

CANADIAN OIL SANDS

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ROSS SMITH ENERGY GROUP

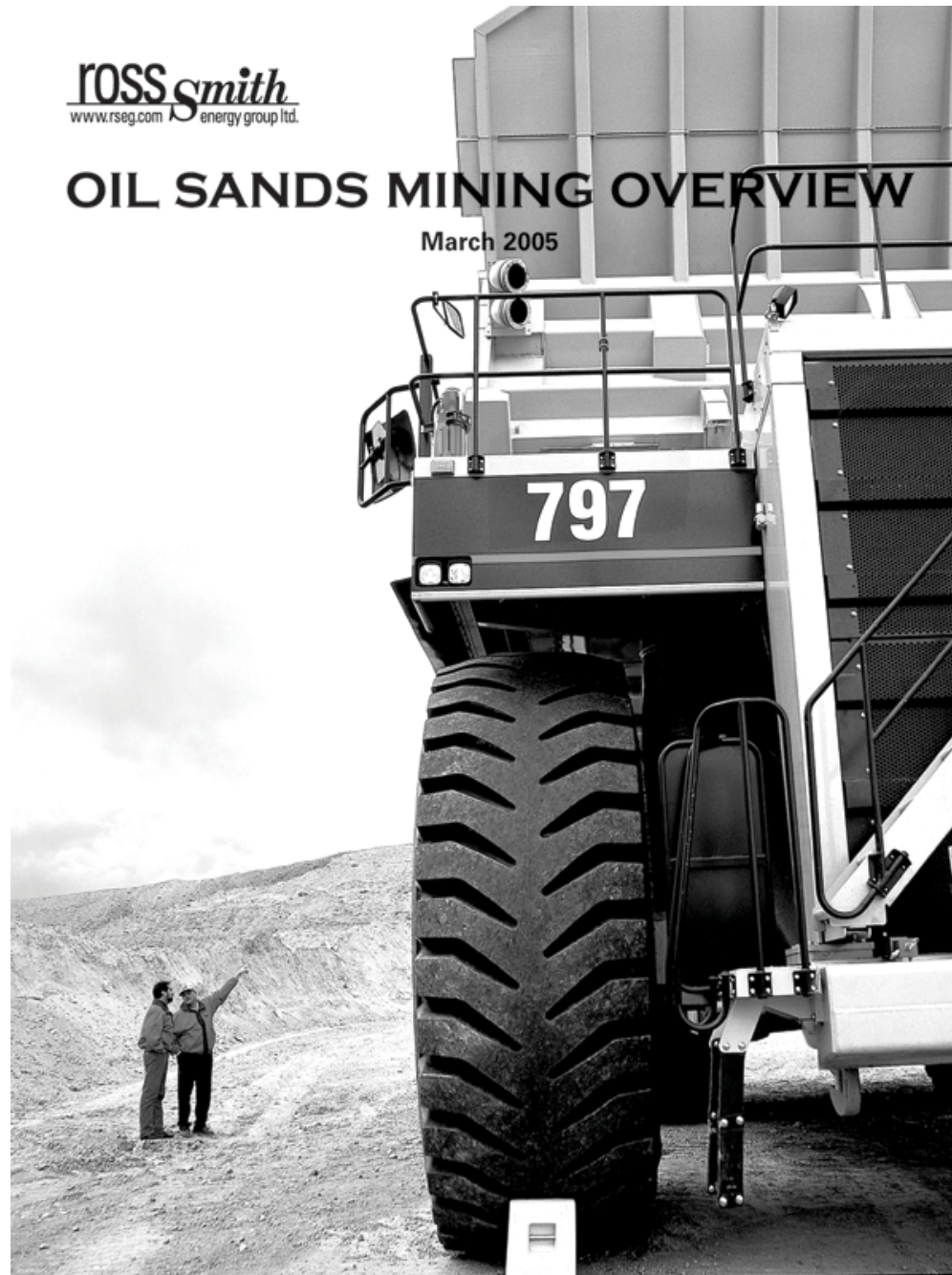
- **RSEG provides independent E&P equity research to U.S. and CDN institutional clients**
- **Our technical and financial analysis of companies and resource plays is rigorous and unbiased**
- **We apply the same methodologies used by E&P companies to evaluate acquisitions**

