



A QUARTERLY JOURNAL FOR DEBATING ENERGY ISSUES AND POLICIES

This issue of the *Oxford Energy Forum* is dedicated to Energy in India.

Set against the landscape of an uncertain international energy market and a potential slowing of China's economic growth, the Indian economy stands poised as a hopeful prospect (the IMF forecasts growth of 6.3 per cent in 2015) in an otherwise unsteady global economic recovery. However, India's new government, elected last May, faces significant challenges in implementing energy reforms, given the complex intertwining of physical (supply), fiscal, poverty and environmental issues. This issue draws together key debates on Indian energy.

The issue begins with three articles covering the recent softening of oil prices, and its varied implications. *Amrita Sen* argues that while this fall in prices could result in a possible halving of India's crude oil import bill in 2015, a combination of low oil prices, greater competition for Asian markets amongst crude exporters, and the liberalization of major petroleum product prices in India will, in fact, ensure that India's fiscal balances continue to benefit even when global crude oil prices have started to rise again. India's traditional sources of crude imports in the Middle East face growing competition both from within that region and from Latin American crude exports (displaced by US domestic production), putting India

in a favourable bargaining position as an importer. This could reverse the struggle India has had over the last decade with oil and fiscal deficits.

*Nilav Bose* analyses the sustainability of India's rapid rise as a leading exporter of refined petroleum products. This export 'boom' did not result from a strategic plan, but from private refiners being undercut in India's domestic market by public oil marketing companies receiving government subsidies, leading to the redirection of their refined product output to the export market from 2006 onwards. Genuine product-pricing competitiveness, with private refiners operating new and complex refineries, supported these changes. However, the author argues that a strategic push *will* be necessary if India is to maintain export market share, due to new refining capacity in its traditional demand bases in the Middle East, and an increasingly crowded export market in east Asia (resulting from lower demand – and hence excess refining capacity) in China. Both articles also conclude that these shifts in international market dynamics combined with domestic price reforms imply potentially greater competition in India's downstream oil products sector.

*Kapil Narula* argues that there has never been a better time for India to build up its Strategic Petroleum Reserve in order to boost its physical (supply) and fiscal

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energy security. The first phase – comprising roughly 38 million barrels – will be ready this year, and India's government, with an eye on reigning in its fiscal deficit to 4.1 per cent of GDP, has been exploring financing options to 'fill up' this reserve. One possibility is to lease out storage capacity to domestic or international crude producers and refiners whilst retaining the 'right to first use' of the oil (at market prices) in the event of a supply disruption. However, the author argues that the government should consider financing the 'filling up' of the first phase itself given the low oil price environment as, if prices do indeed go back to the highs seen before June 2014, it could draw down the reserves and in the process potentially reap a 50 per cent return on its investment.

The issue then opens up into 'big picture' trends in India's energy production and consumption, with three articles. The first, by *Rahool S. Pai Panandiker* and *Ujjit R. Patel*, analyses the challenge of meeting India's future energy needs. The article begins by setting out the scale of the challenge: India's primary energy consumption per capita is currently a third of the world's average; its total primary energy consumption is expected to grow at a rate outpacing China's in the period between now and 2030, with fossil fuels continuing to dominate. As domestic hydrocarbon reserves are insufficient to meet this growth, energy imports, which have increased sharply as a percentage of GDP in the last decade, are likely to continue rising, placing a significant burden on the macroeconomy. The article discusses how the current situation can be characterized by a set of factors (including regulatory, administrative, and policy uncertainty) which have combined to dampen investor interest in the energy sector and impeded the development of capacity required to meet India's energy challenge. The authors outline measures

towards developing a coherent policy framework for energy, which they argue is necessary to unlock India's potential to meet its future energy requirements.

*P. Elango* reviews the evolution and current status of India's upstream sector, and its linkages to the downstream economy, set against the context of India's broader energy challenges. The article charts early successes in upstream exploration; the failure to consolidate these has led to a plateauing and then decline in upstream activity in recent years, reflected in the largest volumetric decline in gas production in 2013. The article highlights problems with antiquated data (which frames investors' perceptions of uncertain resource potential) but also discusses recent technological progress in data-gathering, particularly in the private sector. The author argues for greater harmonization between upstream and downstream policy – which in the past have been pursued to different ends – stating that policies should be predicated on strengthening the perception of India as a large potential energy (consuming) market in the minds of potential upstream investors.

