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TECHNOLOGY HOLDS THE KEY TO RESPONSIBLE OIL SANDS DEVELOPMENT

Industry, government and academia must increase investment in oil sands research and work co-operatively to restore public confidence.

In 1999, an expedition of treaty commissioners surveyed the vast heavy oil deposits of northern Alberta and recorded that the resource was a Canadian wonder that would one day prove to be a tremendous asset for the nation. But while the abundance of the underground heavy oil deposit was obvious for generations, it would also become clear that the unconventional composition of the oil sands would need new technologies to enable commercial development. Success was ultimately achieved but only after decades and a litany of research attempts and failures.

Developing the oil sands has been a journey in which the goal to continuously improve on current practices has led to the creation of more efficient and environmentally effective technologies. From the first hot water extraction process developed in the 1920s, which unlocked the potential of Canada’s world-class resource, to today’s emerging mining and in situ technologies, it has been innovation that has opened new opportunities, improved economic performance and reduced the industry’s environmental footprint.

As well, the majority of our current supplies of oil and natural gas in Canada would not be accessible without innovation. Canada’s total recoverable oil reserves is estimated at 173 billion barrels, and 170 billion of that represents our country’s oil sands resource. There is no question that future technology will also continue to drive improvements in resource recovery.

I am proud to say that Imperial, which celebrates its 150th anniversary this year, has been an early leader in oil sands innovation. We have patented two technologies that have allowed the development of oil sands reserves that exist too far underground to be mined. Cyclical steam stimulation and steam-assisted gravity drainage are key technologies still used by the industry today.

One example of where these technologies are used is at our successful oil sands operations at Gold Lake, Alberta. Although this operation has been in commercial production since the 1980s, we continue to work to improve how we develop this resource. My hope is that our greatest contribution to the Canadian energy industry will be to inspire confidence in Canadians that this huge natural resource, as well as others like it, can be developed in an environmentally responsible and economically sound manner.

Technology has been instrumental in reducing our energy consumption and greenhouse gas emissions across our company. We are doing so at our Gold Lake and Surina, Ontario sites through the use of cogeneration, a technology that allows us to efficiently produce electricity and steam at the same time. We have also proposed to increase our use of cogeneration with our expansion project at Gold Lake, as well as at our upcoming Kent oilsands mining project. There, cogeneration is expected to reduce carbon dioxide emissions for the project’s initial development by half a million tonnes a year—the equivalent of removing about 125,000 cars from the road—compared with purchasing electricity generated from coal. While incremental improvements have been made, more is still needed.

We are continuing the search for fundamentally new, more efficient and cleaner ways of extracting heavy oil from the oil sands. In fact, one of the breakthroughs technologies we are working on could substantially reduce or eliminate tailings ponds at an oil sands mining operation by not using water to separate the heavy oil from sand.

The challenge to develop the oil sands responsibly and economically is the motivation behind why we conduct our own oil sands research. We also support university research projects across Canada, including those conducted at the Centre for Oil Sands Innovation at the University of Alberta. We believe that Canadian researchers are among the world leaders in this field and are both well equipped and fully capable of taking on this challenge.

Investing in research is critical to finding cleaner, more efficient ways of developing the oil sands. That’s why, after four out of every five of our research dollars go toward developing innovative oil sands technologies. Last year, our total research expenditures were nearly $90 million. This is not a one-time investment. We maintain consistent research funding year after year and through this process work to cut back on investments in research and development. However, a market downturn and increased public scrutiny may anything require an opposite approach. They emphasize the importance of additional and continuous investment in order to bring the best technology to bear on the challenges facing oil sands development.

It is my hope that governments, academic institutions and others continue to support this effort. We must work together to increase public confidence by addressing the need of all Canadians in the issues of energy, the economy and the environment. Now is the time to make the kind of investment that will propel us forward in our journey to unlock those relations that will position our industry and our country for even greater success.
Meet five prolific inventors from Imperial who believe innovation requires as much art as it does science

By Marcia Kaye

ARTISTS OF INVENTION

Imperial is a company of ideas, innovation and inventiveness. It has to be in a constantly changing world where environmental protection, growing energy needs, social advancement and economic stability must all be balanced; there’s an ongoing commitment to devising new and better ways of doing things, whether it’s an improved engine oil that offers better fuel economy or a novel technology for safe and responsible delivery of energy from the oil sands.

Innovation, of course, requires inventors. And there’s no shortage of them at Imperial. But a successful inventor needs more than just a good idea, as anyone who’s ever watched the CNBC-TV show Dragons’ Den can attest; most great ideas just aren’t sufficiently practical, economical or marketable to ever get off the drawing board or out of the lab. But at Imperial, many ideas have passed the stages of testing, and retesting, and still more testing, to earn patents and eventually become commercial. More than 700 patents have come out of Surma Research Centre alone.

