s u s t a i n A B L E

Central Kootenays

Backgrounder: Energy, Emissions & Reduction Opportunities (Rural Areas)

Introduction

As part of the Central Kootenay's Integrated Community Sustainability Planning process, the RDCK has gathered input from rural area residents that will help to guide the various Official Community Plans and ongoing discussions on sustainability in the RDCK. The input gathered during a survey in the fall of 2009 was also used to guide this background work on energy use and greenhouse gas emissions that will help our rural areas advance provincial objectives and fulfill legislation requirements.

The Province of BC has initiated a number of legislation and policy actions designed to encourage energy efficiency and reduce emissions of greenhouse gases (GHGs). These include a legislated target to reduce the total GHG emissions in the province by 33% from 2007 levels by 2020, and 80% by 2050, (Greenhouse Gas Reduction Targets Act - Bill 44, 2007).

Of specific relevance to local governments is the Local Government (Green Communities) Statutes Amendment Act (Bill 27, 2008). "Bill 27" amends the Local Government Act to read:

- LGA 877 (3) - An official community plan must include targets for the reduction of greenhouse gas emissions in the area covered by the plan, and policies and actions of the local government proposed with respect to achieving those targets (by May 31, 2010)
- LGA 850 - Required Content of a Regional Growth Strategy:
  (2)(d) to the extent that these are regional matters, targets for the reduction of greenhouse gas emissions in the regional district, and policies and actions of the local government proposed for the regional district with respect to achieving those targets (by May 31, 2011)

In addition, Bill 27 provides some additional enabling powers to local governments to assist them in achieving reductions of community-wide emissions.

This backgrounder provides a review of the energy use and GHG emissions inventory for these areas, a summary review of policies that have energy and GHG implications, and a scoping level analysis of the potential reduction opportunities for these areas over the next 20 years.

Inventory and Forecast Methodology

Review of the CEEI Inventory Data

The Province has developed community-wide energy use and emissions inventories for all municipalities and regional districts in BC. These Community Energy and Emissions Inventory (CEEI) reports provide the total of the electricity and natural gas consumed in the community and an estimate of the vehicle fuel consumption for the baseline year of 2007. The associated GHG emissions are also calculated for each energy consumption type, as well as for estimated waste emissions.[1]

The CEEI data is provided for each individual municipality, and for the regional district as a whole (including member municipalities). Therefore, community energy and emissions for the rural areas of the regional district were extracted by subtracting the municipal inventories of Castlegar, Creston, Kaslo, Nakusp, Nelson, New Denver, Salmo, Silverton, and Slocan from the total regional district inventory. The resulting values were then reviewed and compared to other data sources for the purpose of cross checking the accuracy of the data (see Table 1). This review was warranted because the CEEI inventories are a new reporting feature. This check is a quick validation of the CEEI information.

The overall findings, based on the data that is available for comparison, are that the CEEI data appears to provide a reasonable estimate of the energy and GHG emissions for residential buildings and vehicles.[2]

Table 1. CEEI Comparison to other data sources

CEEI Value	Comparative Value	Notes
Number of residential electricity accounts: 12,492	Dwelling counts from Stats Canada: 13,005	Very good agreement.
Average residential electricity use: 12,660 kWh/dwelling	BC Hydro Conservation Potential Review (CPR) 2007. Average electricity consumption: 10,500 kWh/dwelling per year (non electrically heated dwellings) 19,300 kWh/dwelling per year (electrically heated dwellings) A weighted average of 20% electrically heated, 80 % natural gas, oil or wood	Very good agreement. There is natural gas service in approximately 70% of homes, so it is expected that there is a mix of electrically heated, oil heated and wood heated homes for the remaining 30%.

