

BUDGET

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BUILDING A GREEN ECONOMY

ELECTRIFICATION AND

CLIMATE CHANGE



Budget 2020-2021
Building a Green Economy

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HIGHLIGHTS

The Québec government is firmly committed to turning the fight against climate change into an opportunity for economic development.

- On the one hand, climate change poses a real challenge to prospects for long-term improvements in prosperity and quality of life.
- On the other hand, a strong and sustainable economy is essential to finance a climate transition that matches Québec's ambitions.

The electrification and climate change framework policy will set out Québec's vision for meeting the reduction target by 2030 and adapting to climate change.

The government recognizes the climate emergency and knows that it needs to step up its action in this regard.

- The first implementation plan for the framework policy therefore will be supported by investments of more than \$6.2 billion, effectively doubling the annual amounts granted for fighting climate change under the 2013-2020 Climate Change Action Plan.
 - In addition to the \$4.1 billion arising from the carbon market, appropriations of \$2.1 billion will be allocated to implement the framework policy. This additional amount represents a 50% enhancement in funding compared to revenues from the carbon market.
- Investments are allocated to sectors in which greenhouse gas (GHG) reductions can be achieved at the lowest cost.
 - In fact, more money is allocated to sectors with high GHG reduction potential, particularly the transportation sector, which accounts for 57% of the total potential for reduction.
 - These investments are a first major step towards achieving the 2030 target and helping Québec adapt to climate change.

The government intends to update its implementation plan on an annual basis to ensure that it meets its objectives, that it takes into account progress made and that it maximizes the full impact, in Québec, of the measures implemented.

❑ **Québec's efforts must rely on the contribution of all**

The tabling of the framework policy will be a first step towards achieving Québec's economic and climatic ambitions. However, it is essential that the transition to a green economy engage society as a whole.

- In this regard, the Québec government will provide leadership in the fight against climate change and set an example by reducing its carbon footprint.
- Moreover, the federal government's and municipalities' actions in the fight against climate change will complement Québec's actions.
- Lastly, it is through their individual and collective choices that households, businesses and municipalities will make Québec's transformation possible.

Québec will be able to achieve its GHG emission reduction target by 2030 through the action of all Quebecers, economic sectors and social players.

1. FIGHTING CLIMATE CHANGE: A CHALLENGE FOR US ALL

Climate change puts increasing pressure on the environment and impacts quality of life, health and the economy.

- Climate change is caused by the accumulation of greenhouse gas (GHG) in the atmosphere as a result of human activities.
- Several of the consequences of climate change have been observed in Québec, such as more frequent heat waves and floods, increased coastal erosion problems and permafrost melting.

1.1 Québec's commitments

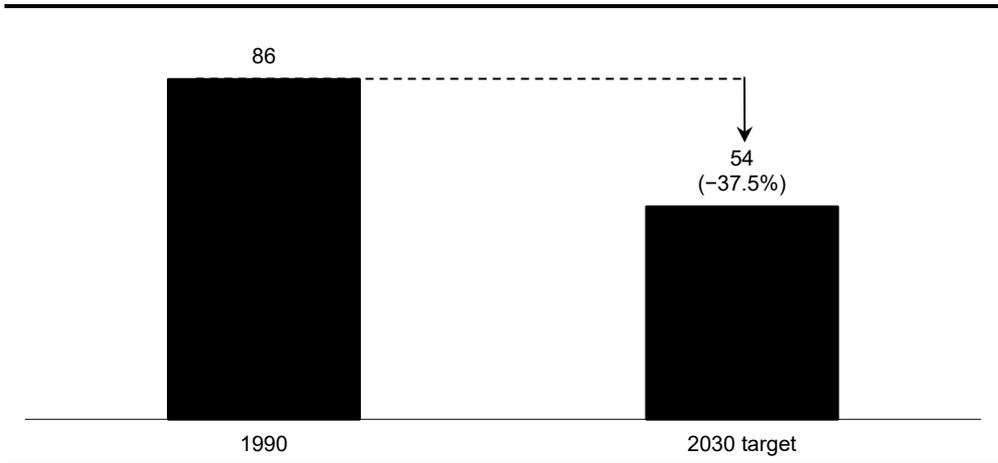
Scientific evidence is clear: nations must work together to reduce their GHG emissions. That is why Québec has set itself an ambitious reduction target.

- The government has committed to reducing Québec's emissions by 37.5% from their 1990 level by 2030.

The initiatives set out in Budget 2020-2021 are part of an ambitious and practical vision that will be announced when the electrification and climate change framework policy is published.

CHART 1

Québec's greenhouse gas emissions in 1990 and 2030 reduction target
(million tonnes of CO₂ equivalent, unless otherwise indicated)



Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

1.2 Enhanced ambition: maximizing greenhouse gas emission reductions in the territory of Québec

The fight against climate change is a priority and requires large-scale action. That is why, as part of Budget 2020-2021, the government:

- reiterates its intention to meet Québec's GHG emission reduction target of 37.5% below the 1990 level;
- announces its commitment to maximize these reductions in Québec in order to improve the quality of the environment, business development and the well-being of Quebecers.

In addition, Québec will take firm action to adapt to climate change.

Besides contributing to the fight against climate change, investments in climate transition will help position Québec in a decarbonizing world and raise Quebecers' standard of living.

The transformation of Québec's economy will:

- attract green investments and ensure the development of low-carbon business sectors that are more resilient to climate change;
- support the development of Quebecers' skills;
- enable the development of hydroelectricity and exports of high-value added goods and services, while creating quality jobs.

CO₂: the reference for measuring greenhouse gas emissions

There are several types of GHGs, such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Each gas has a different atmospheric lifetime and heat-trapping potential.

- For example, the estimated heat retention potential of methane is 25 times that of CO₂ over a 100-year period.

To obtain a common unit of GHG emissions, emissions associated with GHGs other than CO₂ are converted into "CO₂ equivalent," which refers to the concentration of CO₂ that would produce the same impact on climate over a given period.

Moreover, due in particular to the prevalence of CO₂ among the GHGs, the expressions "carbon" footprint, "carbon" pricing, for example, are being used.

1.3 Québec's approach to the fight against climate change

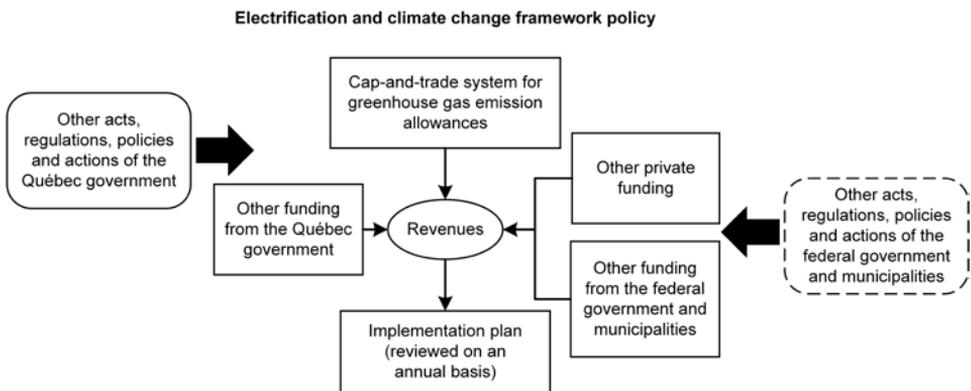
To achieve its climate objectives and take stronger action on climate change adaptation, the government is banking on the upcoming electrification and climate change framework policy. The framework policy will be underpinned by:

- cap-and-trade (CAT) system for greenhouse gas emission allowances, which covers approximately 80% of Québec's total GHG emissions;
 - Establishments covered by this system must purchase emission allowances for the GHGs they are responsible for.
 - For households and businesses, the cost of emission allowances is included in the cost of the fossil fuels they use.
 - Businesses and households are therefore encouraged to reduce their GHG emissions.
- full reinvestment of revenues from the CAT system into the measures set out in the implementation plan for the framework policy, which will be reviewed on an annual basis;
- other acts, regulations, policies and actions of the Québec government to help fight climate change, particularly in the transportation and industrial sectors.

Other interventions and funding will contribute to reducing GHG emissions in Québec, in particular actions by the federal government, municipalities and the private sector.

ILLUSTRATION 1

Québec's strategy for fighting climate change by 2030



The electrification and climate change framework policy

The publication of the framework policy will allow the government to outline its vision with respect to:

- fighting climate change;
- meeting the 2030 reduction target;
- enhancing Québec's resilience to climate change;
- contributing to Québec's economic development.

Later in 2020, the Minister of the Environment and the Fight Against Climate Change will release the first implementation plan for the framework policy, which will cover the period from January 1, 2021 to March 31, 2026. This plan will set out concrete actions and measures that the government will put in place by 2025-2026.

- The implementation plan will focus in particular on electrification to reduce Québec's GHG emissions as well as on climate change adaptation.
- The government will update its implementation plan on an annual basis by, among other things, adjusting the amounts set out in the five-year financial framework to take into account economic growth, GHG emissions and the financial resources that could be made available.

Electrification and climate change framework policy



❑ The cap-and-trade system for greenhouse gas emission allowances: a guaranteed way of reducing emissions

The CAT system for greenhouse gas emission allowances is a market in which GHG emission allowances are traded. The price of these allowances varies according to supply and demand.

- Under this system, the level of GHG emissions must remain lower than a maximum quantity determined by the government.
- This cap decreases every year, according to the reduction target set by Québec, which guarantees reductions in GHG emissions in the sectors covered by the system (industrial, transportation and buildings sectors).

Québec's CAT system is linked to the California system, which allows the two jurisdictions to pool their reduction targets, and their businesses to trade GHG emission allowances.

