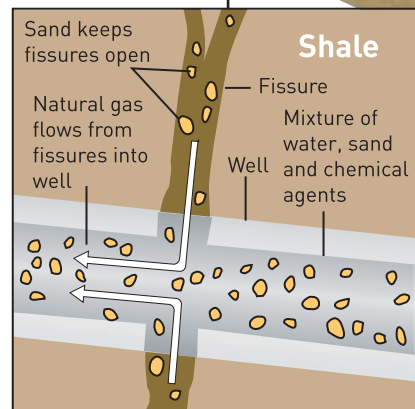
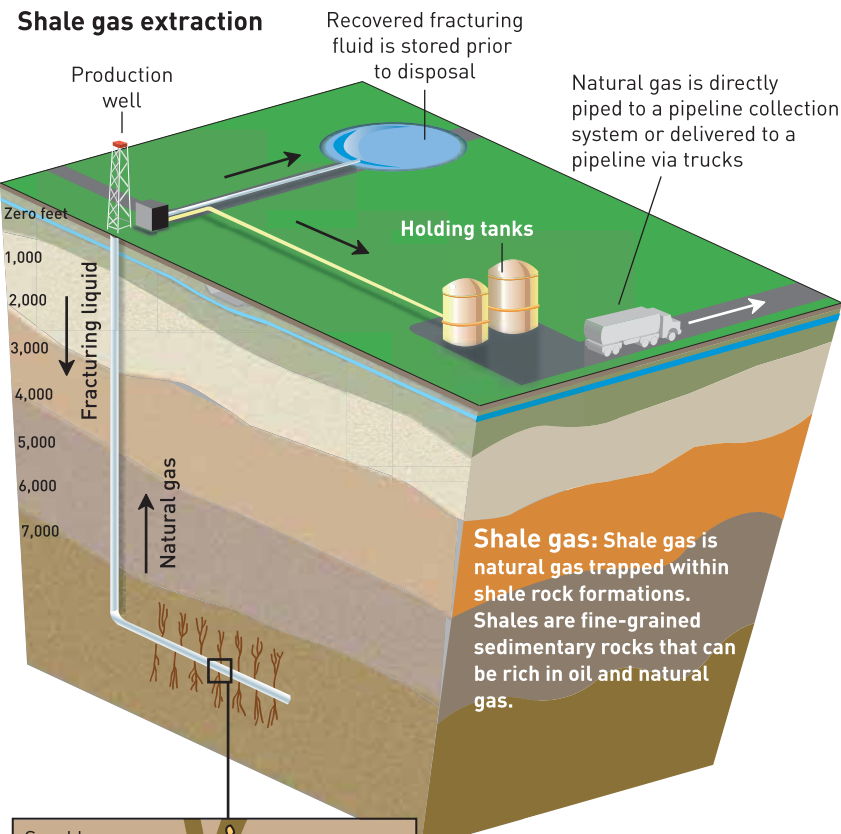


# Shale policy

The hydrocarbon industry feels that only by offering subsidies and reducing royalty rates can India achieve success similar to what the U.S. has achieved in shale exploration.

## Shale gas extraction



**Fracking or hydraulic fracturing:** Fracturing fluid—on average 99.95 per cent water and sand with a small proportion of additives—is injected at high pressure into the rock strata several thousand metres below the surface. The force of the water creates a network of tiny fissures in the rock and the water flow acts as a delivery mechanism for the sand, which finds its way into these newly created cracks to ensure they remain open. This creates passageways through which natural gas can travel to the wellbore. The hydraulic fracturing process is usually performed at the start of the life of a well and normally lasts three to five days after a well is drilled, cased and cemented, and the drilling rig is removed.

Has the Indian government rushed its policy on shale exploration in its urge to repeat the American success story? Yes, says the domestic oil and gas industry. The industry wanted a policy that treats shale differently from conventional exploration, with adequate participation from the private sector, particularly the services industry. But what it got was a policy that is very similar to the conventional exploration policy.

## THE NEW POLICY

The government has restricted shale exploration to state-run Oil and Natural Gas Corporation (ONGC) and Oil India in the blocks awarded to them on a nomination basis before the advent of the New Exploration Licensing Policy.

There is also a regulatory overlap. The existing exploration and production policy does not qualify or quantify the hydrocarbon finds. "It could be either oil or gas or any other hydrocarbon discovery," say explorers. They feel that for shale exploration, a policy offering incentives to industry is required.

