Energy and Climate: Bridging the Geopolitical Gaps

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Introduction

Climate change is a 'hot' subject as an international political topic, and finding more superlatives about climate change after last year's presentation of Al Gore's *Inconvenient Truths* is difficult. At the 2009 UN Climate Change Conference in Copenhagen a successor has to be found to the present Kyoto Protocol. It is now generally recognized that man-made greenhouse gas emissions have a detrimental effect on the global climate, and emissions seem to increase even more rapidly than when the most pessimistic climate change scenarios are taken into account.[1]

Fossil energy use is mainly responsible for these emissions. However, despite increasing worldwide recognition that climate change is indeed a serious global problem and mounting rhetoric from political leaders, there is still little evidence that the fundamental changes needed to prevent the potential dangers of climate change are being addressed. This chapter argues that there are at least three geopolitical gaps that need to be closed in order to reach an effective agreement in Copenhagen in 2009. The gaps are closely related to the global political and economic structure of energy supply and demand. They concern a divide, firstly between the United States and Europe, secondly between industrialised and developing countries, and thirdly between fossil fuel exporting and importing countries.

[1] For the years 2000 to 2006, empirically a CO_2 emission growth rate of 3.3% per year was observed. The most pessimistic IPCC (International Panel on Climate Change) model assumes an emission growth rate of 2.71 % per year over the period 2000-2010. See Raupach et al., *Global and regional drivers of accelerating CO_2 emissions*, Proceedings of the National Academy of Sciences, 2007 <http://www.pnas.org/content/104/24/10288.abstract>.

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Policy Gap 1: United States *versus* Europe

A first geopolitical divide concerns two different routes towards a low-carbon economy. One option is to set binding multilateral greenhouse gas emission reduction targets. Another is to reduce emissions in each country on a voluntary basis, primarily concentrating on the development of low-carbon energy technologies. These different routes have gained particular political attention because the first is strongly advocated by the European Union, and the second by the United States.

Both parties have their motives for a respectively more environmentally-driven, and a more security of supply-driven energy policy. The European Union has been one of the most prominent champions of binding emission reduction targets from the 1990s onwards.[2] In 2008 the EU has agreed to reduce its emissions by 20% in 2020, and 30% if an international climate change agreement can be ratified.[3] The EU target in this field is also justified as a contribution to the competitiveness of EU industry: The EU will 'boost growth and create jobs by meeting its climate change commitments,', according to the European Commission.[4] Indeed, since the 1960s in the EU a large nuclear energy industry was built up whose interests are well served with the EU position on climate change. Thirteen out of the twenty-five Member States presently have nuclear reactors, with France generating as much as 80% of its electricity from nuclear energy.[5] In more recent years, European industry has also developed a leading position in several renewable energy technologies, with, for instance, leading wind turbine suppliers in Denmark, Spain and Germany.[6]

The European Commission also uses climate change as a means of demonstrating to the world that the EU can take the lead in an important international policy field. Or, as formulated in a key communication by the Commission: '2007 marked a turning point for the European Union's climate and energy policy. Europe showed itself ready to give global leadership: to tackle climate change, to face up to the challenge of secure, sustainable and competitive energy, and to make the European economy a model for sustainable development in the 21st century.'[7]

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[2] See, e.g., G. Sjöstedt, 'The EU Negotiates Climate Change', 33 *Cooperation and Conflict*, No. 3 (1998) pp. 227-256.

[3] European Commission, '20 20 by 2020', COM(2008) 13, 16-19 final, Brussels, 23 January 2008.

[4] Ibid.

[5] See World Nuclear Association, 2008 <http://www.world-nuclear.org/>.

[6] REN21, *Renewables, Global Status Report*, 2007 <http://www.ren21.net>.

[7] European Commission, '20 20 by 2020 – Europe's climate change opportunity', COM(2008) 30 final', Brussels, 23 January 2008.

Robust EU climate change policies are furthermore motivated by the fact that, contrary to the United States, the EU is running out of domestic fossil resources. Imports presently account for 82% of the EU oil and 57% of the gas demand.[8] These figures are estimated to increase to 93% and 84% respectively by 2030, giving rise to substantial fears in the EU that it will become vulnerable to the national political interests of gas and oil exporting countries. As the single most important gas supplier to the EU, relations with Russia are in particular under intensified scrutiny. Even more so since the Russian-Ukrainian gas conflict in 2006 demonstrated to many observers in the EU what could happen in the case of a future dispute with Russia.

