

The apprentice: Veronica Meyers, an electrician apprentice for West Fraser Timber; the average age of an apprentice in Canada has gone up to 27

SPECIAL REPORT

The future of jobs

More than a million Canadians are searching for full-time work, but employers complain they can't find the people they need to survive and expand.

Maclean's special report, the second in a series, reveals the hottest jobs, where to find them and what the country needs to do to solve the skills crisis.

PHOTOGRAPH BY CHRIS BOLIN

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Can changes to the immigration system really solve the worker shortage?

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ECONOMY

FILLING THE GAPS

Why relying on immigration as a quick fix for the skilled labour shortage may end up hurting immigrants and employers alike

CANADIAN EMPLOYERS WILL soon have to pay a \$275 processing fee for every new staff member they want to bring in under the federal Temporary Foreign Worker Program. It sounds like a fairly token amount, and it's meant to cover administrative costs, but the fee is really designed to discourage firms from being too eager to use the program as a ready source of cheap labour at a time when more than a million Canadians are looking for work.

It's Ottawa's latest effort to respond to the public outcry that erupted last spring when the Royal Bank of Canada outsourced some IT jobs to a foreign company, which then brought in temporary foreign workers to help move the jobs offshore. The controversy led to further questions about the program—namely, why it admitted 213,516 temporary foreign workers last year, more than three times as many as a decade ago. Even so, Ottawa has made no secret it views foreign workers—whether here on a temporary basis or permanently—as a key weapon to fight a looming labour shortage brought on by retiring baby boomers, as well as a growing skills gap that's predicted to result in more than one million vacant positions by 2021.

In recent years, Canada's immigration policy has put a bigger focus on bringing in people with specific occupational skills—everything from petroleum engineers to financial analysts—and has offered a greater role for provinces and employers in determining who gets admitted. More changes are on the way. By next year, Ottawa has promised to adopt a so-called “expression of interest” immigration model that will function as a sort of online dating service, matching would-be immigrants with firms looking to hire. Employers and provinces would be allowed to pick from a pool of applicants based on local labour-market needs. Selected applicants would then be

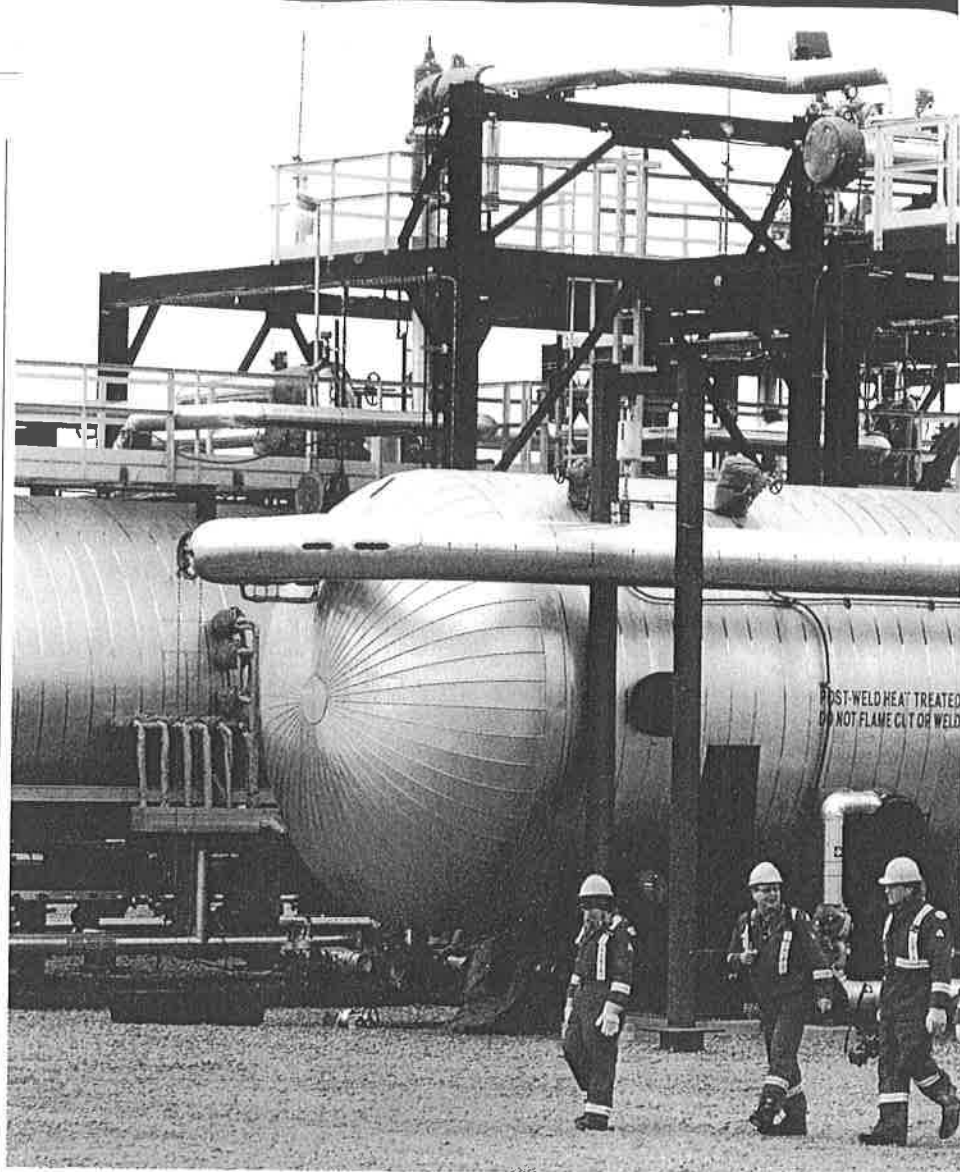
approved through the immigration system.

While it sounds like an elegant solution to a pressing problem, it's a controversial one among experts, who argue that relying on immigrants to fill vacant jobs isn't nearly as straightforward as it seems. Indeed, it's a policy Ottawa has tried in the past with little success. Immigrants, just like natural-born Canadians, are free to do what they want once they're here, meaning there's no guarantee they'll stick with the jobs they were brought in to fill. Moreover, critics warn there could be a host of unintended consequences if immigration is treated as a way to create a job pool instead of the nation-building exercise many think it should be. “We can't use the Temporary Foreign Worker Program like an immigration program,” says Jenna Hennebry, the director of the International Migration Research Centre at Wilfrid Laurier University. “And I don't know that we can use the immigration program like an employment agency either.”

