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The Geopolitics of Energy Security and the Response to its Challenges by India and Germany

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Eurasian Geopolitics as explained in the Heartland model has been reincarnated as Energy Geopolitics. Germany and India are the two strategic economies of the Inner Crescent of Mackinder's 'Heartland' Model and are largely similar in geopolitical focus to the rest of Eurasia. The article argues that in the coming decades at least, Russia will play an important role in these countries' energy vision. A similar unique convergence of goals regarding energy technology requirements will also be seen in the coming decades. India cannot abandon the developmental needs of its one billion plus people to the energy monopolies. Neither does Germany as a significant global economy wish to hang its globalisation efforts on similar energy uncertainties. Both countries therefore seek to spread their energy security through technology-centred geopolitical pluralism. Central Asian energy resources thus seem to be a geopolitical temptation that both nations find hard to ignore. Geopolitical contingencies, it is argued, might bring them together to explore a mixed set of options under some kaleidoscopic combination of an altogether new energy vision.

This century is witness to one of the stages of Kuhn's paradigm of technological jumps in terms of energy, its resource base, and consumption patterns. This jump is already demonstrable in terms of hydrogen-based fuel cell cars and with nanotechnology entering daily life via such inventions as the ipod. Third generation communication technology, 3-G, is virtually transforming our sense of location with quantities of geographic information

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at palm's reach via GPS devices, and miniature technologies have significantly altered the demand structure of energy. Interestingly, however, the jump we are seeing has led to the rapid emergence of technology-driven gaps between societies as opposed to absolute transformation. If energy and its technology are rungs on the economic development ladder, energy is also the source of vital control over the development of other nations. Even the conventional crude oil on production possibility curve represents a choice between the use of oil for electricity or holding it as a fuel reserve for armoured vehicles and war machines: important in defence supplies in the Second World War. The quest for energy security is thus a question of scale in times of peace and war, and technology can only condition the projections along that scale. The more conventional the source, the more rigid its requirement structure.

If one accepts this point a priori we can hypothesise that as long as conventional energy resources are commercially available the geopolitics of energy will play a vital role in determining where nations sit on that 'energy ladder', as they strive toward their respective development goals. This theory helps us to understand why Central Asian energy resources are an important factor in the energy security matrix of some of the major economies of the world: especially those trying to grasp such resources with the help of their geopolitical status as they play out Energy's New Great Game.

Some scholars see Eurasian Energy Geopolitics as constituting the New Great Game of the present century. Mathew Edwards aptly describes Eurasian oil geopolitics as 'shorthand for competition in influence, power, hegemony and profits, often referring to the oil and gas industries and reserves in Central Asia and the Caucasus'.[1] Deep in Mackinder's Heartland, these resources have generated several geopolitical action rationales rather than solely economic ones. One of the chief effects has been to prevent Russia, the current Mackinderian heir to the Soviet Heartland legacy, from enjoying the advantages of energy geopolitics. Manning points out the maddening effect of these resources on policy orientations in the West, where nations vie for them as a prime source of future energy security and where fears are carefully cultivated and manipulated by Russia's Heartland geopolitics.[2] A potential outcome of the policy pressure from the West could be the destabilising of the Balkans and the eruption of hitherto frozen conflicts. The game would thus remain unending, reminding us of the axiom of Hurree Chunder Mookerjee, the character in Rudyard Kipling's famous novel, *Kim* (1901), that 'When every one is dead the Great Game is finished. Not before'.[3]

Mackinder's model is a remarkable idea that has withstood the technological and political shifts of time. Its post–Cold War recurrence provides ample testimony of its persistence as one of the variants of classical realism. As Grey stresses, Mackinder's theory tries to explain why war has been one of the areas of indulgence in the realm of international relations.[4] Another popular criticism of the Heartland model has been that the theory rests

essentially on imperialist perceptions,[5] and that the case represented by current world politics might not be one of classical imperialism. Yet, even after the Cold War, the rivalries remain. The classical geopolitical idea of Russian might as a threat to British imperial order has successively transformed into the present world view of US policymakers. These latter believe that the threat still arises from Mackinder's Inner Crescent 'at the Heartland's behest' justifying the 'pre-emptive' necessity to search for weapons of mass destruction in Iraq or legitimise extension of this threat to Iran.[6] The quest to command influence over this wavering Inner Crescent has been most conspicuous in the New Great Game of energy geopolitics.

The pulverisation of Yugoslavia was a significant move by maritime powers to curtail Russian influence across Eastern Europe and further down, to the Mediterranean. Since then, Afghanistan, the Caucasus, and the Iraq (and subsequently Iran) conflict have all been successive stages indicating the rebirth of the Heartland phoenix.

When we examine the Eurasian energy demand spread in terms of resource availability and total primary energy consumption of the top six economies the spatial association revealed by Figure 1 appears all the more interesting. Total primary consumption is a key indicator of economic prowess, and the US without doubt leads Russia by more than double the latter's consumption. In 2004, the US consumed 100.1 quadrillion

Europe-Asia on orthographic projection (not to scale).

FIGURE 1 China, Japan, India and Germany are the largest total primary energy consumers apart from the US and Russia (2004).

Btu of world primary energy whereas Russia consumed only 30.3 quadrillion Btu. The rest of the world's primary energy is thinly spread. However, China and India have been steadily increasing their share of primary energy consumption over the last decade. Their economic growth rates are already an indication of their demographically based growth in energy demand.

These leading economies all lie on the periphery of Mackinder's Heartland. They are among the leading destinations for global financial flows and are strategically well-linked to both the global powers: the US and Russia. According to the Heartland model, both Russia and the US will try to create a global energy order, as far as energy geopolitics is concerned.