Here, we present five Imperial employees from the Upstream and Downstream sectors who have invented, or co-invented, a total of more than 50 products or technologies for which patents have been issued. While all five inventors have a science or engineering background, they acknowledge that the process of invention is just as much an art, with a little serendipity thrown in. For these inventors, whose upbringings represent these currents, “Made in Canada” has taken on a very special, and highly personal, significance.

TAPANTOSH CHAKRABARTY

As an 11-year-old dying of typhoid fever in a remote village in Bangladesh while his mother wept helplessly, young Tapantosh Chakrabarty faced a monumental struggle...
for his very survival. Not only did he survive, but he thrived, immigrating to Canada, earning a master's and PhD in chemical engineering at the University of Waterloo, and becoming one of Imperial Oil's most prolific inventors, with 25 patents to his credit—six of them in 2009 alone. "I feel I am more productive now than ever," he says.

Chakraborty, an oil sands research advisor with Imperial Oil Resources in Calgary, has been instrumental in developing several processes to extract heavy bitumen from the oil sands, dilute it enough to make it flow, and reclaim waste hydrocarbons, all toward the twin benefits of improving environmental and economic performance. His "pipeline" invention, as he puts it, is the use of a fluorocarbon polymer to line the inside of the huge carbon steel vessels in bitumen froth treatment to reduce fouling and keep operations running smoothly.

Chakraborty calls his inventions a happy confluence of science and serendipity, inspired by the beauty of imagination as evidenced by one of his idols, the late Nobel Prize-winning Bengali poet and musician Rabindranath Tagore. "I see each invention as being akin to a beautiful piece of music or poetry," he says. He adds that there is pride and joy associated with an invention—pride in "strengthening Imperial's longstanding reputation of being the leader in its field," and joy "because nobody else has thought of it."

An inventor needs creativity and tenacity. Chakraborty says, two traits he learned from his widowed mother. Although she had little formal education, there was no skill she couldn't master—sewing, knitting, painting. "And she was the best cook in the village," he says, becoming emotional at the very memory of her boundless inventiveness. She persuaded him that an education was his ticket out of poverty, so he studied hard to succeed in high school, under a mentorship headmaster who transformed the school into a centre for science, humanities and commerce and encouraged Chakraborty to think big. During his most impressive years, Chakraborty was bored by a phrase he had written in white chalk on a panel above the door of his house: "Man can work wonder." But there were more tough times ahead. As a minority Hindu in a Muslim country, Chakraborty was forced to flee to India for nine months as a refugee during the bloody liberation war of 1971. After the war, upon graduating at the top of his class with honours in chemical engineering from the Ban-}

KIM FYFE

When Kim Fyfe was growing up, she didn't want to be a scientist. She wanted to be an artist. Although an excellent chemistry teacher in high school influenced her to follow a scientific path, she realized she didn't need to abandon her artistic leanings. In fact, she brings them into her work every day.

"I think a lot of the scientific inventions we come up with is having the imagination to see the possibilities and the creativity to develop them," says Fyfe, advanced analysis team lead of the lubricant technical support section at the Sarnia Research Centre. During her 29 years with the company, Fyfe has been a part of several patents, many of them relating to the formulation of engine oils for passenger cars. Some of her groundbreaking work involved the use of low-viscosity, or easy-flowing, oil. A novel concept back in the 1990s, low-viscosity oil was almost unknown in the market, but today it's exactly

I think a lot of the scientific invention we do comes from having the imagination to see the possibilities and the creativity to develop them. //
But she says, "For me, it's not about the patent. What we're really looking for is to learn more about the field and to expand scientific knowledge. If a patent happens to come out of that, it's a bonus."

A married mother of two adult sons, Fyle says her job is all-consuming at the moment. But when she retires, she hopes to be able to devote more time to her first love—drawing.

KEN SURY

Ken Sury says that one of his most significant inventions came about through sheer naivete. When Sury first started with the company, he was told that the only way to separate the thick, sticky oil from the sand that binds it is to heat it to a high temperature, just as warming up thick peanut butter in the microwave makes it thin enough to spread. But Sury, who had previously worked for coal, steel and iron ore companies, didn't comprehend this. After all, in the iron ore business, separating the metal from the ore was always done at room temperature conditions. "Let me take a look at this," Sury said to his skeptical colleagues, who put his enthusiasm down to youthful ignorance.

Sury studied a lump of oil sands material, which looked just like asphalt mixed with sand. When he heated it, the valuable oil material separated easily from the rest, suggesting to him that mechanical energy—like a giant blender—would be a better, cheaper and more environmentally friendly method of separation than high heat. He approached a senior researcher at the Syncrude facility, who was less than impressed. "The guy looked at me like I was from the moon," Sury says. But he spent a day in the lab, and within two weeks was successfully demonstrating his new process, showing that it worked not only in 20°C conditions, but at temperatures as low as 5°C. Expected to become commercial within two years, the low-energy extraction technology, a collaboration between Sury and Syncrude, is anticipated to substantially reduce greenhouse gas emissions compared with the conventional hot water process.