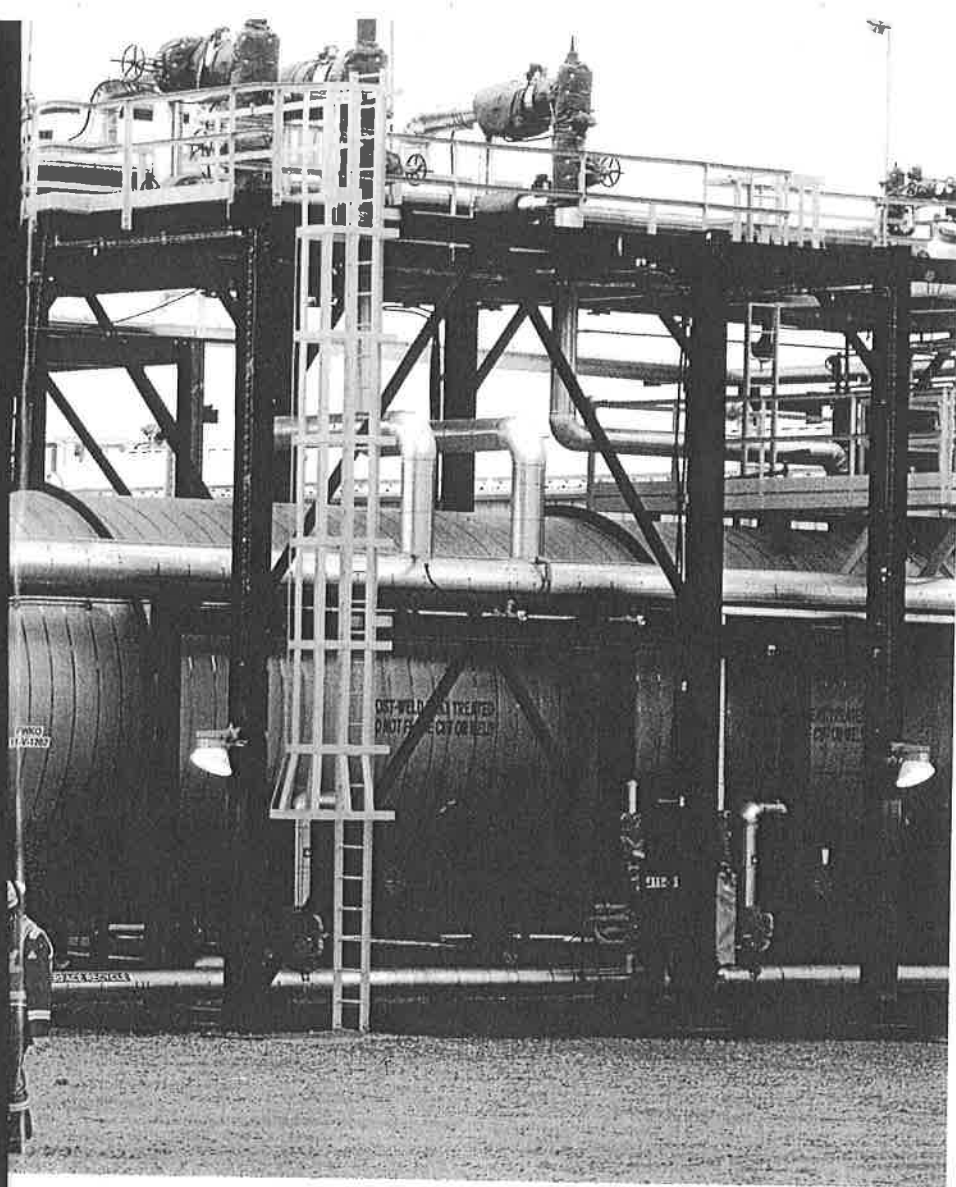
There were 82,765 economic-class immigrants granted permanent-resident status

last year, another 27,541 family-class immigrants and 11,540 refugees. Though the exact mix fluctuates from year to year, there's been a discernible shift in favour of economic-class immigrants since the late 1990s, largely at the expense of those immigrants being let in so they can be reunited with their families. But the numbers tell only part of the story. Within the economic-class category, Ottawa has become much more selective in the way it vets applications. Since January, it has placed a much higher focus on language proficiency, a key indicator of how well new immigrants will fare in the job market, and on professional skills that are equivalent to those sought in Canada. “We have traditionally been a country that just passively accepts applications,” Prime Minister Stephen Harper told Global News last December. “We are now trying to shape those immigration applications and process them in a way that will serve the labour-force holes that are emerging.”

It's not the first time Ottawa has looked overseas to try to fill jobs. Up until the late



TODD KORO/REUTERS



Help wanted: Retiring baby boomers and a growing skills gap are fuelling a labour shortage, particularly in places like Alberta's oil patch

A more troubling trend has been a three-decades-long decline in the performance of immigrants in the economy relative to natural-born Canadians. While new immigrants were twice as likely to be university graduates in 2006, they were also 2½ times more likely to be working in low-skilled positions like sales clerks or truck drivers, according to the study Ferrer co-wrote. Two of the oft-cited culprits for this trend are greater numbers of immigrants coming from parts of the world where French and English aren't spoken, and the challenge of persuading employers to recognize foreign credentials. "I see all these medical doctors from China who have Ph.D.s and master's degrees in medicine," says Jean Wang, a career practitioner at the non-profit Centre for Newcomers in Calgary. "They come here thinking they are going to be a doctor. But that's not true."

Ottawa's new "expression of interest" approach is supposed to overcome these failings. Because provinces and employers will only be picking those highly skilled economic immigrants they actually want to hire, it's argued most will arrive here with good jobs waiting for them, speeding the integration process.

Those who work with new immigrants, however, say their poorer performance in Canada in recent decades is due to more than a lack of job opportunities. Amy Casipullai, the senior coordinator of policy and communications at the Ontario Council of Agencies Serving Immigrants, says many suffer because they are "racialized" and aren't easily accepted into communities or the workplace. "The problem is that most government investment in employment programs is all focused on how to build a better immigrant rather than addressing some of these systemic issues," she says, adding that well-adjusted new immigrants are far more likely to be successful economically. Others note that while the government is focused on using immigration to fill vacant jobs, federal budget cuts have simultaneously gutted many of the programs that are supposed to help these people settle into Canadian life.

The challenge, then, is balancing Canada's appetite for qualified workers with the needs of immigrants themselves. Access to a good, high-paying job is important, but the key to solving the skills gap may be making sure new Canadians thrive in those positions. If not, the country's labour woes will be that much worse. **CHRIS SORENSEN**

1980s, Canada's policy for economic immigrants had been similarly occupation-focused. But it was later abandoned in favour of an approach that focused on more general attributes like education and

overall experience. One reason for the shift, according to a paper co-authored last year by Ana Ferrer, an associate economics professor at the University of Waterloo, was that it was nearly impossible to get reliable

labour-market data to determine where workers were actually in high demand. Just because employers claim they can't find qualified workers doesn't mean they don't exist. The jobs themselves may be undesirable, pay too little or offer too few benefits. It's a task that hasn't gotten any easier given the decision two years ago to scrap the mandatory, long-form census. "I'm a bit worried about creating a system to respond to our labour market when we don't

have a system to identify real, acute shortages," Hennebry says. She adds that Canada's relatively high unemployment rate coupled with a growing number of job vacancies suggests a

problem other than too few workers. "What we have are jobs that aren't attractive to Canadians for a variety of reasons—everything from wages to health and safety."

Not to mention proximity. It has always been difficult to direct immi-

grants to the parts of the country where they are needed most—many gravitate to Montreal, Toronto or Vancouver. The Provincial Nominee Program was created in 1998 to address this by letting provinces nominate potential candidates. But studies have shown a wide variation in the ability of provinces to retain new Canadians after just a few years, with Alberta and B.C. enjoying the most success and Atlantic Canada faring the worst.

In 2006 immigrants were twice as likely to be university grads but 2½ times more likely to have low-skilled jobs

TRADES

It's not such a dirty job ...

The demand for skilled trades workers is on the rise, and the pay couldn't be better

GROWING UP IN Thornhill, Ont., David DaCosta learned from a young age two facts about his father, an industrious Portuguese immigrant: he was a sheet metal worker, and he didn't want his son to be one too. It was hard labour, day after day, year after year. At his parents' urging, DaCosta attended Ryerson University in Toronto in pursuit of a bachelor's degree in radio and television arts. But he was miserable and eventually quit. Another career had caught his attention—and it was in the skilled trades.

This was different from the body-crushing job his father endured, though. DaCosta, 24, pursued mechatronics at Toronto's Humber College. "It's automation," he explains of the emerging trade, which might be used to build factory lines, robots or even roller coasters. "It combines mechanical and electrical knowledge and programming." When DaCosta made the switch, his parents supported him because they recognized he'd be much happier. But, he says, "they didn't really understand it."

Like DaCosta, many more young Canadians are going to university rather than trade school, often at the behest of others,

who still see skilled labour as the work a person does "if you [aren't] that smart," says Donavon Elliott, president of Skills Canada. The stigma has long been that these jobs are physically taxing, dirty and dangerous, and in some cases, they still are. Indeed, 184 people were killed in construction in 2011, and another 75 died while working in mining, quarrying and oil wells—these are the most hazardous jobs of all. That makes trades a tough sell to young people who have gotten used to the idea of joining a knowledge economy that revolves around cushy desk jobs and computer work.

But occupational health and safety standards have become the No. 1 priority of employers, Elliott notes, and the money to be made in the trades has skyrocketed.

Tradespeople earn upwards of \$10,000 more per year than the average Canadian annual salary of \$40,000, according to the Canadian Apprenticeship Forum (CAF). Plumbers in Edmonton take in \$56,290, and masons in

Toronto earn \$51,000, for example. More often than not, says Elliott, after obtaining their provincial designation, "everybody's making six figures." Adds Sarah Watts-Rynard, executive director of CAF, "\$50 an hour is not an uncommon wage rate, once you get up into doing some of those highly demanded trades."

