THE INCIDENCE OF THE PROPOSED CARBON TAX IN NEW BRUNSWICK

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I. INTRODUCTION

The *Discussion Paper on New Brunswick's Tax System* released by the Department of Finance in June 2008 presents various options for tax reform which include: (a) a reduction in personal and corporate income taxes, (b) an increase in the provincial rate of the Harmonized Sales Tax (HST), and (c) the introduction of a new carbon tax. Although when fully implemented this tax would raise a substantial amount of revenue for the provincial government, the discussion paper provides few details on this tax. It simply states that this tax would be modeled on the carbon tax recently introduced in British Columbia and that it would be implemented over a number of years.

As in the case of British Columbia, the carbon tax is part of a package of tax reform that shifts the tax burden from income onto consumption. Such a tax is expected to generate macroeconomic effects (employment, output and the price level), distributional effects (changes in the distribution of income and of the tax burden), and environmental effects (reduction in greenhouse gas emissions). This paper focuses exclusively on the distributional effects of the proposed carbon tax in New Brunswick. Specifically, it measures the change in the distribution of the tax burden among individuals and families with different income levels that would be generated at rates equal to those under full implementation of the British Columbia carbon tax (rates based on a tax of $30 per tonne of carbon).

The distributional effects of the carbon tax in British Columbia were recently analyzed by Lee and Sanger [2008], who calculated the burden of this tax on taxpayers in five different quintiles. They concluded that British Columbia's carbon tax regime (including the income tax cuts and low-income credits) "is progressive for the first year, although personal and corporate income tax cuts lead to an undesirable net benefit for 20% of households. But as the carbon tax increases, the current regime becomes regressive" (p.5).

Although New Brunswick's proposed carbon tax is modeled on British Columbia's, the distributional effects are not necessarily the same in both provinces because of different industrial structures and different sources of electricity generation. Moreover, our results will not be directly comparable to those of Lee and Sanger [2008] because of differences in methodology.

Our results indicate that the carbon tax remains regressive even when the entire revenue it generates is returned to New Brunswickers in proportion to their income. This means that if the revenue from the carbon tax were not recycled in a progressive manner, this tax would impose a disproportionate burden on lower income families. To determine how the progressivity/regressivity of the overall provincial tax system would be affected by the introduction of a carbon tax requires a full tax incidence analysis. To take into

account also the manner in which the revenue from this tax would be used requires a full fiscal incidence analysis.

II. METHODOLOGY

In measuring the distributional effects of the proposed carbon tax in New Brunswick we followed two fundamental steps. First, we estimated the total revenue that would be raised by applying the carbon tax structure in British Columbia under full implementation ($30 per tonne of carbon). Second, we allocated this revenue among selected sets of families. Details of the carbon tax rates on various fuels are shown in Appendix Table A-1.

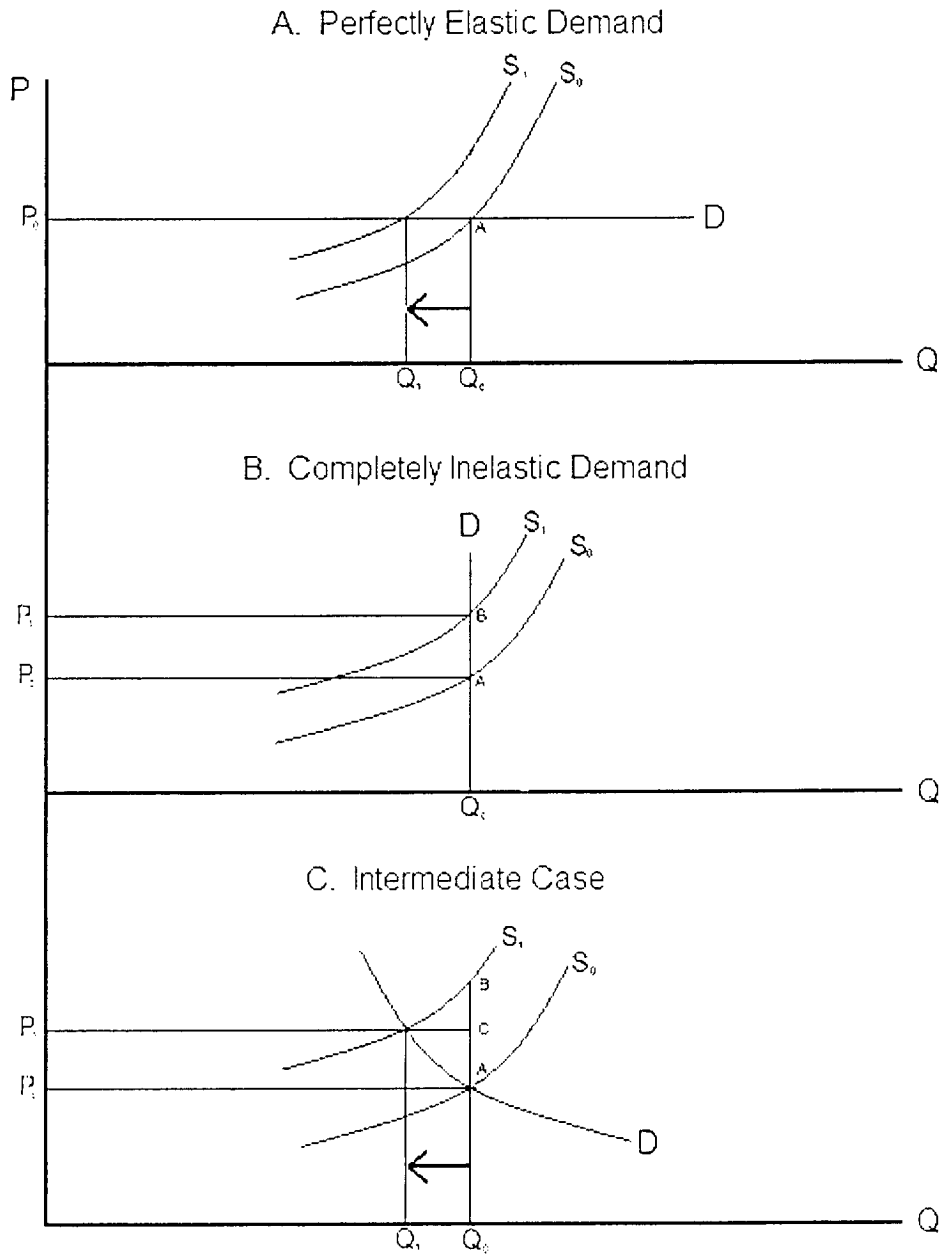
The carbon-based energy sources upon which the tax is imposed are both a final product purchased by consumers and inputs into the production of goods and services purchased by consumers. Therefore, we can distinguish between the direct effects of this tax and its indirect effects. This distinction is important for analyzing the distributional effects of this tax and its effectiveness as a vehicle of environmental policy.

1. Elements of Tax Incidence

Economic theory shows that those economic agents liable for paying a tax do not always end up bearing the burden of that tax because of the possibility of shifting the tax to others. For example, in the case of personal income taxes, the individual required to pay the tax is generally considered to be also the one bearing its burden because he/she does not have the capacity to gain offsetting increases in income. Greater opportunities for tax shifting occur for taxes imposed on businesses.

