

INVENT DEVELOP MARKET QRIIS²

THE 2022-2027

QUÉBEC RESEARCH AND INNOVATION

INVESTMENT STRATEGY



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MESSAGE FROM THE PREMIER



The Québec government has made innovation a mainstay of its economic vision to enrich Québec society as a whole. It is a vision for the future that hinges on innovation in all regions and enhanced business productivity. Such a vision will help us meet the major challenges that we are facing, whether climate change, the ageing of the population, or access to healthcare.

The 2022-2027 Québec Research and Innovation Investment Strategy is ambitious. For a start, it will link all stakeholders in the innovation cycle from the concept stage to commercialization. It will also make support services simpler and more accessible to organizations. Next, it will rely more extensively on sustainable development and social innovation. Lastly, it will facilitate the adoption by public institutions of all forms of innovation.

Key measures and several structuring initiatives for Québec's future, especially innovation zones, will be implemented over the next five years. We are relying on the participation of the research, innovation, and investment sectors to make the strategy a success.

We have an opportunity to build a bold Québec that invests in research and innovation to stand out at the global level. Let us work together to achieve this ambition and ensure that it benefits all Quebecers.

Le premier ministre du Québec,

A handwritten signature in black ink that reads "François Legault". The signature is fluid and cursive.

François Legault

MESSAGE FROM THE MINISTER OF ECONOMY AND INNOVATION



Invent, develop, and market are the watchwords of *The 2022-2027 Québec Research and Innovation Investment Strategy*. The strategy highlights the key role that research and innovation play in enhancing our productivity, thereby creating collective wealth. Moreover, the main objective of the strategy is to at least halve by 2027 the gap with Ontario in labour productivity in the business sector.

To do so, we must rely more extensively on Québec's strengths in the realm of research so that innovations are better marketed and can engender direct economic spin-off and be reinvested in research. That is the innovation cycle. The transfer, development, and commercialization of our ideas continue to pose challenges. The establishment of an environment conducive to innovation from the standpoint of the performance of organizations, research infrastructure, regulations, the ability to navigate in the innovation ecosystem, the government's ability to integrate innovation, or financial incentives, is an essential condition for the success of our efforts.

The choice of the buoyant sectors and structuring projects in which to invest is just as important to ensure that our innovations focus on major societal challenges such as climate change. Artificial intelligence, quantum technologies, the life sciences, aerospace, transportation electrification, natural resources, and renewable energies are niches in which Québec excels and has already achieved international renown. To maintain our renown in these sectors, we must emphasize all the more so the links in the innovation cycle that need broader support.

Through this new strategy, the government intends to generate investments that satisfy Québec's ambitions and monitor on an ongoing basis the attendant economic and societal outcomes. In this way, we can measure the real repercussions of our initiatives and make the necessary adjustments, for the benefit of Québec society.

Le ministre de l'Économie et de l'Innovation et ministre responsable du Développement économique régional,



Pierre Fitzgibbon

MESSAGE FROM THE MINISTER OF HIGHER EDUCATION



Québec is fortunate in being able to rely on a research, science and technology network that excels at home and abroad. Québec researchers are making major discoveries in our establishments and some of them are recognized and relayed the world over. The momentum is continuing at a time when the networks are mobilizing to better match training and the needs of different sectors, create synergy, and pool complementary expertise.

Through *The 2022-2027 Québec Research and Innovation Investment Strategy*, we will rely more extensively on the initiatives of the Fonds de recherche du Québec, which have repeatedly served as levers adapted to the needs of researchers in the fields of nature, technologies, health, culture, and society. Discoveries rarely occur alone, and this is why we wish to encourage greater agility, innovation, and the capacity of our knowledge ecosystem.

Because research represent, first, a question of knowledge and, therefore, education and entrepreneurship, our strategy will focus on the development of a scientific and innovation culture. It will also foster in Québec the presence of a new generation in the field comprising talented individuals with key skills. We must collectively transmit to young people a passion for science and innovation and harness their contribution to society. Each of us has a role to play in Québec's future development.

La ministre de l'Enseignement supérieur,

A handwritten signature in black ink, appearing to read 'D. McCann', written in a cursive style.

Danielle McCann

MESSAGES FROM THE PARLIAMENTARY ASSISTANT AND INNOVATION TRIO

The 2022-2027 Québec Research and Innovation Investment Strategy stems from noteworthy mobilization and impressive collaboration among all the stakeholders in the innovation cycle from the research, entrepreneurship, and investment sectors. Moreover, government departments and bodies are making concrete gestures to revitalize the innovation culture in public institutions and ensure the coherence of government initiatives.

The consultation approach that spearheaded this strategy was an enriching, stimulating process. In addition to highlighting the concerns of various groups and sectors, it has enabled Québec society and, in particular, interveners in the research and innovation ecosystem, to grasp current issues. Above all, it is the thousands of ideas collected that have encouraged us the most for the future.

What we read in the briefs, heard during the regional tour, and confirmed during the Grand Rendez-vous de l'innovation québécoise confirms a determination to join forces for the benefit of an innovative, proud Québec that is open to the world. What you will note in this strategy is the shared desired to encourage Québec to surpass itself, grow stronger, and achieve renown at home and abroad. Québec has set its sights on success.

We would like to thank everyone who participated in this sweeping collaborative, pooling effort that underpins *The 2022-2027 Québec Research and Innovation Investment Strategy*.

L'adjointe parlementaire du ministre de l'Économie
et de l'Innovation (volets innovation et entrepreneuriat),



MarieChantal Chassé

Le scientifique en chef du Québec,



Rémi Quirion

L'innovateur en chef du Québec,



Luc Sirois

La première vice-présidente,
Stratégies et solutions d'affaires
chez Investissement Québec,



Sylvie Pinsonnault

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INTRODUCTION

The government is determined to bolster the prosperity of all Quebecers. Its initiatives seek to attain a level of economic strength comparable to that of its neighbours while making the economy greener. Innovation and productivity are at the root of this vision for the future. Such a vision hinges on the commercialization of recent technologies, the intensification of our innovation culture, and the consolidation of synergy between the research sector and businesses operating in sectors in which Québec enjoys an advantage.

By relying on its advantages, Québec is already advancing on several fronts in the realm of innovation. Over the years, it has established a scientific research base of international calibre. Links have been forged between stakeholders in the research and innovation ecosystem. Québec is positioning itself as a leader in innovative fields such as artificial intelligence and quantum technologies.

To make its firms even more productive and enhance their social and environmental impact, Québec must now, more than ever, accelerate the transition from ideas to the market.

The 2022-2027 Québec Research and Innovation Investment Strategy (QRIS²) will launch significant efforts throughout the innovation cycle. It will spur the discovery, transformation into innovations, and commercialization of innovative ideas. In addition to bolstering productivity and helping to meet societal challenges, the resulting spin-off will contribute to creating innovative ideas, thereby perpetuating the innovation cycle.

To this end, the Québec government is adopting the means to match its ambitions. The 2022-2027 QRIS² provides for more than \$7.5 billion over the next five years to mobilize leaders in all regions of Québec in the research, innovation, entrepreneurship, industry, public, and investment sectors to jointly find innovative solutions to the challenges ahead.

An ambitious, winning economic vision for Québec

Going forward, major projects will structure the government's initiatives aimed at enhancing productivity, promoting the purchase of Québec products to reduce reliance on imported goods, increasing exports, broadening innovation on the market, relying on a skilled, adapted labour force, and developing the energy sector to render the economy greener by reducing greenhouse gases (GHG). Accordingly, the government intends to spur new economic momentum that will create sustainable wealth and high-paying jobs in all regions of Québec.

An innovative Québec is the key to prosperity

Innovation is at the root of the priority projects in this economic vision. The government wishes to act in order, by way of an example, to:

- bolster productivity by increasing the size of businesses and automating and digitizing their operations to enable Québec to export more and become self-sufficient in certain strategic sectors;
- maximize spin-off from research and the commercialization of innovations;
- introduce innovation zones and foster the delivery of innovation projects;
- ensure that Québec adopts the innovations stemming from public research and its businesses.

Unprecedented mobilization for research and innovation

The 2022-2027 QRIS² hinges on a sweeping consultation:

- 233 briefs were received;
- a virtual regional tour was organized in collaboration with MarieChantal Chassé, Parliamentary Assistant to the Minister of Economy and Innovation [innovation and entrepreneurship sections], Rémi Quirion, Chief Scientist of Québec, and Luc Sirois, Chief Innovator of Québec, to define the priorities of the Québec research and innovation (R&I) ecosystem;
- the Grand Rendez-vous de l'innovation québécoise, organized with the support of the Conseil de l'innovation du Québec, assembled more than 2 500 participants and asked the Premier and several ministers to speak. It consolidated the consultative process and presented the government's policy directions in the realm of R&I.

Other groups were consulted, in particular businesses from all over Québec, the representatives of strategic groups, College Centres for the Transfer of Technologies (CCTTs), applied research centres, and the thematic networks of the Fonds de recherche du Québec, as well as secondary school, CEGEP, and university students.

Several proposed enhancements to R&I-related processes were put forward:

- the simplification of the R&I ecosystem;
- enhanced smoothness in the stages of the research and innovation cycle;
- unfailing support for basic and applied research;
- an accelerated transition from ideas to the market;
- broader support for the creation and rapid development of innovative enterprises;
- the development and attraction of innovative workers;
- the complementarity and coherence of government initiatives.

The discussion forums at the Grand Rendez-vous de l'innovation québécoise

The Grand Rendez-vous de l'innovation québécoise was held on November 18 and 19, 2021. Discussion and exchange forums focusing on various themes took place on November 19. The Conseil de l'innovation du Québec, in collaboration with partner organizations and sector leaders, organized the event, which examined:

- labour and talent;
- social innovation;
- start-ups and entrepreneurship;
- innovation in the healthcare sector;
- energy and mobility;
- the academic research sector;
- climate change;
- the development by businesses of in-house innovation;
- the development of public research.

The forums produced observations and courses of action to elaborate the 2022-2027 QRIS².





AN AMBITIOUS VISION FOR THE FUTURE FOR QUÉBEC

A bold, ambitious Québec that invests in sustainable, inclusive research and innovation to excel at the global level and create more economic and social wealth

Invent, develop, and market: A new, more effective approach

The 2022-2027 QRIS² introduces mechanisms and tools to satisfy the needs and challenges now facing stakeholders in the Québec research and innovation (R&I) ecosystem and relies on their mobilization. It promotes an original approach that hinges primarily on:

- linking all stakeholders in the innovation cycle, from the concept stage to commercialization;
- making innovation support services simpler, more accessible, and better known among businesses and organizations to accelerate innovation projects;
- ensuring the government's contribution by adopting innovations in public institutions and enhancing the coherence of government initiatives;
- strengthening accountability and ensuring ongoing evaluation of measures and stakeholders to maximize their effectiveness;
- relying extensively on sustainable development and social innovation.

Link all stakeholders in the innovation cycle, from the concept stage to commercialization

The government recently adopted structuring measures to link stakeholders engaged in all forms of research and innovation, including those in the realm

of investment capital. It wishes to foster partnerships by simplifying and making more effective assistance to businesses and innovators throughout Québec. The measures adopted are indicated below.

- The mandate of Investissement Québec (IQ) now includes financing and investment, consulting services, innovation and export support functions, and investment prospecting abroad. As for business services, the integration of the Centre de recherche industrielle du Québec (CRIQ) into IQ (IQ-CRIQ) now enables the latter to offer support and adoption services pertaining to innovative technologies.
- Axelys, the new public research development corporation, seeks to contribute to Québec's economic and social prosperity by accelerating the valuation, transfer, and commercialization of high-potential innovations stemming from public research.
- The introduction of innovation zones focusing on promising sectors, which assemble in an attractive, inspiring living environment stakeholders in research, innovation, industry, and investment, is under way.
- The Chief Innovator of Québec has been appointed and the Conseil de l'innovation du Québec has been established to develop an innovation culture in businesses and facilitate access to resources and expertise in this field.
- The Chief Scientist of Québec is involved in the Conseil de l'innovation du Québec, especially in the context of the elaboration of the 2022-2027 QRIS².

Mechanisms will also be established so that financial returns generated by government initiatives to market innovations are reinvested in basic research and emerging professionals, i.e., the innovation cycle. To ensure the cycle's functioning, scientific activities must be linked to society's and the market's needs.

The Conseil de l'innovation du Québec is at the forefront in the 2022-2027 QRIS²

Established in December 2020, the Conseil de l'innovation du Québec has a mission to revitalize innovation in businesses and Québec society. The Minister of Economy and Innovation appointed Luc Sirois to the position of Director General of the Conseil de l'innovation du Québec and Chief Innovator of Québec.

Chaired by Sophie D'Amours, Rector of Université Laval, and supported by a team of eminent members from the private and public sectors, the Conseil has a mandate to gather information to advise the Minister to elaborate strategies aimed at spurring innovation and entrepreneurship and broadening their economic and social spin-off in sectors of crucial importance to Québec's future.

Through the establishment of the Conseil de l'innovation du Québec, the Minister is seeking to consolidate Québec's innovation ecosystem to make it easier to navigate and forge closer ties between public and private organizations.

Make innovation support services simpler, more accessible, and better known among businesses and organizations to accelerate innovation projects

Government-funded, effective teams of business advisors are found throughout Québec that are active in organizations such as Investissement Québec, Accès entreprise Québec, regional growth and acceleration hubs, chambers of commerce, industrial clusters, sectoral industrial research clusters, College Centres for the Transfer of Technologies, and other research and transfer centres.

The ecosystem's diversity is a strength but businesses all too often have difficulty navigating it.

Through the 2022-2027 QRIIS² the government will help businesses navigate the research and innovation (R&I) ecosystem, especially by enhancing referrals of the resources available to businesses, thereby accelerating their innovation projects. To this end, the government will support, by way of an example, the Conseil de l'innovation du Québec, to steer entrepreneurs and business executives to the appropriate stakeholders and organizations in the R&I ecosystem to train business advisors.

Ensure the government's contribution by adopting innovations in public institutions and enhancing the coherence of government initiatives

The desire to make innovation a mainstay of the Québec government is apparent and necessary to build a more effective public service, make the healthcare system more efficient, satisfy needs for more qualified workers, support innovative, competitive suppliers, and catalyse technological and social innovations for the benefit of Quebecers and the environment.

The 2022-2027 QRIIS² affords public authorities and government departments and bodies an opportunity to play their role in the development of an innovative society by setting an example, displaying boldness, and using the powerful levers available to them to act in respect of supply and demand for innovations.

It is also an opportunity to establish better governance of R&I through more efficient decision-making, clear priorities, and the broader complementarity and coherence of government initiatives.

In this respect, the Comité interministériel de la recherche et de l'innovation (CIRI) will be revitalized following the rollout of the 2022-2027 QRIIS² through the contribution of the Chief Scientist of Québec, the Chief Innovator of Québec, and Investissement Québec (IQ), whose leadership and expertise will sustain it.

