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Policy Relating to Shale Gas Exploration in India and Environmental Concerns

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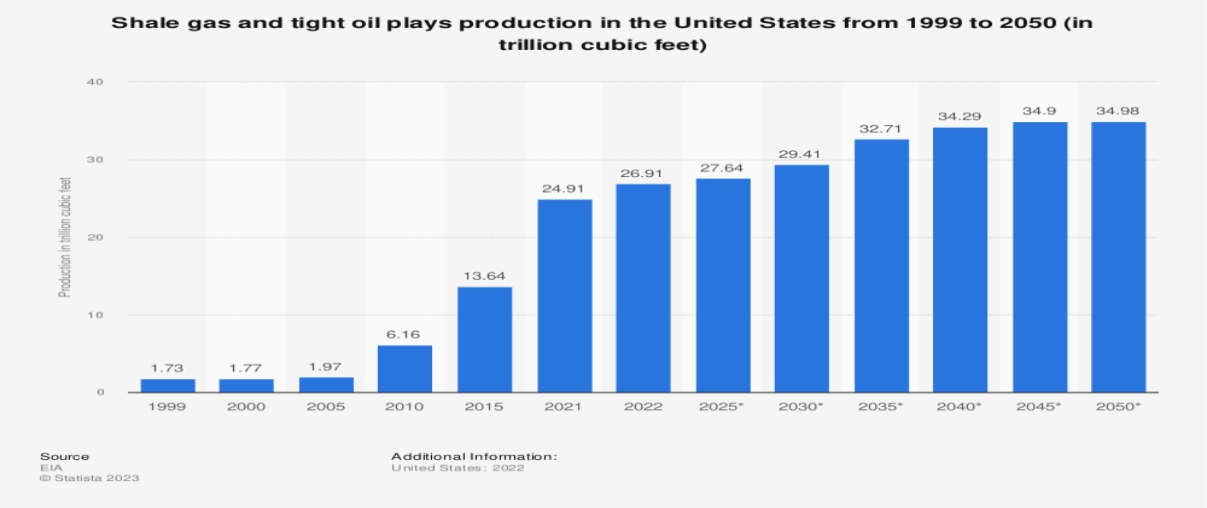
Abstract
Shale gas is the form of an unconventional natural gas, mostly methane found trapped in shale rocks. As per the US Energy Resources Administration, the large resources of shale gas are in China, Argentina, Algeria, US and Canada. Though shale gas has emerged as one of the key source of energy but the process of shale gas exploration also poses serious threats to the environment, especially to the water bodies. Extraction process of shale involves the practice of fracking, wherein the deep holes are being drilled in the shale rocks vertically and then horizontally in order to extract more shale gas reserves. This process of fracking causes serious water environmental concerns such as leakage of extraction chemicals and greenhouse gas emissions and contamination of drinking water. Studies conducted by various organizations and renowned universities have suggested that shale greenhouse gas emissions were as high as those of coal. The process of shale extraction requires approx. 5 to 9 million liters of water per extraction activity. Hence, it poses a serious threat to freshwater resources. In order to meet its energy demands, India has also forayed into the exploration and extraction of shale gas. As per the report submitted by NITI Ayog, India has 96 trillion cubic feet of recoverable shale gas reserves at various places such as Cambay, Krishna – Godavari, Cauvery, Damodar Valley, Upper Assam, Assam-Arakan Basin, Rajasthan and Vindhya Basins. In 2013, Government of India through its ministry of petroleum and natural gas permitted ONGC and OIL for shale gas exploration. This paper talks about shale gas exploration in India and its possible threats concerning to environment.
Keywords: *Shale Gas, Fracking, Green House Gas Emissions, Water, Environment*

