Forecasting Oil Sands Development Using a Granular Phase-Level Approach*

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Abstract

The oil sands holds over 170 billion barrels of estimated recoverable bitumen. The prize is massive but many limitations will dictate how, when and whether these resources leave the ground. We track activity from 50 companies active in the oil sands sector that have various interests in 117 named projects across 5,600+ active leases. These projects combine for 58.8 billion barrels of produced or commercially recoverable bitumen and 98.5 billion barrels held in our contingent project category. When assessing which projects to include in a commercial outlook, it is important to first establish limitations and key success determinants. With the cost of oil sands development, one of these is the lessee's ability to raise development capital and where that project sits in their global or regional portfolio of opportunities. But that is one of many considerations. The geological parameters (producible pay, cap rock integrity or the presence of shale baffles or water lean zones for steam-assisted gravity drainage (SAGD) or stripping ratio and ore grade quality for mines) will dictate the development options and resulting economics of a given project. Other factors like access to infrastructure and planned adaptation of technological innovations also complicate project-to-project comparisons and how to weight which projects go ahead when. This paper will demonstrate how we construct commercial models for individual project phases, balancing project geologic data with corporate metrics and market limitations to determine what fits in a granular outlook. The geology, reserve and company data built for this project view also reveals a diverse project landscape with a wide mix of development types and sizes. This allows us to touch on how our market access views impact granular forecasts but also to provide a high level view of the novel use of solvent applications, modular designs or entirely new development methods that are currently proposed in the project queue. Case studies could include the economic impacts of Solvent Aided Process at Narrows Lake while highlighting other pilots and technology demonstrations (THAI, ESEIEH, UltraLite/InSite facility installation, VSD, C2C-SAGD, to name a few). We currently attribute US$341 billion in remaining value (government share and company) to commercially viable projects that use today's technologies. But it's the future technological advancements that will determine how more could come and who will hold the reins.
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1. SAGD project phase: standard assumptions

Many analysts will derive standard assumptions to reflect the cost flows, operating assumption, and project phase definitions. However, we find that actual projects will always differ from these cost profiles, production ramp-ups, and steam oil rates. We stress the importance of tailored actual data and assumptions for each project phase as prevailing costs, development strategies, and geologies differ.

2. Differentiated cash flow economics

This phase-based output allows us to track the key historical information database and also informs our forecasting efforts. Only projects that we believe will have access to funding and feasible development plans are captured in our commercial categorization.

3. Projects included in our commercial dataset

These granular models allow for more robust analysis and decision-making. As development plans, prices, costs, and extraction technologies change, sensitivities can be applied to a project phase to assess the ultimate impact on economics. For this example, we took the standard SAGD model in section 1 and included known influences for the development schemes.

4. Production forecast by project phase

Tracking the company ownership over time in each project allows the data to be aggregated by working interest. A small handful of companies have and will continue to dominate spending in our view.

5. Capital investment by company

Capital investment is set at planned as expansion phases are brought on at a delayed and reduced pace.

6. Sample sensitivity on adding solvent

Injekting solvents alongside steam has demonstrated positive results in pilot and experimental schemes but has yet to be applied on an entire commercialized project. Husky claims a solvent aided process:

- Decreases SOE by ~30%
- Increases full field recovery rate by ~15%
- Decreases sustaining capital by ~10%
- Requires non-fuel operating costs by 5~10%
- Lower emissions, water usage and land footprint

We have applied these adjustments to a standard SAGD model to show how project profitability can be enhanced.

Source: Wood Mackenzie Global Economic Model

This study highlights the impact of operational technology applications on project-level economics. We expect long-term growth to return to US$70 and new SAGD project growth economics will compete closely with deepwater projects and second-tier tight oils.

Source: Woodmac 2014 view

AER ST 98

Source: Woodmac 2014 view

Woodmac Economic Model

SAGD project with solvent

SAGD project without solvent

CompanieS of project economics (Cdn$)

Wood Mackenzie Business