

Canada’s Fair Share of Emissions Reductions under the Paris Agreement

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What is a Fair Share of the Global Carbon Budget?

The [2015 Paris Agreement](#) commits countries to “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels” (Article 2(1)a). Notably, Canada led the charge to increase global ambition during the negotiations, namely to limit warming to 1.5°C instead of 2°C.

In order to respect these temperature goals, there is a fixed amount of GHG emissions which the atmosphere can absorb. This is termed the *global carbon budget* (GCB).

Scientists use complex relationships between carbon emissions and sinks in the oceans, atmosphere, and soil to estimate these budgets. For example, the [2018 IPCC Special Report on Global Warming of 1.5 °C](#) presents a remaining GCB of about 420 billion tonnes (Gt) CO₂ for a two-thirds chance of limiting warming to 1.5°C and would be the most in line with the precautionary principle. Staying within this carbon budget implies reaching carbon neutrality by around 2040. Other estimates of the GCB have been derived with regards to the 2°C threshold and with a 50% probability of respecting either temperature goals.¹

¹ A budget of 580 Gt CO₂ would give the world a 50 per cent chance of limiting warming to 1.5°C. Achieving this require the world achieve carbon neutrality (net-zero) by 2050 and net-negative thereafter (Garoufalidis-Auger and Greenford, 2021).

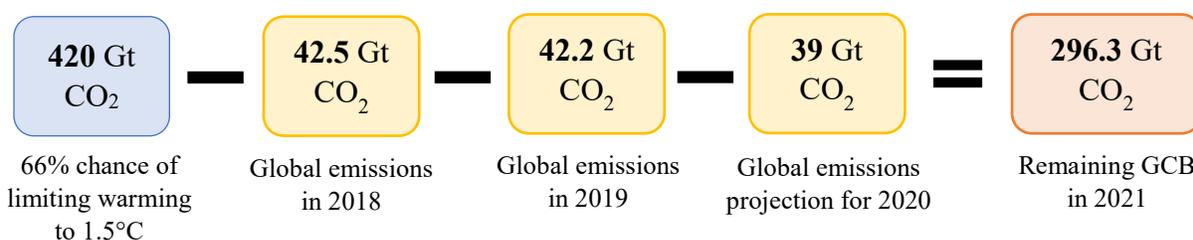


Figure 1: The 2018 GCB as estimated in the [IPCC SRI.5](#) (2018) as cumulative CO₂ emissions from the start of 2018 until the time of net zero global emissions less the global carbon emissions estimated by Friedlingstein et al. in [2018](#) and [2019](#) (with projections for 2020) leaves us with a remaining GCB for 2021 of 296.3 Gt CO₂.

Some advance that policy development among various jurisdictional units should be based on allocating this GCB nationally, sectorially, regionally, and socially. Accordingly, the budget metaphor has important caveats since the uncertainty range is wide enough to put into question whether there is a remaining budget to be split and it ignores temporal considerations around emissions and reductions as well as intergenerational equity.

Equity is a key pillar in allocating the burden of effort-sharing. The Paris Agreement is to be “implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances” (Articles 2(2), “CBDR-RC”). Further, each Party must communicate how it “considers that its nationally determined contribution is fair and ambitious” ([decision 1/CP.21 para 27](#)).

Many have simplified this combination of the temperature goal, CBDR-RC and equitable implementation to mean that signatories must do their *fair share* of the global effort. However, this concept has no conventional or unified definition and most countries have failed to set and achieve objectives representing anything close to their fair share.

The concept of equity in the context of climate change spans several dimensions. For example, poor and vulnerable populations who are least responsible for causing climate change are most susceptible to its impacts. Similarly, future generations will be most impacted by climate change, while our historical and ongoing actions are the primary cause. As there is no agreed upon definition of fair share or equity, many interpretations have arisen each with different assumptions, parameters, and distributions of the GCB. In their 2014 report, the IPCC reproduces an earlier study [organizing effort-sharing](#) along three equity principles:

- **Responsibility** – cumulative accounting for historical emissions.
- **Capability** – relating reductions to GDP or Human Development Index (HDI).
- **Equality** – per capita considerations which can be either immediate or such that effort equality converges at a future year.

Equitable allocations of the GCB are derived based on combinations of these different aspects. For example, the equal cumulative per capita (CPC) approach allocates emissions to each country based on their population while also considering historical cumulative emissions.