What is more, the 2022-2027 QRIIS² is proposing measures to enhance both the adoption of innovations in public institutions and the coherence of government initiatives:

- more extensively structure the integration of R&I into the entire array of initiatives and activities of government departments and bodies, which will be encouraged to formalize their commitment and strategic vision in the realm of R&I. Consensus building with the MEI will, however, be part of the process that affords government departments and bodies complete autonomy in their strategic choices

and the implementation of and follow-up to their initiatives; connect a community of practice, comprising specialists and the heads of R&I questions in the member government departments and bodies of the CIRI to further develop the exchange of strategic information and experience on R&I projects in Québec and abroad;

- initiate calls for innovative solutions to meet societal challenges. In the context of this new initiative, government departments and bodies will rely on the vital forces of R&I in Québec to pinpoint and develop innovative solutions to current challenges such as climate change, the ageing of the population, labour shortages, or access to healthcare services;
- determine and implement regulatory streamlining and amendments, and introduce adapted financial support to promote innovation, especially through government procurement.

Public institutions have a key role to play both as the suppliers of key factors in the development of an innovative society and as the users of innovative technologies and approaches. Moreover, certain government departments are contributing to supplying the inputs that innovation requires, and others can spur the integration of innovation into the products, services, and processes of their clientele. By committing themselves to a structured, concerted approach, the government departments and bodies are creating winning conditions for a more innovative society. Several government departments are already in action. Here are some examples:

The Ministère de la Santé et des Services sociaux du Québec (MSSS)

To meet its priority health-related challenges, the MSSS has established a strategic innovation committee, a permanent decision-making body that is seeking to adopt a clear vision and communicate it to the key stakeholders in the innovation ecosystem to simplify the innovation adoption process in the health and social services network (HSSN). Accordingly, the MSSS and the HSSN are assuming a key role in the testing, development, and adoption of innovations and in innovative procurement. This continuum will facilitate the establishment of the foundations for the use of innovations based on value and their direct impact on patients. The strategic innovation committee is supported by the Bureau de l'innovation du MSSS, established in May 2018 with the mission to adopt a vision, guide innovation-related strategies and activities, and coordinate efforts to accelerate the adoption of innovations in the HSSN.

Concrete expression will be given to this vision in synergy with the initiatives carried out by key partners such as the MEI, bearing in mind the priorities and needs of the HSSN. It will hinge on the levers implemented in the context of two government strategies, i.e., *The 2022–2025 Québec Life Sciences Strategy* and the 2022–2027 QRIS.²

The Ministère de l'Éducation du Québec (MEQ)

The Ministère de l'Enseignement supérieur du Québec (MES)

In the MEQ, innovation is serving school success

The government has set as its objective that 90% of young people obtain a diploma or qualification. This ambitious objective corresponds to the highest international standards in the realm of education.

The MEQ has committed itself in the implementation of its educational mission to an innovation approach that will be introduced in collaboration with the school system and key players in the digital intelligence ecosystem.

First, the MEQ is carrying out an organizational transformation project to enhance its performance and agility. An ongoing review of oversight and programs of study will then be carried out to ensure that they remain adapted to new realities and are based on convincing data. Lastly, digital intelligence will better equip the MEQ and the education community to facilitate their initiatives and decision-making by:

- selecting and using the most relevant data, which will pave the way to more efficient analyses;
- developing data to make them decision support tools that allow for quicker response to the most pressing needs;
- using artificial intelligence to act preventively.

The successes already observed in preventing dropping out of school in two pilot projects conducted in two school service centres have led to the development of bigger projects involving digital technology and artificial intelligence. More than \$10 million has been earmarked and work has begun to further these initiatives with certain recognized partners such as the Quebec Artificial Intelligence Institute (Mila), the International Observatory on the Societal Impacts of AI and Digital Technology (OBVIA), and the Institut de valorisation des données (IVADO).

With the MEQ's commitment, the government is establishing the conditions for collaboration and consensus building necessary to contemplate ambitious projects and efficiently introduce its innovation projects.

New momentum in the universities and colleges supported by the MES

This momentum seeks college and university training offerings that considers the advancement of knowledge and the innovation cycle. The MES and the university network are already in action with the report on the Québec university of the future underpinning the elaboration of promising short-, medium-, and long-term measures to ensure that the universities display broader agility, innovation, and the ability to achieve renewal.

The MES is also working with the college network to broaden collaboration between the training and research sectors.

Consequently, the networks are mobilizing to better match training and the needs of different users, create synergy, and pool complementary expertise. What is more, this approach is crucial in the designation of innovation zones (IZ). In this respect, the integrated inter-level (college-university) research, innovation, and training cells in the Sherbrooke area IZ will provide a striking example of unique, innovative collaboration sites.

The Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ)

Governance for research and innovation in the MAPAQ

The *Politique bioalimentaire 2018-2025 – Alimenter notre monde* and the *Plan d'agriculture durable 2020-2030* make R&I a strategic pillar of government initiatives by relying on broader reliance on R&I with a leverage effect among partners and the strengthening of synergy between stakeholders to support research and innovation.

Accordingly, the MAPAQ has appointed a scientific coordinator who receives specific mandates to foster a coordinated, concerted scientific approach to support the implementation of policies and the choice of strategic R&I priorities. The coordinator and his team establish links between scientific experts in the MAPAQ and external partners, including the Chief Scientist of Québec and the Chief Innovator of Québec and can call upon MAPAQ experts to focus on specific issues. This coordination engenders favourable conditions to increase partnerships with stakeholders in the innovation chain in the biofood sector, other government departments, and granting agencies.

The MAPAQ has also adopted a *Politique sur la conduite responsable en recherche* (CRR) that applies to the activities that it supports financially. The CRR is an indispensable departmental guideline to ensure that research remains credible, objective, dependable, and responsible.

Strengthen accountability and ensure ongoing evaluation of measures and stakeholders to maximize their effectiveness

To ensure performance, provision must be made for ongoing adjustments to the strategy. Accordingly, initiatives are monitored regularly in order to revise them if necessary.

The strategy must also draw inspiration from best practices in Québec and abroad. Thus, a significant benchmarking initiative revealed the successful nations from which Québec can draw inspiration to achieve improvements, especially from the standpoint of business research and development (R&D) investments, technology transfers, and the commercialization of innovations. Several international rankings reveal that countries such as the United States, Germany, Israel, South Korea, Singapore, and the Scandinavian countries have achieved success.

To ensure ongoing adjustment based on Québec's performance and best practices, the 2022-2027 QRIS² relies on new tools focusing on analysis, consultation, accountability, and the assessment of innovation initiatives and stakeholders supported by the government to maximize their impact.

The Innovation Barometer

Without data, we have to play it by ear. The *Innovation Barometer*, managed by the Conseil de l'innovation du Québec, responds to a need expressed by stakeholders in the R&I ecosystem.

It seeks to analyze Québec's R&I capacity at the regional and provincial levels and key areas of activity to offer decision-makers the necessary information to support collective prosperity and face societal challenges such as labour shortages and environmental issues. The first edition of the *Innovation Barometer* will be published in 2022. It is based on extensive collaboration in the Québec R&I ecosystem.

For example, to support the objective of Québec's collective prosperity, statistical indicators such as GDP, productivity, business R&D expenditures, or the use of government incentives will be analyzed by sector and bolstered by data drawn from a survey conducted among businesses and compared with the performance of the other Canadian provinces.

All told, about 20 sectors, such as aerospace, the life sciences, and the agri-food industry, will be analyzed. For each sector, data will guide businesses and organizations that wish to innovate by increasing their investments in machinery, materials and in ICTs, by developing more collaborative projects, or by planning energy transitions.

A framework to ensure the research and innovation ecosystem's performance and sound accountability

Québec is relying on a vast R&I ecosystem. In collaboration with the Conseil de l'innovation du Québec and ecosystem stakeholders, reflection will be initiated on how to pool efforts to attain the shared objective of creating value. The approach will seek to:

- clarify roles and expertise and foster complementarity;
- broaden the ties between R&I ecosystem stakeholders;
- recognize the excellence of organizations in their fields and demonstrate the relevance and impact of their initiatives among users;
- include more extensive performance indicators to support higher-impact projects;
- position the mandates of R&I ecosystem stakeholders in relation to the overall targets of the 2022-2027 QRIS².

The government undertakes to adopt the necessary initiatives to ensure effective intervention, especially through the reassessment of the performance and the business models of partner organizations and the selection criteria governing the projects to be supported.

A better integrated consultative approach

During the consultations surrounding the 2022-2027 QRIS², several stakeholders indicated the importance of consulting them on an ongoing basis. R&I-related challenges are changing rapidly while traditional consultation approaches concerning government strategies are often limited and demand significant resources.

To ensure that it adjusts the initiatives and finds solutions adapted to the challenges at hand, the government is undertaking to pursue active exchanges with its partners and other R&I ecosystem partners through a more integrated consultation process than was previously the case.

Ongoing consultation will simultaneously facilitate the dissemination of the government's R&I-related good practices, evaluate on an ongoing basis the advancement and spin-off from the 2022-2027 QRIS², and help the government to implement measures in the coming years.

Support sustainable development and social innovation

Québec must mobilize all groups and protect its environment to be a genuine leader in the realm of innovation and ensure its prosperity.

Through the 2022-2027 QRIS², the government intends to contribute to sustainable development and the fight against climate change. In addition to supporting specific projects, especially under *The 2030 Plan for a Green Economy*, the R&I ecosystem is prepared to go further. Efforts to do so are being made at all stages of the innovation cycle, for example:

- the Fonds de recherche du Québec are making sustainable development and climate change one of the key societal challenges to be met;
- the Conseil de l'innovation du Québec states that sustainable development and the fight against climate change are a sector conducive to innovating in Québec;
- Axelys is integrating responsible innovation into its values;
- Investissement Québec has launched Compétivert, an initiative to encourage businesses to adopt clean technologies and ecoresponsible practices to become more competitive while reducing their environmental footprint;
- Investissement Québec will introduce a tool that enables it to integrate environmental, social, and governance issues into the analysis of financing and investment projects according to its responsible investment and sustainable financing policy.

Furthermore, the effective commercialization of innovative technologies and products often requires the adoption of novel approaches in organizations and communities. Social innovation is, therefore, vigorously promoted. The 2022-2027 QRIS² relies on social innovation, for example in respect of transformation projects stemming from society's needs. The strategy will focus on users and give them the benefit of high-level research conducted in these fields in Québec. Through 2022-2027 QRIS², the government is undertaking to find the means to foster equity, diversity and inclusion (EDI) to better integrate diverse groups in society with respect to science, research, and innovation.

To do so, sustained collaboration with, for example, the Ministère de l'Environnement et de la Lutte contre les changements climatiques and the Secrétariat à la condition féminine will continue throughout the strategy's rollout.

Support for research and innovation in The 2030 Plan for a Green Economy

The 2030 Plan for a Green Economy (2030 PGE), through the implementation plan, lays the foundations of government initiatives aimed at attaining by 2030 Québec's greenhouse gas emission reduction targets, i.e., a 37.5% reduction in relation to the 1990 level, and the attainment by 2050 of carbon neutrality. The implementation plan includes numerous measures implemented by Québec government departments and bodies.

Funding for the measures comes mainly from revenues generated by carbon market auction sales paid into the Electrification and Climate Change Fund (ECCF) but can also come from other government strategies. For example, the Ministère de l'Économie et de l'Innovation (MEI) is responsible for *The 2018-2023 Action Plan for Growth and Clean Technologies*.

Accordingly, several measures are being implemented through collaboration between the MEI and stakeholders in the R&I ecosystem. The 2022-2027 QRIS² is supporting the stakeholders, in tandem with other sectoral strategies contributing to the implementation plan, thereby engendering structuring outcomes, in particular:

- collaborative industrial research projects aimed at GHG emission reductions. The projects rely on sectoral industrial research groups such as InnovÉÉ (Innovation en énergie électrique) in the realm of transportation electrification, or the CRIBIQ (Consortium de recherche et innovation en bioprocédés industriels au Québec), which carry out projects devoted to the environment and the circular economy;
- projects focusing on adaptation to climate change, especially with Ouranos;
- interdisciplinary decarbonization projects to decompartmentalize technological and social innovation, especially with the Fonds de recherche du Québec;
- innovation projects to develop a battery recycling industry.



A far-reaching plan with ambitious objectives

Five strategic priorities

The 2022-2027 QRIS² hinges on five strategic priorities:

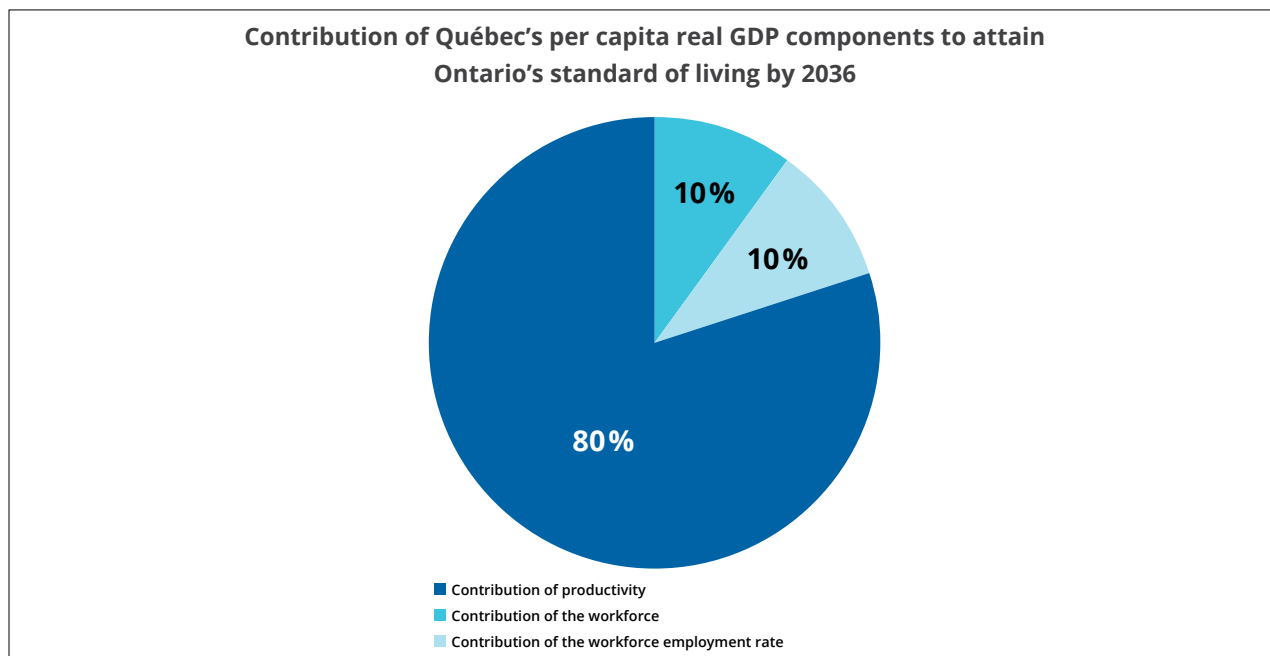
- Strategic priority 1: Excel in research, science, and technology
- Strategic priority 2: Create an environment conducive to the development of innovation
- Strategic priority 3: Support in-company investments and the commercialization of innovations
- Strategic priority 4: Develop talent and a scientific and innovation culture
- Strategic priority 5: Support promising sectors and catalyst projects

The strategic priorities will be introduced through key measures and structuring initiatives for Québec's future, in particular the innovation zones and innovative projects throughout Québec.

An ambitious target of the 2022-2027 QRIS²

The government's economic ambition is to increase the wealth of all Quebecers. To this end, it has set as its objective to reduce the real GDP per capita gap with Ontario to 10% by 2026 and to completely eliminate it by 2036. The pre-pandemic gap in 2019 stood at 15%.