In the almost 25 years since that first assignment, Sury, now a senior technical advisor to Imperial's Fort McMurray oil sands project, has been a part of 10 inventions for the company. One development that's particularly significant to Imperial is a panmic floth treatment process for oil sands that removes the need for an upgraded on-site, saving energy, time and money.
Sun's Drive comes from his patents, he says, who raised 10 children in Chennault (formerly Madras), India. His father was an insurance agent, his mother a homemaker whose education didn't extend beyond middle school. "But they believed in educating all 10 of us to the max," Suny says. "Even though they couldn't really afford it, they had every one of us educated in private schools. And today, we each have, at the minimum, a post-graduate education." Suny is a master's degree in mineral processing from Penn State, Pennsylvania.

Sury says that a great invention requires more than a single great idea. Of 100,000 ideas, he estimates that 10,000 might go to the lab, 1,000 to more extensive testing, two, or three to the field level, and one to commercial development. He believes that in order for a concept to be successful, what's needed are ideas from everybody.

"Every time we hit a snag, I gather the troops and say, 'Let's talk about it,'" he says, adding that inventing is more often than not a team effort. After he showed his coworkers how to separate the bitumen from the sand, there remained the problem of how to pump it out. Again, conventional wisdom insisted that heat was necessary. But a colleague suggested a vacuum truck, such as that used to remove sewage from sewers, along with a specific type of pump. "Lo and behold, it worked," Suny says.

When examining a problem, Suny always takes it down to the most fundamental level. "If somebody says, 'This is the best way,' I say, 'Explain to me why. Show me the science.' If the science doesn't explain it, I need to keep probing." In his incessant pursuit of the best way to do things, Sury never stops asking, "Is this the best way we can do? Can we do it better, faster, sooner? What prevents us from doing better?" It's an approach that he admits sometimes tries his wife's patience. "She says, 'Do you have to have efficiency all the time?'

JOE FEIMER

Joe Feimer often gets his best ideas not when he's working at his desk or in the lab, but when he's on his bike, alone. "I spend a lot of time on the road by myself," says Feimer, who cycles to work most days, 20 kilometres each way. "The solution to a problem doesn't always crop up when I'm really thinking hard, but when I'm relaxed and not distracted." Feimer, supply and fuels product team lead at Imperial Oil Research in Sarnia, Ont., has helped to come up with inventive solutions for many challenges in the downstream business, resulting in 15 patents. Many relate to processes for reducing the level of sulphur, a naturally occurring compound in crude. In 1999, the average level of sulphur in gasoline in Canada was 320 parts per million; now the federal government has mandated a maximum 50 parts per million for gasoline, 15 parts per million for diesel.

Feimer and his team have developed technologies to remove the natural and elemental sulphur from hydrocarbon fuel, as well as in any sulphur that a fuel might have picked up while being transported through a pipeline that also carries higher-sulphur products. The results: a low-sulphur gasoline and an ultra-low-sulphur diesel. The inventions not only served to meet Environment Canada's strict standards but led to better products for Imperial's customers. "They benefit Imperial," says Feimer, "but also society as a whole."

Feimer, who has worked for Imperial for 29 years, studied chemical engineering at the University of Windsor, then earned his master's and PhD in catalytic processes at the University of Waterloo. All of his inventions, he says, came out of a need, either mandated by government or driven by the company. "For me, the motivation is the challenge of solving a need," Feimer says. "Understanding and addressing nature's mysteries -- and seeing my ideas achieve reality -- that is what drives me."

When tackling a problem, he starts by making sure he clearly understands what the need is, works on ideas to resolve it, then begins the hard work of putting the best ideas into action to test their efficacy. Many great ideas don't survive that crucial step. "An invention is not just the idea," he says. "It's the implementator.

While Feimer values his solitary time to ponder ideas, he values discussions with colleagues just as highly. Often, he says, talking to others produces a result that's greater than the sum of the individual parts. "When I'm working with other people, they often trigger something. It's the synergy effect, where you create something that's bigger than anything one individual would have come up with."

Most recently, Feimer has enjoyed working with young people who are fairly new to the company. He's encouraged by their enthusiasm and fresh ideas. "I guess I'm sort of like a mentor now, but it goes both ways," he says. "I'm also feeding off them."

