Climate Justice Project

Clean Electricity, Conservation and Climate Justice in BC

Meeting Our Energy Needs in a Zero-Carbon Future

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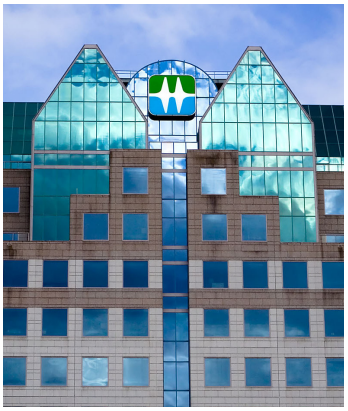

by John Calvert
and Marc Lee

JUNE 2012

CCPA
CANADIAN CENTRE
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BC Office

CLEAN ELECTRICITY, CONSERVATION AND CLIMATE JUSTICE IN BC:
MEETING OUR ENERGY NEEDS IN A ZERO-CARBON FUTURE

By John Calvert and Marc Lee

June 2012

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SUMMARY

Clean Electricity, Conservation and Climate Justice in BC

Meeting Our Energy Needs in a Zero-Carbon Future

ACTION ON CLIMATE CHANGE REQUIRES that BC eliminate the use of fossil fuels over the next few decades. This transition will place new demands on BC's electricity system. A growing population and the electrification of our homes, buildings, cars and other vehicles will all increase demand for electricity. Ambitious conservation measures and major efficiency gains in BC's use of electricity will be necessary, but won't be sufficient to meet all our future needs. Some new renewable generating capacity will also be required.

Complicating the challenge from a social justice perspective, as we bring new electricity capacity on stream, electricity prices will increase, due to the higher cost of acquiring new power. Without offsetting policy measures, these price increases will hit lower income households particularly hard.

In recent years, the government has directed BC Hydro to purchase additional electricity supply from private power producers to meet new demand. Paradoxically, BC's growing demand for electricity has not been coming primarily from efforts to reduce greenhouse gas emissions (GHGs) from fossil fuels, but rather, from the rapid expansion of the mining and oil and gas sectors, the dirtiest industries from a GHG perspective.

The people of BC deserve to have a wide-ranging conversation about how much electricity we need, how we produce it and at what cost. This paper provides a background resource for such a discussion, anchored in the need for BC to plan for a zero-carbon future.

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Our alternative vision leverages BC's electricity assets as part of an aggressive climate action strategy. The central finding of this report: BC's energy and electricity needs can be met, even as we dramatically reduce our GHG emissions and ultimately become carbon-zero by mid-century. But not if we continue with current policies.

Aggressively pursing the energy efficiency and conservation potential in BC, combined with support for small- and community-scale renewable technologies, can significantly reduce the need for new electricity supply. However, this will only happen if the government's energy-intensive resource extraction policies are dramatically scaled back.

RESOURCE INDUSTRIES ARE DRIVING THE DEMAND FOR NEW POWER

The three major components of BC's current economic development strategy — mines, natural gas projects, and liquefied natural gas (LNG) plants — are very energy intensive.

Natural gas and mining corporations are putting increasingly large demands on our electricity system — using clean, low-carbon electricity for the expansion of dirty, carbon-intensive industries. In the absence of significant policy changes, British Columbians will end up subsidizing industrial power use through steep rate increases. In addition, the construction of new power projects to meet rising demand from industry will constitute a major threat to BC's environment.

The three major components of BC's current economic development strategy — mines, natural gas projects, and liquefied natural gas (LNG) plants — are very energy intensive. As new electricity is far more expensive than existing supply, this will raise the overall price of electricity for all ratepayers. Much larger electricity loads plus major investments in new high-voltage transmission lines built specifically for industry add little long-term value to BC's electricity system.

A key finding of this report is that British Columbians are subsidizing mining, oil and gas companies through BC Hydro. Under the current electricity tariff, all ratepayers share the costs of new electricity even if BC Hydro acquires it for one specific class of ratepayers. Consequently, residential and commercial customers will face rate increases to fill the gap:

- By charging gas developers in the Montney shale gas region less than half the cost of new supply, BC Hydro could end up with a loss of up to $150 million every year during its peak extraction period.
- The first LNG plant alone will likely benefit from subsidized electricity of about $125 million per year, and several more plants are proposed.

The province plans to invest in new transmission lines to northern BC for the benefit of natural gas and mining companies.

- BC Hydro is planning a major upgrade to its transmission system, at a cost of $255 million, which it needs only because of the Montney shale gas development.
- The Northwest Transmission line, projected to cost $561 million, is being built specifically to service new mines and private power projects.
- Further north, BC Hydro is planning a $1.5 to $2 billion Northeast transmission line to service shale gas development in the Horn River basin near Fort Nelson.

In addition to the adverse price impact on BC households and small businesses, providing subsidized electricity to new resource projects undermines the incentive for industry to conserve electricity. Support for oil and gas companies also conflicts with BC's GHG reduction targets because they produce massive amounts of greenhouse gases.

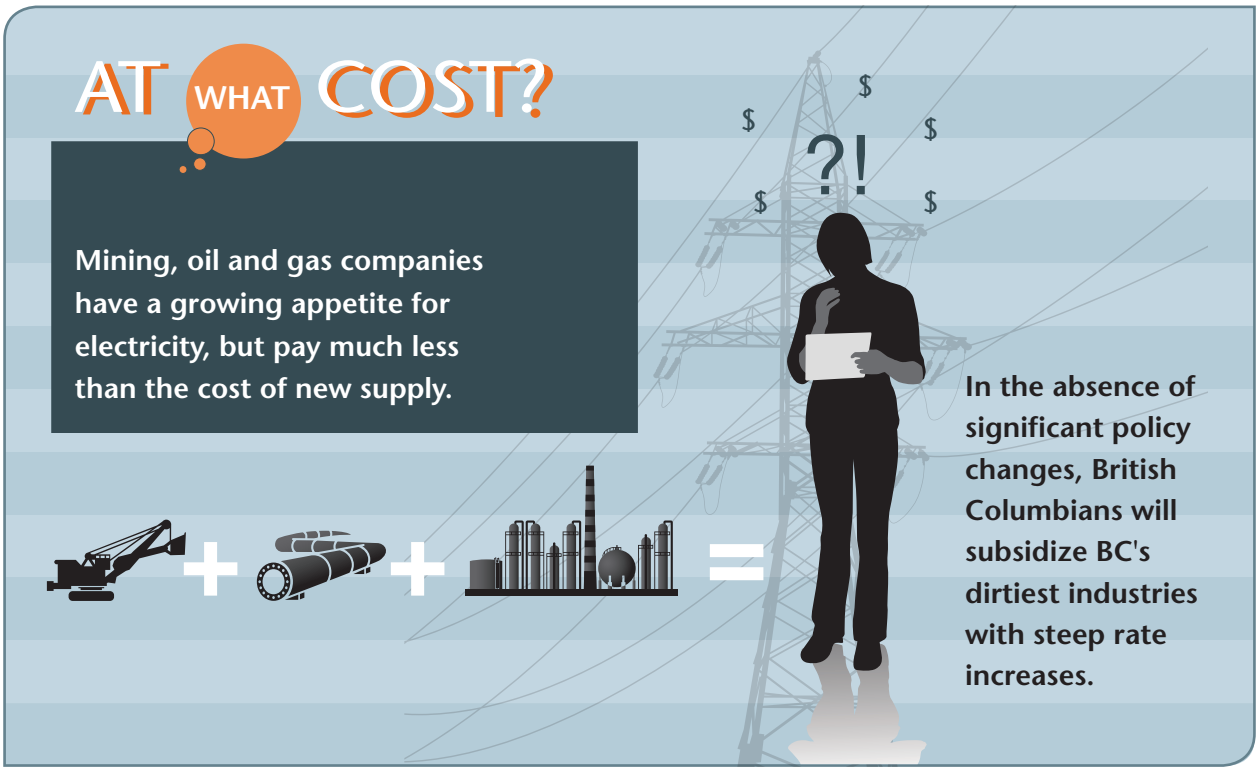
PRIVATE POWER PRODUCTION IS INFLATING THE COST OF NEW GENERATION

Over the past decade, BC Hydro has issued a series of contract tender calls to purchase electricity, primarily from run-of-river and wind sources within BC, supplemented by major purchases of biomass energy from pulp mills. To meet its goal of increasing the role of the private sector in BC's electricity system, the government has also restricted BC Hydro from developing new, small-scale renewable electricity supply.

To create demand for new private power projects, the government directed BC Hydro to meet an arbitrary "self-sufficiency" requirement (now partially rescinded) while proposing that it promote the export of renewable electricity to the US. These policies have resulted in BC Hydro signing over $40 billion in long-term contracts to purchase private power at unreasonably high prices.

Due to time lags, ratepayers are only just beginning to experience the higher electricity costs arising from these contracts.

- In 2006, BC Hydro paid $87.50 per MWh for new supply. By 2009, the average price had risen to $124 per MWh.
- According to the 2011 *BC Hydro Review*, private power projects supplied 16% of BC's total domestic electricity requirements, but accounted for 49% of overall domestic energy costs.



- In 2003, BC Hydro spent $290 million on private power contracts. Since then the amount has increased substantially, with the projected bill for fiscal 2014 reaching $1.1 billion.
- BC Hydro now has contractual agreements that amount to approximately $40 billion for energy purchases from private power developers.

Much of the electricity BC Hydro has contracted to purchase is not well suited to BC's existing hydro-based system. Run-of-river comes during the spring freshet when BC least needs additional power, but is largely unavailable in the winter when demand is highest.

The one notable exception to the emphasis on private power generation is the proposed development of the Site C dam on the Peace River. The need for this dam, however, is driven by the electricity demands of the expanding resource sector—and yet, the energy demands of new mines, gas projects and proposed LNG plants would, if completed, far outstrip the power produced by a new Site C dam.

MEETING NEW DEMAND THROUGH CONSERVATION, EFFICIENCY AND SOME NEW RENEWABLE SUPPLY

The high cost of new power generation points to the need to make much better use of the electricity we currently produce. Conservation and energy efficiency measures (also known as "demand side management" or DSM because it reduces the underlying demand for energy) are generally accepted as the least expensive, lowest impact form of meeting new energy demand.

The high cost of new power generation points to the need to make much better use of the electricity we currently produce.

Other alternatives include small- and neighbourhood-scale energy projects. These are a complementary approach that can reduce demand for electricity from BC Hydro. Installation of solar hot water heaters (and to a lesser extent, photovoltaic panels) is a good example. District energy systems offer considerable potential for reducing electricity demand and for reducing GHG emissions (provided they use renewable sources).

Based on BC Hydro's own estimates, an aggressive approach to DSM could offset most of the projected increase in demand due to population increase and economic growth.

The remaining planning challenge comes from two areas of new demand on the system: conversion of homes currently using fossil fuels (space and water heating, primarily), and electrification of transportation:

- To accommodate electricity demand for transportation, a structural shift towards "complete communities"—that would see people living closer to where they work, shop and access public services and amenities—is required.
- For homes, similarly aggressive DSM policies, including a major retrofit program for BC housing in conjunction with fuel switching renovations, will be needed.

Some expansion of renewable sources of electricity in BC could also make a further contribution to BC's future supply, although it will prove expensive due to the much higher cost of small-scale projects, particularly those located in remote areas.

NEXT STEPS

We recommend the following measures for a balanced supply and demand planning framework for BC, anchored in public power, and refocused on meeting BC's GHG reduction targets.

1. RETHINK BC HYDRO'S INTEGRATED RESOURCE PLAN

BC Hydro's current planning approach must look at all aspects of energy use in BC, in the context of a multi-decade shift to a zero-carbon BC. Rather than using our Crown corporation as a vehicle for promoting private power interests and subsidizing resource projects, the government should direct BC Hydro to plan for the province's future electricity system based on the central role it must play in furthering BC's climate objectives.

2. RAMP UP EFFICIENCY AND CONSERVATION MEASURES

BC Hydro has modeled plans for next generation demand side management (DSM) programs. It should commit to enacting the most aggressive options and developing a culture of conservation. In addition to incentive and retrofit programs, the government should make much more use of its regulatory powers to require commercial and residential buildings to meet high energy-efficiency standards.

3. DO NOT SUBSIDIZE HIGH-GHG INDUSTRIES

The government should reassess its policy commitment to expand capital-intensive resource industries. Minimally, BC Hydro should charge new resource projects the full marginal cost it is paying to acquire the additional power they require, as well as the full costs of transmission extensions, upgrades and related infrastructure investments that are built specifically to supply their projects.

Rather than using our Crown corporation as a vehicle for promoting private power interests and subsidizing resource projects, the government should direct BC Hydro to plan for the province's future electricity system based on the central role it must play in furthering BC's climate objectives.

4. COMMIT TO RENEWABLE PUBLIC POWER

To the extent that we need additional energy supply, future electricity generation should be 100% renewable and developed in the public sector. The government should direct BC Hydro to cancel further tendering for new private power.

5. PRICE CARBON

Another way to shift towards renewable energy and encourage conservation is to put a higher price on carbon emissions. Revenues should be used to fund energy efficiency and conservation and other needed climate action investments like public transit.

