

The Geopolitics of Energy: From Security to Survival

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I. Introduction

Since the industrial revolution the geopolitics of energy – who supplies it, and securing reliable access to those supplies – have been a driving factor in global prosperity and security. Over the coming decades, energy politics will determine the survival of the planet.

The political nature of energy, linked to the sources of supply and demand, comes to public attention at moments of crisis, particularly when unstable oil markets drive up prices and politicians hear constituent protests. But energy politics have become yet more complex. Transport systems, particularly in the United States, have become largely reliant on oil, so disruption of oil markets can bring a great power to a standstill. Access to energy is critical to sustaining growth in China and India – not only to lift these countries out of poverty, but to keep pace with burgeoning populations. Failure to deliver on the hope of greater prosperity could unravel even authoritarian regimes, and even more so democratic ones, as populations become more educated and demanding. And it is these very factors that have turned the market power of energy suppliers into political power. Importers have come to compete for supplies, driving up prices, supplier wealth and the capacity to play roles in regional and international politics that go well beyond the GDP of countries such as Russia, Venezuela and Iran.

These traditional geopolitical considerations have become even more complex with global climate change. The United Nations' Intergovernmental Panel on Climate Change has irrefutably documented that the use of fossil fuels is the principal cause of greenhouse gases that are driving up the temperature of the planet. Climate change will create severe flooding and droughts which will devastate many countries' food production, lead to the spread of various illnesses, and cause hundreds of thousands of deaths per year, particularly for those living in the developing world. Nearly two billion people were affected by climate related disasters in the 1990s and that rate may double in the next decade.¹ At the very same time that countries are competing for energy, they must radically change how they use and conserve energy. The politics of that debate,

¹ Ian Noble, "Adaptation to Climate Change and The World Bank," presentation at UNFCCC Seminar on Development and Transfer of Environmentally Sound Technology for Adaptation to Climate Change, Tobago: 14 – 16 June 2005.

particularly how to pay for the costs and dissemination of new technologies, and how to compensate those who contribute little to climate change but will most severely experience its tragedies, are emerging as a new focal point in the geopolitics.

Ironically, high oil and gas prices and the actions that must be taken to address climate change – namely, pricing carbon at a cost that will drive investment, new technology and conservation to control its emission – will drive another existential threat: the risk of nuclear proliferation. Higher energy and carbon prices will make nuclear power a more attractive option in national energy strategies, and the more reliant that countries become on nuclear power, the more they will want to control the fuel cycle. The risk of breakout from civilian power to weaponization would increase dramatically, as well as the risk of materials and technology getting into the hands of terrorists.

Confronting these challenges requires an understanding of the fragility of international oil and gas markets, but also of the nexus among energy security, climate change, and nuclear energy and proliferation. This paper seeks to address these interconnections, and the kinds of measures that will be needed to ensure sustainability, prosperity, and security.

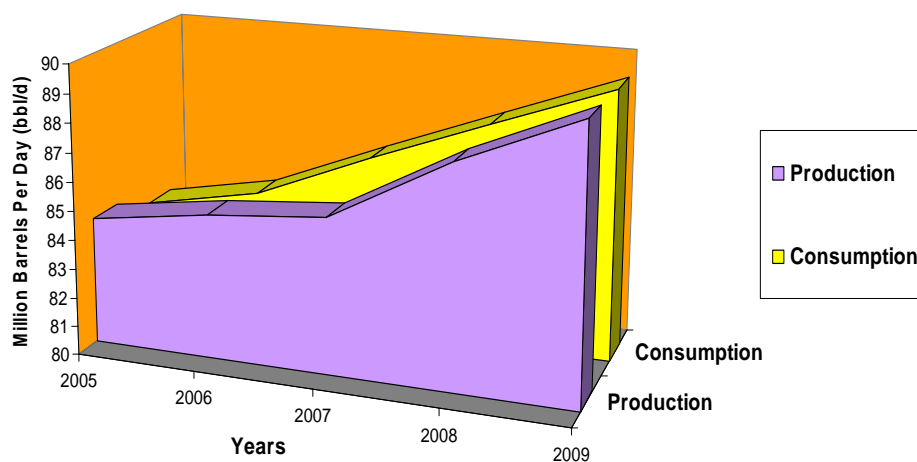
II. Geopolitics of Oil and Gas

Political instability in and around countries considered marginal oil suppliers can cause major price spikes. That instability has created angst among oil importers and given even greater political power to oil suppliers. For example, when Turkey threatened on 17 October 2007 to take its fight against the terrorist organization, the PKK, into Kurdish Iraq, oil prices jumped from \$87.40 per barrel to \$94.53 per barrel² by the end of the month. Yet Turkey is not an oil exporter, and Iraq produces only about 3 million barrels a day in a world market of 85 million barrels per day³. Understanding the factors driving these fluctuations is at the heart of understanding the geopolitics of energy.

