BROOKINGS INDIA

QUALITY, INDEPENDENCE, IMPACT

Report

Petrotech 2014's CEO Conclave

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Report and Takeaways

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Introduction

Brookings India served as the knowledge partner for the Petrotech 2014 CEO Conclave, which focused its three sessions on the landscape of energy supply and demand projected for the year 2030. Panelists discussed the future of energy supplies, the implications of geopolitical stress on energy trade, and the P5 agenda (Planning, Politics, Policy, Production, and Pollution).

While discussing the energy basket in 2030 (Session 1), panelists explored changing demand and supply dynamics, the role and relevance of fossil fuels (coal /oil/gas), unconventional hydrocarbon (particularly shale gas and oil), and technological developments for producing energy more efficiently. The panel's overall outlook was one of cautious optimism – while they were optimistic about the future of energy reserves, they expressed some caution, explaining that a variety of institutional changes were needed in order to make best use of the opportunities available.

To examine how the energy basket envisioned for 2030 would be impacted by geopolitical considerations (Session 2), panelists focused on India's challenges in ensuring both energy security and energy stability. Taking into account recent developments on the geopolitical arena, the panelists considered whether currently energy-resource-dominant countries will maintain their positions of power or whether new discoveries of 'unconventional' and conventional resources will lead to a shift in political order.

In the final session, panelists explored how energy architectures of nations balance energy demand and supply so as to most effectively pursue the P5 agenda. Means of securing sources of energy, understanding implications of energy use on economic trends and realizing consequences of the energy utilization on the environment were examined. The overall framework that emerged was one of two "trilemmas" that exist at the macro and micro levels. The macro level trilemma is one of energy, economy, and environment, whereas on the micro level, it is concerned with access, efficiency, and emissions.

1.

The Energy basket @ 2030: The Future of Energy Supplies

The first session for the day brought together various energy experts to discuss the outlook for energy supplies in 2030. The panel's overall outlook was one of cautious optimism – while they were optimistic about the future of energy reserves, they expressed some caution, explaining that a variety of institutional changes were needed in order to make best use of the opportunities available. Some of the key points that emerged, include:

- **On the demand side, the consumption of conventional sources of energy is expected to continue to grow**
- **On the supply side, there are a large number of untapped reserves**
- **A number of institutional challenges need to be addressed to incentivize exploration and production; these include:**
  - **Current Subsidies and Production Sharing Contracts fail to incentivize investments**
  - **Inadequate Research and Development in Technology**
  - **Absence of an integrated energy policy – multiple ministries, multiple bodies**
  - **Absence of an Coordinated International Strategy**

Energy Demand and Supply Outlook

Consumption of Conventional Sources – Particularly Coal – Will Grow

According to the panel, fossil fuels will continue to be dominant in 2030, while renewables will see only a modest growth, and continue to play a marginal role in the overall energy basket. This is in line with global trends forecasted by the EIA and BP World Energy Outlook reports. The BP forecast find that the composition of the energy basket will largely

remain the same, and fossil fuels – oil, natural gas, and coal – will remain the main supplier of energy, accounting for over 78% of the energy supply in 2030. While oil will account for 28% of the global energy consumption in 2030, natural gas will account for 25% and coal 28%. Renewables, on the other hand, will only account for 5% of the total consumption. The report also notes that the demand for oil and coal is driven primarily by the Asia Pacific region, – led by India and China – which is projected to consume 39% of the global oil supply and 78% of the coal.[1]

Coal currently accounts for over 50% of India's commercial energy consumption. This trend is expected to continue even into the future, and according to the Energy Information Administration, India's consumption of coal will witness an increase of 97% between 2010 and 2030.[2] In terms of natural gas, LNG is going to become more important in the coming decades, growing at 4.5% per annum over the next twenty years; gas production on the other hand will grow at less than half, at 2.1%, and pipeline-paid at about 3%.

Overall, the panel concluded that in 2030 India would emerge the largest consumer of energy. They also cited India's Integrated Energy Policy document, which forecasts that India will import 60% of its requirements in 2030 – more that double that of today.

