BioOilSolv

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Business Focus

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Problem we are solving?

Current bitumen recovery method, Steam assisted gravity drainage:

- Contributes to Extensive GHG emission
- Requires high energy consumption
- Costly separation of bitumen/steam emulsion
- Low recovery

Who has it?

The oilsands industry in Canada in 2018 contributed to:

- 332,000 jobs
- 71.3 billion dollars to GDP growth

Bloomberg

Canada's Oil Sands Need C$65 Billion to Hit 2030 Climate Goals

What is the Solution?

Green, forestry waste derived solvents (biooil) obtained by catalytic pyrolysis using the synthesized highly active catalysts result in:

- Reduced GHG emissions: Reduced use of natural gas for steam generation
- Improved recovery: our research has shown six fold improvement in recovery
- Reduced production costs: bitumen/water emulsion treatment and maintenance costs associated with asphaltene deposition.

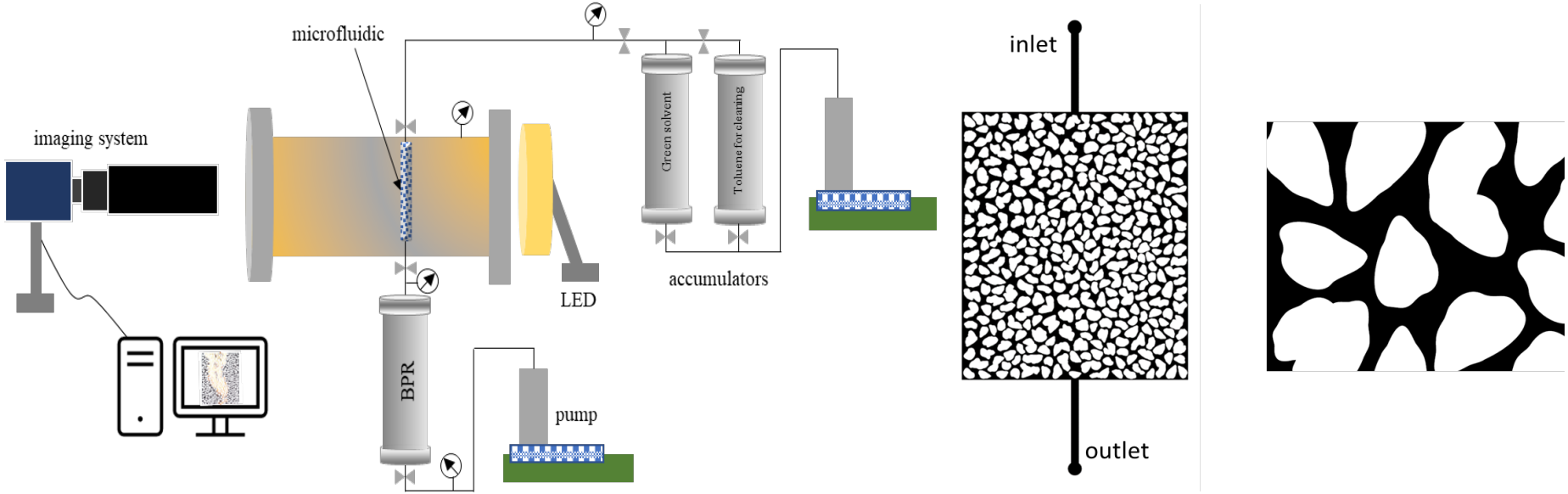
Positioning Statement

For oilsands industries, green biomass derived solvent is the solution that will decrease the environmental impacts (GHG emission), so they can reach their 2030 net zero goal.

Active catalyst for upgrading biomass

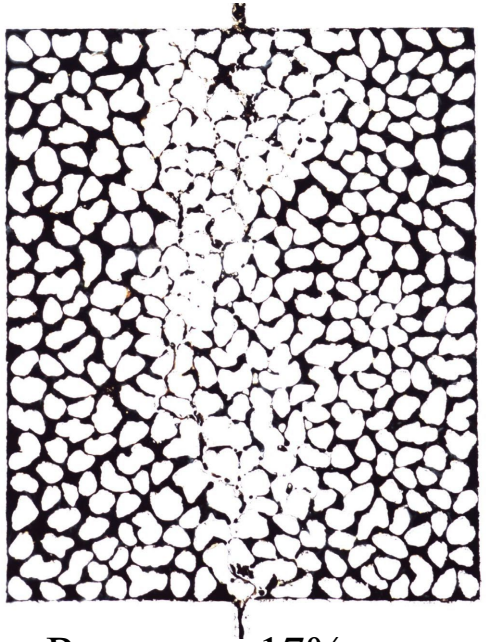
Green solvent to solubilize and decrease bitumen viscosity