² Energy Information Administration (EIA), <http://tonto.eia.doe.gov/dnav/pet/hist/rclc1d.htm>

³ International Energy Agency (IEA) and Economist Intelligence Unit 2007

Figure 1: Oil Demand and Supply



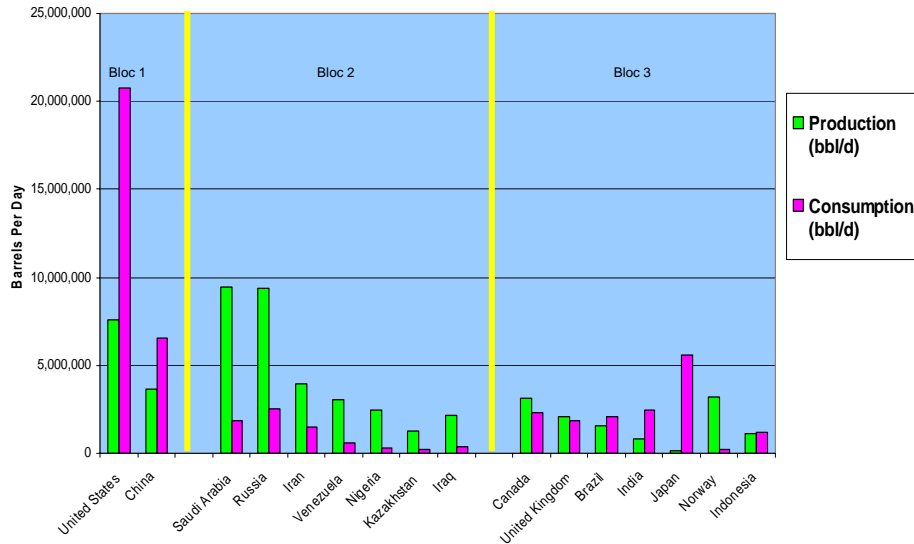
Source: IEA and Economist Intelligence Unit 2007

Figure 1 illustrates that oil consumption began to outstrip production in early 2006, which initially seems counterintuitive. Reducing oil inventories is favored when the future price of oil is predicted to fall. Conversely, inventories are built up when future prices are expected to rise. Consumption of these inventories accounts for consumption outstripping production. Alleviating this tight supply situation depends upon relatively unstable regions, while the security of transit through chokepoints creates vulnerabilities that factor into both security of energy supplies, but also environmental security. Nearly 25% of world oil exports pass through the Strait of Hormuz, nearly 15% through the Strait of Malacca, and nearly 5% through Bab el-Mandeb, the narrow strait connecting the Red Sea and the Gulf of Aden.⁴

Figure 2 below illustrates further the demand and supply factors behind oil price volatility. Bloc 1 in the chart represents the fastest growing sources of demand for oil: the United States and China. Bloc 2 consists of Saudi Arabia, Russia, Iran, Iraq, Venezuela, Nigeria, and Kazakhstan. These are countries upon which we de facto rely to meet short-term shortages in supply. Bloc 3 – Canada, the United Kingdom, Brazil, India, Japan, Norway, Indonesia – shows other important drivers of supply or demand, most notably Japan and India, which rely massively on oil imports.

⁴ Energy Information Administration (EIA), "World Oil Transit Chokepoints," http://www.eia.doe.gov/cabs/World_Oil_Transit_Chokepoints/Background.html

Figure 2: Oil Production and Consumption through 3Q 2007



Data source: CIA World Factbook 2007

On the supply side, there is limited ability to expand production rapidly in the short-term, and even long-term prospects are mixed. Russia is producing at its peak, and Saudi Arabia has limited additional short-term capacity. Due to commercial disputes, local instability or ideology, Russia, Venezuela, Iran, Nigeria and Iraq are not investing in new long-term production capacity. Given limited supply elasticity, political volatility gets magnified through rising prices. Key sources of instability include conflict in the Middle East, the risk of the Iraq war spilling into the Persian Gulf, the risk of U.S. conflict with Iran over its nuclear program or over Iranian support for militias in Iraq, conflict in the Niger Delta, populist state controls in Iran and Venezuela, and the difficulty of securing major oil transport routes.

The flipside of this fragility is the limited elasticity of oil demand in the short-run due to the structure of the transportation sector. Change in this arena requires longer-term investments and technological and infrastructure investments. In the medium-term, there are options such as increased use of hybrid cars which plug into the electricity grid.⁵ In the long-term there are prospects for alternative fuels. But the result today is that, with little short-term flexibility in either the demand or supply sides of the oil market, political instability or insecurity affecting oil producing regions and transport routes can cause huge fluctuations

⁵ David Sandalow, *Freedom from Oil: How the Next President Can End the United States' Oil Addiction*. New York: McGraw-Hill, 2008.

in price. “Oil consumers are paying \$4 billion to \$5 billion more for crude oil every day than they did just five years ago, pumping more than \$2 trillion into the coffers of oil companies and oil producing nations”⁶ just in 2007 alone. To put this in context of political seasons, the price of oil rose from \$30 per barrel when George Bush took office in January 2001, to \$48 at the start of his second term in January 2005, to nearly \$97⁷ on November 9 – an overall rise of 223%.