CANADIAN OIL SANDS

- **Purpose**

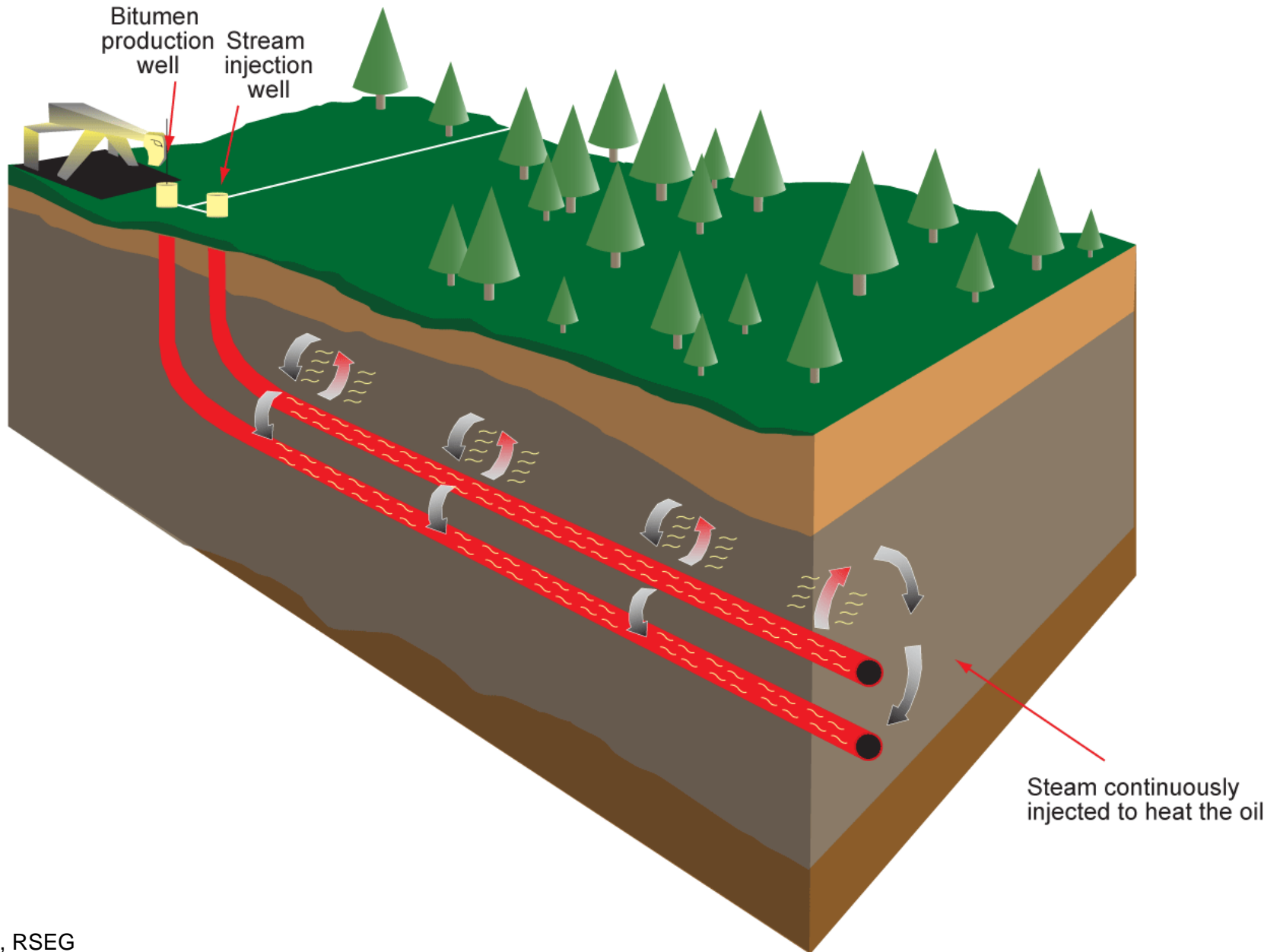
- **Provide an understanding of key economic drivers, challenges and opportunities**
- **Highlight key sensitivities in oil sands economics**