In a production-sharing con-

## Types of natural gas

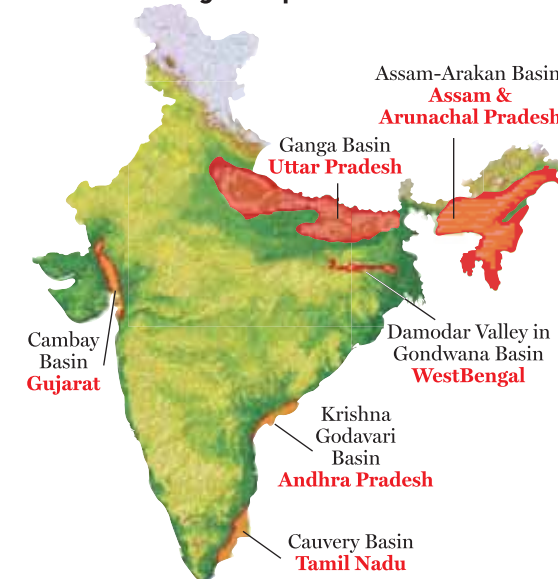
Natural gas comes from both "conventional" (easier to produce) and "unconventional" (more difficult to produce) geological formations. The key difference between the two is the manner, ease and cost associated with extracting the resource.

**Conventional:** Exploration for conventional gas has been almost the sole focus of the oil and gas industry since it began nearly 100 years ago. Conventional gas is typically "free gas" trapped in multiple, relatively small, porous zones in various naturally occurring rock formations such as carbonates, sandstones and siltstones.

**Unconventional:** Unconventional gas reservoirs include tight gas, coal-bed methane, gas hydrates and shale gas. The technological breakthroughs in horizontal drilling and fracturing have made extraction of unconventional gas commercially viable.

**India's shale reserves:** The U.S. Energy Information Administration (EIA) has revised its estimates upwards on technically recoverable shale gas resources in India, which now stand at 96 trillion cubic feet (tcf), up from its previous estimate of 63 tcf.

## Prospective basins for phase 1 shale oil and gas exploration



tract, the government awards the execution of exploration and production activities to an oil company, which bears the exploration and financial risks.

The company is permitted to use the money from the produce to recover capital and operational expenditures, known as "cost oil". The rest, known as "profit oil", has to be shared with the

government. With the government proposing to shift from profit sharing to revenue sharing (or production-linked contracts), the industry fears shale exploration will get even more expensive for the contractor.

## ENVIRONMENTAL RISKS

Drilling a well in a shale prospect is almost three times more difficult than a conventional well. In addition to the environmental risks involved in conventional gas production, there are implications of hydraulic fracturing in the case of shale.

Failures associated with well casing and on-ground activities and risks associated with hydraulic fracturing, such as contamination of water due to the storage and handling of wastewater, are unsurprising. But incidents of methane in tap water are difficult to explain.

The U.S.' success in shale has hinged on a cost-effective service industry and fiscal incentives. The industry feels that only by offering subsidies and reducing royalty rates on shale fields can India achieve similar success.

## Top 10 countries with technically recoverable shale oil resources

Country	Reserves (billion barrels)
1 Russia	75
2 The U.S.	58
3 China	32
4 Argentina	27
5 Libya	26
6 Australia	18
7 Venezuela	13
8 Mexico	13
9 Pakistan	9
10 Canada	9
<b>Total*</b>	<b>345</b>

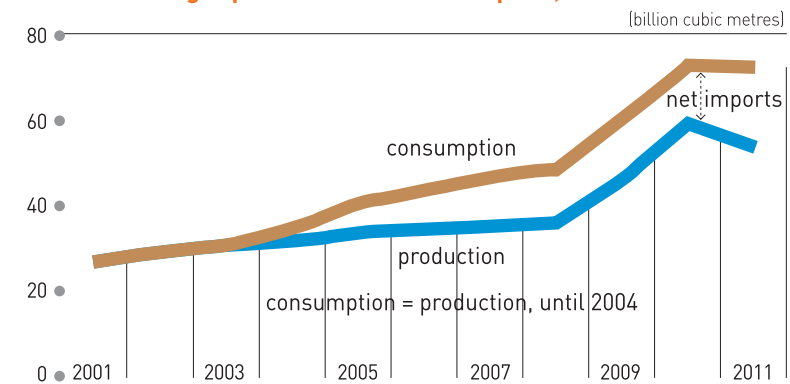
\*including other countries  
EIA estimates used for ranking order.

## Top 10 countries with technically recoverable shale gas resources

Country	Reserves (trillion cubic feet)
1 China	1,115
2 Argentina	802
3 Algeria	707
4 The U.S.	665
5 Canada	573
6 Mexico	545
7 Australia	437
8 S. Africa	390
9 Russia	285
10 Brazil	245
<b>Total*</b>	<b>7,299</b>

\*including other countries  
EIA estimates used for ranking order.

## India: Natural gas production and consumption, 2001-2011



Source: U.S. Energy Information Administration, international energy statistics