GenomeQuébec

# STRATEGIC PLAN
## 2024–2029

## POWERING THE GENOMIC ERA

25 YEARS OF EXCELLENCE SERVING INNOVATION

# A word from our CEO

**Josette-Renée Landry**
President and CEO

On the eve of its 25th anniversary, Génome Québec continues to enjoy the privilege of operating in a society that aspires to become one of the most innovative and creative in the world, with the goal of becoming an OECD leader in research and innovation.

With Génome Québec set to play a vital role in realizing that grand vision, the time was right to develop a new strategic plan. To gain deeper insight, we carried out a wide-ranging consultation with our stakeholders and were able to pinpoint key issues and identify promising opportunities.

One key takeaway was that Génome Québec's agility, diversity of funding programs, and multisectoral impact make it an organization unlike any other.

By checking in and taking the pulse, we gained a better understanding of what the ecosystem needs to thrive. That knowledge will guide our work in the coming years. We intend to continue supporting the growth of genomic medicine while contributing to faster socioeconomic value creation in non-health sectors and maintaining our technological leadership. As we fulfill our commitments, we will continue to embody a culture of excellence while seeking equity, diversity and inclusion at all times.

In the wake of the profound upheavals that have shaken Québec and the world in recent years, we also reflected on our values, especially our desire to help Québec society do things differently.

The time has come to harness the full potential of the knowledge and technology developed through research and innovation, specifically in the omics technology sector. It is therefore with great pride that I present Génome Québec's 2024-2029 strategic plan, a document that will inevitably have to be adjusted to keep the pace of our rapidly changing technological environment.

I would like to extend my sincere thanks to all those who took part in the planning and contributed to our thinking. The mobilization of the many talents and stakeholders in our ecosystem is essential to the success of this strategic plan.

Special thanks to the Ministère de l'Économie, de l'Innovation et de l'Énergie du Québec and Genome Canada for their unwavering support.

Genomics is a branch of science that focuses on the study of the entire genetic information of a living organism, including humans, plants, animals and microorganisms.

Genomics is transforming how we do things in many different ways. It's helping us innovate, accelerating new discoveries, and driving solutions to many of society's challenges, with applications ranging from personalized health care, pathogen control, and antimicrobial resistance (AMR) to wildlife preservation, sustainable agriculture, biomaterials manufacturing, climate change resilience, and more.

# Table of contents

# Mission
# Vision
# Values



## Mission

Catalyze the development and excellence of genomics research and promote its integration and democratization.

## Vision

Genomics-based innovations will lead to equitable and inclusive solutions to challenges in health care, the environment, technology, society, and public policy.

## Values

| | |
|---|---|
| **Excellence** | Is found in our determination to be recognized as a reference in the field. To do this, our employees do outstanding work at all levels and at all times. |
| **Openness** | Is found in the transparency, listening skills, flexibility, and commitment of all our employees as they work together toward a common goal. |
| **Creativity** | Is found in each employee's ability to innovate in search of solutions and in our drive to take effective action as individuals and as an organization. |
| **Integrity** | Is found in the willingness of our employees to behave fairly and honestly, in accordance with their personal values and those of our organization. |
| **Ethics** | Is found in our assurance that all our research adheres to an ethical framework that is acceptable to society as a whole, as well as our sound risk management and principled governance. |

# Opportunities

Present and future



Nearly 25 years since the completion of the human genome project, genomics and its field of applications have progressed considerably. Genetic sequencing and analysis technologies have advanced dramatically, to the point where sequencing a genome is now completely affordable and can be done in a day.

The buzz around genomics is growing worldwide. We are witnessing the emergence of increasingly profitable ecosystems built around producing and analyzing massive amounts of data, as well as the accelerated development of innovations that meet the needs of various fields of life sciences. Coupled with artificial intelligence, the possibilities are endless. And Québec has everything it needs to carve out a place for itself and stand out among the best.

## Present

### Human health

In health care, the speed and availability of sequencing and the ability to conduct in-depth genomic data analyses are expanding the horizons of science, with genomics being used at every stage of care, from prevention and diagnosis to treatment selection. As a result, genomics is becoming an integral part of clinical practice in many medical specialties, including oncology, infectious diseases, and medical genetics.