6. ASSESS REGIONAL IMPACTS

BC should develop a regionally-based screening process to determine areas in British Columbia where the development of renewable electricity, if it is truly needed, is appropriate and areas where it is not. This type of regional assessment must be transparent and allow for the full participation of local communities and First Nations.

7. CONFRONT ENERGY POVERTY

Regardless of changes in government policies in the future, BC Hydro is now saddled with a cost structure that will mean substantial rate increases over the next decade. The government should develop new policies to cushion the impact of rate increases on low-income residents. This includes income transfers, concentrating price increases on the biggest consumers, and investing in retrofit programs for low-income households.

Regardless of changes in government policies in the future, BC Hydro is now saddled with a cost structure that will mean substantial rate increases over the next decade.

The preceding analysis points to the need for fundamental change in the government's overall electricity policies and its power-intensive resource development strategy if it is to meet its climate objectives. BC can incorporate more renewable energy into the system, and increase spending on conservation initiatives. But without a basic change in the government's broader economic policies, these initiatives will be quite inadequate to compensate for the large amount of new energy needed by industrial customers. Maintaining the present policy direction, even for a few more years, will also make it much harder to address global warming in the future.

BC's Electricity System

THIS PAPER FOCUSES on the supply and demand of clean electricity in BC, an essential piece of a broader Climate Justice vision. We review trends in the development of new electricity supply and projections for future demand. We also discuss recent provincial policies and outline options for meeting the challenge of climate change in the coming years. The paper is informed by our view that the people of BC need to have a wide-ranging conversation about how much energy we use, how we produce it and at what cost. In what follows we provide a background resource for such a discussion, anchored in the need for BC to plan for a zero-carbon future.

The people of BC need to have a wide-ranging conversation about how much energy we use, how we produce it and at what cost.

Action on climate change requires that BC eliminate fossil fuels from its energy system over the next few decades. Renewable energy, deployed on a global scale, will be central to achieving a low-carbon economy.[1] Mark Jacobson and Mark Delucci of Stanford University argue that it would be technically possible to provide all of the world's energy with renewable sources (wind, water and solar technologies, with no nuclear and biomass) by 2030.[2] In reality, we are a long way from achieving this objective. In previous research, the Climate Justice Project established a target of 2040 for the elimination of BC's reliance on fossil fuels and 2050 for all other greenhouse gas emissions.[3]

1 International Panel on Climate Change, Special Report on Renewable Energy Sources and Climate Change Mitigation (SRREN), Summary for Policy Makers, May 2011, www.ipcc-wg3.de/publications/special-reports/srren

2 However, they note that inertia of existing policies mean that achieving this goal by 2050 is more realistic. M. Jacobson and M. Delucci, "Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials," *Energy Policy* (2010), doi:10.1016/j.enpol.2010.11.040.

3 M. Lee and K. Carlaw, *Climate Justice, Green Jobs and Sustainable Production: A Framework for BC* (Vancouver: CCPA–BC, 2010), www.policyalternatives.ca/greenjobs

Renewable electricity generation will be central to a low-emissions future, supplemented by biomass and hydrogen for certain uses where electricity is not efficient. This transition off of fossil fuels will place new demands on BC's electricity system. Tough conservation measures and major efficiency gains in BC's use of electricity will be necessary. However, a growing population and electrification of transportation and buildings will increase demand for electricity, and will likely result in upward pressure on electricity prices due to the higher cost of acquiring new power.[4] A key justice question is how to manage this process in a manner that is socially equitable and that does not result in rising energy poverty or unreasonably large rate increases for low-income electricity users.[5]

The provincial government has told British Columbians that purchasing more electricity from private power producers is a key part of the provincial Climate Action Plan. However, it is acquiring a disproportionate share of this new power to meet the mining and oil and gas industries' projected demand for electricity. These are among the dirtiest industries from a GHG perspective. To make matters worse, acquiring this new supply has been expensive and will place a major financial burden on ratepayers in the future. Much of it is poorly suited to the needs of BC's electricity system and, in contrast to past practice where BC Hydro investments gave us a legacy of affordable public power, these purchases are facilitating the incremental privatization of BC's electricity system.

In this paper we outline an alternative vision that leverages BC's electricity assets as part of an aggressive climate action strategy.

Under the current pricing system, industrial customers continue to enjoy very low rates compared with other customer classes. BC Hydro is currently paying almost three times more to acquire the new energy major resource projects need than it charges industrial customers for it.[6] Low rates provide industry with little incentive to conserve. These rates also constitute a subsidy for projects that increase BC's dependence on resource extraction for export—activities that will prevent BC from meeting its GHG targets.

In this paper we outline an alternative vision that leverages BC's electricity assets as part of an aggressive climate action strategy. Public control over electricity infrastructure is a vital advantage for BC as we shift to a zero-carbon future. BC built the bulk of the province's hydroelectric infrastructure in the 1960s, 1970s and early 1980s. The government created the BC Hydro and Power Authority (BC Hydro) in 1962 specifically for the purpose of developing and supplying hydroelectricity to the province because private companies such as BC Electric were unwilling to do so. BC Hydro continues to own and operate most electrical generation in the province, generating approximately 85% of the province's total electrical power (excluding power self-generated by pulp mills and other large industrial operations).[7]

4 In a submission to the BC Utilities Commission, BC Hydro indicated it would need to increase electricity rates amounting cumulatively to 32% over three years, 52% over five years, and an estimated 100% over 10 years. BC Hydro *F2012 to F2014 Revenue Requirement Application,* ch. 2, Rate Management, Table 2–2 and text, p. 2–2, submitted March 1, 2011. Subsequently, it has asked to lower the increases in the initial three years, which simply pushes the costs on to future years.

5 Energy poverty exists when a household spends a disproportionate share of its income on meeting energy needs. A CJP paper on energy poverty noted that some 17 to 18% of households spent more than 10% of after-tax income on energy, and could thus be considered to be energy poor. M. Lee, E. Kung and J. Owen, *Fighting Energy Poverty in the Transition to Zero-Emission Housing* (Vancouver: CCPA–BC, September 2011) www.policyalternatives.ca/energy-poverty

6 The current rate for large industrial customers is just over $40 MWh, while BC Hydro paid $124 MWh for new supply in its 2010 contracts with private power developers.

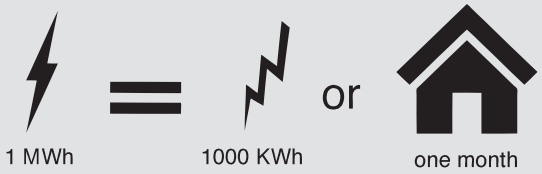
7 While our focus in this paper is on BC Hydro, a privately owned utility, FortisBC, which operates in the Kootenays, produces approximately 5% of BC's electric power. Industry and private power producers make up the remaining generation.

Speaking Electric

In this paper, we are interested in electricity in BC, most of which is provided by BC Hydro. *Electricity* is a type of *energy* that travels down wires to our homes and other buildings. Electricity is typically created by spinning a turbine with steam, water or wind, and can be made from renewable sources (like hydro power) or by burning fossil fuels. Energy is a broader concept that includes generating electricity, but also the burning fossil fuels (oil, gas and coal) to power our vehicles, heat our buildings and so forth. As we seek to reduce greenhouse gas emissions causing climate change, we will need to produce more electricity to power our energy needs without burning fossil fuels.

Electricity terminology and measurement can be challenging for many people to follow. For households, the basic unit on BC Hydro bills is the kilowatt-hour (kWh), which is the amount of energy it takes to light a 100-watt bulb for 10 hours. Residential consumers in BC, for example, pay 6.8 cents per kWh for the first 1,350 kWh over a two-month period, and 10.2 cents per kWh for consumption above that threshold.

Broader system-wide measurements are in bigger units. The cost of energy purchased by BC Hydro is priced in dollars per megawatt-hour (MWh). One MWh is equal to 1,000 kWh and is approximately the energy requirement of one BC home for one month.

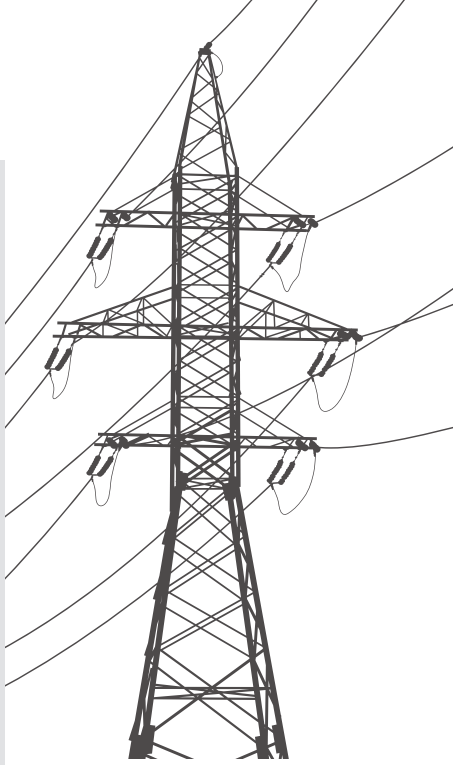


On an annual basis, the total amount of power provided by BC Hydro is measured in gigawatt-hours (GWh). A GWh is 1,000 MWh, and is an amount that would power 90 BC homes for a year.

Capacity to produce electricity in power plants is generally rated in megawatts (MW). Some small renewable options may only have one MW (that is, at peak capacity they can produce 1 MW per hour, though they may not be near peak capacity much of the time). At the other extreme, the WAC Bennett dam has a capacity of 2,730 MW, and produces 14,179 GWh per year.

KWh, MWh and GWh are measurements of the amount of energy we use, like the amount of gasoline in a car's gas tank. On the other hand, MW is a measure of the instantaneous ability of the electricity system to generate this energy, like the size of a car's engine. Both these measures are important in understanding our electricity system works. To function successfully, an electricity system must have sufficient energy (GWh) to meet customer needs, while being able to supply it when customers need it (MW).

Energy measurements are also made in Joules (J, which is one Watt per second). Natural gas bills are typically priced in dollars per billion joules (gigajoules or GJ). One MWh is equal to 3.6 GJ. For the BC economy as a whole, total energy use is reported in petajoules (PJ). One PJ equals one million GJ.



As we seek to reduce greenhouse gas emissions causing climate change, we will need to produce more electricity to power our energy needs without burning fossil fuels.

While large dams had significant adverse environmental and social impacts when they were built, and placed an unjust burden on the communities and First Nations affected, several decades on they are valuable, publicly-owned electricity assets with very low GHG impacts. This contrasts with many other jurisdictions that generate electricity from non-renewable coal, natural gas, or controversial nuclear power plants. Thus the direct impact of BC's current electricity generation system on greenhouse gas emissions is modest, arising primarily from the use of some natural gas and diesel generation.[8]

Electricity is only one form of usable energy. Most energy consumed in BC is from fossil fuels that power industry, support our transportation system and heat our buildings. Only 13% of BC's total energy supply comes from renewable sources.[9] Absent major policy shifts, electricity use under "business-as-usual" conditions will increase significantly over the next two decades, largely due to the BC government's promotion of energy intensive resource industries, as well as population growth and increased material consumption.

Because our provincial economy is very reliant on major energy-intensive and high-GHG-emitting industries like mines, oil and gas extraction, and planned liquid natural gas (LNG) plants, it is particularly important that we look at the industrial sector if we are serious about reducing our carbon footprint.

In light of the relatively modest role of renewable electricity in our overall energy mix, it will be challenging to switch our existing fossil fuel consumption to green energy in the near future. BC Hydro estimates that conversion to electric vehicles and home heating could increase demand by as much as 35,000 GWh (passenger vehicles and residential space and water heating), an increase of 70% over the approximately 50,000 GWh currently used by British Columbians.[10] Addressing existing commercial and industrial demand poses an even larger challenge.[11]

A sustainable economy will require renewable electricity generation. But it must be accompanied by reductions in wasteful consumption, substantially greater energy efficiency in buildings, major conservation initiatives in our transportation system, and structural changes to our urban footprint to implement "complete communities," where people live closer to where they work, shop and play.[12] More efficient use of our existing renewable electricity can free up some energy to meet our fuel switching objectives. BC Hydro, as a public utility, should be a key player in making this happen. But a decade of questionable policies by the BC government has resulted in it failing to achieve the contribution it could be making.

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8 On a lifecycle basis, there are also GHG emissions from hydro power due to flooding of land, but these are relatively small. There is also some controversy over whether burning biomass is sufficiently "green" due to the very long time required for the carbon released to be re-captured by new, growing forests. See Greenpeace, *Fuelling a BioMess: Why Burning Trees For Energy Will Harm People, the Climate and Forests* (Montreal: Greenpeace Canada, 2011).

