Salt Spring Island Community Energy Strategy

Baseline Report—Second Update

March 2010

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for the
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Local Trust Committee

This update is available online at

www.saltspringenergystrategy.org

The Earth Festival Society is pleased to present the second update of the Salt Spring Island Community Energy Strategy Energy and Emissions Baseline data. This report is part of the ongoing work that began in 2003 to track and reduce Salt Spring's energy consumption and associated greenhouse gas emissions. Time passes, and the impacts of climate change become increasingly evident. Communities everywhere must significantly reduce emissions; to delay will have unthinkable consequences for future generations. This report can inform Salt Spring's target setting, strategic planning and actions in the months ahead.

Acknowledgements

Many thanks to the Salt Spring Island Local Trust Committee, who commissioned this report. Thanks also to the agencies—BC Hydro, ICBC, and BC Ferries—who provided the data on which the report is based. Any errors remain the responsibility of the author.

Table of Contents

page

Executive Summary i
Information gaps and recommendations vi

List of figures in executive summary

Chart A: Salt Spring Island's GHG emission trends, tonnes CO2e i
Chart B: Salt Spring Island's energy consumption trends, GJ ii
Chart C: Comparison of electricity and gasoline consumption projections for 2012, GJ ii
Chart D: Comparison of electricity and gasoline GHG emission projections for 2012, tCO2e iii
Chart E: Electrical consumption on Salt Spring Island, 2002—2008 iii
Chart F: BC Ferries traffic annual growth rates over two three year periods v
Chart G: BC Ferries one-way traffic by year v

1.0 Introduction 1

2.0 Electrical Energy Consumption 2
2.1 Residential electrical energy consumption
2.2 Commercial electrical energy consumption
2.3 GHG emissions from electrical energy consumption

3.0 Residential buildings 6
3.1 New construction
3.2 Residential energy retrofits

4.0 Island Vehicles 7
4.1 Fuel-efficient light vehicles
4.2 GHG emissions from Salt Spring vehicles
4.3 GHG emissions impact of the Salt Spring bus

5.0 BC Ferries Traffic 12

6.0 Indirect energy associated with grocery purchases 15
6.1 Estimating quantities of food grown on Salt Spring
6.2 Energy and emissions impacts of organic versus conventional food production
6.3 Energy and emissions impacts of local versus imported food
6.4 Tracking progress in reducing food-related energy and GHG emissions

7.0 Solid Waste 20

SOURCES 21
ENDNOTES 22

List of figures *(bold indicates full-page table)*

Chart 1—Annual residential and commercial electricity consumption	2
Table 1: Changes in annual growth rate of electrical consumption	2
Table 2: Summary of Electrical Energy and associated GHG emissions	**3**
Chart 2—Changes in annual growth rate of electrical consumption	4
Chart 3— CRD Residential Building Permits	6
Table 4: CRD Residential Building Permits	6
Chart 4— Number of registered light vehicles, 2002 — 2009	7
Table 5: Number of registered vehicles, June 2002, 2007 and 2009	7
Table 6: Number of ICBC registered vehicles as of June of each year	**8**
Chart 5—Average % annual growth rate of registered vehicles	9
Table 7: Average % annual growth rate of registered vehicles	9
Table 8: Hybrids as % of late model light vehicles	9
Table 9: Lifecycle and combustion emission factors for transportation fuels	10
Chart 6—Projected trends in Salt Spring light vehicles and associated GHG emissions	10
Table 10: Salt Spring Transit energy and emissions for 2009	11
Chart 7—BC Ferries traffic, passenger vehicles	12
Chart 8—BC Ferries traffic, commercial and semi trucks	12
Table 12: Ferry traffic, annual growth rates, %	13
Chart 9— Ferry traffic, annual growth rates, %	13
Table 13: BC Ferries one-way traffic data	**14**
Table 14: Population and energy associated with grocery purchases	18
Table 15: Foods available to Canadians, 2008	19
Table 16: Salt Spring Island's solid waste received at Hartland Landfill	20
Table17 : Solid waste emissions for 2007, preliminary estimate	20

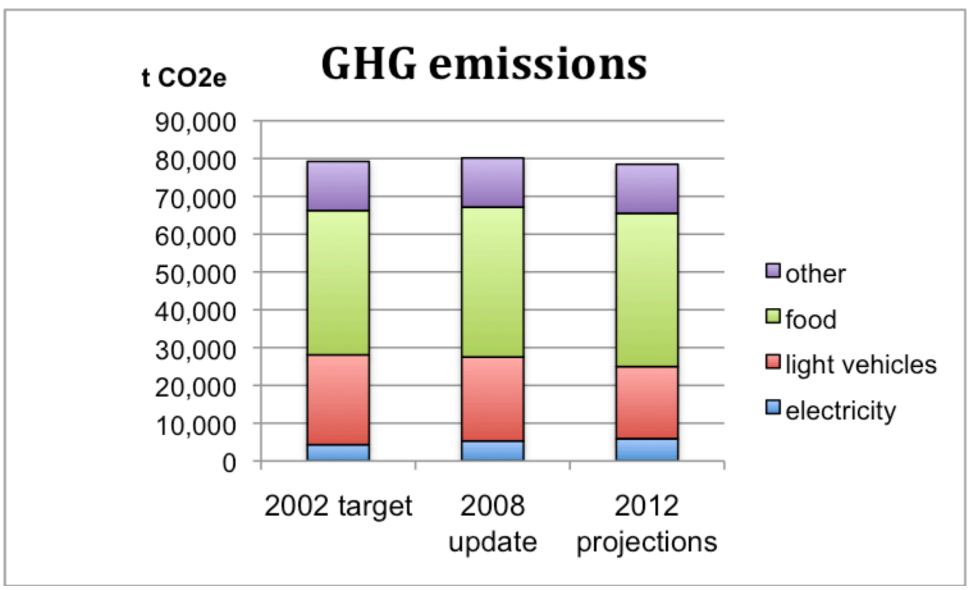
Executive Summary

The Salt Spring Island Community Energy Strategy short-term targets are to reduce island energy consumption and greenhouse gas (GHG) emissions to 2002 levels by 2012. The objectives of this second three-year update are to track progress in meeting these targets, to identify areas where targets are clearly not going to be met, to establish an Energy and Greenhouse Gas Emissions Inventory for 2007 to conform to Provincial baseline inventories, and to refine the analysis of indirect emissions resulting from food consumption, using data from the 2005 Salt Spring Island Local Produce Study. The update compares 2007 and 2008 data from BC Hydro, ICBC, BC Ferries, and other sources where available, with the 2002 data and projections of the original Baseline Report.

