. For example, in the case of peak load power plants or transmission investments, the challenge will be if these investments to come in a timely manner.

When we look at Japan, electricity investments in the last eight or nine years are rather declining. This is mainly as a result of the slow down in the demand growth. If you look at these trends, you can easily identify that the demand growth has been more or less constant in the past five or six years. So declining electricity investment is mainly motivated through the slowdown of electricity demand.

I would like to come back one more time to China, just to give you two numbers—on average, between 1996 and 2000, China spends about US\$20 billion per year on electricity investments. And over the next three decades, China needs to spend about US\$65 billion per year. It means China needs to triple its efforts in order to make the investments in a timely manner. So this is an important challenge for China. Although the country has significant domestic savings, it may be a serious challenge for the country to mobilize them for electricity investments. We expect that China will build about 800 gigawatts in the next 30 years, mainly coal and hydro, but, as a result of a government policy, more and more gas will be used. Gapacity of gas-fired power plants will be added by about 100 gigawatts in the next 30 years, and this combination will end up with an annual investment requirement of US\$65 billion on a yearly basis.

As for the oil and gas investment in the Asia-Pacific region, especially on the production side, the policies of countries are key determinants of investments: some of them are APEC members, and some of them are key producing countries. How do they want to get the capital for the investment needs in the next 30 years? In terms of coal, the relative prices will matter. As I mentioned, LNG will be less and less expensive in the future, and how it compares with coal prices will be an important element for coal, especially in the competition of the power generation. And for electricity and downstream gas, the market reforms and how the countries deal with the uncertainties

which were or will be created by the market reforms are important. We do recognize that stabilization brought huge benefits to the producers and the consumers, but there are some challenges which the countries need to address in order to attract investments.

The challenge is much more pronounced in the non-OECD countries. As the local financial markets are not strong enough, and the investment frameworks are not protective for many investors to put money in, risks are rather higher and it is very difficult to get foreign direct investments to those countries. The challenge is largest especially in the electricity sector in the developing countries. In the whole Asia-Pacific picture, if we had to highlight the single biggest challenge, it is the electricity sector investment in developing Asian countries.

Perhaps with these words I can leave the floor to Mr. Mandil, our Executive Director, for some closing remarks.

Mr. Mandil: Thank you very much, Fatih. I will not keep you long, just to highlight the conclusions we in the IEA draw from this study. The main conclusion, which is not a very optimistic one, is that it will be more difficult in the future to finance the investment needs for the energy sector than it was in the past. Why?

First, because most of the money, which will come for investment, will be private money and that is a shift from previous trends. A shift which is very positive. We have not to regret the past trends, but the past trends were a lot of public money, governments directly or state-owned companies, and that will be less and less the case in the future. That is very positive, but that leads to a specific issue. Private money does not invest necessarily where and when governments want. Private money is invested where returns are high, and risks are low, and the risk competition amongst sectors and among areas to attract private money. In the case of energy you have heard from Fatih Birol, the main three big features of the investment needs. First, it will be more in developing countries, second it will be more in the electricity sector, and third it will be more in the electricity sector in transmission and distribution.

Those three features represent three specific challenges for the investment. The needs for investment in developing countries is very good, but we know that in many developing countries, the climate for attracting the private investment, the investment framework, the legal framework are not exactly the ones which are necessarily to attract

the investment.

First challenge. Electricity—well, the track records of the electricity sector in return on investment, has been rather poor in the last years, certainly worse than in other sectors and mainly in the oil and gas sector. So there is a second challenge: will private money be willing to invest in the electricity sector? And third, needs in transmission and distribution. These investments in transmission and distribution are investments in regulated activities and that is normal. That is because these activities are natural monopolies, so they have to be regulated. But of course, regulation is sometimes, and sometimes rightly, thought by private investors as an additional risk—the risk of regulatory decisions. So for those three main areas of investment, there are three main challenges for private investment to come.

