

Dräger Foundation



XVI Malente Symposium



2006

**Energy, Climate, and Future Welfare -
Changing Global Dynamics**

**October 08 - 10, 2006
Music and Congress Centre Lübeck**

Sunday, October 8, 2007 – Dinner Speech

Professor John M. Deutch

Massachusetts Institute of Technology (MIT), Cambridge, Mass., USA

Professor
John M. Deutch



Energy, Climate and Security Concerns of the Future

I want this evening to have a discussion with you about the connections between energy and national security. I think I should begin by saying that there is an intimate connection between the two – domestic energy policies and programs undertaken entirely in the interests of one country have international implications. Let me give you two examples:

- China's expanded use of coal-fired electricity generation has major implications for global warming.
- Iran's decision to enrich uranium, allegedly to produce fuel for nuclear power plants, is viewed by the United States and by many European countries as an unacceptable proliferation risk, because it moves Iran closer to a bomb.

The United States has not been successful, and I believe that many



European and OECD countries have been equally unsuccessful, in integrating these issues of domestic energy policy and the foreign policy implications of energy issues. The fact that we have not been successful, or have not been doing a good job at integrating these domestic and international aspects of energy, means that there are consequences for the future, for future generations. Future generations in our countries will face higher costs and greater difficulties because we have failed to take actions today that we should have taken.

I would like this evening, as a basis for a discussion, to raise four security issues very briefly, and then make some suggestions about different ways of going forward in order to provide a better future by dealing with these energy insecurity problems. The four issues that I want to touch on are:

- the need to achieve an international consensus and manage the risks of global warming;
- the importance of reducing our dependence on imported oil and natural gas;
- protecting the energy infrastructure from natural disasters and terrorist attacks; and
- ways of minimizing the proliferation risks of nuclear power.

Each of these are energy issues which I think have tremendous foreign policy and security implications. I want to



begin by mentioning two realities that should draw our attention to the issues of energy and security. The first is that the only way to avoid oil and gas dependence would be to begin today a gradual transition away from a petroleum-based economy. The second reality is that the only way to avoid the adverse effects of global warming is to reduce greenhouse gas emissions or to adopt elaborate measures of geo-engineering or adaptation that will also be costly to our society. Progress on both of these issues will be quite slow – it will take decades rather than years. Why? Because programs for both require the development and deployment of new technologies and the design and adoption of new regulatory, political and economic incentive measures, and this will take a great deal of time. During the intervening period – the decades, not just the years – we need to manage the security aspects of these issues, so this is a matter of importance for us all.



China's Energy Security Challenges

Let me begin by talking about oil and gas dependence. I choose to do so by discussing China with you, and I select China not because I want to pick on China or blame China, but rather because I think it illustrates quite poignantly the kinds of stresses and strains there are in the international system as a result of oil and gas dependence. I also should remind you and myself that energy is just one of the issues between the developed countries and China. There are other foreign policy issues that are very important and loom large: Taiwan, North Korea, human rights, trade, intellectual property rights – all of these are matters that are also on our agenda in dealing with our relationships with China, and none of them can be considered wholly independently of the others.

But the fact is that China's remarkable economic growth over the past two decades has enabled it to achieve social progress and a greatly strengthened geopolitical position in the world. For the foreseeable future, the leaders of China will continue to make economic growth their top priority. We should assume therefore that the country's economic expansion will be accompanied

by a corresponding surge in energy consumption. China, which only became a net importer of oil in the early 1990s, is today the third largest importer of oil and the second-largest oil consumer in the world. China has so far been able to meet this increase in demand and prevent the economic slowdown that an energy shortage would precipitate. But the supply challenge is going to become greater for China in the years to come. We should anticipate that over the next few decades China's energy demand will grow at a rate between three and four times that of the OECD countries.



The Implications for Oil and Gas

China will need access to international markets for ever more significant quantities of oil and natural gas. To date, China receives about 11 percent of its oil supply from Iran (which amounts to approximately a quarter of its total supply from the Middle East) and five percent from Sudan.

China has so far sought to avoid doing business with international oil companies, companies like Exxon, Total and Chevron. Instead, the Chinese have entered into

state-to-state agreements with other countries. In making such arrangements with producer countries, China, as a consumer country, is willing to pay higher prices and offer political concessions in order to lock up supply. For example, in 2001 China entered into two such arrangements with Indonesia and Venezuela. In 2005, China entered into nine separate state-to-state arrangements with such countries as Iran, Algeria, Ecuador, Syria and Russia. These deals would be unobjectionable if China were relying on transparent arrangements arrived at on market terms – if China chooses to overpay in the market, to take exceptional financial risk, so be it. US international oil companies would love to be able to do the same thing. The problem, however, is that China's increased use of state-to-state arrangements implies a move away from transparent world oil markets and invites other large consumer countries, for example India, to follow their example of making special deals with certain countries.