Three examples of the potential shifting of a tax imposed on a particular commodity produced in competitive markets are shown in Figure 1. Panel A shows the combination of an upward-sloping supply curve for this commodity and a perfectly elastic demand. This is a situation where it costs more to supply an additional unit of the commodity and consumers are extremely sensitive to price increases. In this case, a tax imposed on this commodity (either a certain amount per unit or as a percentage of the price) could not be passed on to consumers and would have to be absorbed entirely by the owners of the factors or production (workers through lower real wages or owners of capital through lower rates of return). The price remains unaffected by the tax and the entire adjustment takes place through a reduction in production. Panel B shows the case where the same supply conditions are associated with a completely inelastic demand (consumers are totally unresponsive to a price increase). In this case, output is unaffected by the tax and the entire tax is passed on to higher prices (the difference between the before-tax price Po and the post-tax price P1 equals the amount of the tax AB). Panel C shows the more general case of a downward sloping demand curve (consumers are somewhat responsive to price changes) and an upward sloping supply curve. In this case, there is an adjustment in both price and quantity and only a partial forward shifting of the tax. The difference between the pre-tax and after tax price [(P1 – Po) = AC] is a fraction of the increase in the tax AB.

Figure 1. Tax Incidence in Selected Cases.



These illustrative examples indicate that in the short-run the incidence of a tax on a commodity depends on the elasticity of demand and supply. Specifically, the lower is the demand elasticity at the pre-tax price, the higher will be the increase in the price; the higher is the demand elasticity, the lower will be the price increase. By the same token, the greater is the elasticity of supply at the pre-tax price, the greater will be the increase in price; the lower is the supply elasticity, the lower will be the increase in the price. Such a tax will have no effect on prices if the demand is perfectly elastic or the supply is totally

inelastic. The tax will be fully passed on to higher prices if the demand is completely inelastic or the supply is perfectly elastic.

Even in the intermediate case, over the long-run such a tax tends to be fully passed on to consumers. If firms start from a position of long-run equilibrium, producing at the lowest average cost, the portion of the tax that in the short-run is not shifted onto higher prices, creates costs that exceed the revenue from sales. As some firms leave the industry, the total supply is further reduced until the price increases by the full amount of the tax and restores the pre-tax rate of return for the remaining firms.

The incidence of a commodity tax may also be affected by market structure. Firms that can exercise market power tend to face downward sloping demand curves, which generally result in less than full forward shifting. Moreover, for a given demand elasticity, the potential for forward shifting is less for imperfect competitive firms than in perfect competition. This is because for the former the slope of the demand curve is less than the slope of the marginal revenue curve, therefore the demand curve translates into a price increase less than the increase in the marginal cost generated by the tax.

This difference in incidence due to market structure may extent to the long-run. Market power may lead to equilibrium with pre-tax economic profits. In this case, firms have the capacity to absorb a portion of the tax and need not leave the industry if the tax is not fully passed on to consumers.

When a tax is imposed on a final product, its incidence is the same whether the tax is levied on the consumer or on the seller. In the case of the carbon tax, the above conclusion applies to the direct component, i.e., the tax levied on the fuels used by individuals and families as final products. In the case of firms, carbon-based fuels are one of the variable inputs and the carbon tax alters the relative price of this input. Therefore, there is the potential for input substitution in the production process as well as shifting of the tax.

This input substitution and tax shifting takes place at two levels. First, in electricity generation, the carbon tax alters the price of carbon-based fuels relative to the price of electricity generated by nuclear power and renewable energy sources, providing an incentive to substitute the taxed inputs with the non-taxed ones. Second, for all other firms, the carbon tax affects two sets of relative prices. The price of carbon-based fuels increases relative to electricity (as long as electricity is not generated exclusively from fossil fuels and the tax is fully shifted forward), and the price of the energy input increases relative to all other inputs. The implications of these factors for the incidence of a carbon tax are discussed below.

2. Special Factors

Electricity Generation. With the exception of small amounts of electricity generated by industry, electricity in New Brunswick is generated by a public utility called New Brunswick Power Commission (NB Power). This Crown Corporation generates electricity by using hydroelectric power, nuclear power and fossil fuels. Moreover, it engages in electricity trade with other Canadian provinces and with States in the North-East of the US. As a regulated utility under cost-plus pricing formulas, NB Power would be able to pass on to electricity users the entire increase in the cost of the carbon tax. This full forward shifting may not occur for two reasons. First, the provincial government may not allow it. Second, the increase in the relative price of fossil fuels provides incentives for changes in the energy mix, which may also be affected by the special features of trading electricity. Since there is no carbon tax in the US, it would not be possible to raise rates for electricity exported to the US (NB power effectively faces a perfectly elastic demand for its electricity exports). Therefore, the burden of the carbon tax on electricity generation would be borne entirely by the domestic market. Sales to a Canadian province may include forward shifting because the purchasing province (Prince Edward Island) does not have sufficient generating capacity of its own. Imports from the US would not subject to the New Brunswick carbon tax and they would represent a potential for replacing some of the New Brunswick electricity generated with taxed fossil fuels.

The Business Sector. For analytical purposes, the business sector (not including electricity generation) may be divided into (a) large corporations and (b) small corporations and unincorporated businesses. We need also to distinguish between firms producing tradable goods and services and firms producing non-tradable goods and services. Lee and Saunders (2008) assumed full forward shifting of the British Columbia carbon tax paid by the business sector. We suggest a more detailed analysis of the shifting issue.

We start with recognizing some fundamental facts. First, New Brunswick is a small open economy operating within a small open economy. Therefore, its producers of tradable goods are price takers and cannot shift the burden of the taxes they pay to consumers or owners of capital. Second, the corporate sector in New Brunswick is dominated by a handful of large firms which are not only export oriented, but have operations in other provinces and other countries. This means first that moderate changes in the taxes they pay to the New Brunswick government have minor effects on their bottom line, and second that the response to these changes is based on the worldwide operations of these corporations and is not confined to New Brunswick.

These corporations have various avenues of response to a carbon tax. First, they may respond to the increase in the relative price of energy by making production processes less energy intensive. Second, they may pass some of the tax forward to domestic consumers through higher prices, depending on demand and supply elasticities. Third, they may shift some of the burden of the carbon tax backward to workers. This shifting, however, may not be confined to New Brunswick. When decisions by these large firms are made within a national or international context, the additional burden of a carbon tax

in New Brunswick may be spread outside its borders thus allowing for some tax exporting.

In the case of small corporations and unincorporated business, including farming, production may be mostly in the form of non-tradable goods and services. Therefore, they face a downward sloping demand curve for their products (with different price elasticities for different products) and the burden of the carbon tax on this sector can be partly shifted to domestic consumers.

3. Incidence Assumptions

Public Administration. The direct and indirect carbon tax paid by provincial government departments and agencies is fully offset by the revenue collected by the provincial Department of Finance, therefore, there is no burden of the carbon tax in this sub-sector. For other levels of government there may be some net burden depending on constitutional constraints (one government may not be able to tax directly another government) and inter-governmental arrangements. We have assumed that the entire public administration sector does not bear the burden of the carbon tax and we have excluded this component of the tax from our calculations.

