



Value Chain Solutions Inc.

VCS Clean Oil Growth Strategy

Transforming Oil Sands to Clean Oil

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Bitumen growth face severe head-winds, due to "manifestations" of fundamental quality problems: Extremely Heavy / Viscous Crude Oil with Very High Level of Contaminants

- > Limited Markets requires deep conversion refineries
- Costly/Limited Logistics diluents / pipeline bottlenecks
- Severe Price Discounts heavy and diluent penalty
- **Extreme Differential Volatilities** L/H differential
- > Dirty Oil Image high GHG's and Climate Change



Leading to:

Exodus / reducing ownership in Oil Sands by many majors (Devon, Norway's Statoil, France's Total SA, Arkansas-based Murphy Oil and Houston-based ConocoPhillips)

suspension

- Less (No New) investment Less business development
- > Likely No / Little Growth , except for Majors with Existing Heavy Oil Refineries (in US)



Address Quality Transforming Bitumen → Clean Oil

De-Carbonize and De-Contaminate UPFRONT, enabling:

- > Drastic processing simplification
- CAPEX and OPEX savings
- GHG reduction in subsequent upgrading refining

Will lead to:

- **Broadening of market** -expand to medium refineries and emerging market for higher value products
- > Debottlenecked logistics easier pumpable, remove diluent, rail for high value products
- > Enhanced Value and Robustness less exposure to differential volatilities (socio-economic benefits)
- Cleaner Products less carbon, sulphur and particulates emission



DRU- Diluent Recovery Unit; ADC[™]-Accelerated De-Contamination; COC[™]- Clean Oil Cracking; CORe[™]-Clean Oil Refining

VCS -Heartland Complex (VCS-H)





- > Existing AER Regulatory approval in place for 188 kbpd (diluted bitumen)
- Designed to produce clean premium medium crude oil products and higher value refined products such as High Cetane Diesel and Low Sulphur Marine Fuel
- > 1st Phase design capacity is 77.5 kbpd DilBit
- Growth potential with expansion being planned to 500+ kbpd
- LOI \$440 MM Alberta Partial Upgrading Program
- > Advancing engineering for project sanction (or FID)

Full Value Chain (FVC) Value Creation





ENABLER to Resolve Oil Sands Woes

- Differential Volatility, Logistics Constraints, Market Isolation



Value Chain Solutions Upgrader

VCS

at

- **Alberta Heartland**
- **Athabasca Region**
- Hardisty

with VCS Specialty Refinery at

- **Alberta Heartland** (integrated with VCS **Upgrader**)
- **Coastal location**
- **Other logistic hubs**



Supporting Material

Market Diversification



Crude Assays



Premium Medium Crudes (COLF) – Perfect match for majority refineries, globally (enabling refineries to meet upcoming High-Spec products)





⁽¹⁾ To be Transported via Rail – (Differentiation & Segregation of High Demand Premium Diesel and Marine Fuel)
 ⁽²⁾ Import Displacement -> Releasing Diluent Pipeline Capacity ...with VCS Expansion, could lead to reversal of diluent pipeline for Oil Transport

VCS-H Complex Reduces Oil Sands GHG Emissions





- Upfront De-carbonization with cost effective solid carbon sequestration (emerging value add e.g. activated carbon fro pollution abatement).
- Reduced GHG emission as a result of simplified refining configuration and elimination of energy intensive heavy resid conversion units as resid level much lower in COLF Premium
- Products with superior environmental performance; COLF Medium Crude Ultra High Cetane Diesel and Low Sulfur Marine Fuel

Inventory Market Management

VCS

- Use salt cavern storage as alternative to production curtailment
- Avoids undesirable "Hurts" of production curtailments
- Synergy with upgrading specialty refinery
- Serves as a national crude strategic reserve

HIGH DIFFERENTIAL (LOW DilBit Price)

IMM stores DilBit thus reducing surplus DilBit on market



LOW DIFFERENTIAL (HIGH DilBit and/or Oil Price)

During low differentials, DilBit is drawn from storage and processed



VCI Technologies compared to conventional SAGD



- Technology Simplicity is the key innovative integration of proprietary customization technologies
- ► ADC[™] accepts well head bitumen emulsion, eliminating intermediate separation facilities (i.e. FWKO, Treater, Skim tank, IGF, ORF), make use of well production heat, and eliminate the need of diluent and chemicals



Socio-economics



The KEY Socioeconomic Drivers for VCS [Upgrader – Refinery], and its Planned Expansion, are:

- Peak Construction Employment of 2000 +, for over a Decade
 (leading to " tens of thousands person-year " project execution related employment)
- Operating Employment would be in Hundreds for each Phase, for multiple Decades
- The Gross Margin for Each Phase is about \$1 billion per year, for Decades, which is Economic Driver for Direct Stakeholders, with Multiplier Effect for Direct – Indirect socioeconomics.
- Spin Off Benefits to Community (Municipal, Provincial and Federal Taxes)

Such Economic Impacts are expected to grow by an Order of Magnitude, based on VCS Expansion Plan.

Yet, the Socioeconomic Impacts Directly related to VCS is "Tip of the Iceberg".

With Unearthing Markets, IMM, Logistics Debottlenecking, and Product Diversification

→ it would transform Oil Sands → Clean Oil Industry

re-vitalizing our Energy Industry and Alberta Economy, with Responsible Development, leading to Immense Economic Growth.