[1] *Inventories are available at www.env.gov.bc.ca/epd/climate/ceei/index.htm. These Version 1 inventories are being updated and revised estimates will be issued in 2010. It is expected that subsequent inventories will be released for the year 2010, and bi-annually after that.*

[2] *Estimates for electricity use in commercial buildings were found to be incomplete. For example, the total municipal consumption exceeded the region as a whole. The Province will be refining these inventories in May of 2010. For the moment we have prorated the existing commercial consumption to the rural areas by population. Note that the GHG emissions from electricity are small and we expect that future refinements to this value will have only a small effect on the total inventory.*

CEEI Value	Comparative Value	Notes
	heated would result in a value of: 12,260 kWh/dwelling	
Heating oil consumption: not provided	Estimate of 5% electricity accounts are homes with oil heat.	Heating oil was not estimated in the CEEI. We will estimate consumption based on 5% of dwellings.
Number of personal vehicles: 23,263	National vehicle use survey (Stats Canada) estimated 1.5 vehicles per household in rural areas. With a dwelling count of 13,005, this would equate to 19,500 vehicles.	Reasonable agreement.
Number of commercial electricity accounts: Unknown	-	Current CEEI data has less commercial electricity consumption for the RD than for the sum of the municipalities. It is suspected that the RD inventory has not captured complete data. Impact is small as commercial electricity accounts for only 2000 – 4000 tonnes of the 200,000 tonne baseline.
Solid Waste: 18,600 tonnes waste	Tonnes of solid waste disposed per capita (2006) from RDCK SWMP = 0.8 tonnes/capita; Rural area population (2006) is 29,802 Estimated waste = 23,800 tonnes/yr	Reasonable agreement.

Business as usual Forecast of Energy Use and GHG Emissions

The energy and GHG emissions forecast are driven by population growth, with considerations for efficiencies in the future. A population growth rate of 0.5% annually is assumed, though population has actually been declining from 1996 to 2006. The methodology for projecting the "business as usual forecast" (BAU) accounts for anticipated reductions that might occur due to other broader initiatives, regardless of actions the Regional District would take to reduce emissions. Assumptions of other improvements in efficiency driven by higher levels of government include:

- Reduce average energy demand per home by 20% by 2020[3] (e.g. building code improvements, appliance / equipment improvements, etc.)
- Reduce commercial energy demand by 9% by 2020[4] (e.g. building code improvements, appliance / equipment improvements, etc.)
- Reduce passenger vehicle energy use by 15% by 2020[5] (e.g. general fleet turnover and improved efficiencies in vehicle design from existing policy initiatives)

[3] *Residential and commercial building targets from the BC Energy Efficient Buildings strategy (see www.energyplan.gov.bc.ca/efficiency).*

[4] *Residential and commercial building targets from the BC Energy Efficient Buildings strategy (see www.energyplan.gov.bc.ca/efficiency).*

[5] *Transport Canada estimates based on fleet averages from Mobile 6.2c models. Developed in MetroVancouver air emissions modeling studies.*

Energy Use and GHG Emissions in RDCK rural areas (Where are we?)

Estimated community energy consumption, and associated GHG emissions are shown in Table 2. The total estimated GHG emissions in the community in 2007 are estimated at 199,000 tonnes of CO2, excluding emissions from commercial building electricity use and industrial buildings. For an approximate population of 30,000 residents, this is about 6.6 tonnes per person.

Table 2. Building Energy Consumption and GHG Emissions (2007)

	Type	Connections or number	Consumption	Units	Energy (GJ)	CO2e (t)
Buildings						
Residential Buildings	Electricity	12,492	158,149,283	kWh	295,904	3,480
	Natural Gas	8,960	616,136	GJ	616,136	31,516
	Heating Oil	625	1,561,562	L	62,462	4,919
Commercial Buildings	Electricity [a]	-	57,314,511	kWh	206,332	1,261
	Natural Gas	648	269,910	GJ	269,910	13,805
Industrial Buildings	Electricity [b]	-	n/a	–	–	–
	Natural Gas [b]	-	n/a	–	–	–
Total Buildings					**1,450,744**	**54,981**
Transportation						
Passenger Cars (small + Large)	Gasoline + diesel + propane	9,916	9,206,338	L	289,815	23,041
Light Trucks, Vans, SUVs	Gasoline + diesel + propane	13,347	25,808,270	L	798,553	64,319
Commercial Vehicles	Gasoline + diesel + propane	4,210	10,348,296	L	389,628	27,312
Other Vehicles	Gasoline + diesel + propane	1,663	1,958,156	L	64,014	4,807
Total Transportation		**29,137**	**47,321,061**	**L**	**1,542,010**	**119,479**
Waste						
Waste Total	-		18,609-	tonnes of waste	0	31,345
TOTAL					**2,992,754**	**205,805**

