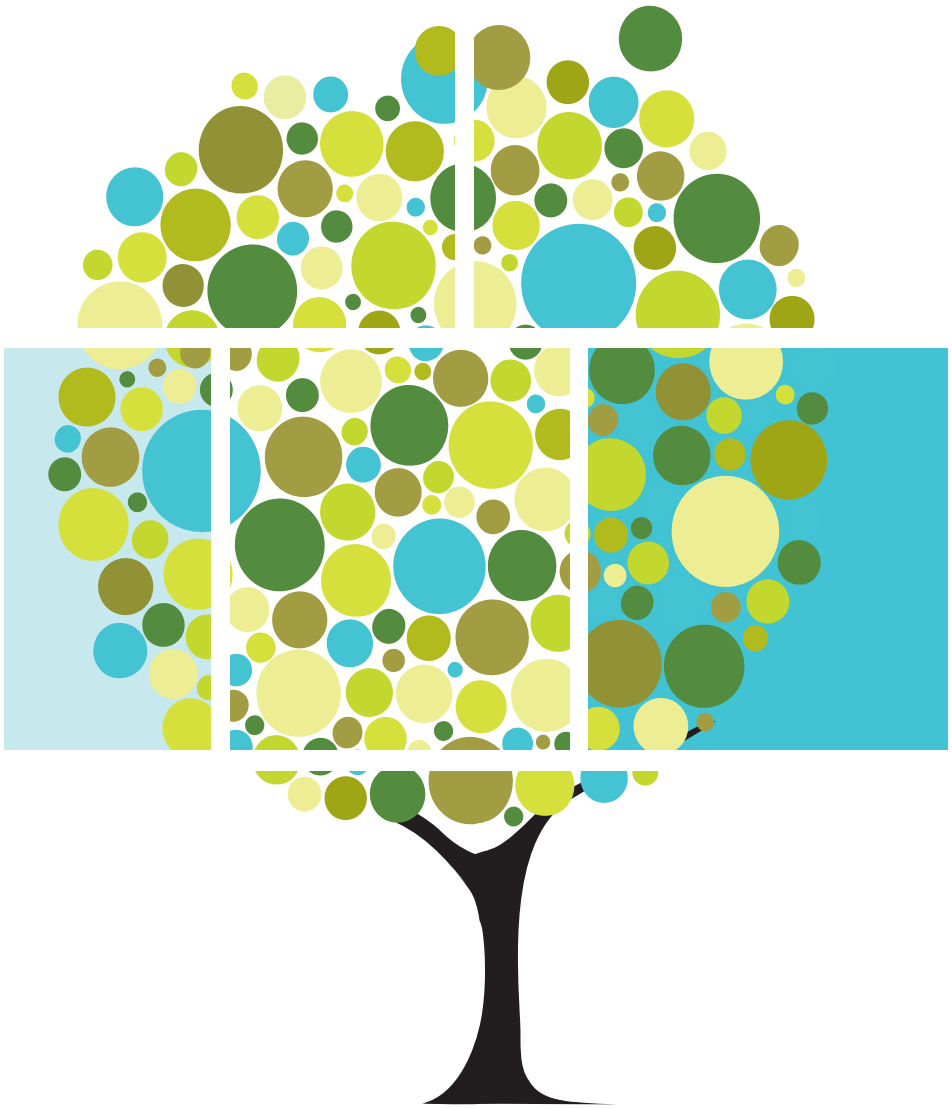
Climate Justice Project

Is BC's Carbon Tax Fair?

An Impact Analysis for Different Income Levels



by Marc Lee
and Toby Sanger

OCTOBER 2008

CCPA
CANADIAN CENTRE
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BC Office

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Part of the analysis in this study is based on Statistics Canada's Social Policy Simulation Database and Model. The assumptions and calculations underlying the simulation results were prepared by the authors; responsibility for the use and interpretation of these data is entirely that of the authors.

SUMMARY

Is BC's Carbon Tax Fair?

An Impact Analysis for Different Income Levels

BC INTRODUCED CANADA'S FIRST broad-based carbon tax in July 2008. At $10 per tonne of carbon dioxide equivalent (CO_2e), or 2.34 cents per litre of gasoline, the tax is modest, but is scheduled to rise by $5 per year to a level of $30 per tonne in July 2012. The tax is revenue-neutral, meaning all revenues from the tax are returned to taxpayers through tax cuts and credits.

This study focuses on the issue of fairness of the carbon tax by analyzing its impact across different income groups. As with sales or consumption taxes, lower-income households will feel the impact of carbon taxes more intensely, but distribution is also affected by how the proceeds of the tax are used. We estimate the impact of the tax for different income groups on direct consumption of fossil fuels (primarily in the home and in vehicles) as well as indirect consumption (fossil fuels embedded in other goods and services purchased). We also model the distribution of the tax cuts and credits brought in by the government.

This paper finds that BC's carbon tax regime is progressive for the first year, although personal and corporate income tax cuts lead to an undesirable net benefit for the top 20% of households. But as the carbon tax increases, the current regime becomes regressive, a situation the BC government must rectify in its next and future budgets.

KEY FINDING
BC's carbon tax regime is progressive for the first year, although personal and corporate income tax cuts lead to net gains for the top 20% of households. By 2010/11 the regime becomes regressive, a situation the BC government must rectify in its next and future budgets.

The carbon tax by itself is a regressive tax, meaning low-income families pay a larger share of their income to the tax than higher-income families:

For the lowest income quintile of British Columbians, the carbon tax and recycling system is modestly progressive in 2008/09, but becomes regressive by 2010/11.

- BC's carbon tax in 2008/09 will increase annual costs by an average of $253 per household in BC. This amount is small relative to income, equivalent to 0.4% of average household income.
- Higher levels of the carbon tax in future years would have impacts that are proportionately higher—a $30 per tonne carbon tax in 2012/13 leads to average carbon taxes paid of $760 per household, or 1.2% of average income.
- By income quintile (each quintile has 20% of households, ranked from lowest income to highest), carbon tax paid rises with income, from $107 for the lowest income quintile (bottom 20%) to $427 for the highest income quintile (top 20%) in 2008/09.
- The carbon tax is regressive, relative to income, absorbing 0.7% of average household income for the bottom 20% of households, but only 0.3% of average income for the top 20% of households.

The bottom 20% of BC families, by income, will have an average net gain of $38 in the first year, but a net loss of $47 by 2010/11.

By comparison, the top 20% of BC families will have an average net gain in the first year of $62, and an even bigger net gain of $311 by 2010/11—even though richer families usually have a much larger carbon footprint.