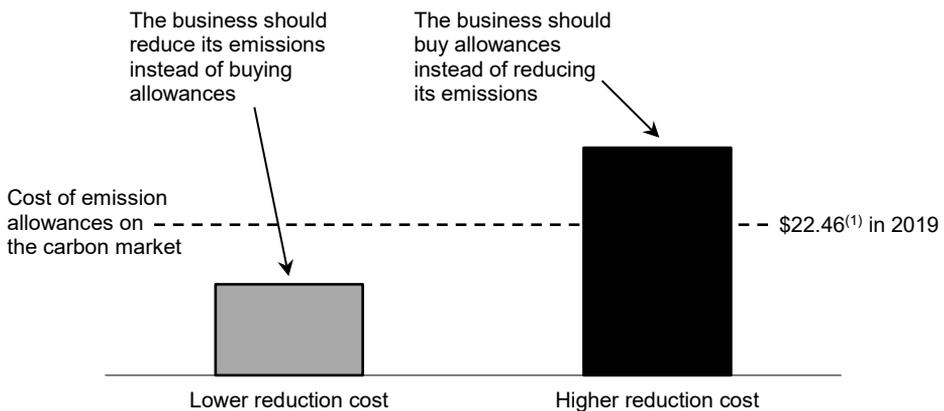
- As a result, the level of emissions emitted by Québec businesses and households could exceed Québec's emission cap if equivalent reductions are made elsewhere on the shared market.

Businesses will usually prefer to purchase emission allowances if the cost of these allowances is lower than the cost of reducing their GHG emissions.

- However, reducing GHG emissions at the local level has significant benefits, including on air quality, health and the economy.
- To maximize these benefits, it is therefore important to help Québec businesses in their decarbonization efforts, which will limit the use of reductions made outside Québec.

ILLUSTRATION 2

Illustration of the link between the price of emission allowances and the carrying out of emission reduction projects



(1) Auction price in November 2019 for 2019 allowances.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

❑ **The framework policy: building a green economy**

Although the CAT system is central to the government's efforts to fight climate change, Québec cannot achieve its GHG emission reduction targets through this means alone.

- The CAT system guarantees the desired reductions in the sectors covered by it, which account for approximately 80% of Québec's GHG emissions; however, it cannot guarantee that these reductions will be made entirely in Québec.
- In addition, other sectors, such as the waste and agriculture sectors, produce GHGs and are not covered by the CAT system.
 - However, these sectors can make GHG reductions and transfer ownership of these reductions to businesses subject to the CAT system. These are known as offset credits. Businesses who purchase these credits can use them as emission allowances.
 - Offset credits are governed by rigorous quantification protocols developed by the government, in particular to certify the quantity of reductions and ensure their permanent nature.
 - Offset credit protocols are in place, particularly in the waste and agriculture sectors. A protocol for carbon sequestration through afforestation and reforestation activities on private land in Québec is also being developed.¹

Concrete action must therefore be taken in all sectors.

In order to meet its decarbonization commitments, Québec reinvests all revenues generated by the cap-and-trade auctions by funding measures to fight climate change.

- These measures are aimed at, in particular, supporting households, businesses and municipalities in their efforts to reduce their GHG emissions and adapt to climate change.

Starting in January 2021, revenues from the CAT system will be used to fund the implementation plan for the framework policy, which will aim to, in particular:

- promote the replacement of hydrocarbons with clean electricity and other renewable sources of energy, particularly in road transportation, building heating and industrial manufacturing;
- reduce energy needs and GHG emissions by promoting energy efficiency and changing our practices;
- create wealth, in particular through the development of industrial sectors linked to renewable energy production;
- enhancing Québec's resilience to climate change.

¹ For more information, go on www.environnement.gouv.qc.ca.

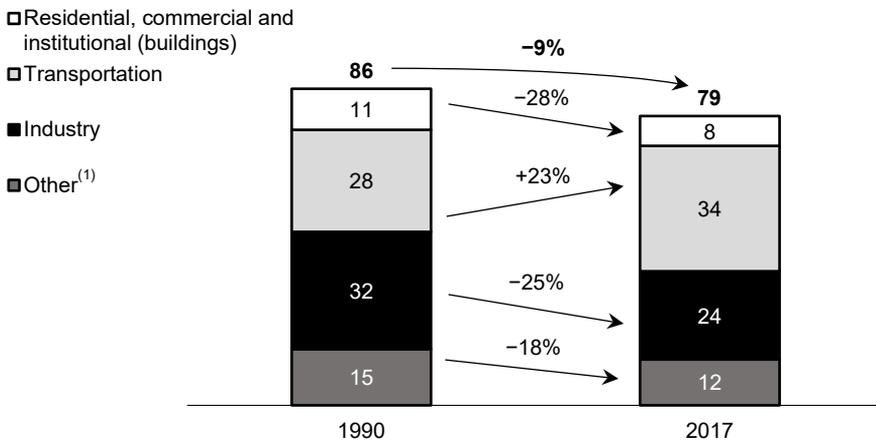
1.4 Reduction in Québec's emissions: where do we stand?

According to the most recent inventory,² Québec's GHG emissions decreased by 9% between 1990 and 2017. This result is mainly attributable to:

- a 25% reduction in industrial emissions;
 - This result is attributable, among other things, to the replacement of polluting factories and processes, the increasing use of renewable energy as well as efficiency gains and adjustments in production.
- a 28% decrease in emissions from residential, commercial and institutional buildings, mainly attributable to the electrification of residential heating systems and improved energy efficiency;
- a 23% increase in emissions from the transportation sector, which mainly results from:
 - growth in freight transport (+139% between 1990 and 2017),
 - the growing share of light truck³ use in household transportation patterns, which rose from 15% to 39% between 1990 and 2017.

CHART 2

Greenhouse gas emissions in Québec – 1990 and 2017 (million tonnes of CO₂ equivalent, unless otherwise indicated)



Note: Sectors as defined in the inventory of greenhouse gas emissions in Québec. Totals may not add due to rounding.

(1) Agriculture, waste and electricity sectors.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

² Ministère de l'Environnement et de la Lutte contre les changements climatiques, Inventaire québécois des émissions de gaz à effet de serre en 2017 et leur évolution depuis 1990, 2019, p. 8.

³ Light trucks include sport utility vehicles (SUVs), pickup trucks and minivans.

2020 target: a 13% difference between greenhouse gas emissions in 2017 and the 2020 target

The last GHG emissions inventory shows that GHG reductions have stagnated in Québec in recent years, due in particular to the increase in the number and size of vehicles on the roads and in freight transport.

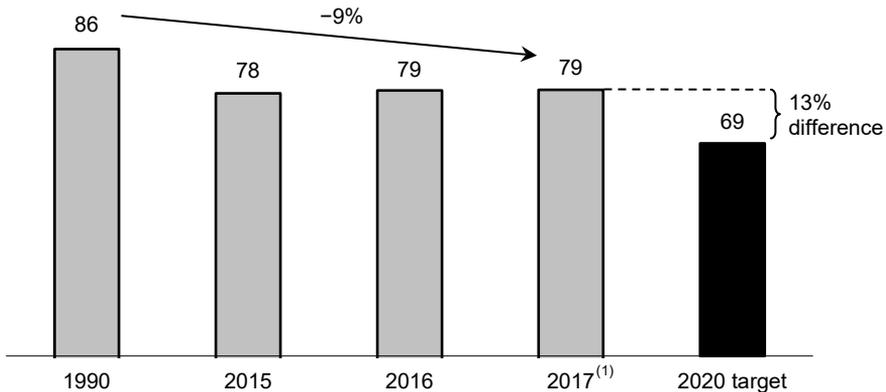
- For example, the number of light trucks¹ used for passenger transit on Québec roads rose from approximately 1.3 million to 1.9 million between 2010 and 2017, an increase of nearly 45%.

In 2009, Québec set an emission reduction target for 2020 of 20% below the 1990 level. Definitive data to assess the achievement of this target will not be available until 2022, but it is unlikely that Québec will be able to meet this target in its territory.

- Indeed, Québec's GHG emissions target represents 69 million tonnes of CO₂ equivalent in 2020, that is, nearly 13% less than emissions recorded in 2017.

Difference between GHG emissions in 2017 and the 2020 target

(million tonnes of CO₂ equivalent, unless otherwise indicated)



(1) The last available inventory of greenhouse gas emissions is for the year 2017.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

1 Light trucks include sport utility vehicles (SUVs), pickup trucks and minivans.

❑ The impact of economic growth on GHG emissions

Given projected growth,⁴ the level of GHG emissions in Québec could rise from 79 to 83 million tonnes of CO₂ equivalent between 2017 and 2030, an increase of 0.4% on average per year.

This increase would result mainly from an anticipated economic growth rate averaging 1.6% per year between 2017 and 2030,⁵ which will put upward pressure on GHG emissions.

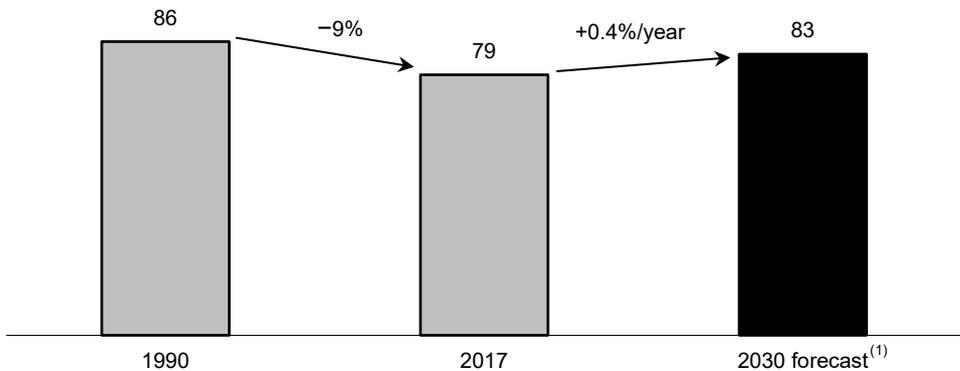
— New investment projects, growth in the production capacity of existing businesses, population growth and consumer choices could have an upward effect on GHG emissions.

However, the impact of economic growth on GHG emissions will be mitigated by, in particular:

- more efficient use of energy, as well as the introduction of new, less polluting technologies;
- an increase in the share of electric vehicles in the fleet and improved energy efficiency for vehicles.