OIL SANDS MINING



Picture Source: Finning

STEAM-ASSISTED GRAVITY DRAINAGE (SAGD)



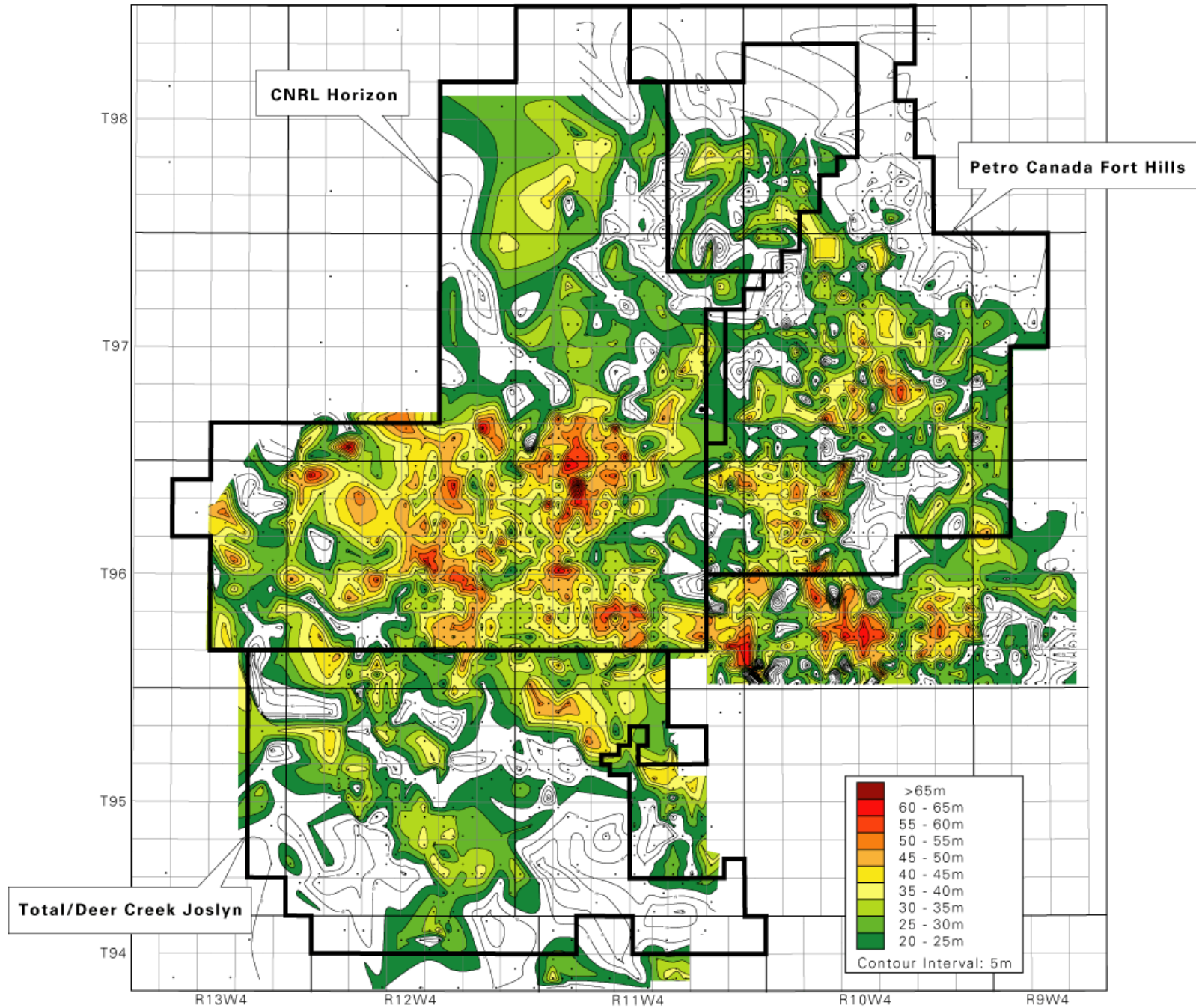
Source: CNRL, RSEG

KEY CHALLENGES AND OPPORTUNITIES

- **Geology / Reservoir**
- **Business**
- **Technical**
- **Environmental**
- **Stakeholders / Regulatory**

- **Key Assessment Criteria**
 - **Pay Thickness**
 - **Reservoir Continuity**
 - **Porosity and Permeability**
 - **Bitumen Saturation**
 - **Thief Zones**

PAY THICKNESS EXAMPLE



- **Prices**
 - **WTI - Heavy Oil, Synthetic Crude Oil (SCO)**
 - **Diluent Supply - Condensate and SCO**
 - **Significant Incremental Volumes - Competition**
 - **Pipeline and Bitumen Upgrader Capacity**

BUSINESS ISSUES – CAPITAL COSTS

	Original Estimate (start-up) C\$B	Final Cost C\$B	% over
