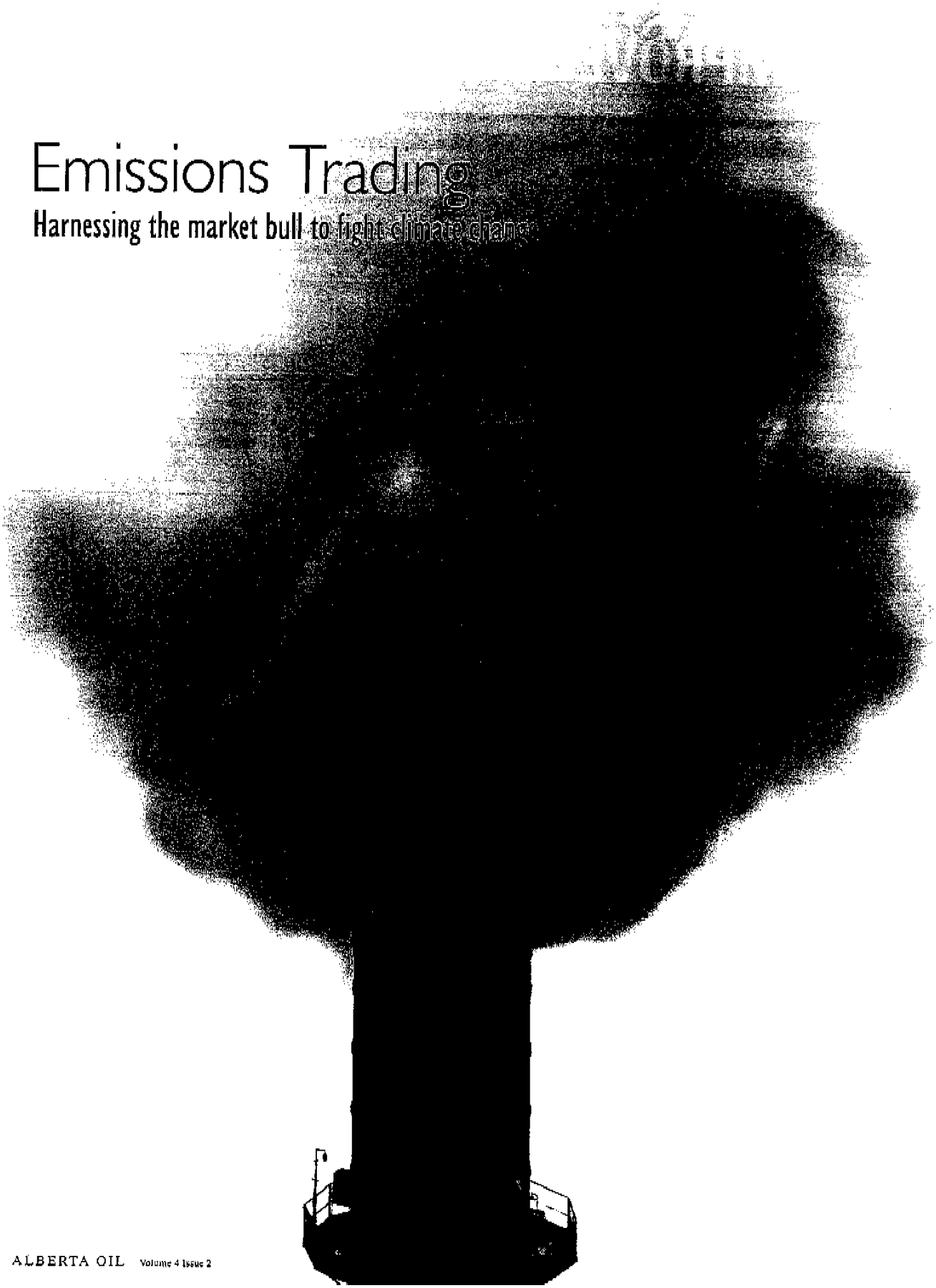
Emissions Trading

Harnessing the market bull to fight climate change



1968: the Vietnam War radicalizes American post-war youth. Warsaw Pact troops suppress the Prague Spring. Student demonstrations almost topple the French government. Pierre Trudeau becomes Prime Minister. Also during that tumultuous year, Canadian professor John H. Dales published *Pollution, Property and Prices*. **Graham Chandler** takes a look at the creation of trading schemes to abate CO_2 emissions, and traces their development back to Dales' radical and highly influential work.

