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The Energy and Resources Institute (TERI) and the Konrad Adenauer Stiftung (KAS) had five international dialogues during the period 2006-2010. These dialogues were invitations to discuss varied viewpoints on energy and resource security concerns to enable a more effective debate on policy options and action. How can the understanding of energy and resource security be enhanced, if examined across different domains, and from different perspectives? What is driving the enhanced concern with energy and resource security? How relevant is it to look at energy and resource security through the lens of foreign, trade, and security policy? What forward agendas do we need to address the growing need for energy and non energy resources? Since, the dialogues, while international, had India central to the discussion, many of the issues did reflect on the Indian case. At the 5th and final Dialogue, it was decided that the key ideas from all of the dialogues be put together into one publication. This book seeks to do this. It builds on the ideas and views of all who participated in the five dialogues – European and Indian partners, and those from Japan, China and the USA - and proposes a positive and inclusive agenda on energy and resource security.



ENERGY AND RESOURCE SECURITY: TOWARDS AN INCLUSIVE AND POSITIVE AGENDA LIGIA NORONHA

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Konrad
Adenauer
Stiftung



The Energy and Resources Institute

Published by:
Office of the Konrad-Adenauer-Stiftung in India
2, Nyaya Marg, Chanakyapuri, New Delhi-110021

Tel: 91-11-26113520
Webpage: www.kas.de

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Printers:
Anshah Publishing House, Delhi-110092
info@shilprapublications.com

Published in 2012

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Foreword

Beyond its enormous relevance to India in particular and South Asia as a whole, the question of energy and resource security has increasingly been highlighted in the international debate. As the backbone of development and prosperity, growing dependence on resources has put forward a new focus which, as it seems, has the potential to become one of the central strategic issues for the 21st century if it is not already.

The question of securing energy components and resources is not limited to the local or regional scenario. Moreover national energy strategies have emerged as key concerns in both developed and developing countries in search also for synchronized global strategic responses. The interlinkages between energy and climate indeed seem to be closer than ever before. Global climate change threatens the very foundations of our existence and the chances of development of the generations to come. The demand for energy and the consumption of fossil fuels are increasing worldwide. The increased emission of greenhouse gases and the climate warming it entails have far-reaching repercussions for mankind and nature.

Not less than five energy dialogues were initiated by TERI and Konrad-Adenauer-Stiftung (KAS) between 2006 and 2010 to address the question of how and on which basis a participatory and truly inclusive future agenda could be framed. Laying much ground for the complex issues of energy and resource security, the event series generated fruitful discussions, critical re-evaluations of existing paradigms, and efforts of strengthening synergies of international expertise. The dialogues involved a global network of eminently respectable experts from government bodies and ministries, the foreign policy and security communities, think tanks, academia and NGOs.

The KAS has been active in India with its various programs since 1968. Together with its Indian friends and partners, and in the light of Germany's Strategic Partnership with India, KAS has become more and more active in promoting bilateral and international dialogues on the pressing debates on issue based future challenges as epitomized in the Foundation's and TERI's cooperation during the past years.

Successfully, the dialogues brought the multifaceted dimensions of energy and resource security into the limelight: Issues such as trade, foreign policy and security policy are facets which we cannot afford to ignore. But developments during the last years also illustrated the difficulties of governments and publics worldwide to articulate adequate responses to these pressing challenges.

This compendium aims at bringing the comparative view – that is the European and German, the Indian as well as the Chinese and American approaches – together in order to contrast the variety of national strategies that emerged as a response to the visible globalization and internationalization of energy politics and future scenarios.

I would like to express my sincere gratitude to our cooperative partner TERI and especially to Dr. Ligia Noronha who is and has always been a reliable friend and partner of KAS since the partnership's beginning back in 2002. The launch of a new TERI-KAS dialogue series in 2011 with which the cooperation entered a new field of engagement, is only one proof of its fruitful future continuation.

Drawing international attention to the issues of energy and resource security requires international impact and expertise. Therefore, I would like to thank all the participants from India, Germany, China, Afghanistan, Nepal and the USA for becoming indispensable voices of the dialogue.

Finally, I would like to thank Joerg Wolff and Dr. Beatrice Gorawantschy who engaged with fervour and strong commitment in the dialogue as Resident Representatives to India. My thanks go also to the Team of KAS India which tirelessly worked for the success of the series and the partnership.

Tomislav Delinic
Director Regional Programme SAARC/
Officiating Resident Representative to India



Preface

TERI and the Konrad Adenauer Stiftung (KAS) had five international dialogues during the period 2006–2010. These dialogues were invitations to discuss varied viewpoints on energy and resource security concerns to enable a more effective debate on policy options and action. How can the understanding of energy and resource security be enhanced, if examined across different domains, and from different perspectives? What is driving the enhanced concern with energy and resource security? How relevant is it to look at energy and resource security through the lens of foreign, trade, and security policy? What forward agendas do we need to address the growing need for energy and non energy resources? Since the dialogues, while international, had India central to the discussion, many of the issues did reflect on the Indian case.

These dialogues had the following themes:

1. India's Energy Security: Trade, Foreign Policy and Security (2006)
2. Energy, Climate and Security: The Inter-Linkages (2007)
3. Resource Security: The Governance Dimension (2008)
4. Energy Resources and India's security (2009)
5. Energy Security: Managing Risks, Balancing Concerns and Developing Frameworks (2010)

The dialogues produced some rich ideas captured in the published proceedings. However, at the 5th and final Dialogue, it was decided that the key ideas from all of the dialogues be put together into one publication since such a rich canvas of issues had been covered. This book seeks to do this.

It draws on the dialogues and new thinking on the subject and proposes an agenda for dialogue and action on energy and resource security.

The book focuses on energy and resources, the subject matter of the dialogues. It has three parts in line with the way the dialogues played out which cover the following:

I. Issues and Challenges

II. Perspectives and Views

III. Thinking Beyond: Towards a positive and inclusive agenda

Part I

The discussion in this part of the book draws from the thematic of each of the 5 dialogues: the trade, security and foreign policy dimensions of energy security (2006), the inter-linkages between energy, climate and security (2007), governance around resources (2008), energy as a key aspect of national security (2009), risks and sustainability issues around resources (2010). What is the key thinking on these issues as presented in these dialogues and what bearing do these issues have on how we think ahead?

Part II

Part II focuses on the perspectives and views across the selected countries – EU, Germany, China and the USA – relative to India and highlights commonalities and differences in strategic responses. What lessons exist or can be drawn of relevance to the energy and resources security debate?

Part III

In the final part of the book, a positive agenda for dialogue and action is proposed drawing on the policy suggestions, mechanisms, and action points discussed at the Dialogues.



Acknowledgements

This book builds on the ideas and views of all who participated in the five dialogues – European and Indian partners, and those from Japan, China and the USA. We had rich conversations and discussions over the years that greatly advanced our thinking on the subject. Not only were these interactions productive, but also a lot of fun. I would like to thank everyone who participated and supported this activity so fully. My thanks to my colleagues who helped co-organize these conferences and get the proceedings together: Anant Sudarshan, Devika Sharma, and Ravi Batra.

My special thanks are to Shivanjali Sharma for her very able research assistance for Part II of this book and Saroj Nair for the final look. I would also like to thank my young friend Shubham Issar for the cover design. My gratitude as always to Konrad Adenauer Stiftung for supporting this book, and especially to Joerg Wolff and Beatrice Gorawantschy for their unfailing partnership through the five years and beyond. My special thanks to Pankaj Madan for his wonderful support of the five conferences and other partnership activities. To R K Pachauri, Director General of TERI, I owe my interest in energy security.



Part I

Issues and Challenges

We live in interesting times, when the old economic order is changing and the new order is still evolving. The transition is challenging and uncertain, made more complex because of the economic and financial crises and the changing political situation in key oil producing countries in North Africa and West Asia. The reemergence of India and China in this context gives rise to a number of insecurities and apprehensions around resource availability globally, given the development needs of their large but generally poor populations. The period 2006–2010 is very significant in terms of energy and resource questions: Oil prices were rising steeply since 2004, and energy security was at the top of the global and national policy agendas; non fuel commodity price volatility made these resources also a cause for concern; key Conference of Parties of the UNFCCC, namely Bali, Copenhagen, and Cancun, took place during this period strongly centered on the linkages between energy and climate; and the 2008 economic and financial crisis and its aftermath, has had many geopolitical and geo-economic implications, made more challenging because of the political changes in key resource rich countries. Fatih Birol of the International Energy Agency in 2010 termed it an era of ‘unprecedented uncertainty’. The 2011 Fukushima effect on nuclear energy only complicated the scene further. While globalization of energy and resource demand is evident, resource nationalism is on the rise. Multilateralism seems to be under threat as countries increasingly opt for unilateral, bilateral or plurilateral approaches to handle difficult issues. Addressing issues and challenges around energy and resources in terms of rising security concerns was thus relevant and valid.

Energy security was originally understood in the context of ‘continuous availability of energy in various forms and in sufficient quantities at reasonable prices’. While abstract in many ways, energy security is tangible and clear to understand when there is disruption and turmoil (Yergin 2011, p 164). It became apparent early on in the Dialogues, however, that given India’s development context, there was need of an expanded understanding of energy security, one that went beyond availability and affordability, to access issues, to meet basic needs of cooking and lighting. This expanded understanding mirrored that found in India’s Integrated Energy Policy, 2006.

“The ability to supply lifeline energy to all citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected.”
(Integrated Energy Policy, GOI)

Through the dialogues, the understanding of security relative to energy and non energy resources, going beyond the Indian context, expanded to become multi-dimensional: around resource availability, affordability, accessibility and sustainability. A key emerging aspect of energy and resource security is social acceptability of the resource choice and its development and use, an issue that will only gain prominence over time with the democratization of the discourse on energy and natural resources. This aspect is linked with outcomes of resource development and impacts on human well-being. ‘Energy for whom and at what cost’ is an emerging refrain.

The concept of energy and resource security that has both emerged from and informed the five dialogues is thus both deeper and wider than the resource availability and affordability quests, and beyond just meeting the increased needs of the

‘energy haves’. It is widened to include resource requirements to address both growth and poverty requirements; deepened to assess issues around the life cycle of fossil fuel development and use (such as impacts on lives, environment) that can have also human security implications. The understanding of what causes insecurity around energy and resources thus has been extended in scope and scale: geographically from global to also local; beyond international relations, resource availability, and global environmental constraints, to also issues of local environment and social justice around the development of resources. As Umbach argued, “Energy security is no longer simply a ‘technical’ question of providing energy efficiently, but also a deeply geopolitical issue that highlights growing interdependencies and inequalities across the world” (2011 a, p 5). Roy (2007, p 23) provided another perspective:

“As a general rule, I put it to you that we need to be less worried about ‘Energy Security’ anywhere and more worried about thoughtless irresponsible corrupt governments everywhere. There is no shortage of energy or resources as such anywhere in the world; what should be making us feel insecure is the shortage of wisdom in political decision-making. That there is everywhere.”

Fossil fuel path dependence

Energy insecurity of nations has traditionally been around fossil fuel insecurity, as these are exhaustible resources and seen as diminishing and geographically concentrated in regions with political instability. This concern has been exacerbated by the rise of China and India. Both *internal* and *external* dimensions are evident in these growing concerns. The internal dimension is linked to drivers and pressures that create energy demands and energy use patterns. Fuel choices to meet these demands are based on beliefs and perceptions of resource availability; the technology

used to develop resources, the formal institutions in place to deliver energy and the relative prices which mediate the demand and supply conditions. These factors often combine to create fossil fuel path dependence. Moving away from this path dependence domestically would require an engagement with these key factors (Sudarshan and Noronha 2009, chapter 1).

The external dimension is linked to forces that come into play in a nation's interaction with the outside world – fossil fuel import dependency, price of fuels in the world market, globalization policies and geopolitical realities around the resource rich countries. It is in this context, and with an increased dependency on external imports and global markets, that trade, foreign policy and security issues come into play. Securing energy is not just an issue of trade policy but also of international relations and hence requires foreign policy making that is domain specific. While resource availability has much to do with political relationships, exploration activity, development of technology and investments, affordability is really linked with price and balance of payments position. As strategies to secure this energy are not just supply contracts, but also involve acquisition of assets, the role of foreign policy mechanisms to create an enabling environment is evident, both to facilitate the activity domestically and in the host country. On the other hand, energy access to meet the needs of the millions who are unserved requires not only more innovative approaches, but also multiple actors and levels of operation.

The globalization of energy and resource crises

Two global trends are observed in addressing energy security (Kreft 2007): One is towards *economic efficiency based on the market economy*. The other trend is the *direct implementation of national interests* (p 50). While energy security has most always been a national security project, it has since the early years

of the millennium decade, been interpreted, formulated and presented as a global crisis, with potential of conflict between ‘old consumers’ (the OECD countries) and ‘new consumers’ (the emerging economies – India, China and Brazil) or between new consumers themselves, for example India and China in search of resources.

Pant (2009, pp 38–39) provided 3 key reasons for the formulation of energy supply deficits as a global crisis: One, relocation to the emerging economies of industries to avail of lower labour costs, but which in turn create a highly energy and resource intensive economies which produce products for the ‘old consumers’, thereby leading to energy needs within a nation for final products whose demand originates elsewhere; Two, the different styles and approaches of engaging with new energy suppliers by the new consumers that are frowned upon by the old consumers; Three, the non renewability of fossil fuels and their externalities, which are opening doors to energy resources which have hitherto been taboo in some countries for environmental reasons, such as nuclear energy, and which have international ramifications. What is interesting to note is that there were few conflicts over resource choices and strategies as long as there were few players. But as resources get in short supply, as the competitive advantage of nations changes, the narrative becomes more aggressive and the language to describe the strategies of new consumers (which mirror those of the now developed countries) is ‘hunger for resources’, ‘competition’, ‘conflict’, etc.

Consumer country strategies for securing resources have for long been of a zero sum type, basically ‘club’ responses to address the potential of supply disruptions and perceived risks of action by suppliers (Kaul 2011, P 34). Club responses are observed, for example, post the 1973 oil crisis in the setting up of the International Energy Agency (IEA) by the OECD member states, as a countervailing force to the Organization of Petroleum Exporting

Countries (OPEC). Post the Cold War, the possibility of accessing oil and gas riches of the dismembered Soviet empire led to the enactment of the Energy Charter Treaty (ECT) to reduce barriers to entry into energy and resource rich countries, address issues of energy investment and trade and ensure reliable transit routes. Soon, the need for a more rule based energy and raw materials trade will see a greater impetus by the World Trade Organization to address these issues.

The rise of the ‘new consumers’ and the large unserved populations in these countries, are redefining the way we look at energy security and responses. The concern with inadequate fossil fuel resources to meet huge projected energy needs, combined with carbon constraints which call to question the continued use of fossil fuels have created serious engagement with non fossil energy sources, seen by many as potentially less conflictual in nature given their easier availability. As Kaul (2011) put it, “From a zero-sum world of energy and power we are now entering a world that affords more opportunities for positive-sum strategies, one of which could be the pursuit of energy security for all” (p 33).

Resource nationalism

Resource nationalism is the growing trend of nationalism over sub soil resources (Grewe 2009). The issue has become significant in recent years and has many manifestations: the oil policies of Latin American countries such as Venezuela and Bolivia; instances in the Russian energy industry, namely the episode over the Russian–Ukrainian gas trade in 2007 which greatly raised concerns in eastern Europe that natural gas imports would be used as a tool for political pressure, and the withdrawal of the environmental permits for Sakhalin – II for Shell, relaxed once Gazprom became a partner; the increased demand for local content and indigenization policies in the extractive industries in countries as diverse as Australia, India, China, Nigeria and Angola; the increased role of national state companies in the search for oil, gas and minerals.

Eighty five per cent of remaining conventional oil and 70% of remaining gas resources are in the hands of governments and state-owned companies today as compared to the sixties when the seven sisters controlled 85% of world's oil and gas reserves. National oil companies (NOCs) are the top 10 reserve holders worldwide and Saudi Aramco holds 20 times the oil reserves of ExxonMobil, the biggest privately-owned super major; NOCs also dominate global oil and gas production. Umbach argues that "...national oil companies are advancing national interests but are also instruments of national power projection. The choice of pipelines to build and of the partners with whom to build them is an index of political entente, if not alliance" (2011 a, p7).