Suncor Millennium (2002)	\$2.0	\$3.8	90%
Shell Albian Sands (2003)	\$3.8	\$5.7	50%
Syncrude Exp'n 3 (2006)	\$4.1	\$8.6	110%
NXY/OPC Long Lake (2008)	\$3.4	est. \$5.8 - 6.1	71 - 79%

- **Competition for resources (experience, expertise)**
- **Scope definition at construction start-up**
- **Rising material and labour costs**

- **Reliability is Key**
 - Mining opex is 75-80% fixed costs
 - High up-front capital
 - Design and operation
- **Natural Gas**
 - SAGD, Mining and Upgrading
 - Supply and cost

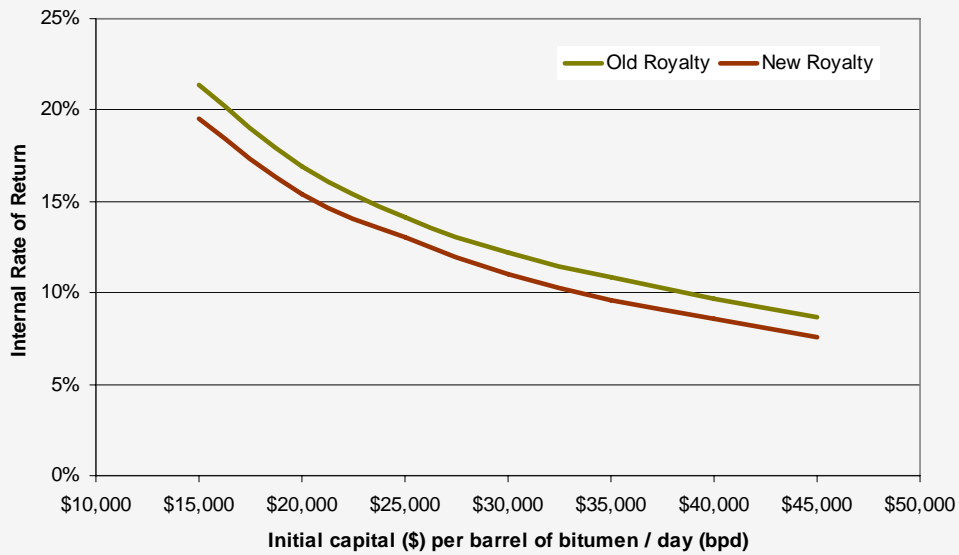
- **Technological Advances**
 - **Coke and Asphaltene Gasification**
 - **Bitumen Combustion**
 - **Nuclear Energy, Coal**
 - **Solvent Extraction (VAPEX)**
 - **Thermal Solvent Processes**
 - **Electrical Heating**
 - **In-Situ Combustion (THAI, post-SAGD)**