CHART 3

Projected changes in greenhouse gas emissions in Québec by 2030 according to economic growth (million tonnes of CO₂ equivalent, unless otherwise indicated)



Note: Estimates based on information available as of February 2020.

(1) This GHG emission forecast scenario is based on actual economic data from 2017 to 2019 and on Budget 2020-2021's economic growth forecast for subsequent years. It excludes the impacts of the CAT system and the measures set out in the first implementation plan for the framework policy.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

⁴ Excludes the effects of the CAT system and the measures set out in the first implementation plan for the framework policy.

⁵ Estimate based on actual economic data from 2017 to 2019 and on Budget 2020-2021's economic growth forecast for subsequent years.

❑ Meeting the 2030 target: a two-step approach

Economic growth can put upward pressure on GHG emissions, particularly because of its impact on energy consumption.

As a result, efforts to meet the GHG emission reduction target of 37.5% between 1990 and 2030 (54 million tonnes of CO₂ equivalent) must be carried out in two steps.

- On the one hand, the anticipated increase in GHG emissions between 2017 and 2030, which would be mainly attributable to economic growth, must be offset.
- On the other hand, emissions must be reduced relative to their 2017 level.

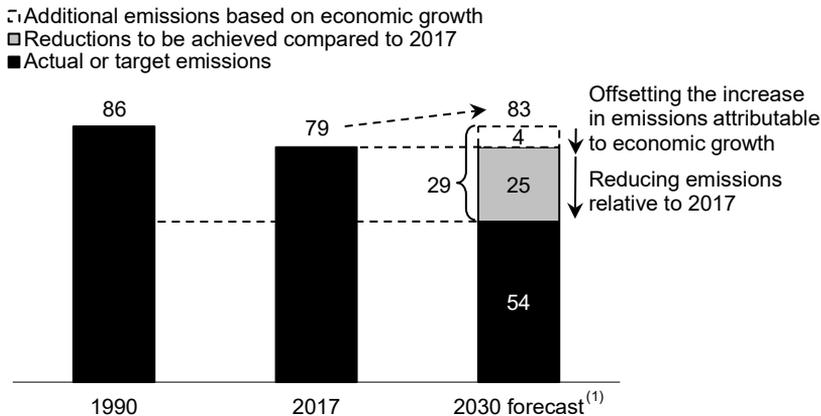
The total effort to be made by 2030 could therefore represent 29 million tonnes of CO₂ equivalent.

- In order to maintain GHG emissions at their 2017 level, efforts representing 4 million tonnes of CO₂ equivalent would have to be made to counter the effect of economic growth.
- Then, in order to reach the target of 54 million tonnes of CO₂ equivalent in Québec, additional efforts representing 25 million tonnes of CO₂ equivalent would have to be made, relative to the 2017 emission level.

CHART 4

Illustration of changes in greenhouse gas emissions and reductions needed to meet the 2030 target

(million tonnes of CO₂ equivalent, unless otherwise indicated)



Note: Estimates based on information available as of February 2020.

(1) This GHG emission forecast scenario is based on actual economic data from 2017 to 2019 and on Budget 2020-2021's economic growth forecast for subsequent years. It excludes the impacts of the CAT system and the measures set out in the first implementation plan for the framework policy.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

Uncertainty regarding the efforts needed to meet the 2030 target

In order to meet the GHG emission reduction target entirely in Québec, GHG emissions must decrease to 54 million tonnes of CO₂ equivalent in 2030.

- Efforts needed to meet the 2030 target are assessed on the basis of a projection of changes in emissions (estimated at 83 million tonnes CO₂ equivalent in 2030) according to projected economic growth.

Estimates are based on assumptions, some of which have associated risks that could impact the estimates. The emissions level can therefore vary significantly over time.

The emissions level depends on the evolution of several factors, including economic growth, technological advances, energy prices, carbon pricing in Québec and around the world, and the level of public support as regards the fight against climate change.

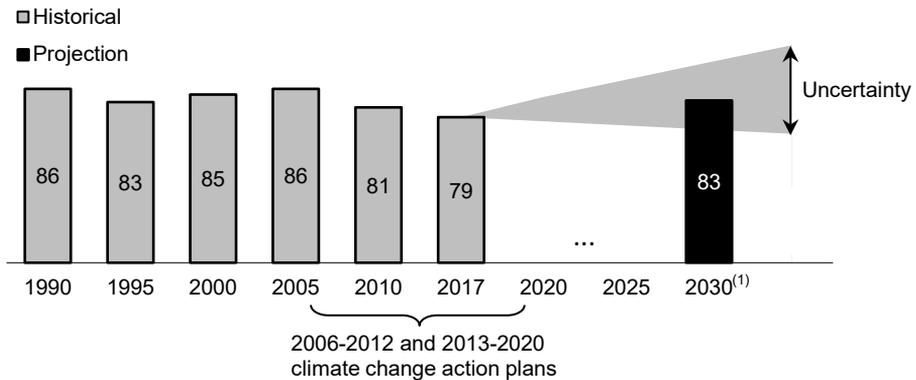
- The level of effort needed to meet the 2030 target is therefore based on a prediction of tomorrow's economic and social reality in the light of information available today.

Projections of GHG emissions are useful to providing an estimate of the potential effort required and to guiding decision-making.

Estimates regarding reduction efforts must therefore be updated regularly due to their uncertain nature.

Illustration of the uncertainty regarding GHG emission projections

(million tonnes of CO₂ equivalent, unless otherwise indicated)



Note: Estimates based on information available as of February 2020.

(1) This GHG emission forecast scenario is based on actual economic data from 2017 to 2019 and on Budget 2020-2021's economic growth forecast for subsequent years. It excludes the impacts of the CAT system and the measures set out in the first implementation plan for the framework policy.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

❑ Estimated reduction potentials for meeting the 2030 target: where should we focus our efforts?

Achieving the 2030 target is possible given anticipated technological developments.

The reduction potentials show the technical potential for reducing Québec's GHG emissions to meet the target of 54 million tonnes of CO₂ equivalent, at the lowest cost and based on current knowledge.

The reduction potentials may vary with the sector and over time based on, among other things, the cost of available emission reduction technologies and the ability of businesses and households to adopt them.

— For example, reduction potentials include the acquisition of electric vehicles, cleaner industrial processes, electric heating systems rather than fossil-fuel heating systems and the conversion of waste into renewable natural gas.

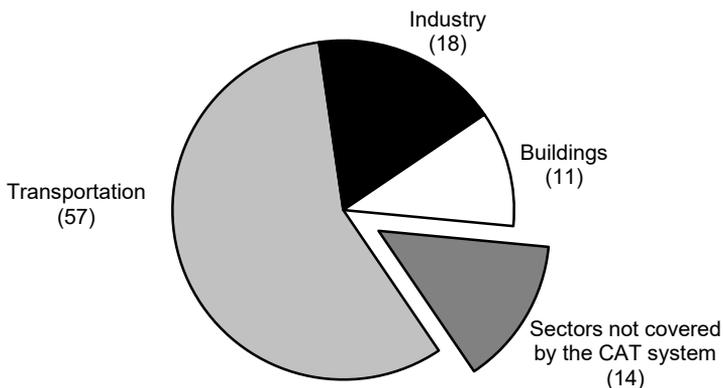
Based on the modellings performed, it is estimated that by 2030:

- the transportation sector could account for around 57% of the technical emission reduction potential of the economy as a whole;
- the industrial sector could contribute nearly 18% of the reductions, while the buildings sector could enable an emission reduction of nearly 11%;
- the other sectors not covered by Québec's CAT system would account for 14% of total reductions.

The implementation plan for the framework policy will be reviewed on an annual basis to allow for flexibility so that changes in reduction potentials over time can be taken into account.

CHART 5

Illustration of technical emission reduction potential in 2030, by sector (percentage of the total effort to be made in 2030)



Note: Estimate based on information available as of February 2020. See page 9 for changes in GHG emissions between 1990 and 2017.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

Estimating technical emission reduction potential and adopting new technologies

Emission reduction potentials reflect the optimal distribution of efforts required to achieve the 37.5% reduction target between 1990 and 2030 in Québec, while minimizing the financial costs to households, businesses and governments.

The reduction potentials for each sector take into account the current and projected cost of reduction technologies. The trajectory of emission reductions by sector is then optimized by minimizing costs.

- Therefore, reduction potentials do not estimate the impact of measures on achievement of the 2030 target.

The resulting technical potentials are based on the best knowledge available at the moment. However, the potentials are adjusted over time according to the evolution of technologies, their cost and the rate of their adoption.

Transportation: significant reduction potential by 2030

The transportation sector is projected to have the highest technical potential for reduction by 2030 (57% of the total reduction potential).

This is due, in particular, to:

- the opportunities afforded by the electrification of transportation in the coming years;
 - The price of batteries for electric vehicles decreased by 87% between 2010 and 2019. This downward trend is expected to continue by 2030.
 - In addition, the range of electric vehicles is increasing every year, which could boost consumer appeal.
 - Finally, within the next few years, a number of businesses will launch all-electric heavy vehicles, particularly for freight transport.
- a reduction in the number of vehicles on Québec roads, attributable, among other things, to an increase in the use of public transit.

Modelling reduction potentials and economic impacts: an integrated vision of the fight against climate change

The Ministère des Finances du Québec and the Ministère de l'Environnement et de la Lutte contre les changements climatiques combined two models to estimate projected GHG emissions, technical reduction potentials and the economic impacts of the investments provided for in the first implementation plan for the framework policy.

- The general equilibrium model of the Ministère des Finances du Québec for the environment (MEGFQ-E) provides a macroeconomic perspective of the fight against climate change and shows the impacts of the CAT system and investments made.
- The energy system for Québec, the environment, climate and electricity model (SEQUENCE) provides a technical perspective of the various technological and energy choices that can be made to reduce GHG emissions by 2030 and allows projections of GHG emissions to be made under various scenarios.