*Kaushik Deb* assesses India's primary energy mix during 2008–13 using average changes in consumption and production to identify important trends. The author argues that broad five-year averages mask a significant shift in the proportion of fuels in India's primary energy basket in the middle of this period. A rapid rise in gas consumption during 2008–11, followed by an almost equivalent decline from 2011–13, was offset by equivalent decreases and increases in coal consumption. However, an increase followed by a decline in gas production during the same two intervals was not matched by an equivalent trend in coal production, which in fact experienced its first volumetric declines since 1999. Increased coal consumption was thus

met primarily through coal imports. This implies that Indian coal consumption has responded relatively quickly to broader changes in energy production. The article discusses the implications of these trends for energy intensity and emissions from energy use.

The next two articles delve specifically into key debates over the disappointing performance of India's upstream sector (partially discussed in the previous three articles). *Daniel Johnston* and *David Johnston* review the debate over profits-based structures (production sharing contracts and royalty/tax systems) versus revenue-based structures in the design of a fiscal regime for upstream exploration. In India, this debate is based on a lack of faith in the accounting for costs, the spectre of cost overruns, and concerns over goldplating. The authors argue that revenue-based systems can be easier from an administrative point of view, but are regressive with regard to government take, and discourage investment. A key consequence of revenue-based systems is also the early abandonment of fields. The article examines the issue of goldplating and discusses how the current focus of attention in the Indian debate is misplaced – it is not a systemic problem. The authors conclude that revenue-based systems have been tried and abandoned, while later generation 'R factors' or Rate-of-Return (ROR) mechanisms are more efficient for creating a progressive fiscal system.

*Anupama Sen* separates the reality from the rhetoric of India's potential role as a major Asian gas market. The article discusses recent gas pricing reform, and argues that it continues to be predicated around managing the price level rather than establishing a logical basis for price formation. It concludes that the prospects for a turnaround in the recent decline in India's upstream gas sector are limited in the absence of further reform on price formation.



The author argues that any potential for LNG imports will be constrained by the lack of infrastructure, and by a potentially shrinking market for gas in certain important consumer segments such as power. The author concludes that the sustainability of pricing reforms will be determined by the ability of major downstream consuming sectors to absorb higher-priced gas, and argues that the only realistic market opportunity for gas lies in the relatively smaller city gas sector – which suggests a much more muted role for gas in India's economic story under present conditions.

The next article in the issue moves away from upstream oil and gas issues, and considers 'the elephant in the room': coal. *Dagmar Graczyk* discusses how coal is fuelling India's economic growth, and will continue to be the dominant fuel up to 2040. Contrary to popular perceptions that this will be fuelled by its coal reserves (the world's fifth largest) the economic viability and suitability of Indian coal for certain uses (for instance, in power and steel) remains debateable. India's coal imports – currently 22 per cent of demand – are expected to triple to 2040, as a result of deeper structural problems in the domestic coal sector. The article analyses the recent controversy over the cancellation of 204 coal block licences, and the implications of the knock-on effect that this could have on India's coal production, and consequently imports. The author concludes that necessary structural reforms (including the reform of the state-owned monopoly Coal India Limited) will only be successful if, among other things, the government engages in closer cooperation with coal-mining states, and develops a much more conscientious approach towards mitigating the environmental degradation of mining areas, given that India will continue to depend upon coal to propel its economic and social development over the next few decades.

Inevitably, the next article focuses on electricity, given that coal forms the majority (roughly 60 per cent) of installed generation capacity. *Rahul Tongia* argues that change is inevitable in India's electricity future, where the traditional social contract to provide 'universal' access to electricity is broadening in its definition to include quality of service and willingness to pay – the latter is arguably already visible in the money spent on back-up power and lighting to combat regular outages (load-shedding). In light of the recent growth in renewable energy, the article also discusses how renewables have long been promoted in India, and how whilst they face similar challenges (intermittency, location, costs) as those deployed in the USA and Europe, there are also further challenges relating to the instability of the grid, along with enormous systemic price distortions which are not reflective of usage patterns. Given these, the author concludes that the nature of the changes brought about by the rise of renewables, along with storage and Smart Grids, will thus be different from the impacts of electricity restructuring in the 1990s – whilst the latter did not affect the 'flow' of power significantly, in contrast the former can be game-changers for Indian electricity, particularly with regards to their potential impacts on the costs of operation of grid-connected utilities.

