

The Case for a Proactive Indian and Chinese Approach to Climate Change and Energy Security

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Abstract

The magnitude of the threat from climate change is starting to be realized by the world's political leaders. A positive aspect of such a threat is that it could unite the world behind a common purpose, but this will require a drastic change in policy, primarily in the United States and the growth countries in Asia. This article argues that India and China could turn the threat from climate change into a political advantage by adopting a new development strategy, based on a demand for full access to all such technologies that may allow to quickly surpass from the dirty stage of development. To develop a leapfrog strategy, however, Indian and Chinese analysts and policy makers need to acquire a profound understanding not only of science and technology but also of how the problems of climate change, energy security and political instability in West Asia (the 'Middle East') are related to each other. This will require a combination of knowledge from several academic disciplines.

This Year's Focus on Climate Change

In 2007, climate change finally reached the top of the global political agenda. British Prime Minister Tony Blair and former US Vice President Al Gore were early out among the top leaders in drawing public attention to the seriousness of 'the climate crisis'. Al Gore's book and film *An Inconvenient Truth* from 2006, which won an Academy Award (Oscar) for the best documentary and the best song in February 2007, awakened much of public opinion in many countries to the dangers of global warming and the essential role of scientists in establishing the facts, assessing probabilities and bringing attention to the problem, so politicians can design

solutions.¹ Tony Blair also strongly contributed by putting climate change on the agenda by commissioning a report from the renowned economist Sir Nicholas Stern. The 700-page Stern report (*Review on the Economics of Climate Change*), which was presented to the British Government in October 2006, argued that the world needed to invest 1 per cent of global GDP each year in order to mitigate the effects of climate change. Three elements of policy are required, he said, for an effective global response. The first is to increase the price of carbon, through tax, trading or regulation. The second is to support innovation and the deployment of low-carbon technologies. And, the third is to remove barriers to energy efficiency and to inform, educate and persuade individuals about what they can do in response to climate change. If this is not done, then up to 20 per cent of global GDP may eventually be lost because of the damage done by global warming. Stern claimed that climate change might become the greatest market failure ever seen. He warned that the effects of climate change might be as catastrophic as the two World Wars and the economic depression during the first half of the 20th century.²

Although US President George W. Bush in his State of the Union address on January 23, 2007, focused primarily on US national oil security, he also for the first time paid serious attention to climate change, stating optimistically: 'America is on the verge of technological breakthroughs that will enable us to live our lives less dependent on oil. And these technologies will help us be better stewards of the environment, and they will help us to confront the serious challenge of global climate change'.³

One week later, on February 12, 2007, the United Nations Intergovernmental Panel on Climate Change (IPCC) published the first of its four reports in 2007.⁴ This first report came from its Working Group 1 on 'the physical science basis', which is responsible for making scientific assessments of the problem. The report provoked widespread public attention with its virtual certainty as to the rapidity of global warming and the fact that this to a great extent is caused by burning of fossil fuels by humans. Working group 2, on 'impacts, adaptation and vulnerability' published its report on April 6, 2007, and Working Group 3 on 'mitigation of climate change' published its report on May 4, 2007. The climate panel plans to adopt and approve its compiled report at its 27th session on November 12–16, 2007, in Valencia, Spain. The scientists working under the auspices of the United Nations Environmental Programme and the World Meteorological

Organisation thus did not yield to politicians any room for forgetting about climate change during 2007.

Shortly after the publication of the IPCC's first report, the European Union (EU) launched its new ambitious strategy for greenhouse gas emission reductions, under the so-called 20-20-20 formula, which was formally adopted at the EU summit in Brussels March 8–9, 2007. The aim is to stabilize world temperature at 2° above the pre-Industrial normal. This is an ambitious aim that many scientists consider unrealistic. The EU's own contribution, in the period until 2020, will be to unilaterally reduce its own emissions by 20% from the level at the base year 1990. At present, emissions are substantially above the 1990 level. The EU also committed itself to ensuring that at least 20% of its energy consumption will come from renewable sources by 2020.⁵ Living up to these commitments will require a colossal effort. Many EU governments and companies are now worried that they will lose edge *vis-à-vis* their competitors in America and Asia, if their emissions are not constrained to the same extent by their governments. To induce other nations to join and accept similar commitments, the EU has pledged to go even further and undertake a 30% reduction in its emissions before 2020 on the condition that other countries join the effort. 'Other countries' here means mainly the United States, China and India. To obtain such commitments, it will require an intense diplomatic effort. In the first half of 2007, the EU was in a favourable position to launch this effort because its most environmentally advanced nation, Germany, had the 'double presidency' of the EU Council of Ministers and the G8.⁶ Germany made climate change the main topic of the G8+5 summit in Heiligendamm on June 6–8, 2007. Not only the full members (Canada, Germany, France, Italy, Japan, Russia, UK, United States) but also the five observers (China, India, Brazil, Mexico and South Africa) took part in the meeting. Optimists had hoped that the G8 could go beyond the declaratory stage, make genuine commitments, and perhaps even design new institutional mechanisms to coordinate the effort of the great powers to overcome the climate crisis. This could have led to a 'concert of world powers' to overcome the climate crisis. It became clear that this was not possible, mainly because the United States did not agree. Shortly before the summit, on May 31, 2007, President George W. Bush made a speech in which he went further than before in pledging action to mitigate climate change, but he favoured an approach without emissions caps, focusing on an American-led process where the G8+5 spend 18 months developing a consensus on just aspirational goals

for greenhouse gas emissions reductions, and then have individual countries design national strategies to meet those goals, asking major industrial sectors to design 'best practices'.⁷ His aim seemed to be to design a process not aiming at a treaty, but at some kind of voluntary engagements. The meeting in Heiligendamm, however, did arrive at a unanimous declaration, with a section on 'climate change, energy efficiency, and energy security', seeing all three in combination and pledging: 'We are committed to take strong leadership in combating climate change. We confirm our determination to work among ourselves and with the global community on global solutions that address climate change while supporting growth and economic development. We commit ourselves to implement approaches which optimally combine effective climate protection with energy security. To this end, we are committed to the further development of the international regime to combat climate change, especially in the run-up to the UN Climate Change Conference in Indonesia at the end of this year'.⁸ The last sentence meant that German Chancellor Angela Merkel had brought US President George W. Bush on board the process to develop a global regime under UN auspices. This was the biggest news at the meeting, leading to an expectation that the negotiations under UN auspices in Bali in December 2007 were going to be taken seriously, and that the world's leading nations may, after all, be able to arrive at a new treaty or protocol by 2009, with emissions caps.

The G8 is one of the two global arenas for discussing global climate policies. The other is the annual conference under the UN Climate Convention framework created by the first Earth Summit in Rio de Janeiro in 1992 and renewed at the second in Johannesburg in 2002. The Kyoto protocol of 1997 resulted from this multilateral negotiation process and is valid for the period until 2012. Many of the countries who have ratified the protocol are finding it extremely hard to live up to their obligations in terms of emissions reductions, and their motivation suffers from the fact that the United States has refused to ratify the treaty and allowed major further increases in its CO₂ emissions. The USA's energy intensity is twice as high as Japan's (one-and-a-half of Japan's if we adjust GDP for purchasing power parities).⁹ Negotiations for a follow-up to the Kyoto protocol should long have started but have been delayed. The climate talks in Nairobi in November 2006 ended in failure. Participation at the talks to be held in Bali December 3–14, 2007, will not be limited to the countries that have ratified the Kyoto protocol, but include all parties to the climate

convention. The world now waits to see whether its leaders are able to negotiate a new protocol that combines elements of the three competing, but also complementary strategies, we have seen unfold over the last 10 years:

- The EU strategy of agreeing on national emission quotas as a basis for a system of quota trade and of taxing the use of carbon-based end products. This strategy starts with legal commitments, on the assumption that it will be possible to find the means to live up to them.
- The US strategy of implementing positive incentive systems for technological innovation. This strategy aims to create the means through market incentives before legal commitments are made.
- The Chinese and Indian strategy of putting economic growth first and refusing to make any commitments while looking for ways to combine rapid economic growth with increased energy efficiency.