Feimer's latest challenge involves impe-
roland léauté
when roland léauté arrived in alberta as a 23-year-old chemical engineering student from france, he wasn't even aware that the province had any oil, let alone some of the largest reserves in the world. it's unexpected, then, that léauté would go on to help invent a process that is revolutionizing the way resources are recovered from the oil sands in cold lake, ab.

léauté was instrumental in developing a process called laser-css. previously, one type of oil sands recovery involved a method called css — cyclic steam stimulation — in which high-pressure steam is injected into a reservoir to make the heavy oil flow more freely. but léauté helped determine that mixing a low concentration of a solvent such as natural gas condensate directly into the steam greatly speeds up that process. laser, which stands for liquid addition to steam for enhancing recovery, is now in commercial use in 240 wells at cold lake.

while early pilot tests showed that laser-css would increase oil recovered in later cycles by 35 percent, recent field data is positive and shows a trending performance that exceeds pilot results. water usage is reduced accordingly, and co2 emissions are down by one-quarter. attempting to describe the satisfaction he feels, léauté says, “it’s like nature is working in synergy with me.”

t’s quite an accomplishment for someone who had no interest in the oil industry. léauté grew up in nantes, in northwestern france, where his father worked as a middleman between farmers and wholesalers. because nantes was bombed during world war ii, his mother had no opportunity to go to school but was determined that her children would get a higher education. after léauté did his undergraduate degree in chemical engineering, he came to study in canada. he purposely avoided going to quebec, since his chief goal was to learn english, and he earned his phd at the university of alberta in edmonton.

léauté, whose research at the time had no industrial application, might have stayed in academia if not for the late roger butler. a longtime imperial employee, butler had just invented a process called sagd, steam-assisted gravity drainage, a novel invention in 1979 that has since been widely used by industry to develop a large portion of alberta’s vast oil sands resource. butler was putting together a research group to further develop the technology and recruited léauté to the company. léauté would stay with imperial for the next 31 years. over his career he has contributed to three other patents, mainly dealing with combustion processes.

invention relies on a love of solving puzzles, a slowness of handwork, and a good dose of originality, léauté says. “that’s what we learned when we were doing our phd — to be original. to present an original solution to a problem or create a new interpretation.” another requirement to become an inventor, he says, is a large measure of gut feeling. first you integrate everything you’ve read, seen, learned and experienced, and then you start taking some risks. and knowing what risks to take comes from intuition.

“research work is much like a chef concocting a complex sauce,” léauté says. “the recipe and the timing for mixing the ingredients often require numerous trials and errors.” he acknowledges that there were so many risks and errors leading up to finding a successful process that he came close to giving up. but he persisted in starting each research initiative with a grand strategy, even if the execution wasn’t flawless. a great strategy with basic execution, he believes, will always win out over great execution of a mediocre strategy.

his motto: “it is better to be approximately right than precisely wrong!”

laser-css took more than a decade to develop, test and pilot, and put into commercial production, and required the complimentary skills and enthusiasm of everyone from the simulations engineers to the field operators. but léauté, a married father of two, is especially gratified that he was able to see the commercialization of the process before he retired in september. “it has been a long march,” he says. “but it shows that if you persevere, some of the research concepts can grow into real practical success.”

// if you persevere, some of the research concepts can grow into real practical success. //
March 24, 1989, Andy Teal was playing with the youngest of his three children on the living room floor of his home in Edmonton when he heard a news report about a tanker running aground in Alaska. His first thought was “I sure hope that isn’t an Exxon tanker.”

Unfortunately, it was an Exxon tanker – the Valdez – which ran aground on Bligh Reef in Prince William Sound. Teal, who was a member of Imperial’s emergency response team, lived in a prime location to respond quickly to a crisis in Alaska. Within an hour his pager went off. The following afternoon he was in Valdez, Alaska, plunged into the adrenaline-drenched task of responding to what was the world’s most publicized and largest marine oil spill in U.S.-controlled waters until the BP Macondo well incident in the Gulf of Mexico.

The next few months passed in a blur of 24-hour days for Teal. There was no time off. It was six weeks before he was able to return to Edmonton to see his family. On his second visit home, he and his wife packed their children into a van and drove to Alaska – that three-day drive was their vacation for the year. They spent the summer in a small trailer in Valdez then moved to a home in Anchorage for the next two years.

As shoreline cleanup advisory manager, Teal saw from point-blank range the tremendous disruption, loss and cost that accompanied a major industrial incident.

“It was a huge shock to everyone involved,” says Teal, who is now Imperial’s Upstream safety, health and environment manager. “And I think, it was the key that led Exxon to say, ‘Let’s come up with the right answer to make sure something like this never happens again.’”

Following the spill, Exxon’s senior management created a taskforce that scored the world for best practices in incident prevention, both within and outside the petroleum industry.

In 1991, after two years of study and development, Exxon rolled out to its worldwide affiliates, including Imperial Oil, a new safety, health and environmental protection framework called the Operations Integrity Management System (OIMS).

“It’s not that we didn’t have policies and tools before OIMS,” recalls Teal, a 32-year
have caused the satellite image. As head of oilfields operations for Exxon-
Mobile Canada, Scott was asked to testify last
summer before a Senate committee in Ot-
tawa that was trying to determine if it is safe
drill offshore in Canada after the BP Gulf of
Mexico blowout.