How carbon tax revenues are used is of utmost importance. In the absence of deliberate policy design to make them more fair, carbon taxes will be regressive and will increase inequality. Revenue recycling offers an opportunity to deliver a progressive outcome. The BC government has committed to "recycle" all carbon tax revenues back to taxpayers through personal and corporate income tax cuts, and a Low Income Climate Action Tax Credit. The recycling regime changes the results significantly, but also raises some concerns:

- In 2008/09, the net effect of the overall carbon tax regime is a modest gain in dollar terms for the bottom two quintiles. The regime is moderately progressive, meaning the lowest-income quintile gains the most relative to income.
- This progressive result essentially disappears in 2009/10 and the overall tax and recycling framework becomes regressive by 2010/11. This is because the low-income credit is scheduled to increase by only 5% in 2009/09 (compared to a 50% increase in the carbon tax) and no further increases are scheduled.
- If we project forward to 2012/13, these trends would worsen, and the carbon tax and recycling system would be clearly regressive, with the bottom quintile facing a net loss of 1% of income.
- Even in 2008/09, there is a perverse result in the top quintile, due to income tax cuts that have much larger benefits for high-income families (corporate income tax cuts, in particular). In dollar terms the top quintile, on average, receives a larger net benefit than either of the bottom two quintiles, even though top earners have the largest footprints because of greater levels of consumption.

We conclude that a progressive result hinges upon the growth of the low-income credit, while tax cuts undermine a fair outcome by leading to net benefits for top earners. These funds would be better used to reinforce the government's Climate Action Plan by supporting programs and infrastructure development.

We model three alternative options for recycling carbon tax revenues, each based on recycling half of the carbon tax revenues: an expansion of the existing low-income credit; a per household transfer; and, a hybrid system based on modeling done for the CCPA's Alternative Federal Budget (AFB). In the latter case, a more expansive green refundable tax credit is introduced, and gradually phased out above a household income of $70,000.

1. The most redistributive model is the expansion of the existing low-income credit, delivering the largest net gains to the bottom quintile. The bottom 40% get net benefits from this formulation, while the higher quintiles pay net taxes.
2. A per household transfer may be favoured in terms of greater political support, but this comes at the expense of transferring income to the bottom quintile. Interestingly, only the bottom quintile gets a net benefit on average from this alternative formulation.
3. The hybrid AFB model may be a compromise between these two approaches, with greater benefit to the bottom quintile than a per household transfer, but with greater coverage across households.

The 2009 BC Budget should commit that the low-income credit be, at minimum, increased in line with carbon tax revenues, and ideally its share should be increased to half of revenues. People with low to middle incomes should have real options for changing their behaviour, and be no worse off under any carbon pricing system.

We propose that, at minimum, the 2009 BC Budget should include a commitment to increase the existing low-income credit in line with carbon tax revenues. Ideally the credit should be funded by half the revenues collected, up from a third. This would help give families with low to middle incomes real options for changing their behaviour, and ensure none are worse off under any carbon pricing system.

In addition, revenue neutrality is a political consideration above all else, and should be abandoned. We propose that the remaining half of the carbon tax revenues be used to fund other climate actions, including major transit expansion, transition programs for workers, energy efficiency improvements for low- to middle-income families, and an alternative technology development program. No further personal or corporate income tax cuts should be financed by carbon tax increases, and 2008 tax cuts should be rolled back.

PART 1

Introduction

When it introduced North America's first broad-based carbon tax, the BC government's commitment to "recycle" all revenues back to households and businesses in the form of tax cuts and low-income tax credits generated praise as a new blueprint for how jurisdictions can and should implement a carbon tax.

AS THE CENTERPIECE of its February 2008 budget, and a major plank in its climate change agenda, the BC government introduced North America's first broad-based carbon tax. The government's commitment to "recycle" all revenues back to households and businesses in the form of tax cuts and low-income tax credits has generated praise from many quarters as a new blueprint for how jurisdictions can and should implement a carbon tax, although the tax itself remains highly controversial.

Carbon pricing is widely viewed as a central policy tool for addressing climate change on economic efficiency grounds. A price on carbon (or greenhouse gas emissions) provides flexibility for consumers and businesses to make decisions based on their particular circumstances, thus meeting emissions reduction goals at the least economic cost. Carbon taxes and cap-and-trade systems are two stylized variants of carbon pricing. A carbon tax provides greater certainty around price, but poses a great deal of uncertainty around total actual emission reductions. A cap-and-trade system works in the opposite manner, with a total emissions target set, and the price of emitting GHGs determined by the auction and trading of permits. In either case, market pressures may drive up prices by more than policy-driven carbon pricing, as has been the case in recent years. And in practice, there are many nuances and complications in terms of implementation that will impact on effectiveness and equity objectives.

BC's carbon tax began modestly, at $10 per tonne of carbon dioxide equivalent (CO_2e), as of July 2008, or 2.34 cents per litre of gasoline. The tax is scheduled to rise $5 per year to a level of $30 per tonne in July 2012. The anticipated impact on emissions, according to the budget, is relatively small,[1] based on the principle that carbon taxes start at low levels and steadily rise over time in order to give households and businesses time to adjust. Whether this will continue to be the case after 2012 remains to be seen.

The BC carbon tax has a relatively broad base, covering all fossil fuels consumed in the province, or 70% of BC's domestic GHG emissions. The remaining 30% represent emissions from industrial processes in cement and aluminum production, and "fugitive" emissions from pipelines and landfills.[2] These outstanding areas will need to be covered by the tax, a cap-and-trade system (such as the regional Western Climate Initiative) or be regulated in order to have a comprehensive system that covers all emissions. In addition, the tax is not applied to international aviation and shipping, nor is it applied to exports, due to "competitiveness" concerns with regard to trade and investment if BC taxed these areas and other jurisdictions did not.

This paper puts aside the issue of effectiveness, and focuses on the issue of fairness. As the price of carbon-intensive goods and services rises, lower-income households will feel the impact of higher prices more intensely. A market-based carbon pricing approach can worsen inequality, if unaccompanied by policy design or deliberate measures that address income distribution. Moreover, if low- and middle-income people get priced out of the market while others can "buy their way out" of change, climate policies may lose broad-based political support. This is of particular importance given the source of emissions by income group. A recent CCPA analysis found that the size of a family's ecological footprint increases with income, and in particular the top 10% of families had a footprint much larger than other families.[3]

As the price of carbon-intensive goods and services rises, lower-income households will feel the impact of higher prices more intensely.

Relative to income, a carbon tax, like sales or consumption taxes, will have a *regressive* pattern—that is, low-income individuals and families will *pay a greater share of their income to the tax* because they consume all of their available income (and more due to household debt), and pay a greater proportion of their household budgets for energy. Higher-income households will pay more tax in absolute dollars (because they consume more) but will *pay a smaller share of that income to the tax*. By comparison, income taxes are generally *progressive* because higher income people pay a greater share of their income to the tax.

