

# BIOTECH

**BIOTECH INDUSTRY IS A PILLAR OF GROWTH FOR CANADA: Minister Bains p.14**

**Too much tax hurts tech sector: Conservative MP Jeneroux p.19**

**IF GOVERNMENT STRATEGY ISN'T COHERENT, it's a complete waste of money: Bloc MP Ste-Marie p.20**

**ONE HEALTH: THE TRANSLATIONAL MEDICINE p.22**

**USE BIOTECH TO SPUR A REAL ENERGY transition: NDP MP Sansoucy p.21**

## Biotech Policy Briefing

# Biotech industry is a pillar of growth for Canada



Innovation Minister Navdeep Bains

### Opinion

As our economy continues to evolve against a backdrop of rapid technological change and increased global competition, the Canadian biotech industry remains a pillar of growth for this country. It is responsible for more than 20,000 high-quality jobs and contributes more than \$6-billion to the economy, while filling the role of innovation leader and destination for investment capital.

Whether in biofuels, biomass, bioagricultural products, or biopharmaceuticals, we have world-class researchers aided by world-class infrastructure. Our

small- and medium-sized biopharmaceutical companies make up one of the larger research-and-development product pipelines in the world, with more than 400 drug candidates in the pipeline—half of which target cancer. Canada also has strengths in the use of big data analytics and artificial intelligence to identify new and better treatments to personalize care, and to develop faster ways to diagnose patients so Canadians can live longer and healthier lives.

As a committed partner to this sector, our government recognizes the need for a comprehensive approach that includes strong financial and policy-based support. That is why our last federal budget made a historic investment of nearly \$4-billion in new support for science, including the



Given its status as one of Canada's most research-intensive industries, Canada's biotech community stands to gain a lot from Finance Minister Bill Morneau's last budget, which earmarked nearly \$4-billion in new support toward science. *The Hill Times* photograph by Andrew Meade

single-largest investment in fundamental research in Canada's history. Given its status as one of our most research-intensive industries, Canada's biotech community stands to gain a lot, and rightfully so.

It's an industry featuring more than 500 companies and thousands of innovations, from healthier foods to biofuels. As such, our government has introduced targeted new programs and policies, as well as numerous strategic investments to help make the most of the opportunity in front of us.

Take, for example, our Strategic Innovation Fund (SIF), which has been expanded to include investments in biotech companies like Stemcell Technologies. Nearly 700 jobs will be created thanks to our investment in Stemcell, not to mention the advancement of life-saving innovations that will extend Canada's legacy in the stem-cell field. Furthermore, as part of the SIF program, we have just closed a call for statements of interest from consortia and networks applying data capabilities in the health and biosciences sector. This, too, will give Canada's domestic industry an advantage on the world stage, and we couldn't be happier about that.

Our capacity to respond to the opportunities presented by technological convergence is another area of interest, with a prominent example being 3D bioprinting. Our government has invested in companies doing innovative things in this regard, such as developing a 3D printer that creates human tissue on demand. The tissues generated will, in turn, allow for earlier testing and results for novel drugs and therapies, moving toward a future where animals are no longer needed for the discovery of new therapeutics. Think of the possibilities.

Finally, to sustain the momentum generated by Canadian biotech, we have established an industry-led Economic Strategy Table for health and biosciences. As one of six such tables, it represents a new model of collaboration between government and industry, designed to boost our global competitiveness and grow the Canadian economy. A final report from the health and biosciences table was recently made public, identifying specific challenges and creating a roadmap to grow our most promising companies.

Complementing this longer-term initiative, our government also recently launched Canada's new Intellectual Property (IP) Strategy. Perhaps more than any other industry, biotech relies on IP for its success. As announced, we are amending our IP laws to reduce the barriers to innovation for such companies, while introducing faster dispute resolution in federal court and initiating an awareness campaign on the virtues of IP for small businesses.

In the months and years to come, investments and initiatives like these will continue to create the right conditions for innovation, build on Canada's unique strengths in biotechnology, and create more well-paying middle-class jobs. It's good for the economy, and it's good for the health and well-being of all Canadians.

Navdeep Bains is Canada's minister of innovation, science, and economic development and also represents Mississauga-Malton, Ont. *The Hill Times*

Our government recognizes the need for a comprehensive approach that includes strong financial and policy-based support for the sector.

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# Access to capital, government red tape among top barriers cited by biotech firms, survey finds

Though the industry believes the federal government's flagship innovation program, SR&ED, is important and useful, all say it could use some tweaks.

BY JOLSON LIM

Access to capital remains the biggest challenge for Canada's biotechnology sector, even as most of its companies have tapped into federal programs offered to startup companies, according to a new report released on Sept. 24.

While the industry has shown signs of promising growth, a survey polling 208 biotechnology companies in Canada found 57 per cent of them thought accessing funds to help grow their businesses was the most pressing barrier facing the industry.

Recruitment and retaining top talent came in a distant second, with 32 per cent of companies saying it was among the most pressing issues. Regulatory challenges were cited by 31 per cent of companies.

The poll was conducted by Deloitte on behalf of industry group BIOTECCanada, in an attempt to learn more about the biotech industry, which overlaps heavily with other sectors such as pharmaceuticals, agriculture, and health-care technology. It was re-

port. More than half of all firms surveyed classified themselves as health biotechnology companies.

Andrew Casey, president of BIOTECCanada, said the survey shows the industry has made a "phenomenal jump in a short couple of years."

Although two-thirds of companies polled identified themselves as either in the discovery or emerging phase of development, and most companies said they employed between zero and 10 workers, 80 per cent of firms said they expected to grow beyond 10 employees by 2021.

"Those companies that have been really small for a long time, their science is now taking off, they're getting the investment dollars and partners, and they're growing very rapidly," Mr. Casey said, attributing growth to strong Canadian research and a strong global investment cycle.

## Accessing capital a challenge for post-early-phase firms

Mr. Casey noted a capital shortage often arises as companies crawl out of their development phase and attempt to increasingly commercialize their innovations.

"Where you're really going to make a go of it, you're going to have to get into very serious dollars," said Mr. Casey, adding that finding investors can be challenge.