Electricity Generation. As mentioned earlier, the potential for shifting forward to consumers the carbon tax on fuels used in electricity generation depends both on economic and institutional factors. In recognition of these factors, we used two shifting assumptions in our calculations. In the first case (Case A) we assumed full forward shifting, which means that the burden of the carbon tax on electricity generation fuels is fully passed on to electricity users. In the second case (Case B) we assumed that only half of the carbon tax will be allowed to be shifted forward. We also assumed that NB Power would respond to this government policy by reducing the amount of carbon-based fuel in half and purchasing electricity from other jurisdictions. Because electricity rate increases would result exclusively from the imposition of the carbon tax, any reduction in the potential increase in electricity rates would result in a reduction in provincial revenue from the carbon tax because the imported electricity, even if it were generated by fossil fuels, would not be subject to the carbon tax.

Under both assumptions, no amount of carbon tax would be incorporated in electricity exports to the US, since firms in a small open economy operate as price takers. For exports to Prince Edward Island, we assumed full forward shifting based on the fact that this jurisdiction does not have the generating capacity to meet its domestic demand for electricity.

For residential customers, the carbon tax paid by NB Power and shifted forward is effectively a direct consumption tax hidden in electricity rates. For the business sector (which in our calculation includes Statistics Canada's subsectors industrial, commercial and institutional) the carbon tax shifted forward through higher electricity rates is a tax on selected inputs.

The Business Sector (not including electricity generation). The carbon tax represents an increase in the cost of selected factors of production through two channels. The first channel is the tax paid directly by firms on the carbon-based fuels. The second channel is the tax on electricity generation passed on through higher electricity rates. As discussed earlier, who will ultimately bear the burden of this increase in input costs depends on a variety of factors, including the demand and supply elasticities of the goods and services produced, market structure, and the opportunities for input substitution in response to changes in relative input prices.

Taking all these factors into consideration, we assumed that the burden of the carbon tax paid by firms, including the tax incorporated in the price of the electricity they purchase, is borne 50 percent by New Brunswick consumers, and 50 percent by the combination of employment income and investment income (including the income of unincorporated business). Our allocation, therefore, differs from that of Lee and Sanger [2008] who assumed full forward shifting.

The Residential Sector. There are three components to the burden of the carbon tax borne by the residential sector: the direct component and two categories of the indirect component. The direct component is the tax paid by consumers on their purchases of carbon-based fuels for transportation, home heating, and the operation of machinery (lawn mowers etc.). Studies of tax incidence generally assume that the burden of taxes on commodities is borne entirely by the ultimate consumers of the taxed goods. We have also used the assumption of full forward shifting of the direct component of the carbon tax.

For electricity consumption, the first of the two indirect components, the residential sector does not pay a tax but bears the burden of the carbon tax to the extent that this tax is passed on through higher electricity rates. For electricity, we used alternatively two assumptions: (a) the full cost of the carbon tax on electricity generation is passed on through higher rates, and (b) only half of the cost is shifted forward.

The carbon tax paid by the business sector will also impose a burden on the residential sector to the extent that it is reflected in higher prices of final goods and services. We assumed that half of the carbon tax paid by the business sector is shifted forward.

4. The Harmonized Sales Tax (HST)

The carbon tax would generate additional revenue from its interaction with the Harmonized Sales Tax (HST), which is a combined federal-provincial form of value-added tax imposed at a uniform rate on the purchase price of most goods and services (with the major exception of basic groceries) sold to domestic consumers in New Brunswick, Nova Scotia and Newfoundland. In all other provinces, except Quebec, only the federal component (called Goods and Services Tax or GST) would apply. Since businesses do not end up with a net tax liability because they receive input tax credits equal to the tax paid on their purchases, the HST effectively applies only to the purchases by the ultimate consumers. In the case of the direct component, the full carbon tax would

be subject to the HST. In the case of the indirect components, only the portion that is shifted forward to consumers will attract the HST. The additional revenue generated by the HST should be considered as part of the over burden of taxation on New Brunswickers imposed by the carbon tax because in the absence of that tax this additional HST revenue would not exist.

The proposed reform of the New Brunswick tax system includes also an increase of two percentage points in the provincial component of the HST. The question then arises as to whether we should use the existing rate of 13 percent (5 percent federal and 8 percent provincial) or 15 percent to estimate the HST effects of the carbon tax. Although in this paper we analyze the carbon tax in isolation, in reality this tax would be introduced as part of the full tax reform package. Therefore, it is appropriate to use the 15 percent rate (5 percent federal and 10 percent provincial).

5. Measuring the Incidence of the Carbon Tax

To measure the incidence of the carbon tax, we need to allocate the estimated burden of this tax among individuals and families with different income levels. Two approaches may be used for this analysis, and under both approaches a distinction is made between the direct and the indirect component. The former refers to the tax paid directly by consumers of energy products – specifically, electricity, heating fuels and transportation fuels purchased by the residential sector – and the latter to the tax paid by the electric utility and by businesses on the taxable energy they purchased.

Under one approach, the direct carbon tax is estimated for individuals and families in selected income groups, often quintiles or deciles, on the basis of their expenditures on various energy sources, which are transformed into quantity units by applying the prices in the chosen period. The indirect component is estimated from empirical estimates of its relationship to the direct tax by income group. This is the approach used by Lee and Sanger [2008], who assumed that the indirect component is 1.92 times the direct component for all income levels (based on studies that measure the energy footprint of families in different income groups).

Under the second approach, one starts from the total amount of the direct carbon tax assigned to the residential sector and then allocates it among different income groups according to their share of spending on the relevant energy sources. The total for the indirect component is broken down into two components based on the shifting assumptions. The portions assigned to workers and owners of capital can be allocated on the basis of the distribution of labour income plus the combination of investment income and income of unincorporated businesses. The portion assigned to consumers can be allocated according to their share of total consumption expenditures. This is the method that we have used, which takes advantage of the available information for calculating accurately the total amounts of the tax.

There are also different approaches for measuring the incidence of the carbon tax. Lee and Sanger [2008] used absolute incidence, where the budget becomes unbalanced before

the proceeds are used for increases in spending or reductions in other taxes, by showing how much carbon tax would be paid by people in each income quintile. Then they place this tax in the context of the full fiscal reform, which is based on fiscal neutrality, to identify the winners and losers from the fiscal reform.

In this paper we focus exclusively on the distributional effects of the carbon tax. In this case, it is more appropriate to use differential incidence analysis where the distributional effects of the carbon tax are compared with an alternative revenue source that would raise the same revenue but would be proportional to income. The difference between the burden of the two taxes measures the net distributional effect of the carbon tax. This approach is equivalent to distributing the revenue from the carbon tax among consumers in proportion to their income, for example through a refundable tax credit proportional to income. The results address the following two questions. How much does the distribution of the burden of a carbon tax differ from that of a distributionally neutral tax that yields the same revenue? If the revenue from the carbon tax is returned to consumers in proportion to their income, which income groups will see their total tax burden increase and which will see it decrease?

This approach also facilitates the analysis of the environmental effects of a carbon tax. First, since it involves a balanced budget exercise it does not generate macroeconomic effects. Second, since the entire revenue raised by the carbon tax is returned to taxpayers, the income effect of the carbon tax (a reduction in real purchasing power from the imposition of the tax) is eliminated by the refundable credit. Therefore, we are left only with a substitution effect determined by the change in the relative price of energy sources and we can use compensated elasticities in measuring the effects of the carbon tax on the demand for energy.