From a distributional perspective, how the proceeds of the carbon tax are used is perhaps more important. The BC government has committed to "recycle" all carbon tax revenues back to taxpayers through: (i) personal income tax cuts in the first two brackets (i.e. on income under $70,000); (ii) corporate income tax cuts; and (iii) a Low Income Climate Action Tax Credit that will piggyback on the federal GST credit.[4] As of July 2008, the credit is worth $100 for adults and $30 for children, and is gradually phased-out above incomes of $30,000 for individuals and $35,000 for families. The credit will be increased by 5%, to $105 per adult and $31.50 per child, as of July 2009, but no future increases have been promised (unlike the carbon tax, which will rise by 50% as of July 2009).

In this study, we model the distribution of BC's carbon tax and recycling measures. Our results confirm that BC's carbon tax, in and of itself, is regressive. However, the overall carbon tax and recycling framework is modestly progressive in 2008/09—that is, low-income families get back more in credits, on average,

A recent CCPA analysis found that the size of a family's ecological footprint increases with income, and in particular the top 10% of families had a footprint much larger than other families.

than they pay in carbon taxes. If the low-income credit is not expanded, however, the regime will shift to become regressive by 2010/11. It is important for policy makers to rectify this situation in the 2009 and future budgets by minimally ensuring that the credit grows in line with the carbon tax.

In addition, the paper reviews alternative models for recycling the tax revenues to ensure a progressive outcome. As currently designed, the share of carbon tax revenues recycled back through the low-income credit declines over the five-year implementation period. Our options also enhance the dollar value of the credit and break with revenue neutrality by using proceeds of the tax to further advance GHG emission reductions (such as public transit expansion, energy efficiency upgrades and transition programs for workers) instead of further personal and corporate income tax cuts.

PART 2

Empirical Results for BC Carbon Tax and Recycling

IN THIS SECTION, we model the distribution of the carbon tax and its recycled components for 2008/09 and the next two years of the fiscal plan tabled in Budget 2008. We draw on household survey data to estimate carbon tax payable for both direct consumption of fossil fuels (primarily in the home and in vehicles) and indirect consumption (fossil fuels embedded in other goods and services purchased). We then estimate the value of personal and corporate income tax cuts, and the low-income credit for households. A more detailed review of our data sources and methodology is provided in the Technical Appendix.

We draw on household survey data to estimate carbon tax payable for both direct and indirect fossil fuel consumption. We then estimate the value of personal and corporate income tax cuts, and the low-income credit for households.

Table 1 on page 12 shows the estimated BC carbon tax paid for its first full year (July 2008 to June 2009). BC's carbon tax as of July 2008, at $10 per tonne CO_2e, would increase annual costs by an average of $253 per household in BC, including the impact of both direct and indirect costs. This amounts to 0.4% of average household incomes (0.5% of median household income). Higher levels of the carbon tax in future years would have impacts that are proportionately higher (e.g., a $30 per tonne carbon tax in 2012 leads to an average of $760 per household and 1.2% of average income). However, to the extent that households can and do change their behaviour away from purchases that are carbon-intensive, they can reduce the carbon tax they pay. The impact of the tax will also be affected by technological and process changes made by utilities and businesses.

By income quintile (each quintile has 20% of households, ranked from lowest income to highest), carbon tax paid rises with income, from $107 for the lowest income quintile (bottom 20%) to $427 for the highest income quintile (top 20%). The carbon tax is regressive, however, with respect to income, absorbing 0.7% of average household income for the bottom 20% of households, but only 0.3% of average income for the top 20% of households (Figure 1). These magnitudes are not particularly large, given the low entry rate for the carbon tax, although the tax will increase over time, perhaps much beyond the scheduled rate of $30 in 2012 (as has been recommended by the government-appointed Climate Action Team).

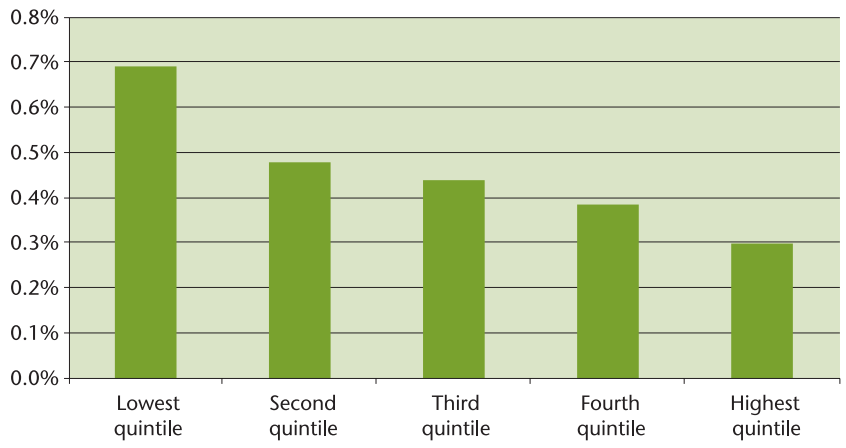
The carbon tax is regressive with respect to income, absorbing 0.7% of average household income for the bottom 20% of households, but only 0.3% of average income for the top 20% of households.

Table 1: Impact of BC Carbon Tax by Income Group, 2008/09

	All households	Lowest quintile	Second quintile	Third quintile	Fourth quintile	Highest quintile
	Average dollars per household (unless otherwise stated)					
Estimated carbon tax (at $10 per tonne CO_2e)						
Direct fuel purchases ($)	87	37	57	85	108	146
Indirect impact ($)	167	71	109	162	208	280
Total carbon tax ($)	253	107	166	247	316	427
Average income ($)	66,356	15,498	34,683	56,222	82,098	143,280
Median income ($)	55,360	16,345	33,950	55,360	81,200	121,620
Carbon tax as % of average income	0.4%	0.7%	0.5%	0.4%	0.4%	0.3%
Carbon tax as % of median income	0.5%	0.7%	0.5%	0.5%	0.4%	0.4%

Notes and sources: Authors' calculations are based on Statistics Canada's Survey of Household Expenditure and BC Budget 2008. Estimates are for the full July 1 to June 30 year in accordance with the carbon tax. Indirect effect estimates based on data from Statistics Canada Environmental Accounts, Direct and Indirect Household Greenhouse Gas Emissions, 1990–2002p, but are adjusted to exclude imports. See Technical Appendix for details.

Figure 1: BC Carbon Tax as Share of Income, 2008



For notes and sources, see Table 1.

As noted above, revenues are fully recycled in three ways: through the low-income credit, personal income tax cuts and corporate income cuts. Table 2 shows the results for households by quintile for the 2008/09 to 2010/11 three-year fiscal plan. For each year we calculate the net gain or loss as a share of income (i.e., a positive number means the average household is a net recipient of funds in excess of carbon taxes paid).[5] There are a number of moving parts in developing these estimates, which we review in the Technical Appendix.