For starters, biotech innovations may fly over the heads of those with money but without much scientific knowledge. For companies in health care, many



A scientist working at spartan, a biotech firm located in Ottawa, is pictured in 2017. The biotech industry is expanding, although investment issues remain, according to a recent survey. *The Hill Times* photograph by Sam Garcia

(SR&ED, pronounced "shred"), and 65 per cent had tapped into Natural Resources Canada's Industrial Research Assistance Program (IRAP).

A total of 72 of the 208 companies surveyed accessed government-facilitated programs for capital in 2017, with 47 firms using their own money, 41 from angel investors, and 26 each for public financing and institutional pharma, respectively.

Multiple industry stakeholders who spoke to *The Hill Times* said programs such as SR&ED are crucial and useful programs that help small biotech firms grow, but all said tweaks were needed.

"The SR&ED program and IRAP may be why we're so good at the invention side of innovation," said Andrew Booth, chief commercial officer at Stemcell Technologies, a Vancouver-based biotech firm employing 1,200 people. "[But] when the companies are actually successful ... you kind of outgrow these programs."

SR&ED allows companies in Canada to get a tax credit on part of the money they spend on research and development. For instance, a Canadian-controlled firm can earn a refundable credit at a rate of 35 per cent on qualified R&D spending, up to \$3-million. Anything above the ceiling, they can earn a non-refundable tax credit at a 15 per cent rate.

The program provides more than \$3-billion annually to more than 20,000 claimants, according to the Canada Revenue Agency.

However, such funding is only limited to smaller firms, something Mr. Booth wants to see changed to help larger firms that still need a boost to adequately scale-up their business.

"I think all biotech companies and all technology companies that are trying to be anchor firms in Canada that generate IP and keep IP in Canada would benefit

from that change," he said.

Removing the threshold on larger firms to continue to access SR&ED is something advocated by numerous innovation sector groups, including the Council of Canadian Innovators, which Stemcell is affiliated with.

Mr. Booth said helping startups move toward becoming large and established "anchor" firms is what's needed to make Canada a dominant global player. He noted Canada lacks a major multinational pharmaceutical company, despite the country being home to among the first major drug innovators, Frederick Banting and Charles Best. The two Toronto-based scientists discovered insulin.

Russ Roberts, senior vice-president of tax, finance, and advocacy at the Canadian Advanced Technology Alliance (CATA), also noted that some companies may stay small because it makes more financial sense to hold onto the benefits.

"Because there is a threshold, the firms will try to adjust their growth rate because you can go too fast—you're going to fall off," he said.

Meanwhile, Mr. Booth's company is one of the only biotech firms to access the federal government's \$1.26-billion Strategic Innovation Fund, which offers fundings for larger companies and projects.

## Red tape, not funding, is the biggest government-related issue

In the survey, it wasn't the amount of funding offered by the federal government that was the biggest issue, companies told BIOTECCanada. Rather, red tape resulting in long timelines and difficulty applying was No. 1, 61 per cent of firms said.

The 2017 federal budget promised to review existing business innovation programs. At the same

time, the government also promised a review of SR&ED.

Mr. Casey and Mr. Roberts both noted significant differences between SR&ED offices in Canada in how applications are reviewed. The program is administered by the CRA.

"We've seen the fundamental issue has been the variability between offices and on the interpretation [of applications] ... That commentary is still occurring," said Mr. Roberts.

"The administration of the program is done regionally. It differs from region to region to region," Mr. Casey said. "It would really make some sense for the federal government to look at it."

Mr. Roberts said the problem stems from a decentralized management of such offices by the CRA, while recent efforts in the last half-decade to improve oversight hasn't seemed to eliminate those problems.

"They have different opinions but different tolerances as to how much support you have to have," he noted.

In addition, Mr. Roberts said the agency's auditing has produced headaches, forcing firms to second guess whether they're filing their paperwork correctly, resulting in them devoting more time and resources to meeting their requirements.

He said a pattern emerged in recent SR&ED opinion surveys done by CATA, finding those who have been audited were less likely to have warm opinions about the program. He said the changes to the CRA management about a decade ago resulted in more stringent auditing.

"The audits have not been going well for companies, even if they've been filing good claims for a number of years," he said. "If you're audited, it's going to be an interesting experience."

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*The Hill Times*



Andrew Casey, president of BIOTECCanada, says it was a pleasant surprise to see signs of growth for the industry, despite continuous concerns about access to capital. *The Hill Times* photograph by Andrew Meade

leased in conjunction with Global Biotech Week, Sept. 24 to 30.

Biotech can generally be defined as the commercial ventures stemming from scientific breakthroughs related to the study of living organisms and life processes. It can range from new crop blends more resistant to climate change to biofuels that are less carbon-intensive.

The prospect for the sector's growth is high, as global health-care spending is estimated to reach \$8.7-trillion US by 2020, according to a 2017 Deloitte

products may take more than a decade to finish clinical trials, and it's never certain it will produce a strong enough return.

"Those are very unique investors. There's certainly some in Canada but not enough to fund the entire industry here," he said.

Without question, Canada's biotech industry has benefitted from federal innovation programs. Eighty per cent of firms surveyed had accessed the federal government's early-phase flagship Scientific Research and Experimental Development Program

## Biotech Policy Briefing

# 'The conditions are ripe': industry says it's consider a national bioeconomy strategy

Canada once had a biotechnology strategy that, despite its flaws and poor execution, sent a signal that biotech firms should open up shop in Canada.

BY JOLSON LIM

With Canada's biotechnology sector showing signs of new growth, industry advocates say it's time the federal government consider a national biotech strategy, more than a decade after one created in 1998 was nixed by the Conservative government.

In January 2018, the Public Policy Forum released a report recommending the creation of a national life sciences strategy and that the federal government adopt a whole-of-government approach to life sciences innovation.

The report, authored by Rob Annan, who joined Genome Canada shortly after writing it, notes that

Canadian firms "operate within a complicated economic, technological and political environment."

These companies also face risky and long-term capital investment requirements made more complex by the pace in which scientific and technological advances occur. Global competition and retaining talent were some of the other issues listed.

The paper said a national strategy would signal the federal government's commitment to the life sciences sector, establish clear priorities and objectives for public investment and policy development, and balance often-competing policy and regulatory priorities.

"To me, the conditions are ripe for this sort of thinking," Mr. Annan, vice-president of public affairs and communications at Genome Canada, told *The Hill Times*. "In the way the last 50 years have really been about the digital economy, I think the next 50 years are about the bio economy."

