An assessment of India's energy landscape: 2008–13

Kaushik Deb

As the global economy spiralled into the worst financial crisis since the great Depression in 2008 (according to Nouriel Roubini, Kenneth Rogoff, and Nariman Behravesh, in a press release reported in Reuters, 27 February 2009), India seemed to be bucking the trend. A five-year average GDP growth rate of 8.6 per cent per annum (p.a.) over 2003–8, more than twice that of the world average of 3.8 per cent p.a., and a full percentage point higher than the rest of the non-OECD countries (7.6 per cent p.a.), had arguably set India up for what was expected to be a period of high growth, rivalling that of China. For a while it did appear that this promise would be realized, before India hit another roadblock in its growth story and GDP growth slowed down around 2011.

India's energy markets followed economic growth, albeit more slowly. The transition in the energy sector in India is echoed not just in volumetric increases, but, more significantly in the proportion of different fuels in its primary energy mix. This paper traces the evolution of India's primary energy mix during 2008–13, using average changes in consumption and production to identify important trends in its energy landscape over these five years.

Consumption

India's energy consumption increased by 6 per cent p.a. on average during 2008–13, with India accounting for 4.7 per cent of the world's energy consumption by 2013. Coal (54.5 per cent of total consumption) was, and remains, the dominant fuel in India and its share of the energy mix as of 2013 was the highest since 1996. Oil (29.5 per cent) was the second-largest fuel, with natural gas (7.8 per cent) and non-fossil fuels (8.2 per cent) far behind. Coal also led the growth in primary energy consumption during 2008–13 (meeting 63.3 per cent of the total increase in consumption), with oil far behind (meeting 20.6 per cent of this increment), and non-fossil fuels (nuclear, hydro, and renewables) adding another 10 per cent.

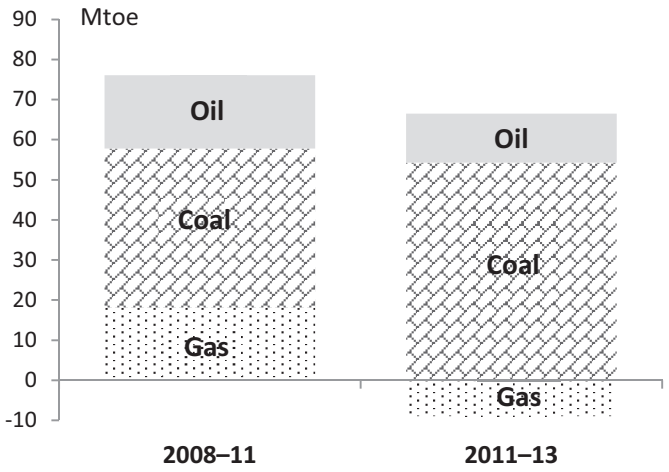
This five-year average, however, masks the significant shift in the proportion of fuels in India's primary energy basket that took place right in the middle of this interval.

Gas consumption, which had steadily started to gain market share and was growing by 6.9 per cent p.a. on average during 2003–8, lost that momentum. Between 2008 and 2011, gas consumption rose by 20.1 Bcm (14.2 per cent p.a.) with rising domestic gas supplies which were cheaper than other fuel substitutes or imports. However, a fall in domestic production from 2011 onwards resulted in a decline in gas consumption by 10 Bcm (–8.5 per cent p.a.) between 2011 and 2013. The gas story is mirrored in coal, where growth slowed down from 7.9 per cent p.a. during 2003–8 to just 5.5 per cent in 2008–11. Subsequently, to compensate for the falling gas consumption, coal consumption rose by 9.6 per cent p.a. during 2011–13. Coal consumption rose by 7.6 per cent in 2013 alone, the second largest volumetric increase on record. In fact, coal consumption has more than doubled over the last decade in absolute terms.

Production

India's energy production increased by 3.5 per cent p.a. during 2008–13, much slower than the previous five-year average growth of 5.1 per cent p.a. In 2013, India's production was just 2.7 per cent of the world's total. This slowdown is solely attributable to coal, which comprises more than 65 per cent of total energy production in India. Growth in coal production fell from 6.2 per cent p.a. during 2003–8 to just 3.2 per cent p.a. during 2008–13.

'INDIA'S ENERGY CONSUMPTION INCREASED BY 6 PER CENT P.A. ON AVERAGE DURING 2008–13.'



Change in fossil fuel demand

Oil and gas production each grew by a modest 2.1 per cent and 2 per cent p.a., respectively, during 2008–13; these figures are much larger than the 0.3 per cent p.a. for oil and 0.6 per cent p.a. for gas in the previous five years (2003–8). Thus, both maintained their shares in India's energy production: about 9 per cent for gas and 12 per cent for oil.

An interesting wrinkle here is the dramatic rise in the share of gas in total production during 2008–11, and its subsequent fall. The share of gas rose from 9 per cent in 2008 to 12 per cent in 2011 before falling to 9 per cent again in 2013. Again, mirroring this is the fall in the share of coal from 66 per cent in 2008 to 62 per cent in 2011 before coming back to 65 per cent in 2013. Both these trends can be explained by regulatory constraints.

'THE REGULATION OF ENERGY PRODUCTION IN INDIA HAS STALLED INVESTMENT AND MUTED PRODUCTION GROWTH.'