I. Introduction

Many scholars believe that by 2050, the energy of fossil fuels will drop significantly. Others question the conclusion that the Earth has sufficient resources to curb humanity's desire for development over the next few centuries. Among other energy sources, shale gas and oil are likely to be abundant and available. Since its peak in 2010, domestic production has suffered setbacks, but due to unconventional resources: coal bed methane and shale gas, people have renewed hope. Oil and Natural Gas (MOP & NG) estimation, the entire amount of coal bed methane resources slightly 90 TCF , while the total dry shale recovered is about 60 TCF. Despite this optimism, just as traditional practices, government intervention may have a negative impact on the market. Due to poor management of domestic prices, investment in the upstream sector in India has slowed. There is no free market for certain exploration and development projects feasible. As the price of management, there are some existing reserves that cannot be produced. With this in mind, the government recently chose deregulation of coalbed methane, hope a positive impact on investment.[i]

Shale gas and oil are unconventional natural resources found at 2,500-5,000 m below the surface, while conventional crude oil is found at 1,500 m. Shale oil and gas production processes require deep vertical drilling prior to horizontal drilling. The most common method of extracting shale gas is "hydraulic fracturing" (hydraulic fracturing), in which a large amount of water is mixed with certain chemicals to depress the rock and release trapped energy minerals.[ii]

USA and Canada are ahead in Shale Gas/Oil exploration /exploitation compared to rest of the world. The first well was fractured for Shale Gas in 1947 in well Kelpper No. 1, located in Grant County, Kansas, USA. Subsequent to the development of directional drilling technology in 1970's, the first successful multistage fracture in a horizontal well was completed in 1986. After a gap of 12 years, the first economical shale fracture using slick-water technology had been successfully completed in 1998. Subsequent to the drilling of thousands of wells, mainly horizontal, shale gas production picked up and constituted to a higher extent of about 20% of total gas production since 2010. US is highly relying on the shale gas exploration for its energy demands. Shale gas and tight oil production in the United States is forecast to increase to nearly 35 trillion cubic feet by 2050, up from 26.91 trillion cubic feet in 2022[iii].



Because of its advantages, shale gas is regarded by some as a "savior" of human beings. From a political and economic point of view, fracturing seems to be an attractive tool. In order to obtain these benefits, the government introduced a policy on shale gas and oil in 2013, allowing state oil companies to engage in fracturing. In the first phase, shale gas blocks were discovered in Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Rajasthan and Tamil Nadu. However, environmental groups have strongly criticized this move, saying they will have an impact on the environment. Hydraulic fracturing has been banned in countries such as Germany and France, as well as in local governments such as Scotland.

II. Legal Obstacles

First point for addressing the shale gas challenge is to explain the statutory framework and current oil and gas exploration policies to understand the applicability of the system to shale gas. It may be noted that according to the Oilfield Management and Development Act of 1948 and the Oil and Gas Act of 1959, the definition of natural gas includes all “natural gas” natural gas. Because of this statutory interpretation, Coal Bed Methane(CBM) is a naturally occurring gas belonging to the MoPNG category, not the coal industry. Even though the New Exploration and Licensing Policy (NELP) provides oil and gas blocks, it may have been recognized that CBM will also be included in the NELP Production Sharing Contract (PSC). Due to the use of a separate CBM system, NELP's production sharing contract specifically excludes CBM from the PSC. In 2013, the government allowed public oil companies to explore and produce shale gas in their blocks under the nomination system, which was handed over to companies such as ONGC and OIL before the launch of NELP.[iv] However, in the case of a competitively awarded NELP block, the contractor must comply with the exploration-related contractual provisions, especially those relating to the exploration phase. If these blocks have been withdrawn from the exploration phase, they will not be able to initiate exploration of shale gas. In the recently approved Hydrocarbon Exploration Licensing Policy (HELP), a uniform exploration permit will be granted to allow for hydrocarbon exploration, a significant improvement to earlier systems.

The second major problem is land and water quality. In the U.S. private landowners, state and federal governments are well known to have full ownership of the assets that belong to their respective properties. India's situation is different. On the one hand, by issuing permits at its level, the Union government can easily permit the exploitation of shale gas, but the adverse effect on land users is a stumbling block. U.S. investors also supported oil and gas companies in shale gas operations due to financial incentives from the landlord , which significantly promoted the introduction of the system.[v] However, India has a large population and agricultural development poses a challenge to shale gas mining. The same is true for water supply and water supply. In this regard, the Sichuan Basin in China will adopt a way forward, they first occupied the region, which is rich in resources and close to water resources. There is a clear distinction between India and the West in terms of water pollution and hydraulic oil and any other environmental problems. In the United States, the goal of federal law is environmental protection, which allows states to develop other regulations. Most oil/gas legislation/regulations are left to the state, while regulators are responsible for licensing and enforcing regulations on oiland gas production and environmental damage. E&P regulations primarily include standard procedures for oil well fences, oil well construction, hydraulic