HEARTLAND AND ENERGY GEOPOLITICS

Geopolitical imaginations have a permanent seat in what is popularly known as Mackinder's 'Heartland'. The area he defined as the geographical region of Eurasia contains the continental and arctic drainage of six rivers: the Ob, Yenesei, and Lena, flowing northwards, and the Volga, Oxus and Jaxartes which form part of a continental drainage system.[7] Despite the many criticisms of this model, Mackinder's basic assumption remains true: in a geopolitical world, the balance of power is 'likely to rotate round the pivot state, which is always likely to be great, but with limited mobility as compared with surrounding marginal and insular powers.'[8] The Heartland with its Euro-Asia continental and arctic drainage includes the Caspian Sea and Central Asian energy resources. Most importantly though it has an entire transport network of pipelines and rail transport crucial for delivering them along its periphery. The four peripheral areas identified by Mackinder may be classified as 'geomes' or cultural hearths. The four geomes are Europe, China-centric East Asia, Indo-centric South Asia and the Islamic world. The main attribute of these geomes is that they represent cases of regional balance of power with a hierarchical relationship to the global balance of power. Both Germany and India are the central powers in their respective geomes. This is corroborated by the *MittelEuropa* conception and German and Austro-Hungarian dominance over the rest of Europe. Perhaps, the conclusion of the Cold War and German unification rekindled this idea within the German intelligentsia.

On the other hand, India, which was interested in this central role throughout the last century, was kept at bay by Chinese and American policy intervention at the behest of Pakistan. But, the tragic 9/11 events changed all that. And, just as the British identified their interest with India during their imperialist heyday, now it is the Americans who believe that Indo-centric South Asia might offer them a better chance of striking the

desired global balance of power with the Heartland state of Russia. Thus, Germany and India are the geo-strategic bridges to a global balance of power and the key to regional order as a result of their central location within their geomes. In short, their separate geopolitical discourses connect equally well to the two rival players in the eternal Great Game: Russia and the US. China has secured this balance but it represents a different case, beyond the purview of the present paper.

Of course, one might argue that present-day energy geopolitics is barely discernible within such macro structures and that bilateralism is commonplace between supplier and buyer in the shape of long-term pledges for joint investment, leasing of resource fields, and the cost-benefit analysis between new-found ventures and the traditional Middle East–led OPEC structure of oil-gas trade. Many of these relationships only indicate the geopolitical pluralism at the periphery of the Heartland. The greater the geopolitical interaction between nations, the more flexible their choices become. It is noteworthy too that Nigeria, not Iran, has been the leading crude oil supplier to India in recent years. Oil geopolitics affects the energy-security arena in two ways: first, the unique import dependency of this natural resource makes its price vulnerable to the international political climate; second, there is high energy-security vulnerability due to the use of pipelines to transport oil. These two factors combined serve to boost the status of Central Asian energy resources vis-a-vis Europe and South Asia, their largest customers.

The energy security framework evolving around Central Asian energy resources is not only emerging as a co-variant of Eurasian geopolitics, but its accentuation has the potential to steer the energy debate into an altogether new direction. The Soviet legacy looms large over these resources, and Russia is also mastering the art of oil geopolitics, using this energy resource as a means asserting its power. For the most part it behaves like a continental power, as the custodian of the Heartland. The German press termed the Russia-Ukraine gas pricing dispute, "The 21st Century's First Declaration of War."[9]

On the periphery of this Heartland, several new developments are emerging. India and China are no longer inward or outward looking Inner Crescent countries, but have almost brought down their own barriers by exacerbating the volatility of global politics. Europe is also finding it hard to challenge these winds of change which are forcing a palpable transition in its economy. But, amidst all these readjustments, one common factor is the increased concern regarding energy security. As developing nations improve their ability to pay more for crude oil, the long-term prospects for developed nations have also been in upheaval. This article examines India and Germany – two strategic consumers located near the periphery of the energy-rich Heartland – and their cost-opportunity structure in the global energy game.

Situating India & Germany in Oil Geopolitics

India and Germany share a geopolitical commonality in having traditionally been seen as sitting on Mackinder's Inner Crescent and enjoying the options of both an inward-outward orientation. Despite this similarity, they differ in that India's partition and the emergence of Pakistan has made India less portable towards Mackinder's Heartland, whereas post-unification Germany has gained considerable inward manoeuvrability towards Eastern Europe and Eurasia, as Sir Halford Mackinder also predicted.

Germany has always envied the locational advantages of Britain and Russia and resented what it has often perceived as a mismatch between its great capabilities and its paucity of palpable resources. However, its encirclement by several European nations gives it the benefit of being centripetal force in terms of the European order. On the other hand, this also shackles it from expanding its access to global resources and trade in a manner that would do justice to its ideal location and prevents it from fulfilling its historical aspirations. This has constituted a foundation of German geopolitics and reveals a fine balance between the continental order which has Russia at one end and the maritime order of the US at the other.

Germany's contemporary role and aspirations towards the world order have been less acknowledged. It has had a long-standing presence in South Asia but has hardly been able to influence the region's polity to any significant degree. Also important to consider is Germany's aid and assistance to Inner Crescent Third World countries as part of its diplomatic agenda, and how this compares to major donor countries like Japan and whether that contribution has been masked by the overall EU input to the Third World.

Germany appears to have traded off a separate global diplomatic status for a more limited role in its immediate community, the EU. The collective interests of the EU might not always serve strategic collectivism and the apparent global energy crisis has exposed certain chinks in the European armour as Germany has tried to separate itself from the rest of the EU as contrasted with Russia's strategic thrust toward differential treatment of its European consumers. Germany has sought rapprochement with Russia, aimed at a long-term partnership that would ensure a perennial supply of natural gas, and the North European Gas Pipeline is one example of the European split. This pipeline has angered Poland, Ukraine and other east European countries, which feel they have been cut out by the two countries. Also, the wider EU community sees Germany as straying in search of self-interest as the EU fights Russia's monopoly over natural gas supplies.

