

The Heavy Oil Working Group

Meeting Report

March 14, 2011
Edmonton, Alberta

MEETING OF THE HEAVY OIL WORKING GROUP

Overview

The Heavy Oil Working Group was announced by the Minister of Natural Resources Canada, Christian Paradis, at the Energy and Climate Partnership of the Americas Ministerial meeting in Washington, DC in April 2010. The Energy and Climate Partnership of the Americas is a voluntary mechanism that aims to bring countries from across the Western Hemisphere together to facilitate the acceleration of clean energy development and deployment, advance energy security and reduce energy poverty.

The world's energy landscape is changing. Despite global advances in the area of renewables and alternative energies, the International Energy Agency, among others, predict oil demand will continue to grow into the foreseeable future. The successful and responsible development of the world's unconventional sources such as shale gas, oil sands and other heavier forms of crude oil are likely to represent an increasingly important addition to the world's fossil fuel supply in the years ahead.

The aim of the Heavy Oil Working Group is to serve as a forum for a variety of stakeholders in the Americas to exchange information on best practices and technological innovation in heavy oil. The first meeting of the Heavy Oil Working Group, hosted by Natural Resources Canada, resulted in an informative discussion, from a hemispheric perspective, on areas of common policy interests related to heavy oil. Meeting participants included representatives from Colombia, Mexico, Trinidad and Tobago, the United States and Canada.

The meeting had four main sessions: a "scene-setting" session that outlined the current and future potential of heavy oil in the Americas; a discussion of the environmental issues associated with heavy development; a session focused on technology; and finally, a session on policy and regulatory best practices. The sessions began with 2-3 presentations by participants, and were followed by a moderated question and answer period.

SESSION 1 – SCENE SETTING

HEAVY OIL: CURRENT AND FUTURE POTENTIAL IN THE AMERICAS

KEY POINTS

- This is it! The Americas are the largest source of heavy oil globally, and heavy oil will play an important role in the current and future energy mix of the region and globally
- The development of technology to aid extraction of these resources will be essential; working group participants represent countries with the most vested interest in advancing such technologies
- Proper management of environmental issues associated with the development of heavy oil resources will be important to bring the resources to market
- It is clear that there are additional environmental issues associated with the development of heavy oil; an in-depth understanding of these different issues is needed, including the severity of the issues, management and mitigation measures required.
- There are three key types of access that must be fulfilled to unlock the potential of heavy oil in the region:
 1. Access to markets (infrastructure)
 2. Access to technology
 3. Access to capital resources – financial capital and human capital
→without access to these key components, access to the resource itself may be restricted

This session focused on heavy oil in the Americas, taking into account the resource potential in the context of global oil prospects. It also touched on trends of heavy oil in the region's production and commercialization, implications of short-term disruptions, and longer-term demand and supply forecasts for oil markets

Ms. Forrest, Director of Global Oil, CERA outlined the case for unconventional oil and factors shaping the future landscape of heavy oil. She briefly spoke on three main areas: Reserves, supply and refining, technology and environmental policy. The Americas dominate global heavy oil reserves. Currently, the top suppliers of heavy oil in the Americas are Venezuela, Mexico and Canada. In ten years, Canada, Ecuador and Colombia are expected to be producing two million barrels per day each. The outlook from Venezuela and Mexico is less certain.

Economic technology needs to be developed to unlock more oil from both conventional and unconventional fields. The challenge is to determine how to increase recovery rates (through steam injection, polymers, solvent etc) in an economically competitive manner that integrates environmental considerations.

Raffie Hosein, Senior Lecturer at the University of the West Indies, and Penelope Bradshaw-Niles, Senior Petroleum Engineer at the Ministry of Energy and Energy Affairs provided a background on the history of the oil industry in Trinidad and Tobago, as well as an overview of the policy considerations for future development of the heavy oil industry. Ms. Bradshaw-Niles then spoke from the government perspective on the issues facing the oil industry in T&T.