fracturing, waste disposal and plugging, and chemicals and water leaks. These laws provide a detailed legal and regulatory structure, as well as federal environmental protections. In contrast, industry organizations like the American Petroleum Institute (API) have established operating requirements that are shale- specific. Hence, although the regulatory framework for environmental sector growth is a concernin India, it is not difficult to develop a specific structure that fits our needs, as frameworks existin other parts of the world.[vi] The IEA's "Golden Rules" discussed in the special publication details the recommendations required in the field of shale gas mining. India's Supreme Court ruled that everyone has the right to enjoy clean water and air. National trust for the benefit of the people of natural resources and the responsibility to protect natural resources from damage, and this is an established principle. If hydraulic fracturing to groundwater risks becomes a reality, the court can be held accountable state, cease their activities and ordered to take other corrective and preventive actions.[vii]

III. Policy Initiatives By Govt. Of India

Ministry of Petroleum and Natural Gas, India's policy of October 14, 2013 approved the exploration and development of shale gas and oil, initially licensed only by NOC (ONGC&OIL) in land nominated blocks, ie nominated before and after NELP Grant the block of NOC on the basis of NELP PSC.[viii] The sole purpose of the policy is to promote shale gas and oil operations in existing onshore PEL / PML areas under the nominated area to meet the overall interests of the country's energy security.

As per the policy, the NOCs have been permitted three Assessment Phases for exploration (Phase I, II & III) of 3 years. Each Phase will culminate in a development and production phase depending on the results of the Assessment Phase According to the policy, NOC is obliged to implement the commitments of the work plan for each block identified:[ix]

Baseline EIA study including sourcing of water and its subsequent disposal.

- G&G Studies
- Drilling of pilot/test wells
- Coring, hydro-fracturing etc.
- Geochemical studies
- Geo-mechanical/Geo-hazard/Geo-technical studies
- Resource Assessment for Shale Gas and Oil

Another obstacle hydraulic fracturing may face a "precautionary principle", the principle has been incorporated into the law. It provides that regardless of any scientific uncertainty, must take precautions in place pose a significant risk to the environment or human health. Therefore, even though some scholars might oppose these risks caused by hydraulic fracturing, the government must also take measures to reduce these risks.

The 2016 Groundwater Protection, Protection, Management and Management Model Act establish the priority of groundwater use – the right to water for life and the realization of "food security, support for subsistence agriculture, sustainable livelihoods and ecosystem water needs". Groundwater can be used for other purposes after the level. The government should suspend hydraulic fracturing in view of the risks involved.[x] PNGRB regulates the development of natural gas pipelines. GOI should issue policy directives to PNGRB, in order to enable the development of a specific framework for shale gas pipeline and the nearest pipeline system interconnected. Shale gas developers should be automatically granted rights, the development of natural gas pipeline from the well may be the closest possible to the natural gas system. Developing appropriate authorization must be interconnected with the developers of shale gas pipeline gas pipeline.

Understanding the enormous and rapidly increasing demand for energy, India is also shifting its focus from supplement conventional oil and gas production with other alternative/ unconventional energy fuel sources. Shale energy, being the most crucial and potential unconventional source, which can help India in achieving energy independence by reducing its import of gas and oil. June 2018, Union Ministry of Petroleum and Natural gas had amended Petroleum and Natural Gas Rules 1959 to include shale in the definition of petroleum so that private players can explore and exploit the shale gas. In August 2018, Union Cabinet approved a policy framework that permits both private and government players to explore and exploit unconventional hydrocarbons including shale gas[xi].