Mr. Annan, and others, noted that the biotechnology regulatory and innovation file is spread out across a number of federal departments and agencies including Health Canada, Innovation, Science and Economic Development Canada, and the Canada Food

Inspection Agency (CFIA).

He said a whole-of-government approach is needed to defuse the "fundamental tension" of competing federal priorities, such as regulatory and procurement concerns versus market-based innovation and economic growth considerations.

Andrew Casey, president of industry group BIOTEC Canada, cited the example of a biojet fuel company using mustard seed in its product having to deal with the aforementioned three federal bodies as well as Transportation Canada, Environment and Climate Change Canada, and Agriculture and Agri-Food Canada.

"You're fundamentally altering how things are grown, manufactured, how they're processed," Mr. Casey said. "It quite often crosses a number of different regulatory overseers and jurisdiction in addition to the fast moving science."

"Nothing is bringing that together and co-ordinating it."

### Canada once had a biotech strategy

Canada's first National Biotechnology Strategy was created in 1983, partly prompted by concerns over the application of new DNA science. The strategy also saw the

establishment of a national biotech advisory committee that brought in stakeholders from multiple sectors.

In 1989, the committee was re-jigged to focus on obstacles to growth, and was asked to make recommendations on the commercialization of biotech products to the minister of industry. In 1993, a regulatory framework for biotech products was established.

In 1998, the strategy was renewed following consultations, and moved to focus on better management and governance and calibrating the country's regulatory system towards changes in biotechnology, commercialization and social acceptance.

The strategy, renamed the Canadian Biotechnology Strategy, led to the creation of a new arms-length advisory committee and the formation of a seven-member ministerial committee governing the strategy. A Canadian Biotechnology Secretariat was also formed.

However, Canada's auditor general reviewed the strategy in 2005, concluding that the Liberal government poorly implemented its governance structure. In Sheila North's report, she wrote that she expected better leadership from the cabinet committee and concluded that by 2003, the strategy was



already outdated and the government was slow on setting targets for implementation anyways.

"The Canadian Biotechnology Strategy has not functioned as planned," she wrote. "It was designed for leadership from the top, which was not provided."

The strategy was also reviewed in 2006 by the advisory committee based on rounds of consultation with industry. In a report presented to ministers, it said the government didn't take biotech's potential seriously and failure to carry out various action plans. It called for a brand-new strategy with an agenda

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# time for feds to



Industry advocates say it's time to consider a new biotechnology or bioeconomy strategy in an increasingly complex technological and regulatory environment. Photograph courtesy of Flickr

focused on measurable outcomes.

In May 2007, the new Conservative government introduced the Science and Technology Strategy, and when the biotech strategy came up for review the following month, it was ended. Its advisory committee was also removed and replaced by a broader body called the Science, Technology and Innovation Council (STIC).

"In its absence, we've removed the policy directive to regulatory departments to continue in that same spirit," said Ian Affleck, who began his career at CFIA under the strategy program in 2004, and

is now vice-president of plant biotechnology at CropLife Canada. He said the strategy nevertheless sent a "strong statement of support for the biotech sector" and empowered federal departments to look how regulations could be improved.

Mr. Annan said the federal government can learn lessons from the previous attempt to bring in a strategy.

"My sense is it's such a rapidly developing space that trying to be too prescriptive probably undermines your chance of success," he said. "If you get talking about specific types of technologies or whatever, it's

going to be quickly be outdated."

Under the Trudeau government, STIC has been wound down, by recommendation of the blue-ribbon Naylor report on overhauling the country's research landscape. The report noted the council had a "more limited and purely responsive mandate" and had no independent reporting authority and a "constrained disciplinary mandate."

Since the strategy was dissolved, new scientific breakthroughs in areas such as genome editing and artificial intelligence have raised a new set of ethical, political, legal and environmental questions. Mr. Annan said such public trust issues must be considered in a new framework.

"We learned a lesson in some ways with the explosion with social media. Now, we're seeing some chickens come home to roost," he said. "Any forward-looking strategy that's going to be talking about technology and about economic opportunity also needs to be looking at the effects of disruption, the ethical dimensions, the environmental implications."

Mr. Affleck said such a strategy could improve public trust of the government's regulatory system.

"The more the government speaks about the work that it does in this space, the more the public will understand and feel comfortable," he said.

## Government report calls for wide changes

The Liberal government currently has an industry-led Economic Strategy Table for health and biosciences, one of six indus-

try tables established in 2017.

The table, with 16 industry representatives and two government bureaucrats as members, put out a final report earlier this month that stopped short of endorsing a full strategy, but said Canada needed changes to its wider life sciences ecosystem. It did propose a national digital health strategy.

The report identified a complex regulatory, reimbursement and procurement processes as an impediment to innovation, a "risk-averse procurement culture" over-emphasizing short-term goals, and a disconnected digital health infrastructure inhibiting the ability to make informed innovation decision-making.

Among other barriers was a skills shortage and limited access to capital leading to Canadian firms exiting the market or merging with larger companies.

The table proposed creating a "procurement innovation agency," better streamlining of its regulatory system that can decrease review times, improving government skills programs, and removing hiring barriers.

The report also concluded that more needed to be done to provide later-stage capital. It proposes a review of the Scientific Research and Experimental Development (SR&ED) tax credit to allow full access to Canadian-based firms regardless of whether such companies are controlled by domestic investors or traded publicly.

Also noteworthy, the government predicts that Canada's health and biosciences sector will lead to an-

nual exports of \$17-billion by 2025, but with enough action, the trajectory can change towards doubling current export levels to \$26-billion by 2025. The biotech sector consists of 900 firms, and the report set a target to double the number of firms to 1,800 in seven years.

Quebec developed a life sciences strategy in 2017, focusing on precision medicine and big data in healthcare, and is the only provincial government to have one in place. Ontario, meanwhile, established the Office of the Chief Health Innovation Strategist, something Quebec wants to emulate as well.

Mr. Casey, Mr. Annan, and Mr. Affleck said creating such a strategy could, at the very least, a strong message to both international and domestic firms that Canada has a welcoming environment for biotech firms.

"Once you make those statements, you have put a flag up that says invest in our country, bring your research here," Mr. Affleck said.