Although different interpretations are still contested, it is clear that current efforts are inadequate. To be clear, interpretations vary due to ethical-normative reasons rather than technical reasons;

effort-sharing studies consistently conclude that developed countries must set and achieve more ambitious targets beyond the average global requirements. Further, there are some GCB allocation methods that *do not* adhere to defensible ethical positions, these include a least-cost approach where reductions are mandated based on where they are least expensive and the grandfathering approach whereby nations are not only absolved of their historical emissions but are also allowed to perpetuate the inequitable current distribution of emissions, thus further exacerbating historical injustices.

Fair Share in Canada

Canada has so far failed to set and meet territorial emission targets in line with the with global efforts to limit warming to 1.5°C and hold it well below 2°C, much less do its fair share in the collective global effort. As represented in Figure 2 below, Canada has consistently failed to achieve its weak targets over the last three decades and is not currently forecasted to meet its 2030 target.

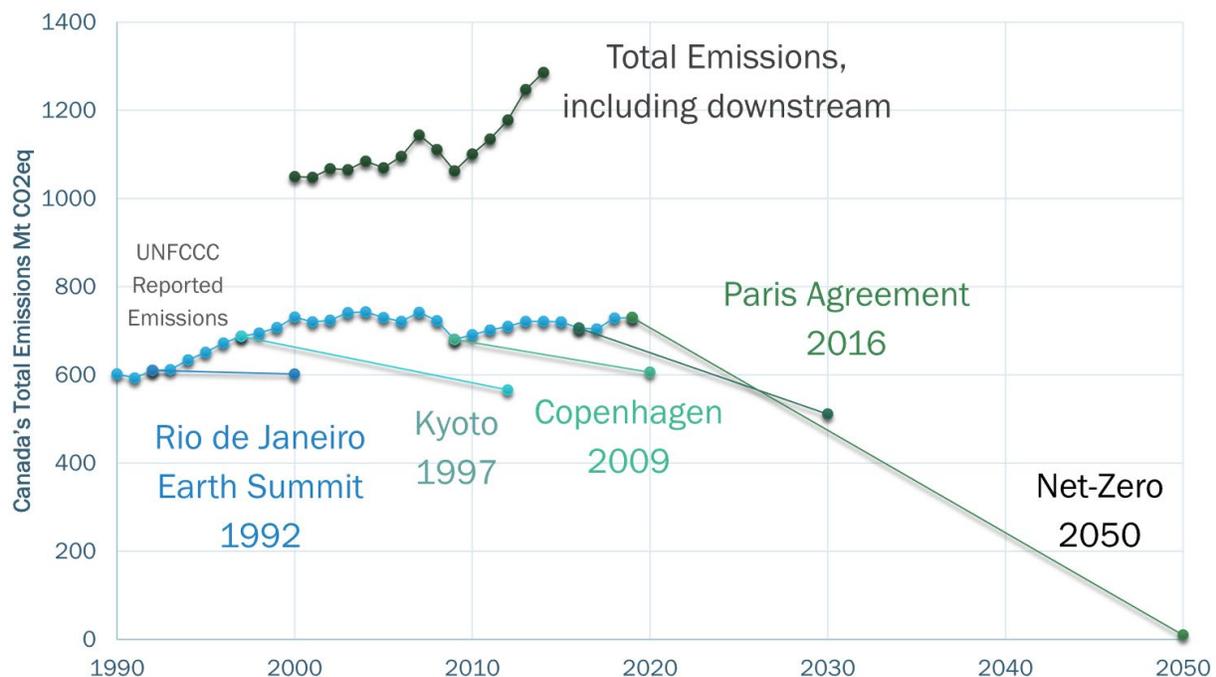


Figure 2: Canada's historical emissions and the federal climate targets it has missed. None of Canada's commitments capture or reflect fair share considerations.

Historical failures have dramatically increased the urgency of stringent mitigation action. Canada is the tenth largest contributor to climate change and its per capita emissions are among the highest in the world. Coupled with a long history of fossil fuel extraction, consumption, and export, Canada is responsible for relatively more warming to-date than most other countries. It is likewise relatively capable of climate action, thanks to the economic prosperity derived from those same factors.