Several countries—including the UK, France, the US, Denmark, Singapore, Iceland, and Estonia—have made massive investments in national genomics strategies and are already reaping the rewards. These strategies rely heavily on pooling and sharing data from very large cohorts of biological samples and health data. For example, 1+ Million Genomes is a multinational European initiative that pools the knowledge encoded in genomic data—a highly promising area for European citizens, health care systems, and innovators.

In the US, the National Institutes of Health is spearheading the All of Us Research Program, which aims to sequence the genomes of one million people of diverse ethnicities. To date, it has provided the sequencing data of 100,000 complete genomes.

Denmark, Iceland, Finland, Norway and Sweden have chosen to group their national initiatives together under the Nordic Alliance for Clinical Genomics (NACG), taking an open-science approach that aims to share experiences, data, and best practices for implementing personalized medicine.

In the UK, the public has broad and equitable access to genomic testing thanks to a network of seven laboratory centres and 17 genomic clinics specializing in oncology, pharmacogenomics, and the diagnosis of rare, hereditary and common diseases.

## Using genomic data to unlock new targeted treatments



- Four pharmaceutical companies—Amgen, AstraZeneca, GlaxoSmithKline and Johnson & Johnson—paid US$120 million to be given nine months of exclusive access to UK Biobank's genomic data.
- Genomics England set up the Genomics Expert Network for Enterprises, or GENE Consortium, a group of private companies that can access data from the 100,000 Genomes Project as part of a pilot project. In exchange, each GENE Consortium member contributed between US$30,000 and US$300,000, depending on its size.
- In a deal valued at US$415 million, Amgen acquired deCODE Genetics to better understand the impact of human diversity on disease, with a view to supporting the discovery and development of new drugs. In 2020, Amgen conducted clinical trials on two new cardiovascular drugs as a direct result of discoveries made at deCODE.