Projections indicate that Salt Spring is very close to meeting its overall 2012 energy and emissions targets to return to 2002 levels of energy consumption and GHG emissions.

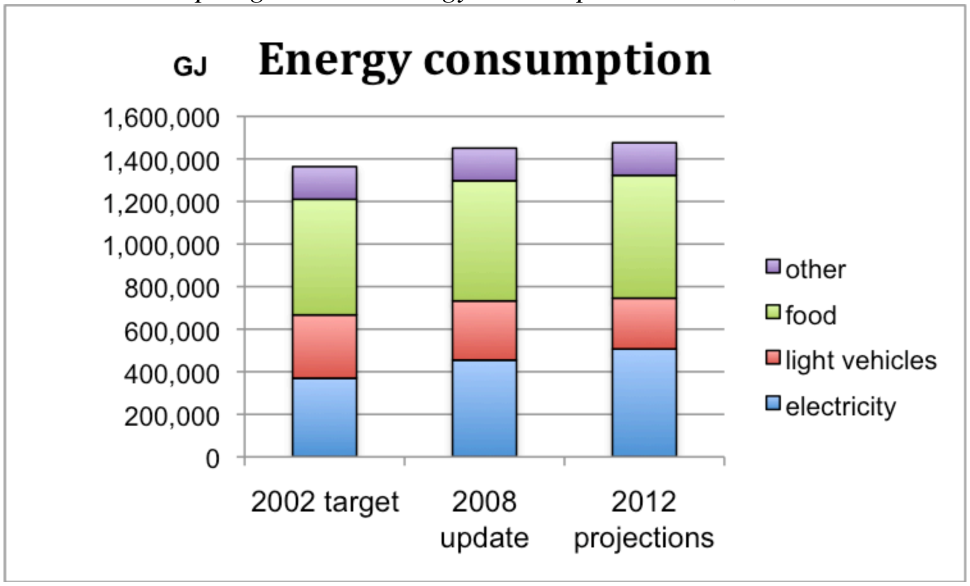
- Salt Spring will meet its GHG emissions targets, largely because of reduced emissions from light vehicles (cars, SUVs and pickup trucks);
- There is uncertainty whether Salt Spring will meet its energy targets because electrical consumption is increasing and it is not yet known whether increases in local food production and decreases in heating fuel oil use will offset the increases in electrical consumption by 2012;
- Islanders appear to be driving less, and driving more fuel-efficient vehicles;
- BC Hydro commercial customers appear to be reducing their energy consumption;
- The Salt Spring bus demonstrates small but quantifiable energy and GHG savings, in addition to the indirect savings which are difficult to quantify.

Chart A: Salt Spring Island's GHG emission trends, tonnes CO2e



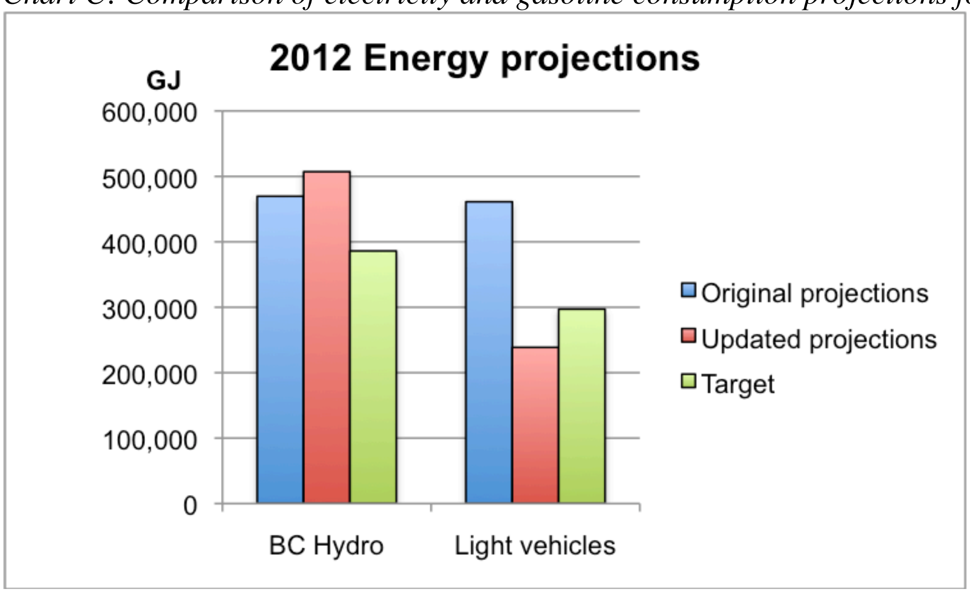
Salt Spring's GHG emissions are beginning to decline and updated projections suggest that we will be under target. Total GHG emissions are estimated to have been 79,000 t CO2e in 2002 and 80,000 t CO2e in 2008, an annual increase of about 0.02%. Projecting to 2012, total GHG emissions will be 78,000 t CO2e, or 1% below 2002 levels. The decrease is due to a significant decrease in emissions from light vehicles. These estimates are conservative. They do not include any potential savings from increases in local food supply since 2002. The 'other' category in Chart A, firewood and fuel oil, is assumed to have remained constant, although anecdotally both may have declined. Therefore actual emissions may be less than projected.

Chart B: Salt Spring Island's energy consumption trends, GJ



Overall, Salt Spring's energy use appears to be increasing and projections suggest that we may not meet our energy targets. Total energy consumption is estimated to have been 1.36 million GJ in 2002 and 1.45 million GJ in 2008, an annual increase of about 1%. Projecting to 2012, total energy consumption will be 1.48 million GJ, or 8% over 2002 levels. The increase is due to an increase in electrical consumption. Again these estimates are conservative, based on the assumptions described in the previous paragraph. Thus it is very possible that the overshoot is overstated.