This increase in consumption of energy was attributed to India's large population and the aspiration to improve their standard of living. In addition, the increased consumption of oil and gas – particularly oil – stems from the growth of the transportation sector, particularly with two-wheelers – the largest consumers of oil – growing at 15-16% per annum.

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[1] *BP Energy Outlook: India Insights.* BP. Accessed December 1, 2013. http://www.bp.com/content/dam/bp/pdf/statistical-review/EnergyOutlook2030/Country-insights/India_Fact_Sheet.pdf

[2] *International Energy Outlook, 2013*. U.S. Energy Information Administration. January 2013. (Accessed December 1, 2013) http://www.eia.gov/forecasts/ieo/index.cfm

Large reserves untapped – Improve the investment climate in the country

Panelists on the whole were optimistic that India faced no dearth as far as the supply of its reserves is concerned. Additionally, a panelist added that unconventional sources were available in even greater quantities than conventional ones. However, the challenge that the country faces today is that while there are vast reserves, a majority of these have not been tapped. According to one panelist, there is at least 1 million square kilometers of area, which hasn't been explored. Similarly, out of 26 sedimentary basins, only 7 are producing or 11 have been exploited, and at least 130 billion barrels are yet to be discovered.

This problem with availability of energy sources in India is probably best exemplified by the coal sector. India has the 5th largest deposits of coal in the world, but unfortunately, the country still imported $10 billion worth of coal last year. The Energy Information Administration lists some of the bottlenecks that impede coal production in India – from delays in regulatory approvals, to opposition based on environmental concerns, land acquisition issues, forest clearing, resettlement and rehabilitation, all challenges that take considerable time and effort to resolve. Additionally, inefficient utilization of rail capacity also affects about one-half of the coal transported within India, but getting approvals to expand rail transportation is a difficult and cumbersome process. Due to such bureaucratic and regulatory hurdles, India's coal imports are projected to rise from 140 million tonnes in 2011 to more than 300 million tonnes in 2040.[3]

The panelists echoed these concerns and pointed out similar problems impeding the production of other forms of energy as well. In terms of LNG, for instance, the country has only four terminals so far. Additionally, there are pipelines that are either not flowing gas or are choked. Similarly, there is a huge market in the South, but we haven't been able to get gas there. The panelists agreed that the government must put its foot on the accelerator and contract mid-term to long-term LNG more swiftly. India has been unable to forge contracts as quickly as China, and currently, the country has only four long-term LNG agreements.

[3] *International Energy Outlook, 2013*. U.S. Energy Information Administration. January 2013. (Accessed December 1, 2013) http://www.eia.gov/forecasts/ieo/index.cfm

Exploration and production require a framework that is supportive, and the panel found that the current framework is severely limiting. A number of – implicit or explicit – barriers prevent exploration, and must be ameliorated. These challenges are discussed in the following section.

BARRIERS TO EXPLORATION AND PRODUCTION

Current Subsidies and Production Sharing Contracts fail to incentivize investments

It was pointed out that the current structure of subsidies is adversely impacting upstream oil companies, who are concerned that they are subsidizing the downstream, and consequently, their investible surplus for exploration has been significantly reduced. This, the panel believed, is one of the major reasons why the pace and intensity of exploration of our sedimentary basins has fallen so sharply, and India cannot harness our indigenous hydrocarbon reserves if this trend continues.

Not only does such a subsidy structure adversely impact exploration, it also causes the marginal production of upstream companies such as ONGC and Oil India, to remain marginal. Indeed, it might even lead to a downturn in their recovery rates.

Apart from such subsidies, the panel discussed how the current structure of the production-sharing contracts between the government and private companies poses a significant challenge. While they agreed that the production-sharing contract was the right template when the country moved away from the nomination era to a liberalized regime, they noted that two things were done incorrectly. First, the contract was drafted far too tightly – it lays down some-25 timelines and each of these is inviolable. Unfortunately, production and exploration doesn't happen according to a textbook, and the contract fails to capture this spirit.