The United States currently favours a more liberal position towards climate change policy. The main way forward, according to the 2006 *State of the Union* speech by President Bush, should be 'the development of new technologies', such as 'clean coal technology, solar and wind energy and safe nuclear power.'[9] As a consequence, Bush announced a significant increase in domestic energy technology research budgets.[10] No mention was made, however, of binding emission reduction targets. Rather, 'economic growth should be fostered to pay for the necessary investments in low energy technologies.'[11] Politically, therefore, the Bush administration pushes for a partnership with countries that share its view of voluntary technology advancement – in particular the 2006 Asia Pacific Partnership – and for agreements parallel to the UN climate change process, such as the 'Major Economies Meetings' initiated in 2007.

Two underlying energy-related factors in particular contribute to the US position. Per capita energy use in the United States remains much higher than in other industrialised countries.[12] The relatively energy-intensive and car-based society of the United States complicates the realization of emission reductions. Furthermore, the United States still has very important domestic coal and 'unconventional' (less-accessible) gas reserves.[13] Reaping the economic harvests

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[8] European Commission, *Energy for a Changing World*, SEC (Brussels, 2007) p. 12. In comparison: oil imports presently account for 60% of the US demand, gas imports for 16%. These figures are foreseen by the US Energy Information Administration (2008) to decline to 54% and 14% in 2030 respectively.

[9] President George W. Bush State of the Union, Speech to the Congress, Washington, DC, 31 January 2006 <http://www.whitehouse.gov/stateoftheunion/2006/>.

[10] The 'Advanced Energy Initiative' announced by President George Bush in 2006 encompasses a 22% increase in energy technology research budgets.

[11] The White House, 'Taking additional action to confront climate change' (2008) <http://www.whitehouse.gov/news/releases/2008/04/20080416-7.html>.

[12] World Resources Institute, 'Earth Trends Statistics, Total Energy Consumption per Capita' <http://earthtrends.wri.org/text/energy-resources/variable-351.html>.

[13] Energy Information Administration (2008). US coal reserves amount to almost a third (29%) of the world's overall coal stock. Unconventional gas reserves are becoming increasingly available because of improved drilling techniques.

of these resources and simultaneously reducing emissions appears to be difficult.

For the future there is some prospect that the gap between the US and EU positions could be closed. In 2008, the Bush administration supported the G-8 Council conclusions that global emission reductions by at least 50% in 2050 would be necessary.[14] President Bush also announced that US greenhouse gas emission growth should be halted by 2025.[15] The two candidates for the US presidential elections support even more far-reaching targets. In his election programme, Obama claims to strive for an 80% greenhouse gas emission reduction by 2050. Similarly, McCain wants an emission reduction of 60% by 2050. If the United States would indeed give up its preference for a purely voluntary and technology-based approach, the debate might be taken one step further. What are, in that case, the right targets to be set, and for whom?

Policy Gap 2: Industrialised *versus* developing countries

A second geopolitical gap regarding climate and energy exists between traditional industrialised countries on the one hand, and developing countries and emerging markets on the other. In the climate discussions, their differing interests have led to a stalemate that has not been resolved so far. Industrialised countries argue that greenhouse gas emissions by developing countries will soon surpass those of industrialised countries, and therefore the former have to start curbing their emissions. Developing countries, on the other hand, stress that the climate change problem originates from high emissions in industrialised countries and consequently these are the ones that will have to show the way forward. In their view, industrialised countries have built their wealth on fossil fuels and now want to prevent developing countries from doing the same.

Both parties are right. Indeed, projections by the International Energy Agency suggest that in 2012 developing countries will overtake OECD countries in terms of absolute greenhouse gas emissions. China has already overtaken the United States as the largest emitter in 2007.[16] But in terms of accumulated greenhouse gas emissions since the beginning of the twentieth century Europe and the United States are still by far the largest emitters.[17] A solution therefore needs to be found that connects these two extremes.

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[14] Hokkaido Toyako, G8 Summit 2008. For a summary of this summit see <http://www.g8summit.go.jp/eng/news/summary.html>.

[15] The White House, *supra* n. 11.