“I was able to tell them quite honestly
that because of our comprehensive OIMS
framework – which covers everything from
design and construction of wells and facili-
ties, training of employees and contractors,
Element 11 requires every operation to
carry out regular exercises to determine
how each element of the framework is being met.
Each year, the management of a particular operation – a refinery, for instance – must
form a multidisciplinary team to conduct an
assessment of how well that operation is meeting its OIMS requirements.

Says, for example, that OIMS requires
each employee on the site to have a personal
safety plan,” says Chris Hay, safety
and operations integrity manager for
Imperial’s Downtowne opera-
tions.

The assessment team will test a representative sample of employees to ensure that such
a plan is in place. What’s more, they will look to see that the plan
contains meaningful content and is being enforced to ensure it is
fully implemented and that it’s not
just boltelaper.

In addition to these annual internal assessments, every three
to five years – depending on the
site, complexity and risk associated
with an operation – there’s an ex-
ternal OIMS assessment. A team
of specially trained personnel from
Imperial Oil and other parts of the
ExxonMobile world will spend
between one and two weeks con-
ducting an overall assessment of how
well an operation is meeting its OIMS
requirements. The assessment
results in a list of improvement op-
opportunities and a numerical score.

“If I like to focus my attention on
the improvement opportuni-
ties and how significant the poten-
tial consequence is,” says Scott.

“The bigger the consequence, the
more resources I want to put into
making sure the improvement is carried out
as soon as possible.”

At the heart of the OIMS, as with every
risk-prevention program, is in
risk assessment and management. Focusing on the
sound management of risks specific to a particu-
lar operation is the key. The purpose is to
effectively to an offshore platform pumping
natural gas as it does to a service station pump
ing premium gasoline.

One of the most powerful elements of
the OIMS framework is the
Element 11, which requires assessment and con-

operations and maintenance practices and
procedures, management of change, incident
investigation and analysis, and emergency
planning. This is one of the elements of the
OIMS framework is to verify that Operations Integrity is work-

ing effectively within Imperial’s operations
will reduce the probability of an incident.

“Hazards are all around us, all the time, both
inside and outside of work,” he notes.
For example, there are potentially hundreds of
bunkers spread throughout the area. Those bunkers
are much more significant than an average
industry standard.”

“Clearly, the results indicate that we are
developing a deeply ingrained culture of
safety and protection – one in which people
will have no interest in doing wha-
exercise without a permit or falling
on the site that might constitute

“Every piece of feedback we received was considered valid,”

Says Aspen points out, the
Kearl project already has an ex-
cellent safety record, with results on an order of magnitude bet-
ter than the normal market-
construction site. The direct wage
cost alone of shutting down this
design, the overall cost, is
between $750,000 and $1 million for
the day. But Saasen believes it was
money well spent.

“I do know something as dam-
aging as shutting down work for
the day,” he says, “I think we got more
out of the point that there is
nothing more important than this site
than safety.”

Chris Hay cites similar ini-
tiations at McKee and
Flexible refineries, where pre-
emptive action was taken to prevent injury or
hazardous exposures to contractors.

“The ultimate goal is to achieve an op-
eration where nobody gets hurt,” says
Says Aspen. “With OIMS, we have a
wonderful tool for managing and its
architect, the Kearl project, needs to
establish our core capabilities and
strategic workforce, which has clear accountability to effectively
improve health and safety. The results across the
business. This is the path to realize our
visions of incident-free operation.”

Tom Davoy 19
AS Robyn Bishop puts down notes for an upcoming meeting at her St. John's office, the young accountant cannot believe how far she has come in just three years at Imperial Oil.

From the moment she was hired in 2007 after graduating with a bachelor of commerce degree from Memorial University of Newfoundland and Labrador in St. John's, she was swept up in a whirlwind of networking and learning. Beginning as a commodity tax accountant in Calgary, the Newfoundland native immersed herself in the wide range of opportunities available to new employees. One of her favorites was the Network Advisor Program that gave Bishop the chance to sign up for lunches with managers of her choice.

"If I was interested in a certain aspect of the company, or just wanted to learn more about an area completely outside my own, I could arrange to meet with a senior adviser from any department over a meal and chat in a casual, open environment," she says. "It was an amazing opportunity."

With the Hebron offshore oil project in her home province at the back of her mind, Bishop was keenly interested in major projects from the start. So she lined up and learned about Imperial's new Kettle oil sands project, and also received background on pursuing an MBA and working on a refinery site. In June 2008, Bishop jumped at the chance for a job rotation to Strathcona refinery to tackle a new field of accounting. "Imperial likes to move staff around," says Bishop. "They want to challenge you, to keep you fresh and interested."

Two years later, in June 2010, Bishop was offered the chance to return to Newfoundland as the topside project accountant for Hebron. "I love the job and I get to be back home," she says. "It's the best of both worlds."

Mentoring and job rotations are part of Imperial's Early Professional Development Program, a multi-faceted process that starts with university recruitment and continues throughout the employee's first three to five years at the company, with the objective of providing new hires with continuous opportunities for development.