These models are used together to study the interrelationships between the economy and the fight against climate change, particularly in the context of the CAT system.

The MEGFQ-E

The MEGFQ-E is an elaborate system of equations presenting the main interrelationships in the Québec economy.

- The model details the entire structure of the economy and the CAT system, and therefore takes into account interactions between economic agents (households, businesses and governments) as well as feedback effects between markets.
- Prices and quantities adjust to balance all markets simultaneously, in particular the labour and goods and services markets. Households and businesses adjust to changes in the economy.

The SEQUENCE model

The SEQUENCE model is a very comprehensive energy optimization tool that produces, in particular, a projection of GHG emissions over the long term and measures different reduction potentials to meet the 2030 target.

- This model is based on the TIMES model generator, which is sponsored by the International Energy Agency.
- It takes into account anticipated technological advances, efficiency in manufacturing processes, the expected level of economic activity in different sectors and the prices of different forms of energy.

Work on the SEQUENCE model will continue to expand the model's database and underlying assumptions, and to continue its integration with the MEGFQ-E.

Note: See Appendix for more information on the models used.

2. FINANCING THE FIRST IMPLEMENTATION PLAN FOR THE FRAMEWORK POLICY

2.1 Enhancing government action regarding the environment

The 2013-2020 Climate Change Action Plan will end on December 31, 2020. The government will therefore soon release its electrification and climate change framework policy, which will address two key climate change priorities:

- mitigating climate change and meeting the greenhouse gas (GHG) reduction target by 2030;
- helping Québec adapt to the impacts of climate change.

The framework policy is more ambitious than previous plans, which reflects Québec's desire to make the transition to a green economy one of its priorities and to intensify government action regarding the environment.

□ Double the annual funds compared to the previous plan

Québec has set an ambitious target consisting of a 37.5% reduction in GHG emissions compared to the 1990 level. However, to achieve the 2030 target, significant action is needed.

In order to reinforce government action, the funds earmarked to fight climate change are being substantially increased. Investments totalling \$6.2 billion by March 2026 have been earmarked for the first implementation plan of the electrification and climate change framework policy.

This amount represents average funding of over \$1 billion per year, compared to \$526 million under the previous plan.⁶ This is double the annual spending under the 2013-2020 Climate Change Action Plan.

⁶ Under the 2013-2020 Climate Change Action Plan, a total of \$4.2 billion was being spent over eight years to fight climate change, that is, from January 1, 2013 to December 31, 2020, an average of \$526 million per year.

❑ **A 50% increase in financing in relation to revenues from the carbon market**

Revenues from the carbon market are deposited in the Electrification and Climate Change Fund⁷ to finance measures aimed at fighting climate change.

— In the first implementation plan for the framework policy, \$4.1 billion will consist in revenues from the carbon market.

The government recognizes that it needs to expand its environmental action; that is why it will allocate \$2.1 billion in appropriations, which is in addition to revenues from the carbon market, to the first implementation plan for the framework policy.

— Of this amount, \$1.3 billion will be spent on public transit.⁸

— In addition, more than \$800 million will be earmarked for initiatives put in place by different government departments.

These additional funds, which represent a 50% increase in relation to revenues from the carbon market, will raise total investments to fight climate change to \$6.2 billion by 2025-2026. This major investment will make it possible to take concerted environmental action.

⁷ Bill n° 44 provides that the Green Fund will be renamed the Electrification and Climate Change Fund.

⁸ Budget appropriations will be granted to the Ministère de l'Environnement et de la Lutte contre les changements climatiques to allow for a transfer of funds from the Electrification and Climate Change Fund to the Land Transportation Network Fund (LTNF). The LTNF is responsible, among other things, for funding public transit projects.

Changes in greenhouse gas emissions and the achievement of reduction targets

In order to ensure that the actions required to achieve the 2030 target are in place, the government will update on an annual basis:

- projected changes in the trajectory of GHG emissions;
- results of the measures put in place.

This update will make it possible to monitor, on an annual basis, progress toward achieving the target and to make rapid changes to the implementation plans. It will make it possible, among other things, to take into account progress in various parameters over this period, including:

- the publication of the inventory of GHG emissions as well as changes in economic growth in Québec;
- the pace of development of new technologies and their integration into manufacturing processes by businesses;
- the implementation of climate policies that could be introduced by other governments;
- the level of mobilization of the population, businesses and municipalities;
- price evolution on the carbon market, which could have an impact on GHG emission reductions in Québec and on the revenues available to finance additional initiatives.

2.2 Investments of \$6.2 billion for climate action

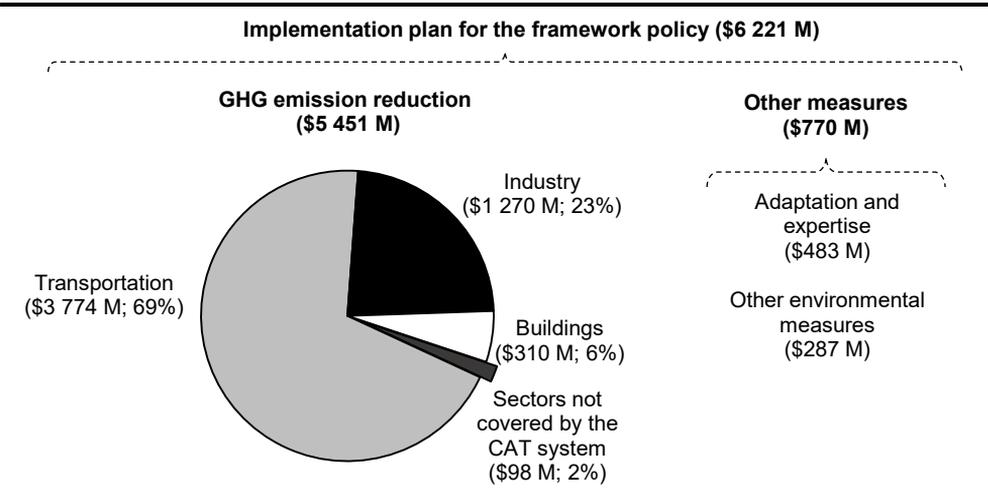
The financial framework for the first implementation plan for the framework policy includes \$6.2 billion in investments over six fiscal years, from January 1, 2021 to March 31, 2026.

The government allocates these funds to various sectors by taking into account the technical potential for GHG reduction. That is why larger sums are allocated to sectors that offer great technical potential for GHG emission reduction, particularly the transportation sector, which accounts for 57% of the total reduction potential.

— This technical potential for GHG reduction demonstrates, in particular, Québec's capacity to transform its vehicle fleet, particularly by fostering transportation electrification, and to offer reliable and efficient alternatives to automobile transportation.

CHART 6

Investments for the first implementation plan for the framework policy by sector – January 1, 2021 to March 31, 2026 (millions of dollars and per cent)



Note: Totals may not add due to rounding.

❑ Substantial investments to reduce GHG

The 2021-2026 implementation plan for the framework policy will be supported by major investments to mitigate climate change. For that purpose, \$5.5 billion will be injected from January 2021 to March 2026 to reduce GHG emissions, including:

- \$3.8 billion in the transportation sector:
 - \$1.5 billion to electrify light vehicles;
 - \$2.3 billion to support measures aimed at heavy trucks, public transit and other transportation initiatives.
- \$1.3 billion in the industrial sector to foster businesses' decarbonization while ensuring they remain competitive. These funds will be used in particular to set up financial support for projects aimed at reducing GHG emissions or at rolling out new processes;
- \$309.5 million in the buildings sector, that is, \$175.0 million for residential buildings and \$134.5 million for commercial and institutional buildings. These funds will help reduce fossil fuel energy consumption through electrification, the use of renewable energy and improvements in the energy efficiency of new and existing buildings;
- \$98.4 million to establish measures for sectors not covered by the CAT system, particularly the residual materials sector.

In addition, \$769.6 million will be allocated to measures not primarily concerned with reducing GHGs:

- \$482.9 million for measures to enhance climate change adaptation as well as the development, in Québec, of expertise and knowledge in this regard;
- \$286.7 million for measures related to other sectors with a beneficial effect in terms of the environment.

TABLE 1

Breakdown of investments for the implementation plan for the framework policy, by sector – 2019-2020 to 2025-2026
(millions of dollars)

	2019- 2020 ⁽¹⁾	2020- 2021	2021- 2022	2022- 2023	2023- 2024	2024- 2025	2025- 2026	Total
GHG EMISSION REDUCTION								
Transportation								
– Light vehicles	–31.9	–51.9	–264.2	–264.7	–268.6	–286.9	–296.6	–1 464.8
– Heavy trucks, public transit and other	–70.0	–65.9	–297.5	–385.4	–435.7	–497.9	–556.6	–2 309.0
Subtotal – Transportation	–101.9	–117.8	–561.7	–650.1	–704.3	–784.8	–853.2	–3 773.8
Industry	–13.1	–75.4	–208.3	–186.6	–256.0	–261.7	–268.6	–1 269.6
Buildings								
– Residential	—	–8.1	–17.1	–17.0	–31.0	–40.8	–61.0	–175.0
– Commercial and institutional	—	–6.7	–9.9	–10.9	–29.2	–31.5	–46.4	–134.5
Subtotal – Buildings	—	–14.8	–27.0	–27.9	–60.2	–72.3	–107.4	–309.5
Sectors not covered by the CAT system	—	–15.4	–25.8	–15.9	–14.8	–13.0	–13.6	–98.4
GHG EMISSION REDUCTION	–115.0	–223.4	–822.7	–880.5	–1 035.2	–1 131.7	–1 242.8	–5 451.3
Other measures								
– Adaptation and expertise	—	–21.4	–75.9	–101.6	–111.2	–107.2	–65.6	–482.9
– Other environmental measures	–0.5	–20.0	–43.0	–63.1	–55.6	–58.1	–46.3	–286.7
Subtotal – Other measures	–0.5	–41.4	–119.0	–164.7	–166.8	–165.3	–111.9	–769.6
TOTAL	–115.5	–264.8	–941.7	–1 045.2	–1 202.0	–1 297.0	–1 354.8	–6 220.9

Note: Totals may not add due to rounding.