In spite of the knowledge that resources are present in T&T, oil production is on the decline, and the Government is looking at policy measures to boost production. The Government recognizes that developing heavy oil resources is one way to increase domestic oil production. However, Trinidad and Tobago faces challenges in terms of production of heavy oil and monetizing it. The oil fields have rather complex geology, where reserves are not found in extensive fields, but rather in pockets. There is also a large oil/gas ratio, and the same reservoirs can have different levels of viscosity. Because of this complex geology, T&T needs to do more in terms of quantification of reserves and extraction potential. The state oil company (Petrotrin) is looking at joint ventures, but is running into difficulties since some upgraders are looking for certification that there are a certain amount of recoverable reserves. For the development of their heavy oil resources, T&T believes it will be useful for them to look at the experiences of other countries to help formulate their strategy moving forward.

SESSION 2

ENVIRONMENTAL ISSUES WITH HEAVY OIL DEVELOPMENT – HOW CAN WE DEVELOP SUSTAINABLY?

KEY POINTS

- The development of the Canadian oil sands and heavy oil resources globally will cause effects on the air, land, and water quality
- Technology is key to reducing the impacts of heavy oil development. The technology that is used to recover, or increase recovery from heavy oil reserves can also be used to deal with waste products
- It is imperative that environmental regulations keep pace with the scale of development. Different levels of government should work collaboratively to formulate a coherent strategy for environmental management
- Environmental drivers and economics drivers are not necessarily conflicting; they can be the same when dealing with heavy oil extraction. For example, reducing water use in heavy oil development is better for the environment, and also makes sense economically.
- Data and other information that is shared and transparent, both domestically and internationally, is important to evaluate the full impacts (environmental, economic, etc.) of heavy oil development

This session discussed the unique environmental issues associated with heavy oil development. Presenters drew from experiences in the Canadian oil sands to note challenges and lessons learned, and the discussion period allowed other countries to share their experiences and expertise on environmental issues.

Ms. Grant, Oil Sands Program Director from the Pembina Institute, outlined the pace, scale and effects of the oil sands to date and summarized the Pembina Institute's proposals for required limits and best practices in GHGs, air, water and land. Ms. Grant started by providing context on the pace and scale of development of the oil sands. She noted that production goals were met years ahead of schedule and the environmental implications have not been taken into account, or limits adjusted accordingly. Although some companies have reduced the environmental intensity (i.e. impacts per barrel produced) of some aspects of oil sands production, the anticipated pace and scale of growth and the cumulative impacts of multiple oil sands operations will eclipse these improvements.

Ms. Grant ended by noting the primary and overarching need in the oil sands to:

- Establish a regional plan that includes science-based environmental limits that ties to decision making so that development occurs within these limits
- Establish world-leading best practices and policies to mitigate oil sands impacts
- Implement a new monitoring system for air, land and water (including groundwater) that is developed by independent experts unaffiliated with industry.

Randy Mikula, Team Leader, Extraction and Tailings, CanmetENERGY, Natural Resources Canada gave a presentation on tailings management with a focus on water use, from the perspective of a scientist involved in the development of tailings technologies. Mr. Mikula echoed Ms. Grant's message that production in the oil sands is growing at a much faster rate than predicted, and this is impacting the environment.

Mr. Mikula noted that there is a tremendous amount of technology that extracts bitumen from sand, and this same technology-intensive approach helps deal with tailings. To combat the issue of tailings in Alberta, the Energy Resources Conservation Board (ERCB) put into place Directive 74 in 2009, which mandates that 50% of fine tailings need to be put into dry stackable tailings. This Directive will be moving the industry to dry stackable tailings, and away from end pit lakes. Several new tailings management technologies are available to achieve this goal.

Mr. Mikula also pointed out that in the oil sands, the environmental and economic issues can be the same; both are concerned with water availability and lease storage volume limitations. Industry and government recognize that the current trajectory of water usage is not sustainable; more water needs to be recovered from the production process and dry tailings need to be created. Storage volume limitations will drive new tailings technologies as much as water availability. Without the implementation of some

other dry stackable tailings technology, long term storage volumes could become unsustainable.