The global nature of the energy dilemma has led to the evolution of newer strategies in the countries concerned, gigantic India, with its growing demand for energy, being one of them. In the past, India relied mostly on Middle East oil and to a lesser extent on past agreements with the former USSR. But, with the growing commercial importance of natural gas, India is

interested in diversifying both its sources and usage of this resource. India's demand basket is unique compared to many other countries around the world: its rural household energy supply comes from non-commercial, combustible, renewable waste, such as cow-dung cake and firewood shrubs. This factor, which already satisfies ecological conditionality, is far removed from any developmental objectives. India has also ventured into newer oil and gas regions in order to ensure an adequate energy supply for higher growth rates, and the purchase of oil equities and the joint exploration and development of oil fields are some of the steps it has taken so far. Nevertheless, India has yet to try to elbow its way into the Central Asian gas arena.

Russia holds the key to Central Asian gas resources. These resources were locked behind the Iron Curtain during the Soviet era but they are now being used as geopolitical bait for reviving Mackinder's Heartland paradigm. The fact that they remain collectively controlled by Russia and the five newly independent states exposes Russia's capacity to influence their commercialisation. However, this is beyond the realm of this paper. Nevertheless, we can fairly assume that both Germany and India consider Russia a geopolitical fulcrum in terms of accessing these resources. In the latter half of the twentieth century these two countries engaged Russia to facilitate their regional balance of power. India has continuously sought Soviet, and later Russian support, against US-backed Pakistan in South Asia and effectively countered the West-led technology embargo of the 1980s with the help of Soviet cooperation in science and technology. India's defence industry and present defence architecture is essentially Soviet built.

Germany was split in the post–world war period before the collapse of the Berlin Wall. This represented an abrogation of the historic Austro-German centrality in Europe, which had been one of the strategic keys to the European balance of power. It is important to realise that both Germany and India hold strategic stakes in the Eurasian landmass in the sense that geopolitical contiguity on the continent is a factor in a unipolar world, at least as long as the obsession of US foreign policy with Inner Asia as a means of strategically controlling Russia continues. These geopolitical dispositions provide the grounds for a comparison between these two countries. Oil and gas are vital for countries not only because most nations need to import them but also because their consumption structure is determined by technological sophistication. Therefore, the need for countries to lessen their external dependence is ultimately a matter of their technological advances.

The Heartland model of the energy security debate has all the characteristics of Mackinder's arrangement of the Eurasian order. The way this order has affected energy geopolitics can only be paralleled by the 'maritime power's response to a continental coalition involved in a form of containment policy.'[10] The US has been applying this thesis since the days of the Carter administration with its policy of containment. As Dodds points

out, Mackinder still offers one of the most 'simple and accessible guide(s) to the complexities of world politics'.[11]

ENERGY SECURITY AND ECONOMIC DEVELOPMENT

Because energy security concerns are invariably portrayed as a stage of economic development, this section's heading sounds like tautology. In fact, energy's vital role in development is never mentioned outside the context of conservation, preservation and efficient energy. Energy has fuelled human civilisation and been venerated in all forms: from mythological gods in ancient times, to the present-day adulation of energy science and nuclear power. The Earth receives 130,000 Gtoe (Gigaton of oil equivalent) of solar energy, which far exceeds current total world energy consumption of 9 Gtoe.[12] This may sound like gargantuan potential to be endlessly harnessed – but is it? The feasibility of energy transformation and storage are a priori conditions for energy research. Distinct, but not altogether unrelated is the short-term energy perspective that helps us manage the present technological exploitation of both conventional energy sources, such as, coal, oil, gas and nuclear (non-traditional), and non-conventional ones: solar, wind, geo-thermal and other non-conventional forms.

Energy resources are a crucial factor in explaining the strengths and weaknesses of a nation's security architecture and might be called the most subjective resource. Energy potential measured as joules per second is inert unless contextualised in either the form of a destructive nuclear bomb or as a productive, peaceful power reactor. Perception is therefore an important factor in measuring technology-dependent energy security where technological choices and end-objectives are naturally defined by humans and the state of society. Differences become conspicuous if we compare the energy needs of an affluent, developed state to those of a poor developing state. There are also variances in the use of energy forms: from simple heat, to ionised, charged particles in the form of micro waves. We must also recognise that as long as poverty and inequality remain even in residual form, the most ancient relationship between man and energy, namely, firewood and heat, will continue to coexist with all modern energy transformations even in the next century. The inability to purchase commercial forms of energy is a big limitation to energy development and exploitation, and we must bear in mind that even today, nearly one fifth of the world's population subsists below the $1-a-day poverty line. The marked increase in poverty in sub-Saharan Africa and the growing poverty in eastern Europe and the CIS provide sufficient warning signals of the challenges to demand-side corrections to energy transformation.[13]

Although this aspect of the paradigmatic construct seems at odds with conventional energy geopolitics wisdom another dimension to the model

exists in which energy geopolitics is restructured by the global integration of economies and the spatial division of labour of national communities along the production possibility curve. Trade and investment linkages across the developed and developing world have led to major adjustments in the global production scenario. Heavy industry and manufacturing has gradually shifted from the developed world to developing countries such as China, Indonesia, India and states. The relevance of the Kyoto Protocol will continue to grow since ample carbon credits and cheap labour advantages rest with the developing countries. This is further bolstered by changes in production as a result of the spatial division of economies due to globalisation. Japan is a prime example of energy efficiency despite a paucity of energy resources. According to Tanabe, as Japan's economic structure was transformed, 'the Japanese economy's energy dependency fell dramatically and a highly energy efficient economy was built',[14] with a 30-percent improvement in Japan's energy efficiency being achieved in 1971–1990. Technology came to the rescue for Japan, but it also established a geopolitical culture which effectively decides the price of transition. The present energy security debate is all about the art of achieving a strategic balance between conventional oil and gas resources and the altogether new technological base offered by nuclear as well as other non-traditional energy sources.