To overcome the wealth discrepancy with Ontario, the two key components of real GDP, labour and labour productivity, must be harnessed. That being the case, labour productivity is the key lever to increase wealth since it represents 80% of the gap, compared with labour, which represents 20%.



Sources: Institut de la statistique du Québec, Statistics Canada, Ontario Ministry of Finance, and Ministère des Finances du Québec. *2021 Fall Economic Update*, page B.5.

The 2022-2027 QRIS² dwells, in particular, on the enhancement of the labour productivity of businesses, which depends on human and physical capital and the innovation that businesses harness.

By 2027, the main objective of the 2022-2027 QRIS² is to reduce by at least half the labour productivity gap with Ontario in the corporate sector, which stood at 5.8% in 2019.

- The pre-pandemic gap stood at \$2.90 of real GDP per hour worked in the corporate sector in 2019, with \$51.00 of real GDP per hour in 2019 in Québec and \$53.90 of real GDP per hour in Ontario, in 2012 chained dollars.

Technological and process innovation is at the root of enhanced business productivity in Québec. Other strategies will be mobilized to attain this objective, especially *the Plan d'action pour la relance des exportations* and support programmes in capital investments (ESSOR) and in digitization (the Digital Transformation Offensive [DTO]).

A financial effort to match Québec's ambitions

Over the next five years, the government will allocate more than \$7.5 billion to create a solid R&I footing in Québec.

This overall amount includes a budgetary base already planned for R&I and an additional budget of nearly \$2 billion earmarked for R&I in the *Budget Plan 2022-2023*.

Some \$1.3 billion of the additional budget comes from budgetary appropriations, \$600 million from investment capital financing operations, and investments of \$75 million under the *Québec Infrastructure Plan* (QIP).

The 2022-2027 financial framework

Table 1 – Financial framework of the 2022-2027 QRIS² (millions of dollars)

| | | APPROPRIATIONS | | | | | | IC ⁵ | QIP ⁵ |
|---|--------------------------------|----------------|------------|------------|------------|------------|--------------|--------------------------|------------------|
| | | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL | | |
| Strategic priority 1: Excel in research, science, and technology | Budgetary base ¹ | 221 | 217 | 217 | 217 | 217 | 1 090 | | 601 |
| | Additional budget ³ | 63 | 66 | 73 | 72 | 74 | 349 | | 75 |
| SUBTOTAL, SP 1 | | 284 | 283 | 291 | 290 | 292 | 1 440 | | 676 |
| Strategic priority 2: Create an environment conducive to the development of innovation | Budgetary base ¹ | 44 | 33 | 29 | 14 | 14 | 136 | | |
| | Additional budget ³ | 25 | 32 | 32 | 26 | 26 | 139 | | |
| SUBTOTAL, SP 2 | | 69 | 65 | 61 | 40 | 40 | 275 | | |
| Strategic priority 3: Support in-company investments and the commercialization of innovations | Budgetary base ¹ | 47 | 23 | 2 | 2 | 2 | 77 | 308 ² | |
| | Additional budget ³ | 78 | 50 | 50 | 28 | 28 | 234 | 600 ² | |
| SUBTOTAL, SP 3 | | 125 | 73 | 52 | 30 | 30 | 310 | 908 | |
| Strategic priority 4: Develop talent and a scientific and innovation culture | Budgetary base ¹ | 7 | 7 | 4 | 4 | 4 | 26 | | |
| | Additional budget ³ | 46 | 49 | 44 | 44 | 44 | 226 | | |
| SUBTOTAL, SP 4 | | 53 | 55 | 48 | 48 | 48 | 252 | | |
| Strategic priority 5: Support promising sectors and catalyst projects | Budgetary base ¹ | 138 | 123 | 35 | 35 | 5 | 335 | | |
| | Additional budget ³ | 68 | 84 | 81 | 60 | 58 | 352 | | |
| SUBTOTAL, SP 5 | | 206 | 207 | 116 | 95 | 63 | 686 | | |
| TOTAL, BUDGETARY BASE¹ | | 457 | 403 | 288 | 273 | 243 | 1 663 | 308 | 601 |
| TOTAL, ADDITIONAL BUDGET³ | | 280 | 280 | 280 | 230 | 230 | 1 300 | 600 | 75 |
| TOTAL | | 737 | 683 | 568 | 503 | 473 | 2 963 | 908 | 676 |
| TOTALS, APPROPRIATIONS, INVESTMENT CAPITAL AND QIP | | | | | | | | 4 547 | |
| ESTIMATED COST IN TAX EXPENDITURES | | | | | | | | 2 971⁴ | |
| TOTAL, 2022-2027 | | | | | | | | 7 518 | |

Note: Since figures are rounded, they may not add up to the total shown.

1. The budgetary base in the MEI and the Fonds de recherche du Québec does not consider appropriations related to research infrastructure and those related to investment capital.
2. The Impulsion PME program is included in the amounts.
3. The funds are related to the announcement of the 2022-2027 QRIS² in the March 2022 Budget Plan.
4. Ministère des Finances estimate. Includes, in particular, R&D tax credits, the incentive deduction for the commercialization of innovations in Quebec, and the tax holidays for foreign experts and researchers.
5. Investment capital (IC) – Investment in infrastructure (QIP).







Strategic priority 1: Excel in research, science, and technology

Québec can rely on an established network of colleges, universities, and research centres. It has established internationally renowned ecosystems and state-of-the-art research and transfer infrastructure in several fields, such as artificial intelligence, quantum technologies, aerospace, the life sciences, and sustainable development. These strengths underpin future innovations and represent a powerful lever to attract private and foreign investments.

At a time when the challenges in the realm of research are becoming increasingly complex and society and businesses have numerous needs, Québec must take decisive action to continue to excel in research. In the context of the 2022-2027 QRIS², the Fonds de recherche du Québec will work with the stakeholders to position research to better respond to the key challenges facing society, the challenges facing partners, and market needs.

The government will support two complementary developmental initiatives to underpin and promote Québec's excellence in research:

- support the initiatives of the Fonds de recherche du Québec;
- promote synergy in the research ecosystem.

Table 2 – Strategic priority 1: Excel in research, science, and technology (millions of dollars)

| | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL ¹ |
|--|--------------|--------------|--------------|--------------|--------------|--------------------------|
| Initiative 1 Support the initiatives of the Fonds de recherche du Québec | 37.1 | 39.1 | 41.1 | 43.1 | 45.1 | 205.3 |
| Initiative 2 Promote synergy in the research ecosystem | 26.3 | 26.9 | 32.4 | 29.3 | 29.3 | 144.1¹ |
| TOTAL ADDITIONAL BUDGET, STRATEGIC PRIORITY 1 | 63.3 | 65.9 | 73.5 | 72.3 | 74.3 | 349.3 |
| TOTAL, STRATEGIC PRIORITY 1 INCLUDING BUDGETARY BASE | 284.0 | 283.3 | 290.9 | 289.7 | 291.7 | 1439.7 |

Note: Since figures are rounded, they may not add up to the total shown.

1. Does not include the funds recorded in the research sector under the Québec Infrastructure Plan (\$75.2 million).

It is crucial to adequately fund research to enable Québec to continue to excel. We must also encourage to the utmost collaboration between public research stakeholders and users, including businesses.

Two indicators will evaluate Québec’s performance in the realm of research:

Targets of strategic priority 1

- Reach Ontario’s level and surpass the Canadian level by increasing to 9% business R&D funding carried out in the higher education system (in 2019, 6% in Québec, 9% in Ontario, compared with the Canadian average of 8%).
- Increase R&D activities in the higher education system to reach 0.90% of GDP over five years (in 2019, 0.87% in Québec and 0.96% in Nova Scotia) and thus remain among the top three Organisation for Economic Co-operation and Development (OECD) member nations.

Initiative 1: Support the initiatives of the Fonds de recherche du Québec

The government will invest more in the Fonds de recherche du Québec to increase world-class research, promote participation by Québec researchers in national and international programs and scientific networks, and establish them as leaders in fields of strategic importance to Québec. What is more, the additional support will facilitate the rollout of specific initiatives and support sectoral strategies, especially in the context of research projects structured in partnership with government departments. Accordingly, the research that the Fonds de recherche du Québec support will satisfy the needs of practice environments and the market, and key societal challenges.

This initiative will round out the project of the Ministère de l'Enseignement supérieur to support the hiring of 500 new university professors in the engineering and communications technologies fields in the context of Opération main-d'œuvre. The training, research, and transfer potential to users of the 500 professors will significantly affect the development of research and innovation.

The 2022-2027 QRIIS² provides an additional \$205.3 million in funding over five years to implement Initiative 1.

Provide recurrent enhancements to the base budgets of the Fonds de recherche du Québec

The government will increase by more than 10% the base budgets of the Fonds de recherche du Québec, i.e., ultimately by \$18 million annually. This permanent enhancement will afford them greater predictability and better matching with needs, whether from the standpoint of research or the development of the next generation of workers.

Invest in world-class research to meet major societal challenges

If a science-oriented Québec is already well positioned, we must now ensure its leadership on the international scene through innovative intersectoral approaches by establishing critical masses of researchers focusing on key societal challenges and market needs and by training a new generation in intersectoral research practices.

The government will continue to support the Fonds de recherche du Québec to meet major challenges. Such challenges centre on questions that concern Quebecers and are related to key government priorities, i.e., sustainable development, including climate change, green transportation, energy, the green economy, sustainable agriculture and agri-food development and clean mining, demographic changes, especially to foster successful aging, and entrepreneurship and creativity.

Enhance the competitiveness of clusters of researchers

More than 6 000 researchers, not counting their students, are working in clusters supported by the Fonds de recherche du Québec, such as strategic clusters, networks, centres, and institutes.

The government's support for the research clusters of the Fonds de recherche du Québec will facilitate the development and consolidation of the centres of excellence that foster discoveries and all forms of innovation such that Québec researchers rank among the best in several fields and can integrate the national and international networks to which they often do not appear to have access individually. In this respect, the Fonds de recherche du Québec will establish inter-cluster collaboration and intersectoral and interlevel networking.

The excellence of research can be evaluated by the impact of scientific publications. It is essential for Québec to remain among the top three in Canada with a strong relative average for Québec scientific publications in relation to publications worldwide.

Significant support for the Fonds de recherche du Québec

The mission of the Fonds de recherche du Québec is to support and promote excellence in research and the training of the new generation of scientists to spur knowledge development and innovation. The Fonds de recherche du Québec support a broad range of activities and initiatives related to basic and applied research.

They offer financial support for training the new generation of scientists (scholarships and traineeships), research careers (support for new academics, research program for college researchers, promotion, and awards), research projects (team research projects in partnership, strategic initiatives for innovation, international collaboration), and research clusters (strategic clusters, networks, centres, and institutes).

Increased funding for all intervention components of the Fonds de recherche du Québec: an additional \$320 million over five years

The 2022-2027 QRIS² earmarks nearly \$1.2 billion over five years for the Fonds de recherche du Québec, more than the amount under the 2017-2022 Québec Research and Innovation Strategy (QRIS), even when funding to support economic recovery is included.

An additional \$70 million over five years has been added to the budgetary base. The basic appropriations will ultimately be increased by \$18 million annually on a recurring basis. The funding will support more extensive research, the training of researchers, and the mobilization of knowledge.

Moreover, an additional \$250 million over five years will enable the Fonds de recherche du Québec to support initiatives geared to multidisciplinary, collaborative, or intersectoral research, especially to meet through the development of knowledge and innovations societal challenges and the needs of practice environments and markets that are the most promising and create wealth and well-being for all Quebecers.

Accordingly, new funding announced for the Fonds de recherche du Québec totals \$320 million over five years. Since the Fonds de recherche du Québec are stakeholders in several strategic priority targets of the 2022-2027 QRIS², the new funds are allocated to several initiatives, i.e., \$205 million for Initiative 1, \$100 million for Initiative 9, and \$15 million for Initiative 10.

Furthermore, specific mandates are added in respect of which funding comes from government departments and bodies to carry out targeted project delivery such as innovation zones, or projects carried out in specific fields such as artificial intelligence in health or to support research in the maritime sector.

Significant support for the Fonds de recherche du Québec (*continued*)

Global amounts granted to the Fonds de recherche du Québec, excluding specific mandates (millions of dollars)

| | TOTAL 2017-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL 2022-2027 | GROWTH |
|--|-----------------|-----------|-----------|-----------|-----------|-----------|------------------|-------------|
| Base appropriations | 872 | 174 | 174 | 174 | 174 | 174 | 871 | — |
| <i>Increase in base appropriations</i> | — | 10 | 12 | 14 | 16 | 18 | 70 | — |
| Total, base appropriations | 872 | 184 | 186 | 188 | 190 | 192 | 941 | 8 % |
| Additional amounts, QRIIS ²¹ | 180 | 50 | 50 | 50 | 50 | 50 | 250 ³ | 39 % |
| Total 2017-2022 QRIIS² | 1 052 | 234 | 236 | 238 | 240 | 242 | 1 191 | 13 % |
| Economic recovery² | 50 | - | - | - | - | - | - | - |
| <i>New funding announced¹</i> | - | - | - | - | - | - | 320 | - |

1. Funding announced in the March 2022 *Budget Plan*. Total of the increase in base appropriations and additional funding under the QRIIS².
2. One-time funding announced in the Fall 2020 *Economic and Financial Update*.
3. The additional funding will be allocated to meeting major economic and social challenges.

Initiative 2: Promote synergy in the research ecosystem

The Québec government intends to pursue its initiatives to foster networking and collaboration in its efficient network of research centres and platforms, by way of an example to encourage technology transfers to businesses.

Initiative 2 targets two objectives.

Mobilize the most successful stakeholders in collaborative research

Québec can rely on research centres and platforms with high transfer potential and on strategic niches such as clean energies, critical and strategic minerals, climate-change risk management, or innovative clinical research. College Centres for the Transfer of Technologies (CCTTs) have emerged as key players in regional institutional applied research because of their proximity to users' needs. The CCTTs are accessible to local SMEs, a key economic driving force in the regions, and are contributing to bolstering their competitiveness through adaptation and the transfer of innovative solutions.

Through the 2022-2027 QRIIS², the government is seeking to maximize the performance of research centres and platforms. It will work with research stakeholders to foster the coherence, cohesion, and pooling of their initiatives and to further the development of collaboration with other innovation stakeholders such as universities, intermediation organizations, other research centres, Investissement Québec-CRIQ, and the industrial research sector groups (RSRIs).

Create world-class research and innovation infrastructure

Research and innovation require recourse to innovative infrastructure and specialized equipment. The government will invest \$676 million for R&I infrastructure projects during the period 2022-2027.

Of special note, Québec will build new facilities that make it a pioneer in promising sectors and maintain its innovative infrastructure at a competitive level in established research and innovation sectors. The establishment of innovation zones will consolidate this approach based on Québec's vital forces by ensuring public and private funding for research infrastructure, collaboration, and entrepreneurship in Québec. In keeping with the objective of broadening synergy between the stakeholders, the government will encourage the pooling of such infrastructure to enhance spin-off from it in the ecosystem.



What is more, the government will invest an additional \$15 million to optimize the operation of research platforms by contributing, by way of an example, to funding highly qualified workers for their operations.

Furthermore, in partnership with the Fonds de recherche du Québec and the Digital Research Alliance of Canada (DRAC), the Québec government will pursue the adoption of digital research infrastructure by funding Québec projects in the context of federal initiatives to support the development of innovative computing infrastructure. The DRAC will implement programs to support the operation of facilities in the Canadian network, of which Calcul Québec is part, and the development of state-of-the art computer equipment.