Notes:
[a] Commercial electricity accounts are incomplete and have been estimated.
[b] Industrial electricity and natural gas account data reported in the CEEI are incomplete and not reported here.
[c] Values may not add precisely due to rounding.

The relative distribution of energy and GHG emissions are shown in Figures 1 and 2. Buildings and transport generally consume equivalent shares of the energy consumed. However, when looking at GHG emissions, the contribution from buildings is a much smaller proportion. This is because the electricity consumed in BC is mostly hydro-electric and has low carbon emissions for each unit of energy consumed.

Figure 1: Energy Consumption (2007)

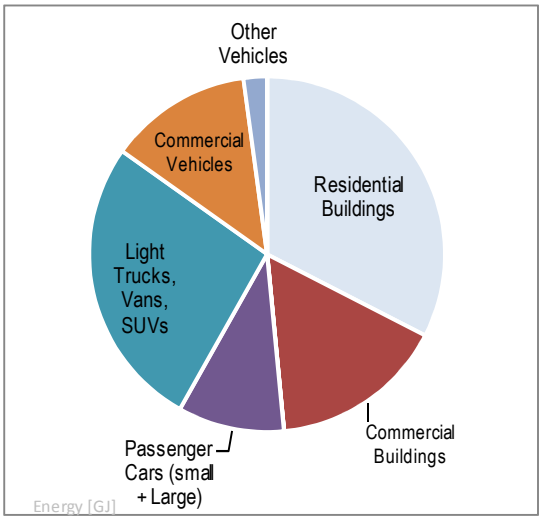
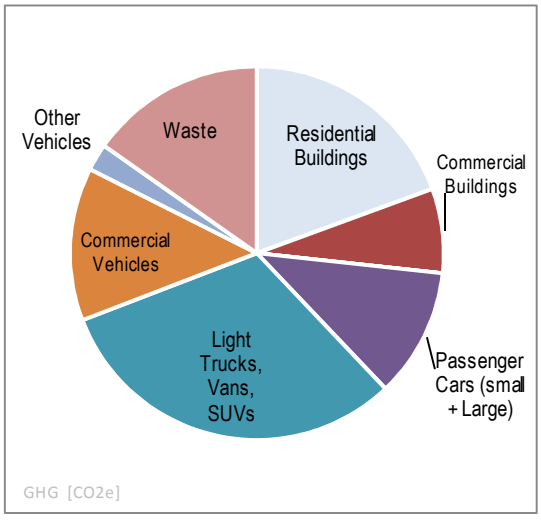


Figure 2: GHG Emissions (2007)



Energy and GHG Forecast (Where are we heading?)

A forecast of energy consumption and GHG emissions for a "business as usual" (BAU) scenario is generated using an estimate of the population growth and the expected improvement in building and fleet standards (see 'Inventory and Forecast Approach' section). In the period from 2010 to 2020 the growth in energy use and emissions from population growth will be more or less balanced by the efficiencies in buildings and transport. After 2020, with no new efficiency increases, the emissions grow proportional to population growth.

The forecast is shown in Table 3 and plotted in Figure 3 (energy) and Figure 4 (GHGs).