While the overarching objective of these more nationalist policies may be projection of national power as well as increased benefits for own people from exhaustible resources, the forms and intensity with which resource nationalism plays out varies across countries depending on the political and developmental context. Russia, for example, sees its energy resources as a way of reclaiming its old power and glory. Two decades ago, Russia lost great power status, territory, economic might, and most importantly, its self-esteem. Energy has been a key plank on which it has been able to rebuild itself both economically and politically. Resource nationalism, in the case of Mongolia, Nigeria, Kazakhstan, South Africa, takes the form of demands for increased local content of resource development policies and sharing of resource value. These strategies are seen with some concern by many commentators as being a move away from globalization towards more nationalist policies. However, as Varadarajan (2007) pointed out:

"In a sense, globalization has also always been politics by another name, except with different tools and a different currency of power. What is happening today is simply another reconfiguration of power – in an economic sense as well as

civic sense. This cannot but influence the oil market as well. So I would not say that there is a re-politicization today that is taking us away from globalization” (p 73).

There are emerging nationalist trends in resource trade and investments. The case of export restrictions on critical raw metals and rare earths from China is a case in point. Other forms are also evident as seen in the case of the Government of Australia intervening when China's Chinalco in 2009 sought to buy into Rio Tinto's iron ore mines at Pilbara. Or when in 2005, there was uproar in the USA, when China's CNOOC competed with Chevron to buy an independent US company – Unocal with minor stakes in Gulf of Mexico but a stronger presence in Indonesia and Thailand. Chevron won the bid.

Umbach (2011 a) points to such nationalist posturing not only as threatening future global market policies and strategies and the WTO order, but also jeopardising future global investments, resource efficiency and planned production levels. He refers to Saudi Arabia, Russia, Iraq and Iran, which together hold 50% of world conventional oil reserves, but are reluctant to accept FDI that would be necessary to develop oil production as required to meet project global requirements. As a result, he says, the supply-demand gap will widen and political factors may increasingly determine the access to oil fields in Africa, the Caspian Basin and the Middle East.

In a Chatham House (2011) workshop on resource futures, however, it was pointed out that resource nationalism is not really new as resource markets have always been political given their importance to domestic politics and external projections of power and that one cannot expect a return to some 'golden age' as there never was one. Tewari (2011) provides a fresh way of looking at the phenomenon of resource nationalism, when he suggests that it could be argued to contribute to sustainable development outcomes in two ways: (a) by keeping natural resources in the ground for a

future date and (b) by driving innovation in consumer countries towards greater resource efficiency and metals recycling, as also by quickening the transition to renewable energy (p 111).

The changing dynamics of control – from ‘big oil’ and ‘big mineral’ towards service companies

The trend that can be seen in resource nationalism, beyond geopolitics and power projections, is an increased recognition by resource rich countries and their people that the resources that they own provide a key handle to improved fiscal health and development, for which they need political and economic control. Political control over resources among nations has been in place over the last five decades since the UNGA Resolution 1803 of 1962 was passed in the context of an increase in demand for raw materials by consumer countries. Resource rich countries then demanded for more control over decision-making and equitable systems of revenue distribution based on resource ownership. This resolution was, in the succeeding decades, tempered by a ‘do no harm’ objective symbolized by international agreements and principles as in notions of sustainable development, the precautionary principle, etc. Today the increase in demand for raw materials is leading to increased demands at the sub national level – from resource rich states and the people of these states – for more equitable and fair systems of revenue and benefit sharing (Noronha 2011).

Economic control over benefits from resource development has been more a result of technical and bargaining capacity of nations relative to operators. The ‘obsolescing’ bargain between companies and host governments was a key theme of the resources policy debates of the seventies and eighties. Today, the focus is on changing the terms of the bargain frontally. Umbach notes that the bargaining power of oil and

gas producing countries has increased at the expense of the consumer states. This is also the case between international oil companies (IOCs) and national oil companies (NOCs) in favor of the NOCs (2011 a, p7). But one can also read this differently.

Whose rent is it anyway?

There is an increased appreciation by governments of resource rich countries that they can and should improve their share of value from resource development *vis-a-vis* companies, especially given the rising prices of energy and mineral resources and increased economic rent. There is an appreciation that this rent does not belong to the extractive companies, but fundamentally to the country and the people of the country, as it emerges not because of any special efforts of the operator, but due to the intrinsic qualities of the resources and the fundamentals of demand and supply. More futuristically, in commodities where market risk is seen as low, host nations will move towards having exploration, resource and marketing companies coming in just as service companies to provide technical services in obtaining exploration information and getting the resource above ground and into global and domestic markets, and being paid a service fee for their efforts. This will be a marked departure from the current situation where the owners have to bargain intensely with the operators to get a larger share of the economic rent of what rightfully belongs to them. More recently, in countries such as India with a federal structure but with more centrist control over resources, there is pressure from resource rich sub national entities on the central government for a larger share of the control over decision-making, compensation payments for externalities of development and a larger share of resource value generated. The need to have a better deal for local people is felt strongly at various levels to ensure an improved social license to operate.

The global engagement of new players

The years since the millennium have seen an increased global engagement in energy searches by new players such as India and China. Their huge resource needs beyond domestic availability, have prompted 'going out' strategies. Investments in equity oil, gas or coal in a larger number of resource rich countries are evident over the last decade. Some economists have argued that these strategies make poor sense commercially. However, to large economies such as China and India, such investments are strategic, as they do not trust markets to provide them energy security (Mohan 2007). In these searches, we have seen occasional competition over discrete properties. These could be repeated and have been highlighted by some as signals of the emerging resource conflicts between these 'resource hungry' economies. Cooperation with China might not always be possible in the area of access to fossil fuel resources, but conflict is not inevitable. Cooperation is definitely possible in other areas such as renewable energy technology, knowledge sharing on energy and resource efficiency, green growth initiatives, strategies to reduce carbon intensity of growth, etc. (Mahalingam 2007).

The impact of increasing energy needs on foreign and trade policy of the new players was also of great interest, in fact it was the focus of discussion of the first dialogue. Mohan (2007) argued that "Energy security is not merely an additional demand on Indian foreign policy; the scale and scope of India's energy security requirements require a fundamental change in the principles that seem to have guided India's foreign policy for decades" (p 57). Further he points:

"As companies like Reliance take on a higher profile in securing energy resources across the full spectrum – from exploration to production and marketing beyond the national boundary – Indian diplomacy for the first time will

be compelled to defend private capital's foreign interests. The challenge for India is to develop effective mechanisms to generate a broad set of rules and their transparent implementation in the new relationship between the private sector and Indian diplomacy." (p 62)

Emerging resource ties

The implications of the new energy and resource ties of the new consumers to issues around human rights, democracy, and governance have been much debated by the international community ever since China and India have ventured out to look for energy and minerals. It has been argued that engagement with some 'problem' countries with human rights violations reduces the ability of OECD countries to further own foreign policy agenda on democracy & governance. Umbach states, for example, that in the view of many Western experts, "China's energy foreign policies in Africa and Iran have complicated, if not undermined Western strategies for conflict prevention, management and sustainable development aid in Africa and the Middle East" (2011 a, p 8). Others have pointed out that the strategies of the new players hurt own transnational and other companies as they perceive India & China companies competing unfairly.

The contrary view that has been and can be put forward is that a large number of international companies from OECD countries have been doing business with these countries for long, and the decision not to engage with these countries is a more recent move, arising out of own domestic pressures and in response to demands by investors and stakeholders. It is also argued that as late entrants to global energy markets, 'new consumer' countries need to access 'unlocked up' resources, niche areas which are mostly in these countries. It is also not obvious if engaging so called 'problem' states by new players will lead to greater conflict or be incentives toward greater stabilization. There is much to be said for more

responsible behavior arising out of greater engagement than out of isolationist policies. These changes are not just a result of self interest but also arising out of the demonstration effect of seeing how the other operates.

States, energy, and resources

The state has traditionally had a central role in energy policy making in terms of ensuring access and availability. Securing energy has been often treated as a national security project. In countries such as China and India, the state has had a central role in energy provision. It is only post 1991 in India, that we see the entry of non state actors both in traditional and non traditional energy provision, following a number of industrial and more lately, electricity reforms, as part of a wave of infrastructure reforms elsewhere in the developing world. Dubash and Florini (2011) note that the nineties witnessed “a deepening of market relations in energy arenas, notably in electricity, with the spread of the ‘independent power producer’ model, especially in Asia, and a wave of privatizations of electricity utilities, especially in Latin America. More generally, private investment in energy-related infrastructure soared” (pp 49-50).

However, they also note that a change is observed since the turn of the century. The financial crises in Asia and subsequent developments, as also the emergence of China and India on the world stage, have led to the states playing an important role in energy again. This is especially noticeable in the emergence of bilateral energy trade.

Limits to national policy making: beyond and within borders

Despite the more assertive roles being played in energy and resource matters, global challenges, trans boundary issues and domestic politics pose constraints to government policy (Lehne 2009).

Four trends are observed that have implications for how states act:

- An increased concern with resource scarcity (energy, water and food) and shrinking carbon space is observed in a number of countries and in global fora. This perception/ emerging view is leading to a politicization and securitization of the debate around resources, in their production, consumption and trade.
- Transboundary development of resources (for example water projects, oil developments,) as in trans Himalayan region, South China Seas are another emerging concern, because of lack of data and information sharing on projects and disputed ownership and jurisdictions.
- Land acquisitions for growing food and biofuels are of particular concern in countries of Africa and in India, in the context of poor recognition of property rights and realities of local people and state capacity to protect its people from predator investors and opaque corporate arrangements. As Bach (2011) points out “it is becoming extremely dicey to evaluate the capacity of a company to uphold global governance standards especially since they are increasingly getting diluted into networks through mergers and acquisitions” (p 122).
- The shifts in acreage under food crops to energy crops is leading to a greater attention to the nexus between food, energy and water needs and the need for a greater balancing of the priorities based on grounds of social equity and environmental justice.

Sharma, recognizes these global and local forces when she states:

“The absolute nature of state sovereignty has been impacted by normative concerns such as environmental degradation, human rights and concerns for sustainable development, as well as non-normative concerns such as

inter and intra-state conflict and insurgencies, terrorism, nuclear proliferation, energy security and so on.” (Sharma 2011, p 16)

These then create limits to sovereignty in policy making. Kaul (2011) added another factor that limits the power of the state:

“...we have to realize that while States have power within national borders, globalization and market integration reduce this controlling power they possess nationally, because they have to be supportive of investment and listen to the market and comply.”

However, the involvement of the state and its increased responsiveness to new concerns in more recent times is also a result of the “recognition that the state can no longer afford to insulate itself from the interests and concerns of the relevant stakeholders – both within the domestic sphere of the sovereign state, as well as beyond—at the international level” (Sharma 2011, p 16).

This is giving rise to what can be termed as a more ‘responsible sovereignty’ in response to new norms and values.

“By acting ‘responsibly’, what is meant is that the state has accepted limits on its absolute sovereign powers by sharing, delegating and devolving domestically (through practices of good governance, broadly speaking) as well as by constraining its actions by adhering to legal conditionalities as well as normative values internationally (through mechanisms of global governance...)” (Sharma 2011, pp 16)

Policy making to ensure affordable supply of energy resources is thus confronted with multiple pressures arising from concerns associated with the development of the

resource as well as the impacts that the development gives rise to. Some of these concerns are intrinsic to the resource itself—for example global, ‘beyond border’ concerns around increased carbon emissions from coal and oil use or fears about nuclear terrorism and nuclear waste arising from the development of uranium resources and nuclear energy. Other concerns, however, pertain to the governance of resources and their development, for example mining-related concerns, adequate compensation for displacement, the equitable distribution of benefits and value arising from resource development and so on. Given the globalization of these concerns, risks and markets, conventional notions of control and ownership of resources are being reconstituted. There is now a greater demand for balancing these multiple concerns emerging from the local, national and global levels and for developing adequate and accountable frameworks that address these concerns better.

Energy, a private or public good?

Crucial to the evolving discourse on energy security and ways in which it needs to be addressed, is the question of whether energy is a private good or public good, a theme that has emerged in every dialogue (Pant 2009, Dubash 2011, Mahalingam 2011, Kaul 2011). Clarity is required as both strategies and actors to reduce energy insecurity flow from this basic understanding. Energy resources – oil, gas, coal, are private goods, both rival in consumption and excludable, and it is this characteristic that gives rise to zero sum approaches that are often witnessed in energy securing strategies. The non rival nature of renewable energy sources, for example wind, solar is clear, but their harnessing and the associated resources that they need in the process of transformation into useful energy are not, for example, capital, land and water. While “theoretically energy is a private good, it is a private good with enormous externalities – economic, political

and otherwise which is the reason why in theoretical terms we call for more public engagement and which is why we have so much public involvement in the sector in various ways. The question is what should the nature of that involvement be at the national level and the global scale” (Dubash 2011).

It is in the provisioning of energy and addressing the challenges around this provisioning through the establishment of norms, rules, standards, open access technology, information banks and data bases, that we see public good characteristics, and around which we also see market and state failure. Securing and provisioning of energy is a public good or service and which cannot be left entirely to the market. This is all the more so when energy access is low as in countries such as India.

Sustainability

Sustainability in the energy policy space has both an inter-generational and an intra-generational dimension. The former arises from the exhaustible nature of fossil fuels and the implications to future generation of their non availability, but also from the footprints arising from their use such as excessive accumulation of green house gases, especially carbon dioxide. More specifically, in case of fossil fuels, this has to do with the shrinking carbon space that is creating pressure to either decarbonize the energy mix by moving to less carbon intensive or no carbon fuels, or decarbonize the fuel itself through cleaning the carbon. Linkages between humans and environmental systems operate in different ways according to their structure, the systems they links and the processes involves in the linkages (Hanna and Munasinghe 1995, p 7). One such linking mechanism is human use of fossil fuels, which has resulted in an accumulation of carbon dioxide in the atmosphere, which in turn is leading to climate change. The energy and climate conundrum has been a recurring theme in the Dialogues, placed as they were in

the run up to COP 15 at Copenhagen in 2009, and the years when energy security was very high on the policy agenda, globally and in India. The inter-linkages between energy, climate and security were the main theme of the 2007 Dialogue and highlighted both the concerns around carbon mitigation and climate change vulnerability.

With the passage of years that needed to see mitigation responses and the increased rather than reduced carbon stocks, we have to deal with climate change impacts which loom high as per reports of the IPCC, making adaptation a necessity. Some impacts have security implications, both of a traditional and non traditional kind. For example, the second order impacts of climate change through extreme events, rising seas levels, higher temperatures, changes in precipitation etc., on ecosystems and human lives, have human security implications, which if unattended can result in traditional security concerns, with the potential of failing states and disorder which add to the risks of global insecurity.

Geopolitics of carbon emissions

The emergence of Asia – India, China, Indonesia, South Korea and its need for energy creates a larger international politics around energy and climate. These countries need energy, coal is their most competitive resource, but coal burning emits carbon dioxide, carbon accumulates in the atmosphere and results in adverse changes in the climate which are projected to be very detrimental to humans and ecosystems. The developing economies are especially at risk to climate change impacts. International pressure on large carbon emitting nations is around decarbonizing given the shrinking carbon space¹. The trade off in the energy and climate debate lies in the fact that carbon mitigation or decarbonization involve costs. The burden of costs has led

1 This is linked to the amount of carbon in the atmosphere that will trigger irreversible climatic changes. This carbon is primarily emitted by the energy sector, and hence this is the sector most targeted for mitigation action.

to a debate at three levels: (a) costs and implications of such transformations for current production and consumption systems and standards of living (b) countries and sectors best placed to decarbonize, and (c) policy instruments to achieve outcomes at least cost.