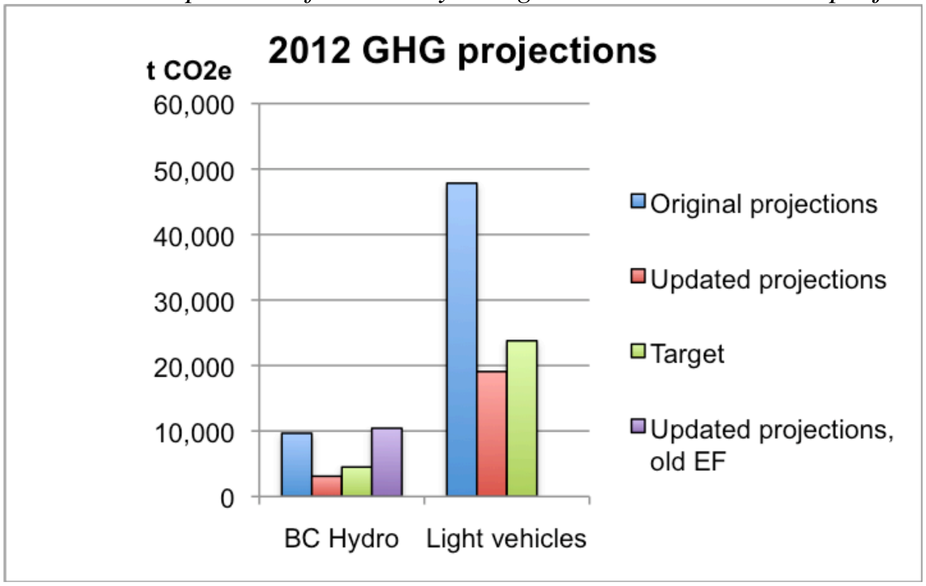
Chart C: Comparison of electricity and gasoline consumption projections for 2012, GJ



A comparison between the island's two largest direct energy types, electricity and gasoline, shows sharply contrasting trends. Electrical energy use on Salt Spring continues to increase as the community grows, however the energy consumption by light vehicles (cars, SUVs and pickup trucks) is declining despite an increase in the number of vehicles due to efficiency increases and a reduction in distances travelled. Chart C shows that Salt Spring's electrical consumption is now projected to be greater than the original

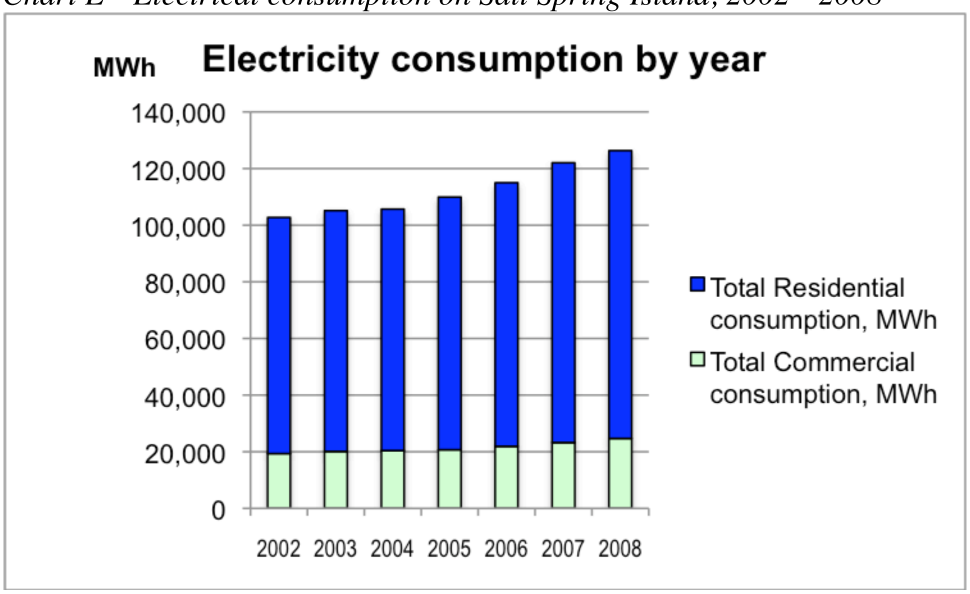
Business As Usual projections by 2012, but the trend for light vehicles shows 2012 energy consumption less than the target.

Chart D: Comparison of electricity and gasoline GHG emission projections for 2012, tCO2e



A comparison of GHG emissions projections for BC Hydro and light vehicles is shown in Chart D. The decrease in projected GHG emissions from BC Hydro results from a change in the utility's emission factor, which has almost halved since the original baseline was undertaken, although the rationale for the reduction is not clear. Emissions projections assuming the original emission factor are therefore included and were used to generate the BC Hydro emissions in Chart B. Whichever emission factor is used, it can be seen that the quantity of GHG resulting from electrical consumption is much less than GHG from light vehicles.

Chart E—Electrical consumption on Salt Spring Island, 2002—2008



Electrical energy use on Salt Spring between 2002 and 2008 increased at an average annual rate of 3.52%. The residential sector uses about 81% of total consumption, with the bulk of the energy used during the heating season. Annual residential consumption per connection has climbed from an average of about 17,000 kWh in 2002 to over 18,000 kWh in 2008. In contrast, the annual commercial consumption per connection decreased over the same period from an average of over 40,000 kWh to about 38,500 kWh. It appears that businesses have reduced their electricity consumption. However, total consumption by this sector increased from about 19,000 MWh in 2002 to about 25,000 MWh in 2008 due to growth in the number of connections.

Population growth alone does not account for the increase in electrical consumption. Fuel switching may be part of the explanation. There are no data to quantify fuel switching, but anecdotally some residents and island businesses report switching to electricity from heating oil, propane and firewood. This would have GHG emission reduction benefits.