9 J. Nyboer, K. Lutes and I. Jaccard, *Review of Energy Supply, Consumption and GHG Emissions in British Columbia, 1990 to 2009* (Canadian Industrial Energy End-use Data and Analysis Centre, Simon Fraser University, prepared for Pacific Institute for Climate Solutions, March 2011) http://cieedac.sfu.ca/media/publications/BC_2011_report__09_data__final.pdf

10 BC Hydro, Long-Term Acquisition Plan (Vancouver: June 12, 2008) www.bcuc.com/ApplicationView.aspx?ApplicationId=192

11 About one third of commercial energy use in 2009 came from electricity, and less than one quarter of industrial energy use, according to data collected by J. Nyboer et al., *Review of Energy Supply, Consumption and GHG Emissions in British Columbia, 1990 to 2009* (prepared for Pacific Institute for Climate Solutions, Canadian Industrial Energy End-use Data and Analysis Centre, Simon Fraser University, March 2011).

12 The concept of complete communities is developed in another CCPA Climate Justice paper, P. Condon et al., *Transportation Transformation: Building Complete Communities and a Zero-Emission Transportation System in BC* (Vancouver: CCPA–BC, April 2011) www.policyalternatives.ca/transportationtransformation. There is also a strong argument that we must make fundamental changes in our lifestyles and patterns of consumption to meet the challenges of global warming. However, the focus of this paper is on the narrower question of the electricity sector.

Much of the policy discourse on electricity emphasizes the conservation potential of the residential sector. However, we need to focus much more attention on commercial and, particularly, industrial users. This is because these two broad customer categories account for about two thirds of our electricity consumption. Because our provincial economy is very reliant on major energy-intensive and high-GHG-emitting industries like mines, oil and gas extraction, and planned liquid natural gas (LNG) plants, it is particularly important that we look at the industrial sector if we are serious about reducing our carbon footprint.

A starting point for this analysis is to look at existing patterns of electricity consumption. Table 1 breaks down BC Hydro's electricity sales for residential, commercial and industrial electricity customers. In the immediate future, BC Hydro expects residential and commercial electricity consumption to decline slightly, while industrial use will grow significantly. In fact, industrial use will account for the increase in anticipated provincial energy demand during the period from 2011 to 2014. It will increase even more in the following years if the government realizes its ambitious and electricity-intensive resource extraction plans.

Table 1: Projected BC Hydro energy consumption — BC Hydro domestic energy sales (GWh)

	F2011 Actual	F2012 Plan	F2013 Plan	F2014 Plan	% Increase 2011–2014
Residential	17,797	17,893	17,720	17,438	-2.0
Light Industrial/ Commercial	18,052	17,869	17,555	17,230	-4.6
Large Industrial	13,164	14,228	14,656	15,377	16.8
Other	1,594	2,080	2,116	2,142	34.4
Total	50,607	52,071	52,046	52,187	3.1

Notes: "Other" includes smaller sales for irrigation, street lighting and local hydro providers (inc. Fortis in the Kootenays). The table does not include the full amount of electricity used by some industrial customers, such as pulp mills, as these facilities generate significant volumes of power for their own use in addition to purchasing large volumes of BC Hydro's energy. BC Hydro projects industrial power sales to grow by 16.8% by 2014

Source: BC Hydro Amended F2012–2014 Revenue Requirement Application, Vol. 1, Ch. 3 Load and Revenue Forecast, Tables 3a and 3–1.

Rather than planning to meet whatever demand for new electricity the industrial sector projects it will require, BC needs an integrated energy policy that will strive to limit the need for new electricity. It should focus, instead, on "living within our means" through comprehensive demand side management, tough conservation measures and aggressive steps to limit energy consumption, particularly in resource extraction, transportation and the built environment. The policy must also acknowledge that all power development, including renewable energy, has major environmental and social impacts.

PART 2

Clean Energy Demand from Dirty Industries

> *The key drivers of the 2010 Load Forecast are the anticipated growth and potential load in the oil and gas sector in BC's Northeast and the mining sector in the Northwest. BC Hydro's residential and commercial sector loads are predicted to grow in step with broad economic and demographic trends.* — BC Hydro[13]

Throughout its history, BC has sought to promote export-oriented resource industries as a vehicle for economic development. The past decade has demonstrated a renewed commitment to resource extraction, with a shift in orientation from forestry to the oil and gas industry, with mining also making a comeback due to high global commodity prices. The BC government has created a supportive framework for the exploitation of resources by: establishing a favourable tax and royalty regime to attract investors; amending the environmental assessment process to facilitate the expeditious approval of projects; making major investments in BC's public infrastructure to provide access to resources; and, in recent years, requiring BC Hydro to supply the new electricity these industries need at prices far below what it costs BC Hydro to acquire it.

The revolution in gas extraction resulting from hydraulic fracturing (fracking) technology and the dramatic increase in global mineral prices has increased electricity demand, forcing BC Hydro to plan to acquire much more power than earlier anticipated. The BC government justifies its resource export strategy by pointing to the very large investments that resource projects pump into BC's economy. For example, in its September 2011 "Jobs Plan" the government points to the large investments in new mines and other resource projects as key components of its overall economic development strategy. However, the Jobs Plan ignores the fact that these sectors are extremely capital intensive, and employ few British Columbians. In 2008, mining and oil and gas combined employed 28,100 workers, about 1.2% of total provincial employment.[14]

13 BC Hydro, 20-Year Load Forecast (2010 Load Forecast), Summary prepared for 2011 Integrated Resource Plan Technical Advisory Committee, Meeting 1, December 14, 2010.

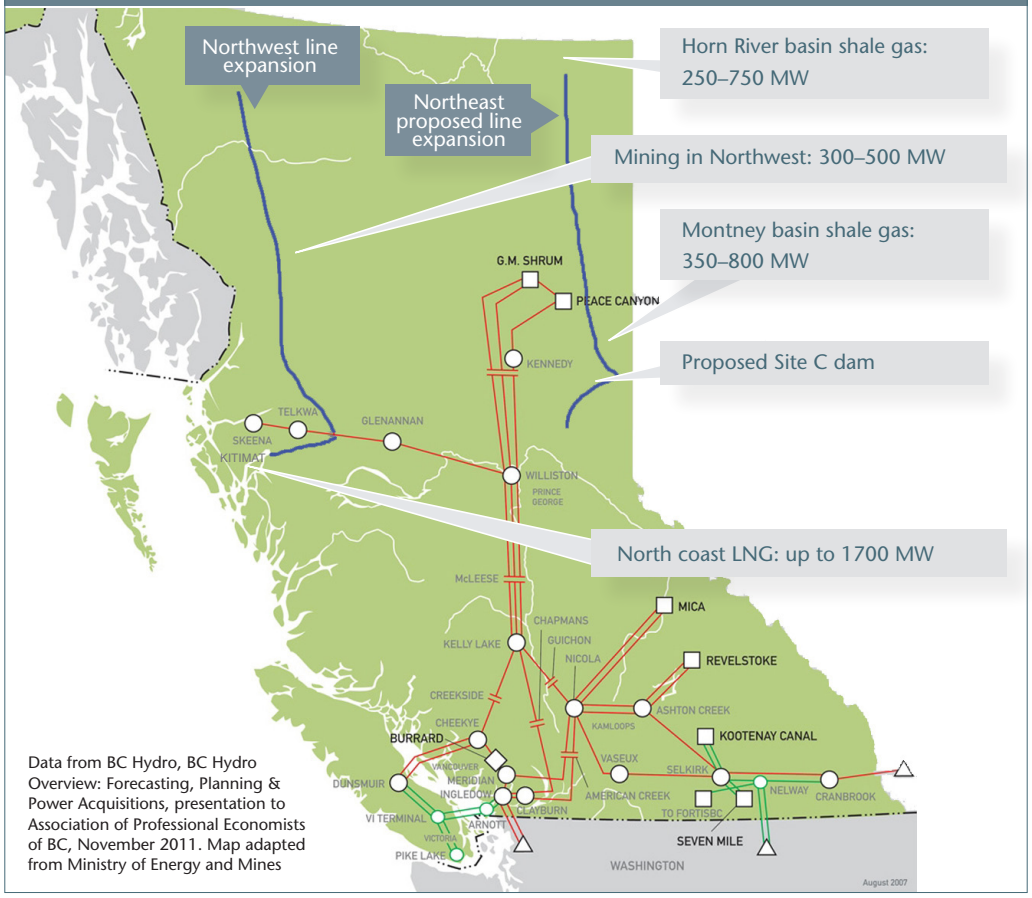
14 BC Stats, British Columbia Employment by Industry, www.bcstats.gov.bc.ca/data/lss/labour.asp

These sectors also result in significant damage to the environment. In the context of climate change, mining and oil and gas are substantial contributors to GHG emissions, accounting for one third of non-household emissions in BC. They have the highest level of GHG emissions per worker of any industrial sector.[15] Moreover, emissions in other jurisdictions that purchase these fossil fuels are extremely high due to the embodied carbon content of these exports: for every tonne of CO_2 released in BC from the combustion of fossil fuels, two tonnes are released in the US and Asia from BC-origin coal and natural gas.[16] These negative environmental impacts sit uneasily with the government's claim to be a leader in addressing climate change.

From the perspective of BC's electricity system, the key point is that resource industries require power—lots of power. Supplying low cost power to resource industries has been part of BC's economic development approach since WAC Bennett first nationalized the BC Electric Company in 1961.[17] However, in that earlier period, work in mines, pulp mills and sawmills was much more labour-intensive, and resource development provided the basis for significant employment and related economic spin-offs for many BC communities. This is no longer the case. In fact, if residential and commercial customers end up paying much higher electricity rates as a result of growing industrial demand, their purchasing power is correspondingly diminished. This will negatively impact demand for goods and services in other parts of BC's economy.

What is significant about the government's recent resource based economic development strategy is its scale. Each of the three major components—mines, LNG plants and gas projects—is very energy intensive. Cumulatively, they will dramatically increase electricity demand.

New mining and gas developments driving new demand



Data from BC Hydro, BC Hydro Overview: Forecasting, Planning & Power Acquisitions, presentation to Association of Professional Economists of BC, November 2011. Map adapted from Ministry of Energy and Mines

15 Lee and Carlaw 2010, supra note 3. Statistic is for mining and oil and gas combined.

16 See another CCPA Climate Justice Project report by M. Lee, *Peddling Greenhouse Gases: What is the Carbon Footprint of BC's Fossil Fuel Exports?* (Vancouver: CCPA–BC, 2010) www.policyalternatives.ca/publications/reports/peddling-greenhouse-gases

17 The BC Electric Company was nationalized a year before BC Hydro was formally created.

What is significant about the government's recent resource based economic development strategy is its scale. Each of the three major components—mines, LNG plants and gas projects—is very energy intensive. Cumulatively, they will dramatically increase electricity demand. Construction of the highly controversial Site C hydro dam, were it to be approved, would meet far less than half of the new demand.[18]

SHALE GAS EXTRACTION

The BC government has enthusiastically promoted shale gas production in Northeastern BC.[19] New horizontal drilling and multi-stage fracking technologies make this gas comparatively cheap to extract. The Montney shale gas basin has one of the largest pools of accessible natural gas in North America. BC Hydro estimates that by 2020 Montney will be producing at least 3 million cubic meters of natural gas a year and possibly much more.

BC Hydro's mid-range estimate of electricity load growth for gas projects indicates that by 2027 customers in the Montney gas field area will require 363 MW of capacity to meet their needs.[20] It will need to supply an average of about 1,800 GWh of energy to the gas industry every year in the period from 2016 to 2030.[21] However, if the gas sector expands more rapidly it will need even more electricity. BC Hydro's high-range estimate indicates that within a decade, it may end up supplying over 500 MW of capacity to this sector—close to half the projected output of the proposed Site C dam—with industry demand closer to 800 MW.

At the current price of $124 MWh it is paying to private power developers for new energy, the 1,800 GWh mid range forecast translates into an average annual cost of roughly $223 million. However, if it ends up selling this power to the gas developers at the current transmission rate price of roughly $40 MWh, BC Hydro would receive only $72 million. This would result in an average annual loss to BC Hydro's ratepayers (and corresponding subsidy to the gas industry) of just over $150 million every year during the high use period.

Public subsidies also exist through the construction of new transmission lines. For example, the current transmission infrastructure supplying electricity to the Dawson Creek/Chetwynd area is not capable of handling the volume of electricity the gas fields will require. BC Hydro is planning a major upgrade to its transmission system, at a cost of $255 million between now and 2015, needed only because of the projected expansion of the gas industry.[22] However, when gas production diminishes in a little over two decades, BC Hydro's ratepayers may end up having funded an expensive and, arguably, very overbuilt transmission line for which there will no longer be a major need.

Further north, the Horn River basin is another major shale gas "play" (as the industry calls it) near Fort Nelson. Electricity supply currently comes from burning gas at the Fort Nelson Generating Station, and back-up power is available via interconnection with Alberta's electricity grid. New

18 See Climate Justice report by Ben Parfitt, *Fracking Up Our Water, Hydro Power and Climate: BC's Reckless Pursuit of Shale Gas* (Vancouver: CCPA–BC, November 2011) www.policyalternatives.ca/fracking

19 Ibid.

20 BC Hydro, *Dawson Cree /Chetwynd Area Transmission Project (Project No. 3698640),* Application for a Certificate of Public Convenience and Necessity, Appendix B (BC Utilities Commission, August 3, 2001), p. 19, www.bchydro.com/planning_regulatory/regulatory.html

21 Ibid., Table 1: Expected Annual Gas Production and Electricity Demand, p. 82.

22 BC Hydro, Dawson Creek/Chetwynd Area Transmission Project ASP-2011-027.

shale gas extraction will demand between 250 and 750 MW of capacity, for which BC Hydro has proposed to build, by 2017, a 500 km Northeast transmission line, at a capital cost of $1.5 to $2 billion.