Participants did debate the statement that developed countries are in a state of denial in order to preserve lifestyles, while the LDCs indulge in poverty blackmail. Singh (2008) spoke of the need to revisit our indulgent and/or dirty modes of doing things in our own enlightened self-interest, and the need to avoid north-south cleavages and think of global action that is collective in nature. He also highlighted the need for lifestyle changes that require small adjustments and much greater multilateral and intergovernmental action to push for mitigation. However, a clear support for strong and prior action to address historic responsibility was evident at the Dialogues, given that no future responsibility for carbon accumulation would exist, if there was no historic responsibility for the carbon stocks. An efficiency, equity and sustainability argument is evident in the debate: (i) reduce wasteful luxury energy consumption without loss in quality of life– the ‘efficiency’ argument (ii) fossil fuel producers and users need to recognize the scarcity of these resources and the externalities they create, the ‘sustainability’ argument and (iii) some users need to vacate carbon space to enable others to grow their energy consumption to meet development needs – the ‘equity’ argument.

Beyond the carbon footprint

But sustainability concerns around energy and resources are not just about carbon emissions which were made abundantly clear in the discussions. On the intragenerational side, the complexity arises in the kind of externalities created by energy and resource development that may have negative impacts on local lives and the environment. This immediate impact that may arise through displacement and

lost livelihoods may also have long term generational impacts, beyond immediate sacrifice, as displaced people who are unable to follow their own occupations, may begin to lose skills. If this loss is not addressed by policy through investments in new skills, the next generation may be further impoverished. The importance of frameworks to address such externalities was the subject of the fifth dialogue and will be discussed in Part III.

Risks

The development of energy resources—coal, uranium, oil and gas and hydropower—is a process that is seldom risk-free. The essence of risk consists of ‘the probability of an adverse event’ and ‘the magnitude of its consequences’. Several of these risks are implicit in the very process of resource development such as accidents and oil spills, environmental risks pertaining to greenhouse gas emissions, waste disposal and exploration and extraction methods. Societal concerns such as displacement and compensation around resource projects are the new ‘above ground’ risks. Moving to more difficult and challenging operating environments, an increased engagement of civil society and instant communications have increased the pressures and concerns around resource development. Security of supplies and transport infrastructure is another important concern. Infrastructure requirements, particularly for import of natural gas, are significant and require large investments in the next few years. Both domestic and international supply lines and stocks can be vulnerable to terrorist attacks, piracy, theft, cyber attacks and sabotage.

Market risk from commodity price volatility is an issue that has become acute in the last decade and which has impacts on purchase planning and long term supply contracts as it translates from upstream through downstream supply chains².

² <http://www.ihc.com/products/pricing-purchasing-analysis/index.aspx>

Volatility in the commodity market is an aspect that will need considerable engagement in the future to help reduce risk. Massey reflected on the role of market mechanism to provide cheap risk insurance against risks associated with trade in commodities:

“... the role of speculators in the market is to pick up risk. A buyer and a seller – say a refinery and an exploration and production firm come to the market wanting to make a trade but also wanting to offload the risks associated with a trade. The financial investor has a greater appetite for risk than the buyer and seller and, while we may call them speculators, they are in actual fact providing risk insurance at the lowest possible cost. There is no other mechanism in the market to provide insurance cheaper.”
(Massey 2007, p 45)

As Prabhu (2008, pp 7–8) pointed out in the context of energy resources, “technology, security and access issues will have to be thought of as trade-offs. The problem of these trade-offs can be solved by either making sure that the same supply does not have the associated risks or by changing the demand pattern itself. Whatever option we choose, we need to think of these issues in a comprehensive manner and about the trade-offs, the risks and the benefits”.

Coal

The world’s reserves are 900 million tonnes, enough to last 190 years at current consumption. Of this almost 60% is held in the US, Russia and China. Another third is India, Australia, South Africa, Ukraine, Kazakhstan and the former Yugoslavia. Coal was seen as the least risky option until climate concerns came around. Today the environmental risk is considered high and the discussion around coal is whether it should be developed fast to avoid becoming ‘stranded assets’ or if they should be left in the

ground until cleaner technologies are available to use it with less risk to future generations. The future of coal and its rate of use – faster or slower – will, however, really depend on a number of factors, not just the carbon question: (i) what is happening in competing fuels: the price of oil, and gas-pipeline, shale, and liquefied natural gas (LNG) in Europe, Asia and the US; (ii) on the commercial success of clean coal and CCS technologies (iii) its own price graph; in a market where the seaborne coal trade is 500 million tonnes a year, demands placed on the international market have an impact on prices; and (iv) the domestic politics of important coal exporting countries such as Australia around the decarbonizing debate, Indonesia as it seeks to extract a high share of the resource rent, and South Africa around its local content policies. (v) the environmental footprints of coal mining locally, especially in countries such as India where coal occurs in the midst of rich forests. The nature of risks is thus multifaceted and varied.

Oil and Gas

Risk and challenges to security from oil and gas include not just from the political instability in several producing countries, the possible manipulation of supplies for political ends, the competition for sources, but also possible attacks on supply infrastructure as well as accidents such as the Deepwater Horizon in the Gulf of Mexico and natural disasters such as Katrina. The unconventional sources of oil and gas such as tar sands and shale gas too come with their own risks and hazards to human and ecosystem health through fracking, the use of chemicals and water contamination and the release of toxins into the air. In the case of tar sands the concern is with water consumption and the carbon footprint.

The uneven distribution of oil and gas supplies among countries creates significant risks. 11 OPEC-members and Russia control more than 80% of the total global proven oil and gas reserves.

The high risk of their movement through the oceans to consumer countries is from the narrow straits through which the oil and LPG tankers pass, which can serve as ‘choke points’. Sixty per cent of the world’s oil and almost all of its liquefied natural gas is shipped on 3,500 tankers through a small number of ‘chokepoints’. Thirty five per cent of seaborne traded oil in 2011 crossed the straits of Hormuz alone, an important point of vulnerability. Were there to be a blockade of the straits due to the confrontation with Iran on the nuclear issue, this could mean a halt to around 17 million barrels of oil (14 crude oil tankers) per day passing through it, amounting to about 20% of oil traded worldwide, 85% of which goes to Asian markets, in particular Japan, China, India and South Korea³.

A supply disruption here would surely shake up oil prices, which have already shown considerable volatility over the last decade and would affect global economic recovery significantly. Prices rose from US\$ 40/bbl to US\$ 147/bbl in 4 years (2004–2008) and fell steeply to US\$ 40/bbl that year. A number of factors explain this: In 2002–03, political instability in Iraq, Nigeria, and Venezuela; from 2004, substantial growth in oil demand especially from Asia; Supply disruptions in 2005–06 arose from political concerns around the Iran nuclear crisis, and the hurricane in Mexican Gulf Coast. Under investment in spare oil production capacity added to the upward pressure on prices as did costs of production which rose by 130% over 7 years. Post September 2007, oil was seen as a commodity to invest in, and financial market drivers and speculative investments added to the rise in oil prices, reaching an all time high of \$147.27/bbl. The crash in oil prices in 2008 followed the economic collapse in the financial sector. The upswing in oil prices in subsequent years has followed the economic

3 http://www.eia.gov/cabs/world_oil_transit_chokepoints/full.html, accessed on 9 March 2012.

recovery, and the fundamentals of demand and supply have caused oil prices to rise to around US\$ 118/bbl or so. Price rise beyond this can be attributed to fears over a crisis in Iran⁴.

Rise in oil prices can pose problems to large oil importing countries such as India, Germany and many of the economically weaker EU countries. The problem in India can be more difficult because of the subsidies on oil products which will result in large budgetary deficits.

Non fossil energy

Nuclear

Nuclear energy, while not entirely carbon free, has far less emissions than fossil fuel based plants and has resurfaced in a carbon constrained world. The world-wide interest in expanding the role of nuclear energy, not only to meet energy security concerns, but also as a mechanism to curb greenhouse gas emissions was evident in the period. The IEA in its global projections of the energy mix did suggest that the share of nuclear would rise. This was pegged at around 13% by 2030 pre Fukushima but in 2011, this was revisited to about 7% as a number of countries are revisiting their nuclear plans. Already Japan and Germany are seriously considering a revisiting of their energy mix, and Germany has announced a moratorium post 2017. Japan is considering moving to more decentralized energy forms as they are less vulnerable to the risks from nature or man made. In developing Asia, there is still a clear interest for nuclear energy because of the need to use all options to address energy access requirements.

⁴ For a clear and succinct discussion of the pressure on oil prices and the movements during the period 2002-2008, see Yergin 2011, chapters 6, 7 and 8.

The security and safety question

The discussions on nuclear energy at the Dialogues, while always endorsing this energy form as contributing to increased energy options, also suggested that the jury is still out on whether nuclear energy is an option for sustaining global energy security, because of concerns around security and safety. Ebinger and Massy (2010) point to issues of reactor safety, management of the fuel cycle and regulatory oversight as being key to whether the nuclear renaissance could deliver on the promises of secure and reliable energy (p 25). They point to the following security issues: (i) the magnified risk of expansion of the nuclear reactor fleet to countries with no experience of their management, of risks of proliferation of enriched uranium, treatment of spent fuel and nuclear waste, (ii) the possibility of ‘uranium wars’ in the future as the demand for low enriched uranium fuel rises as also the possibility of new state actors entering the enrichment process, (iii) the adoption of laser enrichment which could pose significant challenges to international inspectors looking for illicit enrichment programs; and (iv) potential disconnect between new treatment techniques and existing agreements and regulatory regimes (pp 26–27). All of this, they suggest, makes the projected expansion of the nuclear sector very burdensome on an already inadequate international regulatory system.

Ramana (2008, p 103) points out that while all electricity generation technologies have environmental impacts of one kind or the other, nuclear power is unique in three respects:

- It is the only one which comes with the risk of catastrophic accidents leading to massive environmental and public health impacts. This, he suggests, are due to the intrinsic complexity of the systems that make accidents inevitable. Two properties of reactors that make them problematic from a safety point of view: ‘interactive complexity’

(sub-systems interacting in unexpected ways) and ‘tight coupling’ (sub-systems having rapid impact on each other)– that were identified by sociologist Charles Perrow, which create risks of catastrophic accidents.

- All nuclear reactors produce weapons-useable plutonium, and
- It produces radioactive wastes that stay hazardous for tens of thousands of years. Since there is no way of removing the radioactive nature of these wastes, exposure to these wastes will continue to be harmful for hundreds of thousands of years.

A key message from the dialogues was that politics, and not economics, will continue to drive decisions on the nuclear option.

Hydropower

Hydropower has immense potential to address energy security in a clean way. Studies indicate, however, that the potential lifecycle emissions of GHGs from hydro reservoirs could be comparable to gas plants. The key issue with hydel power, however, is the environmental damage caused by large dams and the implications to local lives, through issues of land acquisition and displacement. There are several security challenges, around the fact that often water is shared across national boundaries. The security challenges that emerge from hydropower have a distinct regional dimension, given the fact that the water systems do not recognize political boundaries. In inter state disputes within India or in inter country disputes with Pakistan or Bangladesh, the generally used method is of sharing or allocation of river waters. This involves segmentation of the river rather than the integrated management of the river that is required (Iyer 2009, p 48).

Gyawali (2010) points to the conceptual failure of hydropower development in Nepal around economic, socio-development and scientific issues and the failure of dialogue to reflect institutional plurality (pp 68-69).

Environmental and social externalities are much lower in case of run of river (ROR) projects compared to storage projects. The extent of externalities like submergence and displacement of people, however, vary from one ROR project to another depending upon the project specificities. In the case of storage projects, the issue of fair sharing of the social and environmental costs and benefits between downstream/command areas and upstream/catchment areas becomes critical to the compensation debate. In the North Eastern region, for instance, the lower riparian States are reportedly not willing to pay for benefits like flood control, taking a stand that this is the responsibility of central agencies like the Brahmaputra Control Board.

Micro (<25 MW) and pico (<1 MW) hydropower are considered more environmental and people friendly. Countries such as Laos and Vietnam do have pico hydro in many parts of the country. They are considered inclusive ways of providing energy services. In India, in the absence of a transparent system of allocation of potential sites by the states, growth of micro capacities has differed widely from state to state. Subramaniam points to a lack of incentives as key to this slow growth (Subramaniam 2010, pp 50–51).

New renewable energy

Renewable energy, such as wind, solar, ocean thermal, small hydro and waves, holds great potential for furthering energy security in a carbon-free future. Pfluger (2010) points to the following issues that need consideration: (a) sufficiency of resources (b) security benefits from decentralized energy options (c) unlimited production (d) high costs (e) ability to integrate with other power supply sources in the grid (p 58). There are several other challenges that also need to be addressed, for example concerns regarding food and water security and land use patterns. Closely connected to changing

land-use patterns are issues of adequate compensation, security of installations pertaining to wind and solar farms, and rising costs, which in turn raises the issue of affordability of renewable energy. It is also believed that while decentralized energy systems are a good response to security challenges, they will involve much higher costs. They could also involve more above ground risks as more capacity will be required to deliver the same amount of energy resulting in more NIMBY concerns.

Governance

Engaging with the governance dimension was a logical consequence of the attempt to deepen and widen thinking around energy and resource security and was the key thematic of the third dialogue and central to the fifth dialogue (TERI-KAS 2009, 2011). Some of the overarching governance issues that were addressed during the conferences were on: access and rights to resources such as food, water and energy; the need for consent to exploit resources by the state or private sector—a challenge that was identified at both the supranational level, such as the EU, as well as the local level; and closely connected to eliciting consent was the challenge of sharing the resource value exploited by the public or private sector. The discussions also helped highlight that a statist approach to resources and their security carries with it the potential to disrupt and split efforts at addressing resource security in a collaborative spirit.

Drive to a greater transparency

Beyond efficiency, the energy and resource policy space is also being affected by growing demands toward greater transparency. Dubash and Florini (2011) point to efforts such as the “Extractive Industries Transparency Initiative, Carbon Disclosure Project, and regional efforts on transparency such as around the

Chad-Cameroon pipeline [which] are gradually dragging information on energy transactions into the public domain”. Yet another aspect of governance relatively new to the energy sector is on local governance and accountability. While energy was delivered mostly through centralized means, most of the focus was on bundled central and provincial institutions, i.e., generation, transmission and distribution. But as these got unbundled and increasingly more decentralized energy practices are observed, local governance of energy, both formal and non formal are becoming of importance. In sum, while the state is still the primary player in determining crucial questions concerning diverse issues, it is by no means the sole authority. A host of actors and entities at the global, regional, national and sub-national levels share the stage with national governments – either enabling or challenging the state in its efforts to deal with issues concerning resources and their security.

Rights, consent and sharing value

Resource security raises the issue of access to resources and the right to resources. This is true not only of nations, but also of people, from the national to local level. The pressing question regarding resource security is the adequate and ensured supply of resources, such as food, water and energy. The right to resources such as water on the other hand ensures that access to the same cannot be denied to anyone, particularly due to privatization.

Apart from access and rights to resources, consent regarding the exploitation of resources by the state or private sector is an equally critical factor. Eliciting consent is a challenge both at the supranational level, such as the EU, as well as the local level. At the EU level for instance, the different components within the EU make it difficult for a coordinated approach to energy security. At the local level, the government needs to be involved in ensuring a social license to operate over resources.



Part II

Perspectives and Views

Part II focuses on the commonalities and differences in perspectives and views in the EU, Germany, China and the USA relative to India and highlights how these different countries are managing consumer challenges. The Dialogues focused considerably on India, given that India's energy and resource security concerns were rising and the dialogues with other EU and Asian countries were both to examine points of similarity and differences and ways in which countries could learn from each other. Within Asia, the focus was on China, while within the EU, the focus was on Germany. The references to the USA were more incidental and with a view to examine how US policy was influencing choices, sometime facilitating, sometimes constraining. How emerging economies such as China and India react and adapt to challenges of shrinking ecological space and dwindling resources, are linked to their perception of the room to manoeuvre they have domestically and internationally. The increasing demand on natural resources and the consequent increase in competition for access has, in the last few years, altered power equations, international alignments, and economic and financial flows. It is important therefore to understand different perspectives and concerns as part of developing new agendas⁵.

