

HIGHLIGHTS

The Paris Conference that opens on November 30, 2015, is drawing plenty of attention to the fight against climate change, an issue that blends political rhetoric, economic logic and climate science. The aim of this *Research Paper* is to make key climate change concepts easier to understand as well as to put the mechanisms discussed here in a Canadian context and to base public policy choices on the most relevant facts. Here, in a nutshell, are the main observations developed in each of the four chapters:

Chapter 1: Climate Change in 20 Questions and Answers

- China is the biggest emitter of greenhouse gas, followed by the United States, the European Union and India.
 - Since the first United Nations climate meeting, held in Geneva in 1979, emissions from fossil fuels have risen by 84%.
 - Member countries of the Kyoto Protocol have cut emissions by 22.6% compared to 1990, but this has not prevented a 53% rise in global emissions from fossil fuels during the same period.
 - Canadian greenhouse gas emissions rose 26% between 1990 and 2012, but their growth has stagnated since 2003.
 - Canada generates only 1.59% of global greenhouse gas emissions but has higher per capita emissions than any other country except Australia.
 - Various obstacles must be overcome to reach an agreement in Paris, such as the reluctance of some governments to accept binding targets or compensation for developing countries.
- A number of obstacles complicate the proper functioning of these tools, including the difficulty of measuring emissions accurately, the exclusion of some sectors or industries, the impact on business competitiveness, and carbon leakage.
 - Fuel taxes are already very high in Canada, generating nearly \$22 billion in tax revenue.
 - The taxes set on fuels in Canadian provinces amount to a carbon tax, varying from \$83 per tonne of greenhouse gases in Alberta to \$128 per tonne in Quebec.
 - Subsidies for renewable energy and for electric vehicles, or adding ethanol to gasoline, are ineffective in meeting targets for reducing greenhouse gas emissions.
 - The constraints imposed by governments all have adverse economic impacts in the short term.
 - Climate change has both negative and positive effects. Global warming of less than 2°C, as expected between now and the end of the century, will have positive net effects due in particular to higher crop yields.
 - The three interrelated principles that can guide sound public policy in fighting climate change are effectiveness, tax neutrality and minimization of economic impacts.

Chapter 2: Governmental Measures and Their Effectiveness

- Carbon trading and carbon taxes are two government tools that put a price on carbon.
- These tools enable decision-making to be decentralized, helping meet reduction targets at the lowest possible cost.



Chapter 3: The Innovations That Are Revolutionizing Our Energy Consumption

- Energy intensity, or the amount of energy use per measured unit of production, fell at an annual pace of 1.25% between 1990 and 2013. China's progress has been spectacular, with energy intensity dropping by half in 20 years.
- New technologies in the last 40 years have provided energy efficiency gains equivalent to 1.337 billion tonnes of oil in 11 countries.
- Saving energy through greater efficiency produces a rebound effect, with the energy saved being put to other uses. Thus, automobile efficiency gains have been offset by higher auto sales and larger vehicles.
- Compared to the United States, the energy efficiency of automobiles is 26% greater in Europe, where gasoline prices are 137% higher on average.
- Energy consumption in industrialized countries has been relatively stable over the past 15 years. According to the International Energy Agency, these countries will not be consuming any more oil in 2020 than they do today.
- Carbon intensity, or the ratio of carbon dioxide emissions per unit of energy used, reaches higher levels in emerging countries than in industrialized countries.
- In the United States, the shale gas revolution resulting from hydraulic fracturing and horizontal drilling has helped lower the use of more-polluting coal.
- Renewable energy capacity skyrocketed between 2004 and 2014. Global installed capacity rose by 671% for solar energy and by 1,147% for wind energy.
- At the end of 2014, 13 large-scale carbon capture and storage facilities were in operation around the world, with a capacity of 26 megatonnes of CO₂ per year.
- The global rate of mortality due to extreme weather events has fallen by 98% since the 1920s, showing that human vulnerability to climate is due mostly to economic conditions.
- Malnutrition, diarrhea and malaria, made more frequent by climate change, are risks associated mainly with poverty.
- The fight against climate change should not lead us to forget other health problems, such as the fact that three billion people are exposed to smoke from solid fuels used for heating and cooking, according to the WHO.
- Access to cheap electricity is therefore a significant means of improving current health conditions, even if this electricity comes from fossil energy.
- Between now and 2085, only 13% of deaths due to famine, malaria and extreme weather events will result from climate change.
- Environmental awareness is linked to wealth, as shown by a United Nations survey showing that, among 16 priorities, climate change ranks dead last, especially in poor countries.

Chapter 4: Adapting to Climate Change

- Climate change hits poor countries harder, both in terms of mortality rates and of economic losses as a proportion of GDP.
- Between 1970 and 2008, for example, more than 95% of the deaths caused by natural disasters occurred in developing countries.