The most extreme political impacts of today’s oil market realities are played out by Iran, Venezuela and Russia. Iran is developing a nuclear program despite UN Security Council Resolutions 1696, 1737 and 1747 demanding that Iran suspend the enrichment of uranium and fully disclose the nature of its nuclear program. When the International Atomic Energy Agency (IAEA) Board of Directors referred Iran to the UN Security Council (UNSC), as well as through the various UNSC Resolutions on Iran, countries from every part of the world have opposed Iran developing the capability to produce a nuclear weapon. Yet still Iran remains defiant. In part that may be out of the hope that Russia and China will block any serious sanctions, either because of their commercial interests in Iran, or because they generally resist setting a precedent for the UN to scrutinize individual national security decisions. But just as powerful is Iran’s market power. Iran’s oil revenues were \$46 billion in 2005. They rose to \$47 billion in 2006⁸, and projections for 2007 and 2008 could put revenues in the \$60 billion range.

Venezuela’s influence must be seen in a wider context of globalization and its impact in Latin America. Globalization has helped millions in Latin America tap into technology, markets and capital in a way that has made many countries and people wealthier. But the gap between the “have’s” and “have not’s” has grown. Those who have not made it are also increasingly better educated – and resentful for what they don’t have. That resentment is strongest among those making the transition out of poverty but who cannot see how to advance further. So they become vulnerable to populism. When given a chance to vote, many will use their ballots to express their frustration. It is in this context that Venezuela and Hugo Chavez have brought their wealth to bear. Within Brazil and Mexico, Chavez’s message of populism and his support for local leaders have the potential to galvanize local frustrations. In Bolivia and Nicaragua, the Chavez myth seen from the outside seems to suggest that the poor could be given more at little cost.

Not every Latin American country has gone down Chavez’s populist route, but he is presenting new challenges to a regional order based on democracy and market principles. For democrats in the region, the first challenge is to ensure that there is not a backlash against democracy from those leaders and countries that feel

⁶ Steven Mufson, “Oil Price Rise Causes Global Shift in Wealth; Iran, Russia and Venezuela Feel the Benefits,” *The Washington Post*. Washington, D.C.: Nov 10, 2007. p. A.1.

⁷ Energy Information Administration (EIA), <http://tonto.eia.doe.gov/dnav/pet/hist/rclc1d.htm>

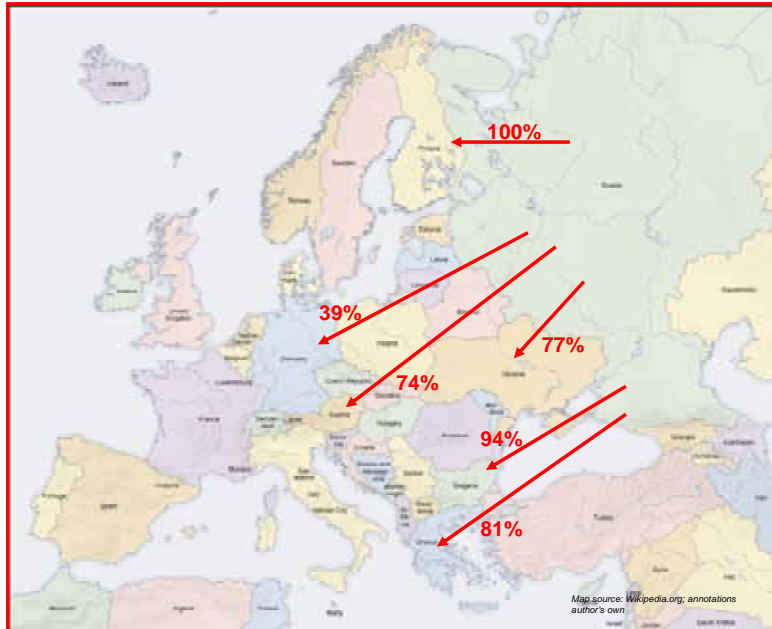
⁸ Institute for the Analysis of Global Security, <http://www.iags.org/n0328052.htm>

threatened by popular frustration. The second is to reform governance and policies to give the “have not’s” a sense that they can have a better future. Whether Latin American leaders can educate their people to create the capacity to benefit from globalization, whether governments can target subsidies to those who need to be pulled into society, and whether the United States will open its markets to technologies, services and products – these factors together will fundamentally affect perceptions of democratization in the region, and whether it is a source of stability or a vent for populism.

A Look at Russia

Given Russia’s veto power in the United Nations Security Council, its unique supply position for gas to Europe, and its control over one of the two largest nuclear arsenals in the world, it is important to understand how energy has transformed Russia internally and its role in the international community. In addition to being the world’s second largest exporter of oil, Russia controls over a quarter of the world’s proven gas reserves at 1,680,000 billion cubic feet. Europe imports 23% of its gas from Russia. Figure 3 illustrates Russia’s dependence on the European consumer, and Europe’s dependence on Russia as a supplier. In the short term, Russian gas supplies can determine the economic vitality of Germany, Greece, Austria and Finland. And while Russia needs the consumers in these countries, their leverage over Russia in the short-term is to boycott Russia and worsen their economic plight should there be a trade dispute over gas. In short, there is no comparable reciprocal leverage.