That financial incentive is due to the massive shortage of workers in the skilled trades. And it's only going to get worse as baby boomers start retiring. By 2031, Canada will be short 2.7 million workers, reports CAF, and this will affect the country's economic growth, increasing the cost to consumers for services and delaying infrastructure projects, including roads and hospitals. More specifically, within the next decade, Canada will need to fill 319,000 construction jobs, 5,850 in oil and gas, 112,000 in mining and up to 77,150 in automotive.

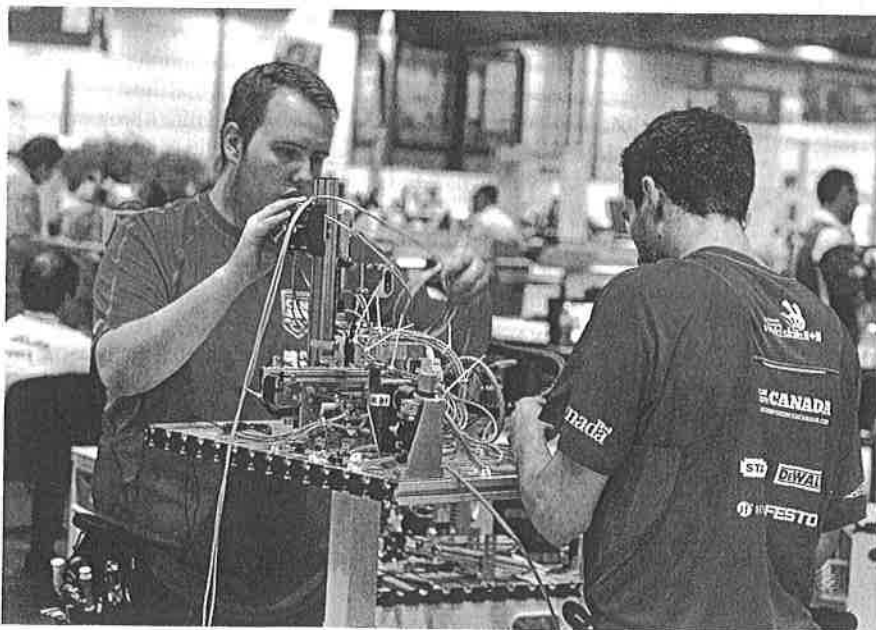
The situation is getting more troubling as the demand for tradespeople spikes in various

provinces—with oil and gas booming in the west, for instance, and offshore drilling and shipbuilding booming in the east. "To deal with heavy demand in the past [was] to say, 'Well, just go and get people from another part of the country,'" explains Watts-Rynard. Now, Canadian companies can't do that as readily. "That's where the situation becomes more dire. People are saying, 'There's no place to go and get more tradespeople from our traditional sources,'" she says.

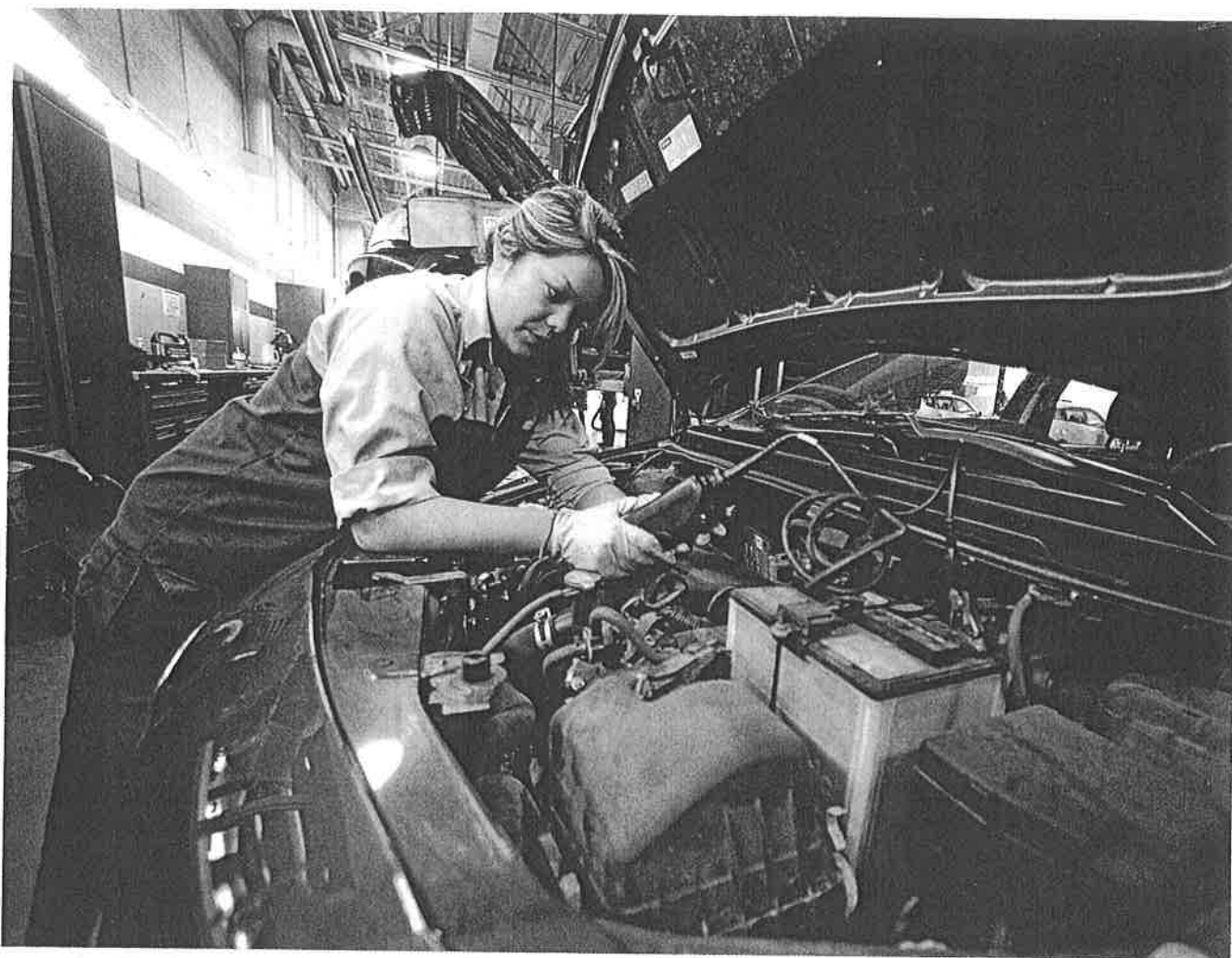
Which is where DaCosta and his peers come into the picture—the key to this country's future: "Tradespeople are the ones who are building, maintaining and operating the infrastructure that we all need to live," says Watts-Rynard. Their importance has become more apparent as their numbers grow more scarce. In this way, for young people joining the trades—either traditional ones such as sheet metal working or new ones such as mechatronics—there is a new-found pride in their job of choice.

DaCosta experienced it first-hand in July, when he travelled to Germany to compete in the WorldSkills International competition. He and his teammate went up against 32 competitors to build a complex assembly line—10 feet wide and five feet high, capable of sorting, capping, flipping and tagging—in four days. They didn't medal, but DaCosta was thrilled about the challenge. And even better, his parents were there to cheer him on. **CATHY GULLI**

'\$50 an hour is not an uncommon wage rate, once you get into doing some of those highly demanded trades'



Trade-off: Practising mechatronics, which combines mechanical and electrical programming



Fine tuning: While there are some incentives in place for both employers and apprentices, critics say more are needed to help meet the rising demand

EDUCATION

Training places

Why the apprenticeship system is now one of the biggest obstacles to getting skilled workers on the job

WHEN HE WAS an auto mechanic back in Jamaica, Laitmore Ellison would never have considered interrupting his work to sit in a classroom. When he became an automotive service apprentice in Canada this year, however, he realized schoolwork was required in order to become a certified mechanic. But like many apprentices, Ellison, 29, couldn't afford to live on Employment Insurance while taking eight continuous weeks off for school. "I have bills to pay, so I can't really take a break and take school for two months," he says. "I've got to go one day a week."

Ellison found a program at Mohawk College that allows him to do just that—study one day a week and keep his apprentice position at a Canadian Tire in Dundas, Ont. He's lucky. The majority of polytechnics and colleges that teach apprentices do so in "block release" form, which demands students attend conventional full-time classes for eight-week chunks—one in each year of their three- or four-year program. (The rest of the time is spent on paid, on-the-job training.) That doesn't suit all apprentices, many of whom are now entering the trades as adults rather

than recent high school graduates. The average age of entry of an apprentice in Canada has crept up to 27, according to Polytechnics Canada, an association of the country's leading public colleges and polytechnics.