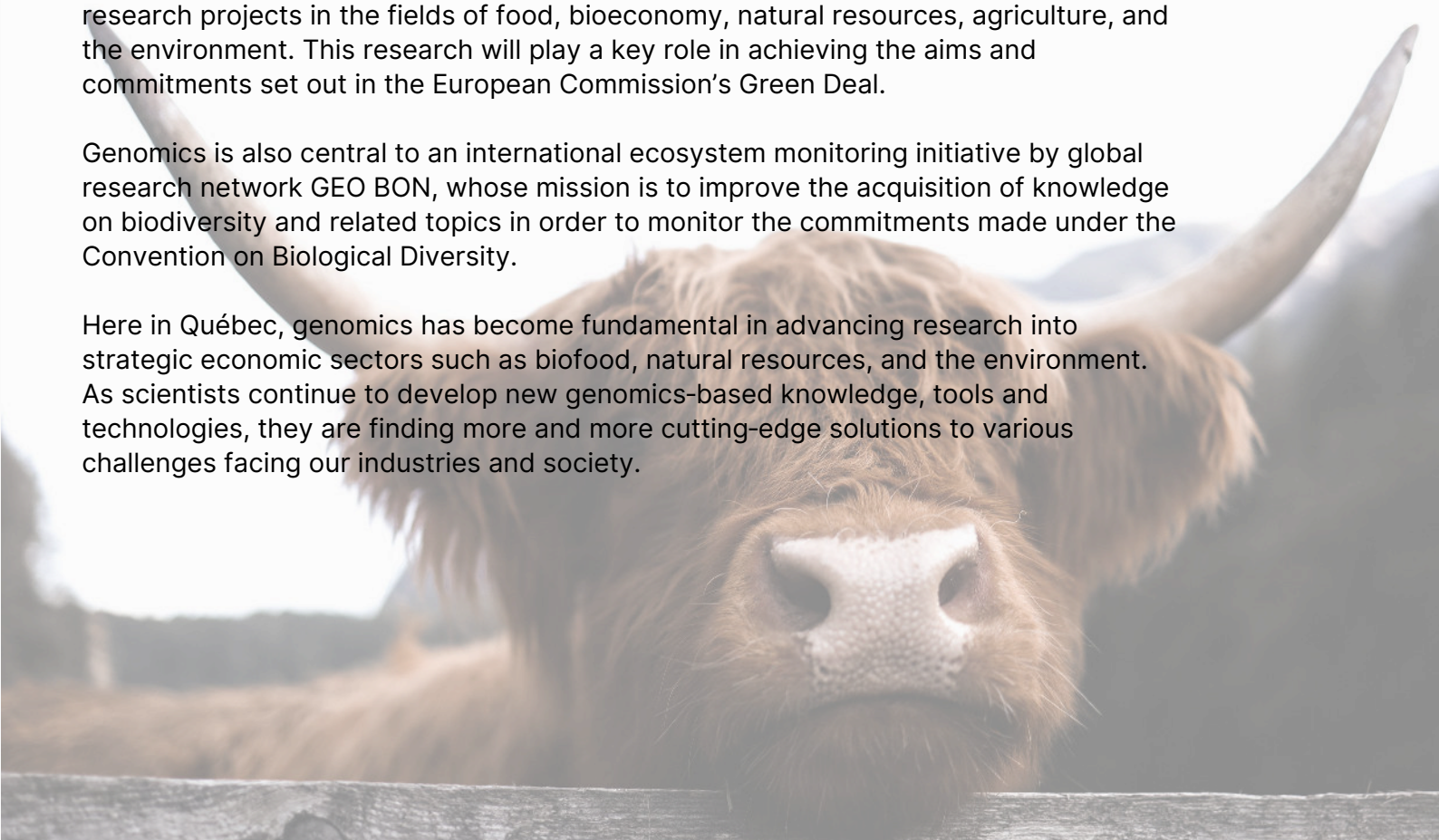
### Healty and productive planet

Outside of health care, genomics now features in policies designed to support the growth of the worldwide bioeconomy. Major organizations such as the United Nations have prepared specific guidelines for the use of genomics in areas such as food safety and animal genetic resources.

The European Union has announced an investment of €897 million to support 135 new research projects in the fields of food, bioeconomy, natural resources, agriculture, and the environment. This research will play a key role in achieving the aims and commitments set out in the European Commission's Green Deal.

Genomics is also central to an international ecosystem monitoring initiative by global research network GEO BON, whose mission is to improve the acquisition of knowledge on biodiversity and related topics in order to monitor the commitments made under the Convention on Biological Diversity.

Here in Québec, genomics has become fundamental in advancing research into strategic economic sectors such as biofood, natural resources, and the environment. As scientists continue to develop new genomics-based knowledge, tools and technologies, they are finding more and more cutting-edge solutions to various challenges facing our industries and society.



# Future

## Science

We are looking to the future and constantly feeding the genomic innovation pipeline to speed up the development of personalized medicine and meet the geopolitical and health needs of tomorrow. For that, we have to be willing to make some investments that, while riskier, have the potential to generate solutions in emerging genomic technologies such as bioengineering, genome editing, and spatial genomics. Combined with various omics approaches (proteomics, metabolomics, transcriptomics, epigenetics) and advanced AI-based analysis tools, these new areas of study are proving extremely promising.