Green solvents in bitumen recovery

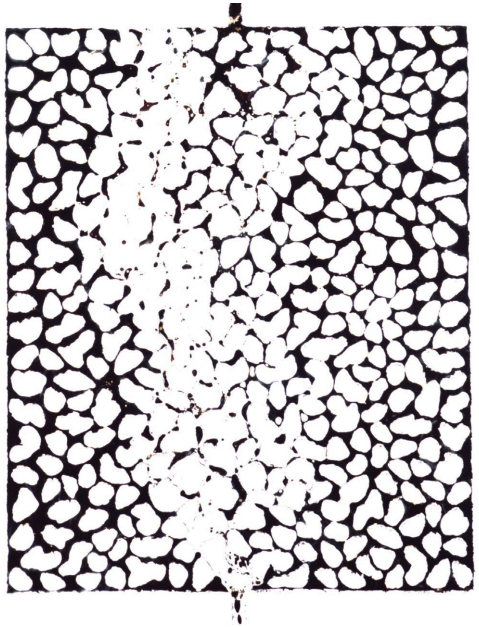


Results: Solvent-aided steam injection

Green solvent A (3%)-Steam (97%), T=170 C, P=70 psi



Recovery=17%
Time = 8 PV



Recovery 24%
Time = 15 PV

Steam injection recovery = 4%

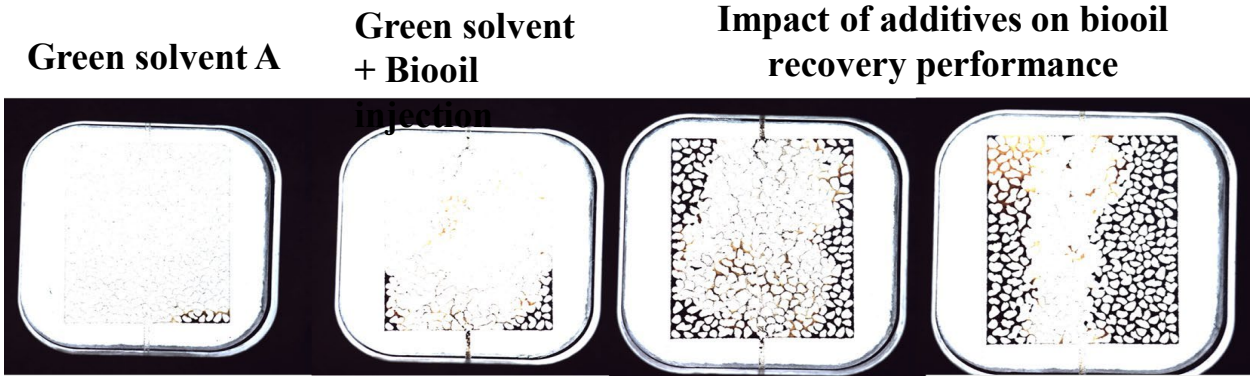
6 times improvement in recovery by using green solvent as an additive

Competitive Landscape

Company		Solvent	GHG emission (Solvent)	Energy requirement	Operation cost due to asphaltene
Imperial, Cyclic solvent		Propane and diluent mainly C5	✗	✓	✗
ConocoPhillips Surmont ESAGD		mainly C3, C4 and C6, SOR: 1.5-2	✗	✓	✗
Connacher Algar SAGD		Condensate, C4 to C8	✗	✓	✗
MEG energy, Christina lake		Non-condensable gas	✗	✓	✗
Cenovus, Christina lake		Non-condensable gas	✗	✓	✗
CNRL-Kirby		Non-condensable gas SOR:2-3	✗	✓	✗
Our technology		Biomass-derived solvents	✓	✓	✓

Competitive Advantage

- Production of biomass-derived solvents is less carbon intense compared to oil-derived solvents, which makes it a more sustainable solution
- Our technology does not lead to asphaltene deposition which improves the recovery efficiency.



