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Technological Advances in Gas Exploration and Production

WOC-1 Study Group 1.1 Leader
2012-2015 Report

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Technology plays a key role in the E&P of Natural Gas

- ❖ Opens up access to and expand new sources of energy supply
- ❖ Hastened adoption of sustainability driven business model

○ Energy Supply

- ❖ Resource depletion makes it imperative to explore new sources in new areas or exploring new frontiers

○ Energy Affordability

- ❖ Technology advancement facilitates in bringing down cost and enhance project economics

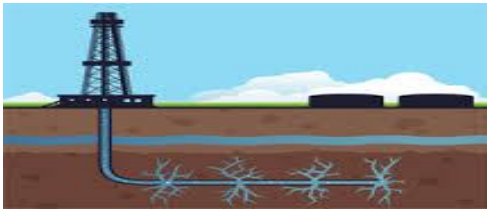
○ Sustainability

- ❖ Technology will remain a key enabler to mitigate future rise in emissions

Advancement and breakthroughs in technology will unlock and deliver various sources of energy to global markets

Current Triennium

TECHNOLOGICAL ADVANCES IN GAS E&P



SUPPLY

- Methane Hydrate
- Unconventional Shale Gas
- Gas Monetization

COST

- Shale Gas Factory Concept
- Better Imaging in Gas Reservoir

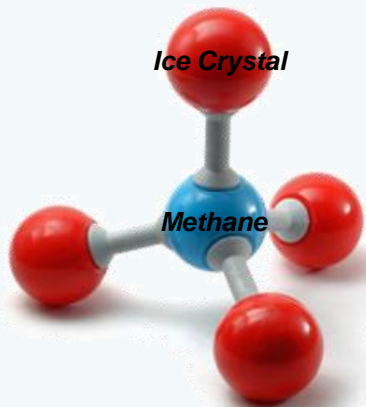
SUSTAINABILITY

- CO₂ Emission
- Zero Flaring Zero Venting
- Micro GTL

Diversification in energy supply has encouraged development of methane hydrates as an important energy in the future

Locating the Deposits

- **Seismic**
- **Well Logs**

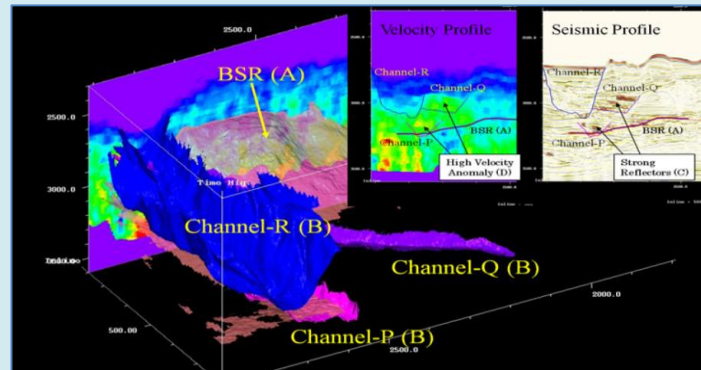


Resources Characterization

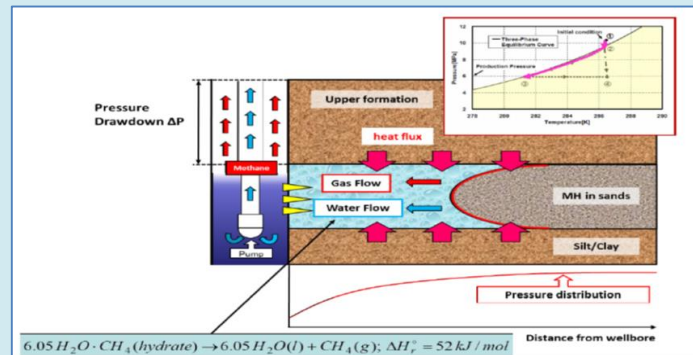
- **Volumetric**

Production Technologies

- **Depressurization**
- **Gravel Pack Completion**
- **Wells & Surface Monitoring Technologies**



Seismic visualization of methane hydrates accumulation



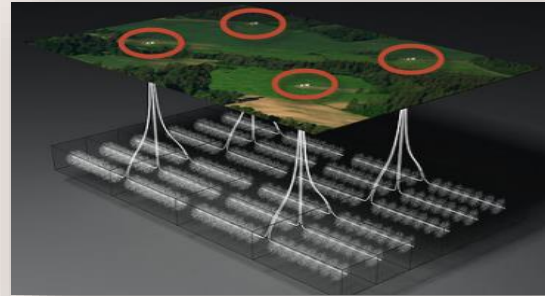
Concept of Methane Hydrate gas production method

Improvements in “Shale Gas Factory” concept drives down E&P costs significantly throughout the value chain

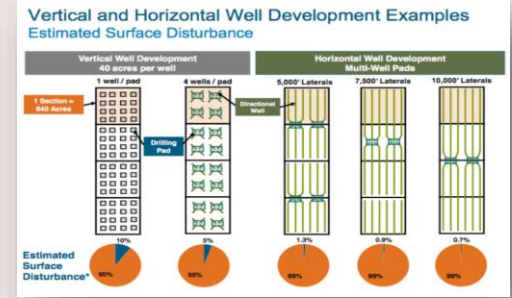
Lean Manufacturing



Multi-well pads

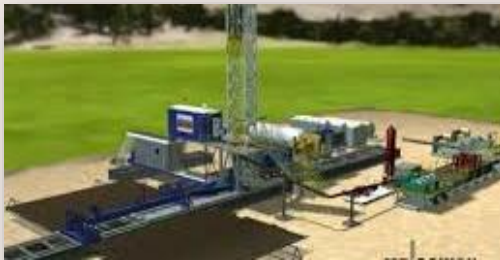


Reducing surface disturbance



“Shale Gas Factory”

