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THE SHALE GAS CHALLENGE

Relevant for: Indian Economy | Topic: Infrastructure: Energy incl. Renewable & Non-renewable

On August 1, 2018, the Central government approved a far-reaching policy that allows private and government players to explore and exploit unconventional hydrocarbons (including shale gas) in contract areas that were primarily allocated for extracting conventional hydrocarbons. Unlike conventional hydrocarbons that can be sponged out of permeable rocks easily, shale gas is trapped under low permeable rocks. Therefore, a mixture of 'pressurised water, chemicals, and sand' (shale fluid) is required to break low permeable rocks in order to unlock the shale gas reserves. The process requires around 5 to 9 million litres of water per extraction activity, posing a daunting challenge to India's fresh water resources.

The risks in fracking

Acknowledging this challenge, the Directorate General of Hydrocarbons (DGH) issued a guideline on environment management during shale gas extraction, stating that "overall volume of fracture fluid is 5 to 10 times that of conventional hydraulic fracturing" and "the (fracturing) activities are likely to deplete water sources and cause pollution due to the disposal of flowback (produced) water." However, the guideline falters and states that these challenges will be dealt while granting environmental clearances as per the Environment Impact Assessment (EIA) process. The EIA process, however, does not differentiate between conventional and unconventional hydrocarbons, and the DGH acknowledges this issue: "No differentiation has been made in the EIA notification between conventional and unconventional oil and gas exploration in this sector."

Sensing this regulatory gap, the DGH in its guideline proposes five new reference points (term of references) relating to water issues in the fracking process that a project proponent must explain while applying for the environmental clearance. However, these five reference points are not succinct to resolve the water-specific issues posed by the fracking activities. The Ministry of Environment, Forest and Climate Change (MoEFCC), which generally releases sector-specific manual for environment clearance, is yet to come out with a manual specific to fracking activities.

Despite acknowledging the enormity of water requirement for fracking activities, the DGH guideline fails to give a general estimate of water requirement per unit of shale gas over the lifetime of a shale well. A recent study from Duke University observes that from 2011 through 2016, the water use per well in the U.S. increased up to 770% resulting in some shale wells consuming up to 42 million litres of water per well. The study further conveys that over a period of time, the usage of water dramatically increases for extracting the same amount of shale gas from a well. The importance of clarity in water usage and the place of shale gas extraction in India is linked directly with water requirements of priority sectors like agriculture.

Shale rocks are usually adjacent to rocks containing useable/ drinking water known as 'aquifers'. As noted by U.S. Environmental Protection Agency in 2017, while fracking, the shale fluid could possibly penetrate aquifers leading to methane poisoning of groundwater used for drinking and irrigational purposes. Several researches conclude that such contamination can be controlled, if not avoided, provided a project proponent maintains a distance of 600 m between the aquifers and shale gas fracture zones. Acknowledging this complexity and the myriad structures of aquifers in India, the DGH guideline states that a project proponent must "design and construct wells with proper barriers to isolate and protect groundwater", but misses out on broadly describing the nature or properties of a barrier that can be considered ‘proper’ to isolate and protect the groundwater.

Water cycle in a typical fracking process is different than other conventional hydrocarbon production activities. When shale fluid is injected underground at high pressure to fracture the rock, 5-50% (depending on the local geology) of the fluid returns to the surface, known as ‘flowback water’. Return flows continue as oil and gas is pumped from the well. The flowback water is usually methane-contaminated, and therefore it poses different recycling and leakage issues than usual wastewater. The Duke University study says, in the U.S., the flowback and produced water volumes generated within the first year of shale production increased up to 1,440% from 2011 through 2016. The DGH guideline again touches upon the exclusive nature of the flowback water but neither proposes any substantive treatment method nor recognises the increase in flowback water during repeated extraction of shale gas from a well over a period of time.

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. But as the process stands today, we are missing an opportunity to comprehensively regulate the fracking process for a sustainable shale gas exploration in India. As a first step, a sector-specific EIA manual on exploration and production of unconventional hydrocarbon resources may be a good idea.

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India will host the inaugural round of the two-plus-two dialogue with the United States on September 6.

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