Strategic priority 2: Create an environment conducive to the development of innovation

Québec is creative and excels in public research. However, it must do more to foster the transition from the concept stage to the market and to commit businesses to innovation projects.

Certain challenges remain to take full advantage of the outcomes of public research.

- The development and validation efforts made to transform an idea into a service, or a marketable product, imply R&D-related risks and commercial risks, which often discourage private-sector partners. The establishment of Axelys is a significant initiative aimed at reducing such risks that must be followed by the rollout of new activities to support the research, entrepreneurship, and investment communities.
- Québec's thriving innovation ecosystem established to provide funding and specialized guidance for businesses is complex and often little-known.
- Regulatory and administrative obstacles to access to public procurement sometimes pose a challenge to businesses as regards the emergence and implementation of innovative technologies and innovative business models.

To create new innovation opportunities, the 2022-2027 QRIIS² is proposing developmental initiatives that call for:

- transferring and further developing research findings;
- facilitating access to ecosystem resources, especially by improving referencing and innovation-related training offerings;
- establishing a regulatory environment conducive to innovation.

Table 3 – Strategic priority 2: Create an environment conducive to the development of innovation (millions of dollars)

| | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL |
|---|-------------|-------------|-------------|-------------|-------------|--------------|
| Initiative 3 Transfer and valuate research findings | 17.8 | 17.8 | 17.8 | 16.8 | 16.8 | 87.0 |
| Initiative 4 Facilitate access to and promote ecosystem resources | 7.2 | 8.7 | 8.7 | 8.7 | 8.7 | 42.0 |
| Initiative 5 Establish a regulatory environment conducive to innovation | — | 5.0 | 5.0 | — | — | 10.0 |
| TOTAL, STRATEGIC PRIORITY 2 INCLUDING THE BUDGETARY BASE | 25.0 | 31.5 | 31.5 | 25.5 | 25.5 | 139.0 |
| TOTAL, STRATEGIC PRIORITY 2 INCLUDING THE BUDGETARY BASE | 69.5 | 64.5 | 61.0 | 40.0 | 40.0 | 275.0 |

Note: Since figures are rounded, they may not add up to the total shown.

An innovation culture in businesses is essential. Knowledge must support business development. Two targets will facilitate the evaluation of the progress of technology transfers in Québec.

Targets of strategic priority 2

- Encourage innovation by increasing to 56% the share of businesses that engage in product innovation¹ (in 2017-2019, 51% in Québec and 56% in Ontario, compared with the Canadian average of 53%) and to 76% the share of enterprises that innovate in business processes² (in 2017-2019, 71% in Québec and 76% in Ontario, compared with the Canadian average of 73%).
- Encourage, by 2027, the annual creation of 4 600 businesses in the professional, scientific, and technical services sector, which relies heavily on highly-skilled workers, to reach 17% of the businesses created in this sector out of businesses overall created annually (in 2019, 14% in Québec and 17% in Ontario).

Initiative 3: Transfer and Valuate research findings

The transfer and valuation of public research, the creation and protection of intellectual property, and the technological maturation of innovations are central to keen global competition. To remain competitive, Québec must substantially ramp up the number of innovation projects stemming from public research and accelerate the transfer of the outcomes to the market and society and existing businesses or through the creation of new enterprises.

1. Product innovation: the marketing of a new or significantly improved good or service (Statistics Canada).

2. Business processes: includes basic activities and support for the production of goods and services (Statistics Canada).

We must also ensure that businesses that need research for innovation projects in specialized fields can find the right expertise.

Among these challenges, the transfer of innovation to markets and society hinges critically on the creation of intellectual property (IP), an intangible asset that constitutes a growing part of the value of businesses. While Québec occupies an enviable position in the realm of research and innovation, the creation of IP does not reflect its ambitions and the investments made. Innovators often underestimate the importance of IP and IP tools are often little-known. To develop a healthy intellectual property culture, it will be necessary to heighten awareness of the importance of IP and IP-related tools, offer expert guidance for the development of an IP strategy, and provide additional financial support for the creation of IP.

In the context of the 2022-2027 QRIS², more than \$200 million, including \$87 million in additional funding, will be invested to attain three objectives.



Collect research findings and protect intellectual property

Funding for Axelys is central to the new public research commercialization strategy. Axelys is now acting as the sole organization mandated by the government to commercialize public research throughout Québec and broaden the transfer of social innovation for the benefit of researchers in public research networks, public research establishments, and spin-off companies linked to public research.

Axelys has a mandate to rethink approaches and practices pertaining to the valuation, transfer, and commercialization of innovations stemming from public research to enable Québec society to benefit from the genius and creativity of its researchers.

The operational support that Axelys offers:

- broadens the pinpointing of high-potential innovations in all public research centres in Québec;
- encourages more extensive commercialization activities in the research community by mobilizing more researchers to increase the number of invention disclosures and encourage them to collaborate in the valuation and commercialization of their research findings;
- maximizes successful technology transfers for the benefit of Québec society and increases the number of spin-off companies resulting from public research to maximize their overall impact;
- facilitates exchanges between the public research community, businesses, and investment capital;
- establishes intellectual property management approaches that provide an environment conducive to the transfer of innovations in order to maximize spin-off from public research;
- catalyzes reliance on the economic, social, environmental, and cultural value stemming from public research;
- increases recourse by businesses to Québec's public research to enhance their performance.

Support technological maturation

The 2022-2027 QRIS² provides continued increased funding for technological maturation projects. This will enable public research centres and researchers to bring to fruition their discoveries with high commercial potential, i.e., to conduct the requisite scientific analyses, tests, and demonstrations to interest investors and potential buyers of their innovations.

With the support and expertise of Axelys, this measure will steer researchers toward the production of the most relevant scientific data possible as regards the commercialization model pertaining to their findings.

The measure enhances the appeal of public research centres for spin-off companies resulting from public research and for private companies whose innovation needs may be satisfied by Québec's public research network. More specifically, this measure involving Axelys seeks to:

- better define a business model to commercialize public research findings;
- guide R&D to generate products that meet market needs; enhance prospects for the acquisition and integration of such innovations in the company;
- increase the chances that the innovations will be marketed;
- reduce the risks of the innovations and support the business model of start-ups resulting from public research;
- increase the chances for start-ups resulting from public research to obtain venture capital funding.

Spur business innovation projects through collaboration with the universities, the ccts, and public research centres

Industrial research sector groups (RSRIs) are intermediation organizations whose main mission is to fund the technological research and development projects of businesses in targeted fields by mobilizing researchers from Québec public research institutes. The nine RSRIs³ are mandated to consolidate the vital forces of innovation in strategic fields in Québec. They now assemble more than 1 300 members, of which roughly 70% are SME.

The RSRIs are implementing several innovation measures adapted to the fields that they cover and are able to strategically position Québec in promising niches, e.g., in the *Stratégie québécoise de développement de la filière batterie*.

Accordingly, in the context of the 2022-2027 QRIIS², the government is investing \$107 million over the next five years, including \$59 million in additional funding, to support the operations of the RSRIs and the development of new projects to:

- foster private investments by sharing risks and simultaneously attracting federal investments in Québec;
- develop research groups attuned to the challenges that industrial environments are facing;
- facilitate access by businesses to public research infrastructure;
- train a new generation of workers to ensure innovation in businesses;
- guide the transfer and integration of technologies among users.

Initiative 4: Facilitate access to and promote ecosystem resources

Through the 2022-2027 QRIIS², the government wishes to clarify the roles and responsibilities of the organizations that help businesses to navigate the R&I ecosystem, especially by enhancing the referral services offered to businesses and accelerating their innovation projects.

To this end, the 2022-2027 QRIIS² earmarks \$42 million over five years for the Conseil de l'innovation du Québec and the regional acceleration and growth areas.

3. Aluminum (CQRDA), aerospace (CRIAQ), industrial bioprocesses (CRIBIQ), biopharmaceuticals (CQDM), energy and electric and smart vehicles (InnovÉÉ), advanced materials (PRIMA), information, communications, and digital technologies (PROMPT), medical technologies (MEDTEQ⁺), and metal processing (CRITM).

Establish new referral and training services through the Conseil de l'innovation du Québec

Starting in 2022, the Conseil de l'innovation du Québec will establish an effective referral service that includes a full, centralized directory of resources and easily understandable evaluation and communications tools. The new tools will enable businesses to find their way more readily around the Québec R&I ecosystem.

What is more, in complex situations that require more elaborate guidance, a team of experts from the Conseil de l'innovation du Québec and sectoral or regional partners will offer businesses personalized support.

This initiative will also be useful to business advisors who will find through a sole source information on the stakeholders in the R&I ecosystem and the tools to support the projects of businesses. Moreover, the Conseil de l'innovation du Québec will launch a Québec innovation advisor attestation, to enable professionals and development agents from all relevant organizations active in the field to better direct businesses to resources.

The new referral and training services will facilitate access to existing resources in the R&I ecosystem and will be introduced through sustained collaboration between the Conseil de l'innovation du Québec and other stakeholders.

Furthermore, to satisfy entrepreneurs' needs specific to each region, the government intends to build on the role of the regional acceleration and growth areas (ERAC).

In collaboration with the Conseil de l'innovation du Québec, the regional acceleration and growth areas will enhance innovation and best business practices in companies. Together, they will encourage collaboration between the academic, business, and investment sectors through measures centred on regional distinctiveness throughout Québec.

Initiative 5: Establish a regulatory environment conducive to innovation

While regulation can engender innovation and entrepreneurship, for example by prohibiting anti-competitive practices or fostering technological change, certain regulations and administrative requirements can make difficult or even impossible the valuation or the commercialization of innovative products or processes.

The 2022-2027 QRIS² provides for two initiatives to establish a regulatory environment conducive to innovation.

Foster the establishment of more intelligent regulations

In the context of the *Plan d'action gouvernemental en matière d'allègement réglementaire et administratif 2020-2025*, an interdepartmental task force headed by the MEI has been established to pinpoint the regulatory and administrative obstacles to innovation. The committee will submit in 2022 the entire array of measures proposed to foster the establishment of more intelligent regulations.

The possibility of introducing experimental regulatory measures is already being emphasized. It might, for example, include regulatory sandboxes in emerging technology sectors to facilitate the testing of new products, services, approaches, or processes. In particular, the government intends to encourage such measures for the innovation zones.

Support innovation through government procurement

A number of Québec start-ups and SMEs have difficulty selling their products and services to large public ordering parties such as governments and cities. Obtaining public procurement contracts is a powerful lever for innovation and supports bringing innovations to market outside Québec.

In the context of the 2022-2027 QRIS², the MEI is undertaking to go further and fund R&I projects in response to procurement needs. This initiative will both support public purchasers in the definition of their needs during the market exploration phase and innovative Québec firms that wish to commercialize their innovations.

Recent efforts reflect this approach. For example, Bill 12, the *Act mainly to promote Québec-sourced and responsible procurement by public bodies, to reinforce the integrity regime of enterprises and to increase the powers of the Autorité des marchés publics* tabled by the Secrétariat du Conseil du trésor in 2022, calls for the establishment of a “public procurement innovation space.”

The space will increase responsible acquisitions by public bodies, use public procurement as a vector of influence in combating climate change, and support the development of innovative goods, services, and construction work.





Strategic priority 3: Support in-company investments and the commercialization of innovations

Québec has fallen behind with respect to product innovation, patents submitted, and the entry rate of new firms in relation to the other Canadian provinces. Additionally, bringing innovations to market on markets outside Québec, especially those of start-ups and SMEs, poses a particular challenge.

Businesses are indispensable stakeholders in the realm of investment in research and development (R&D). We must support the best projects and businesses to ensure that the innovation cycle works and produces productivity gains throughout Québec. In the context of the 2022-2027 QRIS², the government is ensuring that all the means are available to:

- adapt R&D incentives and innovation support programs;
- support innovative technological entrepreneurship;
- foster investment and the commercialization of innovations.

Table 4 – Strategic priority 3: Support in-company investments and the commercialization of innovations (millions of dollars)

| | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL | FINANCIAL INTERVENTIONS |
|---|--------------|-------------|-------------|-------------|-------------|--------------|-------------------------|
| Initiative 6 Adapt R&D incentives and innovation support programs | — | — | — | — | — | — | |
| Initiative 7 Support innovative technological entrepreneurship | 46.0 | 16.0 | 16.0 | 16.0 | 16.0 | 110.0 | |
| Initiative 8 Foster investment and the commercialization of innovations | 31.5 | 34.0 | 34.0 | 12.0 | 12.0 | 123.5 | 600.0 |
| TOTAL ADDITIONAL BUDGET, STRATEGIC PRIORITY 3 | 77.5 | 50.0 | 50.0 | 28.0 | 28.0 | 233.5 | 600.0 |
| TOTAL, STRATEGIC PRIORITY 3 INCLUDING THE BUDGETARY BASE | 124.6 | 73.1 | 52.1 | 30.1 | 30.1 | 310.1 | 908.3 |

Note: Since figures are rounded, they may not add up to the total shown.

Businesses and start-ups must invest in R&I and targeted support is offered to them. The targets will facilitate the evaluation of the progress of Québec businesses.

Targets of strategic priority 3

- Aim to ensure that 60% of all R&D carried out by Québec businesses, the higher education sector, and the government occurs in businesses (in 2019, 56% in Québec, 57% in Ontario, and 75% in the United States) and increase in-house business R&D as a percentage of GDP to reach 1.50% over five years (in 2019, 1.23% in Québec, 1.15% in Ontario, and 2.38% in the United States).
- Promote venture capital investments in businesses over five years:
 - \$4.5 billion at the start-up phase (\$2.6 billion in 2016-2020);
 - \$575 million in the seed phase (\$260 million in 2016-2020); aim to ensure a maximum contribution of 50% from the government in the capital invested in investment funds at the seed phase capitalized by the Québec government (closed funds during the period 2023-2026).

Initiative 6: Adapt R&D incentives and innovation support programs

R&D is recognized for the key role that it plays in growth in productivity and corporate competitiveness. That is why governments support private R&D through fiscal or financial incentives.

Accordingly, Québec is offering tax assistance for R&D, which is creating a favourable, flexible environment in all areas of activity. This across-the-board tax assistance supports the R&D projects of entrepreneurs to foster their growth and competitiveness, mainly in the form of tax credits.

What is more, Québec offers financial assistance that targets priority projects and focuses assistance on stakeholders or activities that can produce high social returns or advance certain public-policy objectives. Such financial assistance for business innovation mainly takes the form of subsidies.

The Organisation for Economic Co-operation and Development (OECD) recommends that governments strike a balance to ensure that these policy tools interact effectively and are complementary. Furthermore, international experience reveals that it is possible to offer direct financing mechanisms that maximize the private sector's contribution to projects, for example, through conditional cost recovery schemes concerning the funds invested.

For this reason, in the context of the 2022-2027 QRIS², the Conseil de l'innovation du Québec will engage in two processes of reflection on assistance for R&D and innovation in businesses. Such reflection will focus on:

- The optimization of the Québec R&D support model to enhance Québec's performance in the realm of innovation. To this end, the Conseil de l'innovation du Québec will rely on departmental and external expertise and consultations. Such deliberations are in keeping with the examination that the federal government has conducted on the tax incentives offered in Canada to support R&D.
- Recourse to intervention models and new forms of financial assistance such as advances and loans to support R&D.