(1) Amounts spent in 2019-2020 to ensure that projects are carried out in the period covered by the plan.

2013-2020 Climate Change Action Plan

The 2013-2020 Climate Change Action Plan will end on December 31, 2020 and will be replaced by the first implementation plan for the framework policy.

By the end of the 2013-2020 Climate Change Action Plan, funding for measures planned in 2019-2020 and 2020-2021 will continue, with projected expenditures of \$785.5 million in 2019-2020 and \$724.9 million in 2020-2021.

Projected expenditures in 2020-2021 under the 2013-2020 Climate Change Action Plan for the period April 1, 2020 to December 31, 2020, include:

- \$220.0 million for the Roulez vert program;
- \$183.2 million for the ÉcoPerformance program;
- \$129.4 million for public transit funding through the Land Transportation Network Fund;
- \$19.9 million for the Technoclimat program;
- \$30.2 million for the Biomasse forestière résiduelle program.

2.2.1 Unprecedented investments in public transit

The government is adopting a long-term vision and is giving itself the means to offer Quebecers reliable and efficient alternatives to automobile transportation. These actions will make it possible to offset the effects of the increase in Québec's vehicle fleet.

In this regard, electrification of public transit is also a way for Québec to prosper while reducing its GHG emissions.

The 2020-2030 Québec Infrastructure Plan (QIP) provides for \$15.8 billion to improve public transit services.

A number of projects that are being carried out, planned or under study will make it possible to improve electric public transit services in six cities and regions, including:

- in Québec City, the structuring public transit network;
- in Gatineau, a structuring electric public transit project to link the western part of Gatineau to downtown Ottawa;
- in Montréal, a structuring electric public transit projects to link the eastern, northeastern and southwestern parts of Montréal to downtown Montréal;
- in Laval, a structuring electric public transit projects to extend the Réseau express métropolitain (REM) to central Laval and connect the eastern and western parts of Laval;
- in Longueuil, a structuring electric public transit projects on the Taschereau Boulevard and extension of the metro's yellow line;
- in Montérégie, a structuring electric public transit project to extend the REM on the south shore in order to serve the Chambly–Saint-Jean-sur-Richelieu area.

The implementation of all public transit projects could represent estimated investments of \$43.8 billion.

In addition to the Québec government, other partners will be called on to contribute financially to these new projects. These partners include the federal government, the Caisse de dépôt et placement du Québec, Canada Infrastructure Bank and public transit authorities.

The government also indicated that it intended to use all means available to maximize the benefits that Québec businesses will gain from these projects, while making sure that it complies with Canadian and international trade commitments.

- Completion of the tramway and light train projects will thus support the development of Québec's rail industry.

2.2.2 Favorable impact on growth

The first implementation plan for the framework policy will enable the Québec government to invest \$6.2 billion to reduce GHG emission in Québec.

- On the one hand, revenues from the CAT system will be reinvested in the Québec economy, which will boost business investment and household disposable income.
- On the other hand, the CAT system will drive an increase in fuel prices, which will have a negative impact on real GDP. However, it will also push down hydrocarbon imports.

Based on the simulations performed, it is estimated that investments earmarked for implementing the framework policy⁹ will have an impact of nearly \$1.2 billion on Québec's real GDP in 2030, reflecting in particular:

- an increase of nearly \$250 million in net exports;
 - This increase arises from additional investments totalling nearly \$800 million, especially in cleaner technologies, that will enable industries to increase their production capacity.
- a gain of approximately 10 000 jobs and more than \$100 million in household disposable income.

Moreover, more rapid engagement by households and businesses could increase these spinoffs for the Québec economy.

TABLE 2

Economic impact of the investments planned for implementing the framework policy – 2030

(millions of dollars, unless otherwise indicated, in real terms)

	Investments	CAT price signals	Total
Consumption	510	-468	42
Investments	881	-93	788
Net exports	345	-97	248
<i>Including: hydrocarbon imports</i>	-776	-230	-1 006
Governments	62	14	76
TOTAL – GDP	1 798	-644	1 154
<i>Household disposable income</i>	597	-473	124
<i>Jobs (number)</i>	12 843	-2 430	10 413

Note: Assuming that emission allowances are sold at their minimum price and that the investments to fight climate change continue over the period 2026-2030, based on similar parameters to those for the period 2021-2025.

Sources: Ministère de l'Environnement et de la Lutte contre les changements climatiques and Ministère des Finances du Québec.

⁹ Other actions, such as contributions from other governments or private funding for reduction projects, are not known and could not be estimated.

❑ **\$1-billion reduction in hydrocarbon imports in 2030**

Investments planned for implementing the framework policy will have a structuring effect on Québec's economy, particularly by reducing our reliance on oil.

- They will help improve Québec's trade balance by reducing its hydrocarbon imports, which are expected to drop by more than \$1 billion (7% of projected hydrocarbon imports in 2030).

In addition to the CAT system, several actions will lead to lower demand for hydrocarbons. For example:

- the Roulez vert program, which supports people who want to purchase an electric vehicle, will help replace oil imports with electricity produced in Québec, thereby contributing to our collective wealth;
- the ÉcoPerformance program, which encourages businesses to purchase more efficient equipment, thereby reducing their fossil fuel consumption;
- the Chauffez vert program, which will allow for the continued conversion of oil-fired heating systems to electricity and will help increase the use of electricity in the buildings sector.

2.3 Several initiatives set out in the first implementation plan for the framework policy

2.3.1 Concrete actions

Pending the implementation of the framework policy, the government wants to ensure that certain programs aimed at reducing GHGs, such as the Roulez vert and Chauffez vert programs as well as measures to support the industrial sector's energy transition, will continue.

These programs represent just a subset of the measures provided for in the first implementation plan for the framework policy that will be announced at a later date by the Minister of the Environment and the Fight Against Climate Change.

In addition, the government will update its implementation plan on an annual basis by, among other things, adjusting the amounts set out in the five-year financial framework to take into account economic growth, GHG emissions and the financial resources that could be made available.

Continuing the Roulez vert program

The Roulez vert program helps to increase electrification in the Québec transportation sector. In addition to contributing greatly to the fight against climate change, it fosters innovation in this sector.

Through the financial framework, the government is allocating nearly \$1.4 billion by March 31, 2026 to the Roulez vert program to continue offering rebates on the acquisition of an electric vehicle.

— These investments will make it possible to maintain the rebates for the installation of home, work and multi-unit residential buildings charging stations.

This additional funding will make it possible to speed up the pace at which Quebecers replace fossil-fuel vehicles by electric vehicles.

TABLE 3

Investments planned for continuing the Roulez vert program (millions of dollars)

	2019-2020 ⁽¹⁾	2020-2021 ⁽¹⁾	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	Total
Roulez vert	-31.9	-50.9	-260.0	-260.0	-260.0	-260.0	-260.0	-1 382.8

(1) Taking into account the amounts currently planned under the 2013-2020 Climate Change Action Plan, \$248 million in 2019-2020 and \$271 million in 2020-2021 will be earmarked for the Roulez vert program.

■ Rebate program for the acquisition of an electric vehicle

To support Quebecers' energy transition, the government is ensuring the continued financing, until March 31, 2021, of rebates of up to \$8 000 on the purchase of an electric vehicle and \$4 000 on the purchase of an all-electric used vehicle.

The parameters of the rebates for the acquisition of an electric vehicle that will apply after that date will be specified at a later date. These rebates will provide financial support in line with market developments.

Current parameters of the Roulez vert program

Rebates under the Roulez vert program for the acquisition of all electric, plug-in hybrid and hydrogen-powered vehicles are based on the manufacturer's suggested retail price.

In 2019-2020, the \$8 000 maximum rebate for the acquisition of a vehicle is only available for new vehicles whose manufacturer's suggested retail price is less than \$75 000.

— A maximum rebate of \$3 000 is available for people who buy all-electric and hydrogen-powered vehicles whose price is between \$75 000 and \$125 000.

In 2020-2021, the \$8 000 rebate will only be available for new vehicles whose manufacturer's suggested retail price is less than \$60 000, and the \$3 000 rebate will be abolished.

The rebate offered for used all-electric vehicles corresponds to 50% of the rebate for a new vehicle of the same model, up to a maximum of \$4 000.

Moreover, owners or renters of new or used electric vehicles can currently receive financial support of \$600 for the acquisition of a 240-volt home charging station.

Eligibility requirements for the maximum rebate for the acquisition of electric vehicles under the Roulez vert program

(dollars)

Manufacturer's suggested retail price	New vehicles		Used vehicles ⁽¹⁾	
	2019-2020	2020-2021	2019-2020	2020-2021
Less than \$60 000	8 000	8 000	4 000	4 000
\$60 000 to \$75 000	8 000	—	4 000	—
\$75 000 to \$125 000 ⁽²⁾	3 000	—	1 500	—
\$125 000 or more	—	—	—	—

(1) Rebates are only available for used all-electric vehicles.

(2) Rebates do not apply to hybrid rechargeable vehicles.

Electric vehicles: a cost effective choice

The cost of buying or leasing an electric vehicle is higher than that of a gasoline-powered vehicle, which may hamper consumer appeal. However, considering the savings associated with operating an electric vehicle and the rebates offered on its purchase, in particular the Québec government's Roulez vert program, electric vehicles are becoming a cost effective choice.

- The rebates offered by the Québec and Canada governments, which amount to \$8 000 and \$5 000 in 2019 and 2020 respectively, significantly reduce the extra cost of purchasing an electric vehicle.

For example, if a household were to purchase a Nissan Leaf[®], it would cost approximately \$15 560 more than acquiring a comparable model of the same class, such as the Nissan Altima[®]. However, this household will benefit from a \$13 000 rebate since the Nissan Leaf[®] qualifies for the Québec and Canada programs.