Society and levels of development are highly differentiated between India and Germany. India's energy requirements are rising sharply whereas Germany is interested in maintaining its current levels of energy consumption. Given that present day commercial energy resources are bound to become depleted or more expensive, one can compare the extent of the difference between the two energy security environments. The hypothesis suggested here is that given the present geopolitical environment, both India and Germany have the choice of either making a vigorous effort to join Russia, and push aside other potential Russian partners in the quest to appropriate Central Asian energy resources, or to leave the issue to be addressed by Kuhn's paradigm of technological change, as one of the responses to that change. This would mean creating a counterforce technologically brave enough to address the quest for energy security against a backdrop of Caspian Sea oil geopolitics. The conclusion of this paper will attempt to verify the possible future directions that the countries will take.

Brief View of the Two Economies

The Indian economy of the 1990s was not considered as dynamic as the Southeast Asian economy or the Chinese economy. In recent decades, however, recognition for the Indian economy's impressive growth rates has become increasingly widespread as the advancing elephant's tread has begun to be heard. In recent years, India has managed to maintain a steady

growth rate of over 6 percent. This has attracted considerable attention worldwide. In fact, the European economies see themselves in a symbiotic relationship with India as a means of augmenting their own growth which has been very sluggish in these last decades. The OECD growth rate in the first quarter of 2006 was 0.9 percent, and was the highest recorded first quarter growth in the previous seven years.[15] India's GDP in 2004 was 793.0 billion US dollars, whereas Germany's GDP was 2.9 trillion US dollars (the size of the German economy is more than three and a half times that of India). However, the two countries have considerable parity in terms of global share of purchasing power. The global share of Germany's GDP in terms of purchasing power parity (PPP) declined from 5.2 percent in 1989 to 4.2 percent in 2005.[16] But, in the same period, India's GDP share rose from 4.1 percent to 5.9 percent. The PPP measure can help us to assess each country's energy demands with PPP energy efficiency as important as industrial energy efficiency. Table 1 compares the two countries from various socio-economic standpoints.

The two economies have other qualitative differences. Agriculture still is and will remain a vital sector contributing to India's national economy. It represented about one fifth of GDP in 2004 whereas services contributed more than half of GDP. Germany has only some 1 percent of GDP from agriculture compared with nearly 70 percent of GDP from services. Although the present growth rate predicts that the Indian economy may outstrip the German economy by 2015–2020, agriculture's share will continue to be almost one tenth of GDP. Agriculture is a significantly underdeveloped sector in India, and in the coming years will receive special focus. This will obviously create a market for the expansion of the service sector in areas like health, insurance, education, entertainment, telecommunications, retail marketing and others, which are now hotly contested by Western as

TABLE 1 Selected Comparative Indicators, 2004

Indicators	Germany	India
Population (mln)	82.5	1,100
Population growth rate (% annual)	0.0	1.4
IMR (per 1,000 births)	4.2	61.6
Ratio of girls to boys in primary and secondary education	98.7	88.1
Geographical area (km^2)	357,000	3.3 mln
Agricultural land (%, land area, 2003)	48.9	60.8
Energy imports (%, use, 2003)	60.6	19.0
Electricity consumption (kwh) per capita, 2003	6,686.2	399.6
GNI (current US$)	2.9 trillion	793.0 billion
Agriculture, value added (%, GDP)	1.1	19.6
Exports of goods and services (%, GDP)	38.0	19.0
Gross capital formation (%, GDP)	17.3	30.1

Source: World Development Indicators database (April 2006), available at <http://devdata.worldbank.org/>, accessed 13 Nov. 2006.

well Indian companies. However, what greatly differentiates a developed economy like Germany is the massive amount of government expenditure on the social sector. Germany spends as much as 60 percent of its budget on social sector services.[17] In this regard India is sorely lagging behind, with planned expenditure not even passing the 20 percent mark, and actual expenditure below this again. Germany spends roughly 6–7 percent of its budget on interest payments but the Indian government spends nearly 30 percent of its budget on this.[18] The German economy is highly export oriented. In 2004, exports comprised nearly 38 percent of GDP and imports 33 percent. Indian exports and imports, however, comprised no more than 20 percent of GDP in 2004. These basic facts reveal certain conditions for growth and size of the two countries and their populations. This also implies that a country's economic situation influences its long-term energy requirements for economic expansion and maturity. If we examine energy consumption patterns for the two countries in question, we find that Germany's consumption needs have almost peaked out and that India's consumption levels are slowly catching up to the same level. Among several energy inputs, Germany consumed 3,082 thousand barrels of oil a day (tbd) in 1980 which had only declined to 2,682 tbd by 1990. Conversely, India consumed a mere 643 tbd in 1980 which slowly increased to 1,168 tbd in 1990.[19] In 2004, India consumed 2,450 tbd whereas Germany stood at 2650 tbd. This clearly shows a steadily closing gap in oil consumption between the developed and the developing economy. We can further qualify this by the fact that oil prices remained relatively stable over most of this period, save this century. But, even this has failed to deter the rise in oil demand by the Indian economy. At the same time, during the present century, Germany has shown a consistent decline in its oil consumption. Table 2 compares the two countries' dependence on energy imports and the structure of their supply side energy mix.