IV. Shale Gas Potential In India

The government allows 100% foreign direct investment in upstream and private sector refining projects. In addition, foreign direct investment limit in the public sector refinery project has been increased to 49%. In addition, the Indian government also promulgated various policies, such as new exploration licensing policy (NELP), coal bed methane (CBM), shale oil and gas, chemical and petrochemical investment region (PCPIR) policy to encourage the entire industry

value chainto make an investment.[xii]

India's shale gas potential India has enormous shale potential in the Cambay Basin, the Assam-Arakong Basin, the KG Basin, the Cauvery Basin and the Damodar Valley Basin. According to asurvey by Schlumberger and ARI (American Institute), shale gas reserves will range from 600tcf to 2000 tcf, and India's technically exploitable shale gas resources are estimated at 63 trillioncubic feet. This estimate may increase as additional reservoir information is collected. Departments of Indian School of Mines, Dhanbad, India have carried out extensive work onIndian shale gas and they have expected that, recovery rate of shale gas could be 50%. Whereasaverage recovery rate in oil and gas reserves in India is 30%. Current Shale Oil and Gas potentialhas been mentioned as annexure A of this paper based on the information provided by DGH onits website.[xiii]

In a pilot project at Ichhapur in Burdwan, WB, ONGC first found shale gas. On 27 October 2013, ONGC began drilling Jambusar-55 (Gujarat), the first well under the pilot programme. Thewell was drilled to a depth of 1,735 meters as on November 24, and further drilling is underway. The well is going to cost more than $7 million. ONGC signed a Memorandum of Understanding with Conoco Phillips, USA. The two undertook joint studies of the four basins: Cambay, Krishna Godavari, Cauvery and Damodar. Based on the results, in technical cooperation with Conoc, a shalegas pilot drilling program was established in the Broach Depression Region of Cambay Basin.[xiv]

Together, Oil India Ltd and Indian Oil Corporation have snapped up a 30% stake in Houston- based Carrizo Oil & Gas ' Niobrara shale gas asset in Colorado for $85.2 million. While Reliance Industries Ltd (RIL) has a 60% stake in US-based Marcellus shale play in Carrizo, GAIL has a 20% stake in Eagle Ford Shale.[xv]

V. Fracking-Required Technology

Shale gas is an unconventional natural gas, about 3,000 meters underground. In the highly impermeable rock surface. Extraction with conventional methods, Shale permeability is very low (in nanometers). Therefore, a special well designed and well stimulation technology to provide sufficient levels of productivity to promote economic development. Horizontal drilling and fracture stimulation is essential for the development of shale gas industry.[xvi]

Hydraulic fracturing to increase the hydraulic fracturing to increase the yield or "fracturing" is a process, in this process, a large amount of mechanical rock cracks, so that the trapped hydrocarbons in a subterranean formation through the fracture into the well eye. Flow to the surface. Hydraulic fracturing can only increase productivity, but also increase the amount of gas recovered from a given volume of shale. When crystalline silica (sand), a mixture of water and an additive (0.5%) extruded outwardly from the lateral duct is filled to thousands lateral fractures (transverse plurality of points along the drill path), hydraulic fracturing occurs. Water cracks opened, filled sand is sand, to prevent them from collapsing. Additives frequently contain an antimicrobial agent (to prevent bacterial contaminated with water) and a surfactant, to reduce the energy used in the process sand/ceramic material as a support.[xvii]

An L-shaped shaft is used to enter the ground for several kilometers. Another method for horizontal boring to extract shale than deep vertical drilling gas. The most common method of extracting shale gas is hydraulic fracturing – fracking. In simple terms Push a large amount of water mixed with certain chemicals that break the rock and release trapped gas.

VI. Fracking In India- The Policy

In order to obtain the benefits of hydraulic fracturing, the Indian government announced in October 2013. Its "Guidelines for Shale Gas and Petroleum Exploration and Development Policy"[xviii] Implement this policy to explore shale gas in Andhra Pradesh Madhya pradesh, Assam,Gujarat, Rajasthan and Tamil Nadu have been identified.