## Public policy

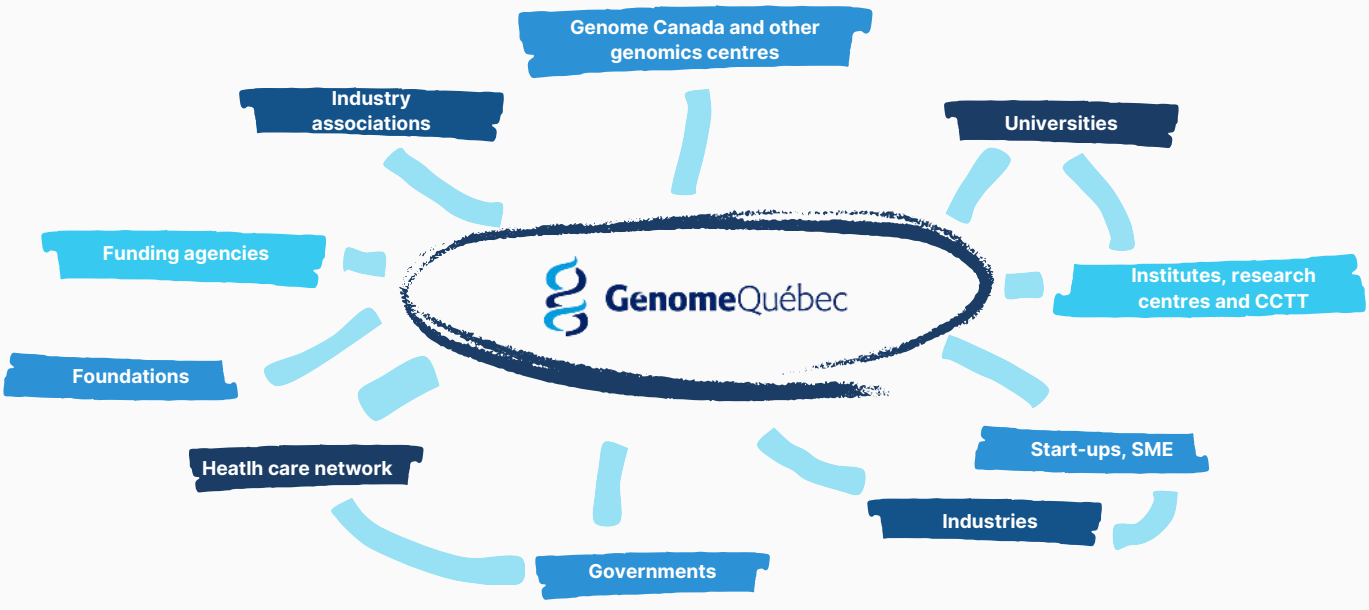
Innovation, Science and Economic Development Canada announced its commitment to developing a pan-Canadian genomics strategy in the 2021 Canadian federal budget. The $400 million strategy will aim to advance the commercialization and adoption of genomics and related technologies in multiple sectors. Consultations took place in 2022, and the government released a consultation report in August 2023, but the official strategy has yet to be announced.

In Québec, the government has yet to formulate a strategy specifically targeting the use and development of genomic innovation. However, genomics is a component of various government policies, including the Ministère de l'Économie, de l'Innovation et de l'Énergie's Life Sciences Strategy and Research, Investment and Innovation Strategy and the Ministère de la Santé et des Services sociaux's Rare Disease Policy. These policies address innovation in health care as well as other industries of vital importance to Québec's socioeconomic development. Genomics also goes hand in hand with many of the government's priorities, including the RNA sector and the innovation zones planned to be set up across Québec to study specific areas of science, such as personalized medicine, agriculture, quantum science and blue economy.

Génome Québec's vision is to fuel the emergence of high-quality genomic innovations that can eventually be adopted and rolled out in Québec to the benefit of current and future generations. Achieving that vision will require us to work with a range of partners from the different ecosystems involved.

This strategic plan describes in greater detail how we propose to leverage our existing assets and strengths to make Québec a Canadian and international leader in genomics.

## Our ecosystem



# Review process

As part of the work to establish its 2024–2029 Strategic Plan, Génome Québec organized sector-specific consultations to gain a better understanding of the issues, opportunities, and major trends in genomics in Québec, across Canada, and around the world.

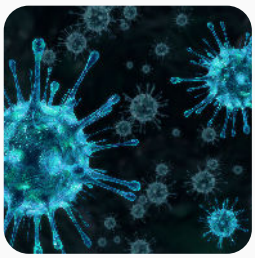
Through these consultations, 250 experts in their respective fields provided feedback on the best ways to meet user needs, keep Québec competitive in genomics, foster collaboration and innovation, and generate wealth for the benefit of the economy and Québec society. Génome Québec staff were involved at every step of the consultation process.

In December 2023, a working session was held with senior management to brief the Board of Directors on the points raised during the consultations and on the main strategic directions that had emerged. The groundwork was laid for the new strategic plan.