Similarly, as a developed nation, Canada has committed under the Paris Agreement to pursue more ambitious emissions reductions than least developed nations, to take the lead in pursuing

those emissions reductions, and to support those developing nations in implementing the agreement.

Box 1: Canada's Downstream Emissions

So far, the climate regime has been tailored around national, territorial reduction targets, even if the Paris Agreement framework allows more flexibility in national ambition setting in favor of collaboration and in recognition of globally integrated energy markets. This is a key issue for fossil fuel exporting countries. Indeed, downstream, or extracted emissions occurring from combustion at point-of-use, which often occurs in the importing country and are therefore excluded from consideration (or annual submissions to the UNFCCC) in the exporting country.

Canada exports fuels which roughly emit as much emissions when combusted abroad as the whole country emits territorially ([Lee, 2017](#)). In other words, **when accounting for downstream emissions of exported fuels, Canada's climate impact is twice what is commonly reported in national inventories.** This limited scope in accounting benefits proponents of high-emitting projects where

These exports also affect global energy markets; it has been estimated that the supply of marginal oil such as Canada's bitumen exports increases global oil consumption by 0.2 to 0.6 barrels per additional barrel of supply ([Erickson, 2018](#))

Fossil fuel exporting countries which also claim leadership in the fight against climate change are increasingly [being denounced](#).

In the context of the Paris Agreement, national climate accountability should also include consideration of exported emissions and market effects since the fight to address climate change is global and collaborative. C-12 is currently silent on international impacts of domestic operations and the current implementation of the new climate factor in federal impact assessment law has failed to properly include downstream impacts.

Calculating Canada's Fair Share

Three different approaches have been used to express Canada's fair share obligation going forward:

- As a **carbon budget** – a jurisdiction must remain within a cumulative amount of emissions within a specified time period.
- As **yearly targets** – must meet a single target in a given year.
- As a **net-zero deadline** – must be net-zero before a specified year.

Examples and implications of each approach are shared in the following sections.

Fair Share as a Carbon Budget

The [2019 Paris to Projects Report](#) uses seven different approaches to estimate Canada's fair share of the GCB (Figure 3, below). The approaches distribute the budget on a per capita basis, and they vary according to whether historical contributions are considered, and which baseline year is used.

Canada is already a climate debtor to other nations and any additional emissions serve only to intensify this indebtedness.