The Indian government has signed a Memorandum of Understanding (MoU) with the United States and Canada for cooperation here. According to this policy, there is already the right to explore and extract shale oil and natural gas. Under the Policy, the right to explore and exploit shale oil and gas has been given only to National Oil Companies (NOCs) [xix] the company engaging in fracking will be responsible for the health, safety, environment and recovery of the site. It will have equipment designed according to Good International Petroleum Industry Practice (GIPIP), depths in excess of 100 meters (or possibly specified depth) Protection of all underground freshwater aquifers by the Ministry of Petroleum) Identified by the local government editorial policy that the NOC must comply disclosed the content, volume and chemical composition of the fracturing Related regulatory authorities. The National Olympic Committee must determine the water source it will use. Use and obtain approval from the State Ground Authority Water Authority, National Pollution Control Board and other relevant regulatory agencies Authorities. For Shale Gas / Oil related activities, the scope of environmental management generally encompasses a range of issues including

underground risk assessment, well integrity, baseline reporting, operational practices and monitoring, disclosure of chemicals used in each well, and capture of methane emissions, if any. In view of these issues, the framework of guidelines presented here provides an insight into the environmental issues related to the Shale gas and oil project at ground level.[xx]

According to Indian law, Fracking can have four challenges - (a) water rights, (b) Public trust principles, (c) precautionary principles and (d) groundwater regulations.

These challenges will be discussed below:

Right To Water-

The Supreme Court of India explained "the right to life and liberty" Article 21 of the Constitution includes water rights.64? Is a supplement According to Article 48A of the Constitution of India, this status should be "Work hard to protect and improve the environment."? State has responsibility is there fresh water for the public? Excessive existence?

If you are concerned about possible contamination of harmful pollutants due to hydraulic fracturing, the Indian courts can hold the state accountable. You can request to stop the activity and take other corrective and preventive actions. The process requires around 5 to 9 million litres of water per extraction activity, posing a daunting challenge to India's fresh water resources. In addition, due to the small amount of water supplied by Rajasthan, Andhra Pradesh, Tyrangana and Madhya Pradesh, strong demands on fracturing water may cause interference, which violates water rights. Shale gas fracking requires large amounts of water, on an average, it requires 15,000 m3/well. It also requires a relatively larger surface area. It is bound to impact irrigation and other local requirements.

In the US, experience out of 260 chemical substances shows that, 58 have been identified to pose a risk to human life and environment, out of them eight are carcinogens and 17 are toxic to freshwater organisms. Fracking can cause tremors on the deeper areas of earth 25-90% of the fluid is not retrieved and cracks in the shaft are possible, hence there will be a risk of pollution to nearby underground water. The instances of underground pollution are reported in US and Canada. Fracking has other impacts such as an increase in air emissions, including greenhouse gases and seismic activity. The Government introduced a policy on shale gas and oil in 2013. It permitted National Oil Companies to engage in fracking. Under the first phase, shale gas blocks were identified in Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Rajasthan and Tamil Nadu. Even the well-developed western countries like Germany and France and sub-national Governments like Scotland have banned fracking. Indian households and irrigation thrive on groundwater. Implementation of the fracking processes without a consultative thought through process, especially on 'water usage policy', may result in larger issues including water stress, contamination of groundwater, and related health hazards.[xxi]

The Public Trust Doctrine-

The Supreme Court of India introduced the principle of public trust in India Jurisprudence believes that "it is based on the ideology of certain common attributes. Such as rivers, coasts, forests and air hosted by the government Free and unimpeded use of the public." The court held that this is in the interest of humans and future generations to maintain the original nature of natural resources. In ***Majra Singh v. Indian Oil Company***,[xxii] the court raised the status of the doctrine andconsidered it a Part of Article 21 of the Indian Constitution.

Precautionary Principle-

Legislation and judgments have recognized the precautionary principle. The National Green Court has made a rigorous interpretation of preventive measures. Principles and have already ruled that the principle embodies two obligations. - (1) "Project Supporters must take all expected preventive and preventive measures to ensure that there is no pollution The results ofits activities" and (2) " must take into account international principles Fair, so make sure it doesn't cause irreparable damage to nature assets". In another case, NGT ruled that "recoverable damage".

Given the strength of NGT environmental protection, because of its enormous environmental footprint, hydraulic fracturing may face legal challenges.