Japan has a potential for playing a role in mediating between the three strategies, since it has been taking actively part in all three strategies. Comparatively speaking, Japan has a highly energy-efficient economy, due to measures undertaken already in the 60s–70s when Japan sought to reduce its dependence on imported oil. Japan is party to the Kyoto protocol with a pledge to undertake costly emission cuts from an already low level. Japan is also a key partner for the United States in the recently created Asia-Pacific Partnership on Clean Development and Climate (APP). Finally, Japan is engaged in a range of collaborative energy conservation projects with Chinese companies and institutions. If Japan could combine all of this with an effective multilateral negotiation strategy, Tokyo could become a key contributor to bringing the world beyond Kyoto during its G8 presidency in 2008.

A rather promising sign at the beginning of the year was a statement from an informal meeting of high-level political leaders from Japan, the United States and the G8 countries including Brazil, China, India, Mexico and South Africa in the US Senate in Washington February 14–15, 2007, organised by the UK-based Global Legislators Organisation for a Balanced Environment (Globe).¹⁰ The meeting, which listened to a keynote address by Japanese national security advisor Yuriko Koike and, among others,

to the possible US presidential candidate John McCain, agreed that both developed and developing countries have to face targets on greenhouse gas emissions, and that a successor to the Kyoto Protocol must be in place by 2009. G8+5 convened a new legislators' meeting for the G8+5 countries in the German Bundestag June 3–4, 2007 (immediately before the G8 summit), and plans yet another in the Japanese Diet in June 2008, just before the next G8 summit and a few months before the US presidential election. The task of the negotiators who meet in Bali in December 2007, is to reach agreement on a new, globally inclusive treaty protocol by the time they meet in Denmark in 2009, with the United States, China, India and Russia as fully committed parties. Such a treaty will need to combine the European strategy, based on national emission quotas, the US strategy of creating incentives for technological change, and a developing 'country leapfrog growth strategy' with radical innovations in energy efficiency and alternative energy; A key element will be to agree on a globally applicable minimum carbon tax, which can divert investments away from the most polluting practices and raise revenue for the states concerned.

Much hinges on US internal politics and the question of whether or not the main candidates for the US presidency in the period 2009–2012 will give priority to climate change and energy security. The most famous whistle blower among American politicians is former Vice-President Al Gore. In 2007, he followed up his prize-winning film with a whirlwind of lectures all over the world, and a new book entitled *Assault on Reason*. One conservative and one leftist member of the Norwegian parliament, former Minister of the Environment Børge Brende and the environmental activist Heidi Sørensen, nominated him, together with the Canadian Inuit activist Sheila Watt-Cloutier, for the Nobel Peace Prize. Al Gore is controversial at home. Because he insisted that President Bill Clinton sign on to the Kyoto protocol even though he had not invested the necessary effort to ensure support in the US Senate, Gore has been blamed for creating a stalemate situation in climate policies on the US federal level. (On the other hand, there would not probably have been any Kyoto protocol if Clinton had refused to sign.) After the signing, with the US Congress refusing to ratify and entrenching itself in a do-nothing attitude, it was easy for President George W. Bush to ignore the climate crisis. Hence US innovative policies were developed only on the level of individual American states, such as California. At any rate, Al Gore has become world famous as 'Mr. Green', and the Norwegian Nobel Committee has often favoured idealists over

more pragmatic politicians. The award-winning ceremony for the winner among 2007's 181 nominees will be held in Oslo on December 10, 2007, just as the climate negotiations are going on in Bali.

How serious is the climate crisis? This article is written by a peace researcher and political historian, with no competence in climatology or natural science. What can be done here is just to summarize what seems to be the scholarly community's consensus as far as climate change is concerned. The UN Climate Panel's reports, and the publicly available scientific debates about them, must be considered as reliable sources.

There is no longer any doubt that the atmosphere is heating up, and that the pace of global warming is increasing. Some scientists fear that the process has already gone beyond the danger level, and become irreversible. There is also no doubt that global warming is caused largely by the burning of fossil fuels (coal, oil, gas) by humans, with change in land use (deforestation) as the other main contributing factor. Those continuing to claim that climate change may be due to natural variations in solar activity are a tiny minority. It also seems clear that global warming is putting both ecosystems and human societies at great risk through the melting of ice, a rising ocean level, changes in rainfall patterns and in the flow of water through major river systems, perhaps also through increase in the frequency and severity of storms and hurricanes and the slowing and possible redirection of water currents.

What remains contested is *how* likely these risks are, how serious they will be, and the extent to which it may be possible for humans to slow down, halt or reverse the warming: Can efforts to reduce CO₂ emissions stop global warming? Is it at all possible to realize the EU goal of preventing the atmosphere from heating up more than 2°C? Will efforts to do so be cost efficient, or would it be better to accept global warming as inevitable and adopt drastic policies of damage control: Move millions of people away from areas exposed to flood or drought, build dykes and irrigation systems on a massive scale. Some of these questions are addressed by the UN Climate Panel's Working Group 3, whose report was released on May 4, 2007.¹¹

No matter what one's view is on the seriousness of the risk, and on the likelihood that measures to stop global warming may prevent the world temperatures from increasing with more than 2°C or 3°C in relation to the pre-Industrial level, there seems to be at least two strong reasons for

taking urgent action. The first is *caution*. Just the *possibility* that global warming may continue to accelerate, and the enormous consequences this may have for mankind, seems enough to form a compelling reason for doing what we can to reduce the risk. This is the main reason underlying the econometrically grounded recommendations in the Stern review. The other reason is that many of the measures needed to meet the challenge from climate change are at the same time means to enhance energy security.

Last Year's Focus on Energy Security

Owing to the steep increase in the oil price during 2005, in part driven by instability in the Persian Gulf region, energy security topped the global political agenda in 2006. It was discussed at numerous bilateral and multilateral summits, including the meeting of the Non-Aligned Movement in Havana, where India assumed responsibility for leading its work on energy security. Energy security was also in focus when the International Energy Agency (IEA) released its *World Energy Outlook* on November 6, 2006. Its message was alarming. In its 'reference scenario', premised on a continuation of current trends, the IEA predicted that the world's total energy use would grow by more than half over the next 25 years, with *coal use* growing most in absolute terms. This would primarily be due to increased use of coal in China, where the demand for coal has grown at an alarming pace since 2002. Half of the projected increase in CO₂ emissions will come from new power stations, mainly using coal and predominantly located in China and India, says the IEA. China was at that point expected to surpass the United States to become the world's largest CO₂ emitter by 2009, but in 2007 it was reported that China had already surpassed the United States in 2006 (although its per capita emissions of course remain much lower than in many other countries).¹² The use of oil will also rise substantially, and since production of oil in non-OPEC countries will soon peak, the share of OPEC in world oil supply is predicted to rise sharply. Within OPEC, oil production will also be increasingly concentrated in a few countries. Although gas resources are more widely dispersed, Russia, Qatar and Algeria are dominating the international market, with Iran a potentially huge provider if the necessary investments are made. In order to meet demand, investment needs in the period 2005–2030 would, according to the IEA, exceed US \$20 trillion, of which US \$11.3 trillion would be in electricity generation, US \$4.3 in oil and US \$3.9 in gas. IEA emphasized that its 'reference scenario', building on ongoing trends, would lead to a 'dirty, vulnerable and

expensive energy system'. The Outlook therefore also included an 'alternative policy scenario' with emphasis on investments in energy efficiency, renewable sources of energy and nuclear power. Under the alternative scenario, consumers would have to pay substantially more for environment friendly products, but the investment needs in energy production would be so much lower that this would more than compensate for the increased prices on the end products. The IEA concluded that 'strong political will and urgent government action is needed to create clear incentives to change existing investment patterns'.¹³