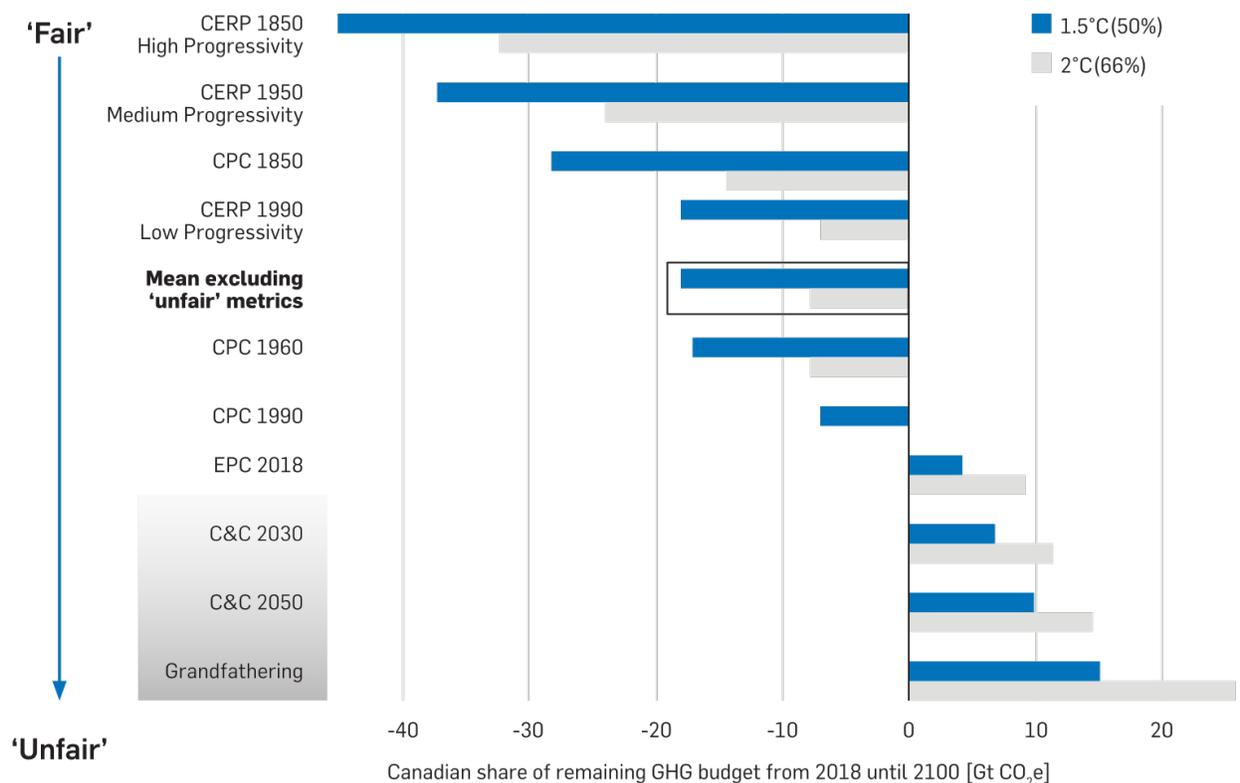


Figure 3: Graphical representation of fair and unfair estimates of Canadian carbon budgets ([Gibson et al., 2019, p.55](#)). CPC is cumulative per capita, EPC is equal per capita.

As a general trend, the more fair an approach is, the more negative the carbon budget for Canada. Hence, “Canada has already exhausted its fair share of remaining emissions allowable under 1.5°C or 2°C by nearly all accounts of what can be considered equitable” under different assumptions of fairness and ethics (“fair share”) ([Gibson et al., 2019](#)). This means strictly ethically, Canada must stop emitting GHGs, begin actively removing them from the atmosphere and helping other countries to do the same.

Fair Share as an Emissions Reduction Target

The [Climate Action Network](#) (CAN) advocates for a total fair share target for Canada of an equivalent of 140% below 2005 levels by 2030.² On the basis of feasibility, this target consists of a 60% reduction of domestic emissions and of emissions reductions occurring abroad at the equivalent scale of 80% of Canadian emissions to cooperate with developing countries in reducing their emissions. This fair share target is illustrated in Figure 4, below, along with historical emissions per sector, existing federal targets and future committed emissions.

