Potential Oil Shale & Shale Gas Basins of India

Assam- Arakan
Cambay
Gondwana
Vindhyan
Rajasthan
Bengal
Krishna-Godavari
Cauvery

**What is Oil Shale**
- Fine grained sedimentary rocks containing relatively large amount of organic matter from which significant quantities of shale oil and combustible gas can be extracted.
- Oil shales range in age from Cambrian to Tertiary.
- Total world resources of oil shale are conservatively estimated at 2.6 trillion barrels.
- Numerous studies have shown that similar rocks with most of their oil generating potential are preserved in Northeast India interbedded with the tertiary coal.
- The estimated in-place oil reserve of these carbonaceous shales is greater than 15 billion tons.
- Oil shales contain no liquid oil in their natural state and must be retorted at very high temperatures to convert the solid kerogen to liquid hydrocarbons.

**What is Shale Gas?**
- Shale gas is gas contained in adsorbed form in the micro-pores and micro-fractures of shale which is a sedimentary rock. The gas is mostly of thermogenic origin but cases of biogenic sources are also reported.
- The shale gas exploration in India is relatively new but rapidly gaining momentum, as India has huge shale deposits. The shales in Vindhyan, Gondwana, Cambay, Rajasthan and other sedimentary basins have been/are being field experimented. The initial results are encouraging and are at par with US producing shales.
- The shale gas production pressures are generally low but length of production period compensates by volume.

**Geological parameters for Shale gas evaluation**
1. Organic matter richness
2. Thickness & area extent
3. Thermal maturity
4. Mineralogy
5. Faults & Fractures
6. Gas content
7. Storage

**Conclusions**
Oil shales in India mostly occur in Assam- Arakan Basin and have resource potential of 15 billion tons of in place oil. DGH India & BRGM, France are carrying out geo-scientific studies of these shales and award of blocks for exploration and production may start from 2012 onwards.

References
Sanjay Chawla (2010) Pre-Conference on Shale Gas, Petrotech-2010 New Delhi, India
Shale’s have low permeability (~ 2 md) and gas does not flow easily through this rock. However, in the 1990s a new drilling technology emerged. A tight shale deposit could be cracked open by injecting water into wells at high pressure. When the water injection stopped, the cracks closed again. But then technologist hit on the idea of pumping water mixed with sand. The sand kept cracks partially open when water injection stopped, increasing permeability and gas flow.

A sedimentary rock deposit has a limited depth but very wide area (sometimes hundreds of square miles). Traditional vertical drilling into a deposit 20 meters deep can yield gas production from a zone of just 20 meters. But new techniques have facilitated horizontal drilling. This makes possible horizontal wells running hundreds of meters long through shale strata, greatly increasing the production zone of each well. Horizontal drilling plus sand cracking have revolutionized the economics of shale gas in the US, and made it a developing industry.

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**Shale Gas Production Methodology**

- **Pinch-weld**
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**R&D Status of Shale Gas Exploration in India**

- ONGC & GSPC are the frontrunner in shale gas exploration. ONGC has tied with Schlumberger to explore shale gas in Gondwana and Cambay basins, India.
- The target areas in Gondwana are organic rich shale horizons associated with unmineable coalseams.
- In Cambay basin, the Tarapur and Cambay shale formations are being explored for shale gas potential.
- ONGC has drilled first shale gas well in Damodar Valley, West Bengal through Permian Shale of about 700 meters thick. The well is targeted to a depth of 2000 meters.
- ONGC plans to drill three more wells in the Valley by March 2012.
- Damodar Valley is a coal field area and ist well is drilled near Durgapur in Ramajunj coal field of Damodar Valley.

**ONGC ventures into shale gas exploration**

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**CONCLUSIONS**

- India has vast resources of shale gas (60 tcf recoverable?) and has taken major initiatives towards exploration and development of the same.
- The basin wise assessment is in progress and Directorate General of Hydrocarbons have planned to carve out exploration blocks for commercial exploitation of shale gas.
- Exploration activities have been started in Cambay and Damodar valley basins.