These state-to-state arrangements with major resource holders include significant non-market aspects. I could go on and give you examples for each of the countries I have mentioned, but let me just make a few remarks about the arrangements that China has in Africa, notably in Angola, but also with the Sudan, and which are especially troublesome. For example, it is reported that China has supported local warlords in the Sudan with military equipment in exchange for gaining preferential access to oil properties and protection from attacks or terrorist events. The net result of all of these non-market transactions is the following: China is building economic relationships that constrain the ability of the United States and



„China will continue to make economic growth their top priority. We should anticipate that over the next few decades China's energy demand will grow at a rate between three and four times that of the OECD Countries“.





other countries to pursue their interests with major resource holders.

We should also pay special attention to the growing relationship between Russia (a major resource holder that uses energy to gain political leverage) and China (a major oil and gas importer interested in locking up supply). Both are acting aggressively to try and tie up the oil and natural gas assets in Central Asia, and direct them to places which will fulfill their political objectives. As their energy ties form, so too will their political relations, and it is patently not in the interest of the United States for these countries to become closely aligned. For instance, their joint membership in the Shanghai Cooperation Organization (SCO) – a regional security group that also includes Kazakhstan, Uzbekistan, Tajikistan, and Kyrgyzstan – has already

allowed Russia and China to increase their influence in Central Asia at the expense of other consuming countries.

Of course, China is not the only Asian country which seeks oil and gas – all the other countries in Asia which are growing, like Japan, South Korea, and Taiwan, are concerned about this competition for oil and gas resources, which could lead to very distressing political realignments in the region.

China's Electricity Sector

Following on from my example of China and its oil and gas situation, let me say a word about the electricity sector. China's electricity production, and its coal use, are projected to grow at two or three times the rate of Europe or the United States. At present, coal comprises about 65 percent of China's pri-

mary energy consumption, and is going to figure prominently in China's energy mix for years to come. The reason for this is simple: China has vast coal reserves, and coal is cheap, about a dollar per million British Thermal Units, compared to imported natural gas which costs about seven dollars for a similar amount of energy. Last year, China built 75 large coal power plants, each of which emits about 15,000 metric tons of CO₂ per day. The United States built zero such coal reactors over the past three years.

Yes, China will also make greater use of nuclear power, but even under the most optimistic scenario, nuclear power will be providing less than ten percent of China's electricity by the year 2030 – the remainder coming from coal. It is true that China's government is demonstrating a much greater awareness of the environmental burdens that accompany the current and projected pattern of energy use. However, even assuming that the Chinese achieve their tremendously ambitious goals of improving energy efficiency, they are going to be using a lot more coal than the United States by the year 2030, and also emitting a great deal more CO₂ than the United States. It is very unlikely that China will choose to pay for the higher capital costs of electric power alternatives associated with carbon capture and sequestration. Why?

– First, China, like other developing economies, does not believe it





should bear the costs of carbon emission measures because the past emissions that are responsible for the high concentrations in the atmosphere today come from our old developed economies.

- Second, despite its great balances of dollar assets today, China has enormous requirements for internal investments, especially as regards public infrastructure, i.e. in the areas of water quality, healthcare, and old-age assistance. They are very unlikely to be willing to set aside the money for the investments that would be required for more costly yet lower-producing electricity generating technologies.
- Finally and most importantly, decision-making in China in the energy sector is extremely regional rather than central. Local authorities are delegated the responsibility for maintaining economic growth and managing energy supply in their areas. Even if the central government in Beijing were willing to undertake to limit carbon and other greenhouse gas emissions, it would take an enormous

length of time before the local authorities would adopt such policies and practices, given the fact that economic growth is the central government's principal target imposed on them, and it would take a very long time before inspection and enforcement of these regulations would be put into place.

However, the picture that I am painting with respect to electricity generation in China is again not because I want to single them out as behaving any differently to the other large emerging eco-



nomies, like India, Indonesia, Brazil and Mexico. My point is that if we do not find a way forward with these large emerging economies like China in the area of greenhouse gas emissions, it is not clear what the point is of the western policies that we are discussing. What then is the purpose of Kyoto? What is the purpose of the United States adopting a cap-and-trade system if we don't see some way clear to including the large developing economies in our efforts to reduce the

emissions of greenhouse gases, and especially CO₂?