It may seem like a minor quibble, but labour advocates argue that it is one of many obstacles littering the path taken by Canadians who wish to enter the skilled trades, which are suffering from a chronic shortage of workers. These represent over 300 professions in fields as diverse as cooking, hairstyling, welding and manufacturing. While certification is voluntary in some areas, it's mandatory for most positions in which safety is a concern, but also for some in which it isn't, such as hairstyling.

Getting more skilled workers on the job is more complex than it appears, say industry advocates. There's actually no shortage of apprentices in Canada—over 400,000 are registered. In fact, more are entering training programs in the skilled trades than ever

COLIN MCCONNELL/TORONTO STAR/GETSTOCK

before. What is slipping, however, is the completion rate. Fewer than half of apprentices actually complete their programs, according to labour statistics. One of the issues, say some analysts, is the onerous classroom requirement, which may be causing well-intentioned apprentices to be lured away to other kinds of work.

But the notion of doing away with big blocks of classroom time doesn't sit well with everyone. Brian Moukperian, the dean of the school of transportation at SAIT Polytechnic, disputes the idea that students can adequately absorb information about a car's engine if they're only in class one day a week. Some apprentices also have the option of seeking the classroom portion of their training from private teachers, or even online.

What most industry experts can agree on is that despite strong demand for skilled labourers, employers don't have adequate incentives to train them, and apprentices don't have adequate incentives to finish their training.

The government does offer some incentives. Registered apprentices can apply for a federal taxable cash grant of \$1,000 per year, up to a maximum of \$2,000 per person, upon finishing their first and then their second years in trades that have been designated as apprentice industries by a certain number of provinces. Apprentices can also apply for a federal completion grant of as much as \$2,000 after they get their journey-person certification. Most provinces also offer some form of funding.

But advocates say that's just half of the problem. Many employers are reluctant to take on apprentices, who in turn struggle to find on-the-job training—which represents about 80 per cent of the education they need to get certified. Only 19 per cent of employers are investing in on-site employment training, according to a survey by the Canadian Apprenticeship Forum. For employers, offering training isn't always easy. Take auto-repair technicians, most of whom are paid a flat rate per job. They earn the same pay whether it takes them three or five hours to complete their work. They have little motivation to spare half an hour to show an apprentice the ropes, according to one mechanic at a large Ontario garage.

The majority of the apprentice-training burden in Canada is shouldered by small

and medium-sized businesses, many of which don't have HR departments to help manage such issues, points out Sarah Watts-Rynard, executive director at the Canadian Apprenticeship Forum.

Polytechnics Canada has called on the government to institute financial awards to employers whose apprentices finish their programs, and to create a requirement that companies bidding on Crown contracts employ apprentices, among other measures. "Since apprentices are considered 'employees' instead of 'learners,' they are not eligible for the same government financial support programs offered to university and college students, and the apprenticeship support programs that do exist are simply inadequate," the group contends.

In the 2013 budget, the government announced it would follow some of these recommendations, reallocating \$4 million over three years to increase apprenticeship opportunities and adding incentives through the use of federal government contracts.

The decline in certified, skilled trades-

Over the last 11 years, Canada has produced

41,000

new plumbers and welders and



1.1
MILLION

humanities, social sciences and behavioural sciences grads



Another serving? In its 2013 budget, Ottawa said it would boost incentives for apprenticeships

people will only become harder to reverse as the years tick by, warns Nobina Robinson, chief executive officer of Polytechnics Canada. "The nature of this learning is you can only learn from a journey person" in many trades, she explains. "If you are not certifying enough of these people, and if they don't have their certificate of qualification, who will train the next generation of workers?" **SARAH BARMAN**



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RESOURCES

Living off the land

Hundreds of thousands of resource jobs will be up for grabs. The challenge: finding willing and able workers.

BY THE END of 2009, it looked as though the sun had set on Canada's once-mighty forestry industry—a gutted workforce, hundreds of empty mills scattered across the country—and in Prince George, B.C., Terry Tate was training pink-slipped mill workers for jobs in other sectors. “We lost, just in the north alone, a dozen operations,” says Tate, project coordinator for the Northern Skills Training program. The industry shed 100,000 people across the country and closed 400 mills between 2003 and 2009.

Today, Tate is helping forestry companies

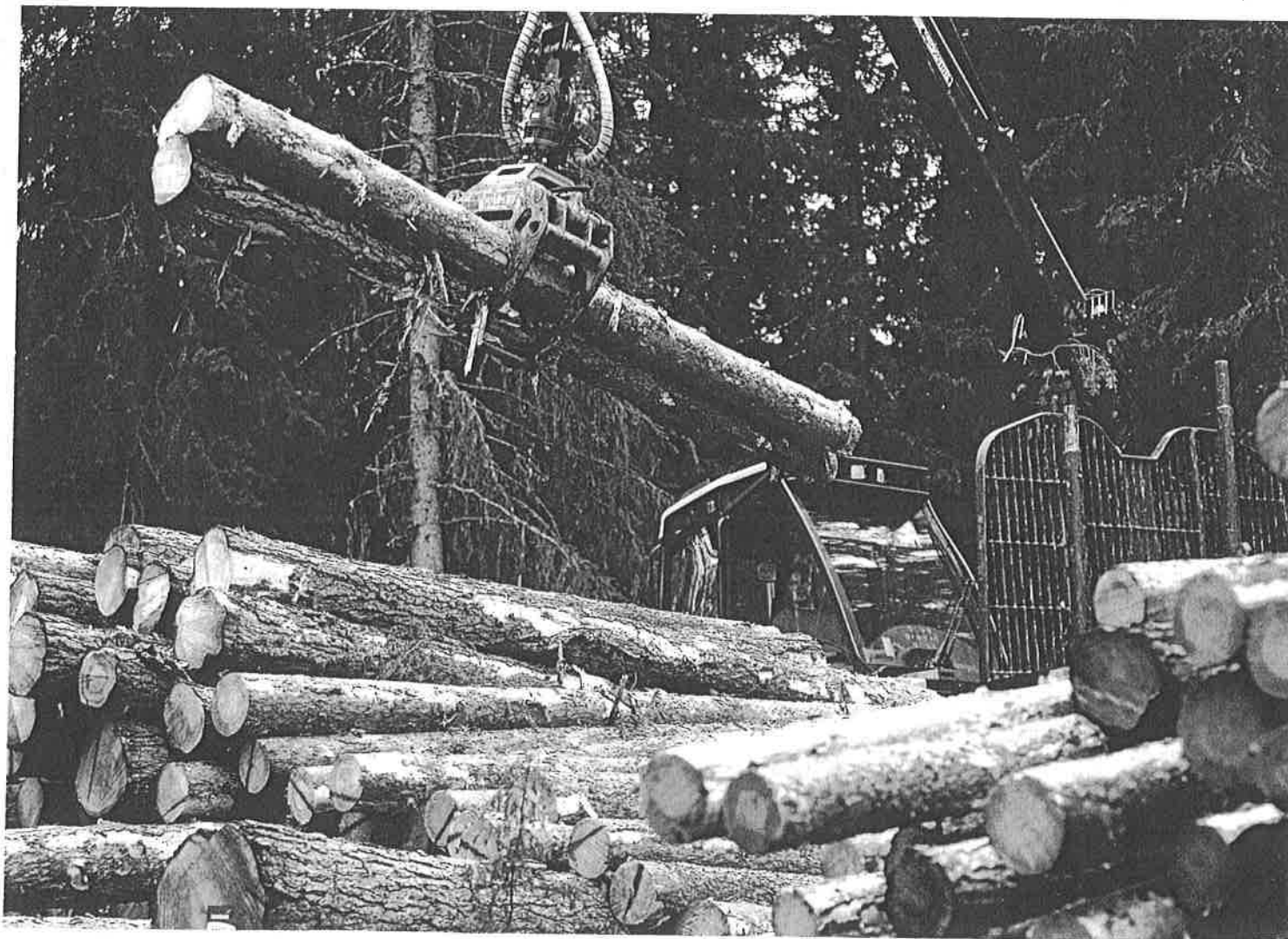
fill jobs that are going begging. “We did a very good job of convincing everyone that the industry is dying and, consequently, forestry programs got cut. People started focusing on high tech,” Tate says. “Now we’re trying to convince people we’re not dead.”