In 2008/09, the net effect of the overall carbon tax regime is moderately progressive, with the notable exception of the top quintile. Positive net gains at the top are the result of corporate income tax cuts that have much larger benefits for

Table 2: BC Carbon Tax and Revenue Recycling by Income Group, 2008/09 to 2010/11

	All households	Lowest quintile	Second quintile	Third quintile	Fourth quintile	Highest quintile
	Average dollars per household (unless otherwise stated)					
2008/09						
Carbon taxes paid (direct and indirect) ($)	253	107	166	247	316	427
Low-income credit ($)	86	129	147	139	13	1
Personal income tax cuts ($)	69	1	18	54	102	167
Corporate income tax cuts ($)	99	15	42	57	60	322
Total recycled benefits ($)	253	145	207	250	175	489
Net gain (loss) ($)		38	40	3	(141)	62
Share of income		0.2%	0.1%	0.0%	(0.2%)	0.0%
2009/10						
Carbon taxes paid ($)	380	161	250	370	473	641
Low-income credit ($)	90	136	155	146	14	1
Personal income tax cuts ($)	162	3	42	127	242	395
Corporate income tax cuts ($)	128	19	54	74	77	416
Total recycled benefits ($)	380	158	251	347	333	812
Net gain (loss) ($)		(3)	1	(24)	(141)	171
Share of income		0.0%	0.0%	0.0%	(0.2%)	0.1%
2010/11						
Carbon taxes paid ($)	507	215	333	494	631	854
Low-income credit ($)	90	136	155	146	14	1
Personal income tax cuts ($)	231	5	60	181	344	562
Corporate income tax cuts ($)	185	28	78	107	112	603
Total recycled benefits ($)	507	168	293	434	469	1165
Net gain (loss) ($)		(47)	(40)	(60)	(162)	311
Share of income		(0.3%)	(0.1%)	(0.1%)	(0.2%)	0.2%

Notes: Estimates are for the full July 1 to June 30 year in accordance with the carbon tax. See Technical Appendix for details on how recycled revenues are allocated across quintiles.

Source: Authors' calculations based on Statistics Canada's Survey of Household Expenditure and Social Planning Simulation Database and Model, and BC Budget 2008.

high-income families (and to a lesser extent, personal income tax cuts). Only the fourth quintile pays positive net taxes in 2008/09, while all other groups are net recipients; the system can thus be thought of as a transfer of income from the fourth quintile to the bottom 60% and the top 20%. As a percentage of income, there is little gain for the top 20%, but it is remarkable that in dollar terms the top quintile, on average, receives a larger net benefit than either of the bottom two quintiles.

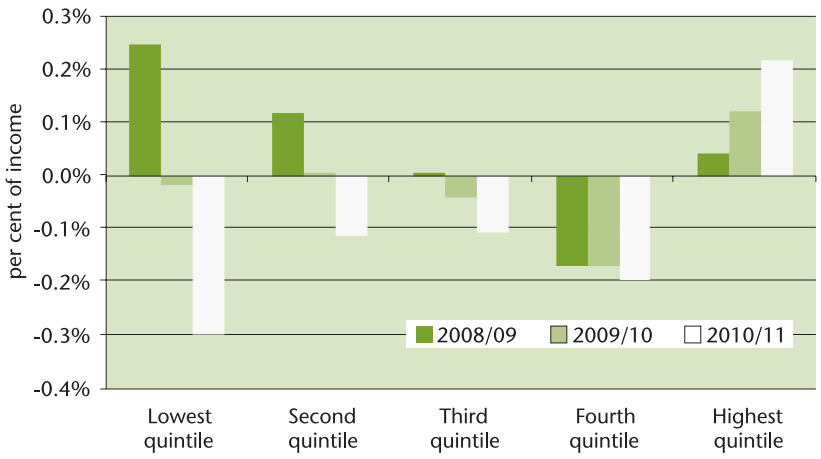
In 2008/09, the overall carbon tax regime is moderately progressive, with the notable exception of the top earners, who have the largest footprints because of greater levels of consumption.

That the highest income group benefits overall from the carbon tax regime is problematic, since top earners have the largest footprints because of greater levels of consumption. In the context of GHG emissions, this means more air travel, more and bigger cars, larger homes and secondary cottages, and more consumption of goods and services in general. Any carbon tax regime must ensure that top earners pay taxes net of any benefits received. One offsetting factor (discussed in the Appendix) is that household size increases with income, so part of the explanation for higher consumption at the top is due to more family members on average. We also note that amounts per household give a higher dollar value of the low-income credit to the second and third quintiles compared to the bottom quintile. This is an artifact of family size, with a greater share of single individuals in the bottom quintile.

Based on the current three-year fiscal plan, the share of revenues going to the low-income credit falls from about 32% of carbon tax revenues in the first year to 17% in 2010/11, and if no changes were made to the value of the credit, to 12% of carbon tax revenues in 2012/13. The reduced share of recycled revenues going to the low-income credit shows up as a more regressive carbon tax regime with each passing year.

As Figure 2 shows, the modest progressivity of the system in 2008/09 disappears in 2009/10 (the system becomes roughly neutral with regard to distribution),

Figure 2: Net Gain (Loss) from Carbon Tax and Recycling Measures



For notes and sources, see Table 2.

and by 2010/11 the regime is moderately regressive (although the amounts are still relatively small compared to income for each group). If we project forward to 2012/13 (not shown), these trends would worsen, and the carbon tax and recycling system would be clearly regressive. Indeed, by 2012/13 the bottom quintile would face a net loss of 1% of income if there was no increase in the credit from 2009/10 levels.

The estimates for future years made in BC's Budget 2008 will be subject to revision in subsequent budgets. Budget 2008 provides little information on the 2012/13 year when the carbon tax hits $30 per tonne, so any estimates would be highly speculative. The fact that fiscal plans are not yet fixed is good news, as it provides ample opportunity to achieve socially just outcomes. It is clear that the size of the credit must grow, minimally, in line with the carbon tax itself in order to avert a regressive outcome developing over time.

The fact that fiscal plans are not yet fixed is good news, as it provides ample opportunity to achieve socially just outcomes.

PART 3

Recycling Options for a Progressive Carbon Tax Regime

Recycling revenues back to low- to middle-income families is important to avoid placing an unfair burden on those who have done the least to cause the problem.

WHILE THE PRINCIPAL INTENTION behind a carbon tax is to provide incentives for better environmental behaviour, recycling revenues back to low- to middle-income families is important to avoid placing an unfair burden on those who have done the least to cause the problem. Corporate and personal income tax cuts do little to advance this objective, as most of the benefits of BC's revenue recycling for low- to middle-income families come from the low-income credit not tax cuts.

There is no reason why revenue neutrality needs to be part of the carbon tax system. The government's approach of full revenue neutrality is more of a political decision than anything else, designed to make the tax more publicly acceptable. A common reaction, however, is to ask why a government would introduce a tax only to give the proceeds away, rather than spend revenues on other climate actions, such as alternative technology development, public transit expansion, energy efficiency retrofits, and just transition programs for workers (or any other programs that address the core problem and facilitate adaptation).