Let me briefly turn to two other matters. These have to do with the vulnerability of the international energy infrastructure to terrorist attack and also natural disaster, and with the proliferation risks of the expanding use of nuclear weapons

International Energy Infrastructure Protection

I don't know how many of you in the audience here this evening noticed that in February of this year a terrorist attack on one of the major Saudi oil processing facilities was thwarted by the internal security service of Saudi Arabia. This oil processing facility in Saudi Arabia produces 650,000 barrels of oil per day for export. On September 16, 2006, terrorists alleged to be connected with Al Qaeda simultaneously attacked two different oil facilities in Yemen, an oil storage facility and a refinery.

There are some important lessons here. As energy use and trade in energy grows, the enormous infrastructure that supports the production, transportation, processing and distribution of energy expands and becomes increasingly vulnerable to terrorist attack. Energy facilities are an enormously attractive target for terrorists, particularly because they can be attacked and enormous economic damage and huge inconvenience caused to the operation of the economy without killing many people. The other lesson to be learnt from these two recent attacks is that energy facilities can be successfully protected and defended against terrorist attack if sufficient effort is made – it is by no means a hopeless task.

More attention needs to be given by European countries and by the United States to protecting our energy infrastructure. That attention needs to be given by both governments and corporations. It is almost certain that governments around the world will adopt new regulations for the protection of energy infrastructure and the transportation of energy. I'm including here gas processing facilities, production platforms, pipelines, tankers, electricity grids, power plants – especially nuclear power plants – and of course hydrocarbon storage facilities. And as I mentioned, if we do a better job of protecting this infrastructure we will have a better chance of surviving and defending against natural disasters such as the hurricanes Katrina





and Rita which in 2005 created such devastation in the Gulf of Mexico and caused such damage to energy production facilities in the United States.

Reducing Proliferation Risks from Nuclear Power

My last comment on the connection between energy and security has to do



with nuclear power. As we look around and think about what we are going to do over the long term to reduce the emissions of greenhouse gases, and especially CO₂, from power plants, many people have naturally started to wonder whether nuclear power could be expanded to take up some – though certainly not all – or even a majority of the required reductions in CO₂ that are needed. In other words, we have had a call for a reevaluation of nuclear power. There are many challenges to having nuclear power serve our economies – let me just mention the principle ones. First of all, it's too expensive today, even given the higher prices of natural gas and the high costs of environmental abatement for coal-fired power plants. We need to be sure that improved safety is possible. There has to be some progress on radioactive waste manage-

ment, on which there has been little progress in the past two decades anywhere in the world. And most importantly, in my point of view, for our discussion of security here this evening is that we have to ensure that commercial nuclear power does not become a source of technology for bomb-usable material for weapons. The proliferation challenge is particularly important because most of the projected expansion of nuclear power is likely to occur in those parts of the world – obviously the ones that are growing the most rapidly – that are the most unstable and the most dangerous from the point of view of proliferation risks.

In 2003, MIT did a study of the future of nuclear power and concluded that the greatest growth and possible deployment of nuclear power would take place

in the following countries: Indonesia, Brazil, Mexico, Egypt, Turkey, South Korea, Taiwan, Thailand and Vietnam. These are not countries that are generally thought to be as stable as – to choose a random example – Germany or the United States. The question is, how do we manage this nuclear power in a way that will not allow the dangerous parts of the fuel cycle – enrichment and reprocessing – to spread around the globe? In 2004, the G8 took the first steps towards a solution to this problem at its meeting in Savannah, Georgia. The G8 endorsed a proposal under which nuclear supplier states, notably Russia and France, but also in principle the United States, would offer enrichment services and take back the spent fuel from the nuclear reactors at very attractive financial terms. Thus countries who wanted to use nuclear power, in exchange for foregoing early deployment of fuel cycle technologies of proliferation concern, would gain advantageous access to fuel cycle services of enrichment and waste management.

A perfect example of this is the contentious case of the two nuclear power stations Russia is building in Iran. Here the idea would be to offer the Iranians the possibility of having these reactors as long as the fuel was supplied on, basically, a leased basis by the Russians – they would supply enriched fuel, then take the spent fuel back from the reactor at the end of its useful life and bring it back to Russia for waste management, reprocessing or disposal as the Russians see fit. Now, I don't think this arrangement is likely to prove successful, because in my judgment the Iranians are not just looking to build commercial nuclear power plants, but are also trying to move closer to access to a bomb. The principle, nevertheless, is important. If we are going to have the advantage of using nuclear power, so important in a carbon-constrained world, we must be sure from the security point of view that it is not accompanied by a proliferation risk. The G8 initiative is very important and deserves all of our support.