Mr. Annan said it would be an easy way to attract foreign direct investment. Mr. Casey said other countries will recognize the value of the bioeconomy if Canada does not.

"It feels like when it was first created it might've been too early, and now it feels like we're behind it," Mr. Casey said. "Now would be a more important time. Look at the economy: biotechnology is an important way for oil and gas, mining, forestry to really become more competitive as they change their product makeup."

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# THE EDGE IS HERE

## UVic launches the world's first Indigenous law degree

At the edge of a welcome new era, Carolyn Belleau honours her past by looking to the future. As one of 26 students entering UVic's Indigenous Law program—a combination of Canadian Common Law and Indigenous Legal Orders—she intends to influence policy and provide legal expertise for her home community, Esk'etemc (Alkali Lake, BC), and beyond.

## Biotech Policy Briefing

# Stakeholders divided on need for renewable targets in new clean fuel standard

Some stakeholders say that the government should set the targets for greenhouse gas emissions from fuel, but allow producers to reach the target on their own.

BY NEIL MOSS

Some stakeholders say the current rules around renewable fuel have a place in Canada's anticipated clean fuel standard, while others say that the government should stick to mandating reductions in greenhouse gas emissions, but allow producers to reach those targets their own way.

"[The government] should not in any way, shape or form dictate how that happens," W. Scott Thurlow, an Ottawa-based lawyer with a specialty in fuel-related policy, said. "If a company has an obligation to reduce [carbon dioxide] and they can demonstrate that they can do it, the government should just say 'congratulations you've complied with the law' and not take any additional steps."

In 2017, Environment and Climate Change Canada announced the development of a clean fuel standard with the goal of reducing annual greenhouse gas emissions by 30 megatonnes, or 30 million tonnes, by 2030, which would help

known as the carbon footprint, according to a government backgrounder. "Carbon intensity is the measure of the greenhouse gas emissions associated with production, processing, distribution and use of a fuel," it said.

The final regulations for liquid fuels under the clean fuel standard won't be released until 2020, and won't be implemented until 2022.

Under the federal renewable fuel regulation, "fuel producers and importers [need] to have an average renewable fuel content of at least five per cent based on the volume of gasoline that they produce or import into Canada and of at least two per cent based on the volume of diesel fuel and heating distillate oil that they produce or import into Canada."

The mandate percentages were adopted for both practical and operational reasons—there were questions if a biodiesel that is more than two per cent renewables would be able to operate in cold environments.

Environment Canada said it plans to maintain the renewable fuel framework for now, but in the long term it will be replaced within the clean fuel standard.

Even though the new clean fuel standard may not operate on a strict blending mandate, higher blends of renewables fuels in the standard will still spur high blends to meet the environment guidelines. A review of the renewable fuel regulations will come only after there has been time to review how the clean fuel standard is progressing.

The renewable fuel regulations achieved a reduction of around four to six megatonnes annually,



Under the framework for Environment Canada's clean fuel standard, spearheaded by minister Catherine McKenna, questions remain about the need for blending mandates to reach greenhouse gas emission targets. *The Hill Times* photograph by Andrew Meade

On the other hand, Mr. Thurlow said the environmental benefits are "dubious" when U.S.-produced ethanol that was previously made with coal-fired plants was being imported to Canada. However, the environmental impact of the the Canadian and

Renewable Fuels Association, said. "It could reduce GHG emissions, but there is not a lot of evidence to show that it was as successful as it was supposed to be."

Under the clean fuel standard, more domestic production of renewable fuel will be encouraged, said Fred Ghatala, director of carbon and sustainability at Advance Biofuels Canada. Instead of what's happening now where the renewable fuels are a mix of domestic and foreign.

The new clean fuel standard will create a requirement to prove that the fuels are better from a life cycle perspective, which Mr. Thurlow said is a "significant" improvement than the original renewable fuel standard.

Mr. Thurlow said that he would "wholeheartedly" support the phasing out the renewables fuel mandates, so the government can focus on the reduction of carbon dioxide.

He said the blending models should be a choice to meet the clean fuel standard requirements, not a requirement themselves.

If renewable fuels are as good at limiting greenhouse gas emissions as the renewable fuels industry claims they are, they would be the primary pathway for compliance in the clean fuel standard, Mr. Thurlow suggested.

He said renewables fuels should be able to stand on that benefit alone, and not need mandates to encourage their use, adding that the subsidies have helped grow the Canadian renewable fuels industry far more than any mandated percentage.

Mr. Plumptre said the regulations are still useful for the stability of the investment environment.

Mr. Ghatala said it would be too early to consider removing

the renewable fuels standard before the clean fuel standard is able to establish itself, which is a few years away.

Mr. Ghatala said there is an opportunity to roll the standards together to maintain the blending requirement, and that a minimum blend is useful to both the renewable fuel association as well those in the petroleum industry.

"It works," he said, adding it can be used to support the clean fuel standard.

Peter Boag, president and CEO of the Canadian Fuels Association, said if the objective of the clean fuel standard is the reduction of the carbon intensity of fuel, other requirements, such as the renewable fuel standard, can complicate complying.

"[There is] no question that blending of biofuels is still the main compliance option and we would expect that increased biofuels blending is going to occur as a result of the [clean fuel standard]," Mr. Boag told *The Hill Times*.

He said companies should not be tied to one way to comply with reduced greenhouse gas emissions.

To keep costs down, companies should be able to be given "maximum flexibility."

Mr. Boag said the government also shouldn't be too prescriptive of types of fuels that will be blended, like ethanol and bio-diesel.

"It should include any fuel that can be substituted to achieve the objective of carbon intensity reduction," he said. "Don't impose a specific requirement to impose a specific kind of renewable fuels."

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*The Hill Times*



Under the renewable fuel standard, fuel producers and importers need to have an average renewable fuel content of five per cent, and two per cent for diesel. *Photograph courtesy of skitterphoto.com*

Canada reach its commitments under the Paris climate agreement.

This would be the equivalent of removing seven million cars from the roads. The standard would require producers, importers or distributors to reduce the carbon intensity of fuels, also

says Bora Plumptre, senior analyst at the Pembina Institute.

In 2016, Canada emitted 704 megatonnes.

Mr. Plumptre said the regulations have been "really important" for getting low-carbon fuel producers getting in Canada.

American renewables has since become less divergent.