Second, the contract expects that costs will be recovered and profits will be shared. But this expectation that costs will be recovered creates confusion between the exploration and production player, and the government, as to what costs need to recovered. Consequently, priorities are inverted from energy security to government revenue. But given that India imports hydrocarbons worth about $150 billion, the government's share of a few billion dollars should not have bogged down the contract.

A panelist added however, that the government is looking to move forward from this contract, and many committees – including the Rangarajan Committee and the Kelkar Committee – are providing recommendations. Additionally, the government is also looking to simplify the workings of the current contracts.

Inadequate Research and Development in Technology

A panelist pointed out that one of the reasons for us not being able to exploit the vast coal reserves we have, is the absence of adequate technology. It is because of the lack of technology that we have not been able to implement clean coal technology on Indian coal and that we cannot mine all of the available coal. He further added that these are all India-specific technology challenges, which cannot be resolved by assistance from abroad.

The panel unanimously agreed that India's investment in the research and development of new technology is far from adequate, and identified this as one of the biggest lacunas facing the sector. One panelist pointed out that while government investment in R&D has increased and is now about 1% of the GDP, private sector or industry investment is missing and must catch up. Indian industries' expenditure on R&D as a percentage of revenue is among the lowest in the world, and Indian energy firms are not making full use of their technical HR capital.

R&D is of essence in order for the industry to survive. In this regard, a one panelist made the case for building alliances, adding that nobody is coming forward to help the industry

invest in technology. They recommended that the industry should come together to invest in R&D as a pooled exercise, in the larger national interest, to turn the tide.

This idea of a consortium for R&D received unanimous support from panelists, and another panelist also recommended collaborations and partnerships with research institutions, including the IITs. He added that consortia and group activities in research would lead to no conflict of interest at least in the pre-competitive research stage. In addition, such pooled research would also shorten the cycle for taking new technologies and products to the ultimate commercial deployment.

The panel also pointed to some areas that need urgent R&D attention, such as the technology of transforming energy from one form to another and commercial ways of recycling carbon dioxide to produce hydrocarbons, adding that such technologies are being developed all over the world, but not in India. It is important to note however that this investment would produce results in a time horizon much greater than 20 years, so we shouldn't expect results by 2030.

Absence of an integrated energy policy – multiple ministries, multiple bodies

While energy security is a critical problem for India, there is a manifest absence of a coordinated energy strategy in the country. Energy is a term that does not have any official endorsement in policymaking. India has no one individual or ministry that covers the whole sector holistically. Instead, India's energy policy is fragmented, with various ministries responsible for coal, petroleum, natural gas, and as a consequence, the country doesn't talk about the full rage of energy sources.

The panel, however, conceded that there would be a lot of resistance to creating an integrated Energy Ministry. Instead, the creation of a Cabinet Committee on Energy Security on the lines of the Cabinet Committee on Investments was recommended. The mandate of

such a body would be to help address the various issues that overlap between the various energy ministries and bodies that currently exist.

Absence of a Coordinated International Strategy

The panel agreed that India doesn't use its sovereign weight – or the weight of its sovereign balance sheet – to compete with other countries on the global stage. This is juxtaposed to China, whose government lends its complete backing to its energy companies as they seek to make investments abroad. For instance, in September 2013, the Chinese Premier did a whirlwind tour of Central Asia to ensure that SINOC and SINOPEC were able to acquire assets in key producing acreages in the region. Even apart from China, governments have played a huge role in supporting the growth of LNG worldwide – whether its traditional markets like Japan, Korea, Taiwan, or West Africa and Australia now.

The panelists believed that the government should make a more aggressive effort enhance the competitiveness of Indian companies investing abroad, and that the Ministry of External Affairs should play a greater role in energy diplomacy. Additionally, the government should engage the Middle East more comprehensively, but also diversify and establish relations with other regions as well.

2.