The main forum for discussion of energy security in 2006, prior to the launch of the *World Energy Outlook*, was the G8 summit in St. Petersburg July 15–17, 2006, building on the 2005 meeting at Gleneagles in Scotland. The summit agreed on a comprehensive resolution on 'global energy security', listing most of the measures that need to be undertaken under the following main issues: increasing transparency, predictability and stability of global energy markets; improving the investment climate in the energy sector; enhancing energy efficiency and energy saving; diversifying the energy mix (with emphasis on renewable sources of energy); securing critical energy industry; reducing energy poverty; and 'addressing' climate change and sustainable development.¹⁴ The choice of the weak term 'addressing' in connection with climate change, and the emphasis on reducing 'energy poverty' by boosting the energy supply to development countries reflected a Russian agenda with resonance in several developing countries. It is interesting to see the difference in the priorities expressed by the various participants at the summit. The host, President Vladimir Putin, emphasized the need to reduce investment risk by having long-term contracts between producers and consumers of oil and gas, whereas Chinese President Hu Jintao took a comprehensive approach to the energy security of energy importers, advocating a long range of measures seen as important from a demand perspective, and which are also inherently essential to the fight to halt climate change.¹⁵ The main problem with the summit in St. Petersburg was not the lack of attention to the climate crisis, but the fact that no commitments were made. Although the G8 pledged to 'pursue energy security through a comprehensive and concerted approach', and spoke of a new 'plan of action' to supplement the 'plan of action' already agreed upon at Gleneagles, the G8 did not agree on any specific commitments. The IEA is said to have a key role in the G8 plan of action, but the IEA is just a centre of documentation and analysis with no power to

implement policies. Implementation continues to depend on the policies of each individual government.¹⁶

At St. Petersburg, President George W. Bush's main satisfaction was to see agreement on a declaration concerning the threat from terrorism in the Middle East. Since then, the high-oil price has led him to become increasingly concerned by questions related to national energy security. It played a far more prominent role in President Bush's State of the Union address on January 23, 2007, than did climate change:

Tonight, I ask Congress to join me in pursuing a great goal. Let us build on the work we've done and reduce gasoline usage in the United States by 20 per cent in the next 10 years. When we do that we will have cut our total imports by the equivalent of three-quarters of all the oil we now import from the Middle East. To reach this goal, we must increase the supply of alternative fuels, by setting a mandatory fuels' standard to require 35 billion gallons of renewable and alternative fuels in 2017—and that is nearly five times the current target. At the same time, we need to reform and modernize fuel economy standards for cars the way we did for light trucks—and conserve up to 8.5 billion more gallons of gasoline by 2017. Achieving these ambitious goals will dramatically reduce our dependence on foreign oil, but it's not going to eliminate it. And so as we continue to diversify our fuel supply, we must step up domestic oil production in environmentally sensitive ways. And to further protect America against severe disruptions to our oil supply, I ask Congress to double the current capacity of the Strategic Petroleum Reserve.¹⁷

It is important to distinguish between concern for national energy security and global energy security, although many argue that the latter is the solution also to the first. David J. O'Reilly of Chevron reflected the oil industry's general view when stating to the *New York Times* on March 3, 2007:

When you are importing two-thirds of the oil we use and a lot of the gas we use, the best energy security is when the globe is secure. And I mean the globe secure holistically, broadly, as well as in an energy way. If you have any one of the major players on the demand or supply side that feels threatened or isolated, I think it's a bad thing for the globe. We are interdependent. We have gone way past the point of independence on anything.

This is of course also what leaders agree upon when they meet, but when acting separately, their most immediate concern is their own national

energy security. This is the case even in Europe, where some members of the German government worry that their country, by contrast to other European countries, does not have a national energy company to help get provisions in an emergency.

When discussing global energy security, there is no way to avoid the debate on so-called 'peak oil'. A certain number of geologists, and others as well, proceed from the obvious truth that the world's reserves of oil are limited. We shall therefore sooner or later reach a global peak, when it is no longer possible to further increase the global production. Oil exploration in the last couple of decades has brought few new discoveries, and no new substantial oil fields have been brought on-stream. If alternative sources of energy are not available on a sufficient scale when we reach the peak, the rich part of the world will be forced to radically change its way of life. The European, North American and Japanese way of life will be unsustainable at any rate if the Chinese and Indians shall have it too.¹⁸ Economists have refuted the 'peak oil theory', arguing that the market forces will ensure global energy supply through investments and technological innovation driven by increases in the oil price. When the price gets to a certain level, it becomes increasingly rewarding to invest in more expensive oil production, reopening old fields to take out much of the two thirds of the oil that was left in the ground since it was only profitable to take out one third at previous prices, producing oil from the tar sands of Canada and other places, and notably taking out more coal. At the same time, it also becomes more profitable to realize some of the elements in the IEA's alternative scenario and boost investments in energy efficiency, new transport technology and renewable energy. When the oil price exceeds a certain level, the demand for oil will automatically decrease as the energy demand is satisfied by coal, gas and other energy sources. The market forces will thus take care of a gradual transition from the oil age to an era based on other energy drivers—with oil continuing to play an important, but diminishing role.¹⁹

The main problem with the economic argument is that the oil price is fluctuating so much and in such unpredictable ways that long-term investments in expensive oil and gas production and alternative energy sources are fraught with risk.²⁰ The oil price is not determined through a perfect interplay of supply and demand, since access to most of the world's oil reserves is controlled or dominated by national oil companies, and since the size of the reserves and the production capacity in Saudi Arabia and other countries is uncertain.²¹ The oil price is also not controlled by OPEC,

although OPEC policies sometimes affect it significantly. Investors in other energy sources have to consider the risk that the major oil producers may respond to a market challenge by pumping more oil and thus lowering the oil price. This means that the market mechanism cannot be relied upon to produce the kind of investments needed to halt global warming and enhance global and national energy security. Just as the IEA says, there is a need for strong political will and urgent government action.

The Geopolitics of National Energy Security

Concern for national oil security is as old as oil itself. Perhaps the best example of a country struggling with its oil security is Japan, since it has relied heavily on oil for more than a 100 years, and has no oil of its own. The US oil embargo in 1940 led Japan to consider whether it should widen its war in China to a war with the Soviet Union for access to Siberian oil or to a war with the Western colonial powers for control of the Southeast Asian oilfields. With the attack on Pearl Harbor, and the invasion of Malaya, Indonesia and the Philippines, it opted for the second strategy and created a system of oil provision based on a short-lived naval supremacy in a 'Greater Asia'. With the US occupation after the 'War for a Greater Asia', Japan's resurrection as an industrial power relied on oil provided under US protection. Japan also sought energy security through diversification of its energy mix, nuclear power generation, and by entering into bilateral contracts with a number of nations for its provision of oil. After the 1973 oil crisis, Japan did more than any other nation to invest in energy efficiency and decided to dismantle its most energy intensive industries. However, Japan soon found that diversification of oil supply through bilateral agreements with many oil exporting countries was a costly endeavour, and hence found it preferable to rely on the global market and buy oil at the cheapest possible price. This led Japan to become strongly dependent on oil from the Persian Gulf, and on US protection of the shipping route through the Hormuz and Malacca Straits and the South China Sea.

