

By Our Own Emissions: The Distribution of GHGs in BC

FOR CLIMATE POLICIES TO BE SUCCESSFUL, we need to fully understand where greenhouse gas (GHG) emissions are coming from. The standard reporting of emissions breaks them down by broad sectors of the economy, but gives little insight into who is doing the emitting. This brief estimates BC emissions by income group to address this gap in our understanding, building on a CCPA study that found that ecological footprint grows with income, and in particular, the top 10% of income earners in Canada have a substantially larger footprint than the next 10%.¹ We then contemplate approaches to reducing emissions based on principles of climate justice.

DISTRIBUTION OF BC EMISSIONS

Four-fifths of BC's GHG emissions come from the burning of fossil fuels.² Data on household expenditures enable us to estimate the *direct* emissions resulting from fossil fuels used in the home and for transportation.³ These count for about one-third of BC's total GHG emissions. In addition, we can estimate *indirect* emissions, those embodied in other goods and services consumed by households.⁴ On average, each British Columbian produces three and a half tonnes of direct CO₂-equivalent greenhouse gases per year, and just over 10 tonnes per person if we add in indirect emissions.

To look at the distribution of emissions, we break BC families into income quintiles (or groupings of 20%, ranked from lowest to highest). For each group we adjust for differences in family size, which tends to grow with income. The average family size is 1.5 persons per household in the bottom quintile, rising to 3.3 persons per household in the top quintile.

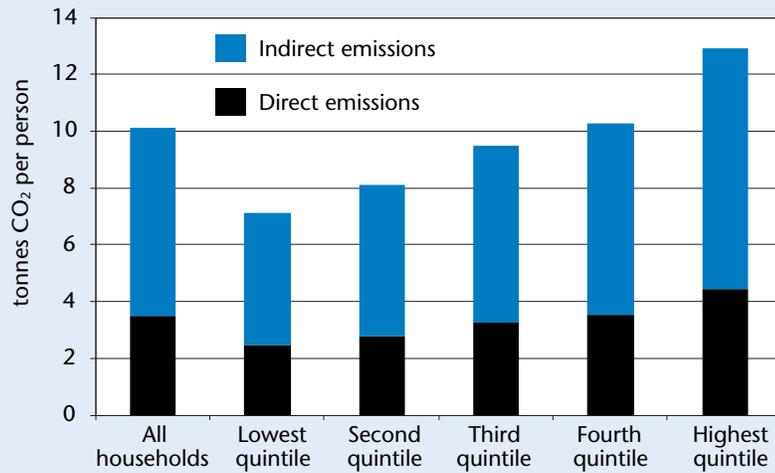
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Figure 1: BC GHG Emissions per Person



Notes: Data are for 2005.

Source: Author's calculations based on Statistics Canada's *Survey of Household Spending*; *BC Budget 2008*.

A person in the bottom (poorest) quintile produces about 30% fewer emissions than the average British Columbian, while someone in the top (richest) quintile produces 27% more emissions than the average.

Figure 1 shows these emissions by income quintile, for direct and indirect emissions. A person in the bottom quintile produces about 30% fewer emissions than the average British Columbian, while someone in the top quintile produces 27% more emissions than the average. Put another way, emissions per person in the top quintile are almost double those of the bottom quintile. If data enabled us to break down the distribution further, the emissions in the top 10% (or 5% or 1%) would be successively higher, while the opposite would be true for the bottom.

Some caution is required in interpreting these numbers. Families have some discretionary control over their direct emissions (lowering winter household temperature, or driving less), but a large amount of emissions are beyond their immediate control. For example, renters in apartment buildings will have more difficulty reducing heat or making investments in energy efficiency upgrades, and people living in suburbs will be much more automobile dependent for their mobility. A comprehensive approach must consider these structural factors that lead to emissions.

HOW SHOULD EMISSION REDUCTIONS BE DISTRIBUTED?

In the international debates around climate action, fairness is frequently invoked. But there are a number of different ways of interpreting whether a solution is fair. At the December 2009 Copenhagen conference on climate change, a deal-breaking issue was around the principle of *historical responsibility*. Developing countries were seeking room to grow their economies (and emissions), with the burden of GHG reductions on the already developed countries, because the richest countries have produced (and benefitted from) almost all of the past emissions that have led us into the climate crisis.