As the U.S. housing market, which makes up a crucial 65 per cent of exports, picks up, forestry companies are hiring again. It’s a revival mirrored across Canada’s once-troubled resource sector. Despite a modest downturn currently, miners predict \$140

billion of new mining investment in the next five years in Canada. And last year was the largest harvest on record for Canada’s agriculture industry, worth an estimated \$53.4 billion, up seven per cent from 2011—growth that’s expected to continue as demand in emerging markets rises. All that is expected to lead to healthy job growth.

The resource industries have long been important employers: 153,000 people work in forestry, 235,000 in mining and 2.1 million in agriculture and food. And while prospects for growth look bright, companies also face an onslaught of retiring baby boomers. That massive demographic shift will leave hundreds of thousands of jobs up for grabs—jobs that, thanks to dramatic changes in technology, will require an increasingly skilled workforce.

Industry groups have launched PR campaigns aimed at convincing young workers to think about careers in forestry, mining or agriculture. But selling the “good news story,”



Knock on wood: Logging operations, mills and wood-product manufacturers expect to hire 40,000 to 120,000 workers by 2020

in the words of one industry executive, to a shrinking labour pool that's skeptical of what these traditional industries have to offer, is an ongoing challenge.

"I'VE GONE INTO schools and spoken to students, and you see the glassy eyes," says Tate: "Yeah right, forestry. My dad was there. He got laid off. Why would I go there?" The answer for many job-seekers is that logging operations, mills and wood-product manufacturers expect to hire between 40,000 and 120,000 workers by 2020, depending on the growth of the U.S. and Canadian economies. Over that period, one-third, or 53,000 forestry workers, are expected to retire.

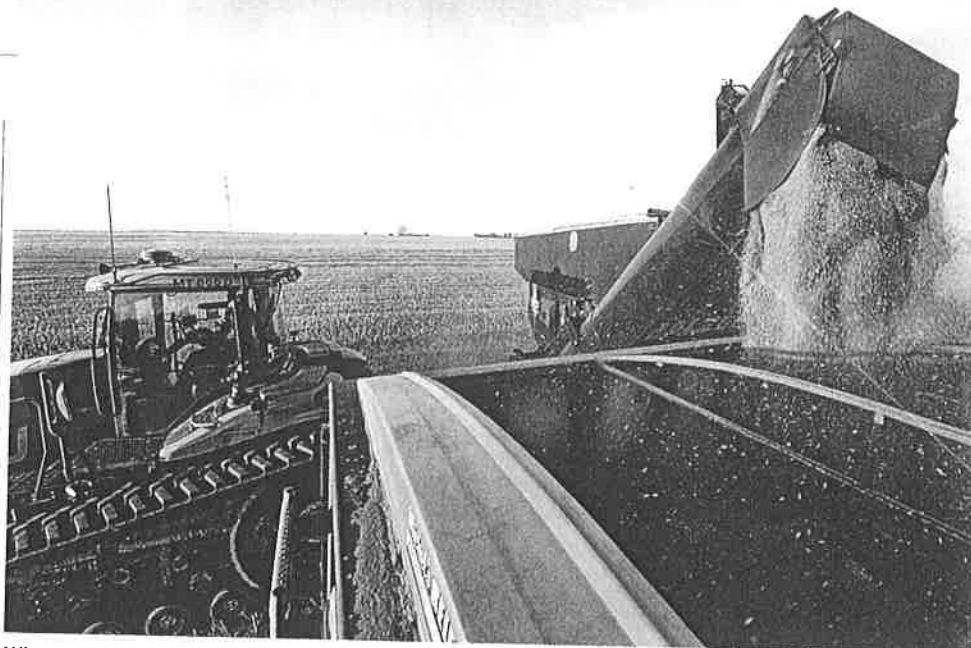
The industry in Canada, still home to some of the world's biggest forestry firms and worth \$57 billion, plans to generate \$20 billion more in revenue by 2020. Half the growth is expected to come from new export markets, including China and Asia, and half from new products, such as turning wood fibre into fuel, fabric and windshield fluid. More than 30 per cent of companies surveyed for a 2011 forest-products report said they expected to bring new products online in the next five years, changing the kinds of jobs in demand.

"There is a whole continuum of jobs required, from the truck driver, the person helping to sweep the floor [in a mill] and maintain the building, right through to the chemical engineers and scientists developing those new fibres and fabrics," says David Lindsay, president and CEO of the Forest Products Association of Canada. Companies also need people who can speak Chinese or Urdu to sell the products abroad, he says, and are already reporting labour shortages for foresters, engineers and senior technicians to manage the lands and direct the harvest of trees.

Still, many of the most in-demand jobs at mills remain in the skilled trades, including electricians, pipefitters and millwrights. While forestry companies operate in 12 of the 13 provinces and territories, Lindsay says the need for workers is particularly high in B.C. and Alberta, where companies compete for workers against other resource sectors.

Canfor Corporation, which shut its Rustad sawmill in Prince George, B.C., at the height of the downturn in 2009, is now hiring again at its pulp mills—at the rate of one or two jobs every week (the company's production was up 22 per cent in 2012 from 2011). But the jobs inside those mills are changing. "Companies are investing more in technology, so the equipment is more computerized, more efficient, faster," Tate says.

"People are sitting in control rooms now.



Wheat economy: One in eight Canadians is employed in the agriculture industry

They have multiple computer screens and TV screens," says Larry Hughes, senior vice-president at West Fraser Timber Co. Ltd. In that company's most modern mills, the logs are scanned as they come in, and a software program decides what to make out of that log. It's technology that reduces waste, increases profits and requires a lot less grunt work—and more computer literacy. "We are finding it a challenge getting skilled employees in the right places," Hughes says. He also worries about replacing high-level managers: Most at West Fraser are in their mid- to late 50s, among a group where early 60s is a typical retirement age.

As the industry's traditional labour pool shrinks, the Forest Products Sector Council is urging companies to hire more women, immigrants and Aboriginals. But recruiting a younger generation that witnessed the demise of so many jobs and would "rather make video games" is tough, notes Hughes.

Careers in forestry where demand will exceed supply, 2011-20

1. Forestry technologists and technicians
2. Chainsaw and skidder operators
3. Silviculture and forestry workers
4. Logging machinery operators
5. Nursery and greenhouse operators and managers
6. Supervisors, forest products processing
7. Supervisors, logging and forestry

Plus, forestry jobs pay less, on average, than mining or oil and gas. Average weekly earnings in May were \$1,055 in forestry, compared to \$1,792 in mining.

In return for lower pay, says Hughes, workers get a better lifestyle. Josh Sephton, a 24-year-old millwright apprentice in Fort St. John, B.C., agrees. "With oil and gas, you'll end up in the bush in the middle of nowhere," he says. "I get to come home every day and see my wife and kid."

'You see the glassy eyes: "Yeah, right, forestry. My dad was there. He got laid off. Why would I go there?"'

BEFORE THE recession, mining companies were fighting for new workers. Commodity prices were booming, and times were

good. "Mining, engineering and technology students were making very good salaries. You could not find an experienced geoscientist or mining engineer or even a skilled tradesperson," says Ryan Montpellier, executive director of the Mining Industry Human Resources Council. Then commodity prices took a hit in 2009, cutting into the workforce. Though the industry has since rebounded, it has struggled recently with a dip in commodity prices, and there are fewer jobs than at the height of the boom.

Nevertheless, the Mining Association of Canada is forecasting \$140 billion worth of new mining investments over the next five years. Over that time, 25 per cent of the workforce will be eligible to retire, threatening the mining sector with an estimated labour shortage of between 116,800 and 145,000 workers—more than half the current workforce.

"Not many kids say, 'When I grow up, I'm going to be a miner,'" Montpellier admits.



It pays to dig down deep: Average weekly earnings in May were \$1,792 in mining, compared to \$1,055 in forestry

Dated perceptions persist, gleaned from movies and TV, of "the dark, dirty, dangerous mining sector. And the reality is, it couldn't be further from the truth," he says. Of the 66 jobs his organization tracks, "very few of them go underground, and those that do are operating very sophisticated, multi-million-dollar equipment and the use of robotics." Along with massive drills and GPS-controlled haul trucks, mines will require "much more highly educated, highly qualified people."