Taxes are labeled as being progressive or regressive with reference to their average tax rates by income group, defined as the ratio of tax burden to a taxpayer's income. A tax is said to be progressive (regressive) when the average tax rate increases (decreases) as a taxpayer's income rises. If the average tax rate remains constant so that each taxpaying unit bears the same tax burden as a proportion of its income, the tax is said to be proportional. By the same token, an increase in the rates of a given tax, for example from 0 to the British Columbia rates for the carbon tax, is progressive (regressive) if the change in the average tax rates increases (decreases) as a taxpayer's income increases. Similarly, a reduction in personal income tax rates may be regressive if it provides increasingly larger reductions in the average tax rate as a taxpayer's income rises. Our results are presented both as the net carbon tax burden (carbon tax burden minus the proportional refundable tax credit) by selected income groups and its ratio to income (the change in the average tax rate).

6. Data Sources

In our analysis we used census families and total income categories for ten income groups. This income breakdown was applied to the entire New Brunswick population and to a number of selected family types. The data for our calculation came from three main

Statistics Canada sources: *(1) Electric Power Generation, Transmission and Distribution (57-202-X),*(2) *Report on Energy Supply and Demand (57-003-X),* and *The Social Policy Simulation Database/Model (SPSD/M).* All calculations are for calendar year 2006.

III. ESTIMATES OF CARBON TAX REVENUES

Our estimates of the distributional effects of British Columbia's carbon tax rates applied in New Brunswick are derived in two fundamental steps: first we calculated the total revenue by sector and then we allocated this total among the selected families groups. The first step is performed in this section.

A. Total Revenue from the Carbon Tax

Carbon-based fuels are used directly by consumers for transportation and for water and space heating, by businesses, and for electricity generation. Because of the special nature of electricity, which uses carbon-based fuels as an input into generation but then becomes an input into the production of goods and services, we analyzed it separately.

Electricity Generation. Our estimates of the carbon tax that would be collected by the New Brunswick government on the carbon-based fuels used by NB Power in electricity generation are shown in Table 1 and are based on the carbon tax rates shown in Appendix Table A-1 under full implementation ($30 per tonne of carbon emissions).

Table 1. Carbon Tax on Electricity Generation in New Brunswick, 2006.

Fuel	Measure	Quantity (000s)	Tax Rate	Revenue ($ millions)
Coal	Tonne	1,103	$62.31	68.8
HFO	Litre	921,960	9.45 cents	87.1
Diesel and LFO	Litre	6,530	8.07 cents	0.5
Natural Gas	Litre	533,857	5.70 cents	30.4
Total	Cubic meter			186.8
Half of the Total				93.4

Note: LFO is light fuel oil, which is taxed at the same rate as diesel, and HFO is heavy fuel oil.

The carbon tax on fuels used in electricity generation would yield 187 million under full implementation and the pattern of electricity generation in 2006. Nearly 47 percent of this total would be generated by heavy fuel oil and an additional 37 percent by coal, with the remaining 16 percent originating from natural gas.

The carbon tax collected from electricity generation will not ultimately be paid by NB Power. As a public utility effectively operating as a monopolist, NB Power has the opportunity to shift the cost of the carbon tax forward to the purchasers of electricity. The full implementation of the carbon tax would result in a substantial increase in electric power rates, which would be a hidden tax on consumers and businesses. The provincial government may not approve such a large increase. Therefore, we have done calculations

also for the case where only half of the carbon tax paid by NB Power is passed on to the consumers of electricity.

To determine who will ultimately bear the burden of the carbon tax on electricity generation, we need to examine the relationship between electricity generation and distribution. Table 2 shows the supply and distribution of electricity in New Brunswick in 2006.

Net generation of 18.2 million megawatthours (MWH) combined with imports of 511 thousands MWH and 172 MH from other provinces provided a gross supply of 18.9 million MWH. Of this total, 2.2 million MWH was exported to the U.S., thus leaving a net supply of 16.7 million MWH for use within Canada. Deducting 2.0 million MWH of transfers to other provinces left an amount available for provincial use of 14.7 million MWH. Producer's use of nearly 900 thousand MWH left 13.8 million MWH of in-province sales.

Nearly 43 percent of in-province sales were to the mining and manufacturing sector with an additional 39 percent to the residential sector and 13 percent to the commercial institutional sector.

Given the pattern of in-province sales shown in Table 2, we can distribute the estimated revenue among the main sectors, as is done in Table 3. This table shows that, if the tax were shifted entirely to Canadian users, 12 percent would be paid by other provinces, 42 percent by residential users in New Brunswick and 44 percent by the industrial, commercial and institutional sectors combined. The last row of this table recognizes that the revenue collected from the electricity use by the Public Administration sector will be offset by the additional expenses for electricity purchases by this sector and shows a net revenue of 182 million.

Table 2. Supply and Distribution of Electricity in New Brunswick in 2006.

	MWH	Share (%)	$ thousands	Share (%)
	18,204,620			
Net Generation	171,935			
Received from Other Provinces	510,833			
Imported	18,891,388			
Gross Supply	2,140,790			
Exported	16,750,598			
Net Supply	2,003,693			
Delivered to Other Provinces		11.96		
Share of Net Supply				
In-Province Availability	14,742,905			
Producer's Use	848,500			
In-Province Sales	13,894,905			
Revenue from in-Province Sales			1,063,121	
Residential	5,381,756			
Share of In-Province Sales		38.73		
Revenue			503,645	
Share of in-Province Revenue				47.37
Agriculture	96,988			
Share of In-Province Sales		0.70		
Revenue			6,304	
Share of In-Province Revenue				0.59
Mining and Manufacturing	5,927,723			
Share of In-Province Sales		42.66		
Revenue			339,700	
Share of In-Province Revenue				31.95
Public Administration	323,900			
Share of In-Province Sales		2.33		
Revenue*			27,786	
Share of In-Province Revenue				2.61
Commercial & Other Institutional	1,763,000			
Share of In-Province Sales		12.69		
Revenue*			151,239	
Share of In-Province Revenue				14.23
Other	401,038			
Share of In-Province Sales		2.89		
Revenue*			34,403	
Share of In-Province Revenue				3.25

* *Author's calculations.*

Table 3. The Distribution of the Carbon Tax on Electricity Generation: 2006, $millions.

Sector	Fully Shifted	Half Shifted*
Other Provinces	22.4	11.2
Direct (Residential)**	78.0	39.0
Public Administration**	4.3	2.1
Indirect (All other sectors)**	82.1	41.1
Total	186.8	93.4
Total minus Public Admin.	182.5	91.3

**Shortfall made up by replacing part of the taxed generation with non-taxed imports from other jurisdictions.*

*** Based on shares of revenue from in-province electricity sales.*

Other Non-renewable Energy Sources. We now turn to the consumption of non-renewable energy resources other than those used in electricity generation. Details of their consumption by sector are shown in Table 4.

Table 4. Consumption of Refined Petroleum Products, Except Electricity Generation: 2006, Millions of Litres unless Otherwise Specified.