The BC carbon tax and its recycling back of revenues to households is an example of "tax shifting," which aims to increase taxes on "bads" (like pollution) and reduce them on "goods" (like income).[6] The promise of tax shifting is a "double dividend" with revenues recycled into income tax cuts to spur economic growth. There is little reason to believe this will be the case. A recent study by the David Suzuki Foundation showed very little difference in

economic impact among various options for recycling carbon tax revenues.[7] Moreover, tax shifting is not sound public policy because at some point in the future carbon tax revenues should fall because we are doing such a good job at reducing emissions. Income tax cuts at this point would need to be revisited to maintain funding for public services.

While some of the economic arguments in favour of tax cuts are dubious, the case for a tax credit to offset regressive impacts of the tax is sound. This raises two issues: what form that credit should take; and what share of carbon tax revenues should be allocated to the credit. Minimally, public expenditures on the credit need to grow in line with the carbon tax itself. But many permutations are possible – the credit could also be increased to half or even all carbon tax revenues. In principle, the carbon tax regime should ensure that low-income families are no worse off, and that families with the largest GHG emissions pay positive net taxes.

While some of the economic arguments in favour of tax cuts are dubious, the case for a credit to offset regressive impacts of the tax is sound.

In terms of the form the credit takes, we model three options, each of which is based on half of carbon tax revenues being recycled, with the other half dedicated to expenditures on other climate actions. These options are: (i) an expansion of the existing low-income credit; (ii) a per household transfer;[8] and, (iii) a hybrid system based on modeling done for the CCPA's Alternative Federal Budget. In the latter case, a more expansive green refundable tax credit is introduced, and gradually phased out above a household income of $70,000 (double the existing threshold for the low-income credit).[9] This model is similar in design to the federal Canada Child Tax Benefit or Old Age Security programs, with about 90% of households receiving some amount of the credit.

Table 3 shows the three alternative recycling models, for the coming budget year, 2009/10, and for 2012/13, when the carbon tax reaches a rate of $30 per tonne of CO_2e. In addition to recycling half of carbon tax revenues to the alternative credit, we assume that the 2008 personal and corporate income tax cuts are rolled back.[10] Because the carbon tax is scheduled to be $15 per tonne in 2009/10, figures for 2012/13 are merely double the 2009/10 amounts. This demonstrates that as the tax and credit system grow over time, they become more redistributive.

The table illustrates the trade-offs in developing a credit scheme to offset regressive impacts of a carbon tax. The most redistributive model is the expansion of the low-income credit, delivering the largest net gains to the bottom quintile. The bottom 40% get net benefits from this formulation, while the higher quintiles pay net taxes. Note that the dollar amount is larger for the second quintile than the bottom quintile. This is due to differences in number of people in the household, with a higher proportion of single individuals in the bottom quintile.

The per household transfer may be favoured in terms of greater political support, but this comes at the expense of transferring income to the bottom quintile. Interestingly, only the bottom quintile gets a net benefit on average from this

Table 3: Comparison of Alternative Credit Schemes					
	Lowest quintile	Second quintile	Third quintile	Fourth quintile	Highest quintile
	Net gain (loss) as a share of income				
2009/10					
Carbon tax paid ($)	161	250	370	473	641
Expanded low-income credit					
Dollars per household ($)	286	326	307	2	1
Net gain (loss) ($)	125	76	(63)	(471)	(640)
Gain (loss) as percentage of income	0.8%	0.2%	(0.1%)	(0.6%)	(0.4%)
Equal per household transfer					
Dollars per household ($)	190	190	190	190	190
Net gain (loss) ($)	29	(60)	(180)	(283)	(451)
Gain (loss) as percentage of income	0.2%	(0.2%)	(0.3%)	(0.3%)	(0.3%)
AFB credit					
Dollars per household ($)	210	278	329	188	0
Net gain (loss) ($)	49	28	(41)	(285)	(641)
Gain (loss) as percentage of income	0.3%	0.1%	(0.1%)	(0.3%)	(0.4%)
2012/13					
Carbon tax paid ($)	322	499	741	947	1,281
Expanded low-income credit					
Dollars per household ($)	572	652	614	59	3
Net gain (loss) ($)	250	153	(127)	(888)	(1,278)
Gain (loss) as percentage of income	1.6%	0.4%	(0.2%)	(1.1%)	(0.9%)
Equal per household transfer					
Dollars per household ($)	380	380	380	380	380
Net gain (loss) ($)	58	(119)	(361)	(567)	(901)
Gain (loss) as percentage of income	0.4%	(0.3%)	(0.6%)	(0.7%)	(0.6%)
AFB credit					
Dollars per household ($)	421	555	659	375	0
Net gain (loss) ($)	99	56	(82)	(572)	(1,281)
Gain (loss) as percentage of income	0.6%	0.2%	(0.1%)	(0.7%)	(0.9%)

Notes: Estimates are for the full year July 1 to June 30 year in accordance with the carbon tax. See Technical Appendix for details. All estimates are based on 50% recycling and roll-back of 2008 PIT and CIT cuts.

Source: Authors' calculations based on Statistics Canada's Survey of Household Expenditure and CCPA Alternative Federal Budget 2008.

alternative formulation. The hybrid AFB model may be a compromise between these two approaches, with greater benefit to the bottom quintile than a per household transfer, but reaching higher up the income distribution.

All of these alternatives accomplish two main objectives. First, they insulate low-income families from the carbon tax by providing larger credits than taxes paid. But families would still face the carbon tax when making purchases, so they would still have an incentive to reduce expenditures that are carbon intensive. Second, they ensure that the top quintile pays net taxes. The low-income credit and AFB credit are the most progressive in this regard.

One criticism that may emerge is whether reducing inequality should be pursued separately as a goal in and of itself, rather than piggybacked onto a carbon tax. This would suggest a distributionally-neutral carbon tax regime, i.e. every income group on average receives back in credits the amount paid in carbon taxes. However, we note that higher income households have more disposable income, capital available and the means and capability to invest in more energy efficient technologies and activities. This enables higher income households with the capacity to reduce their own GHG emissions to reduce their energy costs—and thereby the impact of a carbon tax.

Higher income households have more disposable income, capital available and the means and capability to invest in more energy efficient technologies and activities. This enables higher income households with the capacity to reduce their own GHG emissions to reduce their energy costs—and thereby the impact of a carbon tax.

In contrast, lower income households generally have less capacity to invest in energy efficient technologies or activities: they are "capital-constrained" and often lack the ability to invest in even simple technologies, such as compact flourescent lightbulbs, with relatively high payback rates. For this reason, low-income households arguably should receive net benefits from the carbon tax regime in order to provide them with more options and choices in how they adapt.

PART 4

Conclusion

In the absence of deliberate policy design to ameliorate adverse distributional impacts, carbon taxes will be regressive and will increase inequality.