The demand for engineers and geo-scientists

will improve by 2015, predicts Ferri Hassani, Webster Chair of Mining at McGill University and a mining engineering professor. He adds he's never had a student complain he or she had been trained for a sunset industry.

Miners also face increasing regulatory hurdles, including environmental assessments. Sean Junor is the manager of workforce planning and talent acquisition for uranium miner Cameco Corp. in Saskatchewan. He predicts a jump in demand for people in all regulatory fields, from health and safety to environmental

stewardship, plus community and stakeholder relations. "There will be no projects that move forward without significant community involvement," he says.

Yet, as in forestry, some of the biggest labour holes will be within the skilled trades. Among the positions with the greatest forecasted hiring requirements are truck drivers, heavy-equipment operators, millwrights and industrial mechanics, welders and machine

operators—about 47,000 people will need to fill those roles in the next 10 years. It is by far the industry's largest labour gap, and one for which "there will simply not be enough new talent" to fill, according to a Human Resources Council report. Montpelier stresses that mining jobs pay better than many other sectors, including forestry, two-thirds above the national average of \$914.68 weekly.

"FEEDING THE NATION" is both an old cliché and a passion for Kerry Froese. "It's in my blood, it's what I am, it's what I do," says the chicken farmer from Abbotsford, B.C., who's seen his family's farm grow since the 1970s and wants to hand it off to his own kids one day. Froese is head of the Canadian Young Farmers' Forum, a national network that promotes the farming life and helps young businesses grow. (He's 36 in an industry where the average age is 54.) In contrast to the image of the poor farmer, struggling to get by as weather, pests and market prices eat into his profit, he says farming is a "decent, profitable industry—if you know your bottom line."

David Sparling agrees. "It's an industry that has a very bright future," says the business professor and chair of Agri-Food Innovation and Regulation at the University of

Greatest mining hiring needs to 2023

Top 10 mining jobs with the greatest number of projected employment openings:

| | |
|--|-------|
| 1. Heavy equipment operators (except crane) | 6,205 |
| 2. Underground production and development miners | 5,475 |
| 3. Truck drivers | 5,125 |
| 4. Construction millwrights and industrial mechanics | 5,045 |
| 5. Labourers in mineral and metal processing | 3,195 |
| 6. Welders and related machine operators | 3,070 |
| 7. Heavy-duty equipment mechanics | 2,800 |
| 8. Machine operators, mineral and metal processing | 2,680 |
| 9. Industrial electricians | 2,375 |
| 10. Material handlers | 1,765 |

Western Ontario. "Increasing populations, changing consumption and income [around the world]—there's increasing demand that looks like it's going to go on for at least a couple of decades." That's good news for the one in eight Canadians employed in agriculture and food (62 per cent of whom are self-employed), ranging from truck drivers and mechanics to veterinarians and salespeople.

Though the number of farms in the country fell 10 per cent between 2006 and 2011 to about 200,000, according to Statistics Canada, the average farm size actually grew six per cent, to 778 hectares. Sparling says the push toward larger farms is good—not only because it increases economies of scale, but it coincides with boosts in investment in new technologies and innovations, which, he says, define the modern farm. "They now have an app to help people identify pests in the field. They use drones to fly over land and look for pests." Tractors run on GPS to avoid double-spraying fields, he says. "The whole science of agriculture has become more complex." He

points to Stanton Farms in Ontario, a 2,000-head cattle farm that has its own genetics lab.

That technology will not only increase demand for people who design, build and install these systems, but also "the knowledge workers who analyze market information: when to put farm products on the market, what markets in the world are best," Sparling says.

While large operations increasingly dominate the landscape, boutique farms and organic producers are also driving job growth, finding success by choosing in-demand products and marketing locally. (The number of those farms grew four per cent between 2006-11, to 3,713).

Still, great advances in technology have yet to replace some of the dirty jobs of agriculture, the "back-breaking stuff," as Sparling puts it, such as picking fruit. "The younger generation doesn't want to do some of these hard jobs," Froese says. "It is becoming an issue to get some of that hand labour."

There's already a 10 per cent labour shortage on farms across the nation, notes Mervin

Wiseman, chairman of the Canadian Agriculture Human Resources Council. His organization expects the figure to grow by two per cent a year, and notes seasonal labour is particularly hard to find. It doesn't help that those jobs pay much less than others in the resource sector, including mills and mining. (While average family income on farms was \$127,000 in 2012, average wages for non-family employees was \$41,500 in 2006.) And seasonal jobs leave workers with only half a year's salary, driving demand for foreign labourers. Temporary foreign workers—there were more than 338,000 in 2012—are crucial to horticulture and pork production, notes the human resource council's executive director, Portia MacDonald-Dewhurst. She says some food-processing plants that rely wholly on foreign workers are reporting "extremely severe" labour shortages.

Still, the challenges do little to dampen Froese's enthusiasm. "Everybody has to eat," he says. "It's a great time to be in agriculture in Canada."

Others might add: and in forestry and mining, too. And Canadians with the right skills can have their pick of the jobs on offer.

ROSEMARY WESTWOOD

'They use drones to look for pests. Tractors run on GPS. The science of agriculture has become more complex.'

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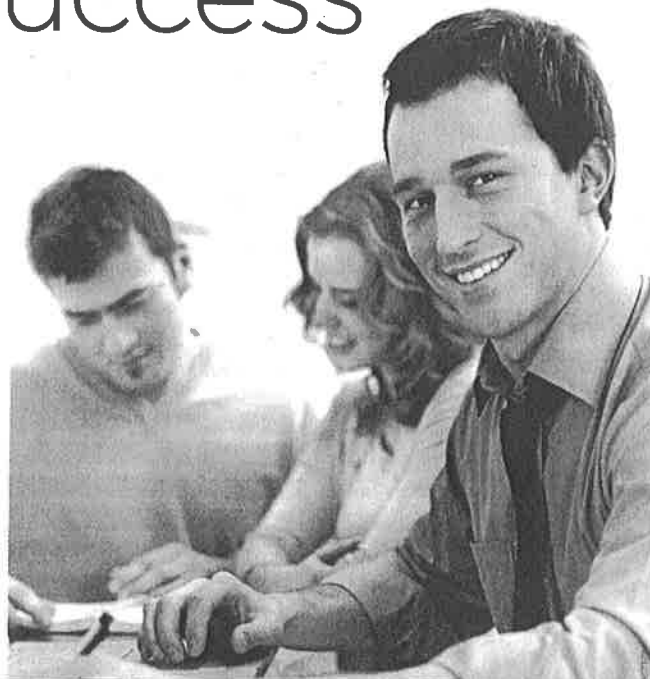
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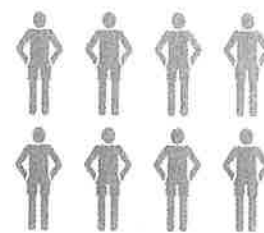
BY THE NUMBERS

The trades: where help is actually wanted

Still suffering from stigma, skilled trades companies are scrambling for workers. But the rewards can be rich.



THE DEADLIEST INDUSTRIES IN 2009 WERE MINING, QUARRYING AND OIL WELLS (75 DEATHS), MANUFACTURING (201 DEATHS), CONSTRUCTION (184 DEATHS) AND TRANSPORTATION AND STORAGE (92 DEATHS)



Nearly eight in 10 apprenticeship certificates are held by men

During the past 25 years, fewer Canadians have chosen to work in skilled trades—11.6 per cent of working Canadians in 1987 versus 9.7 per cent in 2011. The result is a shortage of workers for professions ranging from mechanics to electricians.

