



# IMPROVE

## Conventional Energy Methods

BUILDINGS | **CARBON CAPTURE AND STORAGE** | FUEL CELLS | NUCLEAR | POLICY | PLANNING  
RENEWABLES | SMART GRID | STORAGE | SUSTAINABLE MOBILITY | SUSTAINABILITY ANALYSES



## ADDING EMISSIONS AND WATER RESOURCES TO THE ECONOMIC EQUATION

**Luis Ricardez-Sandoval, Ali Elkamel, Alberto Betancourt-Torcat, Gloria Gutierrez**

Welcome to the Canadian oil sands. While this is one of the largest oil reserves on the planet, extracting the increasingly hard-to-reach resource requires substantial amounts of energy and water. Not only does that drive up the cost of production, it makes the oil sands Canada's single largest emitter of greenhouse gases (GHG).

So how can producers minimize costs, maximize profits, and stay within federal GHG emission and fresh water withdrawals targets? That's where WISE researcher Luis Ricardez-Sandoval and his colleagues come in. Ricardez-Sandoval is working on the development of a comprehensive integrated energy optimization model to improve efficiency in Canadian oil sands operations. Currently, his model incorporates a range of variables such as carbon emissions, natural gas prices, and the amount of steam required to extract oil trapped well below the surface.

Producers can use this model to select the most appropriate production levels and schemes to maintain carbon emissions and water withdrawals within the specifications outlined by government of Alberta. In addition, this model helps producers to plan infrastructure by identifying the optimal configuration of commodities like power plants, boilers, and extraction approaches.

Ricardez-Sandoval's research also includes the use of alternative energy sources for the oil sands. A study conducted by his research group suggests that better water management, carbon storage and capture, and carbon-free energy sources such as nuclear power could play bigger roles in the oil sands industry. Future integrated modeling systems will add those variables into the equation.

With the province of Alberta expected to churn out three million barrels of oil a day by 2020, Ricardez-Sandoval's modelling activities gives oil producers a practical tool to optimize, plan and schedule their operations in profitable and sustainable ways.

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