[16] International Energy Agency (hereafter IEA), *World Energy Outlook 2006* (Paris, 2006) and *World Energy Outlook 2007* (Paris, 2007),.

[17] World Resources Institute (2008) EarthTrends Statistics, Historic CO_2 emissions from fossil fuel combustion 1900-1999 (2008) <http://earthtrends.wri.org/text/climate-atmosphere/map-488.html>.

For overcoming the deadlock a distinction needs to be made between the least-developed countries and emerging markets. In the least-developed countries, of which many can be found in Sub-Sahara Africa and in Asia, often a large part of the population does not take part in the energy market at all. Worldwide there are still 1.6 billion people who do not have access at all to electricity, and 2.5 billion people are still dependent, for their daily energy needs, on traditional forms of biomass, like firewood, dung, charcoal, etc. As much as 1.3 million people per year, mainly women and children, die as a result of diseases induced by indoor air pollution.[18] These figures mean that the least developed countries are, to a large extent, in a phase of pre-commercial energy use: access to 'modern' energy is a key priority for them. Despite many attempts to leapfrog developments and make developing countries enter the renewable energy age in one single step, in developing countries this will inevitably lead to an increased use of fossil fuels – with a corresponding emissions growth.

Whereas access to energy for the poorest is the main energy problem in least-developed countries, in emerging markets like China, India, Brazil or South Africa improving wealth and a developing middle class – although positive from a development perspective – is a serious energy and climate concern. High economic growth rates in these countries in recent years mean that more people in these countries gain access to goods that are already a *sine qua non* in industrialised countries. A prime example is the private car. Before the 1990s private car ownership in China was almost non-existent, but in 2006 some 24 out of every 1,000 citizens owned a car. This number is expected to grow to 42 per 1,000 in 2010.[19] As a comparison: the figures for the United States and the European Union were 765 and 300 respectively in 2002. In India, Tata launched its low-priced 'Nano' in 2008 with the production of 250,000 cars a year for the domestic market, but it soon hopes to expand both domestically as well as to other markets in Latin America, South-East Asia and Africa.[20] All these new cars will be fossil-fuel driven, thus increasing pressure on fossil fuels. And a similar expansion can be seen concerning tv sets, washing machines, air conditioning and other household equipment.[21]

Improving wealth in countries like China and India also means increased pressure on their domestic coal resources. China and India alone account for 45% of the world's coal use and 20% of the world's coal reserves.[22] Energy

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[18] IEA (2006), *supra* n. 16.

[19] Green Car Congress, 'Per Capita Car Ownership to Climb by 67% in 2010' (2008) <http://www.greencarcongress.com/2006/05/percapita_car_o.html>.

[20] A. O'Connor, 'Tata Nano – World's Cheapest Car is Unveiled in India', *Times Online*, 11 January 2008 <http://driving.timesonline.co.uk/tol/life_and_style/driving/article3164205.ece>.

[21] IEA (2007), *supra* n. 16.

[22] BP, 'Statistical Review of World Energy' (2008) <http://www.bp.com>.

demand in these countries is expected to double by 2030. Combining a rapidly increasing energy demand with reducing the use of domestic coal in these countries therefore seems almost impossible.

For the least-developed countries as well as the emerging markets the need for economic development and improving wealth for their population is the key driving force concerning their position towards climate change. This makes them reluctant to agree to binding emission reduction targets for themselves. For the least-developed countries this does appear to be a proper approach. Emerging markets, on the other hand, might very well be in a position to curb their emissions to some extent and to combine this with economic growth. How this could work is shown by China, where the domestic solar and wind industries and their implementation have shown very high growth rates in recent years.[23]

Policy Gap 3: Fossil-fuel exporting countries *versus* fossil-fuel importing countries

A third political energy and climate gap is that between fossil-fuel exporting countries and fossil-fuel importing countries. The former want to maximise economic benefits from their finite resources, whereas the latter aim to reduce their dependency on these resources. Although these groups partially overlap with those of developing and industrialised countries, the origins of this gap are fundamentally different.