	Natural Gas*	Propane	Coke**	Gasoline	Diesel, LFO.K***	HFO	Aviation Fuel
Industry	6,321	62.3	41.8		136.2	146.6	
Transportation							
Direct				984.7	140.1		
Indirect	12			11.9	467.1		48.4
Total	12			996.6	607.2	11.2	48.4
Agriculture		1.0		23.7	19.9		
Commercial & Institutional	1,071	35.4		19.6	149.5	122.7	13.3
Public Admin.				11.2	70.3	13.3	4.8
Residential	689	9.4			134.3	12.7	
Total	8,093	108.1	41.8	1,051.1	1,117.4	306.5	66.5
Total Net of P.A.	8,093	108.1	41.8	1,039.9	1,047.1	293.2	61.7
Units for Tax	GJ*	Litre	Tonne	Litre	Litre	Litre	Litre
Tax Rate	$1.49	c4.62	$74.61	c7.02	c8.07	c9.45	c7.5****
Revenue, $Million	12.1	5.0	3.1	73.0	84.5	27.7	4.6

**Terajoules (TJ); GJ = Gigajoule*

*** Thousands of Tonnes*

****Diesel, Kerosene and Light Fuel Oil; HFO = Heavy Fuel Oil*

***** Approximation between aviation fuel (7.38 cents per litre and jet fuel (7.83 cents).*

Table 5 provides details on the revenue from a carbon tax (except for the fuels used in electricity generation). This component of the carbon tax would generate a gross amount of $210 million net of the amount paid by the Public Administration sector. Most of this revenue would come from gasoline (35%), the combination of diesel and heating oil (40%),and heavy fuel oil (13%). About 38 percent of this revenue would be generated by sales to consumers for direct transportation. An additional 20 percent is paid largely for the delivery of goods and services by the industrial and commercial sectors (indirect component) for a total of 58 percent. Among the non-transportation users, industry would contribute 19 percent, the commercial and institutional sector 14 percent, and the residential sector 6 percent.

Table 5. Distribution of the Burden of the Carbon Tax on Carbon-based Fuels by Sector in New Brunswick: 2006, $Millions.

	Industry	Transportation		Agric.	Commercial/ Institutional	Residential	Total
		Direct	Indirect				
NG	9.5				1.6	1.0	12.1
Propane	3.0				1.6	0.4	5.0
Coke	3.1						3.1
Gasoline		69.1	0.8	1.7	1.4		73.0
Diesel, K and LFO	11.0	11.3	37.7	1.6	12.1	10.8	84.5
HFO	13.9		1.0		11.6	1.2	27.7
Aviation Fuel			3.6		1.0		4.6
Total	40.4	80.4	42.1	3.3	29.4	13.4	210.0

Note: NG = natural gas; K = kerosene; LFO = light fuel oil; HFO = heavy fuel oil; aviation fuel includes jet fuel.

Table 6 allocates the estimated total revenue from the proposed carbon tax between the direct and indirect categories. The former refers to the tax paid directly by the users (including the tax collected from electricity generation which is passed on through higher electricity rates), which cannot be passed on to anybody else. The latter refers to the tax paid by businesses, which becomes part of the cost of doing business and may be shifted to other economic agents (consumers or workers). Case A shows the distribution when the carbon tax on electricity generation is fully shifted forward to all electricity purchasers through higher rates. Case B shows the case where only half of this tax is allowed to be passed-on through higher electricity rates and NB Power shifts part of electricity supply from thermal coal and oil generation to imports from the U.S. and other Canadian provinces.

In case A, the estimated total revenue from the carbon tax is $370 million. This total is distributed almost equally between individuals and families (direct component with a 46 percent share) and the industrial/commercial/institutional sector (54 percent). Within the direct component, 47 percent is for transportation, 45 percent for electricity, and the rest

for water and space heating with furnace oil and propane. For the indirect component, electricity accounts for 41 percent and carbon-based fuels for 59 percent.

In case B, the estimated revenue from carbon tax is reduced to $290 million as the revenue from electricity generation is cut in half, but the distribution between the direct and indirect components remains unchanged. What changes is the distribution within these categories as the share of electricity declines substantially.

Table 6. Direct and Indirect Burden of the Carbon Tax in New Brunswick: 2006, $Million.

	Full Shifting of Electricity Costs	Fifty Percent Shifting of Electricity Costs
Direct Burden		
Electricity	78.0	39.0
Transportation	80.4	80.4
Other	13.4	13.4
Sub-total Direct	171.8	132.8
Indirect Burden		
Electricity	82.1	41.1
Other	116.2	11.6.2
Sub-total Indirect	198.3	157.3
Indirect/Direct	1.15	1.18
Total	370.1	290.1

B. Associated Revenues from the Additional HST Payments

Our estimates of the additional HST burden are shown in Table 7. This table shows that in case A the additional HST revenue would amount to $41 million, $14 million of which would be received by the federal government. The combination of the carbon tax and associated HST would raise the tax burden on New Brunswickers by $410 millions in 2006, while yielding $419 million for the New Brunswick government ($397 from New Brunswickers and $22 million from other provinces). Under case B, the total tax burden would increase by $322 million and the provincial revenue by $333 million.

Table 7. Estimated Revenue from the Carbon Tax and Associated HST: 2006, $Million.

	Carbon Tax	HST			Total Revenue
		Federal	NB	Total	
A. Full forward Shifting of the Carbon Tax on Electricity Generation					
Direct					
Electricity	78.0	3.9	7.8	11.7	89.7
Transportation	80.4	4.0	8.0	12.0	92.4
Other	13.4	0.7	1.3	2.0	15.4
Sub-total	171.8	8.6	17.1	25.7	197.5
Indirect*					
Electricity	82.1	2.1	4.1	6.2	88.3
Other	116.2	2.9	5.8	8.7	124.9
Sub-total	198.3	5.0	9.9	14.9	213.2
Total	370.1	13.6	27.0	40.6	410.7
B. Fifty Percent Forward Shifting of the Carbon Tax on Electricity Generation					
Direct					
Electricity	39.0	2.0	3.9	5.9	44.9
Transportation	80.4	4.0	8.0	12.0	92.4
Other	13.4	0.7	1.3	2.0	15.4
Sub-total	132.8	6.7	13.2	19.9	152.7
Indirect*					
Electricity	41.1	1.0	2.1	3.1	44.2
Other	116.2	2.9	5.8	8.7	124.9
Sub-total	157.3	3.9	7.9	11.8	169.1
Total	290.1	10.6	21.0	31.6	321.7

**Only the portion of the indirect carbon tax (fifty percent of the total) which is shifted forward to consumers attracts the HST.*

C. Long-term Revenue Effects

The estimated revenues from the proposed carbon tax shown in the previous sub-section do not take into account the proposed response by energy users to the higher energy prices. While a detailed analysis of these responses will be carried out in a separate paper, it is possible to provide some rough estimates here.

The demand for energy resources over time is affected by two main forces: (a) the response of users to higher energy prices (price elasticity), and (b) the effect of increasing

income (income elasticity). While there is no shortage of estimates of these elasticities, there is no consensus on their values. There is agreement on three things, however: (a) price elasticities are fairly low both in the short and the long-run, (b) the long-run price elasticities are higher than their short-run values, and (c) income elasticities tend to be higher than price elasticities. Short-run price elasticities are in the range of -0.2 to -0.4, indicating that a 10 percent increase in the price of energy induces a reduction of 2 to 4 in its consumption. Long-run price elasticities are in the range of -0.5 to -0.7. Short and long-run income elasticities range between 0.5 and 1.0. Since in this section we are not providing specific estimates of energy demand responses, but general indications of whether the expected provincial revenue from the proposed carbon tax will change over time, we have used a long-run price elasticity of -0.6 and a long-run income elasticity of 0.8.