- **Increasing Expectations / Standards**
 - **Alberta Specified Gas Emitters legislation**
 - **Kyoto Accord uncertainty**
- **Water**
 - **Sources – non-potable**
 - **Treatment**
 - **Recycle up to 90+%**
 - **Mine tailings management**

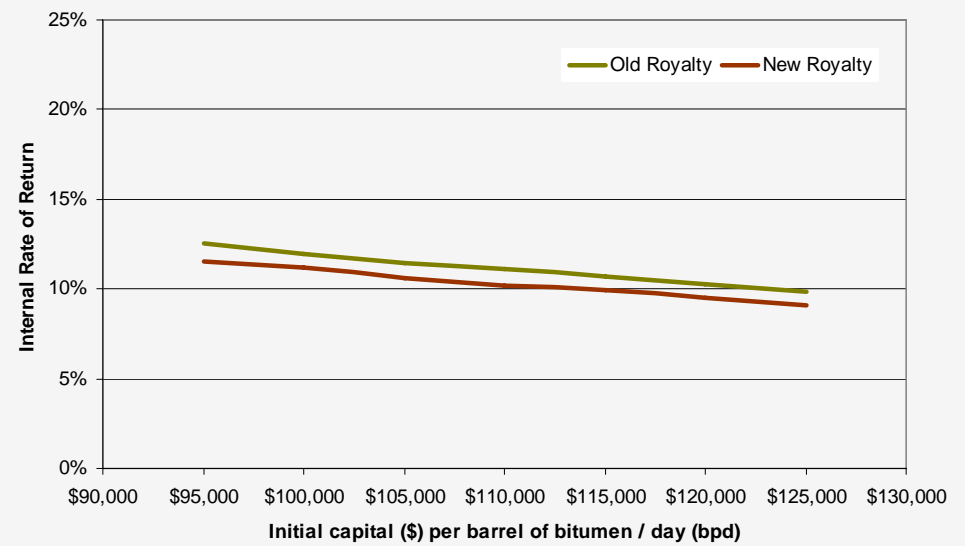
- **Large-Scale Projects**
 - **Significant consultative process**
- **Concentration of Projects**
 - **Cumulative environmental effects**
 - **Local socio-economic effects**
- **Timelines to Production**
 - **Mine: 6-9 years**
 - **SAGD: 4-8 years**