The program starts every September at the blitz of annual career fairs and information sessions held at universities across the country. Unlike other companies, which often send only general recruiters, Imperial staffs its booth with employees from hiring business units who have first-hand experience with the career paths available to new hires in their field. The information sessions give interested students a chance for one-on-one time with Imperial employees. "Some of the recruiters are fairly recent hires themselves, so they can talk to students about their own mentoring and job rotations," says recruitment manager Rhonda Perle. "It helps students relate to the type of experience they could have at Imperial."
The recruitment process is what impressed Benoit Laroch, a chemical engineer from Quebec, who works at the Starmia refinery. “The person they sent for my first interview at the University of Sherbrooke was very knowledgeable in chemical engineering and refining so I didn’t have to explain from scratch what I did during my work-term experience,” says Laroch. The day before his second interview, at the Starmia refinery, he was given a tour of the city and taken out to dinner by an employee he could relate to immediately, a native French speaker, like himself, from Montreal. His interviewer the following day had 35 years of experience with the company, including time at Starmia, where Laroch began working, straight out of university, in February 2006. “It makes you feel like the people at Imperial care about what they are doing.”

The opportunity to move around within the refinery was one of the reasons he took the job. “You basically do a tour of the business and get a good overview of the entire operation,” says Laroch, who has since rotated through three different positions in four years. He now manages the production scheduling of diesel and gasoline, and organizes how those products are shipped from the refinery. “It seems the job I do should be for someone with more experience than I have. I feel lucky.”

The university recruitment program is so popular that on the basis of a student survey, Imperial Oil and the Exchangeable companies in Canada won the 2009 Student Choice Award for Best Career Fair Employer – Atlantic Region from the Canadian Association of Career Educators and Employers.

One of the biggest draw for students is the Network Advisory Program (NAP), which allows new hires and co-op students a chance to interact with peers and more senior employees in other departments. “Company representatives promote it on campus as a fun way to establish networks,” says Forster. New hires learn about what the company does, how they do it, and what career opportunities there are beyond their current work. NAP began in Toronto in 1988, in Calgary in 1999, and has since started up in various operating and office locations throughout Canada.

NAP’s quarterly events might be an informal dinner or a casual mingling activity. In the fall of 2010, a speed networking sit-down dinner had advisers moving from one table of new hires to another with every course. “By the time they finished their four-course dinner each table had the chance to interact and have significant conversations with eight to 12 different advisers from electrical engineers to refinery managers and controllers and even with Bruce March, the chairman, president and CEO of Imperial Oil,” says Susan Stank, a NAP committee advisor.

Through these events new hires meet managers who work in departments they would like to know more about and often sign up for as many as three NAP lunches per quarter. “I find I get as much out of those lunch meetings as the new hires do,” says Stark. “They learn about the various roles and responsibilities of people who have been with the company for a while.”

It makes you feel like the people at Imperial care about what they are doing.
Let's talk oil.

It's a simple word, just three letters. You put it in your car. Maybe heat your house with it. It's in makeup and lipstick. The kids' crayons are made from oil. Fuses, tape, eyeglasses, soccer balls, golf balls and shampoo. The list goes on. All derived from petrochemical building blocks.

Oil drives economies and fuels innovation. And as much as we take for granted the billions of dollars it contributes to personal and public wealth, so does it stir controversy, give rise to protest and make some people's blood boil like, well, oil.

Talking about oil can be as complicated as the science that goes into making all that petroleum-based stuff that is part of our everyday lives.

Eddie Lui likes to talk oil. Vice-president of oil sands development and research, Lui has been with Imperial Oil since graduating as an engineer from the University of Alberta in 1981. He's seen the landscape and attitudes change in a company that has been a global leader in bringing new sources of petroleum to market for 130 years.

Under the stage lights of a television studio at the Banff Centre in the Alberta Rockies in August, science broadcaster Jay Ingram has Lui on the hot seat, grilling him about the oil industry's practices and public relations, its research and innovation, its triumphs and failings.

Eddie Lui is a heavyweight in his field and the respectful grilling is part of a discussion that lends a decade-old practical bent to a two-week program called Science Communications at one of the premier training and conference facilities in the world, Banff, the heart of the Rocky Mountains. Lui, from 15 years of work on the Discovery Channel, has built a broadcast career.
around his unique ability to take the complexities of physics, chemistry, biology and psychology and weave the facts into simple, understandable and entertaining stories.

"Science can sometimes be difficult to understand. It was nice to hear something complex that's communicated well."

-Nagar Elnmieh

"Imagery is how do you take something complex and report it in a way that is more accessible to the public."

-Sandra Haney, director of communications for ProNet Canada in Vancouver, said.

"The course provided me the opportunity to evaluate my communications skills and challenge me with how I think and do science."