It bears noting that the recommendations stemming from reflection on the optimization of R&D support mechanisms will have zero cost for the government.

Tax assistance to support government action pertaining to research and innovation

In addition to the budgetary aid granted to support R&I, the Québec government is offering businesses significant tax assistance. Such measures represent nearly \$3 billion in additional support under the 2022-2027 QRIS². In addition to the tax holidays for foreign researchers and experts described in Initiative 9, the government offers:

Research and development tax credits, including refundable credits pertaining to the wages of researchers, university research, private research in partnership, and research consortia;

R&D tax credits will provide more than \$2.7 billion in support to Québec businesses during the period 2022-2027 and benefit roughly 4 000 firms annually;

The incentive deduction for the commercialization of innovations in Québec, which encourages companies to commercialize their innovations in Québec, will represent a \$176-million reduction in the tax burden during the period 2022-2027 and ultimately benefit more than 300 companies annually.

Source: Ministère des Finances, March 2022 *Budget Plan*.

Initiative 7: Support innovative technological entrepreneurship

Innovative entrepreneurship fosters the creation of new high-growth businesses in innovative sectors. Such businesses are noteworthy for the intensity of their R&I and their ability to commercialize technological advances. Additionally, they mobilize talent and put forward innovative business and social models that are increasingly drawing the attention of investors.

The 2022-2027 QRIS² provides additional funding totalling \$110 million over five years to implement two initiatives.

Support business incubators and business accelerators

The Québec start-up ecosystem has grown significantly in recent years. Growing numbers of promising enterprises are being created. Some of the companies are so successful that they are inspiring entrepreneurial passion in some quarters and a desire to guide and support in others.

Incubators and accelerators play a crucial role in this ecosystem. Their ability to pinpoint quality projects, assess their growth and innovation potential, and consolidate support and financing networks makes their initiatives essential. Moreover, high growth in increasingly diversified, specialized service offers has been observed.

Based on past achievements, Québec is now ready to move to the next stage. Since the race for innovative technological entrepreneurship is global, Québec must more broadly showcase its key assets.

The 2022-2027 QRIIS² will pursue the government's commitment to support business incubators and accelerators by relying on performance and projects with high potential.

Such potential often stems from organizations that focus their initiatives in leading-edge sectors such as artificial intelligence, quantum technologies, the life sciences, creative industries, or technologies to combat climate change, including the green technologies applied in the hydrogen, electric vehicles, battery, and green energy sectors. Their technological and social impact is recognized.

In the context of the 2022-2027 QRIIS², the government will encourage synergy and collaboration between business incubators and accelerators and efforts to concentrate their initiatives in specific sectors or that foster multidisciplinary in their intervention approach.

The success of innovative technological entrepreneurship becomes apparent when other stakeholders in society take an interest in it, starting with the business community that gradually forges more extensive close ties with the start-up ecosystem. This marks a clear commitment by the sector in favour of open innovation that will be emphasized in the context of the 2022-2027 QRIIS².

Support start-ups from the outset

Depending on the industry sector, it takes, on average, between one and five years for an innovative technology start-up to enter the commercialization phase. The effort is intense at a time when sales and a return are almost non-existent.

The 2022-2027 QRIIS² will maintain its financial support for start-ups in the market introduction phase that opt to collaborate closely with business incubators and accelerators. Assistance will be earmarked for the realization of their R&D projects to enable them to create and validate their innovative technologies and business models. Tools will continue to be made available to them to help them financially to take advantage of highly specialized support, especially in the realm of intellectual property and commercialization.

To ensure the success of such businesses and their innovations, strategic stakeholders must intervene when risk is high but potential benefits are remarkably high. Such key stakeholders are early adopters, i.e., businesses that wish to innovate through early use of the technologies that start-ups create. Early adopters thus enable start-ups to perfect and exhibit their innovations.

Hypercroissance Québec

In February 2022, the government granted \$6.5 million in financial support to Startup Montréal to enable the organization to implement a novel support program devoted specifically to high-growth innovative technology enterprises or scale-ups. New specialized services will be offered to selected cohorts of enterprises under the initiative, which will help business incubators and accelerators forge links with similar organizations the world over. The program also calls for sales missions abroad.

Hypercroissance Québec joins similar initiatives implemented elsewhere in the world, the best known one being Future Fifty in the United Kingdom. The program should generate a nearly \$1-billion increase in exports within five years and double the number of businesses valued at more than \$1 billion through initial public offerings.

The assistance granted stems from a partnership between the Ministère de l'Économie et de l'Innovation, the Ministère des Relations internationales et de la Francophonie, and Investissement Québec International.

Initiative 8: Foster investment and the commercialization of innovations

Public and private financial support is essential to enable businesses and organizations to further their innovation projects. Such support is adapted according to factors such as the project's levels of maturity and risk. Against this backdrop, particular attention must focus on the validation of markets and the potential for commercialization of innovations in the attribution of certain types of financial support. A number of tools and support services exist, especially at Investissement Québec, to support enterprise innovation and the commercialization of innovations.

To foster investment and the commercialization of innovations, the 2022-2027 QRIS² provides additional funding totalling \$723.5 million over five years, including \$600 million in venture capital.

Offer businesses direct assistance to carry out their innovation projects

The government will extend and enhance its Innovation Program with a \$72-million budget allowance over the next three years, to support projects submitted on an ongoing basis by businesses. Calls for projects that fall under the themes bring the total funding planned over the next three years to \$113.7 million. The Innovation Program, administered by Investissement Québec, is the main direct assistance tool intended for businesses to implement their R&D projects carried out autonomously in-house, in collaboration with other companies or recognized research organizations.

Help businesses to get past the market introduction stage

The market introduction stage is often regarded as a “death valley” in the innovation cycle, and for good reason: it is the stage during which costs rise considerably and the level of technological and commercial risk is high.

Despite the presence of business accelerators and incubators and valuation and transfer centres, there is still work to be done to help Québec firms be investment-ready for venture capital funds, in particular for innovative enterprises situated outside Montréal, especially because of the absence of a critical mass of businesses in certain sectors.

The government will allocate \$100 million in additional investment capital to pursue the Impulsion PME program, which satisfies such needs. The program mainly covers quasi-equity investments in innovative start-ups. It relies on the commitment and collaboration of support and referring entities and investors active in Québec to enable businesses to sustain their growth and carry out a major initial IPO.

Make venture capital a vector for new opportunities

Through several of its initiatives, the 2022-2027 QRIS² is seeking to broaden the pool of new innovative enterprises. To support such firms, it stands out from previous strategies by offering significant venture capital. To ensure their effectiveness, the venture capital initiatives will focus on needs that private markets do not satisfy, for example in the seed stage. The 2022-2027 QRIS² provides for two initiatives.

Better structure the investment ecosystem

The transition from the concept stage to the market partly hinges on a better structured investment ecosystem. To this end, the 2022-2027 QRIS² provides for support measures to foster involvement by angel investors in the innovation ecosystem to stimulate private investment, support innovative entrepreneurs, and enhance the accessibility and quality of data in the realm of investment capital in Québec. The latter element will provide a more accurate picture of the industry and produce thorough analyses of the Québec ecosystem.

Stimulate venture capital investments

Through Investissement Québec, the government is making available \$500 million over the next five years that will be allocated to venture capital funds managed by experienced teams and new management teams aimed at satisfying the priority needs of the capital chain.

The investment funds financed will target the entire financing chain but mainly the seed and start-up phases. Given the elevated level of risk, these investment phases need the most support to attract private investors. The funds will support numerous economic sectors and sub-sectors such as the life sciences, clean technologies, and technologies in general, especially disruptive technologies.

The management teams selected will be expected to possess entrepreneurial and financial experience and the ability to raise private capital from businesses, entrepreneurs, angel investors, family fortunes, and institutional investors.

The government is investing in the venture capital funds with the expectation of a return in order to support the emergence of technology enterprises that target world markets. It is, therefore, necessary to assemble several success factors to support the best management teams.

The Fonds d'investissement Eurêka

In 2022, through Investissement Québec, the Québec government allocated \$100 million to support the creation of the Fonds d'investissement Eurêka. The fund will be active in the pre-seed phase and will support the commercialization of innovations stemming from Québec public research in all areas of activity. The Fonds d'investissement Eurêka satisfies several government objectives:

- develop Québec public research to optimize wealth creation potential and knowledge stemming from Québec public research institutions;
- strategically and financially support innovative technology enterprises in the transition to the commercialization stage;
- establish investment funds and support the emergence of new investment fund management teams in Québec;
- help make Québec a world leader in the knowledge-based and technology economy.

The advent of the Fonds d'investissement Eurêka joins other existing initiatives in the seed phase, in particular the Concours des fonds d'amorçage du Québec and the partnership with the Fonds de solidarité FTQ to support the life sciences sector.

Accelerate business growth

Growth is a key phase in the development of an SME, whether to go beyond the start-up phase, meet a significant increase in demand for its products and services, or bolster its competitive position. During this pivotal phase, SMEs with high growth potential face numerous challenges that weigh heavily on their resources and specific financing, innovation, new market access, and recruiting needs.

To satisfy such needs, \$22.5 million over five years will support growing SMEs by offering them priority access to specialized support services provided by entrepreneurs in residence at Investissement Québec, and adapted financing tools, in particular to enable them to export their innovations more extensively. This will allow the enterprises supported to accelerate growth in their turnover, broaden innovation and exporting, boost productivity, and expand.

Rely on Investissement Québec to invest and commercialize innovations

By relying on Investissement Québec and the network of Québec government offices abroad and elsewhere in Canada, the government has at its disposal a strike force to promote the growth of innovative enterprises and commercialize innovations here in Québec, in the rest of Canada, and abroad.

The mandates that the government assigns to Investissement Québec grant it significant means. In 2020-2021, Investissement Québec carried out more than 4 400 financial initiatives representing financial commitments totalling \$4.5 billion to support projects worth \$13.8 billion overall in addition to 4 620 strategic support initiatives, including 797 technological support initiatives and 3 347 export support initiatives.

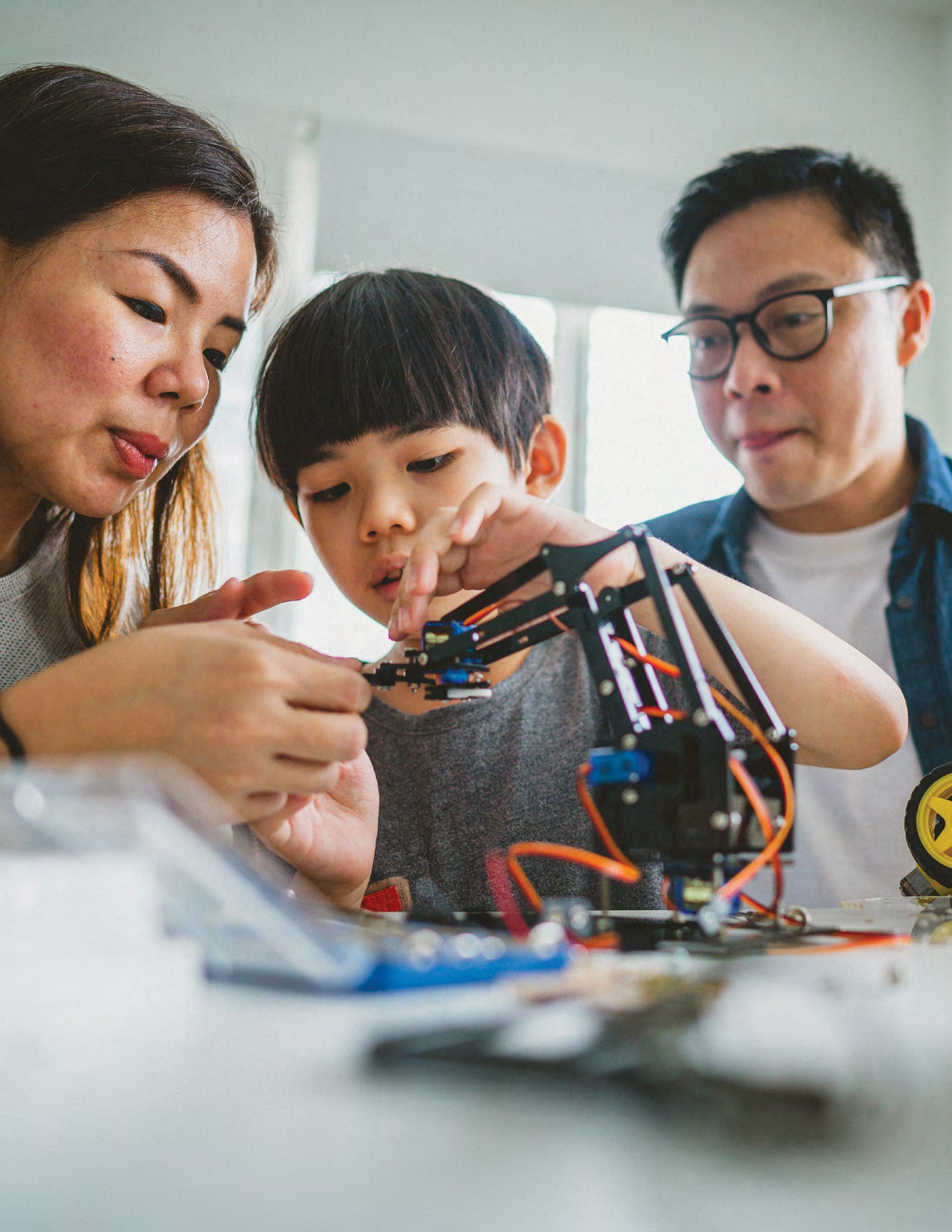
Investissement Québec offers tools that cover an array of business needs both from the standpoint of financing and strategic, technological, innovation adoption advice. The tools seek to:

- enhance corporate competitiveness through innovation and productivity (the Productivité innovation initiative and Investissement Québec-CRIQ);
- support businesses in their technological transition (Investissement Québec-CRIQ);
- support innovation in the clean technologies (Compétivert initiative);
- support Québec procurement;
- ensure access by innovators to capital.

To commercialize Québec innovations, Investissement Québec is offering significant support for exporting, the internationalization of businesses, and the market diversification. It is also contributing to attracting specialized talent for innovative Québec enterprises and organizations.

Investissement Québec is intervening significantly in the flagship sectors that the 2022-2027 QRIS² targets, such as aerospace, the innovative technologies, including artificial intelligence and digital technology, the life sciences, the agri-food industry, renewable energies, electric transport, and cleantech.

Accordingly, Investissement Québec is a key partner for the growth of businesses throughout Québec and abroad. It will be asked to play a significant role in the implementation of several initiatives under the 2022-2027 QRIS², by way of an example in the realm of direct assistance to businesses and in the management of investment funds and the establishment of the innovation zones.





Strategic priority 4: Develop talent and a scientific and innovation culture

Québec's success in R&I depends, first, on the presence of diversified individual skills and a pool of talent, a scientific and innovation culture, and receptiveness to risk-taking in institutions, businesses, and society generally.

As is true everywhere else, Québec must adapt to the innovative technologies, demographic evolution, automation, and the challenge of matching skills and needs.

To do so, it must ensure that it retains talent and attracts new talent, continues to train a robust new generation of workers, enhances and updates the skill level of the labour force, and develops the scientific and innovation culture from an early age.