Our analysis of the revenue effects of the proposed carbon tax indicate that, on average, the price of energy resources will increase by about 10 percent under full implementation. The percentage increase is above this average for electricity and below this average for carbon-based fuels. For income growth we assumed an average annual growth of real GDP of 2 percent, resulting from assumed employment growth of 1 percent of labour productivity growth also of 1 percent.

When the carbon tax is fully implemented and the price effects have worked through the system, generating a demand response according to the long-term elasticity, the demand for energy in New Brunswick would be 6 percent lower than in the absence of the carbon tax. This is a level effect, which will not alter the growth of energy consumption for a given level of income. The price effect alone, therefore, would tend to reduce our estimates of provincial government revenues from the carbon tax by 6 percent or roughly between $ 25 and $18 million per year.

Real economic growth of 2 percent per year would lead to an increase in energy consumption of 1.6 percent per year. This means that the reduction in consumption due to higher price of energy would be offset by economic growth in less than four years. This also means that over a period of about eight years from the full implementation of the tax, the average annual revenue from the carbon tax would be $300 to $400, depending on the assumption about the forward shifting of the carbon tax on electricity generation. These results indicate that our analysis of the distributional effects of the carbon tax, which are derived for the short-run, hold also for the long-run.

While the long-run elasticity of demand is expected to be higher than its short-run value, the change may not be the same for all income groups. Reducing energy consumption in response to higher prices is not a simple exercise of turning off lights, lowering thermostats and driving fewer kilometers. It involves considerable expenses in the form of home retrofits and the purchase of more fuel efficient vehicles. Higher income people have greater means to finance these expenses, which means that over the long-run the price elasticity of demand for energy is likely to increase more for higher income families than for lower income families. As a result, the carbon tax may become more regressive over the long-run and an increasing share of the carbon tax revenue would be generated

by lower income families. Our disaggregated data on the income and consumption patterns of different types of families would allow this detailed analysis, but only if reliable estimates of energy demand elasticities by different income levels were available.

IV. THE INCIDENCE OF THE PROPOSED CARBON TAX

In this section we present our estimates of the incidence of the carbon tax through a number of steps. Table 8 shows the distribution of the burden of the carbon tax by income class, both in total and in dollars per family under the assumption that the increase in electricity generation costs are fully passed on to electricity users. The total burden is made up by four components. First, we can distinguish between the direct component, the tax burden associated with the purchase of energy sources by the ultimate consumer, and the indirect component, the burden incorporated into the products purchased by consumers. For each of these two components, we can separate the burden imposed by the carbon tax and the burden imposed by the associated HST, which has a federal and a provincial component.

The last column of Table 8 shows that, on average, the carbon tax and associated HST would impose a burden of $1,151 per family. This burden differs considerably among families because of differences in family size and income levels. We notice that the burden per family increases steadily with income, rising from $281 for the average family in the lowest income class to nearly $6,000 for the average family in the highest income class.

Table 8. The Distribution of the Carbon Tax by Income Group under *Full Shifting* of Electricity Costs: 2006, $ Thousands.

Income Class	Direct			Indirect			Total	Per Family
$ thousands	Carbon Tax	HST	Subtotal	Carbon Tax	HST	Subtotal		
0-10	4,921	736	5,657	1,170	120	1,290	6,947	281.0
10-20	17,635	2,640	20,275	8,749	1,032	9,781	30,056	465.0
20-30	19,172	2,869	22,041	13,920	1,349	15,629	37,310	657.9
30-50	39,140	5,855	44,995	35,742	2,993	38,735	83,730	979.6
50-70	28,384	4,246	32,630	31,785	2,362	34,147	66,777	1,435.3
70-100	36,605	5,474	42,079	48,844	3,319	52,163	94,242	1,960.1
100-200	22,310	3,337	25,647	42,526	2,776	45,302	70,949	2,607.9
200+	3,533	543	4,176	15,564	949	16,512	20,689	5,995.1
Total	171,800	25,700	197,500	198,300	14,900	213,200	410,700	1,151

Table 9 presents the same information for the case where only fifty percent of the additional costs of electricity generation are passed on to electricity users. The results are very similar to those shown in Table 8. The total burden of the carbon tax and associated HST is lower, the burden per family is reduced to $902, and the pattern of this burden by family increases with a family's income.

Table 9. The Distribution of the Carbon Tax by Income Group under *Fifty* Percent Shifting of Electricity Costs: 2006, $ Thousands.

Income Class	Direct			Indirect			Total	Per Family
$Thousands	Carbon Tax	HST	Subtotal	Carbon Tax	HST	Subtotal		
0-10	3,676	551	4,227	928	95	1,023	5,250	212.4
10-20	12,729	1,910	14,639	6,940	817	7,757	22,396	346.5
20-30	14,270	2,140	16,410	11,042	1,068	12,110	28,520	502.9
30-50	30,023	4,500	34,523	28,352	2,371	30,723	65,246	763.3
50-70	22,301	3,335	25,636	25,213	1,870	27,083	57,719	1,133.7
70-100	29,603	4,433	34,036	38,745	2,628	41,373	75,409	1,568.4
100-200	17,242	2,584	19,826	33,733	2,198	35,931	55,757	2,050.0
200+	2,996	448	3,444	12,345	751	13,096	16,540	4,792.8
Total	132,800	19,900	152,700	157,300	11,800	169,100	321,800	902.0

Table 10 shows the next step in measuring the differential incidence of the carbon tax by presenting the net burden of this tax, which is derived by subtracting the rebate proportional to income from the gross burden of the carbon tax measured in Tables 8 and 9. This table addresses the following question: if the revenue generated by the carbon tax and associated HST is returned to taxpayers in proportion to their income, which income will receive a net gain and which families will bear a net cost?

The fourth and seventh columns of Table 10 identifies clearly the winners and losers from the combination of a carbon tax, associated HST and a proportional rebate. In the case of full shifting of electricity costs, families with income below $70,000 (which account for 78 percent of all families) will bear a net burden while families with income above $70,000 will have a net gain. In the case of fifty percent shifting of electricity costs, only the families with income above $100,000 (which represent 13 percent of all families) will have a net gain. All the other families will bear a net burden.

Table 10. Net Burden of the Carbon Tax in 2006, $ Thousands.

Income Class	Full Shifting of Electricity Costs			Fifty Percent Shifting		
$ thousands	Carbon Tax*	Proportional Rebate	Net Burden	Carbon Tax*	Proportional Rebate	Net Burden
0-10	6,948	3,258	3,690	5,251	2,553	2,698
10-20	30,056	23,885	6,171	22,396	18,715	3,681
20-30	37,310	35,565	3,745	28,521	26,299	2,221
30-50	83,731	79,208	4,523	65,245	62,063	3,182
50-70	66,775	65,884	891	52,679	51,623	1,056
70-100	94,242	95,044	-803	75,409	74,471	-938
100-200	70,949	80,873	-9,924	55,758	63,367	-7,609
200+	20,689	28,983	-8,294	16,541	22,709	-6,168

The net burden per family is shown in Table 11. Columns 4 and 7 show a consistent pattern of a declining net burden per family as family income increases. In the case of full shifting of electricity costs, the average family in the lowest income class would end with a net burden of $149 after the rebate while the average family in the highest income class would enjoy a net gain of $2,403. In the case of fifty percent shifting of electricity costs, these two values would be reduced to a net burden of $109 and a net gain of $1,787.