Market Size and business plan

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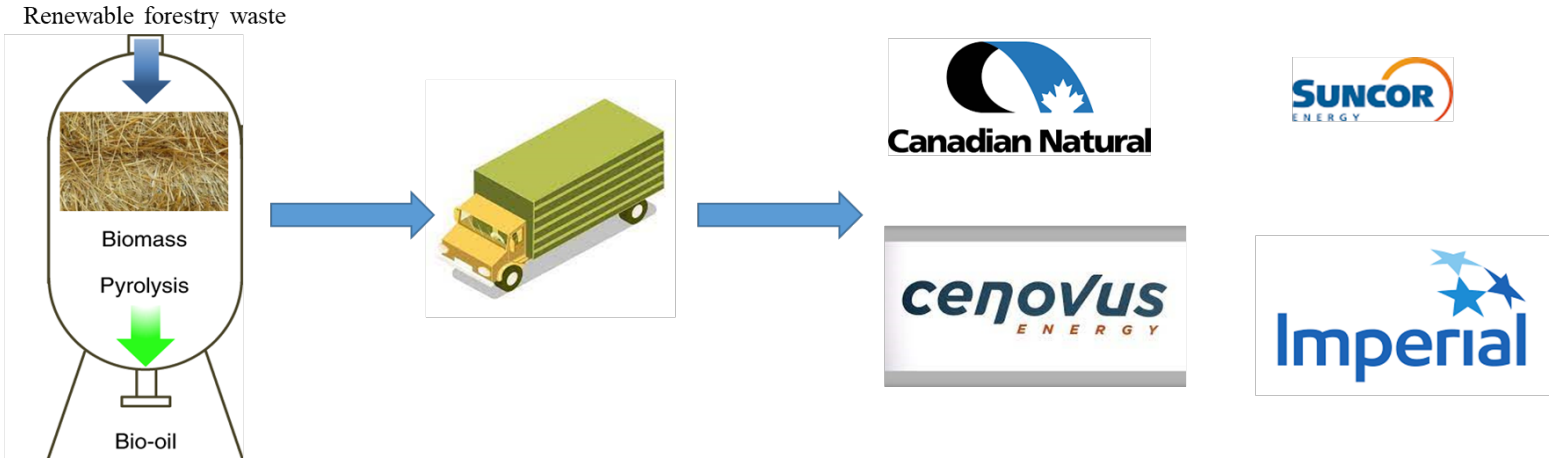
$5200B TAM	$26B SAM	$2.6B SOM
In-situ bitumen reserves in Canada	Current recovery	10% market share

Key customers

Oilsands industries

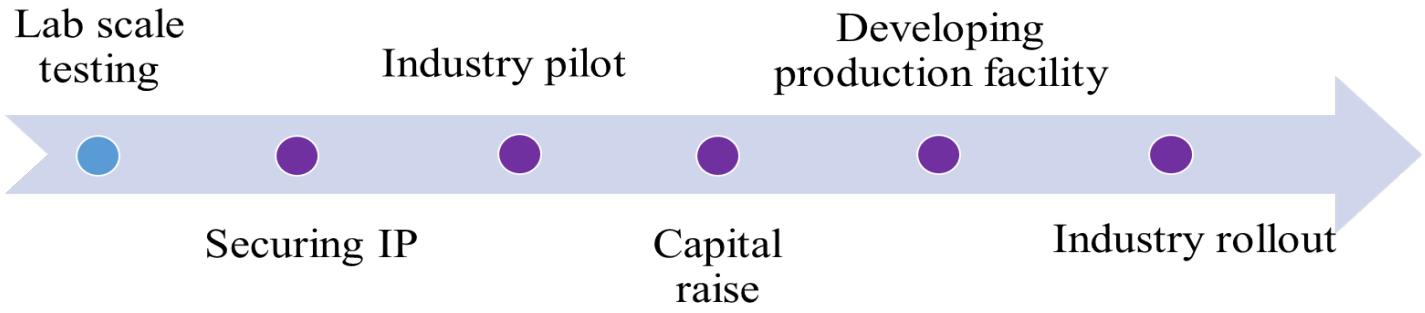
Green solvent production



Go to Market Strategy and key metrics

Barriers, funding required, potential ROI?

- Natural gas cost saving for steam generation: 1.5 CAD/bbl produced oil
- Carbon tax saving: 1 CAD/bbl
- Solvent price per bbl of produced oil assuming 80 % solvent recovery: 1.7 CAD/bbl
- Profit: 0.8 CAD/bbl
- 1.3 million CAD/day saving with current in situ production



Management team

- Advisory board

Jeff Ryzner
Innovation specialist,
University of Calgary

Hector Siegler
CTO, Algal Earth
Professor, University of Calgary

Mohammad Alikarami
PhD candidate University of Calgary
Expert in catalysis, pyrolysis and electrochemistry

Sedigheh Mahdavi
PhD in petroleum engineering
Expert in enhanced oil recovery methods

Technology Focus

Proven, defendable IP, barriers?

- Lab-scale testing of the bitumen recovery technology
- IP disclosure submitted to innovate Calgary