LNG PROCESSING

The second major source of new resource industry power demand is for liquid natural gas (LNG) processing. Compressing natural gas for shipment by tanker requires a great deal of energy. Usually the gas itself provides this energy. But the BC government argues that it can reduce GHG emissions associated with compressing gas by supplying electricity to perform this function, as well as to meet the other energy requirements of the gas industry (producing less gas would also reduce GHG emissions, but this is an option the government has rejected).

The BC government argues that it can reduce GHG emissions associated with compressing gas by supplying electricity to perform this function, as well as to meet the other energy requirements of the gas industry.

While it is not clear how many new facilities will eventually get built, both the Kitimat LNG facility and the Douglas Channel LNG facility have National Energy Board approval. At least one more has been announced by a consortium led by Royal Dutch Shell, and there are media reports of even more projects being contemplated by major gas developers.[23,24] The proposed $3.5 billion Kitimat LNG terminal, due to come on stream in 2015, will be able to process more than 5 million metric tonnes of liquefied natural gas, or roughly 20% of BC's natural gas production. The carbon content of this gas, if combusted, amounts to approximately 112 Mt of CO_2, almost double all of the emissions in BC's total inventory of GHGs.[25]

The first of the two phases of the Kitimat LNG facility is planned to be in operation by 2015. Once completed, it will have a bigger electricity load than BC's largest existing industrial customer, Catalyst Paper. According to energy economist Marvin Shaffer, under the current tariff for industrial customers, BC Hydro could lose as much as $125 million annually, to supply this demand.[26] The second phase would double this demand if it were to be powered by electricity.

In its *Draft 2012 Integrated Resource Plan*, BC Hydro anticipates that it will need 680 MW of capacity and 5,281 GWh of energy, annually, by 2021 to service the full demand of the two new LNG plants already approved.[27] This is more than the total energy output of Site C, should it be built, and is equivalent to approximately 10% of BC Hydro's existing electricity supply. According to BC Hydro, demand from a third proposed LNG plant, assuming it ends up using electricity for compression, could raise the total to 1,700 MW of capacity and 12,800 GWh of energy by

23 David Ebner, "EOG buys rest of Kitimat LNG project" *Globe and Mail,* August 24, 2010. For a description of the project, see the proponent's website: www.kitimatlngfacility.com/. See also: National Energy Board Hearing Order GH-1-2011 regarding KM LNG Operating General Partnership Kitimat LNG Export Licence Application, December 9, 2010. Kitimat LNG is a consortium backed by Apache Corp, Encana Corp and EOG Resources Inc.

24 Nathan Vanderklippe, "B.C.'s Kitimat LNG terminal wins export licence" *Globe and Mail*, October 13, 2011, www.theglobeandmail.com/globe-investor/bcs-kitimat-lng-terminal-wins-export-licence/article2200412/

25 Estimates by M. Lee, "Is BC About to Drop a New Carbon Bomb?" in *Relentlessly Progressive Economics* blog, July 11, 2011, www.progressive-economics.ca/2011/07/11/is-bc-about-to-drop-a-new-carbon-bomb/

26 Marvin Shaffer, "A Jobs for Jobs Strategy" CCPA Policy Note, September 23, 2011, www.policynote.ca/a-jobs-for-jobs-strategy/

27 BC Hydro, *Draft 2012 Integrated Resource Plan: Ch. 2 Load and Resource Gap* (Vancouver: 2012), p. 2-5, 2-7, www.bchydro.com/energy_in_bc/irp/document_centre/reports/draft_irp.html. To get a sense of the size of these projects, TransCanada's proposed pipeline for the Shell LNG plant at Kitimat would itself cost $4 billion. Preliminary estimates by Shell indicate the plant would have two units, each with a capacity to produce 6 million tonnes of gas annually. Scott Haggert, "Trans Canada to build pipeline for Shell LNG Plant" *Reuters*, June 5, 2012.

2026.[28] BC will end up with at least three — and perhaps several more — LNG plants with all the energy demand they entail.

In addition, BC Hydro is planning major capital investments in new transmission infrastructure to service these plants.

In light of the huge potential LNG electricity requirements, the government has already started to backtrack on its carbon reduction commitments, announcing recently that it may be acceptable for at least one new LNG facility to use some natural gas as the source of energy for compression. More worrisome, it is also looking at the option of using natural gas to provide both capacity to back up intermittent renewable run of river and wind supply and possibly also to fill gaps in regional energy requirements. Such a policy change would clearly — and adversely — impact BC's ability to meet GHG reduction targets.[29]

MINING

According to the Mining Association of BC, up to a dozen new mines may be developed in the vicinity of the new Northwest Transmission line alone, once the line is completed. All of these, once in production, will use a great deal of electricity.

The expansion of the mining sector is a major component of the government's economic development strategy. The *BC Jobs Plan* asserts that by 2015, eight new mines will be operational and nine existing mines will have completed major upgrades.[30] According to the Mining Association of BC, up to a dozen new mines may be developed in the vicinity of the new Northwest Transmission line alone, once the line is completed.[31] All of these, once in production, will use a great deal of electricity.[32] To foster this expansion, it also intends to reduce, significantly, various regulatory requirements, which it argues unnecessarily delay the approval of new projects. This policy change, when coupled with the federal government's new policy of fast-tracking resource development by streamlining the environmental assessment process, will further encourage mining growth.

A study by Marvin Shaffer of the impact on BC Hydro of one proposed mine, the Prosperity Gold-Copper Mine Project, found that BC Hydro would lose heavily by supplying it with the 750 GWh of electricity it would need annually, once in full operation. According to Shaffer, "The estimated costs to BC Hydro and its customers, plus the GHG offset costs imposed by this project total over $37 million per year."[33]

In making his calculations, Shaffer used BC Hydro's earlier cost of purchasing private energy — $88 per MWh — and BC Hydro's slightly lower industrial rate at the time — $37.40 per MWh. If we

28 BC Hydro, supra note 27, p. 2–34. This assumes the LNG plants will use electricity for gas compression. "NEB Gets Another Application Proposing To Export LNG Off B.C. Coast" *Pipeline News,* March 16, 2011, www.pipelinenewsnorth.ca/article/20110316/PIPELINE0119/303169976/-1/pipeline/neb-gets-another-application-proposing-to-export-lng-off-bc-coast

29 BC Hydro, *Draft 2012 Integrated Resource Plan: Ch. 9 Recommended Actions* (Vancouver: 2012), pp. 9–71. To be clear, this is an option BC Hydro is exploring, not a current policy. However, using gas to produce electricity to supply LNG plants would be extremely wasteful, given the energy lost in the process.

30 Government of BC, *Canada Starts Here: The BC Jobs Plan*, September 22, 2011, p. 15.

31 One of the little noticed conditions of the federal government's offer to provide up to $130 million in financing for the $404 million transmission line was that it be extended further north to provide access to more potential mines.

32 While the number of projected mines has increased significantly in recent years, industry expansion is affected by a range of factors, including commodity prices, exchange rates and the state of the global economy.

33 Marvin Shaffer and Associates, "Benefits and Costs of the Prosperity Gold-Copper Mine Project," Report Prepared for the Friends of the Nemaiah Valley, March 11, 2009a, p. 19, www.fonv.ca/media/report-shaffer-prosperity.pdf

use BC Hydro's current cost of energy—roughly $124 per MWh—and the current rate it charges to industrial customers of approximately $40 per MWh, the potential loss every year could be over $63 million. And this is just one mine.

As with the Dawson Creek/Chetwynd transmission infrastructure, another major cost associated with mining development is transmission upgrades. BC Hydro initially estimated that building the Northwest Transmission Line would cost $404 million. However, since committing to build the line, it has revised its estimate to $561 million. Even this figure may be exceeded if the line is extended further north as the federal government has indicated it wants in return for a $130 million contribution to the project.[34] While BC Hydro estimates it will get some funding from the new mines, it is not clear how large this contribution will be. Nevertheless, it appears that BC Hydro and its ratepayers will end up paying the largest share of this project.[35]

SURGING DEMAND, LOW PRICES

Altogether, the energy requirements and GHG emissions of the LNG, mining and oil and gas industries are enormous. A report for the Canadian Wind Energy Association calls for electrification of mining and oil and gas operations (including LNG terminals) in order to reduce provincial GHG emissions.[36] It argues that BC Hydro's forecasts for (already large) increases in demand from mining and oil and gas developments in Northern BC are greatly under-estimated, and that the total industrial load could grow to 45,000 GWh in 2025 from 18,000 GWh currently.[37] While this estimate is likely at the very high end of the range of forecasts, it does underline the scope of the growth in demand that could occur.

Surging loads and major investments in new high-voltage transmission lines built specifically to supply these projects will add little long-term value to BC's electricity system.

As noted above, surging loads and major investments in new high-voltage transmission lines built specifically to supply these projects will add little long-term value to BC's electricity system. It is highly unlikely there will be sufficient populations in these regions to justify the investment once the resource projects are exhausted, leaving ratepayers with costly "stranded assets." The volatility of international commodity markets adds to the risk. If prospective customers in Asia for energy (and globally for minerals) decide not to take as much of the commodity as developers anticipate, or if prices end up much lower, the economics of some of these projects may be compromised and BC Hydro's ability to recoup the costs of its infrastructure investments may be negatively affected.

The key point is that under the current system for setting rates, the additional costs of this energy, as well as the infrastructure needed to deliver it, will be shared among all BC Hydro customers, even though the benefits will almost exclusively go to these resource projects. To protect the

34 Christopher Pollon, "Northwest Power Line Grows, So Does Controversy: Government says extending grid beyond 2009 plan will lower greenhouse emissions. Critics see a boost to mining—and emissions" *The Tyee*, July 18, 2011.

35 The formula for determining the cost allocation for upgrades BC Hydro has to make to its transmission system from connecting new industrial customers is set out in BC Hydro's Tariff Supplement #6. New customers are initially charged the extra costs BC Hydro incurs, but if they purchase the agreed amount of electricity over the following eight years, the full amount is refunded to them. New customers are responsible for funding connections from their facility to the main BC Hydro grid.

36 Steve Davis & Associates Consulting Ltd., *Additional Industrial Electricity Load Growth in B.C. to 2025*, Prepared for the Canadian Wind Energy Association, September, 2011, http://aeoliswind.ca/_warehouse/bfe_load_growth_BC_2025.pdf

37 The estimate cited for 2011 is a bit higher than BC Hydro's data cited earlier; the Davis study does not indicate the reasons for the difference.

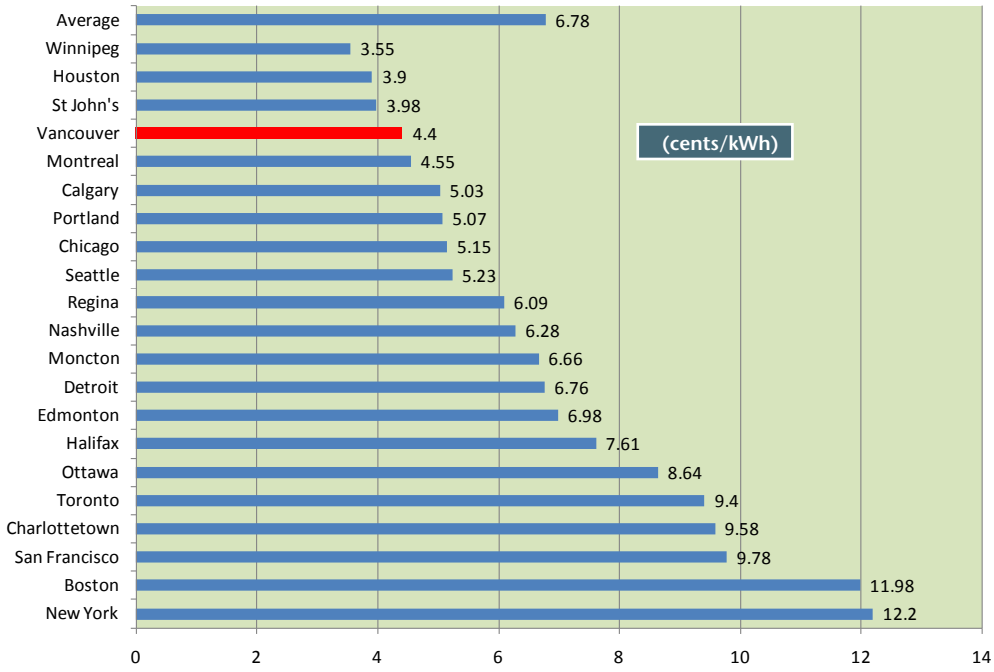
interests of residential and commercial ratepayers, new resource projects should, at a minimum, pay the full cost BC Hydro incurs to supply them with new electricity. If new resource projects are viable only with highly subsidized electricity, it is not clear why British Columbians would want to go forward with them in the first place and even less clear why other ratepayers should effectively subsidize them.[38]

Figure 1 shows that BC industrial rates are currently much lower than the average rates for industrial customers across North America.