Table 11. Net Burden of the Carbon Tax per Family in 2006, $ Thousands.

Income Class	Full Shifting of Electricity Costs			Fifty Percent Shifting		
$ thousands	Carbon Tax*	Proportional Rebate	Net Burden	Carbon Tax*	Proportional Rebate	Net Burden
0-10	281	132	149	212	103	109
10-20	465	370	95	346	290	57
20-30	658	592	66	503	464	39
30-50	980	927	53	763	726	37
50-70	1,436	1,417	19	1,133	1,110	23
70-100	1,960	1,977	-19	1,568	1,549	20
100-200	2,608	2,973	-365	2,050	2,329	-280
200+	5,995	8,398	-2,403	4,793	6,581	-1,787

Table 12 provides some indication of the differential incidence of a carbon tax by comparing selected shares by income class. Families with income below $30,000 account for 27 percent of the population, 41 percent of families, but only 15 percent of income. Under both cases for the shifting of electricity costs, they would bear about 18 percent of the gross burden of carbon tax and even after receiving the proportional rebate would end up with a net burden of about 3 percent of the carbon tax and associated HST. About half of the population lives in families with income below $50,000. This represents 65 percent of families, but receives only 34 percent of the income. It would bear about 38 percent of the gross burden of the carbon tax and about 4 percent of the net burden. By contrast, those in families with income over $100,000 account for 13 percent of the population and 9 percent of families, but receive 27 percent of income. This group would bear 22 percent of the gross burden of the carbon tax and would end up with a net gain of 4 percent after receiving the rebate.

Table 11. Selected Shares (in Percent) by Income Class.

Income Class				Full forward shifting of electricity costs			Fifty percent shifting of electricity costs		
$ thousands	Pop.	Family	Income	Carbon Tax	Rebate	Net Tax	Carbon Tax	Rebate	Net Tax
0-10	3.65	6.93	0.79	1.69	0.79	0.90	1.63	0.79	0.84
10-20	11.42	18.12	5.82	7.32	5.82	1.50	6.96	5.82	1.14
20-30	12.18	15.90	8.17	9.08	8.17	0.91	8.86	8.17	0.69
0-30	27.25	40.95	14.78	18.09	14.78	3.31	17.45	14.78	2.67
30-50	24.24	23.96	19.29	20.39	19.29	1.10	20.28	19.29	0.99
0-50	51.49	64.91	34.07	38.48	34.07	4.41	37.73	34.07	3.66
50-70	16.78	13.03	16.04	16.26	16.04	0.22	16.37	16.04	0.33
70-100	18.66	13.48	23.14	22.95	23.14	-0.19	23.43	23.14	0.29
100-200	11.48	7.63	19.69	17.28	19.69	-2.41	17.33	19.69	-2.36
200+	1.60	0.97	7.06	5.04	7.06	-2.02	5.14	7.06	-1.92
100+	13.08	8.60	26.75	22.32	26.75	-4.43	22.47	27.29	-4.28

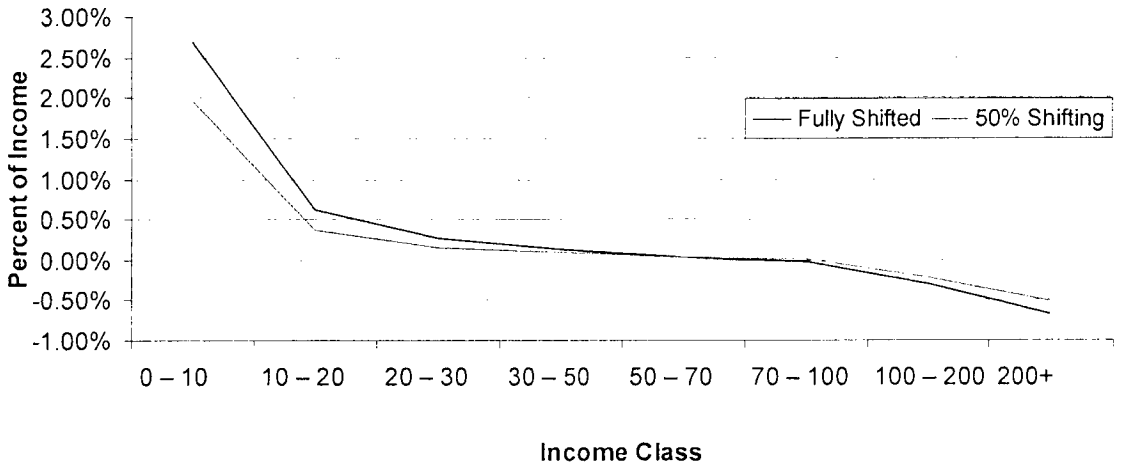
Note: Case A = full forward shifting of electricity costs; Case B = fifty percent shifting of electricity costs.

Table 13 is the final step in the calculation of the differential incidence of a carbon tax. It measures the net burden of this tax (gross burden minus rebate) as a percentage of a family's income. The third and fifth columns show clearly that a carbon tax would be quite regressive when the revenue it generates is redistributed to all families in proportion to their income. The average family in the lowest income group (those with income below $10,000) would end up with a higher tax burden equal to 2.7 percent of their income while the average family in the highest income group (income above $200,000) would enjoy the equivalent of a tax reduction of 0.7 percent its income. This result indicates that the funds generated by the carbon tax must be distributed, through transfer payments or tax cuts, in a manner that benefits disproportionately low income families if we want to avoid imposing on them a disproportionate burden of reducing carbon emissions. This regressive pattern of differential incidence of the carbon tax is shown graphically in Figure 1.

Table 12. Differential Incidence of the Carbon Tax on the Average Family by Income Group.

Income Class $ thousands	Full Shifting of Electricity Costs		Fifty Percent Shifting of Electricity Costs	
	Net Tax Burden $	Percent of Income	Net Tax Burden $	Percent of Income
0-10	149	2.68	109	1.96
10-20	95	0.61	57	0.36
20-30	66	0.26	39	0.16
30-50	53	0.14	37	0.10
50-70	19	0.03	23	0.04
70-100	-17	-0.02	20	0.02
100-200	-365	-0.29	-280	-0.22
22+	-2,403	-0.68	-1,787	-0.50

Figure 1. Net Burden of the Carbon Tax as Percent of Income for the Average Family in Selected Income Classes.



There are also winners and losers from the combination of a carbon tax and a proportional rebate among different types of families because of differences in family size and income levels (Table 114). These differences by family type, however, are fairly small. Two groups seem to fair well from this policy. Seniors (because they do not bear the burden of the indirect tax shifted to labour and investment income) and large families because they tend to have higher incomes.

Table 14. Selected Shares (in Percent) by Family Type.