THE TRUE SIGNIFICANCE of BC's carbon tax in the medium-term is less about engendering emissions reductions than a model of how to implement a carbon tax. Its political fate remains to be determined, as the opposition NDP has honed in on the carbon tax as a key issue for the next provincial election. Other jurisdictions will look closely at BC's model of tax and recycling design if and when they contemplate carbon pricing measures of their own. Federally, the opposition Liberals endorsed a carbon tax and tax shifting model, rooted in the work of Mintz and Olewiler (2008) that would broaden the federal excise tax on gasoline to all fossil fuels. In the October 2008 federal election, this plan failed to capture the public's imagination, and was deftly attacked and distorted by the Conservatives.

We conclude that the design of revenue recycling is of utmost importance if carbon taxes are considered federally, or in other jurisdictions. In the absence of deliberate policy design to ameliorate adverse distributional impacts, carbon taxes will be regressive and will increase inequality. However, revenue recycling offers an opportunity to deliver a progressive outcome. BC's carbon tax regime is relatively well-designed in the first year, although personal and corporate income tax cuts lead to an undesirable net benefit for the top quintile.

Our analysis suggests a number of improvements to BC's carbon tax. The 2009 BC Budget should commit that the low-income credit, at minimum, be increased in line with carbon tax revenues, and ideally its share should be increased to half of revenues. People with low to middle incomes should have real options for changing their behaviour, and be no worse off under any carbon pricing scheme. Increasing the share of revenues going to the credit would be consistent with this principle.

Revenue neutrality is a political consideration above all else, and should be abandoned. The remaining half of carbon tax revenues should provide funds for other climate actions, including major transit expansion, transition programs for workers, energy efficiency improvements for low- to middle-income families, and an alternative technology development program. No further personal or corporate income tax cuts should be financed by carbon tax increases, and 2008 tax cuts should be rolled back. However, write-offs of capital investments in emissions-reducing technologies, in lieu of existing Capital Cost Allowance, could be part of the package for the business sector. Similar write-offs could be contemplated for personal income taxes.

This study did not take into account the one-time $100 dividend, an amount that will also affect the overall outcomes, but which is not technically part of the revenue-recycling regime. The paper also did not take into account behavioural change as a result of the carbon tax. A static analysis is used to compare distribution in the carbon tax regime at different points in time. A dynamic analysis would not change the results in a meaningful way in the short term. Because of the small size of the tax, it will have little impact on consumer behaviour. And because all revenues are recycled back to households, any losses in tax revenue are exactly offset by reductions in recycling.

The low-income credit should, at minimum, be increased in line with carbon tax revenues, and ideally its share should be increased to half of revenues. The remaining half of carbon tax revenues should provide funds for other climate actions, including major transit expansion, transition programs for workers, energy efficiency improvements for low- to middle-income families, and an alternative technology development program.

In addition, this study did not consider the implications for municipalities and other public sector entities that will have to pay the tax but are not part of the recycling regime. Thus, there is a risk that public services will be undermined by environmental objectives. This should be addressed by recycling some of the revenues back to public sector entities, but more importantly, launching a major capital campaign to improve energy efficiency and reduce the carbon footprint of those entities, making them less financially vulnerable to rises in the carbon tax. In a recent address, the premier offered payments to municipalities, but it is not clear whether these would be financed out of carbon tax revenues.

Impacts in the marketplace also cannot be ignored. Between the time the carbon tax was announced in February and its implementation in July, gas prices at the pump had increased on average by almost 40 cents per litre, of which only 2.3 cents was due to the carbon tax. Our modeling of the carbon tax suggests that higher fuel prices in the marketplace have an adverse impact on low- to middle-income earners, and additional policies should be developed to avert this outcome (such as excess profits taxes on oil and gas companies that could be redistributed widely). With the marketplace doing much of the heavy lifting that has been traditionally associated with a carbon tax, offsetting measures to address inequality are needed. As of October 2008, however, gas prices had reverted back to levels at the start of the year.

BC's carbon tax has been very unpopular. This may be because of poor timing, because revenue recycling is not well understood or not seen as necessary, or because of a general dislike of paying more for fuel. But it serves to demonstrate that elegant policy designs that are widely accepted by academics and policy-makers may not pass the democratic test.

Data and Methodology

There are a number of moving parts associated with the BC carbon tax and revenue recycling, each of which has a different timeline:

- Carbon tax is implemented on July 1, 2008 at a rate of $10 per tonne of CO_2e, and rises by $5 per year each July 1 thereafter, up to 2012;
- Low-income credit is implemented on July 1, 2008, and increases by 5% on July 1, 2009;
- Rates in the bottom two personal income tax brackets are reduced by 2% (not two percentage points) effective January 1, 2008, and are reduced by 5% per year on a calendar year basis starting in 2009; and
- Corporate income tax rates (general and small business) fall as of July 1, 2008, January 1, 2010 and January 1, 2011.

Due to the timing of the carbon tax and low-income credit, we make estimates for a July 1 to June 30 fiscal year. Revenue neutrality, however, is defined in terms of the April 1 to March 31 budget fiscal year. To ensure revenue neutrality in our modeling, we independently estimate carbon tax revenues then recycle the full amount in accordance with estimates in BC budget documents. Estimates in the budget's three-year fiscal plan go to 2010/11, and will likely be revised with subsequent budgets.

We engage a static analysis to compare the carbon tax regime in 2008/09, 2009/10 and 2010/11. We hold population, incomes and consumption constant in order to assess the pure effects of changes in the tax and recycling over time. Our analysis could be extended to reflect dynamic shifts in behaviour in response to the carbon tax. However, the size of the carbon tax is relatively small in all years studied, and the associated elasticities are also very small, thus we should expect very little change in behaviour (see, for example, Schipper, 2007). Moreover, any reduction in consumption would lower both revenues and expenditures by an equivalent amount, so the main findings by quintile would remain essentially the same.

Data from the 2005 Survey of Household Spending was used to calculate *direct* spending on fossil fuels by quintile for BC (associated with home heating and transportation). Spending levels were converted to consumption levels by volume using average fuel prices for BC in 2005. The estimated carbon tax rates from BC Budget 2008 (natural gas, heating fuel and motor gasoline) are then applied to consumption levels in order to estimate carbon taxes paid by quintile.

The *indirect* impact of carbon taxes was calculated by using estimates provided by Statistics Canada's Environmental Accounts division of the indirect GHG emissions associated with household consumption: e.g., all the GHG emissions associated with the production and distribution of goods and services purchased by households. The indirect domestic emissions associated with household consumption amount to 1.92 times the direct emissions of households, the average over the 1990 to 2003 period. The GHG emissions associated with imported goods amount to another 0.90 times (e.g., 90%) these direct emissions, but these were not included as they will not be subject to the carbon tax. These calculations assume that indirect emissions and costs are a constant ratio of direct emissions by household size.[11]

We assume that suppliers pass on the additional cost of the carbon tax fully to consumers through increases in the cost of the goods and services they supply. There may be some dynamic or industry-specific competitive factors that affect how much of the carbon tax is passed on in each different situation. At the same time we do not include the impact of additional margins (such as in cost-plus pricing) or the impact of additional taxes that would tend to increase final costs for consumers above the additional carbon taxes incurred by suppliers. These factors would tend to counterbalance each other and so the assumption of full pass-through would appear reasonable.