BC Hydro's ability to charge lower rates stems from its large block of historic low cost public power. This low cost power brings down the average cost of power, even when much more expensive new energy is added to BC Hydro's total supply. But it is not clear why BC should charge industrial customers rates far below those prevalent in other markets. Arguably, the difference between the market price of electricity (average North American price) and the price paid in BC can also be considered to be a subsidy.[39] In Figure 1, the 2.34 cent per kWh differential across all of BC large industrial customers implies a subsidy of $308 million in 2011.

Aside from bringing in less revenue for BC Hydro (and the government), the low industrial rate provides little incentive for firms to engage in major conservation initiatives. To deal with this problem, BC Hydro has pursued an aggressive program of further subsidizing industrial customers

Figure 1: Comparison of large industrial power prices in major North American jurisdictions, 2011



Source: Quebec Hydro, *Comparison of Electricity Prices in Major North American Cities 2011*, www.hydroquebec.com/publications/en/comparison_prices/pdf/comp_2011_en.pdf

38 Of course, the significant, negative environmental impacts of such resource developments should also be a factor in decisions about whether to allow these projects to go forward, regardless of whether they pay the full costs of their electricity.

39 P-O. Pineau, *Pricing Electricity for Sustainability: Climate Change and Canada's Electricity Sector*, Sustainable Prosperity, 2010.

to install energy-saving equipment. Marvin Shaffer calculated that two BC Hydro Power Smart industrial projects undertaken in 2003 cost BC ratepayers between $17.9 and $38.2 million since, in his view, there should have been no need for BC Hydro to pay for these "investments."[40] Arguably, increasing industrial rates would have the same conservation benefit while not imposing additional costs on other ratepayers.

BC Hydro has introduced another measure intended to promote conservation: stepped or graduated rates, including industrial customers. The idea is to encourage conservation by charging the marginal cost of new energy for the last increment of power above a base threshold. The assumption is that customers will try to avoid paying the higher rate by keeping electricity consumption below the threshold at which the higher rate kicks in.

In the industrial sector, stepped rates apply only to the last 10% of energy purchased, based on a benchmark of an industrial facility's average consumption in previous yeas.[41] Perversely, in establishing industrial stepped rates, the government directed that they be revenue neutral, meaning that the price of the bottom 90% was adjusted downwards to compensate for the higher rate for the final 10%. Thus, while the final increment of energy now reflects more closely the cost of new energy, a number of industrial customers have actually been able to save money by avoiding the top 10% increment and paying a lower price for the energy below this threshold.[42] The revenue neutral requirement also means that even with stepped rates, the average cost of energy to industrial customers remains very low.

Under the current system for setting rates, the additional costs of this energy, as well as the infrastructure needed to deliver it, will be shared among all BC Hydro customers, even though the benefits will almost exclusively go to these resource projects.

40 Marvin Shaffer, "Review of BC Hydro's Industrial Power Smart Expenditures" A study prepared for B.C. Old Age Pensioners Association's submission to the BC Utilities Commission, 2004.

41 BC Hydro's Schedule 1823 industrial tariff is composed of a number of parts. This means the price charged to individual customers varies somewhat depending on their load requirements and the volume of baseline energy for which they qualify. The basic charge is $5.810 per kv of demand. The energy charge is $28.17 per MWh for the first 90% of baseline energy and $73.60 for energy used above this amount. This rate schedule explains why some customers were able to reduce their average cost of electricity when stepped rates were introduced, if they kept their energy use at or below the baseline charge.

42 During the economic downturn of 2008/09, some industrial customers continued to use more electricity than they really needed to ensure their threshold was not lowered when they returned to full production. As a consequence, they were wasting electricity. Scott Simpson, "Two Tier Electricity Rate Means Less Hydro Revenue" *Vancouver Sun* January 16, 2010. Citing a report submitted by BC Hydro to the BCUC, Simpson said BC Hydro lost $60 million from this practice in 2009.

PART 3

The Growing Cost of New Supply

The BC government barred BC Hydro from building new small hydro, wind or other renewable generation technologies. Simultaneously, it encouraged private corporations to acquire the best sites for run-of-river hydro and wind farm development.

OVER THE PAST DECADE, the BC government initiated a major shift in provincial electricity policy, designed to limit the role of BC Hydro and dramatically increase the role of the private sector in BC's electricity system.[43] Starting with the 2002 *Energy Plan*, it barred BC Hydro from building new small hydro, wind or other renewable generation technologies. Simultaneously, the government encouraged private corporations to acquire the best sites for run-of-river hydro and wind farm development. To provide the market for their energy, it also directed BC Hydro to acquire new electricity to meet the province's projected needs from private power projects through long-term energy purchase agreements (EPAs).[44]

In the years following the *2002 Energy Plan*, BC Hydro issued a series of contract tender calls to purchase clean electricity primarily from run-of-river and wind sources. BC Hydro awarded the largest of these new private power purchases in the summer of 2006—a staggering $15.6 billion in new contracts spread over 20 to 30 years at an average price, indexed to inflation, of $87.50 per MWh.[45] More recently, this has been supplemented by major purchases of biomass energy from pulp mills, including electricity generated from pine beetle wood.

In its updated *2007 Energy Plan* the government included more stringent environmental targets, including meeting at least 50% of future electricity demand through conservation by 2020.[46] It

43 This section summarizes research documented in more detail in J. Calvert, *Liquid Gold: Energy Privatization in British Columbia* (Fernwood Publishing, 2007); and M. Shaffer, *Lost In Translation: A Comprehensive Critique of the BC Energy Plan,* Prepared for the Canadian Office and Professional Employees Union, Vancouver, June 2007.

44 Government of BC, *Energy for Our Future: A Plan for BC*, 2002.

45 About one third of the contracts, by value, were not fulfilled as proponents were unable to proceed due to problems with financing, engineering, construction hurdles and other factors. While this might be seen as relief for ratepayers from having to pay the high prices in the contracts, BC Hydro still has to make up for the undelivered energy by negotiating more contracts at even higher prices.

46 Government of British Columbia, *The BC Energy Plan: A Vision for Clean Energy Leadership,* 2007.

BC Hydro Review

In its 2010 submission to the BC Utilities Commission, BC Hydro requested an increase in electricity rates by 52% between 2011 and 2015[a] and indicated it would require a cumulative revenue increase of just over 100% between 2010 and 2020.[b] The enormity of the proposed increases triggered a firestorm of controversy across BC as customers demanded to know why BC Hydro suddenly required such a massive rate increase. How could BC's most profitable and most successful Crown corporation suddenly be in such dire financial straits?

In response, the BC government launched a major Review of BC Hydro, led by three deputy ministers, to examine the reasons for BC Hydro's rate increases.[c] Submitted in June, the government did not release the report until August 2011, after it finalized negotiations with BC Hydro. Despite government having mandated the key policies followed by BC Hydro over the past decade, the Review managed to avoid pointing the finger at the government's electricity agenda. Instead, it placed most of the responsibility for the Crown utility's financial problems on the management of BC Hydro and the wages and benefits of its workers.

To cut almost in half the proposed rate hikes over the coming three years, the Review recommended postponing certain major capital investments, developing a new business plan, restructuring procurement practices, limiting employee overtime, restraining employee compensation and cutting 1,200 jobs. It also noted that the government should reconsider its demand that BC Hydro acquire sufficient energy to maintain a 3,000 GWh surplus even in low water years.

Without a proper understanding of the role of BC government policy in precipitating BC Hydro's current financial challenges, it is not possible to arrive at effective solutions.

The Review highlighted the cost of private power purchases from the 2010 tender call, which averaged $124 per MWh — considerably more than the 2010 electricity spot market price which, it noted, had fluctuated from a low of $4 per MWh to a high of $52. However, the Review made only the rather innocuous comment that ratepayers may be somewhat at risk from the high-priced, long-term private power contracts the government had directed BC Hydro to award.

Unfortunately, the superficial analysis provided by the Review and the policy prescriptions it recommended are, at best, little more than a short-run political fix to postpone immediate rate impacts. The Review did not address the fundamental causes of BC Hydro's current problems because of the extremely narrow terms of reference the government established. Without a proper understanding of the role of BC government policy in precipitating BC Hydro's current financial challenges, it is not possible to arrive at effective solutions. Moreover, many of the recommendations — such as postponing needed capital investments and cutting 20% of staff — are highly damaging to the Crown utility's ability to service its customers effectively and will adversely affect its future operations.

In response to the Review's recommendations and the prospect of major rate increases, the BC government cancelled scheduled BCUC hearings on BC Hydro's revenue application and capped rate increases at 17% over three years. Significantly, the increase for April 2013 — just before the provincial election — will be only 1.44%. After the 2013 election, however, the new BC government will have to address the inevitable need for price increases arising from a decade of bad policy choices.

[a] BCUC Order G-180-10, December 2, 2010.

[b] In its March 2011 Revenue Requirement Application, BC Hydro stated that "...(U)nder current rates, BC Hydro will suffer revenue shortfalls of $320 million, $667 million, and $1,054 million in F2012, F2013, and F2014 respectively, absent the requested rate relief."

[c] Government of BC, *Review of BC Hydro*, June 2011. The deputy ministers were John Dyble, Peter Milburn and Cheryl Wenezenki-Yolland.

also mandated that clean, or renewable, electricity generation continue to account for at least 90% of BC's total electricity production. In line with new commitments to reduce GHG emissions, it effectively scrapped its earlier support for coal-fired generation by including a new requirement that all new power plants have zero net GHG emissions by 2016. As carbon capture and storage technologies are currently not economically feasible, coal generation was ruled out.

The *2007 Energy Plan* set an objective of achieving "self sufficiency" from clean and green domestic power projects by 2016 using the lowest rainfall years as the basis for its calculation. To meet this requirement, the province directed BC Hydro to purchase an additional 3,000 GWh of "insurance" electricity that it argued was necessary to guarantee that BC would never face an energy shortage. (The government modified this controversial policy in February 2012—due to the high costs of new supply that would be passed on to ratepayers—to achieve self-sufficiency based, instead, on average rainfall years. We discuss the reasons for this change later in this paper.)

The 2007 Plan also directed BC Hydro to cease relying on the Burrard Thermal natural gas-fired plant in the Lower Mainland for planning purposes by 2014. In recent years, Burrard Thermal has normally produced only about 3% of its potential energy output, but its 900 MW capacity meant that BC Hydro could call upon it to supply electricity during periods of peak demand, normally in December. Burrard also provided some insurance that if the transmission lines from the major dams went down, there would still be power available to the Lower Mainland. Eliminating Burrard meant that BC Hydro would have to purchase even more private power.

Various policy decisions enabled the government to project a future shortage of energy that, in turn, it used to justify additional major private power purchases.

Coupled with a projection that BC would require up to 45% more electricity within 20 years, these various policy decisions enabled the government to project a future shortage of energy that, in turn, it used to justify additional major private power purchases. In practice, this meant that in normal, or high, rainfall years, BC Hydro would end up with a large surplus of power that it would have to sell on the international market at prices far below what it would have to pay to private providers.[47] The government's 2011 *BC Hydro Review* acknowledged that the surplus would be 3,000 GWh in a very low water year, between 7,000 and 8,000 GWh in a typical year and up to 14,000 GWh in a high water year.[48]

BC Hydro's next major energy purchase was the 2009 Clean Power call for biomass generated electricity, resulting in long-term contracts for an additional 3,265 GWh of energy, annually, at an average cost of $124 per MWh, a significant increase from the $87.50 paid under the terms of the 2006 energy purchase.[49] New renewable electricity supply keeps rising in price because the most promising, and generally lower cost, run-of-river and wind farm sites near the main transmission lines were developed first. As developers picked the low hanging fruit, the remaining sites were more expensive to develop.

To meet the projected demand for new energy, BC Hydro is planning a third hydroelectric dam on the Peace River, the 1,100 MW Site C dam. Part of its rationale for this project is that small-scale, renewable energy cannot meet the growing appetite for power from the resource sector for year-round, reliable electricity. Run-of-river energy is primarily available during the spring; because it lacks reservoir storage, it provides little energy in the late fall and early winter when BC needs it most. Wind, arguably, is a better match for BC's hydro-based system because it is

47 M. Shaffer, supra note 43.

48 Government of BC, *Review of BC Hydro*, June 2011, p. 92.

49 According to BC Hydro's *F2011 Revenue Requirement Application* to the BCUC, its projected cost for supplying 45,479 GWh of energy from its publicly owned hydro facilities was $398 million (F11 RRA p. and Appendix A, Schedule 4.0 p. 17). The average cost of this heritage energy was $7.7 per MWh. This data underscores the long-term advantages of public ownership of power generation assets.

not seasonal; however, it is intermittent and can fail to deliver energy at a time when it is most needed, as periods of extreme cold weather are often periods when winds are unusually calm. Backed by the large storage of the Williston Reservoir, Site C does not have these limitations. It could provide firm energy on a year round basis—the kind of energy developers of resource projects are demanding.