Energy Markets in 2030: The implications of geopolitical stress on energy trade

As an opening disclaimer to the ensuing panel discussion, the moderator asserted that while geopolitical shifts are both inevitable and difficult to predict, broad trends can be identified and discussed, despite often revived and consequential disputes. Indeed, he noted, it is an almost seductive exercise to predict consequences of events occurring in other parts of the world without imagining any real effect of these events within India - we must think *specifically* to India in terms of a security and a political shift.

In this context, geopolitical trends have a significant impact on energy production, prices and trade. Indeed, higher energy prices resulted in a resurgence of resource nationalism and the tendency to exert greater state control over indigenous resources. They have also, in some cases, allowed producers to use energy resource leverage to further foreign policy and political agendas. Although sovereign nations have always exerted control over indigenous resources, the revision of legal and regulatory structures has created an atmosphere of investment uncertainty and reduced access for non-state players.[4] Taking these developments into account, one must consider whether currently energy-resource-dominant countries will maintain their positions of power or whether new discoveries of 'unconventional' and conventional resources will lead to a shift in political order.

- **Conventional sources may remain dominant but will ruling dependencies remain valid? What about newfound dominance of areas with newfound reserves – particularly gas reserves?**
- **"Oil is getting old, dirty and costly whereas gas is clean, cheap and aplenty".**

[4] Verrastro, F. 2010. The Geopolitics of Energy. Centre for Strategic and International Studies: Colombia.

What kind of fuel choices should we make? Lower carbon-emission prospects of natural gas have begun to appeal to a larger number of countries, leading to a geographical shift of focus on energy resources (from oil to gas) and changing demand-supply dynamics.

- **For India's long-term energy security, developing pipelines is key. India is habituated to feeling vulnerable on the global energy scale because of its dependency on imports. The country is being cut off pipelines because of certain sensitive neighborhood disputes.**
- **Energy security is a holy grail at the global level – viable, affordable and equitable security will take a while to achieve. Energy stability, on the other hand, is more short-term and turbulent. India ought to focus on long-term energy security and short-term energy stability and its economic potential, or lack thereof.**
- **Many geopolitical stress issues are non-linear and work through osmosis. The US, Russia and China will be impacted by this osmosis. While shale discoveries liberate the US to a certain extent, Russia will be affected as a status-quo power. Much of geopolitics will be affected with advances in technology (i.e hydraulic fracturing and horizontal drilling).**

Conventional sources may remain dominant, but will ruling dependencies remain valid? What about newfound dominance of areas with newfound reserves – particularly gas reserves?

The US has theoretically very pregnant geopolitical possibilities with shale reserves. Developments will determine whether currently energy-dominant countries will maintain their positions of power, or whether new discoveries and shifting demand-supply dynamics will lead to a shift in political order.

While the US was expected to be a primary importer of LNG throughout the 2000s to meet growing demand, it is now facing the very real prospect of being an LNG exporter. The advent of hydraulic fracturing has led US oil production to rise by 30%, and gas production

by 25% in just five years. As a result of this bonanza, US domestic energy prices have plummeted. These changes in supply have also been important for European and Asian gas importers who are looking to benefit from this greater supply– many of which had already planned on increasing the share of natural gas in domestic energy mixes.

"Oil is getting old, dirty and costly whereas gas is clean, cheap and aplenty." What kind of fuel choices should we make? Lower carbon-emission prospects of natural gas have begun to appeal to a larger number of countries, leading to a geographical shift of focus on energy resources (from oil to gas) and changing demand-supply dynamics.

Choosing our fuel for the future: what will shale gas do for oil choices in the future? Oil prices are not necessarily coming down, but are becoming less volatile than they used to be. On the other hand, gas prices react more significantly to local and regional factors, yet are experiencing a downward trend. The world has enough supply – yet energy security is about reliable supply with reasonable prices. Hence, India must focus on gas as this is where our greatest advantage lies.