- Moreover, over a five-year period, electric vehicles result in energy savings of more than \$7 500 and maintenance savings of more than \$1 800.

After five years and thanks mainly to the various rebates offered, the total cost of the electric vehicle is approximately \$6 000 less than that of the gasoline-powered model.

In addition to these savings, a couple using an electric vehicle will reduce its greenhouse gas emissions by 3.7 tonnes of CO₂ equivalent per year. This reduction represents 19.5% of the average emissions associated with a Québec couple, which amount to 19 tonnes of CO₂ equivalent.¹

Cost comparison between Nissan Leaf[®] and Nissan Altima[®] models over five years

(in 2019 dollars, unless otherwise indicated)

	Nissan Altima [®] SV	Nissan Leaf [®] S Plus	Difference
Acquisition cost of the vehicle			
Cost of the vehicle ⁽¹⁾	38 435	53 995	15 560
Rebates offered ⁽²⁾	—	-13 000	-13 000
Subtotal	38 435	40 995	2 560
Cost of the charging station ⁽³⁾	—	895	895
Energy costs over 5 years ⁽⁴⁾	9 640	2 080	-7 560
Maintenance costs over 5 years ⁽⁵⁾	1 840	—	-1 840
TOTAL	49 915	43 970	-5 945
GHG emissions per year (t. CO₂ eq.)	3.7	0.007	3.7

(1) The price includes the manufacturer's suggested retail price as well as various fees and taxes.

(2) The rebates offered amount to \$8 000 for the Québec government and \$5 000 for the federal government.

(3) The cost takes into account the \$600 rebate offered through the Roulez vert program for the purchase of a home charging station.

(4) The distance travelled is 20 000 km/year. The price of a litre of gasoline is the average price in 2019 in Québec, that is, \$1.22 (taxes included). The price of a kilowatt-hour (kWh) corresponds to the price of the second tier of Rate D, which is ¢10.79/kWh (taxes included).

(5) The cost includes taxes as well as oil changes (\$68.99/10 000 km) and brake changes (\$574.88 every 50 000 km for gasoline-powered vehicles and every 120 000 km for electric vehicles).

Sources: Innovative Vehicle Institute, www.nissant.ca, US Department of Energy, Hydro-Québec, Régie de l'énergie du Québec and the Ministère des Finances du Québec.

¹ Based on average emissions per capita, that is, 9.5 tonnes of CO₂ equivalent per person, according to the 2017 inventory of greenhouse gas emissions in Québec.

❑ Continuing the Chauffez vert program

The Chauffez vert program aims to encourage homeowners who use fossil fuels, other than natural gas, as a source of heating to adopt a system using renewable energy, such as hydroelectricity.

It allows homeowners who want to replace a fossil fuel system with a renewable energy system to benefit from financial support of up to:

- \$1 275 for replacing a space heating system;
- \$250 for replacing a water heating system.

This measure substantially contributes to the energy transition and reduction of GHG emissions.

- Since its launch in October 2013, the program's residential component has helped converting 20 400 dwellings to an all-electric system.

Prohibiting oil-fired heating systems to reduce GHG emissions

In May 2019, the Ville de Montréal announced that a draft regulation would be tabled in 2020 to gradually prohibit the use of oil-fired heating systems. This ban would come into effect in 2025 with a view to completely eliminating the use of oil-fired heating systems by 2030. It would apply first to industries, and would then be extended to businesses and institutions, and finally to the residential sector.

- Shortly after, the Ville de Mont-Royal also announced that it planned to prohibit oil-fired heating systems by 2025.

The citizens of these towns who meet the criteria will benefit from the Chauffez vert program, which will support their transition to cleaner energy.

■ Additional funding of \$150 million

In order to continue the Chauffez vert program for the period January 1, 2021 to March 31, 2026, the government is providing \$149.7 million in funding from the Electrification and Climate Change Fund. This amount includes:

— \$137.6 million for the residential component;

— \$12.1 million for the commercial, institutional and industrial component.¹⁰

This additional funding will contribute to the conversion of nearly 115 000 dwellings and more than 800 commercial, institutional or industrial buildings.

TABLE 4

Investments planned for continuing the Chauffez vert program (millions of dollars)

	2019- 2020 ⁽¹⁾	2020- 2021 ⁽¹⁾	2021- 2022	2022- 2023	2023- 2024	2024- 2025	2025- 2026	Total
Residential component	—	-3.1	-11.5	-12.0	-25.5	-33.2	-52.3	-137.6
Commercial, institutional and industrial component	—	-0.2	-0.6	-1.0	-2.1	-2.8	-5.4	-12.1
TOTAL	—	-3.3	-12.1	-13.0	-27.6	-36.0	-57.7	-149.7

(1) Taking into account the amounts currently planned under the 2013-2020 Climate Change Action Plan, \$8.5 million in 2019-2020 and \$13.6 million in 2020-2021 will be earmarked for the Chauffez vert program.

¹⁰ The commercial, institutional and industrial component offers financial support to businesses for projects to convert their space and water heating systems currently running on light fuel oil or propane. These projects must result in the installation of systems that use electricity or other renewable sources of energy.

Converting a heating system to electricity: a profitable decision in the long term

There are significant costs associated with replacing an oil-fired heating system with an electric system. To reduce these costs, the Québec government's *Chauffez vert* program provides financial assistance of up to \$1 275.¹

This financial assistance, added to recurring savings associated with the transition from one energy source to the other, will make the conversion profitable in the long run.

For example, should a couple living in a single-family home decide to replace their oil-fired heating system with an electric system, the rebate could decrease the conversion cost from \$5 000 to \$3 725.²

After converting their heating system, the couple could save just over \$442 per year in energy costs, and the investment would pay for itself in 8.4 years.

This conversion would also allow the couple to reduce its greenhouse gas emissions by 5.5 tonnes of CO₂ equivalent per year. This reduction represents 28.9% of the average emissions of a Québec household, considering that an average Québec household produces 19 tonnes³ of CO₂ equivalent per year.

Cost and savings associated with converting an oil-fired heating system to an electric system

(dollars, unless otherwise indicated)

	Impact
Conversion cost	
Cost to convert a space heating system	5 000
Rebate under the <i>Chauffez vert</i> program	-1 275
Subtotal	3 725
Annual savings	
Annual energy cost of an oil-fired heating system ⁽¹⁾	2 008
Annual energy cost of an electric heating system ⁽²⁾	1 566
Subtotal	442
Number of years to pay for the cost of conversion⁽³⁾	8.4 years
Avoided GHG emissions per year (t. CO₂ equivalent)	5.5

(1) Cost is based on consumption of 2 000 litres of fuel oil per year at \$1.004/litre (taxes included), the average price in Québec in 2019.

(2) Cost is based on consumption equivalent in kilowatt-hour (kWh) to that of fuel oil, that is, approximately 17 250 kWh at a weighted average price of ¢9.08/kWh (taxes included).

(3) The number of years to make the investment profitable is obtained by dividing the cost of conversion by the annual savings.

Sources: Transition énergétique Québec, Hydro-Québec and Ministère des Finances du Québec.

- 1 The program also provides financial assistance of \$250 for oil-fired water heating system conversion to participants who have converted their space heating system.
- 2 Costs include the cost of replacing the oil-fired boiler with an electric boiler and the cost of the electric boiler. They do not take into account a possible modification to the electrical panel or retrofitting of certain rooms in the dwelling to remove the oil-fired boiler.
- 3 Based on average emissions per capita, that is, 9.5 tonnes of CO₂ equivalent per person, according to the 2017 inventory of greenhouse gas emissions in Québec.

❑ Supporting the industrial sector

The industrial sector reduced its GHG emissions by 25% between 1990 and 2017. However, there is potential for further reductions for this sector. Therefore, in order to support businesses and enable the industrial sector to continue its decarbonization, the government is providing investments of \$1.1 billion by March 31, 2026.

This amount, funded through the Electrification and Climate Change Fund, will enable the government to continue funding programs aimed at reducing GHG emissions from the industrial sector, in particular:

- the ÉcoPerformance program, which aims to reduce GHG emissions by financing, in particular, conversion and energy efficiency projects;
- the Biomasse forestière résiduelle program, which aims to reduce GHG emissions through the direct use of residual forest biomass for thermal energy production applications.

This funding will also support the implementation of other measures for the industrial sector. These measures will be announced when the framework policy is implemented.

TABLE 5

Investments planned for measures aimed at supporting the industrial sector (millions of dollars)

	2019- 2020	2020- 2021	2021- 2022	2022- 2023	2023- 2024	2024- 2025	2025- 2026	Total
Supporting the industrial sector	—	-54.8	-173.5	-168.9	-234.8	-229.9	-228.9	-1 090.7

❑ A renewed approach for large industrial businesses

Québec's large industrial businesses are particularly exposed to international competition.

- They export a significant portion of their production, which means they may be confronted with competitors from countries where there is very little or no carbon pricing system.
- Furthermore, they have relatively little control over the price of their products, which are established by international markets.

For this reason, the CAT system provides for an allocation free of charge of emission units that mitigates the effects of carbon pricing for major emitters from large industrial businesses.

- Allocating a portion of the emission units free of charge to these businesses prevents the system from imposing exorbitant costs on them, which could ultimately result in relocating their activities to other areas where environmental practices are less stringent and electricity production processes are more polluting.
- This could lead to an increase in global GHG emissions.

The government has set the operating rules for the mechanism governing the allocation free of charge of emission units until 2023.

The rules for the period 2024-2030 will be announced by the end of 2020.

Extensive pre-consultations with the industrial sector

In the fall of 2019, the government launched extensive public pre-consultations to develop the approach for the allocation free of charge of emission units that will apply for the period 2024-2030. Several meetings in that regard were held, including in Québec and Montréal on September 12 and 18, respectively. Work will continue in 2020.

In particular, the government intends to:

- update the basis for calculating the allocation free of charge of emission units so that it takes into account, in particular, businesses' actual emissions per unit produced;
- boost business investment in their decarbonization;
- take into account changes in global carbon pricing in order to assess the realistic level of efforts needed from large industrial businesses.