"Renewable diesel that was indistinguishable from a carbon intensity from ordinary diesel was satisfying the requirements in the western provinces," Mr. Thurlow, a former president of the Canadian

# Too much tax hurts tech sector

Canada has some great innovators, but its policies and research environment make it tough for them to succeed here.



Conservative MP Matt Jeneroux

*Opinion*

Canada is on the cusp of the Fourth Industrial Revolution with the emergence of the biotechnology industry. This revolution, where digital processes and artificial intelligence (AI) are changing the way products are made, is also coming at a time when Canada is experiencing a brain drain in our tech sector.

A study published earlier this year by the Munk School of Global Affairs' Innovation Policy Lab found that one-quarter of graduates in science, technology, engineering, and math (STEM) fields from Canada's top universities were working outside of the country. Most of those working outside Canada are in the United States, particularly Silicon Valley.

We have federal research and development support programs for companies in the tech sector, including the Scientific Research and Experimental Development Program (SR&ED) and Industrial Research Assistance Program (IRAP). These programs were designed to help companies innovate through tax breaks, which should work well in theory.

However, these programs aren't helping retain tech talent in Canada because of several other factors. First, personal income taxes and taxes on small businesses are high here. When businesses pay more in taxes, they have less disposable income to invest in hiring employees, funding new research, and setting up new spaces. Even when businesses are established in Canada, government policies can sometimes make it impossible to get anything done, as we recently saw with the Trans Mountain expansion project.

Second, Canada's intellectual property (IP) policies make it cumbersome for researchers to bring discoveries to the public. The government released its long-awaited IP strategy earlier this year and it included \$30-million to create a third-party patent pool to acquire IP that Canadian firms could access. This was criticized as confusing and unnecessary. Research from the Centre for International Governance Innovation found that American firms own more Canadian patents than Canadian firms. It is clear that we have some great innovators, but our policies and research environment cannot make it difficult for them to succeed here in Canada.

As well, the Munk School's study found a number of graduates moved to the United States because of higher salaries. As mentioned above, a high tax rate has many

repercussions for Canada, including the ability to offer high salaries to recruit and retain employees. A look at our tax policies and how they are affecting the tech sector is critically important.

Canada has a competitiveness problem. Businesses in all sectors are leaving the country in droves because it's become unnecessarily difficult to get anything built. Lower tax rates and less government interference south of the border is understandably tempting for business owners and innovators.

Canada has an opportunity to be a leader with the emergence of biotechnology and artificial intelligence. While the SR&ED and IRAP programs are well-in-



Matt Jeneroux is the former Conservative critic for innovation, science, and economic development. He was recently named his party's critic for infrastructure, communities, and urban affairs.

Photograph courtesy of Matt Jeneroux's office

tioned to keep biotechnology businesses in the country, there needs to be a stronger focus on the entire business environment that will help Canada's economic competitiveness.

Matt Jeneroux is the former Conservative critic for innovation, science, and economic development and the MP for Edmonton Riverbend, Alta.  
*The Hill Times*



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## Biotech Policy Briefing



Bloc MP Gabriel Ste-Marie says Quebec is ready to replicate in the biotech sector what the province achieved in the early 1990s with the pharmaceutical industry: becoming a world-class hub. *Photograph courtesy of Wikimedia/Julphar.uae*

# If government strategy isn't coherent, it's a complete waste of money

More must be done to equip biotech in Quebec, especially in supporting the growth of small players, so they don't have to accept a foreign takeover for lack of capital access.



Bloc Québécois Gabriel Ste-Marie

*Opinion*

When it comes to science and technology, government involvement is key.

Let's take the pharmaceutical industry as an example. From 1969 to 1987, the mandatory licensing regime offered little patent protection, driving up the production of generics in Ontario. Ontario was pleased with this policy that provided little innovation but ensured a high economic turnout.

That changed in 1987. In the midst of negotiating the Meech Lake Accord, Canada wanted Quebec to be fully part of the federation and Quebec had strong political leverage. As the federal government felt the need to consider Quebec's economic interests and strengths, Ottawa and Quebec worked hand in hand in crafting a policy better suited for innovation, where Quebecers excel. I don't know why, but Quebecers appear to have innovation in their genes.

Ottawa offered better patent protection, risk-sharing investments in industrial research, and tax incentives for research and development. Quebec, for its part, offered venture capital, tax incentives, and a purchasing policy in the health-care system that favoured locally made innovative drugs.

Within just a few years, five multinational pharmaceutical industries had opened major laboratories in Quebec,

providing jobs for nearly 2,000 scientists, mostly within greater Montreal but also in Québec City and Sherbrooke. Quebec was a world-class player in pharmaceutical innovation, with major players and hundreds of startups involved.

Quebec was pleased but Ontario, specialized in the production of generics, was not. So when Quebec lost its political leverage with the failure of the 1995 referendum, economic policies went back to normal, suiting the needs of Ontario.

Liberal prime minister Jean Chrétien diminished patent protection by abolishing the right for pharmaceutical companies to appeal court judgments related to intellectual property (Europe recently forced Ottawa to re-establish it). Another former Liberal PM, Paul Martin, later suspended Technology Partnerships Canada, a risk-sharing investment program, and former Conservative PM Stephen Harper outright abolished it.

Coupled with a change in the pharmaceutical business model, all major laboratories closed their doors. The golden years of Quebec's pharmaceutical industry were behind us.

While the federal government's policies and a lack of co-ordination with Quebec made it lose most of its pharmaceutical industry, it still had many assets: its innovative ecosystem, its education system, venture capital availability, and, most of all, the brains and the proverbial innovation gene of Quebec's people. From the ruins of the pharmaceutical industry emerged what is now a major cluster in biotechnology.

Quebec now has hundreds of startups, a few large players, a major industrial incubator, tens of sub-contractors (diagnostic, drug testing, numeric imagery, laboratory material, etc.) and intense university-industry relations.

Over the last five years, Montreal represented 40 per cent of Canada's private venture capital investments in biotech. Quebec is first in Canada for the number of scientific publications and the concentration of scientists, sixth in America in terms of sales. It is now ready to replicate in the biotech sector what Quebec achieved in the early 1990s with the pharmaceutical industry: becoming a world-class hub.