Perspectives from Participants

Other countries (Colombia, Trinidad and Tobago and Mexico) noted the need to increase public awareness about heavy oil development and environmental impacts. They expressed an awareness of the Canadian regulatory framework regarding oil sands, and discussed how their frameworks were more or less stringent in certain aspects. Countries discussed the different regulatory processes they have in place, and the need to work with implicated stakeholders. The need for data transparency was raised as essential. Only with data transparency can the environmental impacts and well as economic implications of heavy oil projects be fully evaluated.

SESSION 3

EXISTING AND FUTURE TECHNOLOGICAL INNOVATIONS: AN OVERVIEW

KEY POINTS

- Access to conventional resources is decreasing. Technology plays a large role in accessing new reserves and increasing recovery rates
- There is the opportunity for synergy between countries to bring new technologies on-line. Much of the research being done is conducted on a large scale; the results/lessons learned from research can be applied to different areas or countries for large scale-up efficiencies
- Partnership between government, industry and other stakeholders is essential. However, players within these groups are not homogenous; they have different cultures and propensity to deliver on technology and sharing.
- The trend towards partnering and sharing is transforming information that was once proprietary much more widely available. Partnering with stakeholders who can best advance the industry through concrete actions will yield the greatest results
- Governments need to put into place regulatory frameworks that interconnect with emerging technologies and take on an appropriate level of risk

Industry representatives presented on current and future innovations in their respective countries, highlighting both on- and off-shore resources. Jesus Anguiano Rojas, Coordinator of Extra Heavy Crude, Petroleos Mexicanos (PEMEX), Greg Stringham of the Canadian Association of Petroleum Producers (CAPP), and Ricardo Coral, Central Regional Manager, EcoPetrol, Colombia gave presentations.

Mr. Anguiano described PEMEX's current operations in Mexico, highlighting the importance of heavy oil in Mexico's remaining hydrocarbon reserve. PEMEX estimates

that 52% of Mexico's remaining reserves are heavy oil. Their largest field, Cantarell, is experiencing declining production and as a result PEMEX has drilled a number of exploratory wells in recent years. Mexico is relying on new technologies for deep off-shore oil wells, as well as using steam injection and dual pump systems to increase recovery rates and ensure a steady stream of product.

Mr. Stringham spoke to innovation and technology as the key to responsibly unlocking development of Canada's oil sands, especially as the industry moves into an era with increased transparency and quickly advancing technology. Mr. Stringham noted the three main factors affecting technology in Canada's oil sands as: enhancing recovery, responsible development of the environment and economics. These three factors work together and have numerous linkages. Advances in the oil sands have helped to reduce energy inputs, reduce costs and reduce impacts on the environment.

Mr. Coral gave an overview of the new growth strategy of Colombia's state-owned oil company, EcoPetrol. EcoPetrol recognizes the potential for increasing production of heavy oil in Colombia and is focusing on research and innovation to be more competitive. EcoPetrol is cognizant of the need to develop technology to take advantage of the reserves in place, the need to strategically focus on refining and integrate the whole hydrocarbon value chain. They are taking a keen interest in knowledge transfer and will be hosting a number of conferences in Colombia this year, including the Heavy Oil Latin America Congress in August.

SESSION 4

POLICY AND REGULATORY BEST PRACTICES

KEY POINTS

- The ability to remain innovative and flexible is essential when formulating regulatory frameworks
- In many countries, there are a number of players involved in the field of heavy oil: regulatory agencies, energy agencies, environmental agencies, finance agencies etc. It is important to foster communication and collaboration between these agencies to work towards a mutual goal.
- Coherent national or sub-national strategies for heavy oil or for particular technologies such as IOR and EOR may be useful for coordinating efforts amongst multiple stakeholders
- When approving, assessing and monitoring heavy oil projects, information for regulators must be accurate, and accessible. Otherwise, regulators will be unable to make informed decisions. Approving projects based on flawed information, even with a regulatory system in place, will likely have negative implications.
- There is a need for constant evaluation of heavy oil projects, not just during the preliminary assessment stage

- Governments play a role in balancing environmental concerns with the needs of the industry. Water use and availability is a key issue recognized by all participants. Regulating water use by setting standards for extraction, re-use or re-entry into the ecosystem is a positive step. Environmental regulations may be expensive, but they are necessary.
- In some cases, such as in Mexico, a special fiscal regime might be needed to maximize the potential of heavy oil projects.
- In a country such as Trinidad and Tobago, there is a huge abandonment cost for some fields. Fiscal incentives can potentially help get operators interested and mitigate abandonment liability.