A quiet-spoken economics professor was the last person from whom leftist social activists expected radical ideas for curbing air pollution. The concept that Professor John H. Dales of the University of Toronto published in 1968 was more the antithesis of the movement: he wanted to use the big-corporation profit motive.

Yet Dales' book *Pollution, Property and Prices* quickly become a classic of environmental economists. The central idea was radical but deceptively simple: allow companies to buy and trade the rights to pollute. His timing was right, too: Rachel Carson's *Silent Spring* had galvanized the nascent environmental movement. Policy-makers were being pressured to consider measures to curb pollution other than taxing the polluters.

"Dales pointed out that traditional economic and legal solutions to pollution and resource problems were never going to be satisfactory and that a 'third way' was needed," wrote David Pearce of University College London in a recent review of the book's reprint. "Today, all environmental economists of my generation recognize the debt we owe to Dales' work, as one of the intellectual foundations for emissions trading that began in California in the 1970s and now extends across the world."

The idea led to the creation of tradable emissions permits, which immediately became the cornerstone of a highly successful program to cut sulphur dioxide (SO_2) emissions from U.S. coal-fired generating plants (see sidebar). The program has since been part of all major proposals for controlling global greenhouse gas emissions, including the National Round Table on the Environment and the Economy, the European Union action against climate change, and – importantly – the Kyoto Protocol.

How tradable credits are generated

Three basic ways of generating the tradable credits now exist. The United Nations Environment Program classifies them into cap-and-trade; baseline and credit; and offset.

In a cap-and-trade program, regulators establish an overall limit, or "cap," on the amount of emissions considered prudent – necessarily somewhere below collective "business-as-usual" levels. Allowances are then divvied up amongst the emitters. The U.S. SO_2 emissions by electric utilities are a prime example, as well as their nitrogen oxide (NOx) emissions scheme. Another is the European Union Greenhouse Gas Emission Trading Scheme.

Canada's new program, as outlined in Environment Canada's March 2008 release *Turning the Corner: Regulatory Framework for Industrial Greenhouse Gas Emissions*, is an example of the second type: the baseline and credit program. Here's how it works. An emission baseline is first defined for each emitter, which often varies with output (intensity-based). Emitters then make their reductions and calculate their emissions. At the end of the compliance period, the authority compares everyone's baseline calculation with their emissions. If your emissions are lower than your baseline, you receive credits. If they're higher, you have to buy credits. Canada's initial compliance year is 2010.

Offset credits are attributed to companies that will not be subject to intensity-based emissions reduction targets but will be involved in voluntary projects to reduce their eligible GHG emissions.

How exchanging credits works

However credits are obtained, holders can retain them or sell them. It's here that a market must emerge: an emissions trading exchange. Like any other commodity, credits take on a monetary value based upon supply and demand. If Company A figures it can reduce its emissions by the required number of tonnes at a certain cost, then it can sell its credits to Company B, who can't, making a profit on the deal. Since it operates according to free-market principles, as demand rises, so too do prices—with the attendant incentive for Company B to

Greenhouse gas emissions exchanges are already entering a steeper curve. Although the Chicago Climate Exchange (CCX), which commenced trading operations in 2003, claims to be the only operational emissions reduction and trading system in North America today, several other entries are imminent. The CCX's early success led it to launch in 2005 the European Climate Exchange, which now handles the world's largest trading volumes, and which last year hit 40 billion euros, about $US 62 billion. The CCX is now reaching more worldwide with an initiative to establish a pilot greenhouse gas emissions trading program in India: the India Climate Exchange.

SO_2 Emissions Trading Success Story

Initial estimates of the cost of compliance with the sulphur dioxide (SO_2) cap in the US were based on the installation of scrubbers (devices that clean flue gases) in coal-fired electrical generating plants. Thanks to emissions trading, it has turned out that most of the reductions have been achieved by switching to low-sulphur coal. This couldn't have been foreseen, as the savings from the fuel switch weren't known until emissions trading provided the monetary incentive to experiment with new emissions reduction options. Moreover, scrubbers have become more efficient and cheaper because they now have to compete with low-sulphur coal. Operating a more efficient scrubber reduces emissions and thus frees up more credits for sale.

Who can start up an exchange?