The next article discusses the potential role for energy efficiency in mitigating India's rising primary energy consumption. *Anil K. Jain* argues that a concerted strategy on energy efficiency could bridge the gap between energy security and climate change mitigation in India – these issues have typically been viewed as separate policies. The article discusses the enormous potential for energy savings using 'India Energy Security Scenarios to 2047' (IESS 2047), a scenarios-based analysis developed by the Planning Commission which

estimates that a five-fold rise in India's total primary energy demand to 24,000 Terawatt hours by 2047 could be reduced by between 25–40 per cent through the adoption of economy-wide energy efficiency measures. The article highlights the savings potential through the use of targeted policy measures in industry (the single-largest energy consuming sector), transportation (the second-highest energy consuming sector), the buildings sector (based on an expected doubling of the urbanization rate by 2030), and in agriculture and cooking. The author thus argues that energy efficiency measures could partially substitute efforts towards raising domestic fossil fuel production and dealing with import dependency, in providing a solution to India's 'energy problem'.

Moving momentarily away from the focus on domestic issues, the next two articles address important bilateral and foreign policy aspects of India's energy sector. *Arghya Sengupta* focuses on the prospects for nuclear energy following the Indo-US civilian nuclear agreement of 2008, arguing that these are contingent upon a resolution to the controversy over India's Civil Liability for Nuclear Damages Act, which sets up a specialized compensation mechanism for victims of nuclear incidents containing provisions arguably inconsistent with India's international obligations. Specifically, Section 17(b) of the Act holds suppliers liable for recourse where the nuclear incident is due to patent or latent defects in equipment or material, or the supply of sub-standard services; and, Section 46 of the Act arguably allows suppliers to remain liable under regular provisions of tort law and other general legislation despite having fulfilled their liabilities under the Act. This legislation has stalled potential investments in nuclear power, as suppliers argue that they could be exposed to potentially unlimited (and uninsurable) amounts of liability. The article explores these

two issues and argues for a legislative realignment that ensures safety while incentivizing nuclear investments. While President Obama's recent visit to Delhi resulted in an apparent renewal of cooperation to resolve this issue for US nuclear suppliers, the test lies in whether investments in nuclear power eventually pick up.

*Pramit Pal Chaudhuri* analyses the contradictions between India's historical stance on the pursuit of energy diplomacy (and energy security) through overseas acquisitions of hydrocarbon assets by its National Oil Companies and the system within which this is executed, which is in fact designed to constrain the effectiveness of this stance. The article points out how attempts at energy diplomacy have been moved forwards in fits and starts and have easily been trumped by domestic political considerations. Key aspects of energy diplomacy are reviewed, such as India's pursuit of overseas energy assets – which are at about a tenth those of China's. The article discusses recent

efforts to consolidate energy cooperation in the south Asian neighbourhood via hydroelectricity, and the enormous potential for overseas cooperation and financing (both bilateral and multilateral) of India's ambitious target for building 100 Gigawatts of solar capacity (from 3 Gigawatts at present) by 2022. The author concludes that medium-term energy diplomacy will be about leveraging overseas capital and technology to resolve domestic problems.

Given the breadth of the debates covered in this issue, it is fitting that it should end with an article that seeks to define the multidimensional aspects of India's 'energy challenge'. *Vipul Tuli* writes on the need to establish a broader definition of 'energy security' for India which goes beyond physical (supply) security, given the importance of primary energy consumption in sustaining economic growth. The article sets out four broad factors towards this end:

- 'supply reliability' focuses on strengthening the physical dimension of energy supply security, including the

need to develop strategic oil reserves;

- 'energy access' focuses, amongst other things, on bringing the 200 million Indians who lack access to electricity onto the system for modern commercial energy;
- 'economic viability for stakeholders' includes consolidating the fiscal and financial dimension of energy security;
- 'environmental sustainability' focuses on scaling up renewable energy, alongside measures on the mitigation of carbon emissions.

The author breaks down the key policy initiatives required to operationalize this broader and more pertinent definition of energy security for India into eight areas, arguing that such a measured, yet all-encompassing approach will make India's energy security goals seem achievable and its challenges appear less insurmountable.

*The views expressed in this issue are solely those of the authors and do not necessarily represent the views of OIES, its members, or any other organization, company, or government.*

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