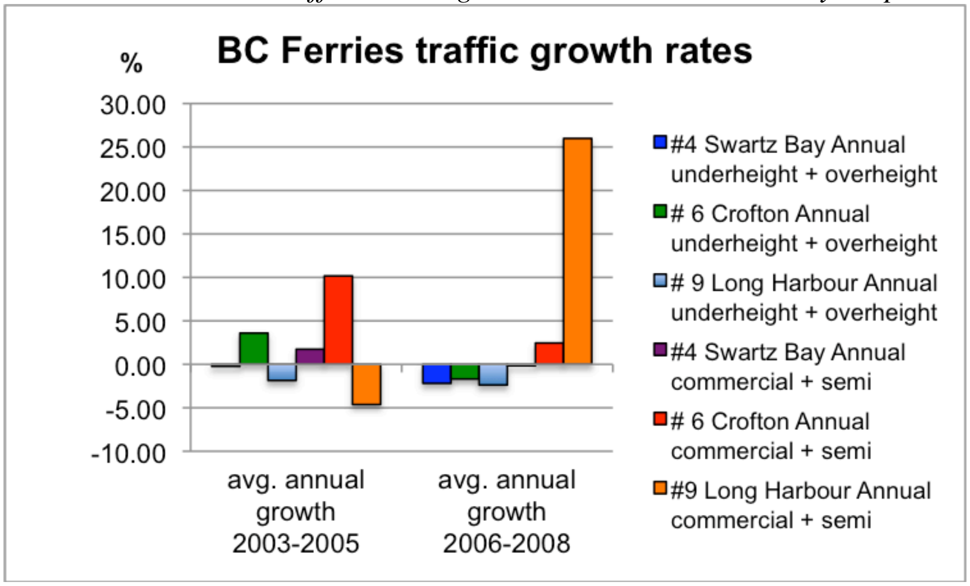
Few homeowners have used the EnerGuide for Houses (EGH) EcoAction residential retrofit program or its predecessors. The Energy Strategy target is 20% of the existing housing stock, about 1,000 homes, retrofitted by 2012. Between 2003 and the end of March 2009, 93 homes (1.9%) had received a preliminary EGH assessment. Of these, 23 had been improved sufficiently to qualify for grants under the program. Lack of participation in the grant program does not necessarily mean that homeowners are not retrofitting their homes, however it does suggest that the retrofit target may not be met.

As stated earlier, the greatest progress in reducing energy consumption and GHG emissions comes from the light vehicle sector. The total number of insured ICBC light vehicles registered on Salt Spring increased from 6,825 in June 2002 to 7,812 in June 2009, but fuel consumption and resulting GHG emissions have declined. When provincial trends for vehicle kilometres travelled (VKT) and fuel efficiency are applied, projections for 2012 suggest that energy and emissions may both be 20% below target. Although these reductions are predicated on assumptions and caution is advised, there are indications that the provincial trends on which they are based are applicable to Salt Spring. Increased fuel efficiency is indicated by the annual growth rate in the number of automobiles (2.1%) relative to SUVs and pickup trucks (1.6%), and by the increase in the number of Smart Cars and hybrids, which represented 5% of total late model vehicles in 2009, up from 0% in 2002. Decreased distance travelled is suggested by the decline in the number of underheight and overheight vehicles on BC Ferries (3.2% fewer trips in 2008 than in 2002), and by the Salt Spring Transit ride numbers (estimated avoided trip distance in 2009 is 0.6% of total km travelled). Therefore there is some confidence that the 2012 projections for light vehicles are realistic.

The number of medium and heavy commercial vehicles has increased. There were 51 heavy commercial vehicles and 56 medium commercial vehicles registered on Salt Spring in June 2002. In June 2009, there were 70 and 76 respectively, a total increase of 36%. The baseline report did not attempt to quantify energy or emissions from medium and heavy commercial vehicles because of lack of information on distances travelled and fuel consumption. Medium and heavy commercial vehicles represent less than 2% of the total Salt Spring fleet but because their fuel requirements may be up to five times greater than a light vehicle it is possible that energy and emissions from these vehicles could equal 10% of light vehicles. Provincially-derived commercial unit diesel fuel consumption numbers were applied to the actual number of registered medium and heavy commercial vehicles, which resulted in emissions of about 1,700 tCO_2e or 7.5% of light vehicle emissions. However without more information there is limited confidence in this number.

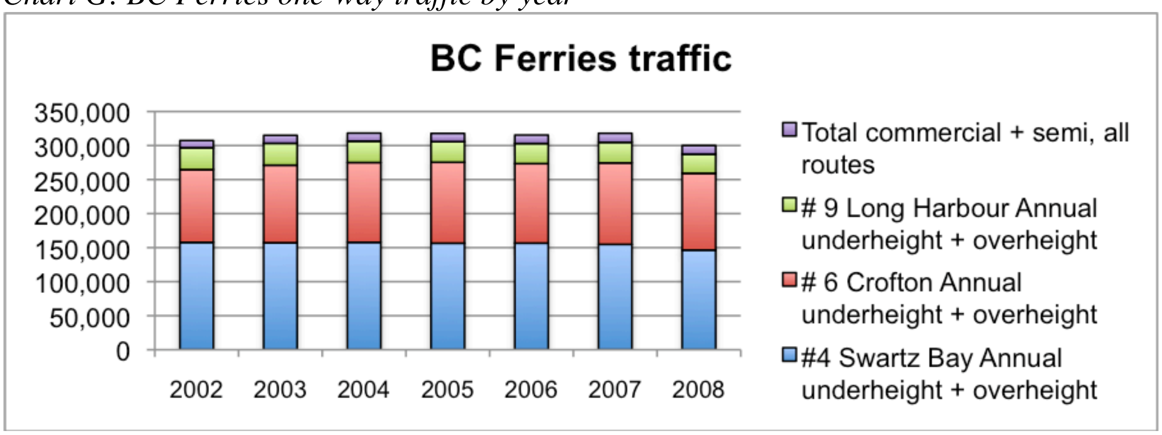
BC Ferries traffic data trends show a decrease in overheight and underheight (light vehicles) and an increase in commercial and semi-trucks. With the exception of Long Harbour commercial and semi traffic, there was a marked decline in growth in the three year period fiscal 2006—2008, compared to the previous three year period.

Chart F: BC Ferries traffic annual growth rates over two three year periods



Total BC Ferries Salt Spring one-way traffic was less in 2008 than it was in 2002 by 7,334 trips or 2.4%, and we appear to be on track to meet the 2012 Energy Strategy targets. While BC Ferries traffic data do not directly impact energy and emissions, they do indicate the island's vehicle activity. BC Ferries' fuel consumption also contributes significantly to regional GHG emissions and air pollution.