Here in Canada, there's no doubt under the federal scheme that trading in emissions credits is about to take off. Vancouver (British Columbia recently announced its very own cap-and-trade plan), Calgary and Montreal have all announced they'd like to have an exchange. "It's generally up to the indexes themselves," says Jack Mintz, Palmer Chair of Public Policy at the University of Calgary. "It may be one of those things like any new industry—you get a lot of entries at one time and once the dust settles it will be whichever exchange people will use the most. You'll want to be in a place where there are a lot of traders and a lot of credits for sale as well as a good demand for them."

And how do credits get listed? "There will have to be some regulations for the procedure, like there is for financial reporting now," says Mintz. "An outside auditor will have to review the claims made about your carbon output." Which, he adds, could evolve into more of a problem as trading goes global, "because of the whole problem with audits in lesser-developed countries where there may not be the people to do it, plus an element of corruption in some cases."

But as global trading grows, clearly the market will become massive. "If carbon is trading at $30 a tonne, it would be somewhere around $15 billion just in Canada," says Mintz. "And at least ten times that for the U.S. And easily $600 billion for the world, eventually."

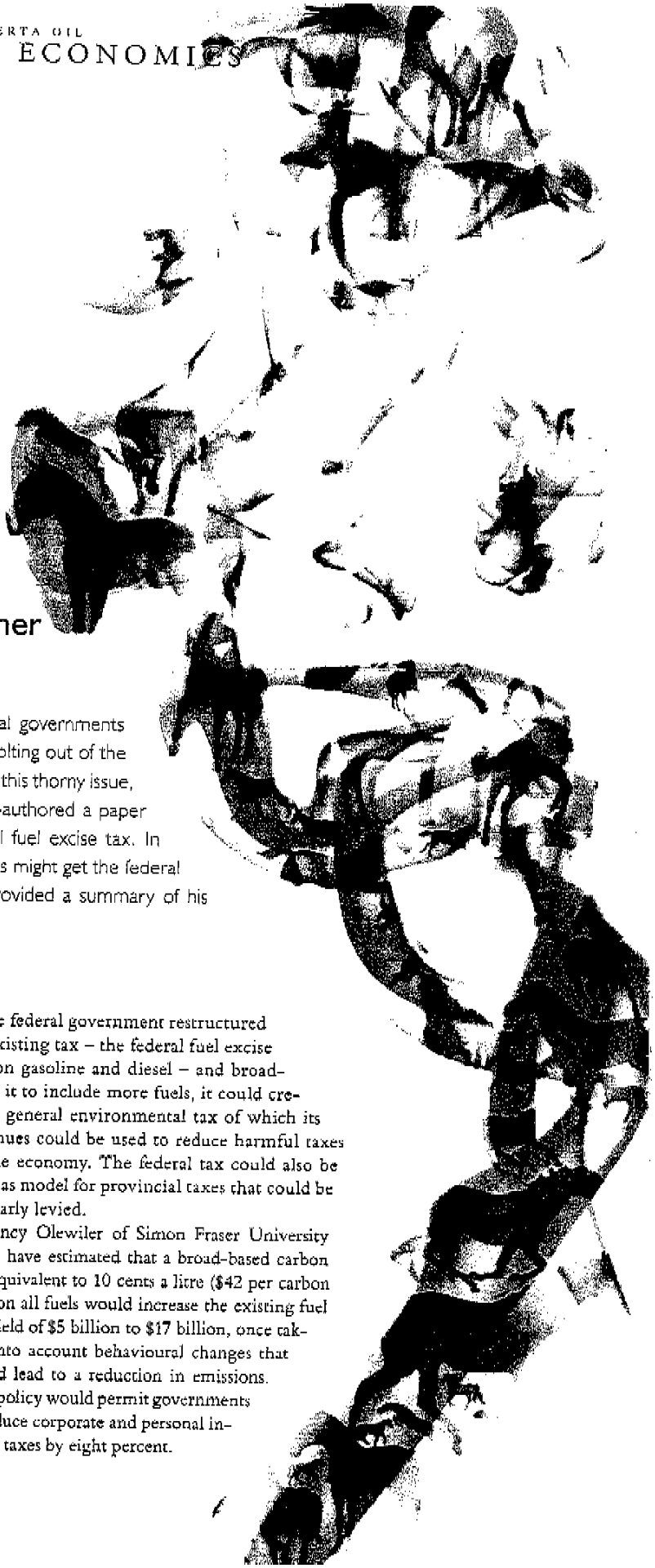
Going forward

Derivatives in GGH trading are already happening, too. As with any other commodity that companies need for future delivery, like gold or oil, price hedging is prudent. Here CCX notched another first: the Chicago Climate Futures Exchange, which they say is the world's first environmental derivatives exchange. But others are jumping on in quick succession: on March 17th the first carbon-linked derivatives contract was traded on the Green Exchange, a joint venture involving the New York Mercantile Exchange.