Figure 3: Percentages of Gas Consumed Imported from Russia⁹



Diversification of transport routes is costly and takes time. For example, the North Europe Gas Pipeline (NEGP) will connect Vyborg, Russia, to Griefswald, Germany, and consist of two parallel pipelines, the first to be commissioned in 2010 and the second in 2012, with a total capacity of 55 bcm/year. The NEGP is projected to meet nearly 25% of Europe's additional gas import needs by 2015, but will cost an estimated \$5 billion. And, of course, this specific project will only further entrench Germany's dependence on Russian gas.

Russia currently ranks 8th in the world in terms of proven petroleum reserves, at 60 billion barrels. It ranks second only to Saudi Arabia in terms of oil production, at 9.4 billion barrels per day. Russia's \$147.6 billion Stabilisation Fund,¹⁰ in which revenues from export duties on oil and taxes on oil mining operations accumulate when the price for Urals oil exceeds the set cut-off price – which is intentionally kept relatively low in order to ensure that the bulk of oil-generated revenues accrue to the Fund – was established in 2004 as a means of hedging against “Dutch Disease” and paying off debt. The 2007 and 2008 budgets were based on a cut-off price of \$27/bbl, although this price may be revised in light of rising oil prices. Russia has also accumulated \$425 billion in hard currency and gold reserves.

⁹ Data: BBC News: <http://news.bbc.co.uk/go/pr/fr/-/2/hi/europe/4578350.stm>; Map source: Wikipedia.org; annotations author's own

¹⁰ Russian Ministry of Finance, <http://www1.minfin.ru>

This energy wealth enabled Russia to pay off \$50.7 billion in debt (\$3.33 bn for early debt repayment to the IMF, \$43.1 bn for debt repayment to the countries-members of the Paris Club, and \$4.3 bn paid to Vensheconomobank (VEB) for loans provided to the Ministry of Finance in 1998-1999 for servicing state foreign debt of the Russian Federation)¹¹. Corporate debt, totalling \$384.8 billion at the end of the first half of 2007, has risen 24% since the beginning of the year. The recent debt growth rate is more of a concern than the actual amount of debt, given that Maastricht standards cite corporate debt over 30% to be dangerous for the macroeconomics of a state. Moreover, Russia has refused to ratify the Energy Charter Treaty, which would guarantee transit rights for energy through Russia regardless of the owner and preclude cutting off energy supplies as a political weapon.

Its energy market power has allowed Russia to consolidate political power internally and has made Russia immune to normal external checks on the exercise of power. Within Russia, Putin has been able to control the appointments of governors and the upper house of parliament. He has orchestrated a change in rules for parties to get into the lower house of parliament, in turn tightening the ties between political parties and the Kremlin. He has appointed individuals linked to the Kremlin to corporate leadership positions in, among others, the gas, oil, rail, airline, shipping, diamond, nuclear fuel and telecommunications industries.¹² The Kremlin has also consolidated control over most broadcast media, and has been able to get the courts to do its bidding on cases against power rivals such as Mikhail Khodorkovsky.

Externally, Putin expertly managed a bidding war for his attention between President Bush and Presidents Chirac and Schroeder when both the U.S. and “old Europe” sought to get Putin on its side in the war on terror and the Iraq War. By the time that the United States and Europe began focusing on Putin’s consolidation of Russian politics in late 2004, new political realities had been created, backed by a newfound stability in oil wealth that would only grow and become reinforced by Europe’s dependence on Russian gas. Today, the result is that Putin ignores international entreaties over the Kremlin’s control of domestic politics, Putin presents himself as the protector of international law and order against American aggression,¹³ Russia uses energy as leverage in its negotiations with what it sees as upstart neighbors (Ukraine, Georgia), and it continues to resist Europe’s entreaties for comparable rights for its investors in Russia.

But arguably the most complex and significant evolution of Russian energy power combined with its political weight on the UN Security Council has been its role on Iran. On the one hand, Russia has stated that it has no interest in Iran acquiring nuclear weapons, and it has been part of the political negotiating group consisting of the five permanent Security Council members and Germany. Yet

¹¹ Russian Ministry of Finance, <http://www1.minfin.ru>

¹² Neil Buckley and Arkady Ostrovsky, “Putin’s Allies turn Russia into a Corporate State,” *The Financial Times*, 18 June 2006.

¹³ See attached

Russia has resisted the imposition of tough sanctions against Iran, seeking to carve out exceptions for Russia's sale of civilian nuclear technology for Iran's Bushehr nuclear power plant and to weaken UN sanctions against Iran, providing cover for China to follow suit. Recently, Russian officials or former officials have indicated that they see prospects for the International Atomic Energy Agency to close out the file concerning the historical questions about Iran's nuclear program and, according to these individuals, that would require returning the Iran case from the UNSC to the IAEA.