Family Type	Pop	Families	Income	Case A			Case B		
				Carbon Tax	Rebate	Net	Carbon Tax	Rebate	Net
Single, 0 kid	12.58	26.03	13.39	14.39	13.39	1.00	14.25	13.39	0.86
Single, 1 kid	3.27	3.38	2.09	2.16	2.09	0.07	2.12	2.09	0.03
Single, 2 kids	2.87	1.98	1.31	1.52	1.31	0.21	1.52	1.31	0.21
Single, 3+ kids	1.47	0.75	0.60	0.56	0.60	-0.04	0.52	0.60	-0.08
Couple, 0 kid	20.23	20.93	27.77	27.19	27.77	--0.58	27.36	27.77	-0.41
Couple, 1 kid	12.75	8.80	13.21	13.62	13.21	0.41	13.78	13.21	0.57
Couple, 2 kids	19.46	10.07	16.68	16.79	16.68	0.12	17.02	16.68	0.34
Couple, 3+ kids	11.37	4.51	8.84	8.29	8.84	-0.55	8.37	8.84	-0.48
Senior	6.76	14.00	6.36	6.31	6.36	-0.05	6.02	6.36	-0.34
Senior couple	9.24	9.56	9.76	9.18	9.76	-0.58	9.06	9.76	-0.70
All	100	100	100	100	100	0	100	100	0

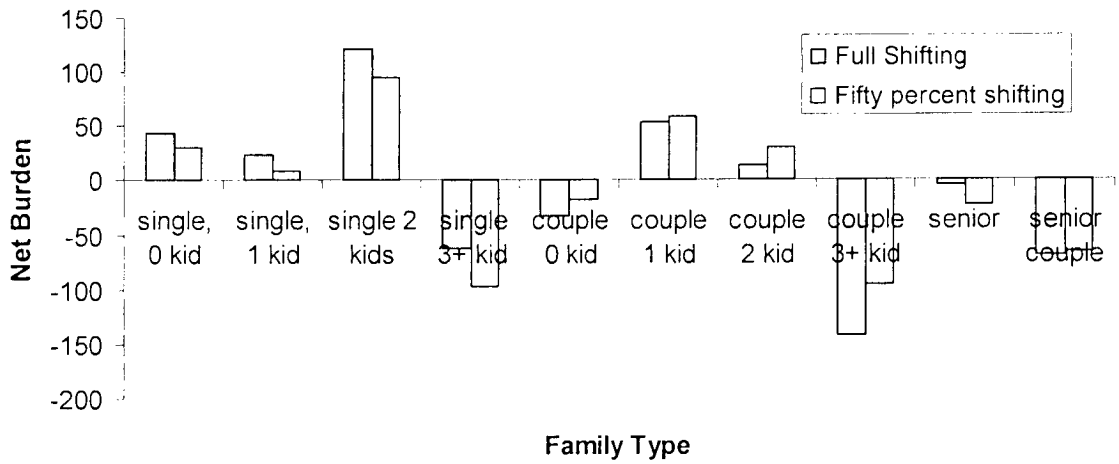
Note: Case A = full forward shifting of electricity costs; Case B = fifty percent shifting of electricity costs.

The small differences among family types are also visible in Table 14, which shows the ratio of the net burden to income.

Table 15. Differential Incidence of the Carbon Tax on the Average Family by Family Type.

Family Class	Full Shifting		Fifty Percent Shifting	
	Net Tax Burden $	% of Income	Net Tax Burden $	% of Income
Single, 0 kid	44	0.18	30	0.12
Single, 1 kid	24	0.08	9	0.03
Single, 2 kids	122	0.38	96	0.30
Single, 3+ kids	-62	-0.16	-97	-0.25
Couple, 0 kid	-32	-0.05	-18	-0.03
Couple, 1 kid	53	0.07	58	0.08
Couple, 2 kids	13	0.02	30	0.04
Couple, 3+ kids	-142	-0.15	-96	-0.10
Senior	-4	-0.02	-22	-0.10
Senior Couple	-69	-0.14	-66	-0.13

Figure 2. Net Burden of the Carbon Tax as Percent of Income for the Average Family by Family Type



V. CONCLUSIONS

This paper developed estimates of the differential incidence of a B.C. type carbon tax applied to New Brunswick through a series of steps. First, it identified the pattern of energy use by the electric utility, the industrial-commercial sectors, and the final users. Second, it calculated the revenue from a carbon tax and the associated HST revenue. Third, this revenue was allocated among selected families separately by income level and by family type. Finally, it estimated the differential tax incidence by distributing the entire revenue among families in proportion to their income.

The results show that a carbon tax in New Brunswick would be regressive and would provide substantial benefits to families with income in excess of $100,000 per year if the revenue it generated were distributed in proportion to income. The results also show that a carbon tax would impose different net burdens (after the proportional rebate) among the various types of families, but these differences are quite small.

Our results indicate that the funds generated by the carbon tax must be distributed, through transfer payments or tax cuts, in a manner that benefits disproportionately low income families if we want to avoid imposing on them a disproportionate burden of reducing carbon emissions.

REFERENCES

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----- *Report on Energy Supply and Demand,* Catalogue Number 57-003-X

---- *The Social Policy Simulation Database/Model (SPSD/M).*

APPENDIX

Table A-1. Carbon Tax Rates by Fuel Type according to the British Columbia System.

Fuel	Units for Tax Rates	Tax Rates*	
		July 1 2008	July 1 2012
A. Liquid Fuels			
Gasoline	c/litre	2.34	7.02
Diesel	c/litre	2.69	8.07
Heating Oil	c/litre	2.69	8.07
Locomotive Fuel	c/litre	2.69	8.07
Heavy Fuel Oil	c/litre	3.15	9.45
Aviation Fuel	c/litre	2.46	7.38
Jet Fuel	c/litre	2.61	7.83
Kerosene	c/litre	2.54	7.62
Naphta	c/litre	2.55	7.65
Methanol	c/litre	1.09	3.27
B. Gaseous Fuel			
Natural Gas	c/Gigajoule (GJ)	49.66	148.98
Propane	c/litre	1.54	4.62
Butane	c/litre	1.76	5.28
Ethane	c/litre	0.98	2.94
Refinery Gas	c/cubic metre	1.76	5.28
Coke Oven Gas	c/cubic metre	1.61	4.83
C. Solid Fuels			
Low Heat Value Coal	$/tonne	17.77	53.31
High Heat Value Coal	$/tonne	20.77	62.31
Coke	$/tonne	24.87	74.61
Petroleum Coke	c/litre	3.67	11.01
D. Combustibles			
Tires-Shredded	$/tonne	23.91	71.73
Tires-Whole	$/tonne	20.80	62.40
Peat	$/tonne	10.22	30.66

**These tax rates are based on a tax of $10 per tonne of carbon emission in 2008 and $30 per tonne in 2012.*

Table A-2. Selected Demographic and Economic Indicators, 2006 (Percent).

Family Class	Family	Population	Income	Empl + Inv	Consumption	Electricity	Fuel
0 – 10	6.93	3.65	0.79	0.37	0.81	3.19	2.49
10 – 20	18.12	11.42	5.82	1.90	6.92	12.58	7.63
20 – 30	15.90	12.18	8.17	4.99	9.05	12.57	9.56
30 – 50	23.96	24.24	19.29	15.96	20.09	23.38	22.11
50 – 70	13.03	16.78	16.04	16.21	15.85	15.70	17.46
70 – 100	13.48	18.66	23.14	26.99	22.27	17.95	25.12
100 – 200	7.63	11.48	19.69	24.26	18.63	12.99	12.98
200+	0.97	1.60	7.06	9.33	6.37	1.64	2.66
Total	100	100	100	100	100	100	100