Montreal is specialized in human health, Quebec City is developing vaccines, Sherbrooke has special expertise in environmental biotech, and all three branches work hand in hand.

Having sat with all the players, the Quebec government developed a biotech strategy early last year and hopes to foster \$4-billion in investments. Now, it's time for Ottawa to follow through. The ecosystem already exists; the policy is in place. All we need is the means to achieve the ambitions we already have.

There's a need for more resources, for sure. The increased federal investments in fundamental research are welcome. More needs to be done, especially in supporting the growth of small players, so they don't have to accept a foreign takeover for lack of capital access.

But most of all, Ottawa must avoid duplicating or contradicting Quebec policies. There's no need to start from scratch with a made-in-Ottawa strategy. When Ottawa decides on its own, it tends to disperse the resources in a vain attempt to develop industries all over Canada.

For the Quebec biotech sector to thrive, Ottawa must support what it does instead of trying to be in the driver's seat. After all, Quebecers have the expertise. If the federal strategy is not coherent and co-ordinated with Quebec, it will be a complete waste of money.

*Gabriel Ste-Marie is the Member of Parliament for Joliette, Que., and industry critic for the Bloc Québécois.*

*The Hill Times*

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# Use biotech to spur a real energy transition

Liberal and Conservative failure on the environment is hurting our quality of life, health, and economy.



NDP MP Brigitte Sansoucy

Opinion

While federal action on climate change has been slow and stilted, many provinces understand that we need to turn towards renewable energy sources. They are taking bold steps to create ways of life that better respect the environment and are fairer for future generations.

This August, our party's leader, Jagmeet Singh, toured Quebec to meet leaders in the province's renewable energy sector. This tour proved to be an opportunity to demonstrate how Canada can make strategic investments to become a true renewable energy leader.

Quebec, by increasingly developing its renewable energy sector, is a real pioneer among the provinces taking action to pro-

tect the environment. Last year, in my own riding, the city of Saint-Hyacinthe opened a new biomethanation plant that has put the city on the map as a trailblazer in the reduction of greenhouse gases in Canada.

The new facilities in Saint-Hyacinthe will be able to process organic material from local agri-food businesses, table scraps, and green waste from 25 municipalities, recycling the waste and transforming it into biomethane, which can replace fossil fuels and feed into the energy grid. The biomass residue, or compost, can also be made into mulch and fertilizer for farmland and urban green spaces, providing additional green benefits to our communities. This plant—the largest of its kind in Canada and only the fifth of its kind in the world—has made the city famous, and stands as an example of a strategic green investment with huge economic and environmental payoffs.

Quebecers understand that we need to invest in a fair energy transition, especially since we know that every dollar invested in the renewable energy sector creates six to eight times more jobs than investment in the fossil fuel sector.

Unfortunately, on the federal stage, Liberal and Conservative failure on the environment is hurting our quality of life, health, and economy. Even while promising real action to tackle climate change, successive Conservative and Liberal governments have continued to give subsidies to the most polluting and devastating energy sectors, tarnishing our global reputation.

The billions of dollars in public money being spent on the Trans Mountain pipeline is the height of governmental hypocrisy. The

decision by Justin Trudeau's Liberals to buy the Trans Mountain pipeline undermines Canada's position as a climate leader and goes against the Paris climate change agreement and the UN Declaration on the Rights of Indigenous Peoples. In making this decision, the prime minister has betrayed his commitment to all Canadians and has proven himself the defender of private interests at the expense of the environment.

The NDP believes that spending billions of taxpayers' dollars to add to our country's contribution to the climate crisis is a decision that defies logic. Expanding the Trans Mountain pipeline is estimated to have the same environmental impact as adding close to three million cars to Canada's roads. New Democrats know that to effectively fight climate change we must look to the future. That's why we are committing to reducing our dependence on non-renewable energy sources and turning toward green and clean renewable energy sources.

This is not just a promise, but a golden opportunity to make significant investments in the development of biotechnological innovations, like the biomethanation plant in Saint-Hyacinthe, that will create new and better-quality jobs for the middle class, and set us on the right course. We will grow our economy and protect the environment, while strengthening local communities and respecting the rights of Indigenous peoples. The transition to renewable energy sources is a sustainable project. It is a real social project to build



NDP Leader Jagmeet Singh speaks during a rally on the steps of Parliament Hill to urge the government to stop the Kinder Morgan pipeline buy on May 22. *The Hill Times* photograph by Andrew Meade

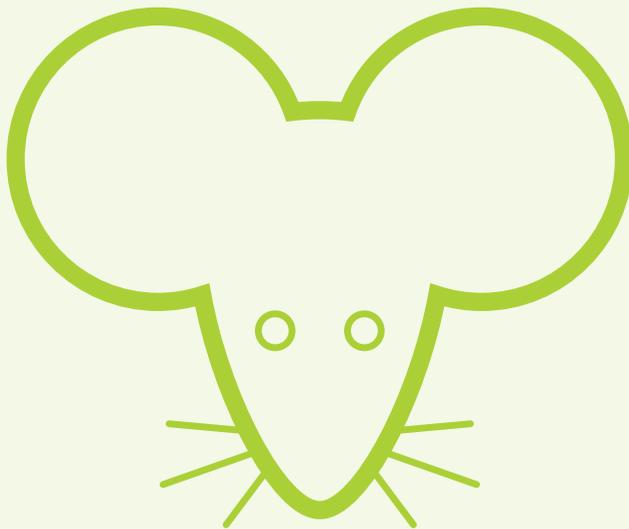
a Canada with a legacy of prosperity for future generations.

The NDP understands that the fight against climate change requires hard work and smart investments. Political courage, convictions, and a sincere desire to act are needed if we are to meet this challenge. Provinces like Quebec have shown us that Canada can become a real leader in the fight against climate change. Our proposals are ambitious, but we cannot wait any longer. Canadians are counting on us to take meaningful action now.

*Brigitte Sansoucy is the Member of Parliament for Saint-Hyacinthe—Bagot, Que., and the NDP critic for infrastructure and communities, families, children, and social development.*

The Hill Times

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## Biotech Policy Briefing

# Should genetic privacy exist in agriculture?

This is uncharted territory. We need research and analysis on how to think of privacy in an agricultural context.