Russia, in effect, has positioned itself to either unravel or make viable an effective diplomatic package against Iran. If it splits the "P5 plus 1" by insisting that the UNSC has no role to consider sanctions against Iran, Russia will almost surely split any effective diplomatic effort, give Iran further leeway, virtually ensure that Iran develops nuclear weapons capability, and raise the risk of a U.S., Israeli or other military action against Iran. Yet Russia also has the capacity to be part of a package that could make clear to Iran – and just as important to the Muslim world – that the international community is not blocking Iran from a civilian nuclear program. To the contrary, Russia's cooperation could make possible the offer of a more advanced civilian nuclear plant, nuclear fuel and the reprocessing of spent fuel, ideally in the context of a package that could be extended as well to other states seeking civilian nuclear programs.

The Iran case, and Russia's role in it, bring together most key elements of today's complex geopolitics of energy: market power to act in isolation, multiplying energy power by seeking to bloc multilateral instruments, the emerging risks associated with civilian nuclear power, and limited short-term recourse to exercise rule-based order to control energy market power. For energy consumers – and those who see the wider risks of vesting so much political sway in energy-rich states – the short-term options are limited. Better management of reserves could help, and bringing China and India into a reserve management system would seem crucial since they are biggest drivers of increased oil demand, yet they are out of the International Energy Association's reserve management system. The more critical changes are in the medium term, through conservation, alternative fuels, massive lifestyle changes, new building codes, and new technologies that burn less energy. It is these very types of policies that are also central to a different yet even more existential aspect of the geopolitics of energy: climate change.

III. The Geopolitics of Climate Change

Avoiding the destruction of the planet through the emission of greenhouse gases is one of the most complex challenges that we, as the collective human race, have ever created for ourselves. Our very survival is at stake. The difficulties lie in the intersection of earth sciences, technology, economics and politics. The emission of greenhouse gases will have the same impact regardless of the source – whether Beijing, Detroit or Newcastle. Hence it is impossible to solve the global problem

without involving all states. The problem of climate change, due to the concentration of greenhouse gases in the atmosphere (CO₂-equivalent), was created by the industrialized world, so emerging market economies resent that they must share the cost in addressing the problem. Yet emerging economies are the fastest growing source of greenhouse gas emissions. Worse yet, the biggest catastrophic impacts will be on developing countries such as Mali and Bangladesh that are not driving the problem in any way.

Figure 4: Climate Change - Causes and Impacts

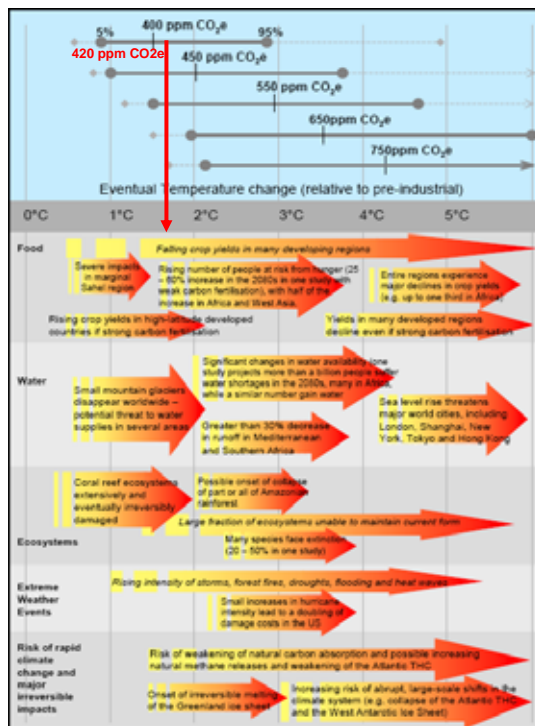


Figure 4 illustrates the types of impacts that could be experienced as the world comes into equilibrium with more greenhouse gases. The top panel shows the range of temperatures projected at stabilization levels between 400ppm and 750ppm CO₂e at equilibrium. The solid horizontal lines indicate the 5 – 95% range based on climate sensitivity estimates from the IPCC 2001 ... and a recent Hadley Centre ensemble study ... The dashed lines show the 5 – 95% range based on eleven recent studies ... The bottom panel illustrates the range of impacts expected at different levels of warming. The relationship between global average temperature changes and regional climate changes is very uncertain, especially with regard to changes in precipitation.