The 2010 BC *Clean Energy Act* [50] set out new, more rigorous conservation targets, mandating that by 2020, 66% of new electricity demand be met through a combination of energy efficiency and conservation and that 93% of total electricity production in BC be supplied by clean or renewable resources. But at the same time, the Act directed BC Hydro to meet its self-sufficiency target by 2016 and its 3,000 GWh insurance target by 2020 rather than 2026, meaning BC Hydro would have to accelerate its purchases of private energy.

Further, it committed the province to a major expansion of energy production though a new policy of explicitly promoting energy exports to the US. As with "self-sufficiency" the government expected BC Hydro to acquire private power for export through signing long-term contracts at guaranteed prices that were far above current market levels. It would then have responsibility for finding a market for this power. This meant it would end up accepting financial responsibility—and risk—for any shortfall between the price it paid and the price it could obtain from energy market sales.

A number of the new policies would have been the subject of detailed scrutiny by interveners at the BC Utilities Commission (BCUC). The government precluded this possibility by exempting many of the policy changes in the Act from BCUC review. The new legislation limited the role of the BCUC to domestic electricity rate setting, while exempting 10 projects and programs that would result in higher rates.[51] This allowed the BC government to direct BC Hydro to implement its new policies with no independent oversight.[52]

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In May 2012, the BC government significantly backtracked on some of the most extreme requirements of the *Clean Energy Act*. Bill 30 eliminated the 3,000 GWh insurance requirement. It also permitted BC Hydro to plan for its future electricity requirements on the basis of average, rather than low, water years. This major policy change will result in the Crown utility purchasing considerably less private power than would have been the case had the earlier Act's requirements remained in place. It also signalled that the government of the new premier, Christy Clark, recognized that the costs of proceeding would have further angered electricity ratepayers whose sensitivity to the rate increases had become a major political issue. But while it eliminated some of the most egregious aspects of the government's earlier policies, it left in place almost all the other components of its electricity restructuring agenda, including its commitment to expanding the role of the private sector in BC's electricity future as well as the exemption from BCUC oversight.

50 BC *Clean Energy Act*, SBC 2010, c.22.

51 These projects and programs include: the Northwest Transmission Line between the Skeena substation and Bob Quinn Lake; installation of new turbines in the Mica and Revelstoke hydroelectric dams; the Site C dam; the ongoing bioenergy and clean power calls; agreements with pulp and paper customers under Canada's Green Transformation Program; the Standing Offer Program; a (future) feed-in tariff program; and the smart meter program.

52 In light of this, the comment of the review committee that responsibility for many of BC Hydro's current problems lay in miscommunication from BC Hydro to the government seems curious.

PAYING FOR PRIVATE POWER

According to the *BC Hydro Review*, in 2010 private power projects supplied 16% of BC's total domestic electricity requirements, but accounted for 49% of overall domestic energy costs.[53] BC Hydro now has 112 active Electricity Purchase Agreements (EPAs) involving a commitment to purchase 20,084 GWh of energy annually.[54] BC Hydro continues to purchase new private energy under its "standing offer" program,[55] as well as a growing volume of biomass energy under phases one and two of its clean energy tender call. Table 2 shows the volumes of electricity BC Hydro is committed to acquire in the period from 2011 to 2014.

According to the BC Hydro Review, in 2010 private power projects supplied 16% of BC's total domestic electricity requirements, but accounted for 49% of overall domestic energy costs.

Table 2: BC Hydro purchases of private power (GWh)

IPP and Long Term Purchases (GWh)	Year			
	F2011	F2012	F2013	F2014
Pre-2000 EPAs	2,904	3,014	3,008	2,931
Island Generation Thermal	1,929	255	263	245
2000 Green RFEOI	140	153	153	153
2001 Green Energy Call	692	715	715	715
2002 Customer Generation Call	287	295	295	208
2002/3 Green Power Gen Call	614	637	637	639
F2005 Call (inc. Brilliant)	1,783	2,424	2,462	2,530
Alcan 2007 EPA	3,103	3,289	3,307	3,394
Bioenergy Call—Phase 1	352	547	627	632
2009 Clean Power Call			146	1,359
Standing Offer Program	58	85	160	160
Integrated Power Offer		204	595	642
Total (GWh)	**11,862**	**11,618**	**12,368**	**13,606**

Source: *BC Hydro F2012–2014 Amended Revenue Requirement Application*, Table 4–6.

Given the high cost per MWh of recent purchases, the projected bill for this growing volume of power has increased dramatically over the last decade. In fiscal 2003, it was $290 million. BC Hydro projects that by fiscal 2014 it will reach $1.13 billion[56] (Figure 2). In its *Draft 2012 Integrated Resource Plan*, BC Hydro aspires to contract an additional 2,000 GWh from private suppliers in the next few years.

Also important is the total liability BC Hydro has incurred as a result of signing long term EPAs. Many of the contracts BC Hydro signed are only just beginning to deliver power.[57] Growing annual

53 Government of BC, *Review of BC Hydro*, June 2011, p. 107.

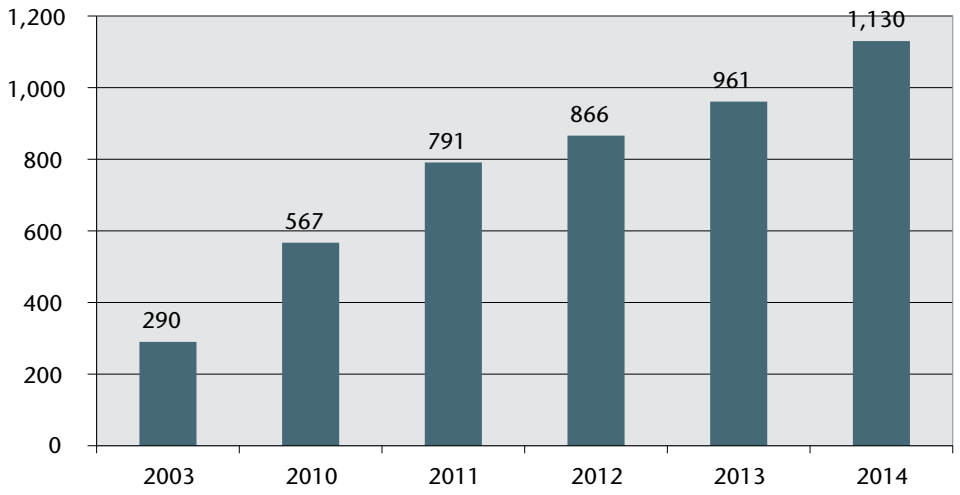
54 Of these, 64 projects were operational as of April 2011. BC Hydro, *Amended F2012 to F2014 Revenue Requirement Application,* Table 4-5, www.bchydro.com/etc/medialib/internet/documents/planning_regulatory/rev_req/amended_bch_f12_f14_rra_chapters.Par.0001.File.amended_bch_f12_14_rra_chapters.pdf

55 BC Hydro has a "standing offer" in which it directly negotiates new purchase agreements with developers building projects of less than 15 MW in capacity (increased from the earlier 10 MW threshold).

56 BC Hydro, *Revenue Requirement Rate Application 2004/5–2005/6,* December 15, 2003.

57 For example, the relatively larger 195 MW Forrest-Kerr hydro project will not start delivering its expensive power until late in 2014 under the terms of a 60-year agreement with BC Hydro. Renewable Energy World, *AltaGas and BC Hydro Sign Purchase Deal for Forrest Kerr Hydro Project*, June 2, 2010.

Figure 2: Increasing costs of private power purchases ($ million)



Source: BC Hydro F2004/5 and Amended 2012/14 Revenue Requirement Applications to BCUC, Table 4–7

commitments from these agreements will result in large—and ongoing—future rate increases for BC Hydro's residential customers. According to BC Hydro's *2011 Annual Report,* the Crown utility has contractual agreements that amount to $43 billion; of these, approximately $40 billion are for energy purchases from private power developers.[58] This is an enormous financial commitment that will impact ratepayers for decades into the future. Energy purchase costs are now the largest single component of BC Hydro's annual expenditures.

As noted, the government's *Review* indicated that BC Hydro paid $124 MWh for the energy it purchased from private power developers in 2010. Coupled with the growing volume of private power purchases, this means that BC Hydro will have a significant surplus of energy during the spring, especially in high-water years. It will most likely end up selling the surplus in the US Mid-Columbia electricity trading hub. Based on the average trading price of 2011, BC Hydro could well end up selling private power purchased for $124 MWh at $36 MWh—a loss of $88 for every MWh it buys.[59]

Because the 2012 spring freshet is running at 131% of BC Hydro's normal spring flow, the Crown utility has had to shut down some of its own generating facilities and spill water rather than produce power. According to one estimate, in the three month spring freshet in 2012, BC Hydro lost $180 million through contractual commitments to purchase private power—power it did not need and could not sell on the market due to the glut of hydro based power in the Pacific Northwest.[60]

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58 BC Hydro, *Annual Report 2011,* note 16: Commitments and Contingencies: Energy Commitments, p. 80.

59 Government of BC, *Review of BC Hydro*, June 2011, p. 107. One reason BC Hydro is unlikely to get a price premium for this energy is that California has thus far refused to consider it as fully renewable energy under its cap and trade rules; thus, it is treated in the same way as energy produced from coal or natural gas. Because BC's imports and exports include energy generated from fossil fuels, California takes the view that BC is able to "launder" coal-produced electricity through this process and refuses to provide any price premium for BC's hydro based energy.

60 Scott Simpson, "BC Hydro losing $180 million to private power contracts this spring, NDP Says" *Vancouver Sun*, May 17, 2012, http://blogs.vancouversun.com/2012/05/17/bc-hydros-private-power-purchases-cost-180-million-this-spring-ndp-says/; Scott Simpson, "Water glut stalls BC Hydro production: Independents keep busy while Crown corp. waits for summer" *Vancouver Sun*, May 11, 2012, www.vancouversun.com/business/2035/Water+glut+stalls+Hydro+production/6603020/story.html#ixzz1yGYPfDbp

Moreover, the long-term price of electricity in the Pacific Northwest is largely shaped by the price of natural gas. There is considerable evidence that natural gas prices will remain very low for at least a decade—and possibly much longer—due to the revolution in shale gas "fracking" throughout the US and Canada. In reality, no one knows with certainty the exact price of energy a decade or two from now, or how much surplus electricity BC Hydro would end up selling on the market at that time. But the risk is being carried entirely by BC's ratepayers who could end up losing billions over the lifetime of these 20 to 60 year contracts.

One reason that this has not been a bigger public issue until quite recently is that, as noted earlier, ratepayers have not fully experienced the costs of these expensive contracts. There is a significant time lag—normally six to eight years—between BC Hydro signing a contract and the private developer delivering power. Consequently, the impact of purchase agreements signed half a decade ago, or more, are only now showing up in the bills of BC Hydro customers.

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The dramatic increase in rates that BC Hydro requested the BCUC to approve in its recent Revenue Requirement Applications has alarmed the public, who are now demanding an explanation. The BC government and BC Hydro have argued that most of the increased revenue is needed not because of the results of the government's energy policies over the past decade but rather for reinvestment in BC Hydro's own infrastructure. In support of this position, the government has pointed to BC Hydro's ambitious capital investment program. In its F2012–F2014 *Revenue Requirement Application* to the BCUC, BC Hydro maintained that it needed to upgrade major components of its aging facilities, including installing new turbines in several dams, modernizing its high voltage transmission lines to the Lower Mainland and refurbishing other components of its infrastructure, as well as the potential cost of Site C, should it proceed. It projected capital spending, excluding Site C, as more than $6 billion over the three years to the end of fiscal 2014.[61]

However, a significant part of the spending identified by BC Hydro and the government's 2011 *Review* is the result of the government's own policy directives. These include the controversial $930 million smart meter program, the $850 million BC Hydro paid to mining giant Teck-Cominco for one third of the energy of the Waneta power plant (in which it remains in a minority position), and the major expansion of transmission lines, generating stations and related facilities it needs to service the growing mining industry and LNG, oil and gas sectors. Also included is the expenditure required to connect and service the increasing number of private power projects that need to link to the main grid. These costs are in addition to the growing volume of private power purchases the government has directed BC Hydro to make, as noted earlier.[62]

61 *BC Hydro Amended F2012–F2014 Revenue Requirement Application.* The largest capital projects planned include the Vancouver City Central Transmission Project, the Columbia Valley Transmission Project, and the Interior to Lower Mainland Transmission Project, the Northwest Transmission Line Project, the Smart Metering and Infrastructure Program, the Mica Units 5 and 6 Project, the Ruskin Dam and Powerhouse Upgrade Project, the John Hart Upgrade Project, and the Site C Clean Energy Project.

62 Large infrastructure costs would be involved even if projects were developed by BC Hydro rather than IPPs; however, profit margins would not have to be paid to private power developers, and the public would own the generation assets.