New discoveries of gas in Australia and East Africa will also most likely add to the global supply of liquefied natural gas (LNG). Growing energy consumers such as China and India will face increased global competition from former LNG exporters Indonesia and Malaysia, now preparing to import LNG to meet domestic demand. The shale gas revolution is not only limited to the US. Australia is rapidly pursuing development of its coal-bed methane CBM resources, with China, India and Indonesia close behind. A number of other countries spread across Asia, East Africa, Europe and South America are also optimistic about prospects for their own shale gas reserves. The development of methane hydrates in Japan coupled with large reserves of conventional sources in East Africa will widen dispersion of gas resources. According to the forecasted growth in natural gas trade by the discovery of these resources, the IEA projects that between 2010 and 2035, international natural gas trade

will grow by nearly 80%. [5] In this context, the panelists seemed to unanimously assert that India needs to expand its relations with countries that have abundant gas resources while at the same time attempting to develop its own reserves.

For India's long-term energy security, developing pipelines is key. India is habituated to feeling vulnerable on the global energy scale because of its dependency on imports. The country is being cut off pipelines because of sensitive neighborhood disputes.

India is surrounded by large reserves of natural gas – Turkmenistan, Russia, and several others. Pipelines would provide the desired energy resources the country requires. The TAPI, for example, presents a controversial state of affairs driven by geopolitical stress between India and Pakistan. India may be close to its resources, yet needs to improve its relations with these countries.

The Iran-Pakistan-India pipeline is rife with geopolitical obstacles. While the Iranian section of the pipeline (over 900 km) is almost complete, no work has happened on the 780-km segment of Pakistan's soil. Pakistan's fundamental problem is financing the project, yet there are other factors are in play. For example, Saudi Arabia is seemingly uncomfortable with Pakistan-Iran links while Riyadh has already expressed displeasure over the West's nuclear deal with Iran. While Pakistan has assured that the project will not be abandoned, further developments will decide the fate of the IPI, particularly as the pipeline passes through the troubled province of Baluchistan.[6]

Increased competition for untapped oil and gas fields is likely to add to the intensity of disputes over contested offshore territories with promising hydrocarbon deposits. This is a major factor in the dispute between China and Japan over a disputed patch of the East China Sea which is believed to sit atop a large natural gas field. A similar dispute has arisen in the

[5] "World Energy Outlook: 2012," International Energy Agency, 146.
[6] The Hindu Business Line, Nov 29, 2013. The Iran-Pakistan-India gas pipe-dream.

South China Sea, with undersea oil and gas reserves again a source of friction and conflict.[7] China claims large swaths of the eastern South China Sea, overlapping with claims from Malaysia, Brunei, Vietnam, and the Philippines. Vietnam has offered India seven oil blocks, including three on an exclusive basis, and joint prospecting in some Central Asian countries. Chinese objections have included demarches, pressure on companies not to sell equipment to India and the alleged buzzing of an Indian warship that had transited through the disputed portion of South China Sea.[8]

Energy security is a holy grail at the global level – viable, affordable and equitable security will take a while to achieve. Energy stability, on the other hand, is more short-term and turbulent. India ought to focus on long-term energy security and short-term energy stability and its economic potential, or lack thereof.

The current dynamic of political Islam in the Middle East region could affect energy security in the long run. As the Arab Spring raised oil prices and concerns about energy security around the world, the Middle East is likely to be at the center of the shift in global energy markets as it negotiates with dramatic political change. However, new and growing gas consumers in South and East Asia and the Middle East will continue to emerge, interacting with large oil-exporters and oil prices in a dramatic way. The increased availability of unconventional natural gas is putting pressure on longstanding contractual arrangements that underpin the oil-linked gas-pricing paradigm. In the Middle East, political instability deters investments that would help the region build natural gas infrastructure and remain competitive in the changing global market.