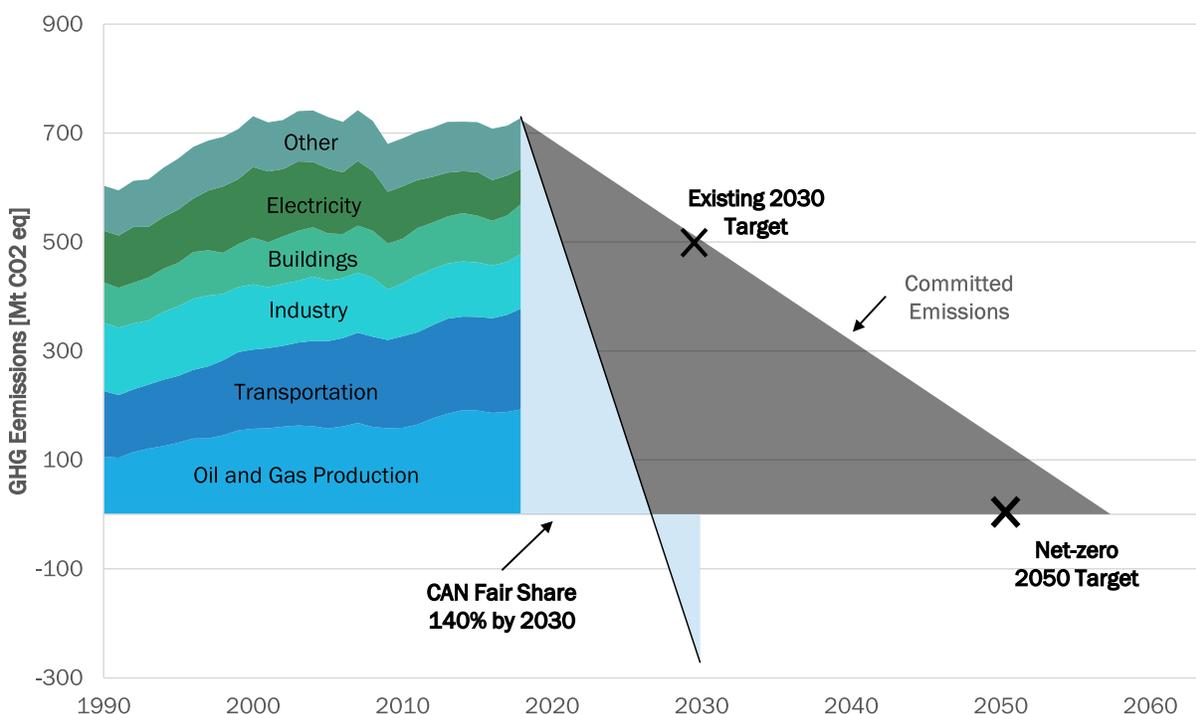


Figure 4: Historical ([CER, 2020](#)) and committed emissions ([Tong et al., 2019](#)) relative to current emission reduction targets and CAN fair share.

As indicated in figure 4, committed emissions associated with existing infrastructure are already expected to overshoot all commitments without any new developments coming online. The difference between the area represented by Canada's committed emissions and of its fair share pathway illustrates how far we are from actualizing the totality of our commitments under the Paris agreement. In order to meet any semblance of Canada's fair share of emissions reductions, all future developments would have to be net-zero or carbon-negative and existing high-emitting infrastructure should be retired. Additionally, any residual emissions must be offset by funding emissions reductions in other countries, which should not replace or interfere with other financial support to developing countries under the Paris Agreement.

It is important to note that the often-cited 45% reduction by 2030 (from 2010) does not represent a fair share target for Canada. This figure is based on the findings from the IPCC's SR1.5 report

² CAN uses a [publicly available framework](#) developed by the Climate Equity Reference Project (CERP) to estimate fair share targets using primary variables of historical responsibility and economic capability to act. [CAN fair share background and methodology](#).

in 2018 and reflects the median reductions in scenarios that limit temperature rise to 1.5°C ([where most scenarios implied temporarily overshooting the temperature goal](#)). As discussed, since Canada is a developed, high-emitting nation, its target must be more ambitious than the global average.

Box 2: Carbon Budgets vs. Yearly Targets

In 2008, the UK passed climate accountability legislation that requires the setting of cumulative five-year carbon budgets. The government must decide on an emissions limit for a five-year period and stay within that budget.

The concept of a carbon budget may be the best conceptual tool to ensure climate accountability and the most rigorous basis to have well informed effort sharing discussions at multiple scales. However, it is important to note that despite sharing a name with global carbon budget (GCB) and being generally considered to be a good model, the UK system does not reflect fair share principles; the carbon budgets set as policy basis for the UK do not represent a fair share allocation of the global effort nor was it directly or scientifically derived from the GCB.

On the other hand, yearly GHG reductions targets, mere snapshots of emissions at a point in time, are not as robust policy tools for accountability as carbon budgets. Indeed, under a yearly reduction framework, a country can achieve its objective for a target year whilst still having yearly emissions before and after the target year far in excess of the reduction trajectories necessary to respect temperature goals.

Fair Share as an Earlier Net Zero Deadline

Globally, 121 countries that have [committed](#) to “working towards achieving net-zero CO₂ emissions by 2050”, among which seven have committed to reaching net-zero *before* 2050 and two countries already claim to be carbon-negative. The fight against climate change could therefore also aptly conceived as a [race to net zero](#).

Garoufalidis-Auger and Greenford (2021)³ offer a novel interpretation of fair share by expressing a fair share carbon budget in terms of how fast it declines and reaches the zero emissions deadline.

Equal per capita (EPC) is the only approach that employs any fair share principle, while still generating a positive remaining carbon budget. The approach, however, neglects responsibility (historical emissions), capability (economic inequities). If the EPC approach is used despite its shortcomings, the net zero deadline should occur between 2023 and 2040, depending on whether emissions remain constant (2023), the reduction trajectory is linear (2025-2030) or exponential (2040). However, since our fair share budget is negative under all other fairer effort-sharing

³ Forthcoming publication entitled *Addressing the Climate Emergency in Canada: Aiming for zero emissions between 2025 and 2030*.

approaches (see figure 3), this would mean Canada should have already met the net zero objective.