**Génome Québec has identified four key insights and expressed its position in the form of four commitments, with accompanying strategies for each.**

## Sector-specific strategic consultations

**Pathogen and AMR control**



March 18, 2022

**GE3LS – human health**

May 24, 2023

**Biofood**

September 18, 2023

**Synthetic biology**

September 27, 2023

**Forestry**

October 2023

**Socioeconomic impact**


October 11, 2023

**Biodiversity**

October 12, 2023

**Genomic medicine**

October 23, 2023

**Scientific culture and education**

November 1, 2023

**Entrepreneurship**

November 2, 2023

# Observation 1



The health care network has been severely tested in recent years. It's become clear that change is urgently needed. The health care network is in need of radical transformation, and innovation is the key to meeting that challenge.

The last few years have been the most difficult in the history of our health care system; the Québec government has stated as much in its plan to implement the necessary changes. We need to start thinking outside the box, because solutions may be found in the unlikeliest places. Integrating innovative approaches such as genomics opens up new prospects for preventing, diagnosing and treating disease. To make the shift toward personalized medicine, we need to promote a global, inclusive and ambitious approach across the entire continuum of care, with a particular focus on knowledge transfer.

**The benefits of genomic medicine**

Genomic medicine is the use of a person's genomic information in clinical care. Its benefits include early and accurate diagnosis, more effective treatments, side effect prevention, improved eligibility for clinical trials, and prognostic and preventive approaches.

Genomic medicine can be used in the field of public health to predict an individual's risk of developing certain conditions, such as cancer. It can also identify people who carry certain genes or hereditary variants. For people with cancer and rare diseases, genomics-based diagnosis can provide access to precision drugs early on in treatment or get patients into live-saving clinical trials. It can also put an end to what is often years of uncertainty between symptom presentation and diagnosis, an experience aptly dubbed a diagnostic odyssey.

At Génome Québec, we support the research and development, data leveraging, capacity building and technology deployment needed to support the emergence of new tools and knowledge. We do this by looking to proven successes in other parts of the world and factoring in issues of accessibility, equity, education and engagement.

# Economic prosperity



**In Québec, genomic medicine will make it possible to:**

- Leverage Québec cohorts for faster development and adoption of omics-based tests and treatments
- Demonstrate the usefulness and clinical significance of new therapeutic targets, new treatments, and repositioned drugs
- Boost the health care economy and develop new therapeutic approaches for use in Québec
- Generate intellectual property, royalties, and R&D investments and enhance the value of Québec platforms

**Commitment 1:** Génome Québec will be proactive in helping create innovative solutions to support the development of genomic medicine and facilitate its integration into the health care system.