CAPITAL COST SENSITIVITY

SAGD
IRR versus Capital Costs

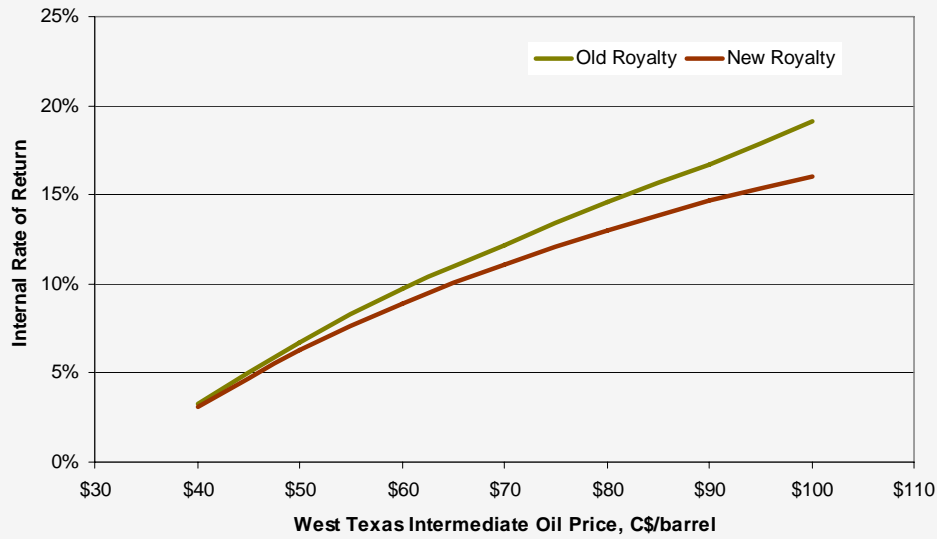


Mining and Upgrading
IRR versus Capital Costs

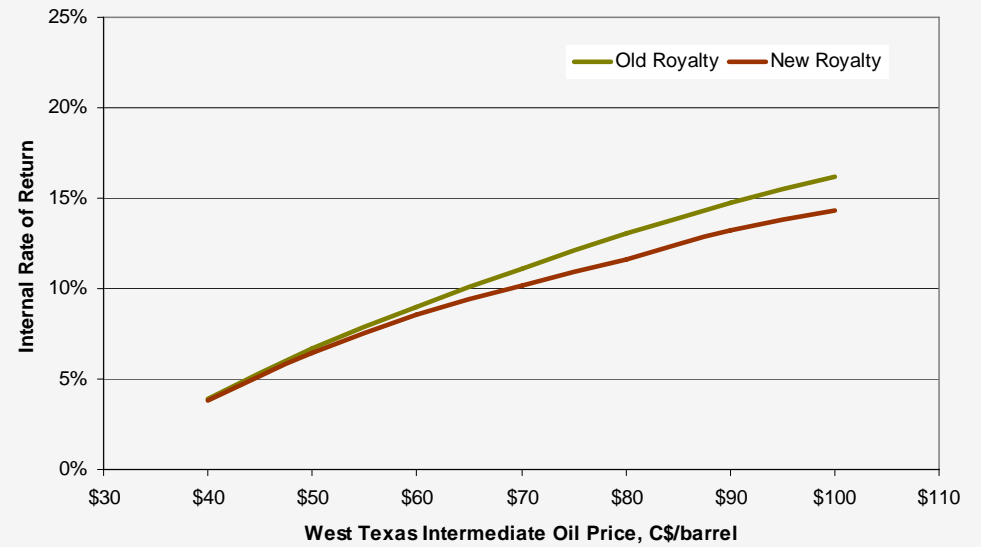


OIL PRICE SENSITIVITY

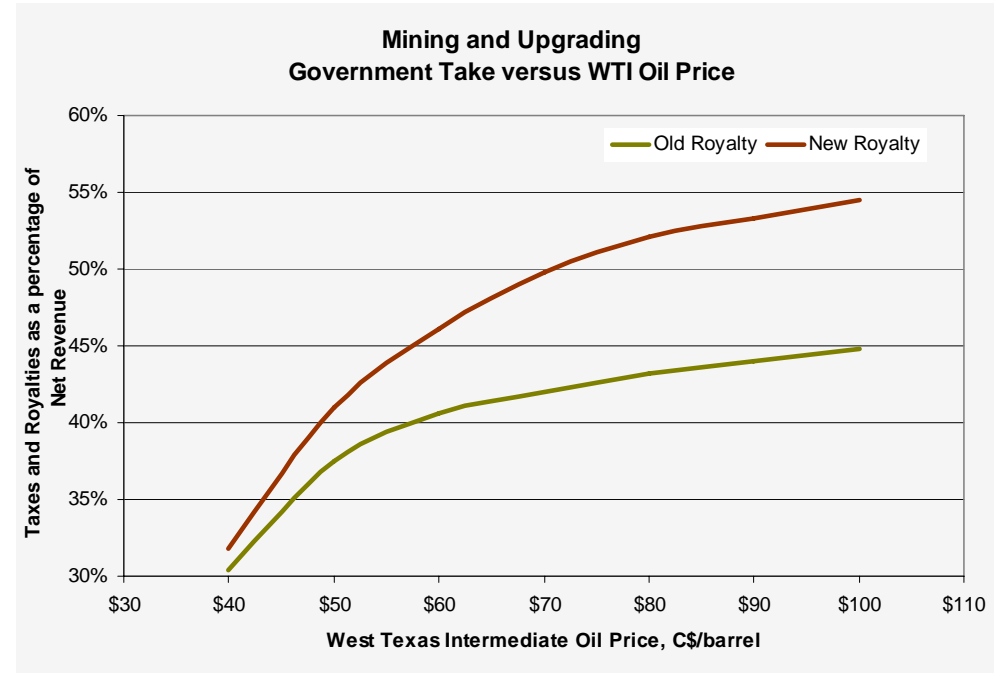
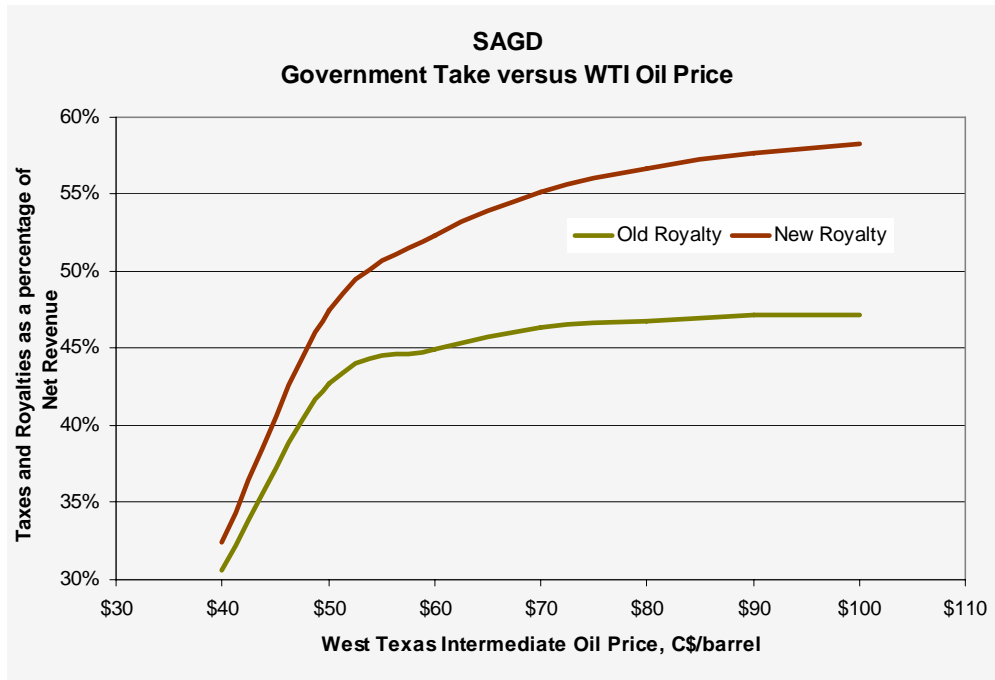
SAGD
IRR versus WTI Oil Price



Mining and Upgrading
IRR versus WTI Oil Price



GOVERNMENT TAKE



OIL SANDS - SUMMARY

- **Economics remain robust**
 - Substantial investment continuing
 - Variable geological qualities across the play
 - Highly leveraged to oil price and heavy differential
 - Capital and operating cost inflation
 - Royalties and taxes – still some uncertainty
 - Technological advances
- **But environmental and regulatory challenges will play an increasingly dominant role in whether projects proceed**