5 Part II benefitted from considerable research assistance by Shivanjali Sharma, TERI

India

The key energy security issues of India are linked to the need for energy resources to address (i) growth imperatives, and (ii) energy poverty. India's energy securing strategies have had elements of both regional and nationalist approaches, such as seeking a Pan Asian cooperation, investments in transnational gas pipelines, energy consumer-producer dialogues, and more nationalist strategies, involving bilateral deals, trade arrangements, and overseas investments in energy resources by state and private energy companies. Whether this mix continues, or there is a tilt to one or the other will depend very much on how India perceives the global environment that it faces, and the space that it has to make choices to secure and deliver energy.

Four key aspects of the Indian economy of relevance to its search of energy and resource security are (Noronha 2009):

- i. Low energy access of a large part of its population: 400 million Indians live without electricity, and 700 million still use traditional biomass for cooking. This has environmental and health implications.
- ii. Large energy and resource needs to deliver growth: To eradicate poverty and meet its human development needs, the Planning Commission estimates that India needs to grow at the rate of 8–10% annually to 2031/32 from 2003/04 as base. India's ability to achieve this growth rate requires commercial energy to grow at the rate 5.2–6.1% annually. According to the projections of the Planning Commission, total commercial energy supply will have to increase 5 times in 2031/32 over the 2003/4 level. Coal will continue to be the most important source of energy followed by oil. Minerals and metals such as limestone and copper and iron ore are required to meet its urbanization needs.

- iii. A growing and demanding middle class: India's middle class is key to its emerging economy status. It is estimated that this group, 126 million in 2007–08, comprise 11.4% of the total Indian households, but makes up 25% of total income and saves more than 55% of its income. As India urbanizes, the demands for energy and raw materials will grow to meet its needs of mobility, connectivity and comfort.

The energy mix is primarily fossil fuel based, and largely dominated by coal, followed by oil and natural gas. Currently imports are 70% of oil requirements, 17% of natural gas and 12% of coal; this is projected to rise in 2031 to 90%-93%, 0%-49% and 11%-45% respectively (IEP 2006). In case of non fuel minerals, expectations are that demand will increase five fold between 2009 and 2030 for minerals and metals such as aluminum, copper and zinc. India's needs for copper concentrates are expected to further stress a tight global market. In case of other critical metals – molybdenum, rare earths, tungsten, and cobalt have strategic importance to the Indian economy, as they are used as inputs into high technology or strategic sectors, with no or inadequate substitution opportunities available for these materials.

Fossil fuel dependence

Coal accounts for 53% of the total commercial energy supply in the country. Although India, in principle has large coal reserves, the bulk of these are not extractable using current technology. It is estimated that only about 20% of coal reserves can actually be extracted, suggesting the need for large coal import dependence in the future. (Chand 2008) India is the third largest consumer of coal after China and USA. Bhattacharya (2011, p 70) points to several constraints in meeting rising demand for coal: (a) coal is found in places of habitation, and dislocating people and rehabilitating is not easy (b) coal in India is located in forest areas and getting

clearances is difficult (c) land acquisition is a major issue. Social and environmental issues are thus the major constraints to getting more coal from the ground. Coal consumers have thus been importing or seeking assets abroad to help meet the shortfall and import dependence is increasing rapidly. Most of the coal imports in 2009/10 came from Indonesia. Coal imports are expected to rise to about 71% by 2030 as per IEA 2011 estimates, but ports are poorly equipped to handle the projected volumes of imports. Coal sector reform has remained an unfinished agenda. The reasons for the persistent dominance of coal in the Indian electricity are numerous and varied, as was evident in an analysis of this issue using a path dependency approach (Noronha 2007, Chand 2008). However, if the electricity sector has to grow rapidly, two important questions arise. The first pertains to the availability of coal, both domestic and imported. The second flags the carbon content of coal, the technology options for addressing it and the issues surrounding these options.

Oil accounts for 33% of commercial energy consumption followed by natural gas at 8%. A large share (70%) of oil is imported mostly from West Asia. India's oil import dependency is projected to rise to 90% by 2031. This rising import dependency and rising oil prices are a cause of great concern for India given that the oil payments impose a huge burden on the exchequer. Apart from the economic burden, there is also concern with the geopolitical situation in countries of West Asia which creates considerable worry about stability of supplies. Supply from politically unstable parts of the world also leads to significant price volatility as predicted supply shortages (whether real or perceived) usually result in industry purchasers stocking their inventories, resulting in high prices, followed by declining prices as buyers leave the market and run down their inventories. This is compounded by concern with regard to oil transit routes, especially the 'sea life lines'.

Supplementing fossil fuels in the short and medium term, substituting more long term

Renewable energy's contribution to the electricity mix in India in 2009 was 34% (50 GW of 148 GW) of which 78% was hydro and the rest included wind (90%) and solar and other renewable energy (10%). Of the various sources, wind energy capacity alone accounts for nearly 11 GW mostly in the southern part of the country. The problem with wind power is that it is seasonal and intermittent, and there is lack of predictability and ability to schedule the power that is to be fed into the grid. Despite all this, contribution of wind to grid power has been significant (70% of RE and about 20% of total electricity mix in 2010). Solar is the new focus of attention. The recent Jawaharlal Nehru Solar Mission with a target of 20 GW by 2022 is a key institutional innovation for expanding solar energy in the country. India has put in place several interesting policy innovations to create markets for green energy and institutionalize energy efficiency in the country:

- 15 states have Renewable Energy Purchase Obligations on discoms. These require electricity distribution entities to purchase between 1%–10% of energy from RE sources.
- A platform is created for trade in Renewable Energy Certificates.
- Energy Saving Certificates (EsCerts) are in place in 8 energy intensive industries who now have specific energy consumption targets to promote energy efficiency, as part of the Perform, Achieve and Trade (PAT) scheme notified on 30.3.12.
- A nodal agency is set up (NTPC Vidyut Vyapar Nigam (NVTN)) to create and catalyze a market for sale and purchase of 33 KV and above Grid connected Solar Power under Phase-I (cum. 1000 MW).

- Innovative financing is promoted by IREDA, green banks, etc.
- Rs. 50 billion is given as grants in aid to States to support the development of RE markets by the XIII Finance Commission.

India has about 150 GW potential of hydropower potential even though its contribution to the total commercial energy mix remains small. In 2009, 39 GW of the 148 GW installed capacity of electricity came from hydropower. The reasons for such under-utilisation of capacity relates to poor and inadequate institutional arrangements to address environmental and social costs, approval issues, inadequate pre-project investigation, longer gestation periods, geological and hydrological risks (in construction and operation), lack of demand (in some of the home states) and in a few cases, inter-state (water availability) issues. Inter-state disputes can become a cause for holding up of hydro projects that involve common river systems between states leading to under-utilisation of hydro potential in the country. The disputes relate to sharing of waters, inter-basin diversion of water loom large in India (Iyer 2009, p 48).

Sethi (2010) points to the following issues with regard to hydropower development in India: (a) no optimization studies for individual river basins (b) poor and inadequate EIAs (c) public hearing processes are weak and identification of project affected people and policies and processes for compensation are weak (d) no independent dam safety inspector exists. Mahanta (2010), based on a study of hydropower development in the North East in India, suggests that water resources cannot ensure development in the absence of proper institutional arrangements. He too highlights how poor resource planning, inadequate and faulty EIAs and absence of local stakeholder participation in decision making results in hostility to hydropower development.

Nuclear Energy in the context of India was discussed extensively. (Grover 2008, Sethi 2007, 2008, 2010; Ramana 2008, Chaturvedi 2010, Prasad 2010). Nuclear energy has been of importance to India for many decades, and it has been developed indigenously given the technology denial regime in place for India. At present, the installed capacity of nuclear reactors under operation is 4560 MW. The nuclear question in India is complex: there are some aspects of it which make it a more suitable energy choice for India, but from the risk angle it is a very problematic choice as discussed earlier. Gupta (2011) suggests that nuclear power scores over hydel and thermal because it leads to less people displacement as compared to hydro, and less carbon emissions as compared to coal power.

“For a 1000 MW hydel power plant the total submerged area will be to the extent of 2000–5000 hectares....A nuclear power plant of the same 1000 MW capacity needs only 120 tonnes of fuel per year and 20 hectares of land and the waste generated is less than 1 ton of fuel per year. For a thermal plant of the same 1000 MW capacity the CO₂ emission is about 7 million tonnes per year and produces 1.5 million tonnes of ash, which needs disposal.” (2011, p 64)

India has modest domestic reserves of uranium and faced constraints on the international trade of uranium due to the denial regime. Given limited resources, India has planned to develop a closed fuel cycle, which makes use of the full potential of the available nuclear fuel resources and also makes it possible to use thorium, which India has in abundance. The three stage nuclear energy programme involves the following: Near-term growth: Will be determined by success in locating additional uranium resources in the country and opening up of civil nuclear commerce as it requires using uranium to produce power and plutonium. Medium-term growth: will come from fast breeder reactors and

adoption of closed fuel cycle. The plutonium will be used as driver fuel in the second stage along with thorium of which India has one of the world's largest reserves, to produce Uranium 233. Long-term growth: will depend on the development of technologies for deployment of thorium and fusion technology. In this third stage, power will be produced using this artificially produced Uranium 233 (Grover 2008).

Uranium trade is an important step on the way to achieving nuclear self-sufficiency, as per the vision behind India's three-stage nuclear programme. The nuclear agreement with the USA helped facilitate access to much needed uranium internationally. Post the 2008 waiver by the Nuclear Supplies Group, India signed agreements with Namibia, Argentina, Canada, Kazakhstan, S. Korea and a broad based agreement with Russia. MoUs are also in place with UK & Mongolia. Negotiations are ongoing with Japan and EU; positive indications are coming from Australia⁶.

Sharma (2010) highlights possible trajectories of security implications around uranium trade: (i) interstate competition and possible uranium wars if global nuclear expansion does take place as envisaged. (ii) intra state conflict in uranium rich countries, such as Kazakhstan, Niger, Tajikistan (iii) regional instability linked to intra state conflicts (iv) possible bilateral and international realignments due to India's uranium diplomacy (v) security of supply routes (pp 38–40).

Public perceptions towards nuclear energy were discussed extensively in 2008, 2009 and 2010 dialogues. Some saw public mistrust and fear as a 'hurdle' to nuclear power expansions, and essentially born out of lack of information or misinformation and/or lack of knowledge about the safety aspects of the technology (Chaturvedi 2010, pp 31–32, Grover 2008). Others like Ramana (2008) put the mistrust down to the operations of the government and the lack of transparency around nuclear safety issues.

6 Grover.R. Feb 24, 2012, ORF

Rao (2009, pp17-19) provided a set of priority actions for India's energy sector and resource security:

- Adopt supercritical boiler technologies which can make better use of coal with fewer emissions per calorie of energy. There are presently limitations on acquiring such technology, on its suitability, cost, and so on.
- Examine technologies that can use agricultural waste, natural plants like jatropha and other oil-bearing plants and examine how they can be grown without diverting land from food crops.
- Initiate immediately a 'Green New Deal' to embark on a renewable energy revolution. A policy to enforce the introduction of measures to construct green Buildings must be enunciated and implemented. We must go all out to promote wind and solar energy as also selected bio-fuels but ensuring no adverse effects on food production.
- Aim to begin a conscious reduction in the use of fossil fuels. This will demand incentives and penalties, enforcement agencies, research, and efficiency and conservation measures.
- Impose tough emissions targets domestically. However, there must be no international commitment to reduce emissions because of the undue pressures of the developed countries that need to do a lot more in this area.
- Must cooperate with China in securing energy resources around the world.
- Recognize the power of oil exporting countries. We must also make ourselves important to them, as for example, by building roads, railways, providing support on education and health. It is essential to nurture close ties with Russia. Terms of joint ventures or exploitation of assets in other countries

must be fair and respect host country interests even if country seems weak. We must do everything possible to gain entry into oil and gas resources of Central Asia. India must pursue its 'blue water' naval strategy to safeguard the supply routes in the oceans. India needs to do all in its power to nurture relations with Nepal and Bhutan to ensure hydro supplies in the future.

- Joint R&D with BRIC countries, Mexico, South Korea on clean coal technologies.
- Support international regulation for transparency, with restrictions on the international finance sector so that uncontrolled movement of novel financial products across borders is curbed. Financial flows need global regulation; as do complex financial products.
- We must go all out for nuclear energy and continue giving top priority in R&D to the ultimate use of thorium as fuel.
- Move towards a rational tariff system for electricity that takes account of costs of service. Subsidies should not be at the cost of distributor companies.
- Relate domestic tariffs for domestic gas (and coal) to their end use prices as is allowed to major end uses, through appropriate regulation or excess profits tax.
- There must at the same time a realistic user charge for fossil fuels and power, and a relationship between the two.
- Subsidies remove flexibility from energy and foreign polices and must not be at the cost of the distributor, but paid for by government to the targeted beneficiaries.
- Ownership of distribution should have a strong private component to introduce commercial and enterprise cultures in them.

European Union

The challenges of the EU in achieving energy security were discussed in several dialogues. (Hedrich 2007, Lehne 2009, Umbach 2011, Pfeiffer 2007, 2008, Pfluger 2011) The dependency of the EU on energy imports, particularly of oil and more recently of gas, forms the backdrop for policy concerns relating to the security of energy supplies. Its energy policy objectives centre around economic competitiveness; energy supply security; environmental policies and climate change. Strategic analysts call for the need to balance these against each other rather than favour one over the other (Umbach 2011).

High import dependency

The dependency on oil and natural gas makes European economies highly vulnerable to energy supply shortages. Europe imports around 50% of its energy needs, while oil amounts to over 80% and gas about 60%. Forecasts predict that by 2030, Europe will have to import 65% of its energy resources (Lehne 2009). Imports of fossil sources of energy are expected to rise to 85% of overall energy requirements by 2030, with high dependence on West Asia. Russia is Europe's biggest oil and gas supplier and has also emerged as the leading supplier of hard coal (30.2% as of 2009). In 2009, some 33.1% and 34.2% of the EU-27's imports of crude oil and natural gas respectively were from Russia. Countries in East and Central Europe are already heavily dependent on Russia and by 2030 EU gas imports from Russia could make up 60% of requirements. Natural gas resources are more evenly distributed. Norway is a reliable major producer (accounting 30.7% of EU-27's natural gas imports as of 2009). Close to four fifths (79.1%) of the EU-27's imports of natural gas in 2009 came from Russia, Norway or Algeria. 57.3% of EU-27 crude oil imports came from Russia, Norway and Libya, while 77.5% of hard coal imports were from Russia, Colombia,

South Africa and the United States. There are those who argue that the EU should now look to the High North for natural gas supplies in partnership with Norway and Canada to reduce its current dependence on Russia, West Asia and North Africa (Greg Pytel, EUCERS, Newsletter, No 11, 2012).

Complex geopolitics

The EU's external energy policy with respect to oil and natural gas supplies is focussed on Russia, North Africa and West Asia, and planned supplies from Central Asia. The bargain that Russia is seeking with the EU is reciprocal access to markets. Putin in 2006, stated that "if our European partners expect that we will let them into the inner sanctum of our economy – the energy sector – and let them in as they would like to be admitted, then we expect reciprocal steps in the most crucial and important areas for our development."⁷ Russia's stand was that if the EU can look to more 'reliable' suppliers than Russia can look to global customers who offer better demand conditions.

Security of the EU's primary energy supplies may be threatened if a high proportion of imports are concentrated among relatively few partners. A noticeable positive trend in the EU-27's energy imports has been the emergence of new partner countries between 2001 and 2009, although import volumes from them remain small. Examples are hard coal imports from Indonesia, crude oil imports from Kazakhstan and Azerbaijan, or natural gas imports from Qatar, Libya, and Trinidad and Tobago.

