



About JIVE: Joint Implementation of Vapour Extraction

What is JIVE?

The Joint Implementation of Vapour Extraction (JIVE) Project is a three year, \$40 million initiative led by the Petroleum Technology Research Centre (PTRC) to develop, demonstrate and evaluate technology for recovering heavy oil in western Canada. The process currently under exploration – solvent vapour extraction (SVX) – has the potential to unlock western Canada’s vast and under-exploited heavy oil resources. SVX enhanced oil recovery technologies are a clean break from past technologies as they use no water and only a fraction of the energy needed to recover oil by traditional methods, significantly changing the impact heavy oil recovery has on the environment.

JIVE research consists of laboratory studies, physical modeling and numerical simulations coordinated with three vapour extraction pilot operations near Lloydminster, Saskatchewan, Canada.

JIVE is funded by TEAM, Sustainable Development Technology Canada, Saskatchewan Energy and Resources, Western Economic Diversification, and industry partners Nexen Incorporated, Husky Energy Incorporated and Canadian Natural Resources Limited. Research partners include the Saskatchewan Research Council and the Alberta Research Council. JIVE breaks new ground as a research program with successful collaboration between several governments, oil producers, and research providers, with the collective goal of developing commercially viable SVX processes.

Increased Oil Recovery

Currently, only 5 to 15% of heavy oil reserves are recovered in western Canada and forecasts for heavy oil production show a reduction of 50% over the next decade unless new technologies are applied. The SVX technologies that are currently being developed through the PTRC’s JIVE program have the potential to increase recovery rates anywhere from 30 to 50%. In western Canada alone that translates into 5 to 8 billion barrels of oil that otherwise would not be recovered.

SVX is an enhanced oil recovery process designed specifically for heavy oil reservoirs. The process involves injecting a gaseous hydrocarbon solvent, typically butane, propane or CO₂, into the reservoir. The solvent mixes with and dissolves in (through diffusion/dispersion) the heavy oil, reducing its viscosity. The target recovery mechanism (drainage, drive, or cyclic), solvent selection and well configuration are dictated by the geology of the reservoir, its rock/fluid properties and any previous development of the reservoir.

SVX processes may also be applicable to shallower, more viscous oil sands, opening up vast potential for application in Saskatchewan, Alberta, and other regions around the world.



Environmental Impact Mitigation

If SVX processes are proven to be technically and economically viable, it could replace steam injection as the preferred heavy oil recovery method. With a Canadian heavy oil resource in excess of 26 billion barrels, and up to 20% recoverable, the use of solvent vapour in place of steam could allow enormous reductions in water use and CO₂ emissions during oil recovery.

Compared to current steam extraction methods, SVX technology could influence the following changes for every billion barrels of oil produced:

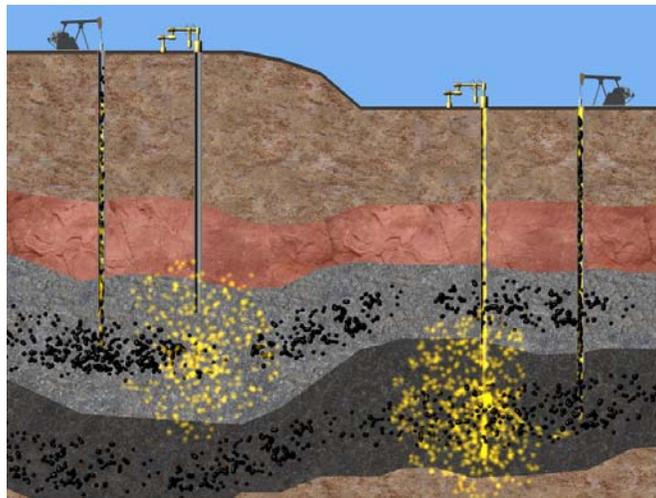
- Eliminate 85 million tonnes of CO₂ from entering the atmosphere
- Save 400 million barrels of fresh water
- Save 1.65 trillion cubic feet of natural gas from being burned.

Considering the billions of barrels of heavy oil still waiting to be recovered in Canada, and throughout the world, SVX technology could have a dramatic global impact on the industry's water usage and CO₂ emissions.

JIVE also presents the opportunity not just to eliminate CO₂ production during heavy oil recovery, but the potential to reduce CO₂ emissions from other production sources. CO₂ is one possible solvent choice, along with butane and propane, to help reduce the viscosity of oil.

Experimental Program and Pilot Results

Between 2007 and 2010, three field trials of solvent vapour extraction technologies were completed, along with well-defined laboratory studies that included scaled and mechanistic physical modeling and numerical simulations. The project demonstrated increased recovery rates from depleted heavy oil reservoirs. The impacts of temperature, pressures and optimizing solvent concentrations were all studied.



In one JIVE configuration, above, solvent (in yellow) is injected then mixes with the oil in the reservoir to reduce its viscosity. This allows more oil to flow to the production wells.

The field trials have shown great promise, including overcoming one of the main obstacles to widespread deployment of SVX – solvent recovery. The remainder of the JIVE research program is focused on optimizing the SVX process for more widespread commercial applications.

For more information on JIVE or to contact the PTRC visit: www.ptrc.ca