This session discussed current policy and regulatory best practices (current or planned) in Mexico and Alberta and how they contribute to successfully developing heavy oil resources, while maintaining standards.

Dr. Edgar Rangel-Germán, Commissioner, National Hydrocarbons Commission (Mexico), spoke about the new legal framework on exploration and production of hydrocarbons in Mexico. He presented the internal mechanism to regulate the industry and touched on the recent and relevant regulatory decisions in his institution. The National Hydrocarbons Commission (CNH) is a new regulatory body, created in 2008 as a result of the Mexican energy reform. It is a contract models and regulatory agency that supervises the hydrocarbons industry and establishes technical guidelines for sanctioning and approval of projects. They aim to increase the recovery rate of hydrocarbon projects, ensure that PEMEX uses the best technology available and that environmental considerations are taken into account. The CNH's role is to ensure that there is thorough identification, evaluation and alternatives so that only the best projects are approved and undertaken. New contract models, which can be utilized at all steps of the value chain, have been put into place following Mexico's energy reform. Heavy oil projects are excellent candidates for these new contracts models, which aim to be more profitable, innovative and competitive..

Mr. David Morhart, Chief of Oil Sands Strategy and Operations, Alberta Department of Energy discussed Alberta's regulatory approach to the oil sands; experiences gained from the past and the plan for moving forward. His presentation covered a brief overview of Alberta's oil sands industry and the government's commitment to ensure this resource is developed responsibly, keeping in mind carbon constraints. Alberta has a comprehensive regulatory framework and monitoring system. It endeavours to encourage innovative practices and new technologies through economic incentives.

He noted that while there is a push towards clean energy, consumer demand for oil will not change in the next few years. It is imperative for governments to be progressive and responsible, while developing regulatory frameworks that will encourage best practices and innovation while mitigating environmental impacts. The regulatory system needs to have assessments at all stages, not just the approval process. He stressed the need for

constant monitoring that is credible, robust and science-based. Mr. Morhart noted that regulatory frameworks that are stable and predictable will encourage companies to invest in developing technologies and also allow them to recover these invested costs in the longer term.

CONCLUDING SESSION

Heavy Oil Latin America (HOLA) Congress

Wes Scott, Vice President, DMG Events provided a brief overview of the Heavy Oil Latin America (HOLA) Congress which will be taking place in Bogota, Colombia August 2-4, 2011. The HOLA Congress seeks to bring together governments, international oil companies, national oil companies and the service sector. It aims to serve the needs of delegates from a business and technical standpoint. More information can be found at: <http://heavyoilatinamerica.com/>

Next Steps

There was a brief discussion on next steps for the Heavy Oil Working Group in terms of future activities.

Participants expressed agreement in the high value of the forum for exchanging experiences and opinions. There was consensus that meetings of the Group could lead to valuable collaboration within the heavy oil community. This informal network is an ideal forum to exchange knowledge, ideas and experiences. Participants were of the opinion that a meeting of this group should be anchored by another event, (such as the Heavy Oil Latin America Congress or the next World Heavy Oil Congress), and that the Heavy Oil Working Group should move ahead with work under three main themes:

- 1. Technology (for policymakers)
- 2. Environment Issues
- 3. Legal and Regulatory Frameworks

Participants are currently being surveyed for their ideas on specific topics under these themes for future activities. Some preliminary suggestions for topics from the meeting included: approaches to increasing public awareness; how to manage different stakeholders; and creating a comparison chart or conducting a case study on regulatory systems in different jurisdictions of the Americas.