Table 3. Estimated Business as Usual (BAU) Energy and GHG Forecast

ENERGY [GJ]	2010	2020	2030	2050
Residential	989,193	831,825	874,364	966,081
Commercial	483,421	462,411	486,058	537,044
Industrial	–	–	–	–
Cars and LD Trucks	1,104,775	987,083	1,037,562	1,146,398
Commercial + Other Vehicles	460,481	484,030	508,783	562,152
Waste	0	0	0	0
TOTAL	3,037,871	2,765,348	2,906,768	3,211,675
GHGs [tonnes CO2e]	**2010**	**2020**	**2030**	**2050**
Residential	40,517	34,071	35,814	39,570
Commercial	15,293	14,628	15,377	16,989
Industrial	–	–	–	–
Cars and LD Trucks	88,677	79,230	83,282	92,018
Commercial + Other	32,603	34,271	36,023	39,802
Waste	31,818	33,445	35,155	38,843
TOTAL	208,908	195,645	205,650	227,222
Per Capita Emissions	**2010**	**2020**	**2030**	**2050**
Population	30,403	31,957	33,592	37,115
PER CAPITA (tonnes per person per year)	6.9	6.1	6.1	6.1

Figure 3: Forecasted Business as Usual Energy Consumption

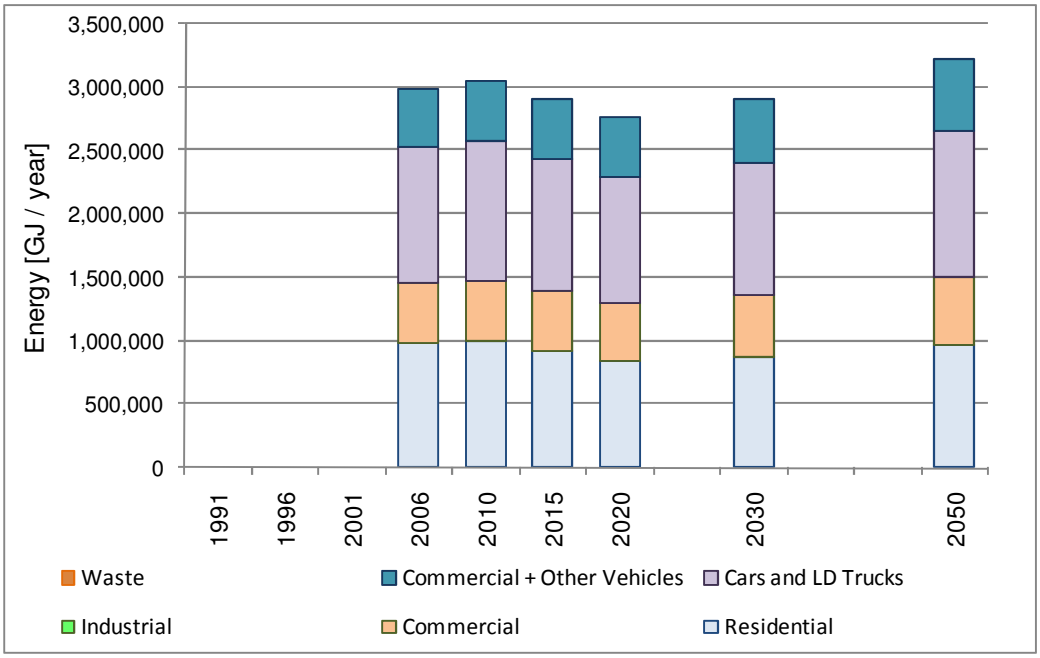
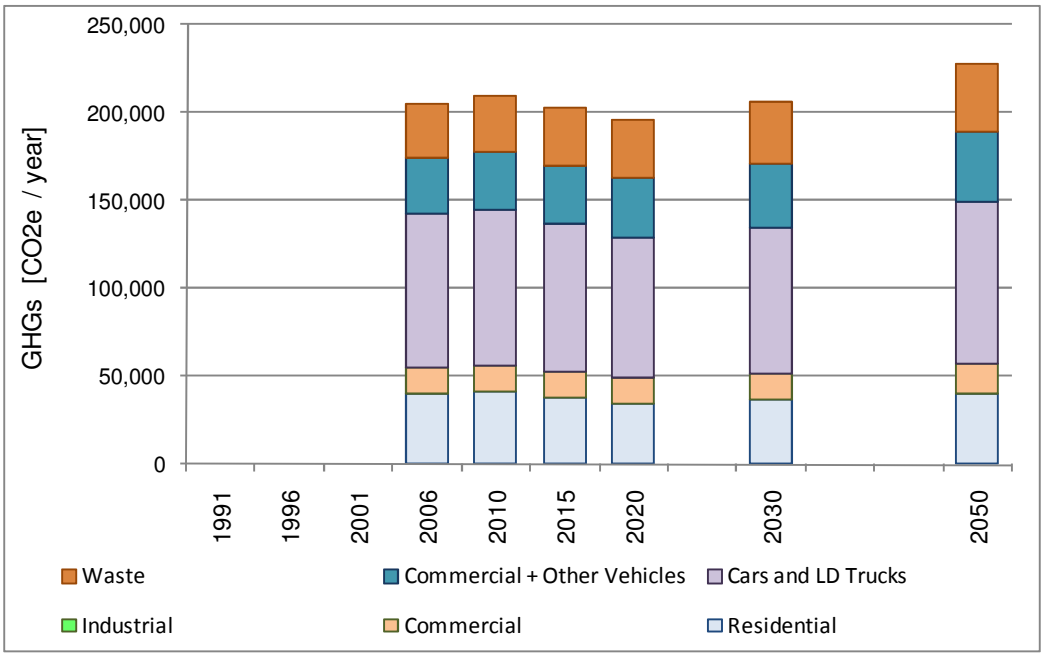