In the last 10 years, China has pursued a policy reminiscent of the policy abandoned by Japan earlier. Although China continues to produce more than half of the oil it consumes, it has carried out a costly policy of constructing a long pipeline linking its market to the oilfields of Central Asia, invested a huge diplomatic effort in trying to persuade Russia to construct direct pipelines from the Siberian fields to China, and entered

into long-term bilateral agreements on oil provisions from a number of countries around the world, notably in Africa. From 1989 to 2005, China increased from 5 to 32 the number of countries it bought oil from.²² In that year, Angola became its largest provider of oil. As of 2004, China imported only 45 per cent of its crude oil imports from the Middle East, compared to Japan's 80 per cent and South Korea's 70 per cent.²³ China does not of course have any military capacity to prevent the destruction of its pipelines during a time of war or to protect the sea lanes from Africa to China, so it pays a certain 'premium' for creating a semblance of security. This is even more the case when we consider the investments that Chinese state-owned oil companies have made in oil production in many countries, with support from cheap state loans. Some oil concessions have been bought at a considerably higher price than anyone else would offer. Chinese oil companies have invested in many countries, but so far there is substantial oil production from Chinese-owned concessions only in three countries: Kazakhstan, Sudan and Angola.²⁴ Although some security analysts in the West have seen China's oil diplomacy as threatening, experts on the oil market argue that China actually does the world a service by paying to bring oil onto the world market that would not otherwise have been produced. China thus contributes to lowering the oil price.²⁵ India pursues some of the same policies as China, in spite of the fact that India is geopolitically more secure. India is closer to the Persian Gulf, has a naval presence in the Arabian Sea, and New Delhi enjoys more confident relations with the world's dominant superpower than Beijing.

Some Chinese analysts argue that their government should draw the same conclusion as Japan did some time ago, always buy oil at the cheapest possible price, rely on the world market and find common ground with other oil importers rather than forming its own bilateral relationships with individual exporters.²⁶ This argument is also heard in the United States, where calls for national energy security through greater self-reliance in energy, and diversification away from West Asian (Middle Eastern) oil are becoming increasingly difficult to ignore. As Chevron's David O'Reilly pointed out in the quotation above, few countries have any prospect of being self-sufficient in oil. Among the major economies, only the UK is close: 'When you are importing two-thirds of the oil we use and a lot of the gas we use, the best energy security is when the globe is secure'.²⁷ Some Chinese analysts say the same. More recently, however, the national energy security argument has been reinforced by its confluence with concerns for

the global environment. Many Americans wonder why young Americans shall die in Iraq to ensure the provision of oil to Europe, Japan and the United States itself if the United States could instead produce its own biofuel, create new jobs in refineries and boost the value of its farmland.

Since energy security has become such a prominent topic in international politics, it may be useful to look at how global political alliance patterns conform with or cut across the producer–importer divide. The world's main oil-importing countries in 2005 were United States (12.4 barrels of oil a day), Japan (5.2 bbl/d), China (3.1), Germany (2.4), South Korea (2.2), France (1.9), India (1.7), Italy (1.6), Spain (1.6), and Taiwan (1.0). The main oil-exporting countries were Saudi Arabia (9.1), Russia (6.7), Norway (2.7), Iran (2.6), United Arab Emirates (2.4), Nigeria (2.3), Kuwait (2.3), Venezuela (2.2), Algeria (1.8), Mexico (1.7), Libya (1.5), Iraq (1.3), Angola (1.2), Kazakhstan (1.1) and Qatar (1.0). Coal is to a much greater extent a national commodity. Few countries depend on import or export of coal. Concerns for purely national, as opposed to global energy security, thus tend to lead to more emphasis on coal, which is the worst possible outcome for the global climate.

The energy importers have a shared analysis organization in the IEA, but it is of little political importance. The most important alliances and political partnerships among importers of oil are NATO, the US–Japan alliance and the strategic partnership between the United States and India. If relations between India and China continue to improve, this partnership will also belong in this category. Oil importers have a shared interest in keeping up a functioning world energy market, but in case of an oil crisis, they may easily become rivals in the quest for access to energy resources.

Among the exporters, the 12-member OPEC is a more powerful and important organization than the IEA. It played a prominent role in the 1973 oil crisis. It later lost some of its clout both because more oilfields were opened in non-OPEC countries and because of internal dissension in the organization, who found it difficult to reach agreement on production cuts to keep up the oil price. OPEC's importance may now again be growing, since oil production has peaked, or is about to peak, in most non-OPEC countries, whereas OPEC's reserves are still high and its productive capacity increasing. The fact that Angola, as a major new oil producer, recently joined the organization further strengthens its role. OPEC's share of the global oil market is poised to increase from 35% to more than 50% in

coming years. OPEC's capacity to agree internally is difficult to predict. The organization has a strong interest in preserving oil's role as a major strategic commodity. It will therefore seek to keep the oil price relatively high, but prevent it from rising so much that oil-based fuel's strategic role in the transportation sector may be challenged. OPEC will certainly never be a driving force in the struggle to halt global warming, although the main adversary of climate-conscious environmentalists is actually the coal industry in the United States and China. Both OPEC and the coal industry may, however, develop an interest in developing carbon capture technologies so as to defend their position in a more environment friendly world. It was reported in 2007 that American Electric Power plans to build a pilot plant with sequestration of CO₂ already in 2008 and to have a fully commercial plant ready by 2011.²⁸

Another important alliance of oil producers is the Cooperation Council for the Arab States of the Gulf (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates), which was founded in Riyadh in 1981, and now aims to establish a common currency by 2010. Iraq and Iran are not members of the council. Iran and Russia's co-operation in the field of nuclear energy is another example of a partnership between oil and gas producers. Russian President Vladimir Putin has also had talks with the leaders of the other main gas exporters, such as Qatar and Algeria, leading to speculation that Russia might aim to establish a 'gas cartel'.

If we move to alliances and partnerships cutting across the export-import divide, thus forming complimentary relationships, the most important one is the special relationship between the United States and Saudi Arabia, dating back to the establishment of diplomatic relations in 1933 and former US President Franklin D. Roosevelt's historic meeting with King Abdul Aziz Ibn Saud on his way back from Yalta in February 1945. Much of today's global energy security hinges on this alliance between an autocratic Islamist monarchy and the world's dominant liberal democracy, based on US provisions of sophisticated weaponry and on the Saudi state's role as a swing producer for the oil market. The relationship came under severe strain after the first Gulf War, with the establishment of US military bases on Saudi territory, and the 11 September terrorist attacks against New York and Washington, largely carried out by Saudis with the aim of putting an end to the US presence in the land of the two holy places Mecca and Medina. The war in Iraq has represented a new challenge to the Saudi-US alliance. A high proportion of the suicide bombers in Iraq have been young

Saudis.²⁹ The war in Iraq has also tended to weaken US leverage in the region and strengthen the influence of Iran. This worries the Saudi kingdom, which has started to play a more prominent independent role in regional diplomacy. The ongoing weakening of the US commitment to guarantee the stability of the Middle East has opened the spectre of a regional power balance in West Asia between Iran and its allies Syria and Hezbollah on one side and Saudi Arabia, Egypt, Jordan and the smaller Arab Gulf states on the other side.