Chart G: BC Ferries one-way traffic by year



The Energy Strategy target for food is to replace 10% of Salt Spring's imported food with local products by 2012 to provide about 23% of the total GHG reductions needed from all sectors. A 2005 study found that commercial fruit and vegetable production on Salt Spring was equivalent to about 5% of annual consumption. A study undertaken the previous year arrived at a similar percentage for meat production, however proposed changes to slaughter regulations have resulted in a decrease in the number of animals raised for meat on the island. It is not clear whether current initiatives underway to increase local food production will reverse the decline in meat production and boost other production sufficiently to meet the 10% target by 2012.

Emissions attributable to Salt Spring's solid waste are tentatively estimated to be 2,229 t CO_2e in 2007, based on 4,205 tonnes of solid waste delivered to Hartland Landfill. This figure does not include emissions from Salt Spring's biosolids (dewatered sewage sludge) also landfilled at Hartland.

Information Gaps and Recommendations

Information gaps were identified in the following areas:

- There is no single source of emission factors available to communities undertaking GHG inventories. Provincially agreed emission factors, with underlying assumptions, should be readily available on a website such as the BC Climate Action Toolkit http://www.toolkit.bc.ca
- Information is generally not available from smaller commercial energy suppliers for proprietary reasons. Growth trends are sufficient for communities tracking progress in reaching targets, given a reasonable benchmark. Access to information, either actual quantities or growth trends, is needed. Salt Spring needs local data on:
    - heating fuel oil
    - propane
    - firewood

  Trends in local supermarket sales of grocery categories—produce, dairy, red meat, etc.—are also needed.
- There is no aggregate data on distances travelled by Salt Spring insured vehicles of any class. ICBC could record odometer readings as part of the vehicle insurance process. Collecting this data would also enable "pay as you drive" insurance.
- There is no Salt Spring data to quantify energy and emissions from medium and heavy commercial vehicles;
- More information is needed to better quantify the impact on local food production on indirect energy and emissions from food purchases;
- BC Ferries fuel consumption and GHG emissions data, if available, for routes 4 and 6 should be included in future Baseline Report Updates;
- Better information is needed to more accurately quantify solid waste impacts;
- The emissions impacts of land disturbance and deforestation need to be quantified and tracked.

This, and related reports are available at http://www.saltspringenergystrategy.org

1.0 Introduction

The Salt Spring Community Energy Strategy short-term targets are to reduce island energy consumption and greenhouse gas (GHG) emissions to 2002 levels by 2012. 2002 emission levels were established in the Salt Spring Island Community Energy Strategy Baseline Report published May 2004. The first update was completed in Jan 2007 and compared 2005 data with the original 2002 data. This is the second three-year update and compares 2007 and 2008 data with the earlier data.

The objectives of this second three-year update are as follows:

- to track progress in meeting the 2012 targets;
- to identify areas where targets are clearly not going to be met;
- to establish energy and emissions data for 2007 to conform to the provincial 2007 Community Energy and Emissions Inventory;
- to refine the analysis of indirect emissions resulting from food consumption, using data from the 2005 Salt Spring Island Local Produce Study, the 2005 Gulf Islands Livestock Processing Feasibility Study and recent online research papers; and
- to provide background for the Salt Spring Island Local Trust Committee in the setting of mid and long-term targets and related policies and bylaws.

The recent Provincial data, provided to communities to assist them in meeting the requirements of Bill 27, uses 2007 as the base year. Therefore this report highlights 2007 data. Salt Spring effectively now has two baseline years, 2002 and the Provincial norm of 2007.

Source data for this report were provided by BC Hydro, ICBC, BC Ferries, CRD and the Salt Spring Island Transit System. 2009 data has been included when provided. Readers wishing a more complete picture are referred to the May 2004 Baseline Report and the Jan 2007 Update Report, available online at www.saltspringenergystrategy.org

2.0 Electrical Energy Consumption

BC Hydro provided updated consumption data for 2002 through 2008. These data do not correspond exactly with the data provided for the original report[1] or for the 2005 update, so three sets of figures are included in Table 1 below. The most recent data set is used in the following discussion.

About 126,000 MWh were consumed in 2008, up from 122,000 MWh in 2007. Electrical energy use on Salt Spring between 2002 and 2008 increased at an average annual rate of 3.52%. The greatest increase, 6.14%, was between 2006 and 2007. The decline in the rate of increase observed in the first update report has disappeared. In the three year period 2003—2005 average annual growth rates were 2.29%; in the period 2006—2008 they were 4.75% (Table 2). Linear trendline projections suggest that by 2012 annual electrical energy use will be about 141,000 MWh, versus the target of 103,000 MWh, and greater than the original BAU projection of 130,000 MWh.