World coal reserves are distributed over a fair number of countries and regions. Oil and gas reserves, on the other hand, are concentrated in just a few countries. Russia, Iran and Qatar account for 60% of the world's gas reserves, whereas oil reserves are predominantly concentrated in the Middle-East.[24] With energy demand rising not only in industrialised countries but also in the developing world this has led to fears in importing countries that exporters with large oil and gas reserves might use their increasing market power in international relations to serve their national economic and political interests only. The large hold of national companies over the world production of oil and gas and the Russian-Ukrainian gas conflict in early 2006 are often, rightly or wrongly, pointed to in this respect.

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[23] *REN21 news*, July-August 2008 <http://www.ren21.net/newsletter/2008-08/>; and REN21, *supra* n. 6. Chinese wind energy has grown by more than 100% since 2005, and the 5MW implementation goal set by the government for 2010 has already been achieved in 2008. By 2007, there were more than 40 companies aspiring to manufacture wind turbines commercially. The Chinese firm Suntech is the world's fourth largest solar pV cells manufacturer.

[24] IEA (2006), *supra* n. 16.

However, as much as fossil-fuel importing countries need security of supply, the exporting countries need security of demand, i.e., security of income from selling their fossil energy resources. Many OPEC countries derive more than 90% of their export revenues from oil, Russia derives 60% of its export income from oil and gas.[25] Although a rapidly growing population and increased energy prices driven by high economic growth rates in many of these countries will stimulate domestic demand to rise, it will still be in their strategic interest to assure a continued export demand for their resources, either as crude materials or as refined products. Anything that might endanger a continuation of this demand, including a climate agreement, will therefore understandably meet with fierce resistance from these countries for economic reasons – unless the reduction of greenhouse gas emissions can be squared with an ongoing fossil fuel export. Or, as stated by the OPEC Secretary General Dr Alvaro Silva-Calderon in a speech to the UN Climate Conference in 2002, the Kyoto Protocol should be implemented 'in a way that avoids a net detrimental impact on fossil fuel producers.'[26]

Technology as a bridge

Potentially, already many low-carbon technologies exist that can contribute to a future low-carbon energy sector, but all of them run into specific problems that have so far prevented them from becoming a practical alternative to fossil fuels. Apart from economic, technical or environmental restrictions, there is often also an international political component involved.

Hydro and nuclear are the largest low-carbon energy sources presently available. In 2006, they both accounted for 3% of the total final energy consumption.[27] For the electricity sector, large hydro energy is one of the lowest-cost options available, but its use depends on the local availability of rivers that carry sufficient water and that can be dammed without hindering shipping movements and urban settlements. Some of the problems related to large-scale hydro development are the resettlement of the population in dam areas, a reduction of marine biodiversity, the salination of downstream agricultural areas and the spreading of tropical diseases. In particular, the construction of upstream dams in international river basins is politically very sensitive.

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[25] See <http://www.eia.doe.gov/emeu/cabs>.

[26] OPEC Statement to the 8th Conference of the Parties to the UN Framework Convention on Climate Change, 23 October-1 November 2002, New Delhi, India <http://www.opec.org/home/environmental%20Issues/statements/cop8.htm>.

[27] REN21, 'Renewable Energy Policy Network for the 21st Century' (2008); REN21, *supra* n. 6.

Nuclear energy is currently experiencing a revival. After decades in which hardly any new plants were built due to the 1986 Chernobyl disaster, now 36 reactors are under construction and many more have been announced.[28] However, waste and safety issues surrounding nuclear energy mean that the technology is still controversial, in particular in some European countries. Internationally, the relationship between the production of nuclear energy and nuclear arms proliferation makes the expansion of nuclear energy production particular to countries that presently do not dispose of this technology a delicate issue.

Bioenergy is another energy source that has the potential to contribute significantly to reducing greenhouse gas emissions. This option also finds strong support in the agricultural sector in many countries that sees bioenergy as an interesting new source of income. The loss of biodiversity and deforestation are main potential hurdles to its large-scale implementation. Politically, bioenergy has recently been met with severe international criticism due to its supposed responsibility for high food prices.[29] A second-generation of bioenergy using woody parts of plants might offset these drawbacks in the future, but is still in an early research phase. The latter also holds true for future low-carbon energy sources like tidal and wave energy or nuclear fusion.[30]

Other options for low-carbon energy are wind energy, solar energy and increasing the efficiency of energy production and demand. Wind energy has large potentials but also needs sufficient back-up capacity to compensate for its variable outputs. Where it is applied on land it often meets with resistance from local communities due to its visual impacts, noise and bird killings. Solar energy in many parts of the world is indeed viable, but is very expensive in others. Energy efficiency, involving many different technologies, is in quantitative terms the most important low-carbon option and economically is often the most attractive. However, in practice it encounters a large variety of market imperfections and barriers that hinder its implementation. This is even more so when the efficient use of energy is supposed to involve a change in human behaviour. Despite many attempts to the contrary, this behaviour turns out to be notoriously difficult to influence.