Figure 4: Forecasted Business as Usual GHG Emissions



Policy & Action Opportunities for RDCK to Reduce Emissions

This section provides a description of some opportunities, as well as a scoping level assessment of the possible impact on GHG emissions. The quantification of these actions is obviously approximate, but it is intended to help define "the range of what might be reasonable" given some level of directed effort by the community.

This estimate does not define precisely how the result would be achieved but rather asks "what could the rural areas of the RD look like in 2020 or 2030?" The actual mechanisms for bringing about change will range between outreach, regulation, incentives, other program activities, etc. Identified opportunities are consistent with the results of the survey to residents conducted in the fall of 2009, and with current electoral area OCPs. These are summarized in Table 4.

Table 4. Potential Opportunities Available

Policy or Action Opportunity [from OCP review, or from staff discussions]	Description	Effect	Example of a possible quantification statements or a desired achievement level. *"By 2030..."*
Encourage energy efficient retrofits in older buildings	The Regional District can encourage energy efficient retrofits through education and incentive programs. For example, energy efficient checklists and brochures can be distributed with building permits. Rebates can be offered for certain retrofits.	A reasonable retrofit of a residential home could reduce energy and GHGs by 30%	…50% of our existing dwellings have had some form of energy efficient retrofit or improvement.
Encourage use of alternative energy systems in new and existing buildings	The Regional District can encourage use of alternative energy systems (e.g. solar panels, wind energy, and geo-exchange) by including them in local government facilities and promoting those projects in the community.	Over time this will reduce the community's collective reliance on fossil fuel energy sources, particularly for heating (primarily with respect to oil heating and natural gas, where applicable).	…10 % of energy for heating buildings and hot water is derived from alternative energy sources.
Promote a voluntary initiative to reduce personal vehicle transportation emissions through a variety of methods	The Regional District can encourage a reduction in personal vehicle emissions by promoting use of public transit, more efficient vehicles and alternative fuels, providing sufficient pedestrian and cycling facilities and routes, encouraging home-based businesses, and encouraging changes in travel patterns, etc..	By committing to changing transportation behaviours and purchasing, residents could achieve a 20% reduction in GHG emissions.	…residents will commit to reducing personal vehicle emissions by 20%.