"It learned a tremendous amount about the activities of Imperial Oil and how they are conducting research and cross-checks of their projects with lower environmental impacts."

-Even the program faculty gave Lai and Imperial Oil its due.

"I learned a tremendous amount about the activities of Imperial Oil and how they are working toward new technologies with lower environmental impacts."

-Sandra Haney

"It was nice to hear something complex that's communicated well." - Nagar Elnmieh
CANADA REMEMBERED

Living in Mexico, renowned painter Toller Cranston fondly looks back on his travels through Canada as the country's most noted men's figure skating champion.

For nearly five decades, my illustrious international figure skating career was fraught with disappointment and failure. However, a splendid post that figure skating offered me was a passport to travel the world and the opportunity to see my own country in a way that few Canadians have.

I was a career artist well before my feet ever hit the ice. The creative sensitivity that I have possessed since childhood reinforces in my mind's eye everything that is aesthetically pleasing to me. Personal relationships and events that have influenced my life negatively have since melted away. The recollections that remain from all those years of travel are pristine and visual.

For years, I travelled throughout Canada like an exotic water bag on an enormous ice-cold pond. On my visit to St. John's, Newfoundland, I was taken by friends to Signal Hill, where Cappillone Marocou made his famous wireless reception from Europe in 1901. The landscape that I saw in the early '70s was the same the Vikings would have seen. I like to think that I share a common visual image with Leif Ericson, the famous Norse explorer, when I first witnessed the austere and surreal beauty of an enormous turquoise blue iceberg that rose dramatically from the sea in the late afternoon sun.

Moving westward to New Brunswick is Saint John, Canada's oldest incorporated city. Towns in the Maritimes are charming but Saint John, in my opinion, has no equal. The architecture is an old melange of European styles. Of note in the downtown is a gateway that men from the floor of the city center up a small hill. The two towers are both dilapidated and crooked. They stand to reveal to tourists tangible proof of the existence of some of Canada's earliest inhabitants and to dispel the global perception of Canada as a new country.

Quebec City is a magical town and the architecture there seems to be an unusual mix of French and English styles. Consider one of the city's oldest hotels, the Château Frontenac. Just like any medieval castle on a hill, it seems intentionally situated on a cliff to dominate the city's skyline. Floating in the St. Lawrence River just downstream from Quebec City is Île d'Orléans. This island preserves the rural lifestyle of years gone by with its magnificent examples of French Canadian strip farming. It seems to me that Île d'Orléans has remained virtually unchanged for centuries.

My family roots start in the Ottawa Valley, Amherst, Ontario, for us, it is the family's epicentre. Our ancestral cottage was located on the shores of the Ottawa River in a place called Marshall's Bay. As a child, I was a misfit in the environment of Ontario cottage life. Back then, I felt that I should be spending my summers practising on a skating rink, not roasting marshmallows over an open fire. This was not a happy time in my life, yet it was there that I first appreciated Canada's enormous diverse forests and abundance of wildlife. It was also there, walking upon forest paths layered in generations of pine needles, that I was able to train my ears to the sound of silence.

In early December, there is a dazzling display of Christmas lights downtown Ottawa. The city undergoes a metamorphosis to become a veritable Winter Palace. The canals in Ottawa freeze so that bus-people can skate to work. Paris, France, at this time is also splendidly illuminated with Christmas lights, but if I were to make an aesthetic choice between the two, Ottawa would certainly come out on top. Its beauty in winter is infinitely more enchanting and original.

For years and years, I performed in Winnipeg. While in Winnipeg, I always made a point of meeting myself to the beauty and architecture of Wellington Crescent, a wealthy residential street in the heart of the city. It is infinitely more like the Champs-Élysées in France than a residential Canadian street. Magnificent homes abound with enormous lawns, many with the Assinibine River over an open fen. This was not a happy time in my life, yet it was there that I first appreciated Canada's enormous diverse forests and abundance of wildlife. It was also there, walking upon forest paths layered in generations of pine needles, that I was able to train my ears to the sound of silence.

In 1988, Calgary was host to the Winter Olympics. I had two jobs at this Olympics. One was that of commentator for the figure skating events for CBC and the other was to perform on ice outside during the closing ceremonies. The energy and enthusiasm of the 12,000 volunteers was electric. That same energy permeated the very air of the Games. The style and choreography of the opening and closing ceremonies had absolutely nothing to do with the European sophistication of former Games. The naturalness and honesty of the two shows and their spectators made me feel very proud to be Canadian.

Many International Olympic Committee members that I know personally confessed they had never seen that kind of enthusiasm in any of the previous Games. This was the very best that Canada could offer the world. I felt humbled to be a Canadian.