HERE ARE SOME AVERAGE SALARIES FOR TRADES IN ALBERTA, WHERE NEED HAS BEEN PARTICULARLY KEEN:



PAINTER
\$45,226



CABINETMAKER
\$45,886



PLASTER AND DRYWALL
INSTALLERS
\$61,997



CARPENTER
\$63,223



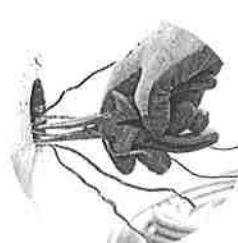
SHEET METAL WORKERS
\$66,569



HEAVY EQUIPMENT
MECHANIC
\$68,451



PLUMBER
\$71,363



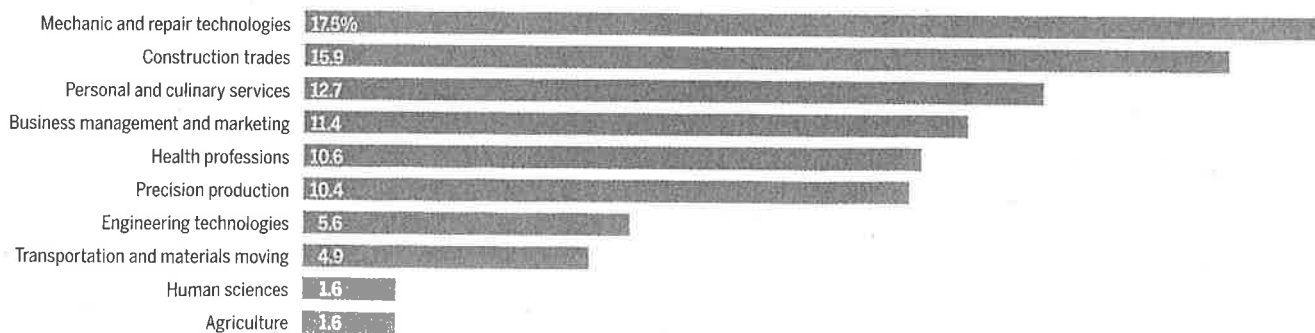
ELECTRICIAN
\$73,599



REFRIGERATION AND AIR
CONDITIONING MECHANICS
\$81,316

Back to school

The top 10 fields of study for Canadians aged 25 to 64 seeking a trade certificate in 2011:





319,000

construction workers will be needed between now and 2020, especially in the non-residential sector

TRADES REQUIRED FOR THIS KIND OF CONSTRUCTION WORK:
Carpenters, ironworkers, millwrights, industrial mechanics, electricians, plumbers, sheet metal workers, pipefitters and welders

In 2011, **12.1 per cent** of adults aged 25 to 64 had trade certificates, compared to **25.9 per cent** of adults who had university degrees

TRADES
CERTIFICATES

BACHELOR'S
DEGREE

1%

14%

RIISING WAGES

From 2000 to 2011, the average weekly wage of full-time workers aged 25-34 with trade certificates increased 14 per cent. For those with bachelor's degrees, it increased one per cent.

THE LARGEST
PROPORTIONS
OF REGISTERED
APPRENTICESHIP
CERTIFICATE
HOLDERS ARE IN :

KELOWNA

7.8%

EDMONTON

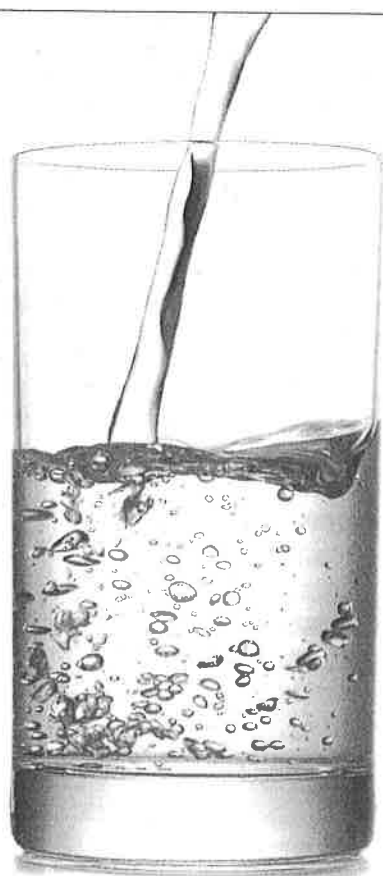
7.7%

SAGUENAY

7.2%

PERCENTAGE OF POPULATION
AGED 25-64

SOURCE: STATISTICS CANADA, 2011



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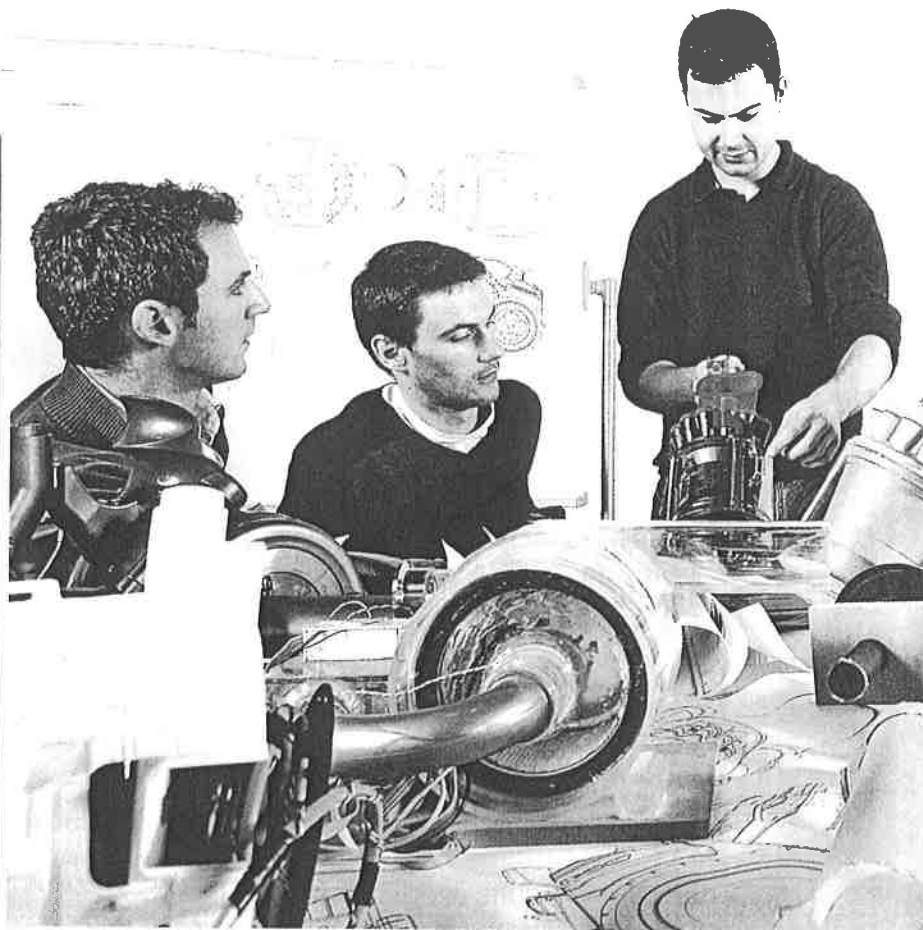
Retirements and declining immigrant participation have Canada facing a critical shortage of engineers

SIR JAMES DYSON, who's been called the Steve Jobs of home appliances, famously spent five years building 5,127 prototypes in the carriage house on his farm before inventing the bag-less vacuum cleaner. Today, he is literally a household name, and has more than 1,500 scientists and engineers working for him around the world, concentrated in the U.K., Malaysia and Singapore. "To compete globally, you need to stay ahead, and companies are recruiting," the British inventor tells *Maclean's*; his own has doubled the number of engineers at its British headquarters over the past two years, and will recruit another 100 in the U.K. by the end of 2013.

As India, China and other emerging economies churn out engineers, countries including Canada and the U.K. are experiencing a shortage—one that could become "enormous," he warns. "Other nations have realized the need for engineers," Dyson says. "We still haven't."

The problem will likely become more acute in coming years. About 95,000 engineers will retire by 2020, predicts a recent report from Engineers Canada, the body that represents the profession's provincial and territorial regulators. It also found that the skills shortage in Western Canada, driven by demands of the oil and gas sector, among other industries, is expected to grow. And Canada still isn't doing enough to promote education in four key disciplines—science, technology, engineering and mathematics, known collectively as STEM—meaning we could lag further behind. "Engineers play a critical role in building a strong economy and society," says University of Calgary president and engineer Elizabeth Cannon. "If we are really going to have an innovative culture and economy, it's imperative that we attract more."