Although all the technologies mentioned can contribute partly to an energy and climate solution and at different time scales, none of them by themselves

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[28] World Nuclear Association, 'Information Papers – World Nuclear Power Reactors 2007-08' (2008) <http://www.world-nuclear.org/info/reactors.html>.

[29] FAO, High-level Conference on World Food Security: The Challenges of Climate Change and Food Security, 3-5 June 2008, Rome (2008) <http://www.fao.org/fileadmin/user_upload/foodclimate/HLCdocs/HLC08-inf-1-E.pdf>.

[30] In this context 'hydrogen' is often mentioned as well. However, this is not a primary energy source, but an energy carrier and has to be produced itself from either renewables, fossils or nuclear energy.

provide a readily available answer. It is in particular the combination of the increasing use of low-carbon energy technologies with a long-term decreasing use of fossil fuels that might be difficult to achieve. At the moment that low-carbon energy sources or energy efficiency will effectively and significantly start to replace fossil fuel demand, they will most probably run into serious obstruction from countries with substantial oil, gas and coal reserves: these include not only OPEC and Russia for oil and gas, but also India, China and the United States for coal. Finding a technical solution that combines the continued use of fossil fuels with greenhouse gas emission reductions therefore appears, in international political terms, the easiest route to take.

There is one technology presently investigated that might play an important role here: carbon capture and storage (CCS). If the CO_2 emissions of fossil fuel combustion could be isolated from the other exhaust gases and could be stored underground in impermeable reservoirs, as is the aim of CCS technologies, the use of oil, gas and coal could continue until physical exhaustion – or until alternatives become available in sufficient quantities – and simultaneously greenhouse gas emissions could be reduced. If CCS technology were to be made obligatory worldwide for all fossil fuel plants, this measure alone could contribute to between one fifth and a third of necessary global CO_2 emission reductions by 2050.[31] Such a scenario would reduce the need for substantial reductions in fossil fuel production and could therefore be acceptable to fossil-fuel exporting countries.

However, the special political position that CCS has, as compared to other low-carbon energy technologies, does not mean that it is the 'Silver Bullet' which the energy world is waiting for. Although it appears to offer good perspectives for an international political way of least resistance towards a low-carbon energy sector, it is exactly for this reason also heavily criticised by the advocates of more fundamental changes. CCS in their view can only offer a temporary leeway that might well hinder the development of more structural solutions. Besides, CCS, like many other low-carbon energy technologies, still needs to be proven in practice on an industrial scale, and might not become available as a commercial technology before 2020. To bridge the geopolitical gaps, more is therefore needed than technology development alone.

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[31] International Energy Agency, *Legal Aspects of Storing CO_2: Update and Recommendations* (Paris; 2006); N. Stern, *The Economics of Climate Change – The Stern Review* (Cabinet Office HM Treasury, Cambridge University Press 2007); P.A. Enkvist, T. Nauclér & J. Rosander, 'A cost curve for greenhouse gas reduction', *The McKinsey Quarterly*, No. 1 (2007).

International cooperation as a bridge

A second pillar crucial to a global energy transition is international cooperation that involves a mutual understanding of national economic and political interests.

With respect to developing countries, international cooperation should be focused on helping these countries with economic growth in a sustainable manner. This is likely to involve far larger financial transfers than presently available from development aid and the Clean Development Mechanism set up as part of the Kyoto Protocol.[32] In 2008 the United States, Japan and the United Kingdom have proposed setting up a multilateral fund involving the World Bank that would help emerging economies to reduce greenhouse gas emissions. With a contribution of 2 billion dollars by the United States and total reserves to be collected aimed at 10 billion dollars, this would only cover part of the estimated 30 billion dollars needed by developing countries to cover the extra costs of clean technologies.[33]

Furthermore, taking into account the need in developing countries for access to energy as well as for economic development, a new agreement should concentrate on stimulating 'development' as an equal goal next to 'climate'. Returning to the 'Environment and Development' title of the 1992 United Nations conference in Rio de Janeiro and far more than a purely cosmetic change, this would reflect a mutual understanding between industrialised and developing countries of the priority order of needs in both groups of countries.