This brings us to a key postulation: that developing countries are out-competing developed countries for energy resources, even at higher prices,

TABLE 2 Energy Balance, Selected Indicators, 2004

Indicators	Germany	India
Energy Production (Quads)	5.3585	10.6464
Energy Consumption (Quads)	14.6935	14.4357
Crude Oil Imports (tbd)	2,239.76	1,788.68
Oil Consumption (mtoe, @ 7.3 barrels per metric tonne)	132.5	97.77
N Gas Imports (dry, bcf)	3182.2	0.0
Coal Consumption (mtoe)	279.95	448.62
Electricity Consumption (bln kwh)	524.609	558.53
Electricity Generation, nuclear (bln kwh)	158.97	16.37

Source: US Energy Information Administration, available at <http://www.eia.doe.gov/emeu/world/country>, accessed 17 Oct. 2006.

with much of this strength being displayed by India and China. Which leads us to the further postulation: that developed countries have been seriously searching for different energy options during this whole period. Such diversification has tended towards non-conventional and non-traditional energy resources like nuclear energy, and solar, wind, geothermal and other means of energy production.

This brings us to the important question of the key underpinnings of the energy security perceptions and policies of our two case countries.

INDIAN ENERGY SCENARIO

In a recent Independence Day speech, former president of India, Dr. A. P. J. Abdul Kalam addressed the question of India's energy security explaining the key factors in India's energy security and the challenges that lay ahead. He outlined two principles of energy security: efficiency, and the adoption of a more synergistic approach to consumption; and tapping all sources of energy at the local, regional and global levels, including 'coal, oil and gas supplies, till the end of the fossil fuel era, which is fast approaching.'[20] The 'energy independence', or 'total freedom from oil, gas or coal imports', referred to in his speech represents an important strategic goal for India, which the country should aim for in the next twenty-five years – by 2030. For now, however, the focus seems more on imports, not only of oil, but also of natural gas, and although the present scenario may seem quite paradoxical to the president's proposal, it offers the required time-out for the shift from 'energy security' to the ultimate goal of 'energy independence'.

India's energy intensity represents some of the world's most inefficient utilisation of energy sources. According to The World Energy Report, in 1997, the intensity stood at 1.04 tons of oil equivalent (toe) per $1,000 (at 1990 prices) of GDP: more than double the world average.[21] A major reason for this is that a large part of rural energy needs are met by non-commercial renewables and biomass, which account for more than 40 percent of the total primary energy supply and represent both a boon and a curse. As this form of energy is relatively unrelated to the energy security metaphor, it reduces the overall security factor by 40 percent. However, it also represents a major obstacle to energy independence. The demand for rural industrialisation will certainly call for a concomitant rise in commercial energy supplies, leading to a big gap indeed.

The world average per capita electricity consumption is 2,500 kilowatt hours (kwh) per annum and that of the OECD is 8,000 kwh. If India aims to provide at least 5,000 kwh per capita annually by the middle of this century it will require 1250–1350 gigawatts (GW) of electricity compared with its current generation capacity of 111 GW.[22] This tenfold increase will be one of the crucial tests for fossil fuels. These challenges need to be met and 'one

has to tap all options including using the known fossil reserves efficiently, looking for increasing fossil resource base, competitive import of energy (including building gas pipelines whenever permitted based on geopolitical considerations found feasible from techno-commercial considerations), harnessing full hydro-potential for generation of electricity and increasing use of non-fossil resources including nuclear and non-conventional.'[23] At present, nearly 70 percent of electricity comes from thermal sources; about 26 percent from hydroelectricity and nearly 2.5 percent from nuclear sources. The potential for expansion in hydroelectricity is very limited and the rapid depletion of fossil fuels accompanied by world price fluctuations presages an ever growing utilisation of nuclear power. However, given the above picture it is very unlikely that the world demand for oil and gas will lessen. In fact, the absolute consumption of these fuels has seen steady growth in both developed and emerging economies. According to International Energy Outlook 2005, India will demand increasing energy supplies at no less than 5 percent increment each year.[24] India accounts for 9 percent of the world total incremental demand for primary commercial energy. Given the country's limited oil and gas resources, its consumption of coal is expected to grow increasing India's share in world coal consumption to 10 percent by 2020. The burgeoning importance of natural gas and oil in industrial forms of energy usage will make India more and more vulnerable to international oil price fluctuations. High prices exacerbate stress on foreign exchange reserves for oil imports. India's import bill for crude oil and petroleum products has increased from Rs. 34 thousand crores in 1996–1997 to more than Rs. 78 thousand crores in 2000–2001. The impact of the increased import quantities of oil in recent years is clear. In 2000–2001, net imports were 74.1 million tonnes, rising to 90.4 million tonnes in 2003–2004.[25] In addition, a sustained demand of 6–7 percent is expected to continue for the time being. The main demand for oil is from the transportation sector. India's consumption of petroleum products has almost doubled in the last decade and total consumption of light, middle and heavy end distillates, along with private sector imports, was 55 million tonnes in 1990–1991 rising to 100 million tonnes in 2000–2001. This warrants a careful look at the available options and for a synergy between them to minimise the transition lag bound to occur with the depletion of fossil fuels.