Policy or Action Opportunity [from OCP review, or from staff discussions]	Description	Effect	Example of a possible quantification statements or a desired achievement level. *"By 2030..."*
Focus growth and new development near existing community hubs, including multi-family units, secondary suites, and smaller lots	By focusing growth in existing hubs, the Regional District can achieve policy objectives related to: increasing diversity of housing options (particularly providing more options for seniors and younger populations), promoting transit, pedestrian and non-vehicular traffic, and encouraging residential units closer to commercial areas.	More compact rural communities can result in driving less distance. Quantification of this effect in rural areas is uncertain.	Modestly assume a 5% reduction in personal vehicle use.
Support and protect agricultural industry	Integration of agriculture could allow for opportunities for biomass energy production.	Unknown	None assumed.
Increase access to local recycling facilities	The Regional District can provide more depots for recycling in core community areas to reduce the amount of waste that ends up in the landfill.	Diverting solid waste to recycling reduces the amount of GHGs that are produced when the waste decomposes in the landfill.	…50 % of our solid waste will be diverted to recycling.

Scenario for Defining a Reduction Target

A scenario can be developed to scope the general impact of the measures described in Table 4. This is not intended as a precise forecast – but rather an attempt to quantify the effects of "what if" these outcomes are achieved. That is, "what could the future look like if these initiatives are pursued?", and "what is the energy and GHG impact?". It is not a comprehensive assessment of the various tools that would be needed to get to the 2030 outcome.[6] The values shown in the tables are for the purpose of "painting a picture" of the future.

The combined effects of this review are that it shows the range of possible reductions. From these, the scenario GHG reductions target, from 2007 levels, would be a 13% reduction by 2020 and a 17% reduction by 2030 (see Figure 5).

The bulk of these reductions would come from a voluntary initiative to have residents reduce their personal transport emissions by 20% by 2030. This would be achieved through a combination of the RD's activities as well as market forces (i.e. fluctuating fuel prices), and residents own actions.

These are reductions in total emissions and occur even with an increase of population. The reduction "per person" is even greater in order to counter the effect of population growth. For example a 13% reduction in *total* emissions by 2020 is a 18% *per capita* reduction and a 17% reduction in *total* emissions by 2030 is a 26% *per capita* reduction. (This analysis assumes a modest population growth of 0.5% per year).

Note that this review is from the perspective of the GHG impact of these policy measures. There are many other benefits that are not explored in depth here. These include reduced expenditures within the community for energy, as well as contributing to other desired community objectives such as economic development, housing choice and social amenities, community stability and growth etc. These factors should all be considered when pursuing these activities, and they should not be evaluated solely on their GHG reduction benefits.

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[6] *A wide range of tools can be deployed to achieve different planning and community goals and most communities are just beginning to explore which ones are effective for which situations. There will be many years of trial and learning to follow in order for each community to define which tools are the most effective. Regardless of the number of ideas, actions generally fall into one of three categories:*

- *Soft Measures: Education and outreach measures will have low uptake – but will not require much effort or resources.*
- *Moderate Measures: Incentive measures (both financial and non-financial) will increase the uptake. These are commonly voluntary such as incentives to builders or homeowners.*
- *Firm Measures: Strong policy and regulatory measures, combined with incentive programs, will have the highest uptake and the most potential to minimise energy use and GHG emissions in the community. Presently, not all of the outcomes can be accomplished through regulation, so strong incentives would be required.*