To promote an open, inclusive innovation culture and deliver the best services in the realm of R&I policies, the Québec government must also lead the way, for example by encouraging access to data.

To meet these challenges, the 2022-2027 QRIIS² includes two key initiatives:

- develop talent, the new generation of workers, and key skills in R&I;
- develop a scientific and innovation culture.

Table 5 – Strategic priority 4: Develop talent and a scientific and innovation culture
(millions of dollars)

| | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL |
|---|-------------|-------------|-------------|-------------|-------------|--------------|
| Initiative 9 Develop talent, the new generation of workers, and key skills in R&I | 39.9 | 41.0 | 36.0 | 36.0 | 36.0 | 188.9 |
| Initiative 10 Develop a scientific and innovation culture | 6.3 | 7.5 | 7.9 | 8.0 | 7.9 | 37.6 |
| TOTAL ADDITIONAL BUDGET, STRATEGIC PRIORITY 4 | 46.2 | 48.5 | 43.9 | 44.0 | 43.9 | 226.5 |
| TOTAL, STRATEGIC PRIORITY 4 INCLUDING THE BUDGETARY BASE | 53.2 | 55.3 | 47.9 | 47.9 | 47.9 | 252.1 |

Note: Since figures are rounded, they may not add up to the total shown.

The funds under the 2022-2027 QRIS² are in addition to the significant funding of other government departments to foster the attraction and training of workers and education in the scientific and technological fields.

Individuals with solid academic training and who acquire skills contribute more than others to innovation. Matching the industry's needs and talent is of the utmost importance. Targets will facilitate the evaluation of how Québec intends to develop its talent and the scientific and innovation culture.

Targets of strategic priority 4

- Reduce the gap with Ontario as regards the share of students newly registered in the fall in a science, technology, engineering, and mathematics (STEM) program and a computer science program in overall registrations at the bachelor's degree level (in 2018-2019, there was a 14-percentage point gap, i.e., 23% in Québec and 37% in Ontario). This target will complement the education and training initiatives of other government departments.
- Increase the staff assigned to in-house business R&D to 13 per thousand workers by 2027 (in 2019, 12 in Québec and 10 in Ontario), and rank among the top 10 in the OECD (17th in 2019).

Initiative 9: Develop talent, the new generation of workers, and key skills in R&I

The existing labour pool is insufficient to satisfy the 1.4 million positions to be filled in Québec by 2030, when highly-skilled jobs will account for more than 50% of all jobs. The attraction of talent is a key issue to sustain the pool of employees of innovative start-ups and strategic sectors in Québec, especially in certain regions that are more exposed to growing labour market disparities. Consequently, the development of talent is one of the priorities of the 2022-2027 QRIS².

Accordingly, the 2022-2027 QRIS² provides \$188.9 million in additional funding over five years, including \$100 million for the Fonds de recherche du Québec, to attract the best talent to Québec and offer broader support to employment in the R&I sector.

These initiatives are in addition to the tax holidays for foreign researchers and experts who engage in R&D or promote R&D findings in their capacity as the employees of a Québec company. It is anticipated that the measures will represent \$56 million in support during the period 2022-2027 and thereby annually attract and retain roughly 500 researchers or experts.

What is more, the MEI will ensure the complementarity of these initiatives with those of the Ministère de l'Éducation du Québec (MEQ), the Ministère du Travail, de l'Emploi et de la Solidarité sociale (MTESS), the Commission des partenaires du marché du travail (CPMT), and the Ministère de l'Enseignement supérieur (MES). The MES has earmarked \$2.6 billion in the context of Opération main-d'œuvre to foster higher graduation rates in certain priority fields. Furthermore, the measures stemming from the report on the Québec university of the future will foster linkage between universities and users, social innovation and scientific creativity, and an intersectoral approach to introduce entrepreneurial training.

Attract the best talent for the Québec of the future with the support of the Fonds de recherche du Québec

The presence of talent and a competent new generation of young people, students, and young researchers is an asset for the development of solutions to key issues and societal challenges. It is an essential condition for large innovative enterprises to attract talent. In this respect, the innovation zones will serve as attraction and retention vectors for foreign talent in ultramodern technological fields.

To promote talent and skills and optimize their integration into society, \$100 million has been allocated to the Fonds de recherche du Québec to enable them to enhance their scholarship programs, e.g., merit scholarships for students and scholarships for young researchers. Additionally, the funds can also enhance the scholarships offered for traineeships devoted to initiation to research for undergraduate university and college students.

Offer broader support for employment in research and innovation

The 2022-2027 QRIS² provides for support for the needs of businesses and organizations that wish to engage in R&D and innovate, through three complementary developmental measures.

- Enhance in-company internships

The training and retention of highly qualified workers that matches labour market needs is a priority for Québec. To promote talent and skills and optimize their integration into society, business innovation internships (Mitacs) are an essential element that supports business productivity and contributes to their success.

- Support the hiring of recent graduates for R&D projects

Support for the hiring of recent graduates for R&D projects seeks the integration of the next generation of researchers into scientific and technological jobs. This measure to enhance support for employment in R&D applies to all businesses and organizations. It fills needs with respect to the attraction, integration, and retention of talent and needs related to the requisite guidance concerning business innovation, especially in SMEs.

- Finance the hiring of innovation and commercialization agents

Support for the hiring of innovation and commercialization agents satisfies needs from the standpoint of the search for financing and capital, commercialization, the management of innovative projects, and the establishment of an innovation culture in Québec firms.

A number of businesses, especially SMEs, feel that innovation assistance programs are not adapted to their situation. Many company directors are unaware of the collaborative research organizations that can support their R&D or innovation projects.

To accentuate innovation in businesses, support will be offered to businesses and organizations to hire innovation and commercialization agents.

Initiative 10: Develop a scientific and innovation culture

There are several opportunities to develop a scientific and innovation culture in society, especially by creating more bridges between the research and business communities. In the context of the 2022-2027 QRIIS², the government will rely on key players and targeted initiatives to simultaneously bolster the scientific culture, entrepreneurial spirit, and receptiveness to risk-taking.

Accordingly, the 2022-2027 QRIIS² provides for \$37.6 million in additional funding over the next five years, including \$14.8 million allocated to the Fonds de recherche du Québec to achieve the objectives indicated below.

Strengthen dialogue between science and society

In the context of the 2022-2027 QRIIS², the government acknowledges the importance of acting early on in individual career paths to develop a scientific and innovation culture. Indeed, the taste for science develops at an early age and it is greatly encouraged when the scientific culture is present in the family, the schools, and the community. It has also been shown that one of the key motivating factors for the pursuit of a career in STEM or other research sectors is the feeling of competence.

To help the new generation to discover, cultivate, and develop its skills in science and research, including STEM, Québec must rely on a network of dynamic organizations dedicated to the promotion of a scientific and innovation culture in all regions.

Consequently, the 2022-2027 QRIIS² offers support to organizations that promote science and innovation. Such organizations, the schools, and scientific museums are the key players to ensure mediation between science and society. The support offered in the context of the 2022-2027 QRIIS² will, by way of an example, facilitate the organization of major events throughout Québec, support for targeted initiatives to develop a talented, motivated new generation in science and research, and publicize promising fields and sectors devoted to research and innovation, and support for projects related to scientific information, research in French, and the clampdown on disinformation.

On this account, disinformation and misinformation are interfering in public debate, creating a gulf between scientific discourse and certain parts of society. It is, therefore, necessary to build bridges between society and the scientific community.

Accordingly, in keeping with their mission, the Fonds de recherche du Québec will add a science and society section to their program focusing on key societal challenges. The section will tackle obstacles to dialogue between science and society, especially disinformation, and will also propose workable solutions to foster dialogue, such as participatory citizen science.

Lastly, it is recognized that promoting equity, diversity and inclusion (EDI) contributes both to school success and healthy work environments and, therefore, to the mobilization and retention of talent.

The promotion of EDI in STEM programs not only broadens access to a highly qualified talent pool, which represents a crucial advantage for the R&I ecosystem, but also enhances the performance of businesses by fostering their creativity and innovation and, ultimately, their productivity.

In practical terms, the government will support the creation of a mixed committee with government departments and bodies and will offer support for the realization of projects devoted to diversity and inclusion in science. The initiatives will encourage the new generation of diverse groups in society, especially women and the Indigenous communities, to turn to careers in STEM and better integrate programs in science, research and innovation. Additionally, the establishment of potential solutions to promote EDI in science will be part of the activities supported by the Fonds de recherche du Québec in the context of their new science and society section.

Set an example: support intended to bolster a scientific and innovation culture in the government

The 2022-2027 QRIS² ascribes to the government a broader role to catalyse innovation in Québec, be more agile and reactive to better support business innovation projects, develop better policies, and deliver the best services.

Strengthen skills and consulting services in science and innovation

The government is already working to equip the public administration with digital skills through training with various partners and digital innovation, especially by means of recourse to artificial intelligence to optimize data, by way of an example under the impetus of the *Stratégie de la transformation numérique gouvernementale (2019-2023)*. The Secrétariat du Conseil du trésor has launched several skills-upgrading initiatives in the public service, especially the development of a competency framework for managers, and training webinars for civil servants in collaboration with the Fonds de recherche du Québec.

Under their new science and society section, the Fonds de recherche du Québec will propose several initiatives such as the promotion of the use of scientific information in the government, scientific consulting among governments and scientific diplomacy, and the launching of in-house scientist and innovator programs in government departments and other government authorities.

Support the implementation of the 2022-2027 QRIS² through solid data

Solid data provide strategic information and are a crucial resource for organizations since they reduce uncertainty, support decision-making, sustain reflection and, therefore, enhance governance. The analysis of big data has become possible through innovative technologies that facilitate its commercialization for the benefit of the knowledge-based economy.

In the context of the 2022-2027 QRIS², the MEI is participating in the financing of:

- the OECD study on the impact of higher education institutions on Québec's innovation ecosystem in a regional economic development perspective;
- the purchase of data on the performance of Québec businesses and labour productivity;
- the dissemination and broader use of data on university research project funding, the improvement of information systems and strengthening the use of data in scientific publications (bibliometrics) in Québec government departments and bodies.

The new data complement other initiatives under the 2022-2027 QRIS², such as the *Innovation Barometer* of the Conseil de l'innovation du Québec.

Encourage access to data for research purposes

Several data sets have been published on Données Québec and the MEI has produced a catalogue of potential data sets in its R&I programs. These efforts will continue considering potential spin-off and the number of innovation projects stemming from them.

Moreover, the Institut de la statistique du Québec will carry out initiatives in addition to those supported in the 2022-2027 QRIS² to make government data available for research purposes.

The research data access services of the Institut de la statistique du Québec

Since June 17, 2019, the research data access services of the Institut de la statistique du Québec have made available to researchers in public bodies data held in the health and education sectors. What is more, Revenu Québec data will soon be added.

Such data are always transmitted to researchers in an environment that guarantees the confidentiality of personal information and in a form that ensures the anonymity of the persons concerned.

This offering will be enhanced in the coming years through the addition of data from the Ministère du Travail, de l'Emploi et de la Solidarité sociale, and the Ministère de l'Immigration, de la Francisation et de l'Intégration.

Source: Ministère des Finances, March 2022 *Budget Plan*.

Foster access to scientific publications

Access to research findings is a crucial element for innovation. Research findings in the form of scientific publications or raw research data are often costly and hardly accessible outside the university community.

Open science is becoming increasingly imperative in the world as one of the main solutions to make publicly-funded research findings accessible to the scientific community and the public at large. The 2022-2027 QRIIS² will focus on this question to foster innovation and knowledge sharing.

Furthermore, in the context of their mission, the Fonds de recherche du Québec will contribute to facilitating immediate access to scientific publications, promoting the circulation of open data and other research products, and establishing open science infrastructure.

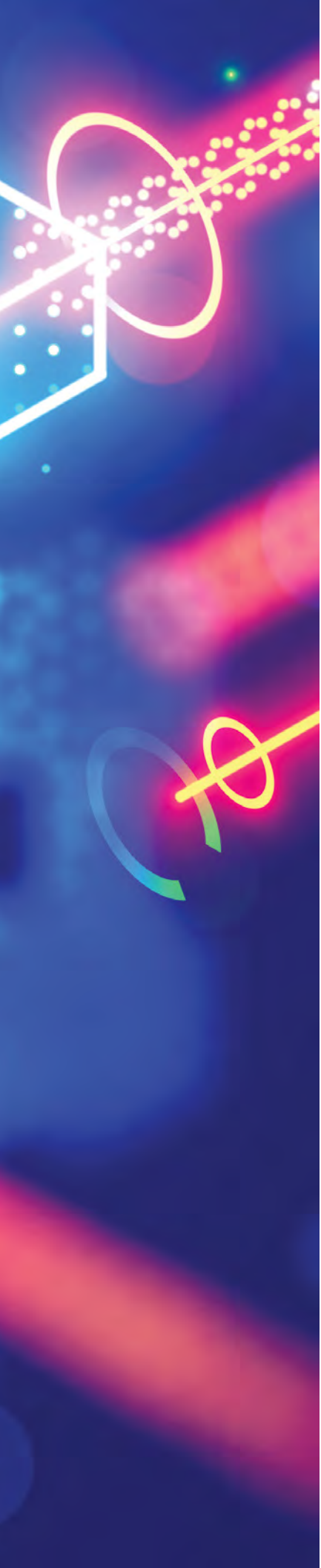
Facilitate the consideration of ethical questions in R&I policies

The Commission de l'éthique en science et en technologie (CEST) is a Québec government body with a mission to advise the government and heighten public awareness of ethical issues in science and technology.

For several years, the CEST has focused on ethical issues relating to the digital transformation, the increase in the quality and quantity of data available to public administrations, and the development of techniques to process and analyze such data.

The 2022-2027 QRIIS² will contribute to heightening awareness among the government departments that are members of the Comité interministériel de la recherche et de l'innovation (CIRI) of the CEST's deliberations.





Strategic priority 5: Support promising sectors and catalyst projects

To have a greater impact, the measures in the 2022-2027 QRIIS² must be concentrated on strategic sectors in which Québec can become a world leader and reflect societal priorities such as social and environmental development.

The government can also play a role in the adoption of innovation in respect of these major societal challenges. The pandemic has already revealed how the government and its partners can mobilize nimbly.

Accordingly, the government will support two complementary, structuring measures to coherently, strategically mobilize Québec's strengths in R&I:

- prioritize high-impact sectors and technologies;
- resolve societal challenges through innovative solutions.

Table 6 – Strategic priority 5: Support promising sectors and catalyst projects
(millions of dollars)

| | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 | TOTAL |
|--|--------------|--------------|--------------|-------------|-------------|--------------|
| Initiative 11 Prioritize high-impact sectors and technologies | 62.0 | 69.6 | 66.6 | 44.2 | 42.3 | 284.7 |
| Initiative 12 Resolve societal challenges through innovative solutions | 6.0 | 14.5 | 14.5 | 16.0 | 16.0 | 67.0 |
| TOTAL ADDITIONAL BUDGET, STRATEGIC PRIORITY 5 | 68.0 | 84.1 | 81.1 | 60.2 | 58.3 | 351.7 |
| TOTAL, STRATEGIC PRIORITY 5 INCLUDING THE BUDGETARY BASE | 205.8 | 206.7 | 115.6 | 94.8 | 63.3 | 686.2 |

Note: Since figures are rounded, they may not add up to the total shown.