Source: The Economics of Climate Change - STERN REVIEW; Nicolas Stern – October 2006

Science, technology and domestic politics further complicate the picture and split even the developed economies. Figure 4, from the October 2006 Stern Report, illustrates the inter-relationships among temperature, CO₂e concentrations, and the global impacts. The Intergovernmental Panel on Climate Change (IPCC) established that maximum temperature increase that the world can sustain without causing irreparable damage is about 2.5 degrees centigrade by 2050. There is less certainty about what concentration of CO₂e will avoid going over a 2.5 degree temperature increase, but the estimates generally fall in the range of 450-550 parts per million (ppm) of CO₂e. The lower the level, the costlier and harder it is to achieve. We are currently at a level of about 420 ppm of CO₂e. There is also uncertainty about the level of annual reductions in greenhouse gas emissions that are needed in order to stabilize the atmosphere at a concentration

of 450-550 ppm of CO₂e, but estimates cover a range from 50-85% in annual reductions of CO₂e emissions relative to 1990 levels.

The objective of a climate change policy must be to create the incentives that will drive changes in technology, technology dissemination, consumption patterns, and new developments in how energy is produced in order to reduce the annual emission of carbon so that the atmosphere does not exceed a concentration of more than 450-550 ppm by 2050. That is a monumental task. If one were to assume the continuation of current practices and technology, estimates indicate that greenhouse gas emissions could *increase* by 25-90% by 2030, much less decrease on the order of 50% or more annually by 2050.

We currently do not have the technologies and policies to achieve this target. Conservation, efficiency, alternative fuels, and cleaner use of fuels all have to be part of the equation. But the combinations we currently have available do not achieve the desired end point. In order to succeed, the international community must find a way to price carbon in order to curb consumption, spur technological innovation, affect fuel choices, and stimulate investment. Some argue that, in the long term, there must be a stable long-term price for carbon of at least \$30/ton to achieve the necessary economic and technological incentives.

Yet pricing carbon has been another source of geopolitical divide. No country has adopted an explicit tax on carbon on the scale of \$30/MT. Cap and trade systems in Europe or those emerging in regions of the United States do not yet come close to this level of implicit carbon price. Within the U.S., our more progressive states have adopted standards for the use of renewable fuels and efficiency. Some states like Florida and California have set targets for overall GHG emissions. They are creating an implicit cost for carbon, but they are not setting the stable and explicit price signals that are needed for innovation. Japan, for example, has called for a 50% annual reduction in CO₂ emissions by 2050, but the Japanese Government has kept a cap and trade system and a carbon tax off the table as policy options.

From the debates over policy, economics, technology and science have emerged four geopolitical blocs on climate change, and perhaps a fifth waiting in the wings. The first is anchored by Europe and, with less fervor, Japan, and supports the adoption of binding emissions targets. The second is driven by the United States and supports setting a long-term goal and nationally binding medium-term commitments, but not an internationally binding treaty that holds countries collectively to account. The third consists of the emerging market economies led by China and India, it has resisted any form of binding international targets, and it has focused its demands on technology dissemination and financing for the cost differential for clean technologies. The fourth group is that of developing countries bearing the brunt of flooding, desertification and other catastrophic effects of climate change, and their demands focus on financing to adapt to the impacts of climate change. Perhaps the emerging fifth group may be that of energy suppliers who see the world

shifting away from the use of fossil fuels. They could emerge either as facilitators of transition if they invest their wealth in technology dissemination and thereby position themselves as winners in a greener international environment, or they could be spoilers who seek to drive up prices and profits to capture the greatest earnings in the course of transition.

Among these groups, the United States has the capacity to be a pivotal figure. China and India will not move toward more responsible international policies if the United States does not set the example. Along with Europe and Japan, the United States has the capacity to demonstrate that green technology and conservation can be compatible with growth and a foreign policy that is more independent of energy suppliers. The United States also stands to benefit from accelerated commercialization of green technologies and the development of global markets in energy efficient and clean energy technologies. But the ability of the United States to lead will fundamentally depend on domestic action: whether it will undertake on a national basis a systematic strategy to price carbon and curb emissions. If it does, the scale and importance of the American market can be a driver for global change. If not, then the United States will find that over time the opportunity for leadership to curb climate change will be replaced by crisis management as localized wars, migration, poverty and humanitarian catastrophes increasingly absorb our international attention and resources, eventually coming back to our own borders in a way that will make the Katrina disaster seem relatively small.