Figure 5: "Wedge Diagram" of Scenario GHG Emissions

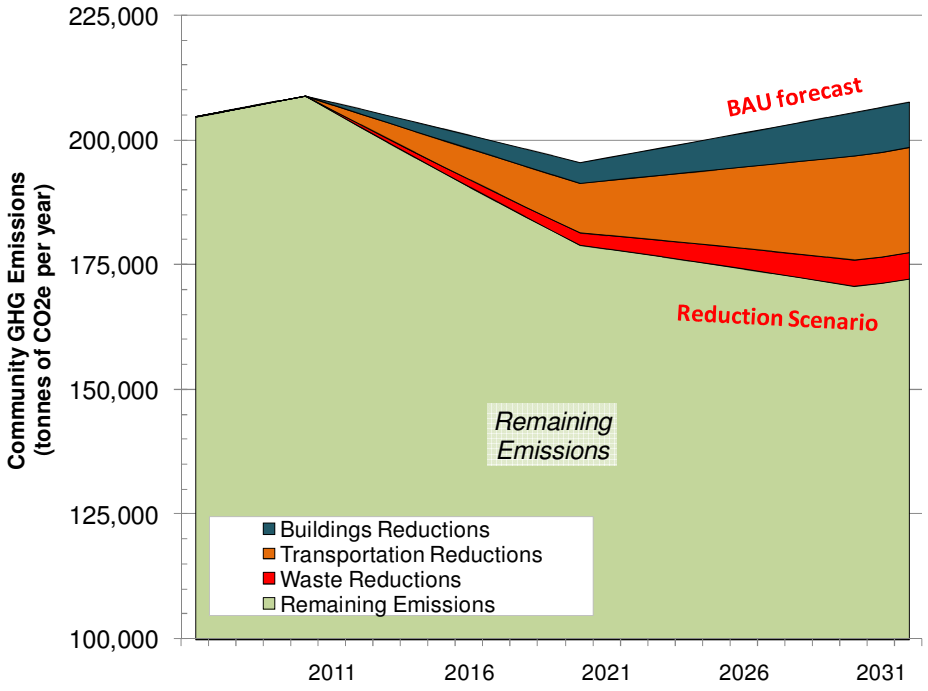
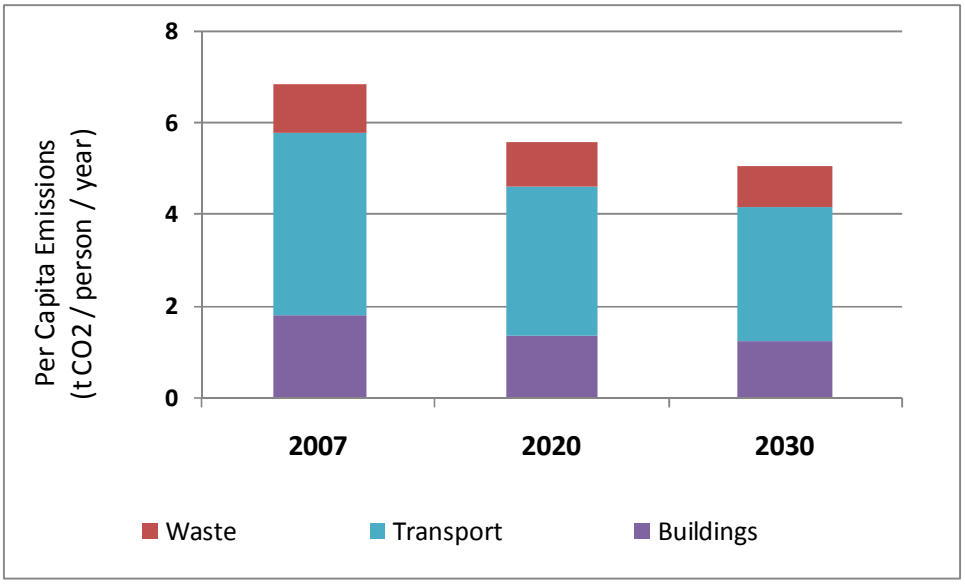


Figure 6: Forecasted GHG Emissions PER CAPITA



Target Recommendations

A target for 2020 can be proposed based on the outcomes defined above. From this analysis it is suggested that the rural areas target:

- A 15% reduction in GHG emissions by 2020 from 2007 levels
- A 25% reduction in GHG emissions by 2030 from 2007 levels

For a long term target, a technical analysis becomes less valuable – painting a 40 year scenario is not a simple task. Rather it is suggested that for a long term target, an aspirational target – i.e. a BIG GOAL be proposed. The Provincial target is an 80% reduction. Something in the range of 50% or 80% would be suitable. Given the long term nature, it is suggested to align with the BC Provincial target.

It is suggested that the rural areas target:

- An 80% reduction in GHG emissions by 2050 from 2007 levels

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