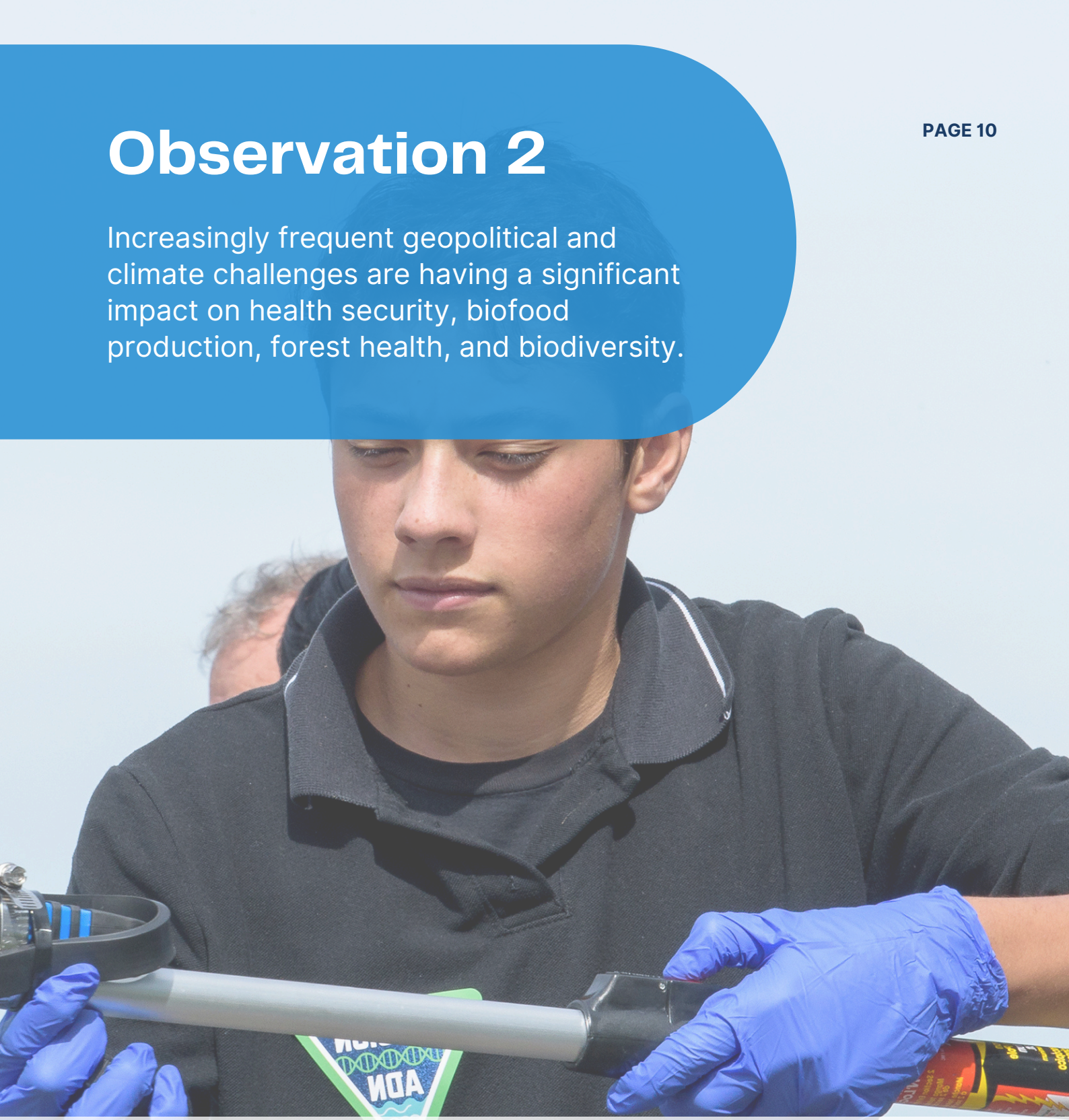
**Strategy 1:** Structure and fuel innovation flow in genomic medicine and help integrate it into the health care system by looking to proven successes in other parts of the world.

**Strategy 2:** Capitalize on our distinctive approach and diversity of funding programs to support the full spectrum of innovation in personalized medicine, with a focus on Québec start-ups and SMEs.

**Strategy 3:** Mobilize stakeholders to exploit the full potential of genomics.

# Observation 2

Increasingly frequent geopolitical and climate challenges are having a significant impact on health security, biofood production, forest health, and biodiversity.



Génome Québec has been supporting genomics-based innovation for over two decades now. For example, it has helped reduce the carbon footprint of Québec's agricultural sector through the development of crop varieties that require less fertilizer and are better suited to changing climatic conditions. Fast, accessible diagnostic tools can track insect pests and pathogens that affect not only crops and forests but also food safety, animal health, and even human health. Genomics can help us better understand where these diseases come from and how they spread between humans, animals, and our shared environment. This approach is known as One Health.

Genomics also offers powerful tools for studying, monitoring and preserving ecosystems. Genomic evidence can be used to better document the genetic variability of populations and integrated into systems for monitoring conservation efforts. We can also use genomics to generate new, more sustainable products with high economic potential, such as biofuels, organic soil fertilizers, biopolymers, and value-added nutritional products.

By supporting genomic innovation in the fields of environment, agriculture, and natural resources, Génome Québec is establishing itself as a pillar of Québec's green economy. But that innovation has to break out of academic circles and be adopted by those who will benefit from it—farmers, biologists, First Nations communities, forest engineers and agronomists, to name a few. Genomics knowledge sharing is without a doubt the cornerstone of this transition to a more sustainable economy.