In the late '70s, I started on my own skating show. The on-and-off experience was thrilling, yet our mode of transportation from rink to rink was anything but luxurious. Our glamorous stretch limousine was, in fact, a decrepit school bus. On one seemingly endless journey, the "limo" spent 16 hours climbing and descending the Coast and Rocky mountains from Vancouver to Calgary. A veritable chorus of complaints from cast members came back from the back of the bus. I, on the other hand, remember descending from the great heights of the mountains to the valley floor below, hypnotized by the magical beauty of an enormous slate grey sky and thousands of lemon yellow aspen trees dancing in the afternoon wind. For my cast members, the trip was little more than torture. For me, it was a visual education as to how monumental and extraordinary the Canadian landscape can be.

A turning point in the global perception of Canada happened just recently in the winter Olympic Games in Vancouver in 2010. The drive to the Olympic site in Whistler is on the most beautiful highway in the world. Nobody could connect this. It was here that the top Canadian athletes vied for and won more Olympic gold medals than any other country. Historically, this has almost always been an American feat. Many countries seem to revel in the glory days of the past, but I believe Canada's future will prove to be infinitely greater than its history.

I have been living outside Canada in Mexico for the last seven years. While I adore Mexico, I also know, as any expat living there, I can do really never be Mexican. We all belong emotionally and culturally to our respective countries of origin. No matter what our personal narratives are or where we live, sooner or later we all want to return home. My time in Mexico has not yet ended, but when my spiritual roots summons me back to Canada, I will return with a great sense of pride and joy for the country I truly love.
RESEARCH HAS ALWAYS BEEN VITAL TO IMPERIAL

The value of research can be traced back to the company's beginning.

Without the help of research and innovation, Imperial Oil may have never gotten its start. In its early days, the company’s top seller was kerosene, an oil product used primarily to illuminate lamps. Discerning shoppers looked for kerosene that would burn brightly with little smoke or odor. The Canadian product, Imperial refined, was reliable, but it came with a significant drawback - it had a skunky, sulphurous smell.

Fearing they might lose their market share, Imperial's founders worked quickly to upgrade their kerosene. They learned that smoke could be reduced through improved refining and that kerosene would burn brighter and cleaner using lamps with flat wicks and perforated burners, which they imported from Austria for the Canadian market. The problem they couldn't solve was how to remove the pungent high-sulphur odour that gave Canadian kerosene its nickname “skunk oil” and made it no match for its competition, a sweeter-smelling product out of Pennsylvania.

The company, determined to rid its kerosene of its foul smell, hired German chemist Hermann Frasch in 1894. After years of experimentation, his deodorization process became Imperial’s first invention. It was a research start, but it wasn’t until automobiles and airplanes entered the picture that the company initiated a formal program of research and development, the first of its kind in the industry.

The program began in earnest in 1924 when Imperial hired Dr. R.K. Stratford, a research chemist out of Brantford, Ontario, to form a one-man research department. When he arrived at the Sarnia refinery, he was not impressed with what was waiting for him. The laboratory equipment, he said, was “of the most primitive type.”

It was clear that corporate management understood the value of research from early experience but they had no precedent for the new role they created for Stratford. Large to his own devices, he began to use scientific methods to develop improved products and processes. By 1928, he had established a small department with a formal mission to encourage research that would be attractive to both the company and the individual scientists. By the time he relinquished his role as research director in 1951, he had expanded the department into an 83-person technical and research group, patented some 30 petroleum products and processes, and supervised the development of countless other inventions. In fact, 14 of the processes developed during his tenure have since been noted as major industrial achievements.

Today, more than 150 scientists, engineers, and technologists work at the laboratories in Sarnia and Calgary to conduct research into all aspects of the company’s business. At the Sarnia laboratory alone, the company has taken out more than 360 patents and made a number of technological breakthroughs that have had an international impact on today’s petroleum products and processing.

The Calgary research centre, located at the University of Calgary, is considered one of the leading oil and gas research facilities in the world. Imperial has held more than 160 upstream patents since 1981, including the first patents on cyclic steam stimulation and steam-assisted gravity drainage, two key processes used across the industry in heavy oil recovery. Today, those inventions are continually being refined at the centre to improve productivity, environmental performance, and economic efficiency. At the same time, the search for breakthroughs in new oil sands technology continues with an ever-increasing focus on environmental protection. For example, one of Imperial’s latest patented technologies will help produce a barrel of oil sands bitumen with less greenhouse gas emissions, equal to that of the average U.S. imported barrel of crude.

In this issue of The Review, we are pleased to profile a few of our researchers who, through their persistence, creativity, and focus on scientific discipline and study, have developed many of the company’s game-changing technologies. Their work highlights the importance of new ideas and the value of a company that encourages research professionals to think outside the box. Their success is also a testament to the men and women who started it all.

What Stratford created and fostered in his time was a favorable research environment, one that balances initiatives designed to meet the short-term needs of the business with long-term ventures that satisfy the creative, exploratory spirit of the inventor. He understood that both objectives contribute to a strong company and have a positive impact on consumers and society. And it is this balanced mandate that still attracts and motivates Imperial’s high-quality research professionals to excel today. - Catherine Transide