2.3.2 Initiatives aimed at several sectors

In addition to the funding drawn from the revenues from the cap-and-trade system, the government will provide another \$2.1 billion in appropriations to different government departments for the purpose of the first implementation plan for the framework policy. This sum will be used to implement:

- actions related to public transit and electrification of the transportation sector;
- initiatives to support the industrial sector's decarbonization;
- measures related to sectors not covered by the CAT system that will lead to GHG reduction;
- measures related to Québec's adaptation to climate change and the development of Québec expertise in that regard;
- measures related to other sectors that, while not focusing on fighting climate change, have a beneficial effect on the environment.

Transportation sector

With regard to the electrification and climate change framework policy, the government has already indicated that it intends to make the transportation sector a priority. Several measures financed through budget appropriations are in line with this commitment.

In order to foster increased use of public transit and alternative transportation and to reduce GHG emissions associated with passenger transit, the government will allocate \$1.3 billion to:

- public transit infrastructure;
- public transit development;
- active transportation, in particular to add bicycle paths.

The government will provide \$70 million to foster sustainable mobility. This amount will contribute to the sustainable development of natural environments in the metropolitan regions of Montréal and Québec City, and to improve the supply of and access to bicycle paths.

Lastly, \$2.5 million are planned to support the development of an information and awareness campaign aimed at businesses and the public. This campaign will aim to increase energy efficiency and reduce reliance on petroleum products, in particular by fostering the use of electric transportation.

❑ **Industrial sector**

To foster Québec's transition to a low-carbon economy and support the industrial sector's energy transition, the government will allocate \$70 million to support the production and distribution of renewable natural gas.

In addition, investments of \$72 million will make it possible to continue developing green industrial sectors, which constitute an important economic development opportunity for Québec and play a role in the fight against climate change. This amount includes:

- \$17 million to support the development of Québec's hydrogen industry, a clean energy that could significantly contribute to reducing GHG emissions;
- \$55 million to promote innovative products from the electric vehicle industry and battery recycling.

In addition, to support the development of the electricity grid and reduce Québec's reliance on hydrocarbons, the government will invest \$15.2 million to connect businesses mainly located in rural areas to the three-phase electricity distribution system.

- This amount will enable the agricultural and greenhouse sectors to use new technologies and thus replace fossil-fuel technologies.

❑ **Buildings sector**

The government is also providing \$30 million to improve access to clean energy for remote communities and their businesses served by off-grid systems.

This measure will help reduce GHG emissions in several sectors, including the buildings sector, which will benefit from access to clean energy for heating systems.

❑ **Sectors not covered by the carbon market**

Some initiatives will improve the treatment of residual materials. In that regard, the government is providing:

- \$10 million to support the industrial, commercial and institutional sector in implementing various projects to reduce and recover organic materials;
- \$20 million for recycling centres to continue improving the quality of reusable materials;
- \$64.2 million to set up a recovery system adapted to the material and components of large household appliances, such as refrigerators and home air conditioners. This measure will ensure the safe destruction of these materials and substances.

❑ **Adaptation and expertise**

Some investments are made in sectors that, although they do not target GHG reductions, are aimed at improving Québec's resilience to climate change and developing Québec expertise. In this regard:

- \$129 million will be used to mitigate the risks associated with flooding by adopting an innovative, watershed-based approach to land use planning;
- \$37.3 million will help develop knowledge on changes in areas at risk of flooding and contribute to communities' resilience given the increased recurrence of flooding due to climate change;
- \$50 million will be used to enhance support to municipalities for disaster prevention, and to address the municipalities' significant needs for knowledge about natural disaster-related risks and mitigation or elimination efforts for climate change risks;
- \$4.5 million will be used to build the capacity of tourism businesses to adapt to climate change.

Importance of research and knowledge acquisition

For the right environmental actions to be taken, government decisions must be based on evidence. However, knowledge in the field is growing rapidly and requires monitoring on an ongoing basis.

Against this backdrop, the government is providing investments in this budget to develop Québec's expertise. In particular, this funding will support research, enhance knowledge about climate change and contribute to mapping development.

In addition, the Ministère des Finances du Québec and the Ministère de l'Environnement et de la Lutte contre les changements climatiques have developed models to estimate technical reduction potentials as well as the impacts of the implementation plan for the framework policy.¹

¹ The general equilibrium model of the Ministère des Finances du Québec for the environment and the energy system for Québec, the environment, climate and electricity, are shown in the appendix.

❑ Other environmental measures

In addition, in order to enhance the fight against climate change:

- \$82.2 million will be earmarked for measures aimed at increasing the forest industry's contribution to the fight against climate change;
 - Increasing forest productivity, carrying out silviculture work to foster the planting of seedlings in public and private forests, and developing knowledge on carbon sequestration will enable the forest industry to benefit from government environmental action.
- \$25 million will be used to identify threats and risks to water supplies, in particular climate change risks.

Lastly, certain actions that do not aim to reduce GHG emissions will also have a beneficial impact on the environment. The government is therefore planning to invest:

- \$50 million for measures aimed at enhancing and increasing the surface area of protected areas with a view to preserving and using natural environments in a sustainable manner;
- \$33 million to increase the ClimatSol-Plus program's envelope, which aims to rehabilitate contaminated soil so that municipalities can implement new site rehabilitation projects and thus revitalize their living environments;
- \$25.5 million to promote sustainable tourism development.

TABLE 6

Financial impact of the measures funded through appropriations for the first implementation plan for the framework policy
(millions of dollars)

	Total 5 years ⁽¹⁾	Total 6 years ⁽²⁾	QIP	Budget Plan
Transportation				
– Public transit projects	—	—	–15 777.5	B.11
– Funding public transit	–850.0	–1 300.0	—	B.23
– Increasing the draw of natural environments	–70.0	–70.0	—	B.23
– Electrifying the government's vehicle fleet	—	—	–13.4	
– Launching a public awareness and education campaign on energy transition	–2.5	–2.5	—	B.23
Industry				
– Supporting the production and distribution of renewable natural gas	–70.0	–70.0	—	B.24
– Continuing the development of the green hydrogen industry	–14.0	–17.0	—	B.24
– Fostering innovative products in the electric vehicle industry and battery recycling	–45.0	–55.0	—	B.24
– Promoting the agri-food sector's modernization by extending the three-phase network	–15.2	–15.2	—	B.25
Buildings				
– Encouraging renewable energy access for all Quebecers	–25.0	–30.0	—	B.25
Sectors not covered by the CAT system				
– Encouraging organic waste collection	–10.0	–10.0	—	B.25
– Improving the quality of materials leaving sorting centres	–20.0	–20.0	—	B.26
– Establishing a recovery system for large household appliances	–52.7	–64.2	—	B.26
Adaptation and expertise				
– Mitigating flood risks	–129.0	–129.0	–100.0	B.26
– Building knowledge about flood risk mapping	–29.8	–37.3	—	B.27
– Enhancing support to municipalities for disaster prevention	–40.0	–50.0	—	B.27
– Building tourism businesses' capacity to adapt to climate change	–4.5	–4.5	—	B.28
Other environmental measures				
– Increasing the forest industry's contribution to fighting climate change	–63.8	–82.2	–50.0	B.28
– Expanding protected areas	–50.0	–50.0	—	B.28
– Strengthening protection of drinking water sources	–25.0	–25.0	—	B.29
– Supporting contaminated site rehabilitation	–25.0	–33.0	—	B.29
– Promoting the development of sustainable tourism projects	–25.5	–25.5	—	B.29
Measures to be identified in the next budget	—	–14.5	—	
TOTAL	–1 567.0	–2 104.9	–15 940.9	

QIP: 2020-2030 Québec Infrastructure Plan.

(1) Financial framework for the period April 1, 2020 to March 31, 2025.

(2) Financial framework for the period April 1, 2020 to March 31, 2026.

APPENDIX: MODELLING THE FRAMEWORK POLICY'S IMPACTS

To assess the impacts of Québec's approach to climate change on the economy and greenhouse gas (GHG) emissions, two models are used:

- the general equilibrium model of the Ministère des Finances du Québec for the environment (MEGFQ-E), which provides a macroeconomic perspective of the fight against climate change;
- the energy system for Québec, the environment, climate and electricity model (SEQUENCE), which offers a technical perspective of the various technological choices that can be made to reduce GHG emissions.

These models are used jointly to study the interrelationships between the economy and the fight against climate change. These models:

- estimate the effects of Québec's approach to fighting climate change and guide policy development to maximize GHG emission reductions while reducing costs to the economy;
- monitor and forecast emissions to facilitate policy adjustments and target achievement.

The development of these models is the result of close collaboration between the Ministère des Finances du Québec and the Ministère de l'Environnement et de la Lutte contre les changements climatiques.

- These models incorporate economic and financial forecast scenarios from the Ministère des Finances as well as economic and technical information from other Québec government departments and bodies.¹¹

□ **The general equilibrium model of the Ministère des Finances du Québec for the environment**

The MEGFQ-E is an elaborate system of equations presenting the main interrelationships in the Québec economy.

- The model details the entire structure of the economy, allowing for interactions between economic agents (households, businesses and governments) as well as feedback effects between markets.
- Prices and quantities adjust to balance all markets simultaneously, such as labour and goods and services markets. Households and businesses adjust to changes in the economy.

¹¹ Several organizations were consulted to develop the GHG emission projection scenarios, including Transition énergétique Québec, the Ministère de l'Économie et de l'Innovation, the Ministère de l'Énergie et des Ressources naturelles, the Ministère des Forêts, de la Faune et des Parcs, the Société du Plan Nord and Hydro-Québec.