Challenges & Responses

India's energy security demands a multi-pronged approach to sustain the transitory path in the coming decades. This approach should examine India's supply and production issues and final forms of consumption. Global energy geopolitics calls for a policy initiative to devise a strategy for securing long-term needs. One of the key steps taken by the Indian government in recent years has been to ensure the country's stake in the global

energy market by acquiring overseas oil equity; at times, the oil equity forms part of an agreement. The multi-pronged approach and oil equity both seek to reduce the impact of the global escalation in oil prices. ONGC Videsh Limited (OVL) is a subsidiary of ONGC with a mandate to: undertake an overseas project for the exploration and production of petroleum and other petroleum products that will enhance the oil security of the country, and to buy equity oil from its overseas ventures. OVL has acquired some new or already producing properties in Vietnam (gas), Russia (oil and gas) and Sudan (oil). The oil from Sudan has started reaching India. India is also a party to interests in Iran, Myanmar, Iraq, Libya and Syria.[26] This quickening pace of diversification will help India to disperse is security load across numerous newer sources outside the Middle East. However, although fears that efforts to draw Central Asia Energy Resources (CAER) towards South Asia may lose momentum in the melee, the sustained interest of Iran and Pakistan might help to maintain the mutual benefits. There is also vying for overseas coal fields. This multi-form of acquisition of overseas energy reserves is bound to strengthen security. Russia figures highly in India's energy security calculus: the initial supplies from Sakhalin-I (S-I) reached India by tanker containing 70,000 barrels of crude oil. They were received at Mangalore refinery by India on 3 December 2006. India has a 20 percent share in the consortium with production rising to 250,000 bpd by the end of 2006.[27] The petroleum minister, Mr. Deora, speaking on the occasion of the oil arrival from S-I, noted that this marks a new silk route for India with a vista of opportunity perhaps leading to gas imports from Russia. Sakhalin-III (S-III) is also of vital interest to India. OVL is working with Rosneft in a joint venture to develop the Yuganskneftgaz fields.[28] The two have also made a joint bid for S-III development. India and Russia have expanded their strategic partnership from military cooperation to joint investment in Russia's vast mineral resources. Russia is also keen to join the Iran-Pak-India gas pipeline project as a natural stakeholder in Central Asian energy resources.

India's second major long-term strategy has been to increase electricity generation as rapidly as possible by increasing its nuclear capacity, for which the Nuclear Power Corporation of India (NPCIL) has been made responsible. India currently has fourteen (two boiling water, twelve pressurised heavy water (PHW)) reactors with a total generation capacity of 2,770 MW. Besides these, the NPCIL has also undertaken the construction of eight (six PHW and two light water) reactors enlarging its total generation capacity to 3,960 MW.[29] According to Anil Kakodkar, the metallic fuels have a short doubling time and can ensure rapid enough growth in installed capacity. As a part of its synergy action plan, the Bhabha Atomic Research Centre (BARC) is working on a Compact High Temperature Reactor which would be a source of hydrogen and an important source of energy carrier in future.[30] India has the potential to produce 250,000 MW of electricity by

2050, provided that adequate resource are invested. India's fast breeder reactor programme is of vital importance in this regard, while the abundant metal thorium can provide an alternative nuclear fuel for future nuclear power plants.

The third arm of India's strategic thrust involves the final forms of consumption, especially in the rural sector. India's primary non-commercial energy consumption (42 percent) is as good as its commercial energy consumption (58 percent). The former consists mainly of rural household and non-industrial demand. Thus, in rural areas, more than 90 percent of the energy demand is met by combustible renewable wastes (CRW). This energy divide between rural and urban India is a strong challenge to India's energy security. A significant shift from CRW in the rural regions could possibly be met by increased liquefied natural gas (LNG) use as a source of domestic cooking and heating. CRW accounts for 54 percent of total final energy consumption, which far exceeds China's 25 percent. Even Thailand (22 percent) with its almost 80 percent rural population uses proportionately less CRW.[31] Nearly, two thirds of CRW consists of bovine dung cake and crop residues and although there is increased use of kerosene and LPG in rural areas the percentage use of CRW has not declined. However, since the average growth in CRW demand is expected to remain below 1 percent, by 2020, the overall percentage of CRW use is expected to remain at 25 percent. That being said, a shift in industrial demand towards rural demand is still needed. Rural electrification and increased commercialisation of agriculture will require greater energy inputs. This must be dealt with by the immediate expansion of India's thermal power generation capacity and by co-factoring the rural demand gap with nuclear expansion potential.

GERMANY'S ENERGY SCENARIO

The size of the German economy makes it one of the world's largest energy consumers. In 2004, Germany consumed 14.7 quadrillion British thermal unit (BTU), the fifth largest share of global energy consumption.[32] Though Germany has an offshore share in the North Sea zone petroleum reserves it is chiefly an energy importer. It used to import 44 percent of its energy needs in 1991, which increased to 63 percent in 2003.[33] This high share of dependence on imports has forced Germany to become a research and development hub of renewable energy resources. It is no surprise that it is the biggest producer of wind-generated electricity in the world. Germany's oil imports mainly come from Russia, Norway and the UK. This is mostly through pipeline networks. The 440-mile MVL pipeline connects the Druzhba crude oil pipeline to the East German cities of Rostock, Schwett and Spergau.[34] The TAL, SPSE and CEL (now natural gas) are other pipeline networks connecting Germany with France and Italy. Germany has