Génome Québec is committed to drawing inspiration from best practices in Québec and beyond to continue funding innovation and pursuing its efforts to democratize genomics and engage as many stakeholders as possible.

**Commitment 2:** Génome Québec will keep promoting the development of genomic solutions to meet environmental, climate and health challenges.

**Strategy 4:** Improve the resilience, productivity and sustainability of the biofood sector.

**Strategy 5:** Promote the use of genomics in environmental and natural resource sectors.

**Strategy 6:** Foster a One Health approach to meet cross-sectoral challenges and drive the advancement of genomics.

# Observation 3

The biggest challenge in innovation is keeping pace with technological change and making the most of Big Data in a consistent, ethical and structured way.


In its technological capabilities, Génome Québec's approach is based on excellence, competitiveness, convergence, and high standards of quality, as well as the optimal use of genomic data paired with artificial intelligence. We are committed to work with ecosystem stakeholders to optimize the use of technology and data for the best interests of Québec society.

**Technological services**

With their institutional neutrality, Génome Québec's technology centres are well positioned to serve as one-stop shops, fostering convergence between the different specialized infrastructures available for omics data production and hosting in Québec. Given its role as a mobilizer, Génome Québec can help others make full use of innovations available through Québec's technology platforms. It can also promote the offer on a larger scale, and better map out the need for technological investment in genomics to optimize planning.

**Big Data**

The ability to share, link and access high-quality data is the backbone of all genomics strategies. To avoid data duplication, Génome Québec will focus on coordinating its offer through partnerships with existing facilities, including the Centre québécois de données génomiques (CHU Sainte-Justine), Genovalia (Université Laval), the Pan-Canadian Human Genome Library (McGill University) and the Génome Québec/CIUSSS du Saguenay-Lac-Saint-Jean biobank.

Génome Québec is also drawing on the expertise of its genomics platform, which serves various research centres in Québec and elsewhere in Canada, for a collaboration with the Montreal Heart Institute and the Centre de recherche Azrieli (CHU Sainte-Justine). Together, we are launching a new flagship initiative for Québec: a human genome library. By generating and exploiting the full potential of genomic data from two large Québec cohorts, the project will give large pharmaceutical and biotech companies, as well as Québec start-ups and SMEs, access to high-quality cohorts. The goal is to accelerate the development of new treatments and tests based on omics approaches and help make the case for bringing these innovations to market in Québec.

Finally, to maximize spin-offs from the optimal use of data coupled with artificial intelligence, Génome Québec will continue to seek out new research partnerships and support projects aligned with Québec's priorities. As publicly funded data is a public good, we want to make sure it is shared as openly as possible, in full compliance with legal and ethical rules, to maximize its social, environmental and economic benefits.

**Commitment 3:** Génome Québec will maintain its leadership role, continue to offer advanced technological services and expertise, and create a framework that helps users exploit the full potential of genomic data, all while fostering the development of a cohesive service offering within Québec's genomics ecosystem.

**Strategy 7:** Bring the Centre d'expertise et de services Génome Québec (CES) toward a one-stop-shop model that makes it foundational, diversified (omics), efficient, and internationally recognized for its high standards of quality.

**Strategy 8:** Harness the full potential of omics data to accelerate the development and commercialization of genomics innovation.

**Strategy 9:** Support growth in the emerging technologies sector.

# Observation 4

In a time of responsible, proactive and inclusive governance, organizations need to be creative and turn to innovative business models to contribute to Québec's socioeconomic growth.

In an ever-changing business landscape characterized by change and uncertainty, it's becoming imperative for organizations of all sizes to position themselves with a view to surviving and thriving over the long-term. An effective business strategy can take many forms, which is why Génome Québec is examining how best to realize the full potential of its mission to generate greater value, with a focus on optimizing processes and resources and co-creating innovative, sustainable and winning partnerships.

In a competitive and constantly evolving job market, Génome Québec intends to consolidate its position as an employer of choice by attracting and retaining top talents and furthering their professional development. To that end, we will continue to offer excellent working conditions and anchor our governance framework in best management practices, social responsibility, and sustainable development. We will also continue to express our commitment to equity, diversity and inclusion by taking concrete actions, both internally and within the ecosystem.