IV. The Geopolitics of Nuclear Proliferation

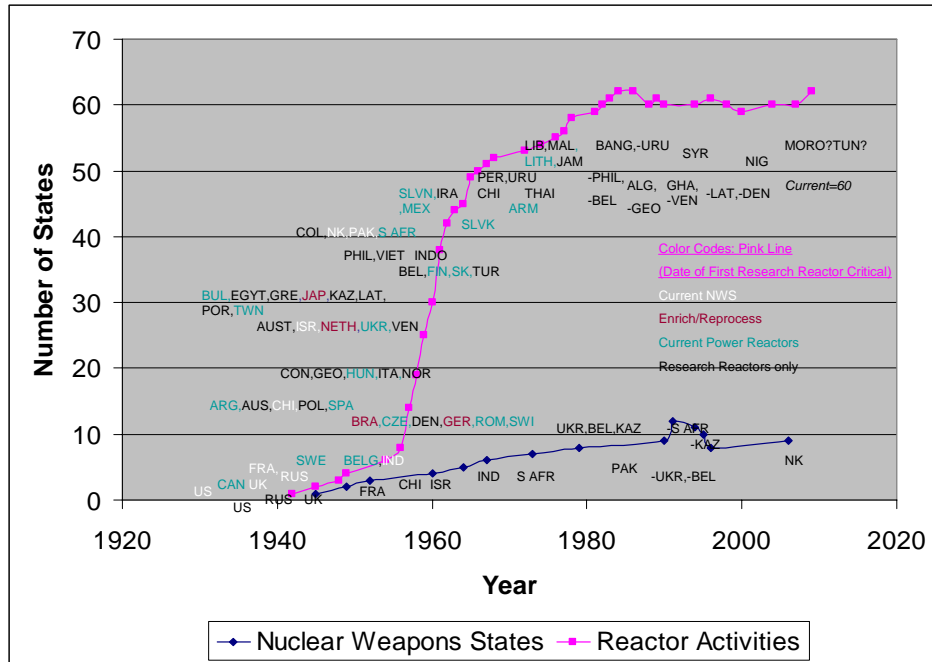
Perhaps the most serious existential risk that parallels that of climate change is that of nuclear technology and materials getting into the hands of rogue states or terrorist organizations. That could result in the devastation of cities or nations and set off reciprocal actions that lead to levels of destruction that were only foreshadowed at Hiroshima and Nagasaki in World War II. High fossil fuel prices, the risks associated with energy suppliers and transport routes and, ironically, policies to combat climate change – namely, the pricing of carbon – could accelerate a drive for civilian nuclear power that could increase that existential risk. For economic, environmental and security reasons, we should expect more and more countries to incorporate nuclear power into the mix of their power generation capabilities.

Today just twelve¹⁴ countries, out of the sixty states with some form of nuclear capacity, can enrich and commercially produce uranium (see Figure 5). Arguably, nine countries currently have nuclear weapons. Imagine if the number producing enriched uranium were to double or triple if developing nations sought to enhance their energy security through a misguided sense of energy self-reliance while adopting carbon-free nuclear technology to produce electricity.

¹⁴ Brazil, China, France, Germany, India, Iran, Japan, Netherlands, Pakistan, Russia, UK, USA

That calls for an intensified effort now, before it is a crisis, to strengthen the firewalls between civilian nuclear power and weaponization programs.

Figure 5: Nuclear Latency?



Source: Scott D. Sagan, Professor of Political Science, Co-Director, Center for International Security and Cooperation (CISAC), Stanford University

The goal must be to give aspirants for civilian nuclear power confidence to obtain nuclear fuel through an international fuel bank and to forego enrichment programs, while placing their entire nuclear programs under the International Atomic Energy Agency (IAEA) Additional Protocol. Such measures may not stop Iran's nuclear ambitions, but they may help other countries from breaking out from civilian nuclear programs to weaponization. They will also reduce the risk of nuclear material leaking into the hands of rogue states and terrorists. And to achieve the credibility to lead the international community in forging such a revitalized regime against proliferation, the United States will need to follow through on the promises it has made to what the non-nuclear weapons states see as "horizontal proliferation", namely ratification of the Comprehensive Test Ban Treaty (CTBT).

Realizing a safer international nuclear regime will require revitalizing the bargain between nuclear and non-nuclear weapons states under the Nuclear Nonproliferation Treaty (NPT). Article 4 of the NPT assures non-nuclear weapons states the right to peaceful civilian applications of nuclear power if they adhere to the treaty's provisions and forego the pursuit of nuclear weapons.

Since the drafting of the NPT in 1968, experience has demonstrated ways in which monitoring and surveillance should be enhanced to reduce the risk of leakage, and these measures have been incorporated into a voluntary Additional Protocol. In return, nuclear weapons states committed under the NPT to reduce their arsenals and seek eventual nuclear disarmament.

It is the disarmament part of this agenda that Secretaries Kissinger, Schultz and Perry, along with Senator Nunn, have proposed in their renewed call for the elimination of nuclear weapons.¹⁵ Even for those who think that full nuclear disarmament is unworkable or unwise, U.S. ratification of the CTBT is the most critical step to restore the credibility and vitality of the bargain the NPT established between vertical (across states) and horizontal (deepening within nuclear states) proliferation. At the 1995 NPT review conference, non-nuclear weapons states accepted an American commitment to the ratification of the CTBT as a basis for the indefinite extension of the NPT – in effect, a deal for their permanent commitment to forego nuclear weapons. In order to advance now the actions needed to curtail the “vertical proliferation” of nuclear weapons, the United States cannot ignore its 1995 commitment on CTBT.

A new package is needed on proliferation and testing that includes:

- A commitment by NPT signatories to accept the Additional Protocol,
- The development of an international fuel bank under the IAEA that would assure nations supply to nuclear fuel as long as they observe the NPT’s provisions,
- A means to centralize the control and storage of spent nuclear fuel, and
- A ban on testing that would complicate the ability of any aspirant for nuclear weapons to break out of a civilian nuclear program.