PART 4

Demand, Supply, Conservation and Efficiency: The Missing Pieces

BC HYDRO'S *2010 RESOURCE OPTIONS REPORT* identified a wide range of renewable supply options that could be developed to meet the province's growing appetite for power. But even if developed through BC Hydro rather than contracted from private power producers they are expensive.[63] As a benchmark, the Site C dam will cost $104 per MWh, compared to wave ($373 to $673), tidal ($222 to $488), and solar ($376 to $884) power. Some middle ground exists for geothermal ($67 to $446), run-of-river ($86 to $1,327) and wind ($114 to $340 for onshore and $165 to $638 for offshore). Efforts to increase supply to meet additional electricity demand inevitably run into these large costs that must translate into higher rates. Whatever technology is used, building new generating capacity will be expensive.[64]

Efforts to increase supply to meet additional electricity demand inevitably run into these large costs that must translate into higher rates. Whatever technology is used, building new generating capacity will be expensive.

This reality points to the need to make much better use of the electricity we currently produce to minimize the need for new power plants. Conservation and energy efficiency (also known as "demand side management" or DSM because it reduces the underlying demand for energy) are generally accepted as the least expensive, lowest impact form of meeting new energy demand. DSM typically includes savings from improvements in energy efficiency of buildings, lighting and appliances. And because all electricity generation, no matter how "clean," has some environmental cost, DSM can avert adverse impacts from new projects.

Other alternatives include small and neighbourhood-scale energy projects. These are a complementary approach that can reduce demand for electricity from BC Hydro. Installation of solar hot water heaters (and to a lesser extent, photovoltaic panels, although costs of solar PV remain

63 See Table 2-2 on page 2-2, BC Hydro, 2010 Resource Options Report, Final Report, February 2012, www.bchydro.com/etc/medialib/internet/documents/planning_regulatory/iep_ltap/2012q1/2010_resource_options.Par.0001.File.2010ResourceOptionsReport.pdf

64 In its *Draft 2012 Integrated Resource Plan*, BC Hydro notes that new natural gas generation may be needed due to demand from industry.

high and there are still significant issues with grid interconnections) is a good example. District energy systems offer considerable potential for reducing electricity demand and for reducing GHG emissions if they use renewable sources. A 2008 survey of district energy systems in Canada[65] identified 11 operational systems in British Columbia, with a combined capacity of 64 MW, and several more systems that were planned or under construction. The Southeast False Creek Neighbourhood Utility, a district energy system using waste heat from sewage (plus natural gas), is expected to reduce the heating requirements of buildings by 70 to 90%. Combining this system with energy efficient buildings and solar thermal collectors results in even further emissions and energy savings.[66]

These initiatives need to be supported by increasingly tough regulations for both the transportation sector and the built environment. Governments have a responsibility to set standards that will require all sectors of the economy to focus on energy conservation.

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As BC Hydro's 2007 *Conservation Potential Review* noted, in addition to saving electricity, sustainable community design and smart growth policies can lead to other community benefits such as more efficient transportation systems, less traffic congestion, reduced sprawl and the maintenance of green space.[67] While the efficiency and conservation potential of integrated community planning is often not included in conservation estimates, a recent study undertaken by QUEST (Quality Urban Energy Systems for Tomorrow) found that municipal policies promoting such things as higher-density, mixed-use communities and district energy systems have the potential to reduce urban emissions in Canadian cities by 5 to 12% (13 to 35 Mt CO_2e) by 2050.[68]

Finally, real reductions in electricity consumption need to be on the table—in particular, the current appetite from dirty industries like mining and oil and gas. In other Climate Justice Project research, a target of zero emissions from fossil fuels by 2040 was established. Clearly, some fossil fuel consumption will inevitably be part of BC's energy mix for the next few decades of transition. But rejecting the growth of these industries in the near-term and planning for a wind-down should inform planning for electricity supply and demand.

The *Conservation Potential Review* identified 22,607 GWh per year of economic conservation and efficiency potential—that is, benefits exceeding costs, up to a price of 13 cents per kWh, by the year 2026 (although because of market imperfections, not all of these savings may achievable). The most aggressive approach would push BC to live within its existing electricity supply, meeting all new electricity demand (population growth and new appliances and gadgets) through energy efficiency and conservation. Indeed, the forward to the *Conservation Potential Review* suggests that after an increase in electricity demand, peaking around 2015, it is entirely possible to see electricity demand return to 2007 levels.

65 District Energy: A National Survey prepared by the District Energy Association 2009 http://cdea.ca/resources/CDEA_finalnationalsurveyreport.pdf/view; note that the Canadian District Energy Association estimates 25 green jobs per project.

66 City of Vancouver, "Neighbourhood Energy Utility" http://vancouver.ca/sustainability/building_neu.htm

67 Available at BC Hydro, Conservation Potential Review, 2007, www.bchydro.com/about/company_information/reports/electricity_conservation.html

68 MK Jaccard and Associates, *The capacity for integrated community energy solutions (ICES) policies to reduce urban greenhouse gas emissions.* Report prepared for QUEST (Vancouver, August 2010). Retrieved from www.questcanada.org/documents/FinalSummaryReport.pdf

We present a conservation and efficiency scenario in Table 3. Projections for residential, commercial and industrial demand are from BC's Hydro's 2010 *Electric Load Forecast*, and do not include adjustments for demand side management programs. We compare this to BC Hydro's *2010 Resource Options Report*, which models five DSM options, and use the most aggressive Option 5, which calls for "a comprehensive effort to change market parameters and societal norms and patterns in order to save electricity [and] contains strong codes and standards and conservation rate structures."

Table 3: Demand growth vs conservation (GWh)

Demand (GWh)	2010 Actual	2020	2030
		Baseline increase	
Residential	17,650	21,658	24,752
Commercial	15,515	20,364	23,465
Total industrial	15,608	22,586	24,151
Other sales and transmission losses	6,761	8,580	9,710
Total gross requirement	55,534	73,188	82,078
Demand side management		**(13,500)**	**(20,500)**
Net demand	55,534	59,688	61,578
Incremental demand		**4,154**	**6,044**

Source: Actual and baseline demand forecasts from BC Hydro, Electric Load Forecast 2010/11 to 2030/31. Demand Side Management Option 5 in BC Hydro *2010 Resource Options Report*.

Table 3 shows that only modest increases in total demand are required if aggressive DSM is implemented. By 2030 an increase of 6,044 GWh would be required, an 11% increase above 2010 levels. DSM measures to achieve this include options:

> *… to create a future where buildings are net-zero consumers of electricity with some buildings being net contributors of electricity back to the grid. Energy efficiency and conservation activities are pervasive throughout society and ingrained in a business decision-making culture. This shift is reflected through widespread district energy systems and micro-distributed generation, smaller more efficient housing and building footprints, community densification, distributed workforce and hotelling (shared workspace), best practices in construction and renovation, efficient technology choices and behaviour, and an integrated community perspective (land-use, zoning, multi-use areas).... For the industrial sector, a market transformation to certified plants occurs, supported with expanded regulation.*[69]

This demand profile would fit within existing supply options. Existing hydro generation can range from 42,700 to 53,400 GWh per year, depending on water conditions.[70] As noted above, purchases of private power have been rising and will be around 12,000 GWh over the next few years, with contracts for 19,000 GWh on the books. That is, supply would be sufficient in average- to high-water years, but some net imports would be required in very low water years.

69 BC Hydro, *2010 Resource Options Report*, Chapter 4, www.bchydro.com/etc/medialib/internet/documents/planning_regulatory/iep_ltap/2012q1/2010_resource_options.Par.0001.File.2010ResourceOptionsReport.pdf

70 BCH Revenue Requirements report 2012-14 (p. 4-7), supra 54.

While this DSM scenario is ambitious, one thing it does not consider is the existing demand from industrial sectors that are GHG-intensive and need to be wound down in the transition to a zero-carbon economy. That is, if we remove demand from the oil and gas industry (3,995 GWh in 2030) and coal mining (917 GWh), this amounts to 4,912 GWh of the 6,044 GWh increase in baseline demand. Table 4 shows a plausible alternative scenario for industrial demand that ramps down electricity supplies to fossil fuel industries, while preserving a reasonable base supply for green industrial applications.

Table 4 shows other industrial demand shifts that could go deeper. Aggressive re-use and recycling policies implemented in BC under a "zero waste" mandate would reduce the need for extracting virgin materials, and if new mines were to pay the full cost of any new power consumed, demand from the metal mining sector could be one third to one quarter the estimate for 2030. In forestry, pulp and paper plants are already generating electricity sold back to the BC Hydro grid, and could move toward meeting most or all of its electric power needs. All together, these shifts in industrial demand would exceed the incremental demand in Table 3.

The remaining planning challenge comes from two areas of new demand: conversion of homes currently using fossil fuels (space and water heating, primarily) and electrification of transportation. Surplus electricity after making the adjustments above would be available to facilitate electrification of existing homes and vehicles. However, BC Hydro estimates that converting all vehicles to electric would increase demand by 9,000 GWh per year, and electrification of remaining homes would be 26,000 GWh per year (22,000 for space heating and 4,000 for water heating). This represents a massive increase in demand that far exceeds any likely conservation measures discussed above—although it will happen over a longer timeframe.[71]

Table 4: Industrial demand (GWh)

	2010 Actual	2020		2030	
		Baseline	Alternative	Baseline	Alternative
Forestry	9,390	9,911	7,500	11,070	5,000
Metal mining	2,308	4,507	2,000	4,551	1,000
Coal mining	524	942	500	917	200
Oil and gas	691	3,906	600	3,995	300
Other industry	2,695	3,320	3,000	3,618	3,000
Total industrial	15,608	22,586	13,600	24,151	9,500

Sources: Actual 2010 and baseline demand forecasts from BC Hydro, Electric Load Forecast 2010/11 to 2030/31; alternative scenarios are authors' estimates.

Accommodating electricity demand for transportation requires a structural shift toward "complete communities" that would see people living closer to where they work, shop and access public services and amenities.[72] In this vision, trips by car would represent only one quarter of trips compared to 75% currently (in Metro Vancouver), with walking and biking representing half of trips, and public transit the remaining quarter. Improving the efficiency of all vehicles (smaller vehicles, lighter bodies, and other technical improvements) also has vast untapped potential. These shifts would dramatically reduce the incremental demand for electricity from BC Hydro.

71 Electric vehicles could also serve as additional "batteries" for the electricity system to assist BC Hydro to smooth the electric load by charging vehicles during low periods overnight, and drawing down electricity during daytime peaks.

72 See P. Condon et al., *Transportation Transformation*, supra note 12.

For homes, we first must also apply the same aggressive DSM policies, including a major retrofit program for BC housing in conjunction with fuel switching renovations.[73] This would reduce the incremental demand from homes by one third to one half. In addition, the development of complete communities would imply denser living arrangements with more shared walls, with reduced energy demand. And a large portion of incremental water heating demand could be reduced by solar hot water systems. By 2040 it is realistic to imagine such broad-based changes taking place if political will is present.

In Table 5, we consider these shifts. Although they still lead to a net increase in demand of 7,000 GWh in 2030 and 10,000 GWh in 2040, these estimates are substantially less than current demand estimates from BC Hydro. Further netting out additional reductions in industrial demand would bring down the anticipated incremental demand. Aggressively pursing the energy efficiency and conservation potential in BC, combined with support for small- and community-scale renewable technologies, will drastically reduce, and perhaps eliminate, the need for new large-scale supply, but only if the government's energy intensive resource extraction policies are dramatically scaled back.

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Table 5: Electrification of homes and vehicles (GWh)

Electrification demand baseline	**2020**	**2030**	**2040**
Homes	5,000	18,000	26,000
Vehicles	1,000	4,000	9,000
Conservation potential			
Transportation transformation and complete communities	1,000	3,000	7,000
Additional home DSM	3,000	12,000	18,000
Net increase in demand	2,000	7,000	10,000

Sources: Electrification figures based on BC Hydro Long-Term Acquisition Plan 2008; conservation potential based on authors' estimates.

When combined with other land-use and neighbourhood planning strategies, there is considerable potential for community-scale energy projects to reduce overall energy use and related GHG emissions. At the same time, these projects may contribute to social justice by giving communities the power to decide the appropriate balance between environmental and financial risks and benefits. Therefore, due to their favourable economics and the potential co-benefits, integrated community energy planning should be a key component of a clean and equitable energy strategy.

In addition to conserving energy, another option to meet future needs is to make full use of the "downstream benefits" electricity the government owns as a result of the Columbia River Treaty with the US. This is a significant block of electricity, amounting to about 4,300 GWh of firm energy, roughly 8% of what BC uses each year. BC is entitled to this energy in compensation for the construction of three large reservoirs on the Columbia River on the Canadian side of the border, built to store water from the spring run-off and release it later in the year, enabling the numerous Bonneville Power dams downstream to generate additional electricity during the summer and fall. The reservoirs also assist the US in meeting flood control requirements.

73 See Lee et al., *Fighting Energy Poverty in the Transition to Zero-Emission Housing*, supra note 5.

In making its projections of future electricity requirements, the government arbitrarily excluded from its calculations the Columbia River Treaty's downstream benefits, which it normally sold in the US energy market. Inclusion of the Columbia River Treaty electricity in the calculations of BC's supply results in BC having a surplus, not a deficit, almost every year over the past decade. It also reduces, somewhat, the need for building new power capacity within the province. Regardless of whether the government continues to sell the energy in the US and imports an equivalent amount to add to BC's supply, or whether it actually arranges for it to be returned across the border to BC Hydro's grid, this energy should be included in BC's supply calculations.[74]

Aggressively pursing the energy efficiency and conservation potential in BC, combined with support for small- and community-scale renewable technologies, will drastically reduce, and perhaps eliminate, the need for new large-scale supply, but only if the government's energy intensive resource extraction policies are dramatically scaled back.