Hence, it is important for India to improve its relations with these countries – particularly Saudi Arabia, Iraq and Iran. Both in offshore assets and in the region, one panelist asserted that India needs "a series of Plan B's" to achieve energy security. Therefore, it was unanimously agreed upon that diplomacy has to be more active, with more persistent

[7] Klare, M. 2012. The Geopolitics of Oil: Old and New. World Security Studies Hampshire College, Association for the Study of Peak Oil.
[8] The Hindu, Vietnam offers India seven oil blocks in South China Sea, November 2013.

lobbying, which, in turn, will require greater coordination internally as a consolidated ministry.

Many geopolitical stress issues are non-linear and work through osmosis. The US, Russia and China will be impacted by this osmosis. While shale liberates the US to a certain extent, Russia will be affected as a status-quo power. Much of geopolitics will be affected with advances in technology (i.e. hydraulic fracturing and horizontal drilling).

New discoveries of energy reserves combined with new technologies to extract energy more efficiently will lead to a dramatic shift in existing dependency on energy-dominant countries and regions (such as Russia and the Middle East).

The US shale gas revolution, however, is only estimated to account for ten percent of global reserves that could total to as much as 6,622 trillion cubic feet. According to gas-sector analysts, the greatest potential lies in shale reserves in other parts of the world – predominantly China, Argentina, Mexico and South Africa. Smaller reserves in a number of European countries such as Poland and Ukraine have also received attention for their geopolitical implications as they have traditionally been dependent on Russia for supplies of natural gas. Successful development of domestic shale reserves could reduce the continent's gas-driven economic and political dependency on Russia and Russia's energy dominance in the region.

3.

Global Energy Architecture @2030: The P^5 Agenda – Planning, Politics, Policy, Production and Pollution

After discussing energy sources and geographies in terms of supply, and the challenges that various factors pose for both these concepts, the third panel discussed the energy architecture in broader context, covering themes such as: i) The question of securing sources of energy, ii) The implications of energy use on economic trends, and iii) The consequences of the energy utilization on the environment. The overall framework that emerged was one of two "trilemmas" that exist at the macro and micro levels. The macro level trilemma is one of energy, economy, and environment, whereas on the micro level, it is concerned with access, efficiency, and emissions. Some of the key issues that emerged included:

- **Shift in Energy Demand => Shift in Responsibility**: Energy demand is expected to shift from the west to the east, implying that the west should no longer bear the responsibility for environmental problems
- **Improving Access a Key Challenge for India:** For India, *Access* to energy remains an issue, but this provides an opportunity to leapfrog towards newer and greener technologies
- **Affordability Displacing Sustainability:** Affordability has taken precedence over the environment, and the development of new technologies to explore and produce conventional sources of energy, has adversely affected the development of sustainable energy
- **Need for an Integrated Energy Policy:** India needs a coordinated and integrated energy policy given the interconnectedness between different types of energy sources

Shift in Energy Demand => Shift in Responsibility

There is an aspirational structure to this whole discussion, when we consider energy consumption as negative public good and recognize that something needs to be done to reduce the overall consumption, but then there's a large segment of population below a reasonable benchmark of per capita energy consumption. Even though we strive to reduce the energy intensity of the households, it is very difficult to reduce the energy consumption as a whole. The WEF energy index shows an increase in energy demand, with 90% of the increase until 2035 being driven by non-OECD countries. Therefore, there exists a structural change in the energy architecture, with the world witnessing a tectonic shift of the energy demand from the west to the east.

There is a second important issue of environmental consequences with organizations like IPCC that suggest that the process of climate change has reached a threshold, and that the changes to the environment cannot be undone. Industrialized countries have, historically, borne the responsibility for environmental problems. However, the last few decades have seen a geographical shift in who pollutes and suffers most from intensive energy use and the energy demand seems to be shifting from west to east. We must address this issue by changing our approach to energy consumption.

Improving Access a Key Challenge for India

Panelists noted that economic growth and development, energy access and security, and environmental sustainability are the three vertices of the energy-architecture framework, but the system is much more complex and also includes stakeholders, boundary constraints, and infrastructure.