Appendix Table: Reconciliation Between BC Budget and CCPA Analysis

		Fiscal 2008/09			Fiscal 2009/10		Fiscal 2010/11	
	Coverage	Budgeted	Annualized	CCPA estimate	Budgeted	CCPA estimate	Budgeted	CCPA estimate
2008/09 total carbon tax revenue	July 1 to March 31	338	451	410	631	615	880	820
Household direct share	July 1 to March 31	113	150	141	210	211	293	281
Low-income credit	July 1 to March 31	104	139	139	145	145	146	146
Personal income tax cuts	April 1 to March 31	113	113	111	270	263	401	374
Corporate income tax cuts	July 1 to March 31	121	161	160	216	207	333	300
Sum of recycling		338	413	410	631	615	880	820
Low-income credit share		30.8%	33.6%	33.9%	23.0%	23.6%	16.6%	17.8%

In addition to higher levels of consumption among higher income households, they also tend to be larger families. A standard adjustment for family size to account for economies of scale at the household level is to divide income or costs by the square root of the number of individuals.[12] Following on the results in Table 1 on page 12, adjusted costs are $88 per person for the lowest income quintile and $236 per person for the highest income quintile. The ratio of carbon taxes paid from top to bottom quintiles is thus 2.7 times when adjusted for family size, compared to 4.0 times for unadjusted numbers. This does not change the principal findings of this study—by percentage of income, there is no difference because both taxes paid and income are adjusted by the same factor.

Revenue recycling estimates are made by allocating to quintiles their estimated shares of the low-income credit, personal income tax cuts, and corporate income tax cuts. The sum of these three is equal to estimated carbon tax revenue. We estimate lower carbon tax revenues in each year than in the BC budget, which may reflect our 2005 base year for household expenditures. We make slight adjustments to our estimates of recycling to maintain revenue neutrality. We do not include a one-time "dividend" of $100 per British Columbian, paid in June 2008 out of the 2007/08 surplus, as this is not part of the revenue recycling plan.

Statistics Canada's Social Policy Simulation Database and Model (SPSD/M) is used to derive allocation shares for each quintile. The SPSD/M contains a detailed database of 100,000 representative individuals in 40,000 families, drawn from tax, census and survey data sources. It also is an accounting model that analyzes the impact of legislated or proposed programs on the taxes paid by and transfers received by individuals and families. Version 10.2 of the SPSD/M is employed in this paper.[13]

The Low Income Credit (LIC) is estimated across quintiles based on the distribution of the GST credit in 2005, derived from the SPSD/M.[14] The BC Budget estimate of $104 million in the LIC for the 2008/09 budget year is grossed up to $139 million to put it on an annualized basis. An important consideration for the recycling regime is that the LIC is only scheduled to increase by 5% as of July 2009, after which its status is uncertain and will be determined by subsequent budgets (the budget commits to modifying the LIC's thresholds for inflation, but not the benefit itself). If the LIC does not grow, or only grows by the rate of inflation, the share of revenues recycled into the LIC will fall over time, and this will lead to more regressive outcomes due to the faster rising carbon tax rate.

Like the GST credit upon which it is based, the low-income credit in any given year is based on the previous year's tax filing. In the SPSD/M the GST credit is calculated as if based on current year income deflated to represent income in the previous year.[15] Because we are more interested in the allocation across quintiles in this paper, this detail should not affect the empirical results.[16]

Personal income tax (PIT) cuts in 2008 are allocated to families based on shares derived from the SPSD/M (a 2008 baseline is estimated, and compared to a 2008 post-tax-cut variant). For subsequent years we use the same allocation shares, and apply them to the estimated value of the total PIT cut.

Corporate income tax (CIT) cuts are allocated based on investment income, as derived for economic families by the SPSD/M. The CIT cut in 2008/09 budget is $121 million, annualized to $161 million. We assume that companies seek to maximize their profits and that corporate tax cuts are equivalent to a windfall in revenues that goes entirely to higher profits. Other incidence assumptions could be used, such as half of the tax cuts to shareholders and the other half to consumers via lower prices. This would reduce the regressive impact of CIT cuts. However, lower taxes would have no impact whatsoever on the cost structure of production and the market conditions facing the company, and furthermore, the growing profit share of national income in recent years suggest that the most likely impact of CIT cuts is through higher profits to shareholders, as we assume.

A further issue related to bringing CIT cuts into the analysis is that we assume all profits go to shareholders residing in BC. To the extent that there is ownership of capital in BC by shareholders outside the province or outside Canada, this assumption is inconsistent with actual financial flows across borders. This leakage of revenues similarly affects the interpretation of the government's claims of revenue neutrality, as it may be the case that more tax is paid by BC residents than received by them in credits and tax cuts. Such methodological issues are ever-present in studies of this sort at the provincial level, and we have no data upon which to make an alternative assumption in this regard. Thus, our results should be interpreted as a generalization of BC's carbon tax regime as if it were national in scope, a point of significance to the national debate on carbon taxes.

NOTES

1 According to modeling done for the BC Budget, the carbon tax will reduce BC emissions by 3 million tonnes relative to business-as-usual (BAU) in 2020. To put this number in context, meeting the legislated target of a one-third reduction in GHG emissions by 2020 requires a 40 million tonne reduction relative to BAU.

2 Detailed information on BC's carbon tax is available in the 2008 BC Budget, www.bcbudget.gov.bc.ca/2008/bfp/2008_Budget_Fiscal_Plan.pdf.

3 Mackenzie et al., 2008.

4 Like the GST credit, the low-income credit is, technically speaking, a *tax benefit*. That is, it is calculated for the current year based on the previous year's tax return. For example, an individual's 2007 tax return determines eligibility and amounts payable for the July 1, 2008 to June 30, 2009 year. This is different from a tax credit, refundable or not, that subtracts from tax payable in the same tax year (2006 credit claimed on 2006 tax form).

5 In tax incidence literature, the term "progressive" refers to taxes that take a progressively higher share of income as income rises. Our results are presented in a way that reverses the polarity to be more intuitive to readers—for example, a positive net gain of income, rather than negative net taxes paid—but we still use the term progressive in its conventional sense.

6 Durning and Bauman, 1998, among others, make this argument.

7 Rivers and Sawyer, 2008, Table 22. Their modeling finds that a carbon tax rising to $100 in 2020 would reduce emissions by about 28% in 2020, but that different models of recycling revenues have very little difference in economic output, ranging from a loss of 0.5 to 1.3 percentage points off of GDP in 2020.