Need of coordination on EU energy policies: within and external

There are about 27 national energy policies, 27 different national energy mixes and 27 different energy foreign policies between the individual 27 member states (Umbach 2011 b, p 124)

7 AP world stream May 26, 2006

This makes it very difficult to come to a consensus on a common energy policy. In fact, as Umbach points out there was no common EU policy until the first Russian–Ukraine gas crisis in 2007. Thinking on common issues across the EU only began in 2005, when China was perceived as a competitor with respect to energy and non energy resources in the global market (p 123). The trigger to a common policy was the 2007 gas crisis. The call to action was prompt and a clear policy emerged. But Umbach points out that a common voice is still insufficient with regard to China and Russia (p 124). Member states within the EU continue tend to pursue their own domestic energy policies which can prove detrimental in reducing import dependency on Russia. Rao (2009) comments “It is clear that European countries in their foreign policies towards Russia are no longer as united as they were. It is clear that the policies are influenced by their present or anticipated dependence for oil and gas supplies on Russia. Russia controls the pipeline that supply Europe gas from Central Asia. It is therefore in a position to disallow alternatives to these pipeline routes from appearing. Russia’s relationship with Central Asian dictators gives Russia an advantage, in addition to its geographical location. As Russia tries to restore its old imperial power, oil and gas are welcome tools in their armoury. Any intrusion into the Russian sphere of influence will see strong reactions as we have seen in Ukraine and Georgia” (p 12).

The Commission adopted a Communication on security of energy supply and international cooperation, outlining the main contours of the EU external energy strategy in September 2011 (Kohler 2011). Hence, the real challenge lies in implementation of common EU energy policies including the infrastructure projects – a precondition for a real united energy market in the EU.

With regard to climate change, the expanded EU also has implications for an EU common policy and international negotiations. In addition to the original EU15 Annex I parties, a number of East European countries, which are economies in transition have now joined to make the EU 27. Dasgupta (2008, pp 37–38) points out:

“Under the Kyoto Protocol, the EU has one single target because it is a group of Annex I countries. At some stage it seems, however, that the EU will have to address the problem of homogenisation of the new EU, particularly with regard to the so-called economies in transition of Eastern Europe. The East European countries have already certified themselves as having completed the transition when they entered the EU, because if they were not market economies they would not be admitted to the EU. It is a peculiar anomaly that these countries moved out of that category when they joined the EU, but they retained the category of economies in transition as negotiators in the climate change context.”

Reducing the dependence on fossil fuels

In March 2007 the EU endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU’s energy security while strengthening its competitiveness. The aim of the new energy policy was to transform EU into a highly energy-efficient, low carbon economy. To initiate this process, the EU Heads of State and Government set a series of climate and energy targets to be met by 2020, known as the ‘20-20-20’ targets:⁸

- Expand renewables from approximately 9%– 20%

⁸ In January 2008, the European Commission proposed binding legislation to implement the 20-20-20 targets. This ‘climate and energy package’ was agreed by the European Parliament and Council in December 2008 and became law in June 2009.

- Reduce EU emissions by 20% in comparison with 1990
- Increase energy efficiency by 20% and reduce the energy demand by 20%

If other industrialized countries such as the USA, India and China commit themselves to similar policies, EU targets reduction in carbon emission by 30% by 2020 compared to 1990. The EU also has special targets for biofuels in the transport sector, that is, to increase the biofuel component by 10% by 2020.

Offshore wind is an essential element of this 20% renewable energy target to be achieved by 2020. While the UK has plans for 33 GW of offshore wind, Germany targets 10 GW, as offshore wind is expensive and challenging.

On the nuclear front, Europe is not phasing out its nuclear industry even though Germany, along with a few other countries, are doing so. France is not likely to phase out its nuclear power even though there is some growing internal opposition against nuclear power. Going forward, in Europe (including Germany), nuclear electricity is likely to remain part of the energy mix. It is the security of supply and the competitiveness of nuclear electricity that will determine whether it will stay in the energy supply demand mix in Germany and other European countries.

On the resources front, the EU is heavily dependent on imported metals. EU has recently come up with 'Roadmap to a Resource Efficient Europe'. The objective of the road map is to transition Europe to a more resource efficient development and also identify the means needed for achieving them.

Germany⁹

Germany is the fifth largest consumer of oil in the world. Germany depends on energy imports higher than the average EU-27, despite the significant amounts of domestically produced energy. It is also the largest consumer of metallic minerals with the EU. Russia, Norway, and the United Kingdom are the largest exporters of oil to Germany. Germany is the third largest consumer of natural gas in the world and fourth largest consumer of coal in the world. Germany's CO₂ intensity and per capita emissions are above the EU-27 average values. In the future, Germany and the EU might remain heavily dependent on Russia for gas. This is going to coincide with an adverse socio-political environment in Russia, as it is facing an emerging gas crisis domestically despite the fact that it has the largest gas reserves in the world.

Nuclear power in Germany accounted for a quarter of 23% of national electricity consumption before the shutdown of 7 plants in March 2011. In 2000, the government and the German nuclear power industry agreed to phase out all nuclear power plants by 2021; this was revisited in 2009, but post Fukushima, as the public turned against nuclear, the seven oldest reactors were permanently closed. On 30 June, 2011, the German parliament approved the government's historic phase-out of nuclear energy¹⁰. The last plant would shut down in 2022. This will involve a rise in carbon emissions, as the slack will need to be taken up by power and gas. The extent of the increase in carbon emissions will depend on the pace at which renewable energy is able to fill this gap¹¹.

9 Material in this section draws from Wolff 2007, Pfeiffer 2007, Kreft 2007, Wolff 2008, Umbach 2011

10 http://www.india.diplo.de/Vertretung/indien/en/__pr/Politics__News/Westerwelle__Message.html <http://www.world-nuclear.org/info/inf43.html>

11 http://www.claudiakemfert.de/fileadmin/user_upload/pdf/pdf_publicationen/Economic_Bulletin.pdf

The plan is to increase the share of renewable energy to 30% by 2020 and 50% by 2030. Foreign Minister Westerwelle says that Germany's change of direction is not going to make it more dependent on other countries as its government is investing more than ever in the three key areas to ensure its power supplies: enhancing the grid, developing renewable energy sources and increasing energy efficiency. German policy emphasizes conservation and the development of renewable sources, such as solar, wind, biomass, water, and geothermal power. Hence, energy saving measures have resulted in energy efficiency (defined as the amount of energy required to produce a unit of gross domestic product) has been improving since the beginning of the 1970s. The German government has set the goal of meeting half the country's energy demands from alternative energy by 2050.

The German targets for renewable energy are 20%–30% in the electricity sector until 2020. Germany is now focusing on the heating and cooling sector and the country has set a target of 14% renewable energy in the heating and cooling sector by 2020. Germany aims for more independence in the traffic sector as well and has set a target of 20% for alternative fuels by 2020 in the transport sector. The country is also focusing on a larger role for biogas for which measures are being taken to connect biogas to natural gas grids. Currently, Germany consumes 100 billion cubic meters of natural gas per year. This will stay more or less stable even if the country makes a saving of 20%. This will serve the twin purpose of achieving GHG reductions as well as energy security for the country.

Germany's plans to rely increasingly on renewable energy will, however, increase its needs to import critical raw materials required for harnessing of renewable energy. Germany's Mineral Resource Agency is one such institution set up in 2010 "towards safeguarding Germany's position as an industrial location for the

long term.” The agency will perform the following tasks: Establish a raw materials information system: The aim is to enhance transparency on the commodity markets; Provide customized advice and assistance to companies and business associations; Provide expert assistance to the German government in setting up and implementing support programmes in the fields of resource exploration, resource extraction and raw materials efficiency; Research and development projects geared towards industrial use; Cooperation with resource-rich countries: The German Mineral Resources Agency will establish contacts and seek cooperation on raw materials¹². With regard to the last, the Agency is already cooperating with Kazakhstan and Mongolia.

In November 2011, a few German companies formed a collaboration to establish an alliance in order to secure the supply of industrial raw materials for German industry. By end January 2012, twelve companies had formed an ‘Alliance for Securing Raw Materials’ set up by several of the big industrial houses of Germany – BASF, Evonik, Thyssen-Krupp, Daimler, Bosch, and BMW¹³. Participants at the Chatham House workshop in 2011 warned, however, that “consumer countries attempting to secure supply can have wide geopolitical ramifications, and in terms of military force profiles and deployments.”

China

China today is the second largest and fastest growing oil consumer in the world. China has a growing population of over 1.3 billion people and there is heavy reliance on imports for energy sources to meet its growing mobility needs and urbanization. The demand for energy resources is also mirrored in increased

¹² <http://www.bmwi.de/English/Navigation/Press/press-releases,did=365428.html>

¹³ <http://www.ft.com/intl/cms/s/0/8f41df0a-4b62-11e1-b980-00144feabdc0.html#axzz1rqof2I3Z>, accessed on 12 April 2012

demand for minerals and metals – iron ore, copper, limestone, and critical metals. The demands that China's growth is placing on the global commodities market is also instrumental for the sharp price rises in this sector.

Umbach (2011a) highlights the following facts about China's energy demand that have global implications: (pp 6-7)

- China alone will contribute 36% of the increase in global energy demand by 2035, and it alone will be responsible for 57% of the increase in global primary oil demand (excluding biofuels) from 84 mb/d in 2009 to 99–107 mb/d in 2035.
- China's gas demand will grow fastest at almost 6% pa, accounting for almost 25% of rise in global gas demand to 2035.
- By 2035, China will account for half of global coal production and install around 600 GW of new coal-fired power generation capacity – the total combined coal-fired generation capacity of US, EU and Japan.

China is also a major energy producer. Coal is the primary source of energy for China followed by oil. In 2010, China was the top coal producer in the world. However, China also imports coal mainly from Indonesia followed by Australia, Vietnam, Mongolia and Russia.

China's growing demand for petroleum as well as natural gas will need to be met by imports and it is expected that China will have to import over 55%–60% of oil and 25%–45% gas needed by 2020 (Xia Yishan 2007). A big role is played in China's oil securing strategies by its state owned oil companies, mainly China National Offshore Oil Corp, China National Petroleum Corp, and Sinopec. These national oil companies

have increasingly become global in their footprints, prompting the term global national oil companies (GNOCs). African oil accounts for more than 30% of China's oil imports, and China is Africa's leading lender and infrastructure investor. CNPC has signed strategic cooperation agreements or memoranda with Shell, Chevron, StatoilHydro, ONGC and others.

On the renewable energy front, China has taken active and important initiatives to develop new renewable energy. China has identified wind power as one of key energy sources to meet the growing economy's energy demands. China aims to have 100 GW of wind power capacity by 2020 and is keenly attracting foreign investment in wind power generation (especially from the USA). If Chinese companies manage to develop low cost, reliable solar modules, it could drastically reduce China's dependence on coal and oil imports as well as mitigate environmental damage.

Given the growing concerns over air quality, climate change and fossil fuel shortages, China is looking at nuclear power as an alternative to coal. China has two major nuclear power companies, the China National Nuclear Corporation operating and the China Guangdong Nuclear Power Group. Work is ongoing for development of nuclear fusion reactors as well as research and development into the thorium fuel cycle as a potential alternative means of nuclear fission. There have been some reservations about nuclear projects following the Fukushima Daiichi nuclear disaster in Japan, and China announced on 16 March 2011, that all nuclear plant approvals were being frozen, and that 'full safety checks' of existing reactors would be made. However, China's overall nuclear energy strategy is likely to continue.

China has adopted a two-pronged approach to meet its future energy needs (Yishan 2007). This entails focusing on domestic sources as well as international ones. Diversification is key to China's growth – diversification of the country's fuel

portfolio, energy supply sources as well as transportation grid. To reduce dependency on import of conventional fuel import, development of renewable energy (hydropower, solar power, wind power) as well as nuclear energy along with new sources of energy is an imperative. Strategic alliances in disputed areas, of bilateral cooperation or multilateral cooperation, between states or companies, between public companies or private sector are all vitally important to access scarce energy resources. It is in these evolving strategies that there are some commonalities in the approaches of India and China, despite significant differences in initial conditions.

On the critical raw material side, China has used trade related measures such as export taxes, quotas and administrative rules such as export licenses and minimum export price requirement to control the movement of raw materials. Such actions have resulted in complaints by the USA and the EU at the WTO Appellate Body with regard to its WTO treaty obligations¹⁴.

China and India – not really similar

While both India and China are on a high growth trajectory there are important differences between these two countries which need to be appreciated. Recognizing the key differences in these nations' energy security scenarios, a key recommendation which came out from the 2009 Dialogue is to de-hyphenate India and China in energy security and energy and climate debates. The energy reality of both countries, their carbon emissions and their consequent impact on climate change are quite distinct.

Hedrich (2007, pp 37–38) highlights key political, economic and infrastructural differences between the two countries which dictate their energy choices and future energy security options. He points that a big difference between India and

14 <http://www.fisime.org.in/Feb29-2012/docs/TradeTrends.pdf>

China is that India is a stable democracy with a burgeoning middle class and China is not. India's political agenda has combined pragmatism with nationalism. Further, he notes that India's energy insecurity is aggravated by the fact that there is little overlap between its main trading partners and its main energy suppliers, while this is not the case in China. Whereas India has had a more laid back approach towards energy security, China has been aggressive in building strategic reserves.

USA

The USA is an important actor in the energy business as it not only is a major producer and consumer, but it also can create both stability and instability in the energy decision space. Three issues with regard to the influence of US policies on global energy security were much discussed during the Dialogues (i) its relations with West Asia (ii) geopolitics in Central Asia as these were of relevance to India as well as the EU and (iii) its support of nuclear energy to meet both energy and climate concerns.

West Asia

West Asia has the largest reserves in the world (65% of the world's oil reserves and possibly 50% of world's gas reserves). Oil has therefore been one of the key strategic concerns in the US relationship with West Asia, if not the most important. Oil risks resurfaced as an issue in the US post 9/11 given the location of Al Qaeda in West Asia. The event specifically strained US relations with Saudi Arabia, given the large presence of Saudi nationals amongst the Jihadis, leading to a renewed concern in the US that oil imports from the regions were a security risk for the US (Yergin 2011, pp 126–128). The 9/11 also led to a change in the debate on Iraq and to the policy of preemptive war. The Iraq war did cause considerable disruption

to global energy security. Quite apart from the fact that it led to a reduction or a halt to exports during the war, post the war and until 2009, the country's production was at 2/3 of its capacity of 3 mbd prior to the war years (Yergin 2011, p 158). Instability too prevailed in the region adding to the tensions that already existed.

Ahmad points to US actions as responsible for the turmoil in the region and the violence.

“Where the region demanded sensitivity it had to see violence and where it demanded statesmanship and diplomacy it saw war and human rights violations by the single hegemonic power. A huge land mass with its own history, culture and civilization is today being intimidated in extraordinary ways that can only cause uncertainty and concern about what the intentions of this hegemonic power are. And even as we grapple with the unfinished issues of Iraq, we find ourselves facing the prospect of another front being opened in Iran. It is in this environment that we consider the issue of energy security.”
(Ahmad 2007, p 114–115)

The current standoff with Iran over its nuclear program, the sanctions in place and the talk of possible strikes on its nuclear installments just increase tensions and the possibility of any war in the region can be disastrous for oil and gas supplies. The underlying message is that any regional instability in this critical and sensitive region of the Straits of Hormuz, which is the world's most important choke-point for oil transported to the global oil markets would have crucial impact on the oil prices and global energy supply security as discussed in Part I.

Central Asia

Central Asian countries are estimated to have about 4%–5% of oil reserves and 6%–7% of world gas reserves with the potential of more discoveries. They have emerged as important alternative sources to West Asia and are being courted by Russia, India, China, the EU and the US. The US is pursuing its own agenda in this region which is to expand its own influence, restrict Russian influence and undermine Iran's efforts in this region. The US interest also lies in the hydrocarbon resources of the region directed west and not to the lucrative markets of South Asia, North East and South East Asia (Ahmad 2007).