On paper, it looks as if Canada does have enough: The number of jobs and the number



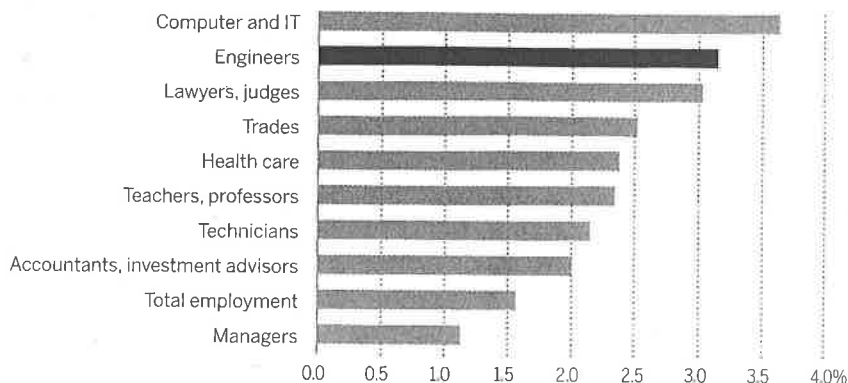
of engineers aren't vastly different. "The shortages occur when you look at things regionally and are discipline-specific," says Samantha Colasante, manager of research and diversity at Engineers Canada. Because of resource and infrastructure projects, B.C. and Alberta will have the tightest labour markets over the coming decade, the report found. Alberta's shortage is expected to be especially severe in disciplines such as civil, geological and petroleum engineering, rather than chemical or materials engineering, for example. Moreover, skill shortages will be driven largely by a coming retirement wave—and a younger generation of engineers may lack the experi-

ence to replace seasoned retirees.

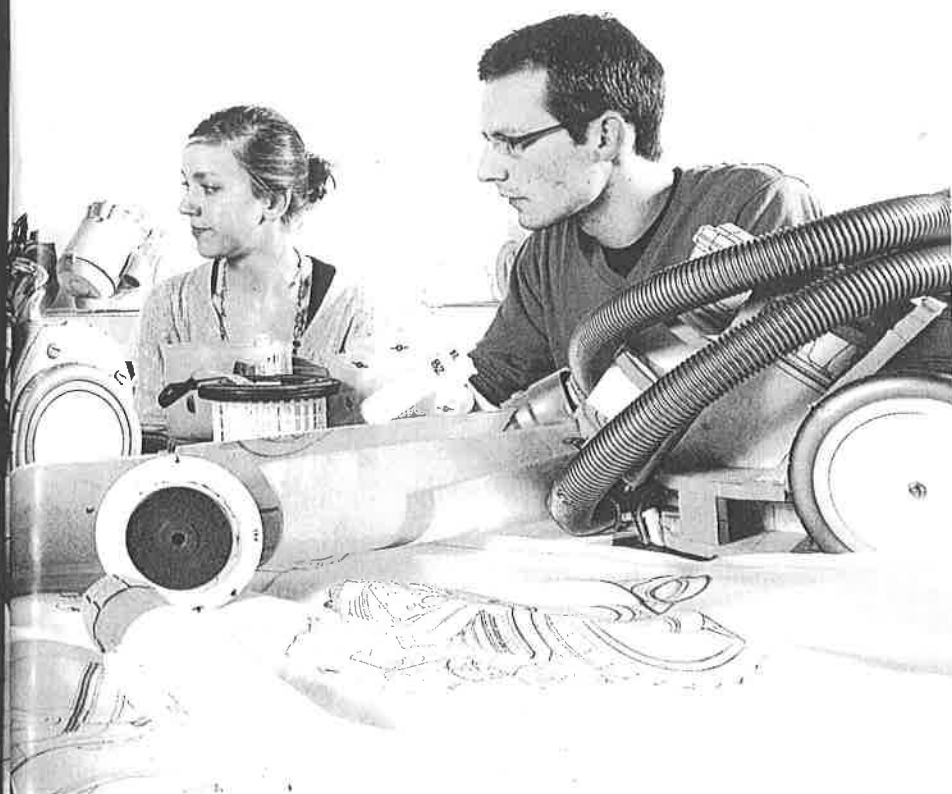
At the same time, many foreign-born engineers are now choosing to return to their home countries. "The main reason is the economy," says Tarlochan Sidhu, dean of the faculty of engineering and applied science at the University of Ontario Institute of Technology, who moved here from India in 1983. "I had two Ph.D. students who graduated two years ago—very bright students. Both went back to India and started their own companies. We're seeing more of that." Immigrants will be important to fill our engineering employment needs in the future, as they are now: In 2011, notes a recent Statistics Canada report,

High-demand occupations

Annual average employment percentage change, 1999–2010



DYSON CANADA: CHART SOURCE: TO ECONOMICS, STATISTICS CANADA



Engineers at work: Companies like Dyson are hiring, but Canada isn't producing enough engineers to keep up with demand

immigrant adults aged 25 to 64 represented just under one-quarter of our adult population, but held about half of all STEM degrees.

A 2013 report from the Conference Board of Canada graded the country on the percentage of science, math, computer science and engineering grads, and gave us a "C"—12th out of 16 comparable countries—noting that, in 2010, our proportion of graduates in these fields was 21 per cent, the third year it showed a decline. In Finland, by comparison, 32 per cent of all university graduates were from the fields of science, math, computer science and engineering; 18 per cent were engineers.

According to a study cited in a 2012 report produced for the Canadian Council of Chief Executives (CCCE), from 2004 to 2007, eight to nine per cent of all newly granted university degrees in Canada were in engineering-related fields; in China, that number jumped from 30 per cent in 2004 to 37 per cent in 2007. Canadian students "understand the importance of science and technology to Canada's future," it says, but "most are not inclined to pursue careers in those fields."

There are all sorts of reasons why STEM education in Canada, and engineering in particular, has lagged; for one thing, engineering isn't a subject that's studied in high school, so when picking a career path, many young Canadians aren't overly familiar with it. "There's not a proper understanding of

what engineers do and how they contribute to society," Sidhu says.

In some developing countries, "there's a cultural background of science and engineering," says Bonnie Schmidt, president of the outreach group Let's Talk Science, and a co-author of the CCCE report. "It's rejoiced, celebrated—not necessarily the way we talk about it here."

Things are starting to change. Another study, for Canada's Science, Technology and Innovation Council (an 18-member panel created by the Conservatives in 2007), shows improvement in some respects. From 2006-10, there was a 32 per cent increase in the overall number of science degrees granted, it says, with a seven per cent increase in the number of engineering degrees.

Universities, meanwhile, are tailoring their engineering programs to attract a new kind of student. The recent overhaul of York University's Lassonde School of Engineering, a \$250-million investment, is "perhaps the most ambitious project in Canadian academia at the moment," says founding dean Janusz Kozinski. Linked with York's Schulich School of Business and Osgoode Hall Law School, the program aims to train what it calls "renais-

sance engineers," who have a multidisciplinary approach and, according to Kozinski, "a social conscience and a sense of global citizenship." Students "are exposed to entrepreneurial education and legal education from the outset," he says, and can earn a dual degree if they choose.

The University of Calgary, too, is expanding its Schulich School of Engineering and its internship program, which now includes 60 per cent of its third-year students. Calgary has been especially active in recruiting more women into engineering, where they're still sorely under-represented. In 2001, Cannon created Cybermentor, which links young female students to established professionals in the field. "We've had up to 3,000 young women come through this program in over 70 communities across Alberta," she says.

Recognizing the need for engineers, Dyson has also launched various initiatives to draw more young people to STEM subjects. In 2011, for example, the James Dyson Foundation partnered with Vancouver's Science World to create its Engineering Lab, full of interactive exhibits that teach kids about the field.

In the long term, some see engineering emerging as one of the more sought-after degrees. Eric von Hippel, a professor of technological innovation at the MIT Sloan School of Management, who has studied basement inventors (those who create and modify consumer products, often in their spare time) points to the so-called maker movement,

'If we are going to have an innovative economy, it's imperative that we attract more engineers'

spurred by the availability of new tools such as the 3D printer. "In places like Chicago and Detroit, there are maker labs springing up with 3D printers, laser cutters" and other do-it-yourself equipment, von Hippel says.

The Mini Maker Faire movement is expanding across Canada, with events in six cities from Vancouver to Montreal. And in west-end Toronto, Maker Kids has run a non-profit workshop space for about four years: 3D printing is the coming attraction among all the inventing, tinkering and hacking activities at these venues.

"If you give kids access, it's so easy to use," says von Hippel. "That will get people excited about engineering. If they can just sketch something up and press 'print,' they'll say engineering is pretty cool." **KATE LUNAU**