8 Two recent studies from the US model recycling of revenues to fund per-person income transfers (100% recycling), and find that this turns a regressive tax into a progressive outcome (Congressional Budget Office, 2007, and Boyce and Riddle, 2007).

9 The AFB tax credit would provide each adult with $10 and each child with $5 in a refundable tax credit for each dollar of the carbon tax rate, for all family incomes up to $70,000, with a phase-out at a rate of 5 cents for every dollar of family income above this amount. For instance, with a tax rate of $10 per tonne CO_2e, this credit would provide $100 a year to each adult and $50 a year to each child in a green tax credit. The income threshold is approximately twice the income threshold for the BC low-income credit (although the credit phase out rate is slower, at 2 cents per dollar above the threshold). For the phase-out period, a $100 credit at a carbon price of $10 per tonne for a single individual would be phased out by an income of $72,000. However, a $900 credit for a two-parent, two-child family of four wouldn't phase out until family income reached $88,000.

10 If we were to model these alternatives carrying forward the 2008/09 personal and corporate income tax cuts it would lead to some unbalanced outcomes between the fourth and top quintiles.

11 While detailed calculations of the indirect emissions associated with different household income groups are not yet available for Canada, analysis from the United States suggests that this ratio of total to direct emissions doesn't vary considerably for most income groups. See Boyce and Riddle, 2007.

12 For example, housing two people under one roof costs less than housing two individuals separately. By the square root rule, a family of four has double the costs of a single individual not four times the costs.

13 According to the Statistics Canada web site: "The Social Policy Simulation Database and Model (SPSD/M) is a micro computer-based product designed to assist those interested in analyzing the financial interactions of governments and individuals in Canada. It can help one to assess the cost implications or income redistributive effects of changes in the personal taxation and cash transfer system. The SPSD is a non-confidential, statistically representative database of individuals in their family context, with enough information on each individual to compute taxes paid to and cash transfers received from government. The SPSM is a static accounting model which processes each individual and family on the SPSD, calculates taxes and transfers using legislated or proposed programs and algorithms, and reports on the results."

14 Nuclear families are used to derive these allocations as broader family concepts lead to anomalous findings with larger credits claimed in the top quintile, reflecting older children living with their parents but getting the credit. This means we are *slightly biased towards overstating* the redistribution arising from the low-income credit.

15 Hicks, 2007.

16 Another issue with GST credit arose in 2001 with a federal supplement for home heating fuels. The supplement was provided to those who qualified for the GST credit and was delivered through the same architecture. The Auditor General subsequently questioned whether this additional home heating expenses credit suffered from poor targeting, in particular for renters whose heating expenses were covered in their rent, or households whose heating was primarily from electricity generated by hydro power. The government responded that this was a means of delivering the relief quickly, did not entail the creation of a new delivery architecture, and in the case of renters, provided relief against indirect fuel price increases in the future due to higher rents. These issues are relevant for BC's carbon tax, although an important aspect is that the tax will continue to be present and increase over time, and will thus be reflected in rental costs. According to the Ministry of Finance, over-coverage is preferable from a design perspective, and administrative savings by following the GST credit system are reasons for the current design of the credit. (Personal communication with BC Ministry of Finance, May 28, 2008.)

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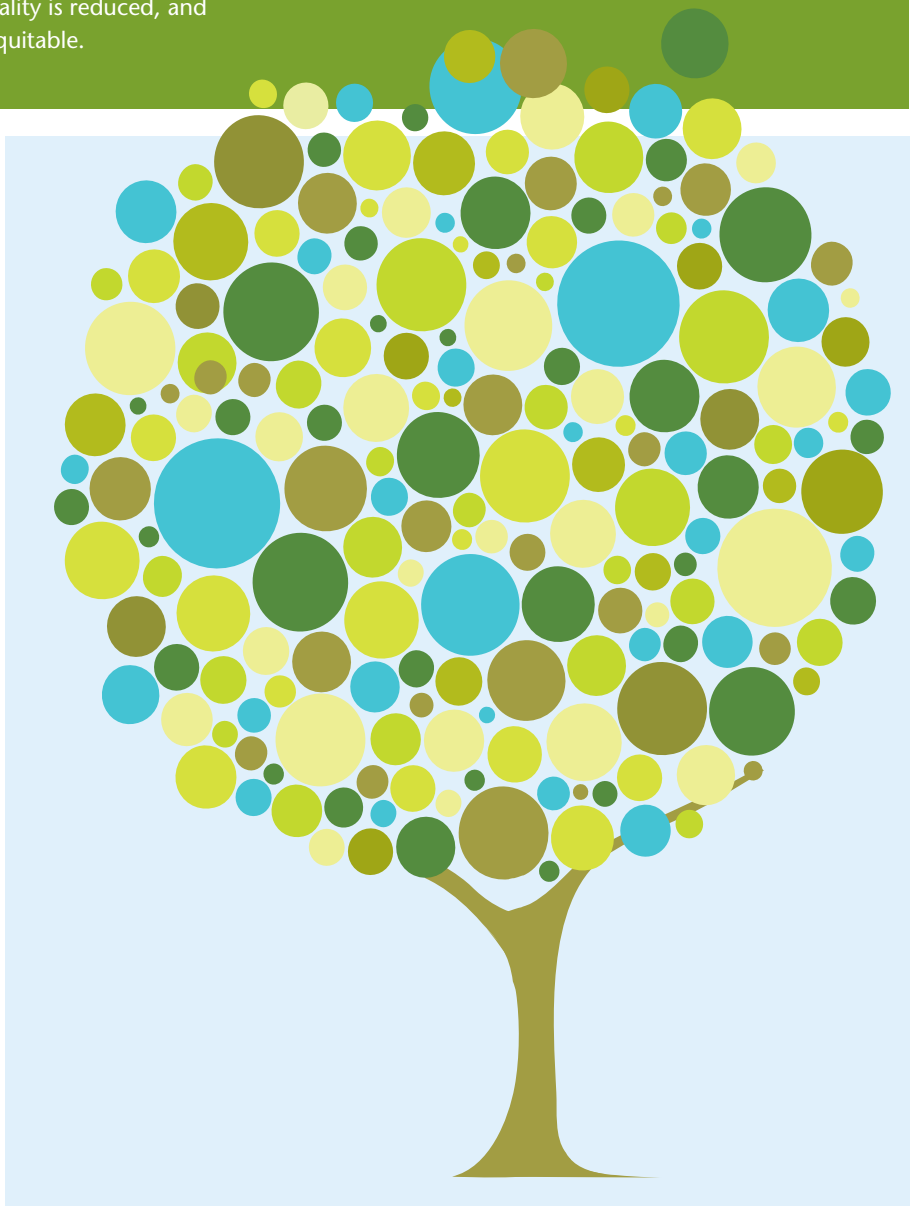
THE CLIMATE JUSTICE PROJECT

The Climate Justice Project is a multi-year initiative led by 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.



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