The reassertion of American hegemonic power in Asia in the middle of the millennium decade was considered troubling precisely because it was happening at a time when other possibilities of cooperation and a new security concept were emerging (Vardarajan 2007, p 121). “The new Asia, as far as US is concerned, seems to be about keeping the Iranians and Russians out, the Chinese down and the Americans in. The Americans are kept in by playing on Asian bilateral insecurities such as between Japan and Korea, China and India, India and Pakistan.”

The nuclear energy debate in the US

Tellis (2008, pp 69–77) points to the idea of ‘perfect energy security that is driving a lot of the calculations with respect to nuclear energy in the US’. He discusses the new nuclear initiatives of the USA in terms of five key elements: First, multiple drivers, none of which can be priced individually. He highlights the key drivers of US nuclear energy (pp 70–72): The need to tap every available source of energy to meet projected Asian energy demand; Climate change concerns and need to decarbonize; Changing economics of nuclear power production including changes in fossil fuel prices; Perception that relative contributions of the cost of

nuclear fuel are marginal to the final cost of the output; and the question of security of supply. These perceptions are also driving its support for nuclear expansion plans in other countries. The second element relates to seeking a solution to transport challenges from nuclear energy, that is, nuclear power not simply to produce electricity but actually to produce hydrogen for the transportation sector, replacing fossil fuel-based gasoline engines with hydrogen engines in automobiles. The third element is that the US is moving towards a closed fuel cycle and reprocessing. The fourth element is that the Bush administration is trying to deal with nuclear proliferation by focusing on both technical solutions through the GNEP programme as well as through regime innovations. The fifth element addresses the issue of increasing the role of nuclear power without increasing waste through transmutation and reprocessing as a way of managing the waste problem without separation of plutonium. Varadarajan (2007) suggests that the nuclear deal with India was also “entirely about strategy and revolves around modulating India’s contribution to this emerging Asian architecture. The idea could be to have India play a part in Asia analogous to Britain’s in the EU – within the system but close to US interests”.

Ahmad (2007) criticizes the political strategy deployed by US to arm twist India into lopsided deals.

“US perceptions of energy security are quite different from ours. They speak in terms of security but foster insecurity. They speak in terms of stability but foster more violence. India cannot accept this and does not want energy to become an area of conflict and domination. Our approach is cooperation on bilateral basis, regional basis, continental basis, and a global basis”. (p 118)

Summing up this overall energy debate and the power tussle between the 'old dictators' and the 'new age warriors', Pant (2009) very astutely observes that going forward, if the ultimate interest is to turn this into a positive sum game and find a win-win situation, the two warring clans of energy players will have to resort to cooperation and balance.

He states, (p 40)

“Given the fact that the entire energy debate is seen in terms of geopolitical considerations, we see the usage of terms such as ‘scramble for energy’, ‘rivalry and competition’, of ‘Europe versus Russia’ and so on. It is in this context (that) one needs to see the decision by the US to create military bases on the African continent. This militarization of energy security is a result of the geopolitical constraints felt by rising energy demand in the world. However, at another level, there is also a dialectical process and pressure building up for greater collaborative action in the energy domain. It is in this context that we have to see the International Energy Agency’s (IEA) interest in entering into a dialogue and cooperation with the OPEC. There is also now a greater emphasis on dialogue between energy producers and consumers as well as multi-national strategic oil reserves. Again, in the years to come, economic imperatives will be driving national and international oil companies towards greater collaboration.”

Annexe 1: Perspectives and views on energy options and related issues

On Nuclear Energy			
India	EU	Germany	China
<ul style="list-style-type: none"> ● The contribution of nuclear energy in the electricity mix has been miniscule (3%) till now; plans are to raise it to 20% by 2050. ● Indigenous programme will not only continue, but will be scaled up. ● Closed fuel cycle has been and will continue to be an integral part of India's nuclear power development policy. ● The policy of indigenization will continue even when India sets up LWRs. ● There is polarity on the suitability of nuclear energy in India: some strongly support for reasons such as lesser people displacement/ carbon emissions as compared to hydel/ thermal projects; others argue against on grounds of safety, lack of transparency, public mistrust, economics. 	<ul style="list-style-type: none"> ● Europe is not phasing out its nuclear industry even though Germany, along with a few other countries, are doing so. ● France is not likely to phase out its nuclear power even though there is some internal opposition against it. 	<ul style="list-style-type: none"> ● Germany until March 2011 obtained one quarter of its electricity from nuclear energy, using 17 reactors. ● Post Fukushima nuclear disaster in Japan in March 2011, the German Federal Government is re-evaluating the role and safety of nuclear energy. <ul style="list-style-type: none"> ■ Imposition of 3 month moratorium to examine the general conditions that apply within the energy sector. ■ Disconnecting of seven nuclear power plants from the grid and shutdown of another for reasons of safety and security. ● Nuclear energy to be phased out by 2022. ● Nuclear power is likely to be replaced by energy from renewable sources and low carbon gas power plants. 	<ul style="list-style-type: none"> ● China has plans to substantially raise the share of electricity produced by nuclear power. ● China is working towards developing nuclear fusion reactors and thorium fuel cycle and given the climate change concerns and fossil fuel shortages, nuclear power is also being regarded as an alternative to coal.

On Coal

India	EU	Germany	China
<ul style="list-style-type: none"> ● Coal is dominant in commercial energy space. ● Share of coal in commercial energy is expected remain significant to 2030. ● Imports will rise as there are several constraints to meet the rising demand for coal domestically. ● Clean coal technologies are considered key. ● Other technologies being considered: <i>in-situ</i> coal gasification, use of coal to liquids and coal to gas technologies and tapping coal bed methane. 	<ul style="list-style-type: none"> ● To decrease dependence on coal, by 2020. ● CCS technologies are also being researched. 	<ul style="list-style-type: none"> ● Germany is focusing on raising efficiency of coal fired power plants. 	<ul style="list-style-type: none"> ● High dependence will continue for some time. ● China is making substantive efforts to develop clean coal technology to increase energy efficiency and reduce GHG emission. ● China is fostering Indo-China partnership for R&D projects for clean coal, coal bed methane, coal liquefaction, coal gasification etc.

On Renewable Energy

India	EU	Germany	China
<ul style="list-style-type: none"> ● Renewable sources not a substitute but a supplementary energy source, given large unmet energy requirements. ● There are environmental and social issues with hydel power projects. ● Given India's topography and distributed rural population, solar energy is regarded as a preferred local energy source. ● Wind power, a success story, but emerging issues. 	<ul style="list-style-type: none"> ● Expand renewables from approximately 9% to 20%, by 2020. ● Offshore wind is an essential element of this 20% renewable energy target to be achieved by 2020. ● While the UK has plans for 33 GW of offshore wind, Germany targets 10 GW, but offshore wind is expensive and challenging. ● Solar power is also important in countries such as Spain and Portugal. 	<ul style="list-style-type: none"> ● Renewable energy is set to take center stage in the country's energy security scenario and its share in electricity generation to progressively increase to replace nuclear. <ul style="list-style-type: none"> ■ Germany has plans to generate 35% of its electricity from renewable sources by 2020, 50% by 2030 and 80% by 2050. ● Fostering energy relations with India for production of renewable energies. <ul style="list-style-type: none"> ■ Joint plans to set up solar plants in India (for example in decentralized renewable energy supply). 	<ul style="list-style-type: none"> ● China views renewable energy as a viable option for reducing dependence on coal and oil imports as well as mitigating environmental damage. ● Alternate fuels are being explored extensively for home heating and cooking, diesel substitute for buses etc. ● Is emerging as a leader in global renewable generation growth.

Managing Geopolitics and Energy Relations

India	EU	Germany	China
<ul style="list-style-type: none"> ● Success of India's energy and raw material strategy will largely depend on its ability to manage the near and far neighborhood. ■ Strategic alliances with neighboring countries on natural gas. ■ Securing oil supplies from South Sudan, Nigeria and Angola. ■ Managing the geopolitics of West and Central Asia. ■ Diversify both fuels and the sources of supply under long-term arrangements that include trans-national pipelines. ● SAARC region richly endowed with natural resources; need for regional cooperation. ■ Water potential of Nepal, Bhutan, India and Pakistan. ■ Natural gas of Bangladesh, Pakistan, Myanmar. ■ Critical metals – Afghanistan. ● Joint R&D and technological co-operation with BRICS. ● Cooperation on energy with ASEAN countries. ● India – US relations on energy need revisiting . ● Multilateral solutions in a number of issue areas need support. 	<ul style="list-style-type: none"> ● Manage geopolitical concerns <i>vis-a-vis</i> Russia (high import dependency, pipeline issues in the Caspian region). ● Dialogues and partnerships with organizations such as OPEC. ● Strengthening its dialogue with India and China. ● Fostering an EU–Russia energy dialogue. 	<ul style="list-style-type: none"> ● International cooperation as a crucial point of its energy and resource security strategy. ● Strategic energy partnership with Russia. 	<ul style="list-style-type: none"> ● Diversifying its import options and exploring strategic alliances with Central Asia, Africa and Russia for sourcing energy supplies. ● Regional cooperation to explore new avenues for its energy options –Kazakhstan, Turkmenistan and Myanmar. ● Diversification of means and routes of energy transport is key to its energy security (Kazakhstan, Russia and within China).

Energy and Resource Markets and Regulations

India	EU	Germany	China
<ul style="list-style-type: none"> ● Move towards a rational power tariff system that reflects costs of service. ● Relate domestic tariffs for domestic gas (and coal) to their end use prices. ● Need of a realistic user charge for fossil fuels and power, and a relationship between the two. ● Subsidies remove flexibility from policies and distort behavior. ● Subsidies should not be at the cost of distributor companies. ● Subsidies when needed, to be paid for by government and for targeted to beneficiaries. ● Ownership of distribution should have a strong private component to introduce commercial and enterprise cultures. 	<ul style="list-style-type: none"> ● EU views implementation of internal energy markets as a critical step towards achieving energy security and creating a win-win situation for producers and consumers by providing the following benefits. <ul style="list-style-type: none"> ■ Give European consumers a choice between different companies supplying gas and electricity at reasonable prices. ■ Make the market accessible for all suppliers, especially the smallest and those investing in renewable forms of energy. ■ Enable a framework for CO2 emission trading. ■ Ensure reliable and coherent energy network in Europe by focusing on infrastructure investment. ■ Contribute to diversification and security of supply. 	<ul style="list-style-type: none"> ● Internal energy markets will streamline the demand and supply of energy and play a pivotal role in achieving EU wide energy security. ● Germany has plans to introduce smart metering as part of the liberalization process in the European energy market. 	<ul style="list-style-type: none"> ● Reduce subsidies. ● Improve efficiencies in production and distribution.

Energy and Resource Markets and Regulations (Contd.)

India	EU	Germany	China
<ul style="list-style-type: none">● Resource trade transactions need to be made secure and transparent by shifting to multilateral arrangements and trading in neutral locations.	<ul style="list-style-type: none">● EU is developing innovations in transport sector.<ul style="list-style-type: none">■ Focus on need for environment-friendly and intelligent transportation systems that exploit present technological innovations.		

Thinking Beyond: Towards an Inclusive and Positive Agenda

Part III

The period of ‘unprecedented uncertainty’ that is unfolding requires us to engage with the nature of this uncertainty: Can we produce enough? Does the world have enough? How do we deal with sustainability questions? How do we deal with perceptions of fear and concern about what the future holds not only in terms of resource availability, but also arising out of strategies pursued by consumer countries? How do we manage the period of transition between resource and fossil fuel intensive economic systems to more green economies without affecting development prospects of the developing world? While the period to 2030 is expected to be manageable in terms of resource supplies, the concerns are for the period beyond. The Shell scenario, for example projects that if historical patterns of development are followed by emerging economies, this will result in a tripling of energy demands of 2000 levels, which are clearly unsustainable for energy supplies and the environment. British Petroleum’s Energy Outlook 2030, sees a world primary energy market share convergence at 27% for three fossil fuels (oil, natural gas and coal) and 7% for the major non fossil energy sources (hydro, nuclear, renewable energy) by 2030. Natural gas and renewable energy forms win within each type.

The search for energy and resources is a reality that we are living with and will have to live with. Considerable apprehensions exist around paths to be followed by the emerging economies, especially China and India. Uncertainty relates to whether they will be rule makers or rule breakers or rule shapers. The sense at the Dialogues was that the trajectory followed by the emerging economies will depend very much on the kind of responses they face to their development by the established order. A supportive order will help create a better disposition towards more inclusive and positive rule shaping and making. A hostile external environment will lead to rule breaking, and potentially conflict situations.

To propose a forward agenda for dialogue and action, in Part III, some of the overarching themes from the dialogues around energy and resource security are revisited below.

Overarching themes

Globalized demand and partially globalized resource supplies

Globalization is increasingly posing several challenges as well as opportunities in the context of energy and resource security and hence a reconstitution of the way in which resources are controlled by states. (Umbach 2011 a, Sharma 2011) A clear trend of a ‘globalized demand’ but a ‘partially globalized supply’ of resources is evident, as these are still spatially located and controlled. The rising and globalized nature of demand for energy resources is well established. However, the uneven distribution of energy supplies among countries has led to significant vulnerabilities. Threats to energy security include geopolitical maneuverings, political instability of several energy producing countries, the manipulation of energy supplies, the competition for energy sources, attacks on supply infrastructure as well as accidents and natural disasters.

The politics of energy security and national resource strategies have emerged as key concerns worldwide. A growing competition in demand is evident, while supplying countries are more concerned with national interests. This could result in serious conflicts of the next century over energy, raw material and water resources (Pfluger 2011, p 105).

Securitization of energy and resources

Energy security and the issues pertaining to energy resources are increasingly treated as part of the traditional security agenda, especially for consumer countries. Energy and resource security is becoming an important component of foreign and security policy agendas around the world. Nonetheless, Dialogue participants highlighted the need to bring energy security into the foreign policy calculations of the country in a much bigger way than it has hitherto been characterized with in order to engage with it more positively. Energy security is not only a concern for energy importing countries, but also energy producing and exporting countries. The general consensus was that fossil fuels will remain important in the world and so will the security concerns (both traditional as well as non-traditional) remain central to those who depend on them, either for exports or for imports. The linkage between energy resources (such as fossil fuels, renewables as well as uranium) and comprehensive national security is more than apparent. Energy resources are seen as strategic assets—crucial for military, economic and social development. The increasing demand for such resources and the consequent increase in competition for access has in the last few years altered power equations, international alignments, and economic and financial flows.

The emergence of a more participatory energy and resource politics

As the strategic importance of energy resources increases, both globally and nationally, and as sub national governments get more involved in decision-making, it is more likely to also become the subject of intense public and political debate domestically. The energy citizen and sub national entities are beginning to make themselves heard in energy debates in four key ways: Firstly in making energy access, electricity, a key electoral demand, as in India; Secondly, in creating social resistance to some forms of energy (specially nuclear, but also wind) and their siting, that are seen as detrimental to human and ecosystem wellbeing, as in Germany, EU and India; Thirdly, in demanding energy change that recognizes the need for some energy equity, both among nations and within nations, focusing on resource and energy efficiency; and Fourthly, in requiring compensation for externalities of, and sharing of the benefits from resource development. These voices that have hitherto been soft, unheard of, are now beginning to carry weight in national policy making, and even have a presence in international discourses.

The inter-linkages between energy, climate and security

A new international politics around climate and energy has emerged with the growth of India and China that has moved the debate from being centered on environment to one of competitiveness (Chellaney 2008). Differential and historic responsibility towards carbon accumulation in the atmosphere is well known and recognized, but it needs to be recorded that the developed world, especially the USA, has done little to address its responsibility even after UNFCCC was signed in 1992. Much more is required in terms of action to address climate risks and the inherent trade-offs involved in action on the energy front.

Climate change as a tension multiplier, capable of exacerbating existing conflicts by increasing the asymmetry between the human and natural resources in countries affected by climate change was a recurring theme. Panelists highlighted the vulnerability of regions, such as South Asia, to climate change and the possibility of increased conflict between countries (Najibullah 2008). The security impacts of climate change could be around human security, possible inter-state and intra state competition over natural resources affected by climate change resulting in resource wars, and intra and inter-state migration triggered by extreme events which in turn could cause conflict in the destination states. Dasgupta (2008) highlights the need for pursuing policies based on enlightened self-interest, not altruism. The North, he says, should not pursue short-term national interests at the cost of its own long-term interests.