focussed more on natural gas in the last decade. It has the third largest natural gas reserves in the European Union (EU) after the Netherlands and UK, pegged at 9.9 trillion cubic feet (tcf). Nearly two thirds of its gas consumption is met with imports. Russia supplied up to 46 percent of Germany's gas demand in 2004, followed by Norway (33 percent) and the Netherlands (23 percent). STEGAL, MEGAL and TENP are among the vital gas conduits for German needs.[35] Germany had an installed capacity of 118.9 GW of electricity before 2004, and in 2004, produced 566.9 billion kilowatt hours (bkwh) and consumed 524.6 bkwh of electricity.[36] The thermal production of electricity had a share of 61 percent, but the second largest share was nuclear production (28 percent). Brown coal, which has poor burning quality, contributed to 42 percent of electricity production in 2004. For environmental concerns, Germany wishes increasingly to reduce the share of its electricity produced by coal-fired generation. But, there is also a strong case for using imported hard coal in power generation. As an incentive, new plants are guaranteed CO_2 emission rights for the first 14 years. There is also pressure to phase out Germany's nuclear power plants. These factors have brought natural gas as an important source of energy into greater focus. Already 15 percent of Europe's electricity is generated by natural gas, which may rise to 40 percent in the next three decades. However, the price factor for natural gas may be an important determinant in slowing the targeted nuclear phase-out by 2025. At present, nearly one third of Germany's electricity is produced by nuclear power plants. Industrial production in Germany is one of the most efficient in the OECD region. Moreover, heavy industrial production is increasingly shifting to other parts of the world and therefore relies more and more on their imports. This has led to increased energy efficiency or a reduction in the energy-intensity mix in industrial production. Germany saw a steady decline in energy intensity in the early 1990s, mainly due to the closure of heavy industry in East Germany.

Challenges and Responses

The Merkel government has called for a new EU energy security strategy and outlined three objectives: security of supply, efficiency and environmental compatibility. It aims at making wider and more intensive use of renewable energies and conserving energy by more efficient industrial use. Germany feels there is need to create a global energy architecture for fossil fuels comprising energy producers, consumers, transit countries and the private sector in order to reduce the potential dangers of energy blackmail or chaos. The objective is to reduce potential conflict in the energy sphere and stabilise the energy market and to ensure fair competition and an efficient price mechanism in the long term. Germany also shares IEA concerns on energy geopolitics as there is 'increasing dependence for oil supplies on a decreasing number of producer countries, ever greater risk of disruptions to

supply due to the growing international trade with oil and gas and danger of political instability in producer and transit countries.'[37] According to Heinrich Kreft, a senior German foreign policy advisor, energy geopolitics can potentially polarise the world again in Cold War fashion. He visualises two kinds of energy camps. One camp clubs together the EU, Japan and the US. These countries are distinguished by their approach to energy security based on global economic efficiency through a market economy, and essentially means the aforementioned energy architecture. The other camp consists of China, Russia, some Middle East states (indirectly referring to Iran) and India to some extent. These countries have an energy agenda based on the pursuit of national interests. One reason for this polarisation cited by Dr. Kreft is the current level of 'mistrust in US dominance' with its actions and initiatives in the Middle East. Dr. Kreft also refers to the cornerstones of energy security policy. These must be carried in mind while formulating policy for Germany. The nationalisation of the Russian energy industry has had an impact on the CIS region that will make Russia the key supplier in the longer run. China's aggressive energy policy and, to a lesser degree, that of India, through the development of privileged relations in the energy sphere with certain energy exporters, has the potential to squeeze out Germany and other European powers from global energy relations. Alternatively, Germany also confronts the question of dealing with Russian energy in the longer run as the Ukraine fiasco has shown that collective bargain might be safer but there are individual preferences and offerings by Russia which Germany finds hard to ignore; this is also evinced through the Schroeder legacy in Russo-German relations.

The collateral approach is also one of Germany's strong options as the US has called for reducing dependence on Gulf oil. The White House communiqué of 23 February 2005 on 'US-German Joint Actions on Cleaner and More Efficient Energy, Development and Climate Change' brings out salient features of Germany's diverse international cooperation within the OECD framework.[38] One important German agenda is closer cooperation with developing countries aimed at addressing the issue of poverty reduction and access to cleaner, affordable energy sources, including technology for renewables. Another important goal is to expand the market for energy efficient products, including high-efficiency power transmission systems, fuel efficient vehicles, and energy efficient household and commercial products. There is a US-German joint commitment to Methane to Market Partnership (MMP) that will vitalise the commercial use methane. There is also a key cooperation effort towards the cleaner production of heat and power from coal under the Carbon Sequestration Leadership Forum (CSLF).[39] Germany is also looking forward to new vistas of energy economy: along with the US it helped to found the International Partnership for Hydrogen Economy (IPHE) which conducts advanced research and development in hydrogen fuel cell technology. Thus, Germany has a clear impetus towards

a technology-intensive, renewable energy portfolio encompassing wind, geothermal, solar and hydrogen power. This represents strategic diversification for the coming decades against possible energy blackmail.

STRATEGIC CONVERGENCE ON THE INNER CRESCENT

We now examine the spectrum of ideas advanced by the paper so far and suggest several non-mutually exclusive scenarios of real-world complexities. The steps taken by India and Germany are a reflection of world energy geopolitics and the conclusions in the debate are somewhat kaleidoscopic. Just as the three glass sides within a kaleidoscope face each other, the geopolitical relations (here, the three scenarios below) of India and Germany can be viewed as facing facets comprised of self-sustained options working either in combination or independently. The three scenarios outlined below have been visualised specifically for the India-Germany relationship and are partially designed to look into the typologies of combination as a response within the whole complex of energy geopolitics.

Scenario A: Heartland Paramount!