Japan, who relies almost completely on West Asian oil, has not developed any high profile West Asian policy or alliances of its own, but has generally supported US policies. It has not, however, followed the US policy of applying unilateral sanctions against Iran. Japan is the world's largest importer of Iranian oil and has also invested in the Iranian oil sector. The EU countries have pursued diverging policies in West Asia, with the UK supporting the United States, whereas France and Germany have maintained relations both with Iran and the former regime in Iraq in defiance of US policies. The difference came to the fore in the dispute over the US invasion of Iraq in 2003.

The emerging powers China and India have both strengthened their ties with the various West Asian countries, notably the two local rivals Iran and Saudi Arabia, but have not so far wielded any significant influence in the region.³⁰ China, and to a lesser extent India, has also built strategic ties with oil-producing countries elsewhere in the world, through the Shanghai Cooperation Organization, which includes oil- and gas-producing states of Central Asia,³¹ and through bilateral agreements with oil-producing states in Africa and Latin America.

In the game of strategic balancing in relation to oil and gas, the control of sea lanes is traditionally important. In addition, pipeline construction and plans of such have come to play a significant role. Pipelines linking Russia's gas fields to the European market have become a dominant factor in EU–Russian relations. Planned pipelines from Siberia to northeast China or to Nakhodka, in order to supply the Japanese and South Korean markets, are an essential ingredient in North East Asian politics. The new expensive pipeline from Azerbaijan to the coast of Turkey was made in order to reduce Western dependence on Iran and Russia. The projected pipeline from Iran to India has contributed to the ongoing rapprochement between India and Pakistan, since such a line would need to pass through Pakistan's

territory. There is also an ongoing Sino-Indian rivalry over pipeline construction from the offshore oil and gas fields of Burma, with Bangladesh having obstructed Indian interests.³² Pipeline construction has a potential for forging ties between formerly hostile states, but may also provoke conflict. Pipelines are also vulnerable to military and terrorist attacks.

What we see at present are two conflicting trends. One is towards increasing realization that no nation can be self-sufficient in terms of energy. All nations must therefore contribute to enhancing global energy security through a functioning world market. This was the message from the G8 meeting in St. Petersburg in 2006. The other trend emphasizes increased local and national energy security in response to the high oil price and to a fear of depending too heavily on provisions from the highly volatile Gulf region.

Peace Risk and War Risk in West Asia

Five countries in the Middle East have 722 of the world's 1293 billion barrels of proven oil reserves: Saudi-Arabia 264, Iran 133, Iraq 115, Kuwait 102, and United Arab Emirates 98. Their oil is cheap to produce, but the sector suffers from underinvestment and inefficient management. Production from the biggest oil fields is decreasing, although new technologies now make it possible to extract more oil than hitherto from each field, and even to open up closed fields once more. The production of oil in West Asia is controlled by state monopolies. They—particularly Saudi Aramco—may still probably boost their production significantly. If the situation in Iraq should stabilize, or if Iran should arrive at an agreement with the UN concerning its uranium enrichment and perhaps open ties with the United States, then this could lead to a new wave of investments in the oil and gas sector of the countries with some of the largest reserves in the world. A draft law on hydrocarbons was debated by Iraq's parliament in May–June 2007, and the government hoped to get it adopted before the summer. Meanwhile, the UN sanctions levied against Iran because of the uranium enrichment controversy made it urgent for the Iranian Government to attract foreign investments and adopt more investment friendly policies in its oil sector. If there should be investment breakthroughs either in Iraq or Iran, then this could once more lower the oil price and render investments in coal, energy efficiency and alternative energy—and coal—unprofitable throughout the world. Paradoxically we may call this a *peace risk*.

On the other hand, the war and civil war in Iraq, the possibility of United States or Israeli aerial attacks against Iran, or sabotage against oil installations and shipping in the Hormuz Strait contribute to driving the oil price up, and thus boosts the expectation that investments in coal, energy conservation and alternative energy may be profitable. This we may call the *war risk*. Both the peace and the war risks are already playing a role in investors' calculations all around the world. The irony of the matter is that the war risk contributes positively to boost the kinds of investments needed to stop global warming and enhance global energy security, whereas the peace risk tends to prolong the era of cheap oil and thus delay action to stop global warming.

Attempts to secure the supply of oil to the global market through military interventions of the Iraqi kind, are likely to fail. On the other hand, a strategy to reduce dependence on oil from the Gulf by investing heavily in other sources of energy may provoke the West Asian countries to manage their internal and external conflicts in ways allowing them to pump significantly more oil.

This is only one of the moral and political dilemmas that need to be faced when world leaders seek to form energy policy strategies. Another dilemma relates to coal.

Can Coal Be Part of a Solution?

The current momentum in the struggle to stop global warming can be kept up and utilized only if it is possible to build political alliances between several different political constituencies not only in Europe and Japan but also in the United States, China, India and Russia as well. The first big question is what will happen in the US presidential campaign. How far will John McCain, Hillary Clinton, Barack Obama and other presidential hopefuls go in the direction of pledges to do something effective to reduce CO₂ emissions? They must appeal not only to the environmentalist lobby but also to those concerned with US national security, to farmers, to the business community and to everyone's concern for their private economy. For this reason they will not talk about taxes, although the imposition of a carbon tax would have a beneficial effect not just by increasing the competitiveness of non-carbon products but also by contributing revenue to the US federal and state budgets. The hopefuls will also avoid talking about the need to set caps on CO₂ emissions in the way the EU has done.

Instead, they will argue that American farmers can contribute to national energy security by producing crops for biofuels, and that such fuels may be produced in a number of new refineries providing a significant number of jobs. They may also argue, on the basis of experience from California and from the Chicago Climate Exchange, that carbon quota trade provides a market-based solution that is suited to resolving the climate crisis by channelling investments in the right direction. If, through an agricultural- and market-based strategy, American politicians are able to put in place the mechanisms needed to carry out a major change in the US energy system, then the emission caps and treaty-based obligations may follow—at a time when they are not seen as quite so consequential as they are today. And when that time comes, since it is the US Senate that ratifies all treaties, and since the agricultural states are overrepresented in the Senate, it will be essential to have the farmers lobby on the president's side.

A key problem in such a political strategy is to get liberal proponents of environmental responsibility, conservative proponents of national security, farmers and labour unions wanting jobs in new refineries to work in the same direction. The two main ways of reducing CO₂ emissions are to increase demand-side energy efficiency and to decarbonise power generation. Trade with quotas may contribute to both if they are sufficiently expensive. There are strong arguments both from a climate change and energy security perspective for a major drive towards more energy efficiency. The quest for efficiency pulls technological innovation, and thus appeals to universities and knowledge-based companies. The production of biofuels has a potential for reducing oil expenditure in the transport sector, and once the biofuel industry is strong enough—as it is in Brazil—it will form a lobby that is likely to favour taxes on carbon-based fuel.

The biggest problem is coal. The United States has abundant reserves of coal, and so has China. From a national energy security perspective, it is tempting to maintain and even increase the role of coal in power generation. This enhances national security, but is the worst one can do for the climate—unless clean coal technologies are applied with secure carbon sequestration. Today these technologies remain prohibitively expensive.