Of the six regional genome centres in Canada, Génome Québec is the only one to operate technology centres of national and international standards. This visibility provides a significant strategic advantage, since its technology services are managed according to a cost-recovery business model that allows profits to be reinvested in the organization's mission. Génome Québec's suite of technological tools and services is not only a source of organizational pride and a crown jewel of the Québec ecosystem but also a lever of business growth whose full potential is still untapped.

**Commitment 4:** Génome Québec will prioritize agility, appeal, transparency, and the diversification of its funding sources to optimize its distinctive business model.

**Strategy 10:** Develop mutually beneficial partnership models with a view to growth and the establishment of self-sustaining operations.

**Strategy 11:** Optimize administrative processes while providing agile, versatile support to fulfill our mission.

**Strategy 12:** Promote our employer brand to attract and retain diverse talent.

**Strategy 13:** Strengthen society's engagement in genomics by drawing inspiration from international leaders in genomics education and value promotion.

| Focus 1 | Focus 2 | Focus 3 | Focus 4 |
|---|---|---|---|
| **INSIGHTS** | | | |
| The health care network has been severely tested in recent years. It's become clear that change is urgently needed. The health care network is in need of radical transformation, and innovation is the key to meeting that challenge. | Increasingly frequent geopolitical and climate challenges are having a significant impact on health security, biofood production, forest health, and biodiversity. | The biggest challenge in innovation is keeping pace with technological change and making the most of Big Data in a consistent, ethical and structured way. | In a time of responsible, proactive and inclusive governance, organizations need to be creative and turn to innovative business models to contribute to Québec's socioeconomic growth. |
| **COMMITMENTS** | | | |
| Génome Québec will be proactive in helping create innovative solutions to support the development of genomic medicine and facilitate its integration into the health care system. | Génome Québec will keep promoting the development of genomic solutions to meet environmental, climate and health challenges. | Génome Québec will maintain its leadership role, continue to offer advanced technological services and expertise, and create a framework that helps users exploit the full potential of genomic data, all while fostering the development of a cohesive service offering within Québec's genomics ecosystem. | Génome Québec will prioritize agility, appeal, transparency, and the diversification of its funding sources to optimize its distinctive business model. |
| **STRATEGIES** | | | |
| **Strategy 1:** Structure and fuel innovation flow in genomic medicine and help integrate it into the health care system by looking to proven successes in other parts of the world.<br><br>**Strategy 2:** Capitalize on our distinctive approach and diversity of funding programs to support the full spectrum of innovation in personalized medicine, with a focus on Québec start-ups and SMEs.<br><br>**Strategy 3:** Mobilize stakeholders to exploit the full potential of genomics. | **Strategy 4:** Improve the resilience, productivity and sustainability of the biofood sector.<br><br>**Strategy 5:** Promote the use of genomics in environmental and natural resource sectors.<br><br>**Strategy 6:** Foster a One Health approach to meet cross-sectoral challenges and drive the advancement of genomics. | **Strategy 7:** Bring the Centre d'expertise et de services Génome Québec (CES) toward a one-stop-shop model that makes it foundational, diversified (omics), efficient, and internationally recognized for its high standards of quality.<br><br>**Strategy 8:** Harness the full potential of omics data to accelerate the development and commercialization of genomics innovation.<br><br>**Strategy 9:** Support growth in the emerging technologies sector. | **Strategy 10:** Develop mutually beneficial partnership models with a view to growth and the establishment of self-sustaining operations.<br><br>**Strategy 11:** Optimize administrative processes while providing agile, versatile support to fulfill our mission.<br><br>**Strategy 12:** Promote our employer brand to attract and retain diverse talent.<br><br>**Strategy 13:** Strengthen society's engagement in genomics by drawing inspiration from international leaders in genomics education and value promotion. |

GenomeQuébec

We would like to thank the Ministère de l'Économie, de l'Innovation et de l'Énergie du Québec for its trust and unwavering support. Thanks also to Genome Canada, our federal partner.