Some expansion of renewable sources of electricity in BC could also make a further contribution to BC's future supply, although it will prove very expensive due to the much higher cost of small-scale projects, particularly those located in remote areas where construction costs are high. The intermittent character of much of the energy produced by these generation technologies means they need storage capacity in the form of BC Hydro's dams. To the extent that these projects are worthwhile, they should be done by BC's public utility, where profit margins need not be paid out to private investors, the public retains control over generation assets, and environmental and social impacts can be given full and proper consideration.

74 While zero fossil fuels in electricity generation is an ideal for 2040, in the interim BC Hydro should be able to include the capacity of the gas-burning Burrard Thermal power station in its planning. This station provides 900 MW of back-up capacity in the Lower Mainland, used primarily during cold snaps, but hardly at all for producing energy. Its inclusion for planning purposes reduces the need to acquire more energy without risking system shortfalls.

PART 5

Where Do We Go From Here?

THE PRECEDING ANALYSIS points to the need for fundamental change in the government's overall electricity policies and its power-intensive resource development strategy if it is to meet its climate objectives. While BC can incorporate more renewable energy into the system, and increase spending on conservation initiatives, without a basic change in the government's broader economic policies, these initiatives will be inadequate to compensate for the large amount of new energy needed by industrial customers. Maintaining the present policy direction, even for a few more years, will make it much harder to address global warming in the future.

Maintaining the present policy direction, even for a few more years, will make it much harder to address global warming in the future.

There are measures we can adopt to put BC back on the right track, and renew BC Hydro as a key strategic asset in the province's Climate Action Plan. Some of these have to do with repealing the ill-conceived policies incorporated into the 2002 and 2007 Energy Plans as well as the 2010 Clean Energy Act. Others address the specific problems now facing BC Hydro, and changes needed to facilitate the achievement of our larger environmental objectives.

We recommend the following measures for a balanced supply and demand planning framework for BC, anchored in public power, and refocused on meeting BC's GHG reduction targets.

1. RETHINK BC HYDRO'S INTEGRATED RESOURCE PLAN

BC Hydro is developing a new long-term Integrated Resource Plan by December 2012 for approval by the provincial government. An integrated planning approach must look at all aspects of energy use in BC, in the context of a multi-decade shift to a zero-carbon BC. This will include aggressive energy efficiency and conservation as a top priority, coupled with more prudent use of renewable electricity supplies. It should fundamentally build on the strengths of BC Hydro as a Crown corporation to meet the overarching need for collective action and structural change that is essential to climate action. Powers for public oversight and approval of major projects should be restored to the BC Utilities Commission.

Although damaged by questionable government policy directives, BC Hydro still can be a central player in closing the gap between good intentions and a coherent climate and energy agenda. Importantly, the government must resist the temptation to accommodate growing demand for power from high-GHG industries through directing BC Hydro to supply all their new energy. Rather than using our Crown corporation as a vehicle for promoting private power interests and subsidizing resource projects, the government should direct BC Hydro to plan for the province's future electricity system based on the central role it must play in furthering BC's climate objectives.

While recently modified, BC's "self-sufficiency" targets are both arbitrary and costly. These should be abandoned in favour of a more pragmatic approach that meets BC's needs across different sectors of the economy in a cost-effective manner, by continuing to take advantage of electricity trading opportunities. Long-term planning must also consider the impacts of climate change on electricity generation assets. Of particular concern is the retreat of glaciers that feed BC's hydroelectric dams.

2. RAMP UP EFFICIENCY AND CONSERVATION MEASURES

The government must resist the temptation to accommodate growing demand for power from high-GHG industries through directing BC Hydro to supply all their new energy.

As BC Hydro has noted, the cheapest way to meet new energy demand is through conservation, and there exist many untapped possibilities. BC Hydro has modeled plans for next generation demand side management (DSM) programs, and should commit to enacting the most aggressive options and developing a culture of conservation. There is scope for testing innovative pilot programs, then rolling them out across the province.

While incentive and subsidy programs such as Power Smart may continue to play a role, the government should make much more use of its regulatory powers to require commercial and residential buildings to meet energy efficiency standards comparable to the much higher European Union efficiency regulations. Mandatory energy audits and breaking down financial and other market barriers to efficiency upgrades are also required. The government can also push for major efficiency improvements from large industrial customers through tougher regulations and rate pricing policy tools rather than subsidies. Promoting conservation will also give a major boost to green job creation as retrofitting is labour intensive.

3. DO NOT SUBSIDIZE HIGH-GHG INDUSTRIES

Investments in resource projects, once made, are very difficult to reverse. Investors will oppose restrictions on their activities and can be expected to demand full public compensation for future policy shifts that negatively affect their profit expectations. Many of the projects are fully or partially owned by investors from other provinces or the US. Consequently, the investment obligations of the BC-Alberta Trade, Investment and Labour Mobility Agreement and the North American Free Trade Agreement will give their owners the legal venues to challenge any policy they view as detrimental to their interests.

The government should reassess its policy commitment to expand capital-intensive resource industries. Providing subsidies and tax breaks to mines and oil and gas projects is not a viable long-term development strategy for the province. Encouraging development of new mines and oil and gas projects by offering low-cost electricity, cross-subsidized by BC Hydro ratepayers, is not sustainable and can also have a negative effect on other economic sectors by effectively

reducing the incomes of ratepayers through higher residential electricity prices. There are also significant opportunity costs associated with channeling major public infrastructure investments to resource projects at the expense of other areas of the provincial economy.

Because of the high cost of acquiring new electricity supply, BC Hydro should charge new resource projects the full marginal cost of the additional power they require, including transmission extensions, upgrades and related infrastructure investments. The current transmission rate—roughly $40 per MWh—encourages investment based on electricity that is increasingly subsidized by residential and small commercial ratepayers. If projects are not viable at the marginal cost that BC Hydro pays to build, or acquire, new energy, including related infrastructure costs, they should not go forward.

4. COMMIT TO RENEWABLE PUBLIC POWER

The government should direct BC Hydro to cancel further tendering for new private power. This should include ending BC Hydro's "standing offer" program that allows BC Hydro to negotiate contracts of less than 15 MW in capacity without a new tender call and with no effective control over prices or costs. It should also reassess the value of having a feed-in tariff that forces BC Hydro to purchase energy at extremely high prices without regard for whether it is beneficial in addressing the province's electricity system needs or is encouraging a misuse of resources that could much better be used in more efficient power generation technologies.

To the extent that we need additional energy supply, future electricity generation should be 100% renewable and developed in the public sector. The government should also place a moratorium on awarding new water licenses and new wind farm tenures. The policy of giving these licenses and tenures to private developers constitutes a massive giveaway of public assets.

To the extent that we need additional energy supply, future electricity generation should be 100% renewable and developed in the public sector.

Existing water licenses and wind farm tenures should return to the public domain once their terms expire, rather than automatically extending them as has been the practice in the past. In the interim, the government should raise water rental fees and capacity charges, which are currently approximately 2% of the value of the energy generated by most private power projects, to a more realistic level so that the public is able to obtain a fairer price for its water resource. The 10-year tax holiday for wind farms should be cancelled.

5. PRICE CARBON

While a major shift in BC's electricity policy is essential to the achievement of needed climate objectives, it must be accompanied by a broader package of climate measures that address other key contributors to BC's carbon footprint. Another way to shift toward renewable energy and encourage conservation is to put a higher price on carbon emissions. There is a strong argument for using policy tools such as a carbon tax, in conjunction with the preceding recommendations on energy policy.

While a carbon tax is a sound policy measure in principle, as another CCPA Climate Justice Paper argues, the BC government has implemented its carbon tax in a manner that is inequitable and largely ineffective. It fails to use part of the revenue generated to fund new climate initiatives, and results in lower income residents paying a greater share of their income to the tax than higher income earners. The report recommends a carbon tax of $200 per tonne by 2020, with half the

proceeds going to the creation of a credit for low- to middle-income households in a manner that the bottom half of households would receive more in credits than they would pay in tax, on average. The other half would go to supporting climate action investments, such as public transit, energy efficiency, and green jobs development.[75]

6. ASSESS REGIONAL IMPACTS

A key justice consideration concerns the differential regional impacts of power generation costs and benefits. BC should develop a regionally-based screening process to determine areas in British Columbia where the development of renewable electricity, if it is truly needed, is appropriate and areas where it is not. This type of regional assessment must be transparent and allow for the full participation of local communities and First Nations.

Planning should be based on a regional model that provides an open, accessible, and transparent process for determining acceptable and appropriate development in each region.

Planning should be based on a regional model that provides an open, accessible, and transparent process for determining acceptable and appropriate development in each region. Critical regions and ecosystems should be identified and protected, with cumulative impacts assessed across resource sectors, and new renewable energy development matched with regional profiles.

Within areas where it is deemed that (specific) renewable electricity development is appropriate and environmentally acceptable, priority should be given to ensuring that local governments, community organizations, and First Nations have effective input into the process and that the benefits are shared equitably with them. The province needs a much fairer approach to compensating First Nations and local communities impacted by energy development. The Columbia Basin Trust is one example of how compensation can be directed back to the most highly impacted communities.

7. CONFRONT ENERGY POVERTY

Regardless of changes in government policies in the future, BC Hydro is now saddled with a cost structure that will mean substantial rate increases over the next decade. In its Revenue Requirement Application to the BCUC noted earlier, BC Hydro indicated that it would need an increase of fully 100% over the next 10 years to meet its financial needs. Even without the measures we have outlined, residential ratepayers will see rates double over the next decade, greatly increasing energy poverty in BC.

The province should develop new policies to cushion the impact of rate increases on low-income residents. A Climate Justice report on energy poverty recommends an offsetting income transfer for low to middle-income households to ensure they are no worse off due to higher electricity prices. If developed properly, this would improve the conservation benefits of higher prices, without an increase in energy poverty.

The report also recommends making the tiered pricing system more progressive by concentrating rate increases on the biggest consumers, and an expanded provincial program of energy efficiency retrofits that targets older buildings, multi-unit buildings and rental housing that is

75 M. Lee, *Fair and Effective Carbon Pricing: Lessons from BC* (Vancouver: CCPA–BC, February 2011) www.policyalternatives.ca/publications/reports/fair-and-effective-carbon-pricing

disproportionately occupied by low-income households who do not have the resources or the agency to make energy efficiency investments.[76]

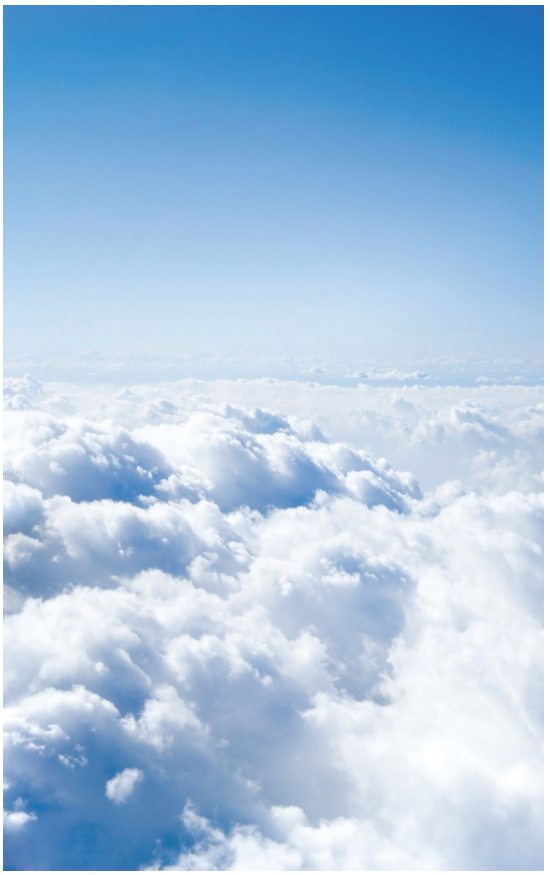
CLEARLY THERE ARE OTHER IMPORTANT POLICIES that BC should adopt to address the challenge of climate change. Our hope is that the analysis and recommendations we have presented will contribute to a wider discussion about how BC can transform our economy in the coming years in a manner that dramatically lowers GHG emissions and fossil fuel use, while doing so in a way that is socially just, environmentally responsible and economically prudent.

76 Lee et al., *Fighting Energy Poverty in the Transition to Zero-Emission Housing*, supra note 5.

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.

www.climatejustice.ca



CCPA
CANADIAN CENTRE
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BC Office

The Canadian Centre for Policy Alternatives is an independent, non-partisan research institute concerned with issues of social and economic justice. Founded in 1980, it is one of Canada's leading progressive voices in public policy debates. The CCPA is a registered non-profit charity and depends on the support of its more than 10,000 members across Canada.

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