Groundwater Regulation-

The central government's model bill for effective regulation of groundwater has been adopted by15 states and 4 federal territories. It stipulates that groundwater is a common pool resource held by the government's public trust and a common heritage of the people. It stated that the government "has the responsibility to ensure the fair distribution and use of groundwater in the interests of public places while promoting environmental values". It identifies priorities for the use of groundwater – water for life, food security, agriculture, sustainable livelihoods and ecosystem needs. Water distribution must promote protection and ease of use.

VII. Conclusion

In the future, if the hydraulic fracturing on a commercial scale, then it's a user might do. The face of international law and legal challenges in India and France. With respect to the former, India may have to assume the obligations of procedural and substantive obligations, the precautionary principle and the right of seafarers aquifer transboundary harm. According to Indian law, for the local people, water and basic rights, the principle of environmental law (e.g. public trust principle and the precautionary principle) and groundwater law may face challenges.

In view of the growing number of oppositions and people around the world and the suspension of hydraulic frustration by the state and local governments, the Indian government should follow suit. If this option seems feasible, the government should at least all entities engaged in hydraulic fracturing has strict disclosure requirements.

The main difference between modern shale gas development and conventional natural gas development is the widespread use of horizontal drilling and large volume hydraulic fracturing. Although shale gas has been produced in the United States for more than 100 years, the economics of these wells are often very poor. Higher natural gas prices and recent advances in hydraulic fracturing and horizontal completion technologies have made shale gas wells more profitable. Since the production of shale gas requires a large amount of hydraulic fracturing and horizontal drilling costs, the cost of shale gas is often higher than that of conventional wells. However, this is usually offset by the low risk of shale gas wells.[xxiii]

Given the state of the supply deficit and heavy reliance on imports, it becomes imperative for India to harness all its energy resource, including that of shale gas. The unlocking of domestic shale gas can help India meet its growing energy demand and helping it to reduce its dependence on expensive energy imports. Learning from shale gas development in US, India might increase economic activity in the country, thereby boosting government revenues and creating new jobs. Additional gas supplies can also spur investments in downstream segments, which cater to significant latent gas demand in the country. Initially the price of shale gas would not be viable for power and fertilizer production but it can be utilized for peak loads in power plants, refineries and, steel where it can substitute expensive liquid fuels.[xxiv] One of the contribution to shale gas development in the US was the guar gum, exported from India which helps in improving the viscosity and flow of water in the fracking process. The production of guar gum is domestic, will be a great advantage for shale gas development in India. The gum is extracted from guar ki phalli, grown mainly by farmers in arid lands in Rajasthan and Haryana with the serendipitous discovery of its use in shale gas extraction, its production has risen enormously, earning almost US$ 5 billion during the period from April 2012 to January 2013.

If we continue exploration and production of shale oil in India, we can reduce oil imports from other countries. Therefore, India's economy can stand out from the downstream strategy. Therefore, shale oil from India Basin, which is an important step in the development of this great country of India. Modern technology is bound to drive the growth of Indian shale oil. By the beginning of the production of shale oil from India, we can reduce expensive fuel imports from other countries. Therefore, we have modern technology and geological experts ONGC, we can hope to produce fuel oil, which will promote industrial growth. Shale gas has the potential, but tomorrow is not a panacea for India's energy crisis. Although we need a policy on shale gas, but it must be whole. We should learn from the experience of other countries (USA and UK) far away. They understand the challenges in terms of water, investment incentives, such as land, willenable us to develop stronger policies in India.[xxv]

In conclusion, India needs to pay special attention to the environmental protection issues of the shale gas program. Due to the improvement of public enthusiasm, a strong judicial oversight and the scarcity of land / water issues, shale gas exploration will be subject to scrutiny. Although India also follow federal law in environmental law at the national level, which provides that the specification emission of air and water from industrial uses, but for shale gas, and even the process must be specified. In the West, strict compliance with industry standards also carry a recognized form of business, unfortunately, India is not very high degree of trust, compliance more by the rules / regulations driven. In addition, due to the complexity of the shale gas industry, states may not enact legislation, and therefore the central government may need to issuethese regulations.[xxvi]

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