- Eliminate uneconomical delays
- Improving wells quality
- Reduce overall footprints



Skidding rigs



Simultaneous operations



Single pipeline connection

Numerous efforts are ongoing in developing energy efficient technologies to mitigate carbon emission

Zero Flaring Zero Venting



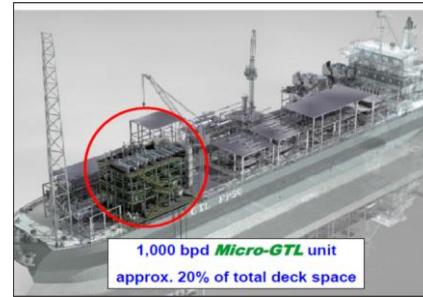
Standards :

- FVI

Financial Incentives :

- Fiscal & Tax Regimes
- Carbon Pricing

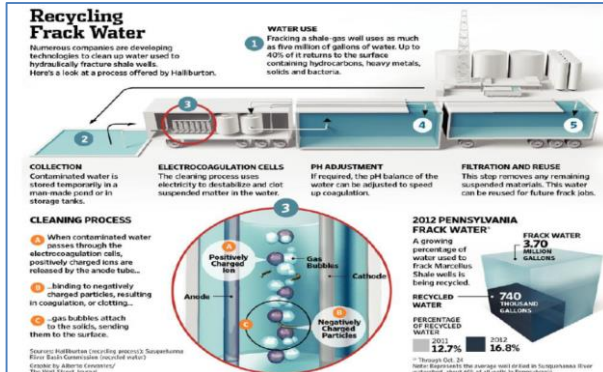
Technologies for Gas Flaring and Venting Reduction



Micro GTL

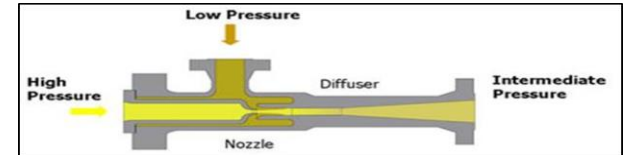
- Modular Design
- Simplicity
- Automation
- Robustness of Operation

Water Recycling in Shale Gas

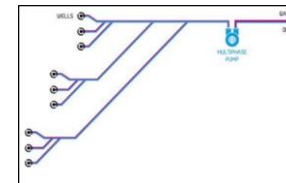


Recycling of Associated Gas

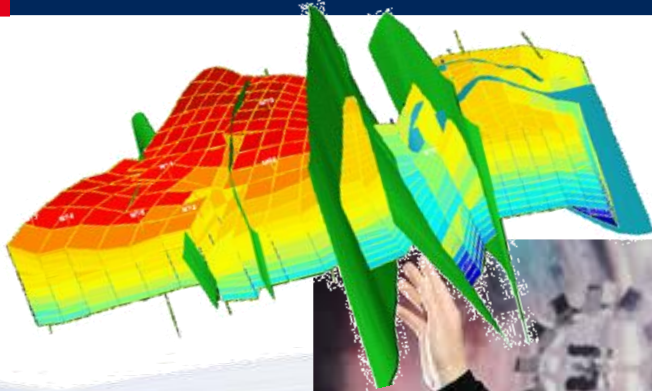
- Gas Ejectors



- Multiphase Pumps



Advanced Computing and Robotics & Automation will be the next big thing



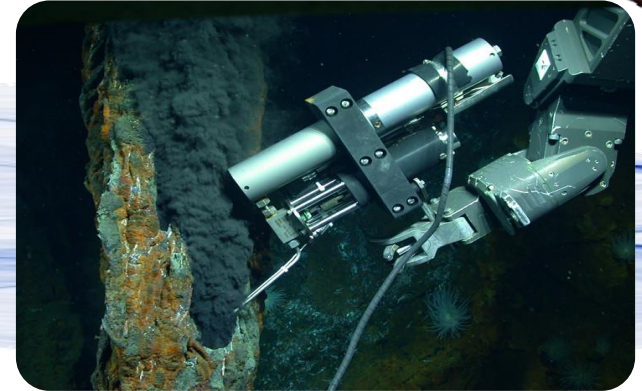
Advanced Computing



- **Data mining : Medical diagnostics to Basin/Prospect diagnostic**
- **Visualization : Gaming Industry into E&P**
- **Virtual Reality environments**



Robotics and Automation



- **Asset Integrity**
- **Speed and Productivity**
- **Labor Turnover**

Conclusion

- ❖ Technology continues to be a game changer for businesses
- ❖ Under the current oil price scenario, the impetus to find technologies to lower cost of production of unconventional oil and gas has also impacted the production of conventional hydrocarbons
- ❖ The fields of automation, materials and robotic innovation is seen as future gamechangers in the fields of production and monetization as players seek to cut operating base costs, ensure profitability and increase affordability for higher risk exploration ventures
- ❖ The industry has moved ahead embarking on innovations that could yield a significant reduction of upstream emissions despite unattractive gas price

Special Thank You



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Merci!

