Shale gas in India: The wrong path?

Asit Biswas & Julian Kirchherr
Lee Kuan Yew School of Public Policy, Singapore

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This article looks at whether the exploitation of shale gas could end India's energy crisis. The authors argue that the country currently lacks the technical capabilities necessary to utilize its recoverable resources. Furthermore, shale gas exploitation would aggravate the country's water pollution problem. As a result, the authors conclude that India ought to increase its energy efficiency, not its efforts in the exploitation of shale gas.

Keywords: shale gas, India, water quality, wastewater, pollution, energy security.

India lacks energy. In 2011, almost 300 million people – 25 percent of the country's entire population – had no access to electricity at all. Even 65 years after Independence, only nine states – Andhra Pradesh, Gujarat, Karnataka, Goa, Delhi, Haryana, Kerala, Punjab, and Tamil Nadu – out of a total of 28 have been declared officially as totally electrified. But even in these so-called totally electrified states, power shortages and power cuts are often common. In July the worst energy blackout in a decade left more than 620 million Indians without electricity and total energy demand currently outstrips supply by as much as 15 percent.

Chronic energy shortages and unreliable supplies threaten India's economic growth. For investors, continuous and reliable supplies of energy are essential requirements for any ventures. According to estimates by HDFC Bank, the country's chronic energy shortages have already slowed down GDP growth from 8 percent to 6.5 percent. With

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accelerating energy demand, poor management, and bureaucratic constraints, India's energy gap is likely to remain for at least the next two decades: The International Energy Agency (IEA) estimates that even by 2030 homes in many states will still have no continuous access to electricity.

India's hunger for energy is symptomatic for the Asia-Pacific region: some 93 percent of the growth in energy consumption until 2030 is predicted to occur in non-OECD countries, particularly in Asia. Asia-Pacific is predicted to provide as much as 35 percent of total global energy production in 2030,[1] but this is still not predicted to satisfy the increasing regional demand.[2] Hence, policy-makers are urgently seeking solutions which would ensure that the emerging Asian economies are not starved of energy.

One solution could be shale gas. Indeed, the Indian government now plans to exploit the country's shale gas resources to disprove the IEA's pessimistic estimates. It had planned to unveil a comprehensive shale gas exploration policy by the end of December 2012 although the release has been delayed for unknown reasons. Supposedly, the policy is now in the final stages of completion and ought to be released in the near future.

It has been estimated that India has recoverable shale gas reserves between 6 trillion cubic feet and 63 trillion cubic feet; the exact amount is still unknown. Large reserves have been confirmed in Cambay, Assam-Arakan, Gondawana, and Cauvery. Currently, gas accounts for approximately 11 percent of the country's energy mix, nearly half of energy consumed is generated from coal, followed by hydropower at 25 percent.

Why is there this excitement over shale gas in India? Shale gas is now receiving tremendous attention in many countries of the world. The IEA has even announced that the world could enter a "golden age of gas".[3] Indeed, shale gas has turned the United States energy market on its head. The country's shale gas industry grew by 45 percent a year between 2005 and 2010, reducing the American gas price from USD 30 to as little as USD 3 per million British thermal units (mBtu). The United States is now about to turn from a gas importer to a gas exporter. China, which is estimated to hold the world's largest shale gas resources, aims to replicate this American success story, with plans to produce as much as 3500 billion cubic feet of shale gas annually by 2020.

From the Indian standpoint, the excitement over shale gas is understandable. However, it could be premature. The exploitation of shale gas may not close India's energy gap in the foreseeable future for at least two reasons. First, the country lacks the technological capabilities necessary to access its reserves. Second, an exploitation of shale gas in India is likely to devastate the country's water

resources offsetting any energy benefit from a potential exploration.

Indeed, a major obstacle in accessing shale gas is technological. Hydraulic fracturing, commonly known as fracking, is the technique by which shale gas is exploited. It is highly sophisticated and complex. Currently, only North America – with its highly favorable geology – has been able to exploit shale gas commercially on a large scale. India would have to enter countless strategic and long-term partnerships with foreign governments and private sector companies to acquire these technologies and skills. The country then needs to adopt this know-how to its specific geology which is most probably less favorable than the North American one. This will take time and is unlikely to be as straight-forward as its proponents suggest.