While climate change can be used as a driver to move systems to cleaner energy, in most countries, especially Asian countries, climate change is only a second order goal relative to ensuring energy availability, the co-benefits argument notwithstanding. The inaction on the part of the developed world, however, does not refute the fact that there is a need for collective action on the part of emerging economies, through raising awareness and adopting policies to reduce the carbon intensity of national economies. There is also need to recognize how international negotiating positions play out domestically. Sethi (2008, pp 35–36), puts it neatly:

“The international phraseology and semantics such as ‘2.2% of the country’s GDP going into adaptation costs every year’, is perfectly placed on international tables. However, when put at the domestic table, it allows the state to say that they are doing enough for the people at home. For instance, the automotive industry in India has been

under tremendous pressure to adopt fuel efficiency norms. However, the automotive industry referred to the climate change debate saying that as long as foreign technology is not available, they cannot adopt the new norms. They have asked for the restructuring of bank loans because the new emission laws and standards will make it difficult for the automotive industry to adapt to the changing environment. Therefore the way that the Indian government and other developing country governments use the climate change language at international fora has the potential to very often put the communities at greater economic and environmental risk than they were hitherto.”

Future agendas

Thinking beyond thus requires us to frame issues somewhat differently. The discussion below centres around the following key themes:

- From resource securing to resource enhancing strategies
- Multilateral solutions to energy and resource security
- Research, development and technology
- Regulatory frameworks to balance concerns and risks
- Collaboration and cooperation
- Distributed governance

From ‘resource securing’ to ‘resource enhancing’ strategies

The established discourse around energy and resources is skewed in its understanding of security. Because of the influence of this discourse, it has actually shaped thinking and resulted in the belief of the unavoidability of certain conflict scenarios. These scenarios are predicated on a discourse that is driven by power compulsions, national interest, and zero sum thinking. Therefore,

issues such as resources, climate and governance are also victims of the same skewed discourse, focused on securitization rather than development. The views at the Dialogues were that there is a need to arrive at alternative approaches and discourses that question received notions about development, resource management and governance.

Resource efficiency and conservation – Greening the economy

Energy (resource) efficiency and conservation is the most cost effective short-to-medium term supply option for EU, China and India. The fundamental issue addressed by energy/resource efficiency is to improve upon management of both production and consumption. It employs a variety of approaches to reduce resource use and environmental impacts per unit of production, trade, or consumption over the entire life-cycle of goods, services, and materials. Increasingly cradle to cradle approaches are replacing the earlier cradle to grave thinking, influencing change at the design stage of products and services.

Green economy has emerged as a key aspect of sustainable development and one of the themes for the Rio plus 20 Conference in June 2012. Along with the theme of institutional framework for sustainable development, hectic global discussions are on the measures and strategies to achieve sustainable development while ensuring poverty eradication. Green jobs have become central to this debate. At the Delhi Ministerial dialogue¹⁵, the Chinese delegation noted that:

“China attaches great importance to a green and local carbon economy. In the 12th Five Year Plan starting from this year, the focus is to shift the pattern of economic

¹⁵ For speeches and presentations made by countries on the Green economy please see <http://moef.nic.in/modules/others/?f=dmd>

development. A major objective of the plan is to focus on sustainability and to shift the production and consumption mode towards energy efficiency and environment friendliness.”

The Indian delegation noted:

“.....the concept of green economy is a dynamic one infusing every activity taken towards poverty eradication with sustainability....”

All of this requires reinforcing efficiency with users and efficient distribution systems, and regulatory bodies that reward performance and penalize non performance. Promoting resource efficiency would lead to improved productivity, increased competitiveness & profitability, and environmental benefits and resilience. Such strategies, however, have to be accompanied by a consciousness of the Jevon’s paradox, and increased resource savings should not result in increased consumption of the resource as a result of increased demand from reduced costs of using it. In this context, there is also need to consider the issue of wasteful lifestyles and consumption patterns. This is a problem not only for energy security, but also for food and water security, not just in rich countries, but also with the rich elites in poor countries, and calls for the need to change lifestyle patterns (Singh 2008). A key post script, however, is how do we satisfy need, not greed and who is to make such judgments¹⁶ (Chatham House 2011, p 10).

Pricing right

Fossil fuel consumption subsidies are the big issue in any demand side moderation. In 2009, the International Energy Agency estimated that these amounted to US\$ 313 billion, one

¹⁶ Managing Resources Futures: Corporate and Government Strategies in a Resource Stressed World. Workshop summary. Chatham House. London. 10-11 November 2011, p 10

fifth of which were in four countries: India – US\$ 21 billion, China – US\$ 19 billion, South Africa – US\$ 5 billion; Egypt – US\$ 17 billion. Russian subsidies for the consumption of fossil fuels (around natural gas and gas based power) totaled almost US\$ 34 billion, more than 10% of the total of US\$ 313 billion. Subsidies need to be targeted to the poor and not used to support inefficient production or luxury and frivolous consumption.

Need of responsible resource and raw material investment strategies

The importance of overseas energy and resource equity investments for countries, such as India and China were well supported. The discussions in response to criticisms about engaging with resource rich states with human rights and governance concerns, highlighted the need to engage rather than isolate so called ‘problem’ states, and to have clear and focused investment strategies. The point was also made that in ‘going out’ strategies there is need to have clear rules in place.

The relationship between private players and the States requires the need for overseas resource investment rules that are transparent and have accountability built into it. There should also be frameworks to protect local lives from land grabs around such investments, domestically and overseas. As the energy and resource investment footprint is expanding, it is important that countries come together for some ground rules as these are long term investments which require stability. Firstly, a rule based approach to managing energy relations between nations is needed which increased transparency and communication. There are strong reinforcing mechanisms between security and transparency which need to be understood in the context of energy. It may be useful to either examine the worth of frameworks such as Extractive Industry Transparency Initiative (EITI) and the Equator

principles or develop new ones. Secondly, investment rules and standards need to be put in place to ensure that local people in some of these countries where governance is poor are not affected negatively by these investments. There is a need to focus not just on institutions and rules but also on comprehensive outcomes for local people. This would require benefit sharing and compensation frameworks to deal with gains and costs of energy resource development, as well as peer review and grievance redressal mechanisms. Thirdly, rules are needed in place to avoid conflict between investing countries. Instead of bidding against each other, countries need to find ways in which joint bids can be put together.

Natural Gas as a bridge fuel

As nations move from energy systems that are heavily fossil fuel based to those that are based on non fossil fuels, there is need of time for technologies to develop and make economic sense. During the transition period, natural gas can well act as a bridge fuel. Apart from the twin benefits of addressing energy security, natural gas would also help lower carbon emissions given that it emits less carbon as compared to oil or coal. The first dialogue focused very much on the importance of pipeline gas diplomacy given that India's largest source of insecurity was our external oil exposure which could not be reduced in a hurry. Given the concentration of natural gas resources in Asia, it was felt that China and India was uniquely located to push for a network of gas pipelines in Asia, which would not only increase regional energy security but also would serve as instruments of peace building (Ahmad 2007, Batra 2007, Varadarajan 2007). A strong case can also be made for investments in long term supply contracts in LNG to ensure consumer and producer security. International, interdependent gas markets need to be developed, which requires investor confidence, reciprocal access, financial capital, and government backing in projects that involve risk. The shale gas revolution only reinforces these requirements.

Investing in Renewable energy

Investments in renewable energy will make the energy agenda more positive sum in nature, and less conflictual. Where renewable energy is concerned, there is a need for developing innovative financing mechanisms for making RE sustainable & commercially viable, going beyond a grants based approach. Also, technology innovation is essential for increasing commercial viability of renewable energy resources. In this context, the viability of feed-in tariffs as the only mechanism to enhance the role of renewable energy in not only India, but also the world needs to be studied. Different policy interventions are needed as the market matures. Initial funding in the form of innovative financing, such as microfinance, when supported by market development strategies and customized packages prove immensely helpful to promote small scale energy access projects (TERI-IGES 2012).

Multilateral solutions to energy and resource security

A key recurring theme at the Dialogues was the importance of adopting multilateral solutions to addressing current resource insecurity as well as with regard to the climate change conundrum. The following key issues emerged:

With regard to energy and commodity trading

Energy trade tends to be bilateral and anything that is bilateral is heavily dependent on mutual trust and credibility (Massey 2007). Risk is then aggravated as issues around politics, finances, and security become of relevance. Bilateral deals tend to increase volatility and result in a greater waste of resources, as there is always a 'game' element in such deals (Chatham House 2011, p9). Hence the "need to support multilateral arrangements and trading in neutral locations, not in the producer/consumer countries. By making trades and transactions secure and transparent more

buyers and sellers can be made to talk and costs reduced. Most energy is traded in London, Singapore and the US. Savings are available because a market guaranteed mechanism is in place. The move from bilateral to multilateral to exchange trading is therefore positive and should be encouraged” (Massey 2007, p 35).

Assuring both demand and supply security

Energy and resource security requires that both the concerns of consumers and producers be addressed. Just as consumers worry about supply security, often the producers worry about demand security. At times, this could be long term demand as in the case of oil and coal producing countries. These countries worry about their resources in the face of the decarbonisation debate around climate change. Should the resources be developed soon to avoid them becoming stranded assets or should they be kept in the ground and wait for improved values once cleaner technologies are available. At other times, it could be shorter term concerns relating to reduced income from resources arising out of conflict that could reduce demand as a result of sanctions or embargoes, or bottlenecks. Such concerns require consumer producer dialogues to ensure that concerns and strategies are harmonized. The International Energy Forum is a good initiative, but needs to be more active.

Data and knowledge sharing

Better data management and knowledge sharing is needed for food and minerals, such as the Joint Oil Data Initiative (JODI). However, even JODI needs to be more accessible. There is also need for improved institutional capacity to map, assess and manage natural resources better. Use of spatial technologies would also help bridge the data gaps. Knowledge sharing in this context would be very useful.

Avoiding unilateral trade restrictions

WTO rules need to be used better in the context of export restrictions around resources as also around barriers to trade. In this context both the China restrictions on rare earths and the inclusion of international civil aviation in the EU–ETS are particular examples of possible threats to multilateral approaches to address such issues. In both cases the actions are perceived to be driven by a desire to ensure competitiveness: in the one case, it was controlling a raw material which is critical for various emerging sectors; in the other, it is perceived as an unilateral trade measure in the name of climate change, but which leads to serious market distortions and unfair competition¹⁷.

Already a number of concerns have been raised: Indian Minister for Environment and Forests said that it was an “unilateral measure which is in violation of the principles and provisions of the international convention and it will also not augur well for the success of future climate change negotiations”¹⁸. The Minister also said “Without an international consensus on equity, unilateral trade measures and technology related IPRs, substantial movement under the Durban Platform will not be possible. These should be a part of an ambitious agenda if we are serious about international cooperation on climate change”¹⁹.

Using plurilateral approaches to global problems with care

While there may be a case on efficiency and pragmatic grounds to work with the largest emitting group of nations, for example BASIC, and get real progress on curbing emissions, if this comes at the cost of an equitable long term cooperation on technology

17 <http://www.twinside.org.sg/title2/climate/info.service/2012/climate20120205.htm>
accessed on 13 April 2012

18 <http://www.indianexpress.com/news/eu-tax-on-airlines-a-deal-breaker-in-climate-talks-natarajan/935687/> accessed on April 13 2012

19 <http://moef.nic.in/downloads/public-information/speech-mef-11-4-12.pdf>

and financing on mitigation and adaptation for the rest of the developing world, this will indeed be a huge set back to the spirit of the UNFCCC and hit out at the heart of the equitable responses needed to address climate risks. Strategic groups should be seen as ways of catalysing action and breaking down obstacles to negotiations, and create domestic action but there is need of a broader consensus for an issue such as climate change. In the ultimate analysis, there is need of a larger legitimization of actions and decisions through a multilateral process to the energy and climate conundrum.

Research, development and technology

The dialogues were clear that attention to R&D and technology on the energy and resources front was needed on four counts: (i) saving (ii) substitution (iii) augmenting and (iv) cleaning. In the context of a wider resource security, Sahai (2009) pointed out there was need to conserve diversity and think out of the box. For example, we can promote Siachen as a permafrost gene bank. It will cost nothing and both India and Pakistan can work together to protect our genetic resources and create positive political externalities. Sethi (2007) argued that India, for example, should focus R&D on the following: (pp15-17)

- Clean coal technologies, in-situ coal gasification, tapping coal bed methane and using coal to liquids and coal to gas technologies and carbon sequestration.
- Non fossil fuels: For example, bio-diesel and cellulosic ethanol could replace 60%–70% of liquid fuels if they become commercially viable. Solar could meet up to 85% of our energy with just 5 million hectares of land and 15% conversion efficiency. Other areas of interest are bio-energy, thorium, gas hydrates.
- Seek deep-sea oil and gas under open acreage. Pursue alternate routes to hydrocarbons based on tar sands, ore emulsion, methanol from marginal gas fields etc.

Gosh (2008) argued that a climate change regime will have to factor in technical uncertainties and surprises. It will have to encourage multiple R&D collaborative models which are devised on the basis of the changes in institutional incentive structures for innovation. He also spoke of the need to revisit the WTO rules on technology transfer and intellectual property rights, and to work with venture capitalists on oil and coal in order to usher in non fossil fuel change.

Regulatory frameworks to balance concerns and risks

Technology and innovation will be central to achieving energy security, but responsible stewardship and investment will need to underpin the approach of nation states to balance concerns and above ground risks of resource development. The disconnect between energy choices recommended by experts and desires of people were highlighted in the first dialogue (Tewari 2007, p 136). Enhancing States and civil society engagement in the context of energy decision making was emphasized repeatedly. It is therefore necessary to suggest ways for strengthening regulatory mechanisms at the national/sub-national level while identifying the loopholes in legal frameworks at the global and national level. Sahai (2009) points to the need of care with regard to transformative technologies.

“Genetic engineering has to be regulated better and there is need for greater transparency, participation in decision making and for more cautious bio-safety testing. Without these conditions in place, agricultural technologies will neither be safe nor appropriate to adopt. Therefore, although technology is not to be scoffed at, we need to be conscious of transformative technologies which are breaking species barriers. These technologies are creating novel gene combinations that will create new kinds of organisms that

we will not know now how to deal with. New technologies at the end have to work with people. People have to want it and there is no question of pushing technologies through paternalistic decision making processes.”

States and markets are in a unique position to address challenges facing the resources sector. Whether it is the need to internalize externalities, manage conflict and terrorist risks, create new markets, regulate others, or avoid the resource curse in resource rich countries, the roles of the state and the market will need to evolve to address challenges. States and markets, both at the domestic as well as the global level, require frameworks that can ensure the redressal of challenges implicit in the resource sector. Legal frameworks and institutional mechanisms must, for instance, address benefits and burden sharing concerns, adequate compensation for those impacted negatively by resource development and put in place frameworks to share value and avoid conflict.

More people centric frameworks

Some interesting new developments that stand testimony to a more people centric approach to resource development is evident in the International Bar Association’s Model Mines Agreement, the Responsible Mining Development Initiative of the World Economic Forum and in India, the more progressive MMDR Bill 2011. Senapati (2011, pp 85-86) points to the need of agreements to be (a) institution to institution, rather than company to individual, and (b) based on shared goals and mutual interests. The need for training for negotiating for local communities to reduce asymmetry between negotiating parties was highlighted. It was also pointed out that this takes times and should not be rushed. (c) monitoring of implementation of the agreement by an independent party or a multi-stakeholder group to ensure the clauses are enforced. (d) respect and recognition is key to good agreements, and ‘listening’, ‘understanding’ and ‘respect’ should drive the process.

Benefit sharing or sharing value from resource development is key to making resource extraction more attractive to local people. Many models are now in place in developed resource rich countries, the design of which reflect priorities there: thus Norway focuses on an inter generational fund, Alaska and Alberta balance benefits between present and future generations, the Australian and PNG models focus on sharing value with local communities (Nanda 2011, p 96).