Drawing on international analyses of climate justice, UBC’s Sonja Klinsky and Hadi Dowlatabati cite five principles of fairness that can be applied to our thinking of how we reduce emissions:

- **CAUSAL RESPONSIBILITY:** Those responsible for the problem should have the greatest burden to fix it. This is also reflective of the “polluter pays” principle in environmental law.
- **EQUAL ENTITLEMENT:** Every person has the right to emit a certain amount of greenhouse gases per year consistent with a sustainable economy (that is, total emissions are less than the “sink” functions of the earth to process them naturally).
- **PROTECTION OF THE MOST VULNERABLE:** Resources should be transferred to those who bear the greatest risks, and climate policies must not leave the least well-off in worse shape.
- **EQUAL BURDEN-SHARING:** Countries, regions, industries and people face different costs of adjustment, due to their different circumstances. For example, rural areas of BC may require specific policies relative to urban areas.
- **PROCEDURAL JUSTICE:** Those who are adversely affected should have a meaningful say in decision-making.⁵

While some of these principles may be in conflict with each other, it is important that we link emissions reductions to some concept of fairness if they are to be successful in implementation. A recent study, for example, proposes a global carbon distribution where all individuals would be treated equally based on their emissions, regardless of whether they live in a country that is rich (high-emitting) or poor (low-emitting).⁶ This would account for high-emitting individuals living in poor countries and low-emitting individuals in rich countries. The authors propose a cap on emissions of the highest emitting individuals and a floor that would allow the lowest emitters to continue to increase their emissions somewhat. This would be a step towards a longer-term ideal of equal per person emission rights.

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This analysis is clearly of interest to Canada and BC as governments figure out how to achieve GHG targets. BC has legislated a target of a 33% reduction below 2007 emission levels by 2020, although the province currently does not have a plan to achieve it.⁷ How the burden should be shared across all British Columbians merits attention from policy makers, given that emissions are unequally distributed, and the great possibility for climate action strategies to make conditions worse for the most vulnerable.

EMISSION REDUCTIONS FOR BC FAMILIES

If we apply BC’s 33% target to the figures above, on average direct emissions must fall to 2.3 tonnes per person, and indirect emissions to 6.8 tonnes per person. But how should that reduction be allocated across groups? One approach is to make each family reduce their emissions by one-third. Total emissions for the bottom would be required to fall to 4.8 tonnes per person, while those at the top would drop to 8.6 tonnes (Option A in Table 1).

However, such an arrangement would mean that the top 20% would continue to emit almost one and a half tonnes more than the bottom quintile did *to begin with*. Furthermore, the lower the starting point of emissions, the more difficult the reductions and the greater the impact on families via reduced consumption of necessities. Put another way, higher income families have more GHG-intensive consumption patterns (for example, larger homes, vacation properties, more and bigger cars), and will be able to more easily reduce their emissions than low-income families.

A fairer approach, based on the principle of equal per capita emissions, would reduce the emissions of all households to the target of 6.8 tonnes (including indirect emissions). In this scenario, the bottom quintile is already close to the target, and would need to reduce emissions by 5.4% or 0.4 tonnes per person. This approach places the greatest burden on the highest emitters, who would have to reduce emissions by almost half, a reduction of 6.2 tonnes.

To illustrate the distributional dynamics, we have so far assumed no change in BC's population. BC Stats estimates that by 2020, there will be 5.1 million people living in BC, up from 4.2 million in 2005.⁸ Table 1 shows that BC emission reductions would thus be larger for all groups, with emission reductions of 23% for the bottom quintile, rising to 57% for the top quintile.

Higher income families have more GHG-intensive consumption patterns (for example, larger homes, vacation properties, more and bigger cars), and will be able to more easily reduce their emissions than low-income families.

Table 1: BC GHG Emission Reductions

	All households	Lowest quintile	Second quintile	Third quintile	Fourth quintile	Highest quintile
	tonnes					
Carbon emissions per capita, 2005	10.2	7.2	8.1	9.5	10.3	12.9
Emissions reductions to meet 2020 target						
A: One-third reduction across the board	6.8	4.8	5.4	6.3	6.9	8.6
B: Equal per capita amount	6.8	6.8	6.8	6.8	6.8	6.8
Reduction to per capita amount (tonnes)	-	0.4	1.4	2.7	3.5	6.2
Percentage reduction to meet equal per capita amount	-	5.4%	16.9%	28.8%	34.4%	47.7%
2020 target with population growth						
A: One-third reduction across the board	5.5	3.9	4.4	5.2	5.6	7.0
B: Equal per capita amount	5.5	5.5	5.5	5.5	5.5	5.5
Reduction to per capita amount (tonnes)	-	0.6	0.9	1.4	1.7	2.6
Percentage reduction to meet equal per capita amount	-	22.9%	32.2%	42.0%	46.5%	57.3%

Note: Table includes direct and indirect emissions.

Source: Author's calculations based on Statistics Canada's *Survey of Household Spending*; *BC Budget 2008*.