The ban on testing is pivotal in the geopolitics of nuclear power. A comprehensive test ban would have the greatest impact on states that want to use civilian programs as a platform for the development of nuclear weapons. Nuclear weapons states have other means to service and replenish their arsenals. Those truly committed to civilian nuclear power should not have a need to enrich, and in most cases the scale would be sufficiently small that it would not make economic sense for them to do so. If any entity were to test a nuclear weapon, it should be immediately detectable, and it should trigger sharp multilateral pressure to abandon the program. This was the case with North Korea, where China, the United States and Japan quickly secured UN condemnation and sanctions after North Korea’s nuclear test in October 2006.

A comprehensive test ban creates the incentive to sustain the status quo among nuclear states, and to constrain states from developing nuclear weapons capacity. The CTBT isolates those who seek to advance their ambitions for nuclear

¹⁵ George P. Schultz, William J. Perry, Henry A. Kissinger and Sam Nunn. *Wall Street Journal* (Eastern edition) New York, NY: 4 Jan 2007, p. A 15

weapons. Russia would need to be part of this package – as a supplier of fuel, and a secure source for storage and reprocessing – with massive commercial benefits to Russia. The United States should seize on this opportunity – if not now, then under a new President in 2009 – to ratify and implement the CTBT, and in so doing strengthen American leverage to broker an international package to stop nuclear leakage and curtail the risk of breakout from civilian programs.

V. Conclusion

For more than a century, energy, politics and power have been clearly intertwined as a force in international security. The stakes are only getting bigger as the issues go beyond national prosperity and security, to the viability of the planet. Policy makers and citizens must understand the nature of this change and recognize that inaction – simply not attempting to forge coalitions and to guide constructively how states use energy – will be catastrophic.

It will be crucial to resist allowing short-term electoral cycles in the United States or elsewhere to drive energy policy and politics. Inevitably, some politicians will make unrealistic and unattainable calls for energy independence. That is simply not possible in an interconnected world that requires access to global markets, capital and technology, whether a nation is a net importer or exporter of energy.

In the short-term, diplomacy and effective reserve management will be critical tools that are not fully developed. Expansion of the IEA's reserve management system to China and India, and technical support to help them coordinate with others, will be an important confidence building measure for states that, at present, see themselves pitted against the rest of the international community. Energy diplomacy also needs to be made a central foreign policy consideration. Key questions include:

- Where can nations jointly benefit from further exploration and development?
- What transit systems merit international cooperation and investment?
- Are there regional security arrangements that can mitigate risk and create shared incentives across states, especially in the Middle East, the Gulf and Central Asia?
- Can the P5 reach an understanding to suspend the use of their veto rights on issues related to energy politics in order to stimulate a full debate around tough questions that get sidetracked through veto threats?
- Should nations commit to an E15 format, composed of the largest economies and energy users, as a means to force a focus and sustained agenda on the policies and politics behind energy supply and use?
- How do domestic energy and economic growth concerns drive the foreign policy choices of China and India and their roles in multilateral institutions?

Focused answers around these questions could be the foundation for national, regional and international energy strategies that foster cooperation around energy issues, rather than allow short-term political considerations shape what generally may appear to be zero-sum competitive outcomes.

In the medium and long-term, both geopolitical interests and environmental sustainability call for a radical departure from current patterns in the use of fossil fuels which, for most states, compromise national security, and for all nations threaten the planet. A shared medium-term strategy among states to foster convergence around political, environmental, energy and economic goals should include:

- Measures to price carbon emissions and to coordinate prices across states, if not create transnational carbon markets.
- Financing and policy measures (e.g. addressing liabilities associated with carbon capture and sequestration) to support the development, testing, demonstration, commercialization, and dissemination of clean and efficient technologies that can transform the terms of debate on energy use and climate change.
- Means to stimulate investment in clean technologies: to reduce private sector and temporal risk for the developed countries, to finance the differential between clean and traditional technologies for emerging economies, and to develop infrastructure and adapt to climatic changes in developing countries.
- Common international standards for firms to disclose the use of carbon and establish guidelines for emissions per unit value of output in order to promote public accountability and guide investment decisions.
- A new form of international framework for climate change that reflects the complexity of the interaction of technology, economics and politics and leads to better and tighter standards for performance over time.

On the nuclear side, no issue is more important than creating a strong firewall now between civilian power and weaponization programs, before more countries seek to break out from civilian programs. Hard as this may be, it will be easier than getting new entrants into the ranks of nuclear weapons states to disarm. For this process to start, the United States must start with the ratification of the Comprehensive Test Ban Treaty, with India and Pakistan acting in concert with the United States.

These are major challenges. They are not unattainable. If such actions are taken now, we stand a chance to get the geopolitics of energy to move the international community toward constructive long-term outcomes. If not, we will allow the geopolitics of energy to make all nations less secure, and bring into question the very viability of our future.