Marc Saner

Opinion

OTTAWA—As of last year, Canada has a genetic privacy law. It sets rules for the privacy of our personal genomes and non-discrimination based on genetic information. This law has become necessary because decoding our

personal genomes—and those of other people—had become increasingly quick and cheap.

All species have genomes, of course, and since the same decoding technology is being applied to agricultural species, it is a good time to think about the tension between transparency and privacy in the context of growing food.

We already pay a lot of attention to managing information on transgenic plants (GMOs). Last June, for example, the Canadian Food Inspection Agency (CFIA) disclosed that a small unauthorized patch of transgenic wheat was found on a roadside in Alberta which, in turn, swiftly closed the wheat export market to Japan and South Korea—markets estimated at over \$200-million per year. Considering how contentious GMOs are in international trade, our approach to information management and disclosure is not likely to change in this context anytime soon.

Using biotechnology to modify genomes is only half the story, however. As with human genomics, we should think about the

diagnostic benefits associated with decoding genomes. In the agricultural context, one interesting aspect of a genome would be sequences that reveal pesticide resistance.

Pesticide resistance can be a big deal if it appears in an important weed or pest. The recent emergence of a strain of pigweed, Palmer amaranth, resistant to multiple herbicides led to demands for greater scrutiny and purity of commercial seeds. No one wants to take the risk of introducing crop seeds contaminated with an herbicide-resistant weed. Because we are all familiar with epidemiological thinking, customers and society will expect disclosure and a call for privacy would seem strange.

Consider the following sample case for privacy, however. Genetic services are emerging that can help growers manage pesticide resistance by quickly and cheaply mapping the genomes of some pest species. A greenhouse grower who wants to maximize the effectiveness of integrated pest management may want to know the genetic resistance profile

of key pests and may relatively cheaply purchase such information from a commercial decoding service. In this case, the grower has real incentives to keep that information private.

For starters, it is a voluntary action that costs money and transparency could represent an additional expenditure. Secondly, neighbouring growers may not only become free-riders if the data are openly accessible, they may even slander competitors by accusing them of being the source of contagion of a resistance trait. Thirdly, regulators would be empowered with better surveillance and planning tools and companies may prefer to “let sleeping dogs lie.”

On the flip side, the case for transparency is also compelling. Integrated pest management and regional management of pesticide resistance could be much improved, scientists could find invaluable insights into the emergence, spread and management of pesticide resistance, and regulators could save money and be more effective. As a result, growers and society at large would profit.

This is uncharted territory. We need research and analysis on how to think of privacy in an agricultural context. Governance work is required for the design of knowledge consortia or public-private partnerships. Procedures for knowledge management, ownership and consent, benefit sharing and open science need to be developed. There may be a hidden benefit here. Research into the best balance of privacy and disclosure in the agricultural sector may well become relevant to the human context, one day. It is conceivable that our personal genomes contain traits that inform on antibiotic resistance or the propensity to spread a plague. Such information would be of great public interest and it would be good to have more thought and debate under our collective belts, should this possibility become reality.

Marc Saner is chair of the geography, environment and geomatics department at the University of Ottawa and an adjunct professor of philosophy at Carleton University. He thanks Michael Scheffel for helpful discussions and information.

The Hill Times

## One health: the translational medicine

Establishing a national One Health initiative with advancements driven by researchers and clinicians in both human and veterinary medicine will support research, improve human and animal health and save on health-care costs, both nationally and abroad.



Glen Pyle

Opinion

GUELPH, ONT.—Who doesn't love puppies and kittens? For some, this is the attraction to veterinary medicine. But its impact goes beyond cute animals. Advances in veterinary medicine

improve human health, and research in human health in turn helps animal patients. Veterinarians, physicians, and researchers can work to improve the lives of all creatures under a concept called “One Health.”

One Health recognizes that the health of humans, animals, and the environment are connected. This interconnectivity creates the potential for information or biotechnology created for use in people to be used in animals, and vice versa.

OVC is recognized as a world leader in One Health. The unique opportunity at OVC to investigate disease, develop diagnostics, and create new treatments for naturally occurring diseases in companion animals facilitates the translation of basic research to medical practice.

A multi-laboratory team led by pathobiology Prof. Byram Bridle created a vaccine-based treatment for cancers in cats that is now in clinical trials for both pets and people. At the Ontario Veterinary College's department of biomedical sciences, Prof. Brenda Coomber discovered a gene-based test to predict the effectiveness of lymphoma treatment in dogs that may be used in human lymphoma.

In partnership with veterinary cardiologist Prof. Lynne O'Sullivan, our lab discovered unique changes in small molecules called micro-RNAs that circulate in the blood of dogs with dilated cardiomyopathy. This information may be used to create a test for early heart failure diagnosis in both animals and people.

One Health initiatives also focus on infectious diseases. More than 60 per cent of infectious ailments in humans are zoonotic diseases spread from animals. Between 2000 and 2010, almost 100 new disease vectors from animals were identified.



Veterinarians, physicians, and researchers can work to improve the lives of all creatures under a concept called ‘One Health,’ writes Glen Pyle. Photograph courtesy of Pixabay

Globally, zoonotic diseases cost more than \$100 trillion a year. A single influenza outbreak would erase five per cent of global GDP. Advances in zoonotic disease surveillance and management from One Health initiatives have protected the world's food supply, as well as animal and human health.

Implementing One Health globally would cost an estimated \$2.5-billion to \$4.8-billion annually, a fraction of the \$11.5-billion to \$48-billion lost each year from epidemic outbreaks.

Global health-care expenditures will exceed \$11-trillion annually by the end of this de-

cade, and the total bio-economy worldwide will be worth nearly \$1.3-trillion by 2030. Many of these costs fall under One Health.

Despite the benefits of One Health, research funding for the approach pales in comparison to research funding for human

medicine. The scope and complexity of issues under the One Health umbrella require a substantial financial investment to create the necessary human and technological infrastructure.

As well, the traditional silo nature of biomedical research inhibits intersectoral communication and trust, a key requirement for the interdisciplinary basis of One Health. Technical and personnel infrastructure is often insufficient to run national One Health initiatives.

None of these problems is insurmountable.

One Health is especially ripe for scientific and economic devel-

opment in Canada. Our network of world-class universities and research institutes produces highly qualified personnel to conduct research, practise medicine, and work across the health-care spectrum.