POLICY OPTIONS TO GET THERE

The unequal distribution of emissions means care must be taken to design an approach that does not disproportionately affect low-income families. The highest income families produce the most emissions, and have an even greater share of BC's income. A carbon tax alone is regressive—it will take up a larger share of income for low-income families than high-income families, even though the low-income families have the least capacity to adapt to higher carbon prices. A major emphasis on redistribution must be built into the revenue recycling of the carbon tax, much more so than the existing low-income climate action credit. Indeed, as of July 2010, low-income families will be paying more in carbon tax than they get back in credits and tax cuts—a situation that needs to be rectified.⁹

In terms of other policy options, it is possible to imagine a “personal carbon trading” system that would set per person emission limits, but enable the lowest emitters to sell “excess” emissions to the highest emitters, a move that would alleviate income inequalities. Alternatively, a cap with auctioned permits to large industrial emitters could be redistributed on a per capita basis (“cap-and-dividend”). There are a number of complexities in comparing these options that will be examined in future Climate Justice Project research.

Policy makers must also think about how to affect structural changes in how we live, work and play, so that far fewer people live in auto-dependent areas and instead have better access to jobs, services and amenities by walking, biking or taking public transit. A new model for retrofitting homes is needed that addresses the challenges faced by low-income families in making investments that reduce their emissions. Similarly, other policies will be needed with a focus on industry and business to reduce emissions in the production, transport and delivery of goods and services.

A key challenge in moving ahead is political resistance to greater equality as an endpoint. It may take more than one decade to get to equal per capita emissions, and this objective could meet with fierce opposition from the highest emitters. The path to equal per capita emissions would still be characterized by inequality, although that inequality would be decreasing over time. But in the long run, by mid-century at the latest, equality must win out—fossil fuel use must be eliminated, and therefore GHG emissions for all households must fall to zero.

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NOTES

- 1 H. Mackenzie, H. Messinger and R. Smith. (2008) *Size Matters: Canada's Ecological Footprint by Income*. Ottawa: Canadian Centre for Policy Alternatives, June.
- 2 Government of British Columbia. (2009) *British Columbia Greenhouse Gas Emissions Inventory Report 2007*. www.env.gov.bc.ca/epd/climate/ghg-inventory/index.htm. Figure includes net deforestation.
- 3 Direct emissions are estimated by drawing on 2005 data on household expenditures for BC quintiles, from Statistics Canada's *Survey of Household Spending*, which include estimates of fuel used in principal residence and motor vehicles. Average fuel prices in 2005 were used to determine consumption in volumes. This was then multiplied by emission factors from BC government for BC's carbon tax to estimate direct emissions.

- 4 Indirect emissions are estimated from Statistics Canada, *Direct and Indirect Household Greenhouse Gas Emissions, 1990-2003p*. Indirect emissions for domestic sources only are about 1.9 times direct emissions, and we apply this multiple to each quintile. This calculation is for all of Canada, and does not include indirect emissions from imports; doing so would increase the multiple to 2.8 times direct emissions.
- 5 S. Klinsky and H. Dowlatabati. (2009) "Conceptions of Justice in Climate Policy" in *Climate Policy*, 9, p. 88-108.
- 6 S. Chakravarty et al. (2009) "Sharing global CO₂ emission reductions among one billion high emitters" in *Proceedings of the National Academy of Sciences*, vol. 106 no 29, pp. 11884-88, July 21. www.pnas.org/cgi/doi/10.1073/pnas.0905232106
- 7 The last BC Climate Action Plan contains measures that, according to modeling by MK Jaccard and Associates, meet between 60 and 80% of the 2020 target. The government-appointed Climate Action Team made recommendations in August 2008 to get to 100% of the target, but these measures have not been adopted. No distributional analysis has been done on any of BC's climate measures to date.
- 8 BC Stats, *British Columbia Population Projections, 2009 to 2036*, June 2009, accessed at: www.bcstats.gov.bc.ca/data/pop/pop/project/BCtab_Proj0906.pdf
- 9 M. Lee and T. Sanger. (2008) *Is BC's Carbon Tax Fair?* Vancouver: Canadian Centre for Policy Alternatives.

CLIMATE JUSTICE PROJECT

The Climate Justice Project is a multi-year initiative led by the CCPA and the University of British Columbia in collaboration with a large team of academics and community groups from across BC. The project connects the two great "inconvenient truths" of our time: climate change and rising inequality. Its overarching aim is to develop a concrete policy strategy that would see BC meet its targets for reducing greenhouse gas emissions, while simultaneously ensuring that inequality is reduced, and that societal and industrial transitions are just and equitable. The project is supported primarily by a grant from the Social Sciences and Humanities Research Council through its Community-University Research Alliance program. Thanks also to Vancity and the Vancouver Foundation.



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