Indeed, India's Reliance has been at the forefront of such joint venture efforts already. It has developed initiatives with Chevron, Pioneer Natural Resources, and Carrizo Oil & Gas in recent years. Oil India and Indian Oil Corporation are involved in similar joint ventures. Meanwhile, GAIL even holds a 20 percent stake in the Eagle Ford Shale in Texas.

Admittedly, these attempts are likely to boost India's technological capabilities significantly. However, even with mature and competitive equipment, India may still not be able to duplicate America's shale gas revolution in a successful and timely manner.

The main reason for this is likely to be India's failure to treat wastewater. Indeed, exploiting shale gas requires massive amounts of water which becomes heavily contaminated during the exploitation process.[4] There is now considerable disagreement among experts over whether it is possible to entirely recycle shale gas waste water cost-effectively.[5] Because American companies do not reveal yet which chemicals are injected in the ground during the exploitation process, regulators cannot test systematically if the treatment has been sufficient.

From what we know today the exploitation of shale gas, when not conducted properly, might lead to the migration of highly toxic injection fluids into water sources which may be used for drinking. A study undertaken by the Duke University shows that exploiting shale gas may contaminate groundwater seriously. Indeed, methane concentrations in drinking water were 17 times higher within one kilometer of an active shale gas well in Pennsylvania than those farther away according to the research results.[6]

Methane is a dangerous substance and high levels of methane in drinking water make such water flammable posing the risk of house explosions. Breathing and consuming methane has a variety of health implications

such as nausea and a feeling of dizziness. In addition, methane is a particularly dangerous greenhouse gas able to trap 20 times more heat in the atmosphere than CO2.

Today, sadly, India is a world leader in water pollution: the Holy Ganges contains more than 60,000 faecal coliform bacteria per 100 millilitres in many parts, which is 120 times more than what is considered safe for bathing. In most parts of the country, including the capital Delhi, sewage is disposed of without any treatment to nearby rivers. This is because India lacks sufficient treatment capacity and even where such treatment plants exist, their proper operation and maintenance practices have been often poor.

In a country with such a record of waste water treatment, it may be unrealistic to expect that wastewater from shale gas exploitations would be adequately treated. Indeed, even in the United States, with a great record of wastewater treatment, there have been many reports of toxic wastewater from fracking which was improperly disposed of. If India acquired the necessary technology and expertise to exploit shale gas, it may still fail to treat the resulting wastewater. Such a failure may offset any energy gain. For India's poor, clean water often may be more important than access to energy.

The global perception of shale gas and its potential is still evolving. Hence, India may take the wrong path if it attempts to exploit its shale gas resources without considering the serious and unintended consequences of such a development path. India cannot solve all of its policy problems at once. It must start with the most pressing ones. The approach to making policy could be simple. For example, an engineer building a house must start with the foundations and not the third floor. Similarly, a policy-maker must set priorities from the very beginning.

Hence, India must first reassess the size of its recoverable reserves for shale gas carefully. The current estimates are not precise and leave too much room for speculations. Only a developing country with vast reserves may decide to enter the technologically challenging complex shale gas business promptly. Only if sufficient reserves are available and more pressing policy challenges are faced, India may then continue to build up its technological shale gas capabilities. Because its geology differs vastly from the United States and China, building up technological capabilities implies not only copying foreign approaches, but developing genuinely Indian ones that will suit to Indian conditions. Such a development, via trial-and-error, will take considerable time.

In the meantime, focusing on energy efficiency instead of increasing energy supply would be a viable alternative. After all expanding supply is not the only path to cope

with increasing energy demand. BP projects that global energy intensity – how much energy is needed for a unit of output – will be 31 percent lower in 2030 compared to 2011.[1] If India embarks on this trend, it may not need to jump on the shale gas bandwagon immediately until the side effects of this development are carefully assessed.

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About the author(s)

Asit Biswas is Distinguished Visiting Professor at the Lee Kuan Yew School of Public Policy, Singapore, and founder of Third World Centre for Water Management. Julian Kirchherr is a research associate at the Lee Kuan Yew School of Public Policy, Singapore.

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