The lessons of energy geopolitics call for the creation of sufficient diversity not only in oil suppliers but in energy sources ranging from oil to natural gas and nuclear energy. Although this has been the main essence of geopolitical debate we must remember that the possible trade-offs for each country depend on their geopolitical situation. These vast energy resources are lying underutilised in the centre of the world's most potent peripheral consumer markets, notably India, the rest of South Asia and China, and East and Southeast Asia. Also, Europe, the powerful supplier of finance and technology, can apply its economic thrust to augment vibrant growth for the whole of Europe-Asia. Thus, Central Asia could see itself as a hub with future possibilities for a second wave of globalisation. Yet, the entire model of Central Asian energy geopolitics is essentially a continental ordering of preferences steered by Russia, the curator of Heartland. Russia is already an important partner for India and Germany. There is a possibility that these countries can strategically engage Russia for a long-term trilateral understanding on energy security. Such an understanding has possibilities of being further upgraded to non-traditional forms of energy security cooperation. This is important when compared to the Chinese overtures in Eurasia and West Asia. India feels that the diplomatic burden of acquisition of these assets is far heavier than other lighter weight options. But, then what is its other option? Nuclear Energy!

Second Scenario: The Heartland Walk Over!

Nuclear energy is the technology-laden geopolitical response of the maritime order of energy security to the continental order commanded by Heartland's energy resources. This is indeed one possible direction the countries lying on the Inner Crescent are examining. India certainly is thinking in this direction at a time when Germany is considering reducing its nuclear dependence. How then can these two diametrically opposite objectives find a common interest within an Energy Security (ES) framework? The answer may lie in some kind of reciprocal symbiotic relationship. The technology and its fuel form the binding interest between India and Germany. India's nuclear energy programme is perceived by the West as constituting both a commercial and strategic interest. The West is highly sceptical regarding the possible of misuse of nuclear technology or the siphoning off of nuclear material to threaten the security of the West itself. This raises the problem of India's own security concerns which have to be appreciated by Western countries bent on restricting the possibilities and exploration of the wider application of such dual use technologies by other nations.

India cannot afford the luxury of allowing global energy security anxieties to control oil and gas resources beyond its territory as it needs a 3–4 percent annual increment in primary energy supply in order to maintain an 8 percent growth rate through 2030.[40] Our immediate response to this is that market reforms in the power sector that promote competitive pricing and ensure better resource allocation under a regulatory authority improve efficiency across energy chains and provide an incentive to develop environment-friendly technology and an integrated energy policy to deal with any energy constraints on economic growth. India can very realistically rely on coal for power generation. Coal accounts for over 50 percent of India's commercial energy consumption with some 78 percent of domestic coal production allocated to power generation. The expert committee on India's integrated energy policy is also of the opinion that imported coal is far cheaper than imported oil and gas as far as power generation is concerned along western and southern coasts. Another significant area of concern is T&D losses, which are quite high. Madhav Godbole points out that T&D losses were 45 percent in 2000–2001: comprising 20 percent power theft, 4 percent commercial losses and 21 percent technical losses.[41] Also, in terms of purchase power parity, the power tariffs in India for industry, commerce and large households are among the highest in the world. Germany can be of considerable help in ameliorating these concerns and there is an opportunity for a major synergistic relationship. Germany itself relies heavily on coal as a measure of energy security and hence can be source of cleaner power technologies. India has 10.2 billion short tons (bst) of recoverable coal reserves. Germany can also envisage shifting certain energy intensive industries to India. The Indian government is trying to create special

economic zones for facilitating such translocation of industries. Germany's R&D base for Clean Development Mechanisms (CDMs) is already at advanced levels. India can help itself by aligning itself to these interests. The international environment envisages energy partnerships that can bring two or more countries together.

Third Scenario: Heartland Eclipse Under the 'Crescent'!

Through its presence in Afghanistan, Germany can look for a symbiotic relationship with India especially in matters where energy is a consideration not only for economic growth but also as a means of attaining a geopolitical balance of power. Germany has a strategic presence in Afghanistan. In fact, Germany has had a long history of cooperation with northwestern frontier tribal heads and the Amirs, even before Afghanistan's independence in 1919. Presently, it is part of the NATO contingent in Afghanistan. Germany can be a vital stakeholder in materialising trans-Afghan gas pipelines, whether from Turkmenistan or Iran. Germany could initiate a guarantee mechanism to the parties of contract as most of the nations, notably, Pakistan, Iran, India and Afghanistan, would perhaps be collectively more amenable to German rather than American initiatives. In this way, Germany could add another option to its Central Asian gas dependence if the Afghan route became viable. The aid and assistance programme for the reconstruction of Afghanistan which has been run with German help is widely acknowledged by Afghanistan. Germany has taken on the task of rebuilding the Afghan police and army to fight Al-Qaeda and Taliban threats. It has been training Afghan personnel since 13 March 2002.[42] Germany has supplied the Afghans with some 600 police cars, police vans and motorcycles. These vehicles are maintained by Afghan mechanics trained by garages installed by the federal German government. Germany is also involved in the Afghan energy sector: it works with the Asian Development Bank (ADB) to 'co-finance the northern section of a high-voltage power supply line from Uzbekistan'. This supply route 'is seen as the economic lifeline of the north-east provinces (in particular Kunduz and Baghlan) and the region, and should secure electricity for Kabul from the end of 2007'.[43] Germany also provides support and assistance to help Afghanistan utilise more renewable energies and effectively promote them over remote and difficult rural terrain and has an active presence through provincial reconstruction teams (PRTs) in northern Afghanistan under the ISAF mandate.

Thus, Afghanistan offers a chance to bridge the wide gap between the geopolitical interfaces of the continental and maritime world interests. South Asia has made a modest beginning towards such convergence. There is need to reflect on the nuances of regional, collective and cooperative security that are also dissected by poverty and disillusionment worldwide and which need to be addressed. But much more than that, whilst addressing

them there are immense possibilities in terms of reaching out to those 'Dead-Lands' which have been cut off by time–space compression.[44] This might generate an atmosphere of positivism in which Mackinder's Heartland could come to be seen as more of an opportunity than a constraint.

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