The integration by businesses of the most promising technologies hinges on the ability to pinpoint and adopt them. Targets will evaluate how Québec intends to support promising sectors and catalyst projects.

Targets of strategic priority 5

- Increase the share of businesses that use emerging technologies:
 - to 11% for clean technologies (in 2017-2019, 7% in Québec and 10% in Ontario);
 - to 10% for artificial intelligence (in 2017-2019, 6% in Québec and 6% in Ontario).
- Increase by 25% within five years the number of firms associated with the knowledge-based industries⁴ to reach 15 000 (in 2020, 11 807 in Québec and 31 310 in Ontario) and thus reduce by at least one-quarter the gap with Ontario of the share that this sector represents in businesses overall (in 2020, the gap stood at 2.4 percentage points: 4.9% in Québec and 7.3% in Ontario).

Initiative 11: Prioritize high-impact sectors and technologies

To avoid dissipating its strengths and to maximize its chances of success, Québec has adopted the means to prioritize its initiatives, either to ensure the development of strategic industries and the delivery of essential services, or to develop fields in which it possesses strength in research.

The 2022-2027 QRIS² has at its disposal R&I-related foundations that can support the adoption of other sectoral strategies and offer solutions to major challenges such as the fight against climate change.

4. According to Statistics Canada the knowledge-based industries include legal and accounting services, architecture, design, engineering, computer system design, public relations, consulting services in management and the environment, scientific research and development services, and all other professional and technical services.

The support and financial levers adopted will be mobilized to implement initiatives in various promising fields and sectors, such as cleantech, the battery industry, aluminum, aerospace, and the life sciences, and in transversal technologies and fields such as artificial intelligence and energy.

Rely on innovation to spur the development of Québec's energy capacity An example of transversal innovation fields

The development of energy capacity will be the next major project to spur economic growth and decarbonization in Québec. Innovation must be harnessed to ensure the efficient, sustainable, competitively-priced development of green energy generation and distribution capacity on which all sectors of our economy rely.

Moreover, R&I projects will support the development of new industries, such as the production of battery components, green hydrogen, and bioenergy, to decarbonize the industries that cannot be electrified.

Lastly, it will be necessary to adopt innovative technologies and production processes in existing Québec industries, such as steel and aluminum production and transportation. By supporting collaborative research, start-ups, and megaprojects in existing businesses, the 2022-2027 QRIS² will equip such industries in their decarbonization efforts.

The 2022-2027 QRIS² makes provision for \$284.7 million in additional funding over the next five years to support three initiatives that will act as levers to support R&I.

Pursue the rollout of innovation zones

The rollout of world-class innovation zones is the crux of the Québec government's economic vision. This structuring approach hinges on broader collaboration between knowledge institutions, industry, start-ups, and civil society. The innovation zones focus on promising sectors of activity for Québec. They seek to increase the commercialization and exporting of innovations, local and foreign investments, and business productivity, in a sustainable development approach that promotes attractive living environments for innovation stakeholders.

The innovation zones will give rise to new centres of excellence and strategic industry sectors and ultramodern technological fields in respect of which Québec possesses sustainable competitive advantages at the international level.

The government has already announced \$156 million in funding to support the first two innovation zones, Sherbrooke quantique and Technum Québec, in addition to assistance available in other program budget allowances. Additional funding may be added over the next five years to fund the establishment of innovation zones. The analysis of application files continues.

The Sherbrooke quantique and Technum Québec innovation zones

The **Sherbrooke quantique** innovation zone facilitates the development of disruptive technologies in the quantum science sector and its numerous technological applications in the pharmaceutical, energy, transportation, and finance sectors. All told, \$436 million in public and private investments were announced in February 2022, especially to set up one of the world's most efficient quantum computers developed by IBM.

The **Technum Québec** innovation zone in Bromont is relying on the highest concentration in Canada of jobs in microelectronics and smart electronic systems. It will benefit some 700 Québec firms in the sector. All told, \$255 million in investments will contribute to the digital transformation of manufacturing sector businesses and support the growth of industries of strategic importance to the Québec economy, such as the aeronautics, telecommunications, life sciences, energy, and transportation sectors.

Support transversal technologies: accelerate the adoption by businesses of artificial intelligence

To provide a solid footing to enhance the productivity and growth of businesses and organizations in strategic sectors, the government is supporting state-of-the-art technologies that are applicable in different fields.

Substantial investments have helped make Québec a recognized leader abroad in the realm of artificial intelligence (AI), which is integrating into all fields and areas of activity. It enhances productivity and mitigates the consequences of the labour shortage.

To maximize spin-off from AI, Québec must encourage in all regions the establishment of bridges between different environments to broaden the adoption by businesses of AI.

Under the 2022-2027 QRIS², the government will invest \$217.2 million including additional funding totalling \$125 million over five years to support the excellence of university research in the realm of AI, the training of researchers, business AI adoption project delivery, the incubation and seed stages of AI enterprises, and consideration by businesses of the societal impacts of AI and digital technology.

Support research and innovation projects in crucial sectors

The 2022-2027 QRIS² provides support for the integration of innovation into sectoral strategies in respect of which Québec possesses outstanding expertise or that are indispensable, and in the innovation zones.

Provision is made for additional financial support for projects related to the life sciences:

- the development of innovative solutions for healthy ageing, support for the MEDTEQ⁺ consortium's "Qualité de vie des aînés" project;
- support for the Médicament Québec initiative, which will harness Québec's research expertise and infrastructure, enhance its autonomy in the realm of the discovery, development, and production of the active ingredients used in drugs or vaccines and, lastly, promote partnerships with innovative pharmaceutical, generic, biotechnology, and manufacturing or contract research firms.

The Québec Life Sciences Strategy

In the context of the March 2022 *Budget Plan*, the government calls for investments of nearly \$211 million over three years, including an additional \$110 million for *The 2022–2025 Québec Life Sciences Strategy*, to bolster the life sciences ecosystem, generate synergy to meet major healthcare challenges, develop human capital, attract talent, support the creation and growth of innovative enterprises, attract and bring to fruition investment projects, and foster the commercialization of innovations. The 2022-2027 QRIIS² will round out this strategy by:

- making accessible resources and expertise covering the entire innovation cycle;
- supporting the implementation of research and innovation projects focusing on ageing in health and support for Médicament Québec;
- pursuing its support for the development and management of platforms related to mobility and the optimization of health-related information to support the advancement of medical research and thereby accelerate the discovery and development of new treatments.

The 2022-2027 QRIIS² also provides additional financial support for other projects:

- the development through a collaborative approach of innovative technologies for tomorrow's transport (aircraft, space vehicles, land vehicles, and ships, or their systems and strategic components such as batteries and battery recycling). The project is partly linked to the implementation plan of *The 2030 Plan for a Green Economy*;
- the development of innovative agricultural technologies (agtech) that have the potential to solve the challenges posed by environmental protection, resistance to climate hazards, and dependence on labour or productivity in farming or agri-food enterprises. This measure will be implemented in collaboration with the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ).

Complementary sectoral strategies in promising sectors

To develop promising sectors, the government is supporting several strategies that complement the 2022-2027 QRIS², including those indicated below.

The Québec battery industry development strategy

This open-ended strategy will focus on three sectors: the mining and transformation of Québec minerals to manufacture battery components such as anodes and cathodes, electric commercial vehicle production, and the development and recycling of batteries by means of avant-garde Québec technologies.

The Québec Aluminum Development Strategy

One mainstay of this strategy is the development of innovation and Québec's green aluminum. To this end, Québec is accelerating industrial research and relying on promising niches and Québec aluminum's carbon benefits.

The 2016-2026 Québec Aerospace Strategy

One of the three pillars of this strategy is to envisage aerospace of the future through innovation, especially by designing in Québec aircraft and space technologies and bringing to fruition and commercializing Québec innovations.

Foster innovation in the forest industry

To foster market diversification, it is now essential to develop and commercialize innovative forest bioproducts in new sectors. Such development can be accelerated by promoting synergy between the forest sector and other sectors. Plastics, chemical products, food, pharmaceutical products, cosmetics, and nutraceutical products are key examples. The integration into other sectors of forest bioproducts affords an opportunity to make the transition to a greener economy since they usually replace products with a higher carbon footprint. They can thus contribute to promoting clean, sustainable economic growth throughout Québec.

Initiative 12: Resolve societal challenges through innovative solutions

New policies will facilitate innovative solutions to resolve major societal challenges. This is a new visionary measure that goes beyond economic indicators and conforms to global best practices. Under the QRIS², the government will allocate an additional \$67 million over the next five years to two initiatives aimed at the scaling of projects through the entire innovation cycle.

Integrated solutions to respond to government challenges

The QRIS² seeks to further mobilize stakeholders in the machinery of government in Québec around the vital forces in R&I. Public institutions must rely on the entire R&I ecosystem to meet certain major societal challenges, for example, in health, education, or the environment.

The Comité interministériel de la recherche et de l'innovation (CIRI) will pinpoint the major challenges that public institutions are facing. The Québec R&I ecosystem, from basic research to the implementation of innovative solutions in different sectors, especially by means of applied research, the development of innovative technologies, the contribution of innovative enterprises, and the contribution of social innovation initiatives, will support the resulting projects.

With the commitment made by supporting public institutions to introduce on a broader scale the innovative solutions that are developed, the conditions will be right to have an impact among users and thereby contribute to meeting certain major societal challenges.

Through this measure, the government is seeking to:

- mobilize public and private stakeholders to elaborate, test, and implement innovative solutions that respond to the needs pinpointed and will rely on the partners' complementary expertise;
- rely on the strengths of public research and civil society in tandem with the initiatives of the government and private companies throughout the R&I chain to accelerate the response to challenges and maximize the impact for Québec;
- transform the needs pinpointed by major ordering parties into economic and social wealth creation opportunities;
- capitalize on social innovation principles to enhance adherence to the solutions developed to satisfy individual and community concerns and needs.

Launch calls for proposals in social innovation for a more integrated approach

Organizations and communities are increasingly recognizing recourse to social innovation to elaborate new processes to meet significant societal challenges. Moreover, social innovation is critical to ensure the effective adoption of innovative technologies.

Social innovation projects can seek to:

- equip individuals and communities to confront paradigm shifts, for example in terms of the socioecological transition, territorial development, or the use of innovative technologies;

- support the initiatives of community-based organizations or government departments and bodies in service delivery that better, more sustainably satisfy a defined need of groups of individuals or communities, e.g., in education, security, health, immigration, and social solidarity;
- enhance the development and acceptability of innovative technologies that will improve the quality of life of Quebecers by integrating social concerns into such projects.

Social innovation leads to behaviour change in individuals and communities in harmony with public concerns.

Through the QRIIS², the Québec government is recognizing the distinctive nature of social innovation to meet societal challenges.

Innovative approaches will:

- increase and broaden socioeconomic spin-off from social innovation by promoting experimentation and the promotion and scaling of social innovation projects;
- broaden the adoption by government departments and bodies of social innovation to better respond to their needs and mandates. What is more, this measure will contribute to enhancing the integration of social innovation into technological innovation to encourage Québec society to better implement technologies.

CONCLUSION



The 2022-2027 QRIS² is crucial for the Québec government, which has adopted ambitious objectives in the realms of collective wealth creation, an improved standard of living, and the solution of major societal challenges.

The government's perspective hinges on a bold, ambitious Québec that invests in sustainable, inclusive research and innovation to excel at the global level and create more economic and social wealth.

To guide its initiatives, the government has adopted the ambitious objective of reducing by at least half the labour productivity gap with Ontario in the corporate sector.

By 2026-2027, the government will make a significant commitment to achieving this goal by earmarking more than \$7.5 billion for innovation, including nearly \$2 billion in new commitments. This includes \$1.3 billion in budget interventions to which are added \$600 million in financial aid in the form of investment capital, and \$75 million in investments under the *Québec Infrastructure Plan* (QIP).

With the support of the Québec R&I ecosystem and the participation of the entire array of public institutions, the 2022-2027 QRIS² will implement novel approaches to support all innovation-related measures:

- link all stakeholders in the innovation cycle, from the concept stage to commercialization;
- make innovation support services simpler, more accessible, and better known among businesses and organizations to accelerate innovation projects;
- ensure the government's contribution by adopting innovations in public institutions and enhancing the coherence of government initiatives;
- strengthen accountability and ensure ongoing evaluation of measures and stakeholders to maximize their effectiveness;
- rely extensively on sustainable development and social innovation.

The government will roll out key measures and structuring initiatives for Québec's future, especially the innovation zones, to:

- Strategic priority 1: Excel in research, science, and technology;
- Strategic priority 2: Create an environment conducive to the development of innovation;
- Strategic priority 3: Support in-company investments and the commercialization of innovations;
- Strategic priority 4: Develop talent and a scientific and innovation culture;
- Strategic priority 5: Support promising sectors and catalyst projects.

APPENDIX 1: STRATEGY CONSULTATION APPROACH

The new *Québec Research and Innovation Investment Strategy* centres on a sweeping consultation process that has sustained the reflections of the Ministère de l'Économie et de l'Innovation (MEI) and fully ascertained the concerns of stakeholders in the field in the Québec R&I research and innovation ecosystem.

The approach, which follows the guiding principles of the *Cadre de référence gouvernemental sur la participation publique*, hinged on an array of consultation methods adapted to different clienteles, the accessibility of information concerning the MEI's themes and key directions, the participants' sustained commitment, and feedback and coconstruction mechanisms.

The stakeholders represented throughout the approach include individuals, government bodies and stakeholders, non-academic research centres or organizations, businesses, organizations devoted to scientific culture and the dissemination of science, intermediation agencies, start-up support organizations, colleges and College Centres for the Transfer of Technologies (CCTTs), social economy or innovation organizations, business or economic development support organizations, research professors or research groups, clusters, unions, industrial associations or groups, university stakeholders, and representatives of the Fonds de recherche du Québec.

A three-stage approach

The approach comprised three stages: a call for briefs, a regional tour, and the Grand Rendez-vous de l'innovation québécoise, a major event that assembled both government representatives and stakeholders in the Québec R&I ecosystem.

Call for briefs

The first stage in the consultation process was a call for briefs, which the MEI launched in March 2021. As a result of the sector's mobilization efforts, especially by the Conseil de l'innovation du Québec and the Fonds de recherche du Québec, 233 briefs were submitted, and more than 1 500 recommendations were received and analyzed. The contribution was considerable and represents more than twice the number of briefs received at the time of the previous strategy. The analysis of the briefs provided significant information and thematic groups of use for the deliberations surrounding the elaboration of the 2022-2027 QRIS². Research funding, the workforce, talent and skills, and governance issues were the themes that the participants mentioned most frequently.

The regional tour

In the wake of the call for briefs, the MEI organized a regional tour between May 28 and June 11, 2021 comprising six virtual meetings that covered different regions. Marie-Chantal Chassé, Parliamentary Assistant to the Minister of Economy and Innovation, chaired the meetings, which were co-facilitated by Chief Innovator of Québec Luc Sirois and Chief Scientist of Québec Dr. Rémi Quirion. The six virtual meetings took place by group of regions in the following order:

- Bas-Saint-Laurent and Gaspésie—Îles-de-la-Madeleine;
- Saguenay—Lac-Saint-Jean, Côte-Nord, and Nord-du-Québec;
- Montérégie, Estrie, Centre-du-Québec, and Mauricie;
- the metropolitan area (Montréal, Laval, and Longueuil);
- Capitale-Nationale, Chaudière-Appalaches;
- Laurentides, Outaouais, Abitibi-Témiscamingue, and Lanaudière.