With Canada's impending entry into the emissions trading market, the Montreal Stock Exchange has formed the new Montreal Climate Exchange for futures contracts exchanges in Canada. First trades are slated for May 30th this year. "We can't introduce a cash market until there are actual physical credits available," says Leon Bitton, Vice-President Research and Development at the Montreal Exchange. "However, the federal government has established targets, so now that companies know their target they are starting their emission reduction strategies. Some want to perform better than their targets, so that means you already have an exposure that needs to be managed." And that, Bitton explains, is the purpose of their futures market. "It's a way to lock in your purchase for delivery in 2001, the first compliance year of the federal plan," he says.

And, as with all futures markets, futures in emissions credits will attract speculators. "We're creating a new asset class," says Bitton. "Anyone who has a view on the price will be able to invest in the futures markets." Which bodes well for emissions trading – once investors are attracted to commodity derivatives like futures, it means faith in the market, that a new market has come of age. Emissions trading is no longer a radical concept at all – like those 60s and 70s baby boomers, it's come full circle and matured into the mainstream. ■

Regular AO contributor Graham Chandler holds an MBA in corporate finance and spent a decade structuring and marketing deals in the world of energy banking in Calgary, Denver and Houston.



Carbon Taxes:

Getting the Horses to Run Together

Carbon pricing policies pursued by federal and provincial governments are like a horse race these days. Both governments are bolting out of the starting gate, but running in different directions. To address this thorny issue, University of Calgary professor **Jack Mintz** recently co-authored a paper that considers a fundamental restructuring of the federal fuel excise tax. In response to our magazine editors' question about how this might get the federal and provincial horses onto the same track, Mr. Mintz provided a summary of his controversial proposal.

The uncoordinated carbon pricing initiatives of the federal and provincial governments have resulted in a hodge-podge of policies being adopted – carbon taxes in BC and Quebec, regulations in Ontario and a levy on excess emissions in Alberta are all quite different applications. The federal government has its own plan, namely a levy on emissions in excess of an intensity-based target with amounts returned to companies if spent on carbon-reducing technologies.

A sensible approach that would appeal to many businesses would be to create a platform for harmonized federal and provincial carbon pricing policies.

To achieve better policy, carbon taxes are increasingly considered a good option to price carbon on a comprehensive basis that would affect consumers and businesses, not just emissions caused by big emitters that tend to be the focus for regulatory and tradable permit schemes.

If the federal government restructured an existing tax – the federal fuel excise tax on gasoline and diesel – and broadened it to include more fuels, it could create a general environmental tax of which its revenues could be used to reduce harmful taxes to the economy. The federal tax could also be used as model for provincial taxes that could be similarly levied.

Nancy Olewiler of Simon Fraser University and I have estimated that a broad-based carbon tax equivalent to 10 cents a litre ($42 per carbon ton) on all fuels would increase the existing fuel tax yield of $5 billion to $17 billion, once taking into account behavioural changes that would lead to a reduction in emissions. This policy would permit governments to reduce corporate and personal income taxes by eight percent.

The idea of converting the federal fuel excise tax into a broad-base carbon tax was suggested by the federal Technical Committee on Business Taxation ten years ago. The concept was to keep tax revenues constant so that any broadening in the tax base would be accompanied by tax reductions elsewhere. At that time, the Committee recommended a reduction in the gas tax although it could have considered using the revenue to reduce other taxes.

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Consistent with this approach, British Columbia introduced a carbon tax escalating from $10 to $30 over the next three years with the revenues used to reduce the corporate and personal income taxes as well as provide a tax credit for low-income households to cope with higher fuel prices.

A good case can be made for carbon taxation of some form compared to other potential policies such as regulations or cap-and-trade systems. While regulations and cap-and-trade systems provide greater certainty in meeting targets for emission reduction, carbon taxes provide greater certainty to pricing policy. This is particularly important to capital-intensive industries when making large investments to adopt new technologies, including carbon capture and storage.