So, our message, which is a message to the governments because we are a body for the governments, this message is a wake up call. And we say, “Please governments, pay attention. You have a huge role to play.” And one of the big mistakes should be to say that liberalization of the markets means less or no government intervention, no government involvement. Government involvement is absolutely needed, but not the same way it worked before. In the past years, we saw government involvement directly, producing energy, giving grants, subsidies, loans, fixing tariffs. That should not be the case now. That is the area for the market, and for the market forces. But the huge role for governments is to set the policy and to make sure that with the adequate policy regulations, the private money will be happy precisely where the government wants this money to come. That is not easy, that needs some time, very fine-tuning, but it is the key necessity if we want to attract this money where it is needed. If we do not, the risk is that markets in the future will not be well supplied, well balanced, with the two evident risks: high prices, and supply disruptions. So this is our wake-up call to governments.

The last bullet of this slide is—well on another topic I do not want to address in detail because of lack of time, but just to say that you remember that our scenario is the scenario with the assumption that there will be no new energy and environment policy after 2002. The result is not very sustainable. For instance, CO₂ emissions will increase during this period, with this scenario dramatically: 60 percent compared to 2001. Of course, we have elaborated, and you will see it in the document, an alternative scenario taking into account strong policies which have been drafted during the year 2003 mainly

in OECD countries with much more energy efficiency and also more renewables. You will see, which are the result in the investment field, it is interesting. It is much better for CO2 emissions but not yet enough, and we think that it is absolutely necessary to go further and to rely on major technical breakthroughs which are necessary in some technologies.

Three technologies here as an example are quoted. First is carbon sequestration, which can totally change the picture. Second is hydrogen amp fuel cells, which can be very important too provided it is coupled with carbon sequestration because hydrogen needs to be produced with fossil fuels. Third is advanced nuclear reactors. We are convinced that nuclear has to play an important role if we want to cope both with issues of security of supply and issues of environment. But for that we need probably advanced reactors, coping mainly with the issue of nuclear waste.

So this is another message to the government. Please make sure that long term research and development is adequately conducted in your countries and in international cooperation. Thank you very much for hearing us and I do not know but I think we are prepared to have a debate and questions and answers now.

(Q & A)

Q: A moment ago, you mentioned a scenario that assumed a 60 percent increase in CO2 emissions during the next 30 years. At the end, you also mentioned new policies drafted this year and said something about technical breakthroughs. Will the 60 percent increase in CO2 emissions change in spite of such policies and breakthroughs?

Mr. Mandil: I was a little bit too short and I want to explain more clearly. The 60 percent assumption is supposing the best-case scenario. The best-case scenario is the scenario where there is no change in energy and environment policies compared to 2002. We have devised an alternative scenario taking on board all the policies designed in 2002 and 2003 to reduce CO2 emissions. There are a lot of those policies. For instance, in Europe there are policies to give mandatory targets for renewable energy share; in some other OECD countries too, including Japan. So if we take on board those policies, we have an alternative scenario with a much bigger share of renewables, and also significantly reduced energy consumption because we assume that there is room for enormous progress on energy efficiency. That of course has a result on CO2 emissions

and if I remember well instead of plus 60 percent it must be something like plus 10 percent. I do not remember exactly but it is around plus 10 percent in 2030, which is much better of course. It is at the cost and if you have a look to the book you will see which are the results of investments. And it is certainly with higher prices of energy but okay that is very good. We have to pay for protecting the environment. What we say is that even that is not enough. It is not enough to be satisfied with CO2 emissions which are 10 percent higher in 2030 than they are now. We say that to achieve that, we need further technological breakthroughs, which could bring CO2 emissions significantly not above but below the present levels, which is needed if we want to stabilize concentration of CO2 in the atmosphere.

Q: Mr. Mandil, thank you very much for enlightening us again today. In particular, I love the words “wake-up call for the governments.” But what would be the worst-case scenario for Asian developing countries if investment constraints may stay and not relieved? Maybe the worst-case scenario may not be written in the book but what is your worst case? This could be the best wake-up call for the government. Thank you.

Mr. Mandil: Thank you. The worst-case scenario is as you said, it is not in the book, but it is not difficult to follow the logical consequences if the investment in the electricity sector cannot be done in a timely manner. There may be and there will be problems in terms of delivery of electricity services to the industry, to the economy and to the population. This will have serious implications we believe on the economy and the social life of those countries. The countries which will be heard, especially in the context of Asia, is mainly South Asian countries, starting with India, as the domestic sources in those countries are much weaker and less solid compared to some East Asian countries such as China and others.

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