In this context, it may be seen as promising that President Bush in his 2007 State of the Union address pointed at the same remedies for enhancing energy security as those needed to resolve the climate crisis:

Extending hope and opportunity depends on a stable supply of energy that keeps America's economy running and America's environment clean. For too long our nation has been dependent on foreign oil. And this dependence leaves us more vulnerable to hostile regimes, and to terrorists—who could cause huge disruptions of oil shipments, and raise the price of oil, and do great harm to our economy. It's in our vital interest to diversify America's energy supply—the way forward is through technology. We must continue changing the way America generates electric power, by even greater use of clean coal technology, solar and wind energy, and clean, safe nuclear power. We need to press on with battery research for plug-in and hybrid vehicles, and expand the use of clean diesel vehicles and bio diesel fuel. We must continue investing in new methods of producing ethanol—using everything from wood chips to grasses, to agricultural wastes.³³

He did not say greater use of coal, but of 'clean coal technology'. With the horrific contribution that coal-fired power plants are making to global warming, it is of critical importance that the United States, China and India cease to construct new power plants based on dirty coal technology and use only new clean technologies. This does not just require the technology as such; a whole system of safe deposits and a legal framework that needs to be put in place. At first, this will be expensive, so it represents an immense hurdle for humanity, but once a system is in place, innovation will lead to cost reductions. Technological cooperation in this field between the United States, China and India, as well as Germany and Japan, will be essential. The Chinese coal industry is posited to be the worst contributor to the warming up of the atmosphere in the years to come.

This leads us to the third political dilemma.

Asia's Right to Development

Since Europe, North America and Japan have benefited for many years from access to cheap oil and since they still use far more energy and emit much more CO₂ per inhabitant than other parts of the world, they must take main responsibility for reducing the world's CO₂ emissions. However, today the most cost-effective investments in energy efficiency can be made in the most energy-intensive countries. This means mainly Russia and China, but also India.³⁴ India consumes less energy per output unit than China and Russia because of its large primary and tertiary sectors, and its relatively small industrial sector. However, the high population

growth in the northern part of India does contribute to increased use of energy and thus also to higher emission levels.³⁵ In order to mitigate climate change, we need both a highly substantial reduction of CO₂ emissions in the rich countries and an immediate shift away from the energy intensive growth model that is being pursued in China, Russia and India. Massive investments in energy conservation must be made in both developed and developing countries simultaneously. It is furthermore clear that the rich countries are morally responsible for covering not only the cost of their own substantial emissions cuts but also much of the investment needed to stop the emissions increase in China, India and other developing countries, so they can shift to an energy efficient growth model. If China and India stick to their present models of growth, then anything the rich countries do to reduce their CO₂ emissions will be offset by growing emissions in China and India. On the other hand, if China and India shift priorities and manage to stabilize their emissions, then the rich countries will still have to carry out huge emission cuts. If we need, say, a global cut of 60% before 2030, and India and China go only as far as to stabilize their emissions, then the rest of the world must cut their emissions by far more than 60%. What this demonstrates is, firstly, that it is unacceptable to continue debating whether or not developing countries should set caps on their emissions. They must. Secondly, it is equally evident that the rich countries cannot buy freedom from heavy emissions cuts by funding energy efficiency projects in developing countries. They must both cut drastically at home and invest heavily in cuts abroad.

The EU countries, the United States and Japan have developed cooperation with China in the field of energy conservation and taken part in implementing so-called Clean Development Mechanisms (CBMs), so their own companies can obtain emission quotas by funding projects to cut emissions in China. The informal meeting of political leaders from the G8+5 countries in Washington February 14–15, 2007, stated a need for ‘programs focusing on capacity building, access to technology and financial incentives—to help developing countries invest in more efficient and low carbon technologies’.³⁶ CBMs need to be developed on a much greater scale than hitherto, in relation to many developing countries, also to Russia, and they need to be incorporated into a strict global system of treaty-based emission cut levels, trade in *expensive* quotas and rapid implementation of new technologies worldwide. Companies certifying CBMs need to work under a system of reliable international auditing.

Efficient mechanisms need to be put in place to drastically reduce the time lag from innovation to global implementation. The EU and the United States have adopted different strategies to get the big Asian growth countries on board in the struggle to reduce emissions, and Japan is a partner in both strategies. The EU has opted for strict national quotas, grounded in the 1997 Kyoto protocol, and an emissions-trading regime with CBMs.

In 2005, the United States joined in creating the Asia-Pacific Partnership on Clean Development and Climate (APP or AP6) with emphasis on stimulating voluntary measures to generate technological change and innovation.³⁷ The two strategies are often seen as contradictory, but could be complimentary. The United States focuses on the means needed to attain what the EU seeks to impose through legal commitments. The EU and Japan are also engaged in APP-like measures through their bilateral cooperation with Asian growth countries, and several states in the United States (California, New Mexico, lately also a group of states in north-eastern United States, have experimented with quota trade). The main difference between the EU and US strategy is that the EU begins with the political will and takes for granted that the industry will find a way to reduce emissions when obliged by their governments to do so, whereas the United States seeks to first induce the industry through various market incentives to develop the means to cut emissions so political constituencies can be created, who on a later stage will make it possible to mobilize political will. Optimists believe in a healthy competition between the two strategies. Pessimists think the Europeans and Americans will fight over their differences in ways that allow both to refrain from undertaking the actions needed. The big problem is that we do not probably have the time to wait and see whether one or the other system works. At the International Studies Association convention in Chicago on March 2, 2007, a research group from Yale University characterized global warming as a 'super wicked problem' because it combines three features: (1) The problem is so urgent that there is no time to make mistakes and learn from them along the way, (2) there is no central authority to implement the necessary action, and (3) the consequences of failure may be catastrophic.

One positive contributing factor would be if India and China changed attitude and adopted a proactive strategy of their own in the fight to stop global warming. Although China disappointed many by not adopting any new targets in the National Climate Change Programme it issued shortly

before the G8+5 summit in June 2007, this plan strongly recognized the seriousness of the threat from climate change. This may augur well for a change in the Chinese attitude during the next two years, when China will be expected to negotiate seriously with a view to joining the global regime to combat climate change.³⁸ Chinese and Indian spokespersons often argue that climate change is caused primarily by the Western countries since they have a much higher energy use per capita, and therefore it is unreasonable to expect the Chinese and Indians to limit their economic growth in order to help save the world. This attitude may be about to change. Chinese and Indian scientists and politicians realize that global warming will hurt them no less than the Europeans, Americans and Japanese, and some developing countries, with Bangladesh as the most prominent example, will suffer tremendously. This realization calls for a proactive strategy, with China and India aiming for a clean growth model, and demanding of the developed countries that they both pay the cost and make their most advanced technology available. Might it not be an idea for India and China to establish a number of ambitious Environmental Innovation Parks (EIPs), each concentrating their research and innovation on one or a few aspects of the portfolio of measures needed to halt global warming: energy conservation in households and public buildings; clean coal, renewable sources of energy, natural gas, urban planning aimed to reduce the need for transportation, non-polluting systems of transportation, quota trade, efficient government monitoring of energy use, etc.? China and India could demand that the first and second generations of industrialised countries in Europe, America and Asia (Japan, South Korea, Taiwan and Singapore) pay most of the initial cost for these EIPs and make their technologies and scientists available. Patent systems must not be allowed to hinder or delay the utilisation of technologies needed to halt global warming, so patents will need to be bought in ways that make technologies generally available. The set-up of EIPs might hasten the pace of technological change in the world's least energy-efficient countries, provide Indian and Chinese companies and universities with great opportunities, and create a significant scientific constituency in support of environment friendly policies. So far, the Chinese and Indian responses to the UN Climate Panel's reports have not been innovative or globally responsible, to say the least. It will be interesting to see whether Chinese and Indian commentators react in the usual defensive way or adopt a more proactive stance when the IEA releases its *China and India Energy Outlook: Implications for the World* in the autumn of 2007.