Chart 1—Annual residential and commercial electricity consumption

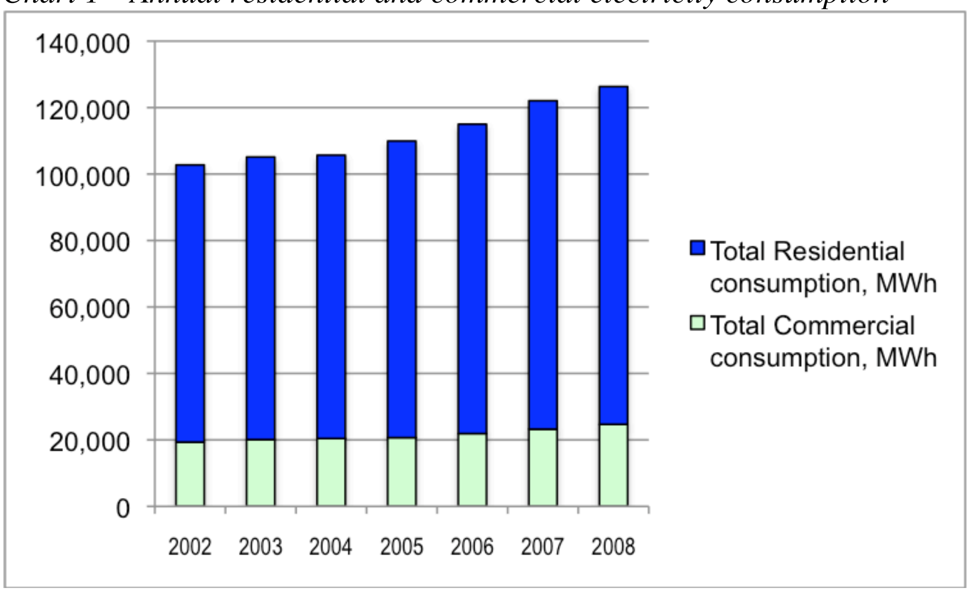


Table 1—Changes in annual growth rate of electrical consumption

	2003-2005	2006-2008	2003-2008
Residential avg. annual growth rate	2.30%	4.44%	3.37%
Commercial avg. annual growth rate	2.28%	6.08%	4.18%
Total avg. annual growth rate	2.29%	4.75%	3.52%
Avg. annual growth rate per residential connection	-0.39%	1.34%	1.34%
Avg. annual growth rate per commercial connection	-1.93%	-0.67%	-0.67%

Table 2— Summary of Electrical Energy and associated GHG emissions

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total electricity consumption, MWh	101,548	104,266	107,232										130,458
As above, updated 2006			102,695	105,007	105,451	109,733							124,046
As above, updated 2010			102,739	105,135	105,687	109,925	114,998	122,059	126,329	128,686	132,755	136,824	140,893
% annual increase				2.33%	0.53%	4.01%	4.61%	6.14%	3.50%				
Total Residential consumption, MWh	81,200	83,538	85,998										102,880
As above, updated 2006			83,243	84,709	85,052	88,730							99,717
As above, updated 2010			83,402	85,039	85,264	89,244	93,103	98,823	101,637	103,803	107,022	110,240	113,458
% annual increase				1.96%	0.26%	4.67%	4.32%	6.14%	2.85%				
# residential accounts, Dec			4,913	5,100	5,172	5,321	5,397	5,456	5,535	5,671	5,771	5,871	5,971
avg. annual consumption, kWh/account			16,976	16,674	16,486	16,772	17,251	18,113	18,363	18,348	18,627	18,905	19,184
Total Commercial consumption, MWh	20,348	20,728	21,234										27,578
As above, updated 2006			19,452	20,298	20,399	21,003							24,329
As above, updated 2010			19,337	20,096	20,422	20,688	21,895	23,235	24,692	24,883	25,734	26,584	27,435
% annual increase				3.93%	1.62%	1.30%	5.83%	6.12%	6.27%				
# commercial accounts, Dec			481	526	534	546	563	585	641	643	666	688	710
average annual consumption, kWh/account			40,202	38,205	38,243	37,890	38,890	39,718	38,521	38,614	38,565	38,516	38,467
Total energy, GJ	365,573	375,358	386,035										469,649
As above, updated 2006			369,702	378,025	379,624	395,039							446,565
As above, updated 2010			369,860	378,486	380,473	395,730	413,993	439,412	454,784	463,269	477,917	492,565	507,213
Energy, residential, GJ	292,320	300,737	309,593										370,368
As above, updated 2006			299,675	304,952	306,187	319,428							358,981
As above, updated 2010			300,247	306,140	306,950	321,278	335,171	355,763	365,893	373,692	385,278	396,864	408,450
Energy, commercial, GJ	73,253	74,621	76,442										99,281
As above, updated 2006			70,027	73,073	73,436	75,611							87,584
As above, updated 2010			69,613	72,346	73,519	74,477	78,822	83,646	88,891	89,579	92,641	95,703	98,765
GHG emission factor t CO2 / MWh (1)	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.074
Total GHG , t CO2 eq. (2)	4,265	4,379	4,504										9,654
As above, updated 2006			4,313	4,410	4,429	4,609							9,179
As above, updated 2010			4,315	4,416	4,439	4,617	4,830	5,126	5,306	5,405	5,576	5,747	10,426
As above, emission factor of 0.022 t CO2 / MWh			2,260	2,313	2,325	2,418	2,530	2,685	2,779	2,831	2,921	3,010	3,100
GHG emissions – residential, t CO2 eq. (2)	3,410	3,509	3,612										7,613
As above, updated 2006			3,496	3,558	3,572	3,727							7,379
As above, updated 2010 emission factor of 0.022 t CO2 / MWh			1,835	1,871	1,876	1,963	2,048	2,174	2,236	2,284	2,354	2,425	2,496
GHG emissions – commercial, t CO2 eq. (2)	855	871	892										2,041
As above, updated 2006			817	853	857	882							1,153
As above, updated 2010, emission factor of 0.022 t CO2 / MWh (3)			425	442	449	455	482	511	543	547	566	585	604