All told, 179 individuals who represented the diversity of the Québec R&I ecosystem participated in the meetings, which sought to prioritize the themes mentioned during the call for briefs, especially to determine what the participants perceive as the obstacles and most promising potential solutions. The attraction and retention of talent, specialized labour shortages, the need for all stakeholders in the Québec R&I ecosystem to collaborate and network, difficulties encountered in obtaining support for innovation in businesses, obstacles to financing at the commercialization stage, and the transfer of R&I to users were the issues most frequently broached by the participants.

The Grand Rendez-vous de l'innovation québécoise

The Grand Rendez-vous de l'innovation québécoise (GRVIQ), held on November 18 and 19, 2021, marked the culmination of the consultations surrounding the elaboration of the 2022-2027 QRIS². The MEI, with the support of the Conseil de l'innovation du Québec, organized the event. The GRVIQ sought to consolidate the consultations held in the previous months by encouraging the R&I ecosystem to adhere to the key governmental R&I-related strategic thrusts.

The November 18, 2021 session was held online and face-to-face with more than 2 500 participants. The day's program alternated between discussion groups involving experts and speeches by the Premier and various ministers demonstrating the government's determination to make innovation a mainstay in Québec. A more innovative public service that relies, by way of an example, on digital technology and data, a more agile healthcare system, high-performance higher education institutions, and more and better qualified workers were the themes broached.

The November 19 session, organized in collaboration with partner organizations, industry leaders and several members of the Conseil de l'innovation du Québec, included reflection and exchange forums focusing on:

- labour and talent;
- social innovation;
- start-ups and entrepreneurship;
- innovation in the healthcare sector;
- energy and mobility;
- the academic research sector;
- climate change;
- the development by businesses of in-house innovation;
- the development of public research.



The forums attracted nearly 1 100 participants and led to the submission to the MEI of action plans for each of themes to sustain the MEI in the elaboration of its measures under the 2022-2027 QRIS².

Other consultations

At the same time as the main approach, several targeted or ad hoc consultations or consultations conducted by the partners were carried out:

- a consultation involving secondary school and CEGEP students was held in the fall of 2021, including an online questionnaire (642 respondents) and a series of discussion workshops, in partnership with the Technoscience network and the ACFAS;
- meetings were held with federal government and municipal partners;
- four thematic meetings were held with the members of Synchronex, the college network that represents the 59 CCTTs;
- the Conseil de l'innovation du Québec visited more than 500 businesses, including the members of the Cercle des leaders de l'innovation, and met with more than 30 organizations from 15 regions in Québec;
- the Conseil de l'innovation du Québec organized an Off-Conseil forum to meet with young leaders in Québec society, usually between 25 and 40 years of age. More than 200 young people sustained reflection at the meetings of the Off-Conseil forum and round-table forums;
- the Fonds de recherche du Québec led a discussion workshop among the groups of researchers that it supports;
- exploratory meetings were held with representatives of the First Nations and the Inuit.

Key messages

In the wake of the public consultation process, a series of key messages were synthesized into four core themes: governance issues, R&I for the benefit of society, growth and wealth creation through innovation, and workers and talent in R&I. The messages significantly sustained the MEI's reflection in the elaboration of the 2022-2027 QRIS².

Governance issues:

- the participants strongly advocated broader coherence, i.e., a comprehensive, government-wide, cross-jurisdictional, interdepartmental QRIS²;
- there is a need to simplify the R&I ecosystem through more efficient access to and pooling of the resources available;
- an effort is necessary to ensure regulatory and administrative streamlining;
- it is important to strike a balance between past achievements and novel approaches;

- data-related issues include ethical, secure access, performance targets and action indicators, and the evaluation of spin-off from innovation;
- a strong capacity to be agile and reactive according to the changing context is important.

R&I for the benefit of society:

- high-impact strategies, mission-oriented research and the formulation of key government challenges to respond to the challenges of tomorrow were mentioned;
- digital technology (AI, ICT, 5G, cybersecurity), quantum technologies, green technologies, aerospace, agriculture and agri-food are deemed essential sectors;
- sustainable development, climate change and the energy transition, the optimization of the healthcare system, the ageing of the population and patient well-being, social inequalities, regional vitality, and the digital transition were the societal challenges most frequently mentioned;
- a stronger scientific and innovation culture at an earlier age;
- stronger entrepreneurial skills from the standpoint of the management of innovation and change at all levels of training;
- enhanced assistance for scientific journalism and the promotion of a scientific culture that serves remote areas and more vulnerable communities;
- strong mobilization of research stakeholders to promote scientific research in all its forms;
- social innovation stakeholders confirmed the importance of promoting and fostering social innovation;
- the Québec public procurement process as a vector of innovation;
- a fertile dialogue between science and society that promotes literacy, numeracy, and a critical mind.

The imperative of growth and wealth creation:

- the participants strongly approved the notion of the “transition from the concept stage to the market;”
- the innovation culture needs to be strengthened in Québec;
- businesses must develop and grow through in-house innovation;
- the assistance and support process offered to businesses is complex and can represent an obstacle to innovation;
- financing is lacking at the market introduction and commercialization stage.

Labour and talent in R&I:

- labour-related challenges differ from one sector and region to another (shortages, access and retention, the failure to match training and users’ needs);
- the attraction and retention of talent is a critical issue, especially in the regions and in STEM programs;
- lack of job security for support staff and research professionals.

APPENDIX 2:

DETAILED TABLE OF THE INDICATORS

Indicators will facilitate the monitoring of changes in Québec in the realm of research and progress toward the overall objective of the 2022-2027 QRIS², i.e., to reduce by half the labour productivity gap in the corporate sector with Ontario.

The entire array of R&I stakeholders, including several Québec and federal government departments, are contributing to these trends and not only the 2022-2027 QRIS². The initiative of the *Innovation Barometer* will round out this list of indicators. The outcomes have been established based on data published by Statistics Canada, except where stated.

| INDICATOR | TARGET | EXPLANATION |
|---|--|--|
| An ambitious, transversal target | | |
| Labour productivity in the corporate sector – Real GDP per hour | Reduce by at least half over five years the labour productivity gap with Ontario in the corporate sector (in 2019, the gap stood at \$2.90 of real GDP/hour: \$51.00 of real GDP/hour in Québec and \$53.00 of real GDP/hour in Ontario, in 2012 chained dollars). | Labour productivity measures how efficiently workers transform their efforts into output. |
| STRATEGIC PRIORITY 1: Excel in research, science, and technology | | |
| The proportion R&D in the higher education system funded by businesses | Reach Ontario’s level and surpass the Canadian level by increasing to 9% business R&D funding carried out in the higher education system (in 2019, 6% in Québec and 9% in Ontario, compared with the Canadian average of 8%). | Funding for R&D in the higher education system comes from the federal and provincial governments, commercial enterprises, the higher education system, NGOs, and abroad. |
| R&D expenditures in the higher education system as a percentage of GDP | Increase R&D activities in the higher education system to reach 0.90% of GDP over five years (in 2019, 0.87% in Québec and 0.96% in Nova Scotia) and thus remain among the top three OECD member nations. | R&D conducted in the higher education system includes that carried out in the universities and affiliated teaching hospitals. Such expenditures are divided by GDP. |

| INDICATOR | TARGET | EXPLANATION |
|--|---|--|
| STRATEGIC PRIORITY 2: Create an environment conducive to the development of innovation | | |
| The share of businesses that innovate | <p>Increase to 56% the share of businesses that innovate in products (in 2017-2019, 51% in Québec and 56% in Ontario, compared with the Canadian average of 53%).</p> <p>Increase to 76% the share of businesses that innovate in business processes (in 2017-2019, 71% in Québec and 76% in Ontario, compared with the Canadian average of 73%).</p> | <p>According to data from the <i>Survey of Innovation and Business Strategy</i> (SIBS) targeting enterprises with 20 or more employees.</p> <p>Product innovation implies the commercialization of a new or significantly improved good or service. The processes include basic activities and support for the production of goods and services.</p> |
| Businesses established in the professional, scientific, and technical services sector | <p>By 2027, create annually 4 600 businesses in the professional, scientific, and technical services sector to reach 17% of the businesses created in this sector out of businesses overall created annually (in 2019, 14% in Québec and 17% in Ontario).</p> <p>(Out of a total of 25 010 enterprises created in Québec in 2019, 3 580 firms were created in this sector, compared with 12 010 in Ontario).</p> | Includes newly created businesses in the sector targeted, which relies heavily on highly skilled workers. |
| STRATEGIC PRIORITY 3: Support in-company investments and the commercialization of innovations | | |
| Share of total R&D conducted by businesses in Québec | <p>Seek to ensure that at least 60% of all R&D conducted in Québec is carried out by businesses (in 2019, 56% in Québec, 57% in Ontario, and 75% in the United States. Québec ranks 24th among the OECD member nations).</p> <p>Increase in-house business R&D as a percentage of GDP to 1.50% over five years (in 2019, 1.23% in Québec, 1.15% in Ontario, and 2.38% in the United States).</p> | <p>In-house business R&D is part of the overall aggregate of total research (gross domestic expenditures on R&D [GERD]). The expenditures are divided by GDP to better compare data.</p> |
| Value of venture capital investments obtained by businesses | <p>Invest at least \$4.5 billion over five years (2023-2027) at the start-up phase (\$2.6 billion in 2016-2020).</p> <p>Invest at least \$575 million over five years (2023-2027) in the seed phase (\$260 million in 2016-2020) and aim to ensure a maximum contribution of 50% from the government in the capital invested in investment funds at the seed phase capitalized by the Québec government (closed funds during the period 2023-2026).</p> | <p>The value of investments represents the total value of the amounts of venture capital that businesses have obtained in the phases targeted. Data collected by CVCA and Réseau capital.</p> <p>The share of private investors applies to investments carried out through the Economic Development Fund (EDF).</p> |

| INDICATOR | TARGET | EXPLANATION |
|---|--|--|
| STRATEGIC PRIORITY 4: Develop talent and a scientific and innovation culture | | |
| Newly registered students in the fall in a science, technology, engineering and mathematics (STEM) and computer science program | <p>Reduce the gap with Ontario concerning the share of such students in total undergraduate registrations (in 2018-2019, a 14-percentage point gap: 23% in Québec and 37% in Ontario).</p> <p>Bachelor's degree level: Increase the number of students to 9 000 over five years (average over the past five years: 8 289).</p> <p>In technical or vocational training: Increase the number of students to 9 000 over five years (average over the past five years: 4 420).</p> | The cohort of full-time students newly registered in the fall in science, technology, engineering and mathematics (STEM), with the addition of computer science. |
| Staff assigned to in-house business R&D per thousand workers | Increase the staff assigned to in-house business R&D to 13 per thousand workers by 2027 (in 2019, 12 in Québec and 10 in Ontario), and rank among the top 10 in the OECD (17th in 2019). | Groups together researchers, wage earners, or outside staff, advisors, and entrepreneurs associated with in-house business R&D. Compared with staff working in the industries. |
| STRATEGIC PRIORITY 5: Support promising sectors and structuring projects | | |
| Share of businesses that use emerging technologies | <p>Increase to 11% the adoption of clean technologies (in 2017-2019, 7% in Québec and 10% in Ontario).</p> <p>Increase to 10% the adoption of artificial intelligence (in 2017-2019, 6% in Québec and 6% in Ontario).</p> | According to data from the <i>Survey of Innovation and Business Strategy</i> (SIBS) targeting enterprises with 20 or more employees. |
| Knowledge-based industry enterprises | <p>Increase to 25% the number of enterprises in this sector to reach 15 000 within five years (in 2020, 11 807 in Québec and 31 310 in Ontario).</p> <p>Reduce by at least one-quarter the gap with Ontario concerning the share that this sector represents in the entire array of businesses (in 2020, a 2.4-percentage points gap: 4.9% in Québec and 7.3% in Ontario).</p> | According to Statistics Canada, the knowledge-based industries include legal and accounting services, architecture, design, engineering, computer system design, public relations, consulting services in management and the environment, scientific research and development services, and all other professional and technical services. |

APPENDIX 3: COMPLEMENTARITY OF POLICIES, STRATEGIES, AND ACTION PLANS

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation

- *Politique bioalimentaire et son plan d'action 2018-2023*
- *Policy for the Responsible Conduct of Research*
- *The 2020-2030 Sustainable Agriculture Plan*
- *The 2020-2025 Québec Greenhouse Growth Strategy*
- *Plan d'action ministériel pour l'industrie des pêches et de l'aquaculture commerciales 2018-2025*

Ministère de la Culture et des Communications

- *The Québec Digital Culture Plan*

Ministère de la Cybersécurité et du Numérique

- *Plan d'action favorisant un gouvernement ouvert 2021-2023*

Ministère de l'Économie et de l'Innovation

- *Plan québécois en entrepreneuriat 2022-2025 (under development)*
- *The 2016-2026 Québec Aerospace Strategy*
- *The 2015-2025 Québec Aluminum Development Strategy*
- *The 2022-2025 Québec Life Sciences Strategy*
- *Plan d'action pour la croissance et les technologies propres 2018-2023*
- *The 2018-2023 Action Plan for the Ground Transport Industry and Sustainable Mobility*
- *Plan d'action gouvernemental en économie sociale 2020-2025*
- *Plan d'action pour la relance des exportations 2020-2025*

Ministère de l'Éducation/Ministère de l'Enseignement supérieur

- *Plan d'action numérique 2018-2023*

Ministère de l'Énergie et des Ressources naturelles

- *Energy Transition, Innovation and Efficiency Master Plan*
- *Québec Plan for the Development of Critical and Strategic Minerals 2020-2025*
- *Stratégie québécoise sur l'hydrogène vert et les bioénergies (forthcoming)*

Ministère de l'Environnement et de la Lutte contre les changements climatiques

- *The 2030 Plan for a Green Economy and its implementation plan*

Ministère des Forêts, de la Faune et des Parcs

- *Policy for the Use of Wood in Construction*
- *Stratégie de développement de l'industrie québécoise des produits forestiers 2018-2023*
- *Québec Timber Production Strategy*
- *Stratégie d'aménagement durable des forêts*

Ministère de la Justice

- *Plan d'action 2020-2021– Table Justice-Québec*
- *Plan pour moderniser le système de justice / Plan stratégique du MJQ 2019-2023*

Ministère des Relations internationales et de la Francophonie

- *Québec's International Vision*
- *Territorial strategies (United States, Europe, Indo-Pacific, Latin America and the West Indies, Africa)*

Ministère du Tourisme

- *2021-2025 Tourism Intervention Framework*
- *Fonds dédié à l'innovation touristique 2021-2026*

Ministère des Transports

- *Politique de mobilité durable et son plan d'action 2018-2023*
- *Stratégie maritime 2020-2035*

Ministère du Travail, de l'Emploi et de la Solidarité sociale

- *Government Action Plan for Community Action 2022-2027*

Secrétariat du Conseil du trésor

- *Passeport Entreprises*
- *Stratégie de transformation numérique gouvernementale 2019-2023*
- *Stratégie d'intégration de l'intelligence artificielle dans l'administration publique 2021-2026*
- *Stratégie gouvernementale des marchés publics*

Société du Plan Nord

- *2020-2023 Northern Action Plan*
- *Northern Initiatives Fund – Section B and opportunity budget*

Commission des partenaires du marché du travail

- *Politique d'intervention sectorielle*