Conclusions

To stop global warming and ensure global energy security, enormous investments are needed in energy conservation and alternative energy. Still these investments may be smaller than those needed to sustain the world's current energy system. The IEA's *World Energy Outlook* from 2006 spoke of an investment need of US \$20 trillion before 2030 if there is to be no change in policies. If more sensible policies are adopted, leading to a higher energy efficiency, the investment need will be somewhat lower and be directed towards multiple sectors rather than just electricity generation, oil, gas and coal.³⁹

Although most of the cost of resolving the climate crisis and enhancing global energy security must be carried by the most developed countries, who have long benefited from carbon-based economies, emission cuts must be made in developing countries as well, and the most cost-effective investments can be made in Russia, China and India.

Because the means to stop global warming and ensure global and national energy security are largely the same, it may be possible to forge political alliances needed to carry out drastic action also in the United States, China and India, provided that the responsible leaders do not seek to enhance their national energy security by resorting to increased use of coal-fuelled power plants without any clean coal technology.

Three main measures are needed. They are not alternatives, but form part of a necessary package. The first is a treaty-based minimum carbon tax, to be levied by all the world's governments, who may keep the revenue to themselves. The second is a globally applicable system of national caps on CO₂ emissions and trade in sufficiently expensive quotas to stimulate drastic technological change. And the third is massive positive incentives for investing in technological innovation and rapid implementation of clean technologies, both in the large economies that have the greatest innovative capacity in this field (Japan, United States, and EU) and in the major growth countries where investments in energy efficiency will be most cost-effective: Russia, China, and India.

On the background of what we now know, the Bali talks in December 2007 should be characterized by a new global will to act. Japan could be a key player. It hosted the negotiations leading to the Kyoto protocol. It may serve as a mediator between different strategies and could use its G8

presidency in 2008 to build on the work done by Germany in 2007. The world needs to get beyond the declaratory stage, shape new institutional frameworks, or provide existing multilateral institutions with the necessary funding and authority to effectively coordinate the global effort to stop global warming and ensure global energy security. The scientists on the UN's IPCC are proving their worth this year as a collective whistle-blower. Yet, no similarly impressive institution exists to coordinate the necessary action.

Success will depend on the ability of the United States and the EU to overcome their differences and launch a healthy competition in the field of environmental innovation. China and India may play on this competition, not by skirting away from obligations, but by drawing American, European and Japanese companies into innovative projects in India and China. China and India may wish to set up EIPs in collaboration with Japanese, American and European institutions and companies. Smaller, advanced Asian countries like Singapore and South Korea might also have a significant role to play. Chinese and Indians need to overcome their tendency to argue defensively that a problem created by the West must be resolved by the West. They will themselves be harmed and may better serve their own interests by adopting a proactive attitude: advocate emissions cuts through energy conservation and the use of alternative sources of energy, and demand of the rich countries that they pay most of the price and make their most advanced technologies available.

Notes

- ¹ <http://www.climatecrisis.net/> (Accessed June 5, 2007).
- ² For the *Stern Review on the Economics of Climate Change*, see http://www.hm-treasury.gov.uk/independent_reviews (Accessed June 5, 2007) The Stern report was criticized for its failure to properly discount the value of damage done in a relatively distant future, which could be mitigated or prevented by technological or other change of kinds we may not be able to foresee today. The criticism, however, did not draw any comparable public attention to the stir caused by the report itself. William Nordhaus, 'The Stern Review of the Economics of Climate Change,' November 17, 2006, at <http://nordhaus.econ.yale.edu/SternReviewD2.pdf> (Accessed June 5, 2007)
- ³ President George W. Bush, 'State of the Union,' January 23, 2007, at <http://www.whitehouse.gov/stateoftheunion/2007/index.html> (Accessed June 5, 2007).
- ⁴ <http://www.ipcc.ch/> (Accessed June 5, 2007).

- ⁵ By contrast, a much delayed draft for the fourth US Climate Action Report to the UN, which was leaked to the press in March 2007, predicted that US emissions would *increase* by 19% from 2000 to 2020. *USA Today /Associated Press*, 3 March 2007, at <http://www.usatoday.com/news/washington/2007-03-03-emissions-report.N.htm> (Accessed June 5, 2007).
- ⁶ 'New impetus for climate policy: Making the most of Germany's dual presidency.' Berlin: German Advisory Council on Global Change (WBGU) Policy Paper 5, December 21, 2006.
- ⁷ <http://www.whitehouse.gov/news/releases/2007/05/20070531-9.html> (Accessed June 28, 2007).
- ⁸ <http://www.whitehouse.gov/g8/2007/g8agenda.pdf> (Accessed June 28, 2007).
- ⁹ According to the US Energy Information Agency, the total primary energy consumption in 2004 per dollar of GDP was 4,577 in Japan, whereas in the United States it was 9,336. However, since local costs are higher in Japan than the United States, if we adjust for purchasing power parities, the United States figure remains 9,336 (since used as a benchmark), whereas Japan's use of energy per dollar of GDP increases to 6,532. <http://www.eia.doe.gov/pub/international/iealf/tablee1p.xls> (Downloaded June 5, 2007).
- ¹⁰ http://www.globeinternational.org/docs/content/washington_statement.pdf (Accessed June 5, 2007).
- ¹¹ <http://www.ipcc.ch/> (Accessed June 4, 2007).
- ¹² This was according to the Netherlands Environmental Assessment Agency. See the *Sydney Morning Herald* June 20, 2007, at <http://www.smh.com.au/news/World/China-overtakes-US-as-top-CO2-emitter/2007/06/20/1182019182449.html> (Accessed June 28, 2007).
- ¹³ <http://www.worldenergyoutlook.org/> (Accessed June 5, 2007).
- ¹⁴ Joint declaration on 'Global Energy Security', St. Petersburg July 16, 2006, at <http://en.g8russia.ru/docs/11.html> (Accessed June 5, 2007).
- ¹⁵ Putin's view was expressed most clearly in a speech to the G8 energy ministers on March 16, 2006: 'One of the keys to global energy security is a fair distribution of the risks among energy resource producers, transit service providers and consumers. The energy market must be insured against unpredictability and its level of investment risk must be reduced. In other words, measures taken to ensure reliable supplies must be backed up by measures taken to ensure stable demand. In our view this is the optimum way to harmonize the interests of all the players on the energy market. To achieve this we must develop the corresponding instruments, in particular, long-term contracts between producers and consumers', at http://www.g7.utoronto.ca/energy/energy_putin060316.html (Accessed July 6, 2007). Hu Jintao expressed his priorities in an outreach session during the G8 summit itself: 'China's energy strategy can be summarized as follows: Give high priority to conservation, rely mainly on domestic supply,

develop diverse energy resources, protect the environment, step up international cooperation of mutual benefit, and ensure the stable supply of economical and clean energies.' Hu Jintao's Address at the G8 Outreach Session, July 17, 2006, at <http://www.fmprc.gov.cn/eng/wjdt/zyjh/t264261.htm> (Accessed June 5, 2007).