The regulation of energy production in India has stalled investment and muted production growth. After significant increases all through 2003–8 (6.2 per cent p.a.), coal production growth stalled during 2008–13 with a growth of only 3.2 per cent p.a. as mentioned earlier. In fact, coal production in India fell twice in these five years, the first volumetric declines since 1999. This slowdown was largely due to expansion plans and investments getting mired in environmental clearances and significant delays in land acquisition for new mining areas. This period also saw record increases and declines in gas production. New gas discoveries were brought online, increasing production by 14.8 per cent p.a. during 2008–11. Subsequently, gas production started to fall from 2011, with the new fields starting to decline much faster than expected and no new investment in the sector having been seen in the previous years. The decline in gas production during 2011–13, by 14.5 per cent p.a., was almost as rapid as its rise in the previous three years. This led to the largest decline in gas production in any country in the world during 2013 (–6.7 Bcm). The lack of a viable pricing policy and commercial flexibility continues to constrain growth in this sector.

Implications

The slowdown in India's energy consumption was accompanied by a slowdown in its economic growth. GDP growth slowed from 8.6 per cent p.a. during 2003–8 to 6.6 per cent p.a. in 2008–13, while the growth in energy consumption slowed from 6.8 per cent p.a. to 6 per cent p.a. Consequently, the rate of improvement in the energy intensity of GDP also slowed down. In addition, relative changes in the primary energy mix had implications for CO_2 emissions from energy use.

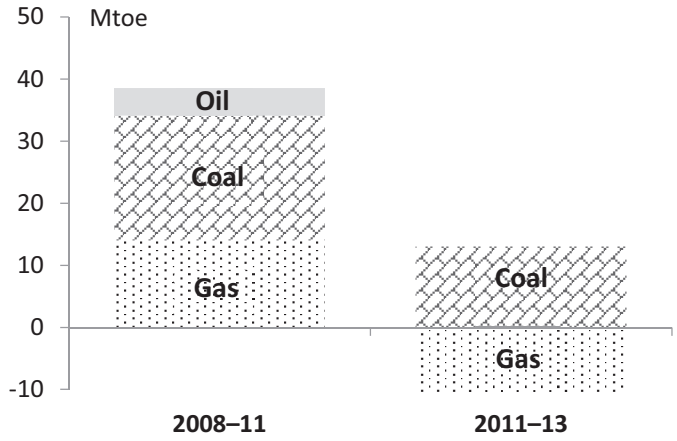
More significantly, the sharper slowdown in domestic production in comparison to consumption implied that the share of India's energy consumption met by domestic sources fell to 59 per cent by 2013, the lowest on record.

Rising import dependency

India's net energy imports increased by 10.1 per cent p.a. on average during 2008–13. Coal led the trend with imports rising by 22.5 per cent p.a. during this period, while gas imports and oil imports rose by 10.6 per cent p.a. and 4.6 per cent p.a. respectively. More striking is the rise in the growth rate of coal imports, from 16.2 per cent p.a. in 2008–11 to 32.6 per cent p.a. during 2011–13. Underlying this rapid increase is the trend in domestic gas production during this period (described above) and the tight Asian LNG market at the time. The increase in relatively cheaper domestic gas supplies during 2008–11 offset the rise in coal imports to an extent. However, as domestic gas production collapsed in 2011, energy demand shifted to coal imports. Indian imports of LNG, on the other hand, entered a three-year supply growth lull in 2011, as the Fukushima nuclear disaster pushed Asian demand (and prices), to record highs and made gas imports much more expensive than coal imports. The result was a much more dramatic increase in coal imports during 2011–13.

Higher energy intensity and emissions from energy use

Energy markets are sluggish in their response to economic drivers. As a result, GDP growth slowed more sharply than energy consumption,



Change in fossil fuel production

thus slowing improvements in India's energy intensity as well. From a decline of 0.8 per cent p.a. on average during 2003–8, energy intensity only fell by 0.6 per cent p.a. during 2008–13. These gains in energy efficiency were made during the early part of this period (2008–11) when GDP growth was faster than the increase in energy consumption; GDP rose by 8 per cent p.a. during 2008–11 while energy consumption increased by 6.3 per cent p.a. (This was in line with trends in the previous five years (2003–8) when GDP growth of 8.6 per cent p.a. was matched by an increase in energy consumption of 6.8 per cent p.a.) This resulted in an improvement in energy intensity of 1.5 per cent p.a. in 2008–11; however, in the following two years (2011–13) the slowdown in GDP was larger than that in energy consumption. GDP growth came down to just 4.7 per cent p.a. while energy consumption growth declined by to 5.5 per cent p.a. This led to energy intensity increasing by 0.8 per cent p.a.

In line with this broad improvement in energy intensity, the rate of growth of CO_2 emissions from energy consumption has continued to decline in India – from 6.7 per cent p.a. during 2003–8 to 6 per cent p.a. during 2008–13. However, the fuel mix has also played a role in these figures. With the rising share of gas in the energy mix during 2008–11, CO_2 emissions increased more slowly – by 5.7 per cent p.a. on average during these three years. But the subsequent increase in the share of coal in the energy mix raised the growth rate of CO_2 emissions to 6.6 per cent p.a. on average during 2011–13.

'… THE RATE OF GROWTH OF CO_2 EMISSIONS FROM ENERGY CONSUMPTION HAS CONTINUED TO DECLINE IN INDIA …'

This assessment of India's energy landscape during 2008–13 therefore shows not just a short-term resurgence in, but also a longer-term growing dependence on coal, both domestically produced as well as through imports, brought on by underlying changes in the relative proportions of fuels which make up the primary energy mix. It also shows that Indian coal consumption has responded relatively quickly to changes in energy production and supplies. Perhaps the most significant implication of this is the impact on CO_2 emissions. Going forward, India's emissions of CO_2 will be dependent on the relative proportions of cleaner fuels in primary energy, and on India returning to higher GDP growth.