However, carbon taxes would have a significant impact on consumers and businesses. Prices will rise reflecting the carbon tax for many products – utility prices and energy-intensive products. Low-income households would be hit hardest since heating and transportation services represent more important costs in their budgets compared to higher income households. Business facing higher fuel costs will be less competitive in export markets and less able to compete with imports coming from abroad.

If the carbon tax revenues are used to reduce high marginal personal and corporate tax rates (including those faced by low-income Canadians subject to a host of income-tested benefits), Canada's tax system could be made more efficient and fair. Thus, using the carbon tax revenues to lower corporate and personal taxes is imperative to help reduce not only emissions, but also economic harm caused by taxation.

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THE CUTTING EDGE

Alberta Research Council
Evaluates Carbon Storage Potential

Some eastern Canadian companies have been heard grumbling that when fate rolled the dice, Alberta got all the sixes – the deposits of conventional oil, then oilsands, and now even the ideal underground formations to store carbon emissions. Alberta Research Council Ian **Potter** gives a snapshot of some of his organization's projects, including the emergent field of carbon capture and storage research.

Striking at the heart of oilsands emissions

Carbon management has become a hot issue for industry, and in particular for Alberta's oilsands. Upgrading the bitumen releases a great deal of carbon dioxide, but luckily, a solution appears to be right underfoot. Carbon capture and storage (CCS) takes CO_2 that would normally be emitted to the atmosphere, and injects it deep underground. Alberta's Industrial Heartland, a growing source of CO_2 emissions, is on top of the Redwater Reef, which early indications show to be an ideal, safe and long-term storage location for those emissions.

Along with ARC Energy Trust, ARC has started the Heartland Area Redwater Project (HARP), which is expected to confirm that the Redwater Reef can accept as much as 1 billion tonnes of greenhouse gases, equating to 20 years of emissions from the Industrial Heartlands' present and future processing plants.

Neil Shelly, executive director for the Alberta Industrial Heartland Association, says companies need ways to respond to government emission reductions targets. "Our major market for oil is the U.S. California is passing laws to only buy oil that was produced with less than their maximum carbon intensity target," notes Shelly. "With HARP and other CCS projects, the carbon footprint from oilsands production could be lower than that of conventional oil." Shelly jokes he's heard eastern companies complaining that when fate rolled the dice, Alberta got all the sixes: the deposits of conventional oil, then oilsands – and now even the ideal underground formations to store carbon emissions.

Getting the most out of oil reservoirs

Fewer new oil pools means that producers are now looking to maximize recovery from oil that has already been discovered. Secondary recovery technologies can usually improve recovery by another 10 to 40 percent.

One technology that shows great promise is polymer flooding for heavy oil pools. This enhanced recovery method involves adding a water-soluble polymer to water, which thickens the water and provides a greater push of oil to the production well.

Early attempts at polymer flooding were discouraging. "However, we saw the potential for this technology, especially in heavy oil," says Dr. Fred Wassmuth, a senior research chemist at the Alberta Research Council. "When we started work in the early 1990s there were a lot of problems to iron out." Persistence has paid off. Today, polymer flooding has been shown to increase recovery of heavy oils by another 10 percent.

"Industry response to this technology has grown quite a bit in the last few years," says Wassmuth, who is now involved in a number of polymer flooding projects in Alberta and around the world. The positive response has spurred the creation of a joint industry project to further develop the technology and assess the potential of advanced salinity-tolerant polymers.

Technology pipes in cost savings to industry

Oilsands is difficult material to transport. Its abrasive qualities and chemicals corrode metal pipelines, incurring a significant cost to industry in unplanned production outages and maintenance costs. "When you're piping oilsands, you're effectively piping liquid sandpaper," says John Wolodko, a polymer scientist at ARC.

To protect pipelines, a project between 3M Canada and ARC aims to develop new liners that will prevent corrosion and erosion. "Oilsands conditions are unique," says Wolodko. "It's going to take comprehensive engineering and a lot of testing to find the optimal design." Over the next year, 3M and ARC will be evaluating different materials to see which ones perform the best, then design, fabricate and validate a prototype liner.

Ian Potter is Vice President of Energy at the Alberta Research Council.