- ¹⁶ For the IEA's role in the G8 Plan of Action, see IEA Executive Director Claude Mandil's talk 'Bridging the Energy Gap,' Monterrey, Mexico, October 3, 2006, at <http://www.iea.org/Textbase/speech/2006/mandil/monterrey.pdf> (Accessed June 5, 2007).
- ¹⁷ President George W. Bush, 'State of the Union,' January 23, 2007, at <http://www.whitehouse.gov/stateoftheunion/2007/index.html> (Accessed June 5, 2007).
- ¹⁸ Kenneth S. Deffeyes, *Beyond Oil: The View from Hubbert's Peak*, Hill and Wang, New York, 2005; Paul Roberts, *The End of Oil: On the Edge of a Perilous New World*, Mariner Books, New York, 2005; Kjell Aleklett, 'Oil: a bumpy road ahead.' *World Watch*, January 1, 2006. For ample documentation of the British geologist Colin Campbell's theories and the activities of the Association for the Study of Peak Oil&Gas (ASPO), see <http://www.peakoil.net/> (Accessed June 5, 2007).
- ¹⁹ Jad Mouawad, 'Oil Innovations Pump New Life into Old Wells. Industry Finding Ways to Extend Supplies,' *New York Times*, March 5, 2007, Section A, p. 1, column 5.
- ²⁰ The literature on the oil price is endless, but no one seems to have come near any ability to predict it accurately. Leonardo Maugeri deservedly hails the high oil price in 'Two Cheers for Expensive Oil', *Foreign Affairs*, 85(2), March/April 2006, pp. 149-161, and also ventures to say that the price 'is unlikely to fall substantially in the short term and could even experience more spikes' (p. 161). *Newsweek*, however, brought an article only half a year later warning of a possible price fall: Leonardo Maugeri, 'That Falling Feeling,' *Newsweek*, October 9, 2006, at <http://www.msnbc.msn.com/id/15081350/site/newsweek/page/0/> (Accessed July 6, 2007).
- ²¹ Matthew S. Simmons argues in *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*, John Wiley, Indianapolis IN, 2005, that Saudi Arabia has exaggerated its capacity for boosting its oil production and that its production is soon going to decline. Representatives of Saudi Aramco have since strongly argued that Saudi Arabia's actual reserves are much higher than the certified 'proven' ones and that the company will have the capacity to increase its production significantly for many years to come. Saudi Arabia has responded to the high-oil price by making huge investments in exploration as well as in technologies that make it possible to extract more oil from existing fields. See the US Energy Information Administration's country analysis brief on Saudi Arabia (updated on February 2007) at http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/pdf.pdf (Accessed May 8, 2007).
- ²² Linda Jakobson and Zha Daojiong, 'China and the Worldwide Search for Oil Security', *Asia-Pacific Review*, 13 (2), 2006, pp. 60-73 (see p. 63).

- ²³ Kent Calder, 'China's Energy Diplomacy and its Geopolitical Implications', The Edwin O. Reischauer Center for East Asian Studies, *Asia-Pacific Policy Papers Series* No. 3/2006, p. 14.
- ²⁴ Erica Downs, 'China', *The Brookings Foreign Policy Studies Energy Security Series*, December 2006.
- ²⁵ '...from the viewpoint of consumers in North America, Europe, and Japan, Chinese and Indian investment in the development of new energy supplies around the world is not a threat but something to be desired, because it means there will be more energy available for everyone in the years ahead as India's and China's demand grows.' Daniel Yergin, 'Ensuring Energy Security', *Foreign Affairs*, 85(2), March/April 2006, pp. 69–82 (see particularly p. 77).
- ²⁶ Linda Jakobson and Zha Daojiong, *op. cit.*, pp. 64–70.
- ²⁷ Jad Mouawad, 'Saturday interview [with David J. O'Reilly] Big Profits, Big Worries', *New York Times*, March 3, 2007, Section C, p. 3, column 1.
- ²⁸ AEP news release March 15, 2007, at <http://www.aep.com/newsroom/newsreleases/> (Accessed June 4, 2007).
- ²⁹ Thomas Hegghammer, 'Saudi militants in Iraq: Backgrounds and recruitment patterns', Report from the Norwegian Defence Research Establishment (FFI), February 5, 2007.
- ³⁰ John W. Garver, *China & Iran. Ancient Partners in a Post-Imperial World*, University of Washington Press, Seattle, 2006; Kent E. Calder, 'China's Energy Diplomacy and its Geopolitical Implications', The Edwin O. Reischauer Center for East Asian Studies Asia-Pacific Policy Papers Series 3; Jin Liangxiang, 'Energy First. China and the Middle East', *Middle East Quarterly*, Spring 1995; Flynt Leverett and Jeffrey Bader, 'Managing China–U.S. Energy Competition in the Middle East', *The Washington Quarterly*, 29/1, 2005, pp. 187–201; Li Shaoxian and Tang Zhichao, 'China and the Middle East', *Contemporary International Relations*, published by China Institute of Contemporary International Relations, 17/1, January/February 2007, pp. 22–31; Wu Lei, 'Middle East Oil and East Asian Energy Security', in *The Middle East and East Asia*, Institute of West Asian and African Studies, Chinese Academy of Social Sciences, Beijing, 2003, pp. 105–116.
- ³¹ Alyson J. K. Bailes, Pal Dunay, Pan Guang and Mikhail Troitskiy, 'The Shanghai Cooperation Organization' *SIPRI Policy Paper* No. 17 (May 2007).
- ³² Åshild Kolås and Stein Tønnesson, 'Burma and Its Neighbours: The Geopolitics of Gas', *Austral Policy Forum* 0630-A, August 2006, at <http://nautilus.rmit.edu.au/forum-reports/> (Accessed June 4, 2007).
- ³³ President George W. Bush, 'State of the Union,' January 23, 2007, at <http://www.whitehouse.gov/stateoftheunion/2007/index.html> (Accessed June 5, 2007).
- ³⁴ The total primary energy consumption in 2004 per dollar of GDP using market exchange rates is reported by the US Energy Information Administration as

Russia 91,490, China 39,760, and India 25,989. These figures may be compared with Japan's 4,577, Germany's 7,764 and United States's 9,336. (If we use purchasing power parity figures, the picture becomes very different: Russia 15,763, China 9,080, India 4,205, Japan 6,532, Germany 7,175, and United States 9,336.) See at <http://www.eia.doe.gov/pub/international/iealf/tablee1g.xls> (Accessed March 12, 2007).

- ³⁵ For the role of population growth in rising CO₂ emissions, see Robert Engelman, 'Global Warming and the Third World. Population, Consumption and Equity, *Tiempo*, undated, at <http://www.cru.uea.ac.uk/tiempo/floor0/recent/issue30/t30a2.htm> (Accessed June 5, 2007).
- ³⁶ Washington Legislators' Forum Statement, February 14–15, 2007, at http://www.globeinternational.org/docs/content/washington_statement.pdf (Accessed June 5, 2007).
- ³⁷ Many commentators have dismissed the APP initiative as a smokescreen for doing nothing, but it has at least created an institutional mechanism for doing something if the political will should emerge. The APP was taken seriously at a panel organized under the International Studies Association (ISA) Convention in Chicago on March 3, 2007, where three papers were presented: Gorild M. Heggelund, 'China's Participation in the Asia-Pacific Pact: Future Emissions Reductions under the Kyoto Protocol Less Likely? Norichika Kanie, 'Japan's Climate Policy, Diplomacy and Perceptions of the Kyoto Protocol and the Asia Pacific Pact,' Tora Skodvin and Steinar Andresen, 'The Asia Pacific Partnership on Clean Development and Climate: Supplement or Alternative to the Kyoto Protocol?' All papers are available in the 'paper archive' on <http://www.isanet.org/chicago2007/program.html> (Accessed June 5, 2007).
- ³⁸ 'China unveils action plan to combat climate change', *The Hindu*, June 5, 2007, at <http://www.hindu.com/2007/06/05/stories/2007060503391300.htm> (Accessed June 28, 2007). Full text of the plan is available at <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File188.pdf> (Accessed June 28, 2007).
- ³⁹ <http://www.worldenergyoutlook.org/> (Accessed June 5, 2007).

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Tan Shapiro. "Contingency Theory"

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