Management of risks and social perceptions around energy development

The Dialogues stressed the need for more transparency and accountability and a greater sensitivity to the concerns of people around risks, especially nuclear risks. The involvement of the local populace in decision-making right from the stage of initial planning and the building in of appropriate compensatory mechanisms in project implementation are thus key issues in project planning. Given the fact that, despite the post Fukushima apprehension, nuclear energy could still be an increasingly important component of the world's future energy mix, security concerns such as proliferation and terrorism were issues that had to be addressed and were discussed at length in all 5 dialogues. In this context, one of the major security concerns vis-à-vis nuclear energy was over the question of closed versus the open fuel cycle, particularly given the fact that adopting the closed fuel cycle, as is the case with India, increases the fear of nuclear proliferation or terrorists getting hold of reprocessed fuel. Countries, perhaps, should together work towards building nuclear free zones to bring in greater stability, and particularly on nuclear non-proliferation concerns, there is a need for developing an equitable, sustainable and harmonious framework and for countries to harmonize their narratives on the issue.

Ramana alerts us to the need to avoid statements of 100% certainty of safety, or dependence on linear probability risk assessments as these do not allow for multiple failures that complex systems are prone to. Gyawali (2010) speaks of the need to move away from consensus and neat optimization to look for clumsy solutions where decisions are complex, uncertain, and risky.

“Unfortunately, much of engineering, economics and management have been in thrall of economic optimization that is rather impractically believed to provide that single, neatly optimized, 100% perfect solution to a ‘wicked problem’, i.e., ‘Kosi High Dam will solve ALL of Bihar’s problems’! Given the scientific uncertainties discussed above, and the plurality of social responses, it is wiser to opt for a ‘clumsy, many 10% solutions’, each of which carry different risk perceptions and overall are more resilient in the face of surprises. This requires a constructive engagement in a multi-stakeholder platform, rather than a perfectly optimized monistic solution from a powerful hydrocracy. Such an approach would better help societies beset with wicked problems to arrive easier at a negotiated settlement.” (p 70)

Communicating urgency and transparency

Comments by Graczyk (2008) and Sibal (2008) were on the challenges of communicating climate change. Graczyk (pp 139–145) pointed to the fact that different actors required different messages because of their differential listening abilities, differential interests and the different time horizons involved. As a result, the message has to target actors at different levels. The reason we do not act together is because climate change is not sexy. It is not easily understood and it is a very technical subject. Therefore, we need a more common

terminology to communicate. Despite the differential footprints, there is urgency for collaborative action because of the impact that it creates. There is also need to recognize that political interests may drive misinformation. This may create perceptions that drive behavior that is detrimental to security.

The consumer being at the heart of the energy and climate change debate was highlighted by Sibal. If we need to bring about change we have to work with the consumer. However, language is a critical issue in communicating climate change related issues because of the problem of information overload and because of the importance to share and understand. Therefore, there is a need to have positive images at different levels for the consumer — money savings from early action, for example, is key to creating an understanding on climate change. The final message with regard to the role of the media is that it is an important vehicle to convey and communicate, for which the use of symbols is key (pp 146–147).

Communicating and transparency is also urgent in the nuclear energy case. There is need for greater credibility and trust of the nuclear establishment through improved communications (Chengappa 2008) and more public debate on issues of concern to the public, instead of these issues being cloaked under strategic interest arguments. Sethi (2008, p 88) puts it well.

“Irrespective of which side of the political spectrum one is on, the nuclear debate can definitely benefit from greater transparency, disclosure and sharing of available knowledge in respect of: (i) uranium reserves and the likely civil nuclear power potential; (ii) weapon proliferation risk and the risk of fissile material reaching wrong hands as a result of an expanded civil nuclear regime; (iii) the likely contribution of nuclear power in GHG abatement; (iv) public perceptions of safety, environmental and health concerns as relevant to an expanded civil nuclear programme; and (v) the economics of nuclear power inclusive of long-term management of nuclear waste.”

Collaboration and cooperation

Addressing challenges regarding food, water and energy security reveals the incapacity of states to 'go it alone'. Not only do these challenges disregard political borders, they also easily spill-over from one issue area to another. The complexity and interrelated nature of these issues make it necessary to consider transnational modes of governance and management, alongside statist responses. Lehne (2009) put it well in the context of the developed world,

“all industrialized countries are facing threats in securing energy supply. Domestic politics has only limited powers to secure resources. Adopting an energy mix towards alternatives and renewable resources can increase energy security. However, the example of energy supply demonstrates that major problems can most effectively be addressed at the global level. Technology-driven countries have to make innovations accessible to low-income countries and thereby help reduce energy demand and address climate change in the world. Consuming countries also have to demonstrate their interdependence with supplying countries. What we really have to do is to reject the position of rivalry and argue for a new model of cooperation.” (pp 8-9)

Collective security arrangements such as the protection of sea-lines of commerce and the strengthening of a consumer-producer dialogue are finally taking place. However, the question that arises is: how much are we doing to really strengthen the forums, which can contribute to collective security and the enhancement of the consumer-producer dialogue?

Taking the debate on international cooperation forward, the dominant concern revolves around structuring of Indo–Chinese relations and how to address the climate and energy questions,

particularly in light of the fact that some believe that political and military tensions between India and China are unavoidable (Chopra 2007).

India–China cooperation

So, where do the possible synergies for Indo–China strategic cooperation lie?²⁰ Some key areas for advantageous alliance which can be brought about by robust institutional mechanisms (Mahalingam 2007, pp110-112) are:

- India and China have great potential to develop strategic petroleum reserves (SPR) that can lead to significant cost savings from joint construction of oil tankers as well as joint procurement and more importantly, joint management of stockpiles or even floating stockpiles in the region.
- Joint effort can be made for delinking of gas prices from crude prices which has made gas expensive for both India and China (for example Iran deals) and is holding back the potential for gas use.
- It will be mutually beneficial for India and China to find avenues for accessing electricity from Central Asia, especially as this region has great hydropower potential and a Trans-Asian electricity grid to harness its potential.
- Developing clean coal technology can provide the panacea to the energy inefficiency and GHG emission malaise. The scientific communities, supported by political will, in India

20 For a discussion around Sino–India cooperation, see Noronha, Ligia and Sun Yongxiang, *India–China Energy Dialogues of 2006 and 2007: A Report*, China Report, 44:1 (2008) pp 47–52; S Mahalingam, *India–China Energy cooperation* in Noronha L and A Sudershan, (2009) *India’s Energy Security*, Routledge, UK; also see special issue on India–China energy perspectives, *Energy Security Insights* Volume II, Issue 2, August 2007.

and China can put their might together explore clean coal technology and joint R&D projects for clean coal, coal bed methane, coal liquefaction, coal gasification etc.

- Other possible area for joint efforts can be cross investments in refineries, and Chinese aid in pipeline construction.

In this context, Vardarajan (2007) highlights the need for India to change its feeling of insecurity and paranoia about China. Chinese investments in India need to be encouraged as this will assist Indian companies in oil and gas exploration and address strong security concerns.

Pan-Asia Cooperation

At present, Asia has no unified energy architecture unlike in Europe, which has the European Union and Africa which has the African Union. Asia has numerous regional organizations – SAARC, ASEAN etc. – but no all-encompassing pan-Asian architecture. Vardarajan (2007) proposed a pan-Asia architecture in which the first two legs could be the East Asia Summit Process and the Shanghai Cooperation Organization (in which India, Iran and Pakistan are all involved). Energy cooperation could be the third leg. In this scenario, China and India will be required to take lead roles by virtue of demography, economic growth and energy needs.

Instead of hard bilateral positions, South Asia may need to get third party mediation for dialogue to work. One of the reasons why a sense of pessimism is all-prevailing is because people in South Asia tend to think that the problems that the sub-region faces are somehow unique and cannot be compared to other regions. Several successful effective sub-regional examples in Europe demonstrate functional issue-based linkages. This initiative undoubtedly requires a very strong inter-governmental thrust. If we were to change the whole paradigm of the regional

discourse from securitisation to development, we might be able to mitigate some of the security threats that constrain regional cooperation in South Asia. Particularly at the South Asia level, there is a need to change the discourse on regionalism and energy security. The academic/ research community must assist in a shift to a framework of desecuritisation. This can be facilitated through the formation of organized constituencies and domestic pressure in each South Asian country which favours cross-border cooperation. The paradigm for cooperation at the South Asian level should be based on development, rather than security.

Gyawali (2010, p 71) suggests that:

“The new architecture of cooperation between Nepal and India... needs to move more vigorously to Track III and further beyond among other social solidarities and academics across the border. Track I at the secretary level is necessary but hardly sufficient to reach viable agreements, and should only be the court of last resort after difficult issues have been debated threadbare by the solidarities of the market and civic movements. The state’s role should be elevated from that of a ‘contractor’ implementing projects to that of an adjudicator maintaining a level policy terrain that allows sufficient space for different voices to be heard and not filtered out. The alternative to this architectural re-design is a continuation of the impasse of the past.”

More specifically, cooperation can be on the following: Transnational Gas pipelines across Asia; Strategic Pool Reserves – similar to that of the IEA; Equity oil and gas investments – sharing and mitigating political risks; Cross investments in countries, upstream and downstream, to create reciprocal security of demand and supply; Technology collaborations in both clean coal technologies, Carbon Capture and Sequestration (CCS) and non conventional energy sources; and Managing demand, with a focus on energy efficiency, resource efficiency, and influencing consumer behaviour.

Pan Eurasia cooperation

The energy interdependence between Europe and Russia – makes a cooperative approach imperative in future (Kreft 2007, p 52). Such a strategy must include two elements:

1. An enhanced energy charter process drawing upon the 1994 Energy Charter Treaty that will establish a legal framework to promote long term cooperation in energy. Russia requires a legal framework on investment, transit and trade in energy resources. It is in EU's interest to ensure that Russian energy giants abide by the rules when engaging in European markets.
2. Development and political reinforcement of the EU's energy dialogue with Russia, including member states, the energy industry and financial institutions.

An important point to be noted is that EU, Russia and other producing countries rely on western technology for the exploration of new gas fields, the construction of pipelines and the maintenance of infrastructure—all of which are cost-intensive. It would, therefore, serve all well to invest in policy initiatives that take into account common interests in energy security, knowledge and financial investments as well as the guarantee of supply. More recently Sergey Lavrov, Foreign Minister of Russia spoke of the need of international energy cooperation for sustainable development at the UN General Assembly in September 2011. “Sustainable development requires reliable supply of energy resources for the global economy. Russia has made a proposal to elaborate a Convention on International Energy Security that would cover all aspects of global energy cooperation taking into account the balance of interests of all actors in the international market. We call for starting practical preparation of this document.”²¹

21 <http://www.unmultimedia.org/radio/english/2011/09/russia-calls-for-energy-security-convention/http://www.unmultimedia.org/radio/english/2011/09/russia-calls-for-energy-security-convention/> accessed on November 5, 2011

Distributed resource governance

From pricing to local level institutions to political mobilization, the third Dialogue highlighted several pertinent recommendations for strengthening the governance of resources across levels and actors. The actors that need to be involved in the governance of resource security extend from the global to the local. At the global level, there needs to be better collective security arrangements, such as producer-consumer dialogues between energy producing and consuming countries. The need to include people in governance requires decentralization in policy-making and implementation. To this end, it is necessary to have a clear role assignment and accountability from the national to the local level. The state, private sector, local communities, civil society and epistemic communities act across these different levels simultaneously; using a range of tools such as finance and pricing mechanisms, political mobilization, awareness and sensitization programmes, corporate social responsibility, and so on.

To strengthen resource governance, some key institutional strengthening is required:

- Regulatory bodies need to be peopled by independent-minded staff in order for them to be truly independent.
- Establishment of institutions to vulnerable groups.
- New fiscal instruments for resource sharing with local governments.
- Policy-making that has adequate representation of, and consultation with, stakeholders at various intersecting levels: at the multilateral level such as producer-consumer dialogues, within governments and between different ministries.

- Proper coordination between the centre, state and local level bodies. The subsidiarity principle is helpful to this end, in that decisions need to be taken at the most appropriate level.
- Capacity building process for local level bodies, particularly financially (Raghunandan 2009).
- Countervailing power through political mobilization is the only strategy for those without power (Mundle 2009).

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Resource security:
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Energy security: managing risks, balancing concerns and developing frameworks
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32 Mr. Prabir Sengupta	TERI
33 Mr. Surya Sethi	Former Principal Advisor, Planning Commission, Government of India
34 Dr. Devika Sharma	TERI
35 Mr. Rajiv Sikri	Former Secretary (East), Ministry of External Affairs, India

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Acronyms

ASEAN	Association of Southeast Asian Nations
ASRM	Alliance for Securing Raw Materials
BASF	Badische Anilin-Und Soda-Fabrik
BASIC	Brazil, South Africa, India and China
bbf	Billion Barrels
BCB	Brahmaputra Control Board
BMW	Bayerische Motoren Werke
bn	Billion
BPEO	British Petroleum's Energy Outlook
BRIC	Brazil, Russia, India and China
CCS	Carbon Capture and Sequestration
CDP	Carbon Disclosure Project
CGNPG	China Guangdong Nuclear Power Group
CIES	Convention on International Energy Security
CNNC	China National Nuclear Corporation
CNOOC	China National Offshore Oil Corporation
CNPC	China National Petroleum Corporation
CO ₂	Carbon Dioxide
COP 15	The 15th Session of the Conference of Parties of UNFCCC
DISCOMS	Power Distribution Companies

DMD	Delhi Ministerial Dialogue
EASP	East Asia Summit Process
ECT	Energy Charter Treaty
EIAs	Environmental Impact Assessment
EITI	Extractive Industries Transparency Initiative
EsCerts	Energy Saving Certificates
EU	European Union
EUCERS	European Centre For Energy and Resource Security
EU-ETS	Eu Emissions Trading System
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GHGE	Greenhouse Gas Emissions
GND	Green New Deal
GNEP	Global Nuclear Energy Partnership
GNOCs	Global National Oil Companies
GOI	Government of India
GW	Gigawatt
IEA	International Energy Agency
IEP	Integrated Energy Policy
IGES	Institute for Global Environmental Strategies
IOCs	International Oil Companies
IPCC	Intergovernmental Panel on Climate Change
IPRs	Intellectual Property Rights
IREDA	Indian Renewable Energy Development Agency

JNSM	Jawaharlal Nehru Solar Mission
JODI	Joint Oil Data Initiative
KAS	Konrad Adenauer Stiftung
KHD	Kosi High Dam
Kv	Kilovolt
LDCs	Least Developed Countries
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
MMDR	Minerals and Metals (Development and Regulation)
MoU	Memorandum of Understanding
MRA	Mineral Resource Agency
NIMBY	Not In My Back Yard
NOCs	National Oil and Gas Companies
NVVN	NTPC Vidyut Vyapar Nigam
OECD	Organisation for Economic Co-Operation And Development
ONGC	Oil And Natural Gas Corporation
OPEC	Organization of Petroleum Exporting Countries
ORF	Observer Research Foundation
PAT	Perform, Achieve and Trade
PNG	Papua New Guinea
R&D	Research and Development
RE	Renewable Energy
REC	Renewable Energy Certificates
REPO	Renewable Energy Purchase Obligations

RMDI	Responsible Mining Development Initiative
ROR	Run of River
RREE	Roadmap to a Resource Efficient Europe
SAARC	South Asian Association for Regional Cooperation
SCO	The Shanghai Cooperation Organization
Sinopec	China Petroleum & Chemical Corporation Limited
SME	Small and Medium Enterprise
SPR	Strategic Petroleum Reserves
TERI	The Energy and Resources Institute
TIGEF	The Indo-German Energy Forum
UK	United Kingdom
UNDP	United Nations Development Programme
UNFCCC	UN Framework Convention on Climate Change
UNGA	United Nations General Assembly
US	United States
WEF	World Economic Forum
WTO	World Trade Organization