With its expertise and proven track record, OVC particularly could become a national hub for a global One Health initiative. That national hub needs public investment in research and biotechnology development, as well as national support and oversight to bring together the diverse stakeholders for the effective communication that drives One Health.

Sustained and reliable funding is essential for the movement of ideas from concept to product, bettering the health of Canadians and producing a highly skilled workforce. One Health initiatives will save the Canadian economy from potentially crippling economic losses, and a more effective health-care system will reduce costs. As well, knowledge and biotechnology generated by a One Health system could be exported, generating revenue for Canada.

Canada stands to become a global leader in food safety, zoonotic and infectious diseases, translational medicine and other fields that comprise One Health. Establishing a national One Health initiative with advancements driven by researchers and clinicians in both human and veterinary medicine will support research, improve human and animal health and save on health-care costs, both nationally and abroad.

Glen Pyle is a biomedical science professor at the University of Guelph.

The Hill Times



Early research suggested risks to the health of dairy cows if the GMO product bovine growth hormone was used in herds, writes Green Party Leader Elizabeth May. When it comes to GMOs, her party supports the precautionary principle. *Photograph courtesy of Wilson Hui*

## The real perils of biotech

Whoever decided that patenting and restricting access to seed was a way to feed the world?



Green Party Leader Elizabeth May

Opinion

The public discussion about genetically modified organisms (GMOs) almost invariably focuses on bitter disputes about the safety of GMO crops. While many argue that the technology poses threats to natural systems and to human health, most research suggests that this is not the case.

Still, peer-reviewed studies fall on both sides of the question. Given the enormity of the risk, the Green Party firmly supports the precautionary principle.

It is clear that early research demonstrated risks to the health of dairy cows if the GMO product bovine growth hormone (BGH) was used in herds. Canada refused to register bovine growth hormone. This aspect of our dairy industry is a strong reason to protect Canadian consumers from U.S. milk supply, as our current supply management system does.

We should not rapidly expand the introduction of GMO crops. We should, at a minimum, label GMO products to allow consumers to make an informed choice about what they are buying.

Nevertheless, while the issue of safety occupies most of the debate, it is not the only public policy concern. Whether one believes GMOs will be proven safe or dangerous, we should all be concerned about the threat to food security posed by increasingly monopolistic corporate control of the world's seeds.

For millennia, farmers have cultivated crops from thousands of seed varieties. Local farmers saved seeds ideally suited to local conditions. Hundreds of varieties of grains, vegetables, legumes, pulses, and so on were cultivated and improved through natural selection. New information, like the seeds themselves, was shared. The advent of corporate agriculture and seed patenting threatens global food security. It is increasingly illegal

in countries around the world, including Canada, for farmers to save their seed.

As the climate crisis worsens, agriculture is inevitably facing increasing threats. It is well understood that the more diverse a system is, the more resilient it will be. A monoculture of one crop is vulnerable to a disease or insect in a way that diversified plantings are not. Yet, the global industrial enterprise of agribusiness is forging ahead to reduce and simplify available seed and control seed through contracts and patents.

Making the situation even more perilous, two big agriculture giants are now merging. Monsanto controls nearly 60 per cent of the world's proprietary seeds, while its new parent company, Bayer, controls 70 per cent of the world's chemical inputs and pesticides in agriculture.

The public relations claims of the benefits of simplified, genetically impoverished agriculture is that we will "feed the world's poor." But it is the poor, some of whom are growing their own food, and the local food supply that are most at risk; it is the small farmer who depends on collecting and saving seed who is at risk. And the total global food production has not increased as the boosters had claimed.

It does not require masses of evidence to point out the obvious: large multinationals are not altruistic. They exist and thrive, as any private corporation does, on returning profit to shareholders. The mantra about GMOs and "feeding the world's poor" is transparent in its hypocrisy.

The real research to feed the world and build in resilience is coming from poor farmers. John Vidal reported on one such effort in the United Kingdom's *The Guardian*. Debal Deb is an Indian plant researcher, working without research funding and trying to keep under the radar of Monsanto. He is documenting and cultivating the wide variety of traditional varieties of rice—more than 1,300 strains. And he is documenting the varieties that can grow in drought conditions, and which can grow under four to five feet of water. His diverse community-based seed bank is a hope for the world.

Whoever decided that patenting and restricting access to seed was a way to feed the world? It never was. It is a way to drive up profits for multinationals. We must reconsider the kind of agriculture we need to adapt to climate change, develop resilience, and share knowledge through networks of farmers. In that effort, multinational monopolistic for-profit corporations are not the solution; they are in the way.

Elizabeth May is the leader of the Green Party of Canada and the Member of Parliament for Saanich-Gulf Islands, B.C.

*The Hill Times*

# Canadian biotech at a glance

4%

Canada's health and biosciences sector's historical growth rate

40 firms

the number of "high growth" firms the government has identified

9%

the annual growth target Minister Bains' Economic Strategy Table on Health/Biosciences has set for the sector by 2025

91,000

the number of jobs within the health and biosciences sector

\$17-billion

the annual value of exports predicted for 2025 on the current trajectory

\$7.8-billion

the contribution to Canada's GDP in 2016

\$26-billion

the annual exports value target set by the Economic Strategy Table on Health/Biosciences by 2025

1

the number of Canadian companies on the Global Digital Health 100 Companies list

900

the number of companies in the sector in Canada

9th

where Canada ranked in the 2017 Commonwealth Fund of health-care system performance out of 11 countries

1,800

the number of companies the Economic Strategy Table on Health/Biosciences wants in Canada by 2025

—Source: *Economic Strategy Table on Health/Biosciences Final Report, September 2018*

208

number of firms that responded to the 2018 Biotechnology Industry Data Survey by BIOTECCanada

61%

percentage of firms that said administrative barriers were among the most pressing issues with government programs

59%

percentage of firms surveyed that said they will pursue government-facilitated innovation programs in the future

37%

percentage of firms that said funding package size was among the most pressing issues with government programs

80%

percentage of firms that have accessed the Scientific Research & Experimental Development Program (SR&ED)

57%

percentage of firms that identified access to capital as the biggest barrier facing the industry

65%

percentage of firms that have accessed the Industrial Research Assistance Program (IRAP)

—Source: *Biotechnology Industry Data Survey 2018, conducted by Deloitte on behalf of BIOTECCanada*