Guiding Principles for Energy Security Policy

Are there some guiding principles for going forward? I conclude by mentioning to you six principles that I believe should guide our attention towards this energy security issue over the next

years – again, these are not problems that will be dealt with swiftly, they are problems that are far from being widely agreed, but I draw them to your attention as important guideposts for dealing with the security problems as we move forward.

The first is that the International Energy Agency should be broadened to include the rapidly developing economies that are so important as consumers of energy. Currently the IEA is limited in its membership to OECD countries, while China, India, Indonesia and Mexico are not members. It seems foolish to me that this should be the case; we urgently need

to find a mechanism to include these large importing countries that have common interests in managing the international oil and natural gas marketplace in one place, which is precisely what the IEA was created to do.

Second, in my judgment inadequate progress is being made on building an international consensus on carbon emission policies. If we do not reach some agreement with the developing economies about carbon emissions and control, it is going to be impossible to prevent the global warming phenomena from placing enormous costs on our future generations of citizens. If we do not work to mitigate





emissions today, we are going to be faced with the problems of dealing with adaptation and geo-engineering in the future.

Emerging economies will be unwilling to pay these additional costs associated with carbon emission controls, which poses the question as to what industrial economies will be willing to do to pay the difference. Of course, no progress on this subject can be expected so long as the United States has no carbon control policy itself, and let me tell you, we do not have this now. If we are going to make progress, in other words, the international community must come together with new ways of reaching agreement

on carbon emission controls which will include both the developed and the developing economies.

My third point is that our countries must make a much greater level of effort on the research, development and demonstration of future energy technologies. Technology is needed for many purposes, for example to improve end-use efficiency, in the area of carbon capture and sequestration, to encourage alternative liquid fuels, or to increase the use of biomass feedstocks.

Development and deployment of these technologies will require adoption of new mechanisms to internalize the social

costs of oil dependence and global warming. This means higher energy prices. It means an energy tax or some equivalent measure. Higher energy prices are of course very unpopular with both the consumer and their political representatives. But I must say that without this kind of long-term technology development effort, I really fear that we will be not prepared to make the necessary transition away from oil and gas and will not be prepared to deal with the global greenhouse gas threat.

Let me give you just one example of an R&D incentive which is lacking. We know that carbon capture and sequestration is an important potential way of



managing greenhouse gas emission reductions. Today there is not a single example of a CO₂ capture and sequestration project in the world that starts with the CO₂ produced at a coal-fired power plant, captures that CO₂, transports it by pipeline, and places it into an aquifer, a deep aquifer, which has been authorized by some independent regulatory authority for storage over a long period of time. Nor is there any example of a CO₂ sequestration project where there is sophisticated instrumentation available to allow independent people to measure, monitor and verify the location and safe storage of that CO₂ underground. It seems to me that the world urgently needs to have three or four such carbon capture and sequestration projects up and running and that these are projects that can be successfully mounted on an international basis and should not and need not be done by individual countries.

My fourth point, as I've already mentioned to you, is that this transition from a petroleum-based economy will take decades. In other words, in the near term we are all going to be dependent on oil from the Persian Gulf, notably from the following four countries: Saudi Arabia, Iran, Iraq and Kuwait. All of these are the major oil-producing countries in the Persian Gulf region. This means that we have to deal with these countries and must deal with them in a manner which takes their own societies into account and encourages them to continue and indeed expand their production.

Fifth, a condition for expanded deployment of nuclear power around the globe should be that there must be no expansion of the proliferation risk, which means making operational and effective means of managing the

dangerous parts of the fuel cycle, i.e. enrichment and reprocessing, so they do not spread around the world.

Sixth, more attention needs to be given to international cooperation on energy infrastructure protection. A great deal could be done here in joint projects, joint planning, transfer of knowledge about how best to manage our energy infrastructure and exercises for protection of key energy infrastructure facilities, such as liquefied natural gas (LNG) terminals and electricity grids; joint naval operations to protect sea lanes of communication for all the tankers that travel from one country to the other; and information security for Supervisory Control and Data Acquisition (SCADA) systems that control key elements of the energy infrastructure.

Your conference is going to be dealing with global climate change and the future welfare of the world. This is a worthy and important subject – it may in fact be one of the key subjects that we have in front of us. The fact that we are not doing enough today around the world means that future generations are going to find themselves in much worse circumstances than they otherwise would. An essential aspect of this project is to make sure that we realize that it's going to take a long time, to be sure to pay attention to these security matters which are so vital to the proper functioning of our energy economy during this intervening period, and to be sure that we keep on reminding both the public and public officials that we need to move away from our dependence on oil and need to take the global climate change threats seriously. Thank you so much for your attention.