The gap between the voluntary, technology-based approach initially advocated by the United States and the binding emission reductions favoured by Europe, though presently already narrowing, can most likely only be completely closed by an approach that includes both. The United States has repeatedly stated its position of not entering into any binding emission reduction targets without developing countries also taking up obligations.[34] The latter, in turn, will not enter into emission reductions if they will not be financially and technologically compensated for this step. The transfer of technologies on favourable terms from industrialised to developing countries seems to be a way out. It could persuade developing countries to enter into emission reduction efforts,

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[32] See S. Slingerland, L. van Geuns & C. van der Linde, 'Van zwarte naar groene energie – Geopolitiek van een mondiale energietransitie', 62 *Internationale Spectator*, No. 5 (May 2008) pp. 259-263 [in Dutch].

[33] J. Lovell, 'UN Climate Head Welcomes Marshal Plan Climate Fund', *Reuters News Service* (17 January 2008) <http://www.planetark.org/dailynewsstory.cfm/newsid/46461/story.htm>.

[34] P. Wiseman, 'G-8 Countries Agree to Cut Greenhouse Gases', *USA Today* (9 July 2008) <http://www.usatoday.com/news/world/2008-07-08-bush-g8_N.htm?csp=34>.

which in turn could persuade the United States to accept challenging and binding reduction targets at home as well.

For international climate cooperation between fossil-fuel exporting and importing countries a variety of topics will need to be addressed. Apart from the stimulation of carbon capture and storage technology also greater use should be made of the renewable energy potentials in fossil-fuel exporting countries, since the Middle-East deserts are perfect locations for solar energy and the Russian forests hold ample biomass to be used in a sustainable way. As the technological knowledge for the application of these technologies is predominantly available in the present main fossil-fuel importing countries, technology transfer could help take away part of the resistance to a low-carbon energy transition in exporting countries. However, it is not only technology that needs to be transferred. Fossil-fuel exporting countries often have mono-sectoral economies that are almost completely dependent on gas or oil as their sole export products. For long-term economic progress and social stability it is important that these countries take steps towards the diversification of their economies. Importing countries generally have diverse economies and could therefore, if desired, provide some assistance in helping fossil-fuel exporters to diversify.

Furthermore, trust between exporters and importers could be increased by well-planned interventions in the structure of the global oil and gas markets that ensure the medium-term security of supply for importers and security of demand for exporters, as well as the long-term gradual and structured reduction in the production of fossil fuels instead of a sudden collapse. These interventions could include sharing the risks of much needed investment projects in fossil fuels between producers and consumers and allowing state-owned companies of fossil fuel producers to have access to markets in consuming countries in return for a better dialogue on the short and long-term production quota of exporting countries. It is a positive sign in this respect that at the Jeddah Energy Conference held in June 2008, the first steps were taken towards increased cooperation between the secretariats of OPEC, the International Energy Agency and the International Energy Forum, which together represent most of world's fossil-fuel importing as well as exporting nations.[35]

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[35] Jeddah Energy Meeting Joint Statement, June 27, 2008 <http://www.saudi-us-relations.org/articles/2008/ioi/080627-joint-statement.html>. In the meeting it was agreed that the secretariats will start to cooperate to prepare shared analyses of oil market trends and outlook, as well as analyses of the impact of financial markets on the level and volatility of oil prices.

Conclusion

Fundamental changes in the global structure of energy supply and demand are profoundly needed to meet the challenges posed by man-made climate change. Technology development and improved international cooperation can jointly contribute to closing the present geopolitical gaps that impede such a global low-carbon energy transition. For that purpose, it should be recognized that countries have different driving forces with respect to energy transition. Environmental motives, security of supply considerations or economic development aspirations are all equally valid driving forces on the path to a global low-carbon energy economy.

Only if these driving forces are properly identified, recognized and mutually respected by all nations is there a chance that a new agreement in Copenhagen in 2009 will bring about more than hot air, nice words by political leaders and a world community that shrugs its shoulders and continues with business as usual.