The current challenge faced by India is securing reliable and good quality energy supplies, and increasing energy *access*. In light of this, the need for a mix of options for energy supplies and the focus on renewables stems not only from the concern of sustainability, but also of improving access. But, due to the increase in imports, alternatives need to be considered. India is linked to the international landscape due to energy vulnerabilities, high imports, low R&D, and being far behind on the development path.

Panelists pointed out that India's focus on large-scale and macro systems, has happened at the cost of a small-scale decentralized incentive system. One manifestation of this is that all plans to solve the problem of energy for cooking have failed due to which black carbon emission has not been effectively tackled due to biomass consumption. Panelists agreed that an **innovative & decentralized system** will allow better resource efficiency but there is a lack of policies and awareness.

Affordability Displacing Sustainability

Panelists discussed how the future of green energy currently seems to be in question, explaining that in the triangle of affordability, energy security, and environment, affordability appears to have displaced environment from the top spot. This, they pointed out, is even true for countries such as the United Kingdom, – which have hitherto been much more focused on green energy – where this change has occurred due to economic troubles. Apart from the recession, the discovery of shale gas reserves is expected to further dent the growth of renewables and green energy. The discovery of such cheap gas in the U.S., has led to debates on the cost-effectiveness of renewables and many in the sector fear that a "dash for gas" in pursuit of lower capital costs, could divert attention away from greener energy solutions. This is the dilemma we face when, while making the carbon intensive technologies cheaper, and discover alternate geographies for traditional energy sources, energy impact would tend to increase and reduce the efforts on the development of alternatives.

In general, the development of alternatives has been sub-optimal, because of the inconsistency in incentives around the world. No country except Germany has taken significant steps to combat climate change. While India has done well in terms of clean energy, the focus must now shift towards energy efficiency, especially since India is at the top in terms of energy intensity. "Sustainable energy" involves renewable energy, energy efficiency, and energy access as the three dimensions, which map onto environmental sustainability, economic competitiveness, and social issues, respectively. Therefore, systems must transform in a way to address these issues that need awareness, incentives, and policies to bring about behavioral change in India.

Need for an Integrated Energy Policy

The panelists reiterated the concern raised by the first panel about the absence of an integrated energy policy. Renewable sources of energy involve huge investments in infrastructure. These investments must be benchmarked against the cost of supply of conventional energy resources, thereby requiring an integrated view. The rate of investment in renewable energy must be balanced against alternative investments and returns across different sectors. Such analyses that span sectors necessitate an integrate energy policy.

The National Mission for Enhancing Energy Efficiency does require an integrated architecture and at some point of time, the various policies governing energy across ministries, will need to be coordinated. Currently, all the projects in this context lie within the purview of the Ministry of Power. But a panelist stated that the Ministry of Power is incapable of providing the necessary momentum, and therefore, the need of the hour is to view energy as something that drives the economy and not in terms of as separate compartmentalized components like coal, petroleum, gas etc.

Reform Existing Subsidies

India is well endowed in coal, and coal can therefore be used to cross-subsidize the petroleum sector. However, the Government of India has still been using cost-plus model in this sector. The panel held that this sector needs to be liberated, and competitive international prices should be allowed to improve revenue. A clear pricing policy is required to oversee the pricing and planning across different sources.

Panelists added that regulatory commissions in India are ignoring the ramifications of not increasing prices, and that the behavior of politicians is shortsighted. But, understanding that raising fuel prices would be politically contentious, they stated the need to involve the public in such processes, and increase awareness about the economic repercussions of such subsidies. In doing this, they can follow the example of countries that have successfully informed people about the implications of pricing, and reaped its benefits.

Eventually though, the panelists were optimistic that India – due to the lack of any legacy structures –had opportunities to leapfrog to newer policies and sources of energy. An integrated approach that incorporates markets, technologies, and policies is needed with trade-offs being considered in making decisions. The policies must be inspired by the best practices and be made flexible for energy realities. Finally, consistency of policy related to energy is important, especially to allow the corporate sector to assume a greater role and responsibility.