■ **A model to illustrate changes in the behaviour of economic agents**

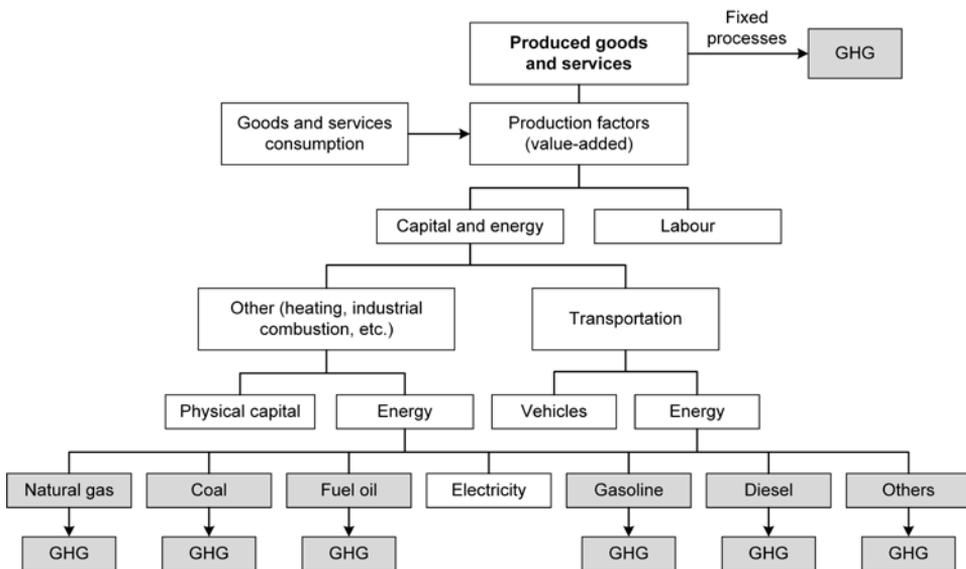
The MEGFQ-E makes it possible to quantify the impact of the CAT system and several climate change measures on the different sectors of the Québec economy and on the reduction of GHG emissions. This impact results in particular from changes in the behaviour of households and businesses.

The model presents a detailed picture of the economy.

- Six typical households are represented according to income and composition.
- Approximately 70 categories of goods and services are modelled. The economic agents' purchases depend, among other things, on their preferences and the relative prices of goods and services in the economy.
- Nearly 45 industries are represented, including large industrial businesses subject to the CAT system.
 - The production structure is detailed for each business according to the use of different inputs in the production process and their hydrocarbon consumption.
 - Keeping their production technology in mind, businesses choose a combination of inputs based on their relative prices to produce goods and services in order to maximize their profit.

ILLUSTRATION 3

Illustration of the production process of a typical business in the MEGFQ-E



Source: Ministère des Finances du Québec.

■ **A model that takes into account the carbon market reality**

The MEGFQ-E helps to understand the implications of climate transition in Québec because it is adapted to the Québec economy and the reality of the carbon market.

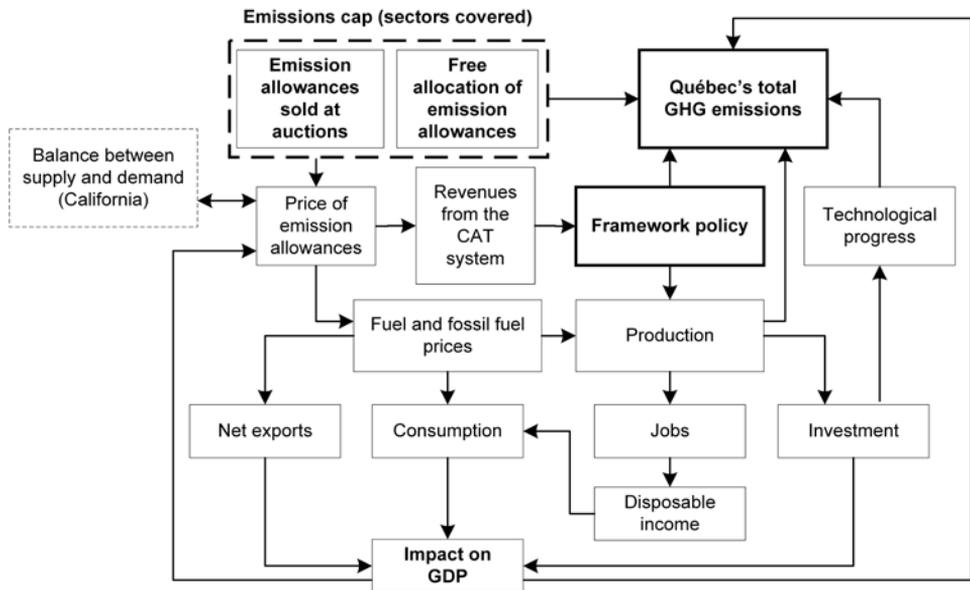
- The model includes four regions: Québec, California, the rest of Canada and the rest of the world.
- In particular, it takes into account the joint carbon market with California and its impact on GHG emissions.

The CAT system and its main characteristics are represented in the model, which makes it possible to illustrate the impact of the implementation of various policies on the interrelationships that exist in this market.

- Industries can change their production processes to substitute their capital with hydrocarbon consumption, thereby reducing their GHG emissions.
- These business decisions are influenced by a number of factors, such as price sensitivity and technical capabilities.
- Moreover, the model takes into account choices concerning modes of transportation (modal shifts) and heating methods (electricity, fuel oil), as well as the economic agents' behaviour, including households.

ILLUSTRATION 4

Simplified illustration of the interrelationships in the MEGFQ-E



Note: For simplification purposes, some interrelationships are not illustrated.
 Source: Ministère des Finances du Québec.

❑ The SEQUENCE model

The SEQUENCE model is a very detailed energy optimization tool, which allows, among other things, to:

- produce a projection of long-term GHG emissions for the different sectors in Québec's inventory of GHG emissions, as well as for the various economic sectors, according to different scenarios;
 - These projections take into account, in particular, the projected progress in technology, improvements in the efficiency of manufacturing processes, the projected level of production by sector, the prices of the various forms of energy and the CAT system.
- measure the impact on GHG emissions of the measures funded and the interrelationships between the various mechanisms for fighting climate change in Québec.

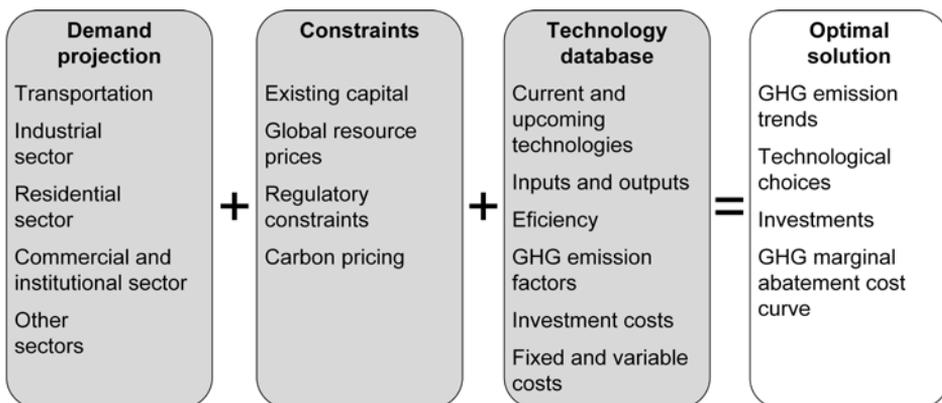
The model is based on the TIMES model generator, which is sponsored by the International Energy Agency.

The development of this model for Québec is the result of a partnership between the Ministère des Finances du Québec and the Ministère de l'Environnement et de la Lutte contre les changements climatiques.¹²

- The model is based on detailed databases covering, in particular, energy systems and different technologies, both existing and upcoming.
- The model optimizes energy use under various constraints in order to replicate Québec's energy system over the long term.

ILLUSTRATION 5

SEQUENCE model optimization process



Source: Ministère des Finances du Québec.

¹² The Québec government worked with ESMIA Consultants inc. to develop the SEQUENCE model.

Work on this model will continue in order to expand its database and underlying assumptions, and to integrate it with the MEGFQ-E. The current version of the model includes:

- nearly 600 000 equations characterizing all production and GHG emission generation processes in Québec;
- more than 3 000 different production technologies.

Risks associated with greenhouse gas emission projections

In order to make GHG emission projections, the government used economic and environmental models.

The estimates made are based on several assumptions, some of which are associated with risks that could affect the simulation results.

Changes in the economy's growth path

Simulations are based on the most recent economic growth projections for the various sectors of the economy as well as on the financial projections of the Ministère des Finances du Québec.

However, a differing trend in economic growth or differing financial variables over the next few years could have an upward or downward impact on the level of Québec's GHG emissions.

- For example, it is estimated that a 1-percentage-point downward adjustment of real GDP growth in Québec could lead to a decrease in GHG emissions of 0.6 million tonnes of CO₂ equivalent.

Changes in prices

Projections are based on several assumptions about price trends in the economy until 2030.

These trends will depend mainly on the relationship between supply and demand for each market. For example:

- a higher-than-expected increase in the price of GHG emission allowances would lead to additional reductions in Québec;
- a faster-than-anticipated increase in natural gas prices on the North American market could accelerate the industrial sector's electrification, since the price of electricity would make electricity more attractive compared to other hydrocarbons.

Technological advances

The model is based on various assumptions concerning the development of new technologies.

- On the one hand, accelerated decrease in the cost of these technologies could lead to faster-than-expected GHG emission reductions.
- On the other hand, delays in the rollout of various technologies could lead to a higher-than-expected increase in GHG emissions.

Risks associated with GHG emission projections (cont.)

Public support for the fight against climate change

The fight against climate change requires the contribution of all sectors of the economy.

Therefore, a more or less significant change in the behaviour of households and businesses could influence the emissions level.

Moreover, households and businesses' sensitivity to the various measures that will be put in place could also lead to either lower or higher additional reductions in GHG emissions.

The international environment

Changes in the international environment could have a significant impact on GHG emissions in Québec.

For example, the implementation of carbon pricing in several regions could lead to an increase in global demand for lower-carbon products, or even have an upward impact on the price of products made in Québec on the markets.