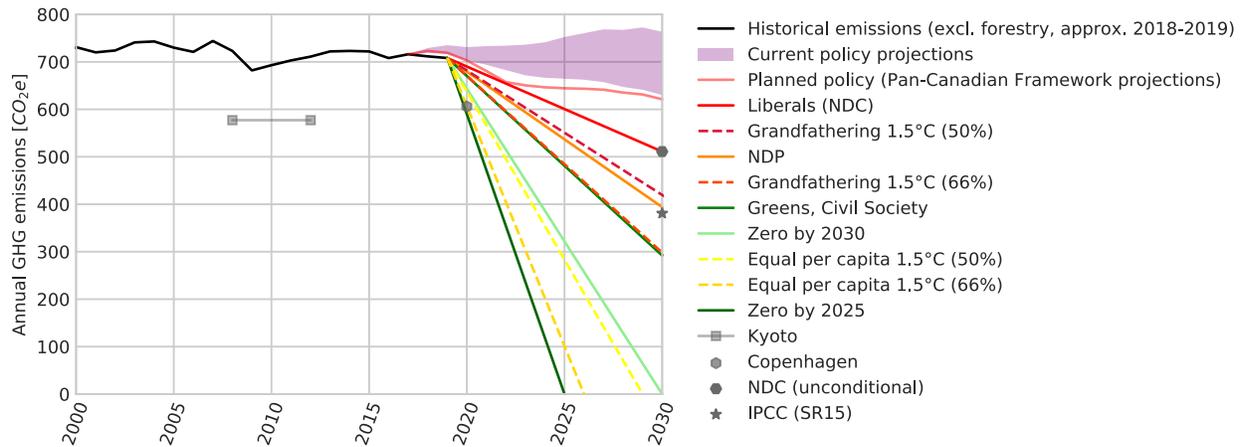


Figure 5: Represents net zero deadline for ECP carbon budgets (yellow, dotted) and other pathways more fully described in Garoufalidis-Auger and Greenford (2021). Image reproduced from Garoufalidis-Auger and Greenford (2021).

Box 3: Zero vs. Net-Zero

Net-zero emissions is expressed in the Paris agreement as “a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases” (art. 4(1)). In other words:

$$\text{All human induced GHG emissions} - \text{all human induced GHG removals} = 0$$

However, there is currently high uncertainty around the technical feasibility, scale, and permanence of large-scale removals which, as a result, remain mostly theoretical at present. Relying on nonexistent future technologies to justify less ambitious reduction efforts risks overshooting the already limited GCB, resulting in disproportional and inequitable impacts on more vulnerable nations and populations. For these reasons, more equitable approaches prioritize directly reducing the major sources of human induced emissions such as fossil fuel extraction and combustion in the industrial and transport sectors. The best approach is to aim for zero human-induced GHG emissions and use removals, if and when they are feasible, to exceed zero.

Fair Share and Bill C-12

Bill C-12, which creates the Canadian Net-Zero Emissions Accountability Act, refers to both the UNFCCC and Paris agreement in the preamble. Despite not being mentioned explicitly, the principles of equity and CBDR-RC could be understood to be included by reference to “Canada’s international commitments” in sections 4, 8 and 26(b).

The Bill stipulates that the methodology used to produce the greenhouse gas inventory must be consistent with that of the UNFCCC, however, section 26 specifically enables stepping away from these carbon accounting methodologies at cabinet’s discretion.

The proposed framework involves setting targets for milestone years every five years rather than cumulative carbon budgets for five-year periods and it does not specify where emission reductions must occur or to what extent international credits will be available to meet the targets.

C-12’s main obligation is framed as a net zero target for the year 2050 (“Target — 2050 / The national greenhouse gas emissions target for 2050 is net-zero emissions” s.6).

One way to make C-12 coherent with the need to do our fair share as a country without politically compromising on the ethics is to reconceptualize the purpose of the act as *achieving net zero emissions as soon as possible and at the latest by 2050*, rather than simply as a deadline for the year 2050.

Conceptualizing the climate challenge as a race to net zero may also have more pedagogical value than yearly targets in order to educate the average Canadian. Beyond requiring the government to be accountable for climate action, winning the climate challenge will need to involve almost everyone so using this legislation to educate should not be an underestimated tool.