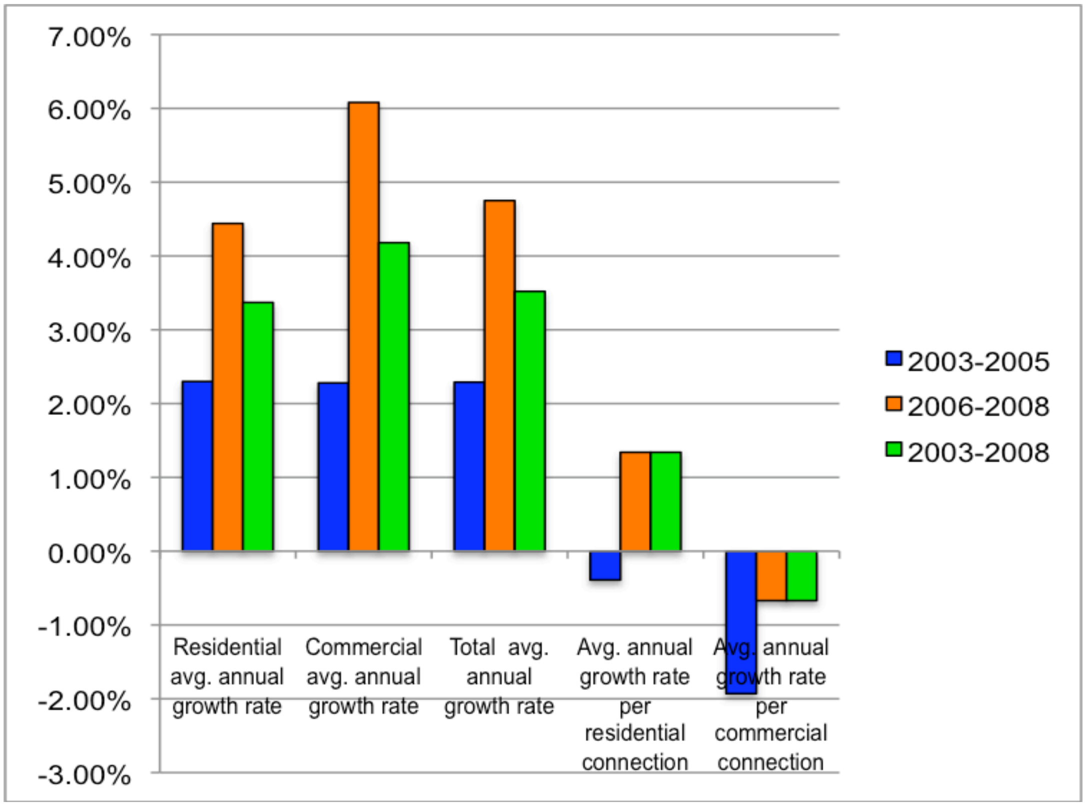
Blue—original 2002 baseline   Green—first update   Black—second update   Data shaded in grey are linear trendline projections

[1] 2002 GHG emission factor of 0.042 t CO2 / MWh from Bowen CEP—BC Hydro—VCR projection for 2005 used for 2012 (0.074 t CO2 / MWh)

[2] "consumption" times "GHG emission factor"

[3] GHG emission factor of 0.022 t CO2 / MWh from 2007 Community Energy and Emissions Inventory (CEEI) Reports User Guide

Chart 2—Changes in annual growth rate of electrical consumption



2.1 Residential electrical energy consumption

Consumption by the residential sector increased from about 83,000 MWh in 2002 to about 102,000 MWh in 2008, representing an average growth rate of 3.37%. The residential sector uses about 81% of total consumption, with the bulk of the energy used during the heating season. Dividing the total annual residential consumption by the number of residential accounts provides average annual residential consumption. This has climbed from about 17,000 kWh in 2002 to over 18,000 kWh in 2008 (Table 2).

Annual residential growth rates have increased from an average of 2.3% between 2003 and 2005 to 4.44% between 2006 and 2008. For the same period by connection, rates have climbed from negative 0.39% to 1.34%.

2.2 Commercial electrical energy consumption

In 2002, the average annual consumption per commercial account was over 40,000 kWh. By 2008 the average consumption had dropped to about 38,500 kWh. Over the same period, the number of accounts had grown from 481 to 641. It appears that businesses have reduced their electricity consumption. However, total consumption by this sector increased from about 19,000 MWh in 2002 to about 25,000 MWh in 2008.

Annual commercial growth rates have increased from an average of 2.28% between 2003 and 2005 to 6.08% between 2006 and 2008. For the same period by connection, rates have climbed from negative 1.93% to negative 0.67%.

2.3 GHG emissions from electrical energy consumption

GHG emissions, expressed as tonnes of carbon dioxide equivalents (t CO_2e), are determined by multiplying electrical consumption by an emission factor. Various agencies use different assumptions in calculating emission factors, and the same agency may change its assumptions over time. Emission factors also change over time due to changes in technology. The electricity emission factor used for the 2002 Baseline Report and the first update report was 0.042 t CO_2e / MWh. The emission factor cited in the 2007 CEEI Reports User Guide is 0.022, given as t CO_2e / kWh, however this appears to be a typographical error and should be 0.022 t CO_2e / <u>MWh</u>. Applying the two emission factors to the 2008 total electrical consumption of 126,329 MWh, we get 5,306 t CO_2e and 2,779 t CO_2e, respectively (Table 2). In other words, Salt Spring's emissions attributed to electricity consumption are halved without any action on our part, simply by halving the BC Hydro emission factor.

3.0 Residential buildings

New residential construction activity is declining. Home retrofits appear to be increasing, but the numbers are low. New homes are considerably more energy efficient than older homes, scoring an average of EGH 77 versus EGH 46 on a provincial basis.

3.1 New construction

The number of building permits issued for new dwelling units each year has been generally declining since 2002.This trend is most marked for the single family dwelling category, which peaked in 2003 at 82 units and fell to 39 in 2009. Less construction suggests fewer GHG emissions associated with the construction sector, and lower population growth. A shift from single family to multi-unit dwellings would enable reduced per capita emissions, but that shift is not evident.

Chart 3— CRD Residential Building Permits

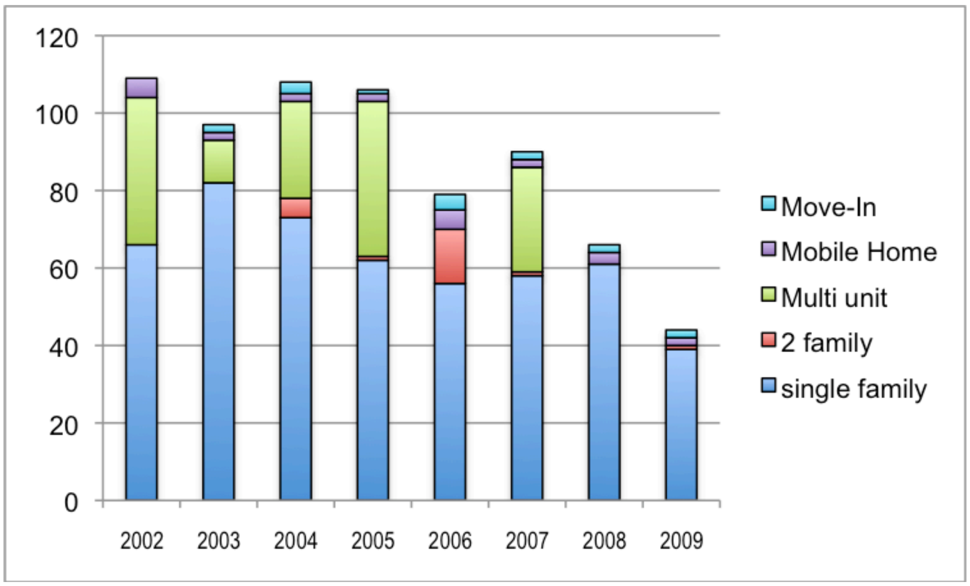


Table 4: CRD Residential Building Permits

Year	Single family	2 family	Multi-unit	Mobile Home	Move-In	Total new residential
2002	66		38	5		109
2003	82		11	2	2	97
2004	73	5	25	2	3	108
2005	62	1	40	2	1	106
2006	56	14		5	4	79
2007	58	1	27	2	2	90
2008	61			3	2	66
2009	39	1		2	2	44

3.2 Residential energy retrofits

Between 2003 and the end of March 2009, 93 homes (1.9%) had received a preliminary EGH assessment. Of these, 23 had been improved sufficiently to qualify for grants under the program. The Energy Strategy target is 20%, about 1,000 units, of existing homes retrofitted by 2012. If EGH retrofits represent 10% of all home retrofits, 230 homes have been retrofitted, leaving 770 remaining, or about 257 per year.

4.0 Island Vehicles

ICBC provided the vehicle registration data[1] used in this section (Table 6). Figures refer to the number of vehicles registered in the month of June each year.

The total number of insured light vehicles increased from 6,825 in June 2002 to 7,812 in June 2009, an average increase of 123 vehicles per year, down from 141 reported in the previous update. Overall, the average rate of increase has declined from 3.5% per year (2002 Baseline Report) to 1.9% for the period 2003 through 2009. The number of automobiles increased by an average of 2.1% per year from 2003 through 2009; the equivalent percentage for light trucks was 1.6%. The higher growth rate for automobiles than light trucks suggests that light vehicle fleet efficiency has improved.

Chart 4— Number of registered light vehicles, 2002 — 2009

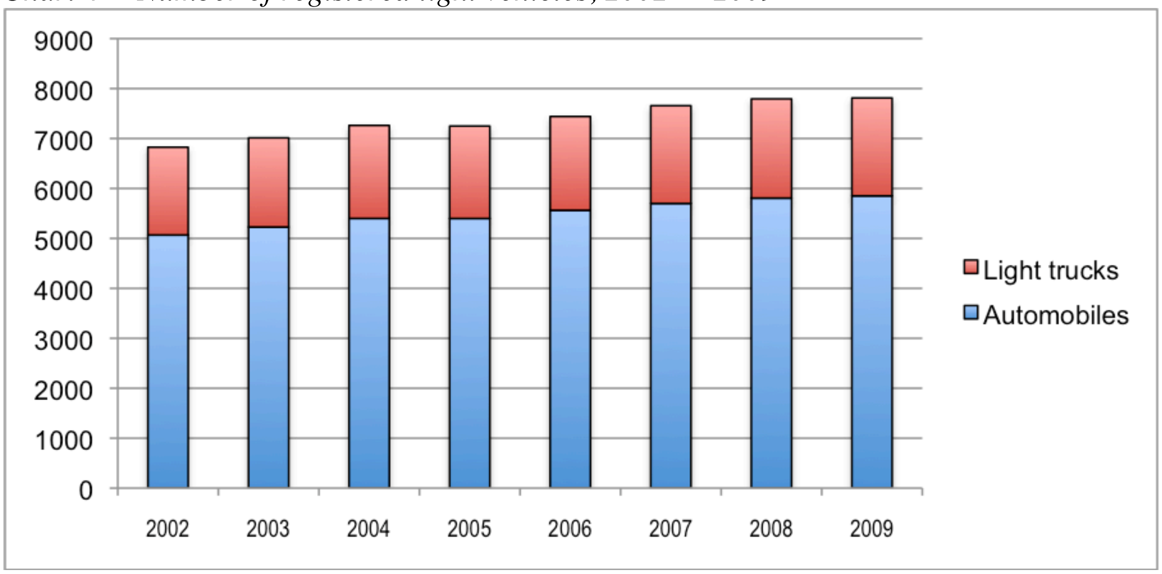


Table 5: Number of registered vehicles, June 2002, 2007 and 2009

	2002	2007	2009	increase*
Heavy commercial vehicles	51	72	70	19
Medium Commercial vehicles	56	67	76	20
Light trucks and SUVs	1,757	1,957	1,960	203
Automobiles	5,068	5,700	5,852	784
Total light vehicles**	6,825	7,657	7,812	987

* 2009 minus 2002
** Light trucks and SUVs plus Automobiles

The number of medium commercial vehicles increased from 56 in 2002 to 76 in 2009, and the number of heavy commercial vehicles increased from 51 to 70 over the same period. The growth rate for heavy and medium commercial vehicles is more than double the rate for light vehicles. Medium and heavy commercial vehicles represent less than 2% of the total Salt Spring fleet but because their fuel requirements may be up to five times greater than a light vehicle it is possible that energy and emissions from these vehicles could equal 10% of light vehicles. Provincial per commercial unit diesel fuel consumption numbers were applied to the actual number of registered medium and heavy commercial vehicles, which resulted in emissions of about 1,700 tCO2e or 7.5% of light vehicle emissions. However without more information there is limited confidence in this number.

Table 6: Number of ICBC registered vehicles as of June of each year

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Heavy commercial vehicles	51	57	59	65	74	72	78	70	77	83	88
# increase HC	8	6	2	6	9	-2	6	-8			
% increase HC		11.8%	3.5%	10.2%	13.8%	-2.7%	8.3%	-10.3%			
Medium Commercial vehicles	56	60	64	59	60	67	73	76	56	60	64
# increase MC	-2	4	4	-5	1	7	6	3			
% increase MC		7.1%	6.7%	-7.8%	1.7%	11.7%	9.0%	4.1%			
Automobiles	5,068	5,228	5,400	5,399	5,563	5,700	5,807	5,852	6,008	6,121	6,233
# increase automobiles	180	160	172	-1	164	137	107	45			
% increase automobiles		3.2%	3.3%	0.0%	3.0%	2.5%	1.9%	0.8%			
Light trucks and SUVs	1,757	1,785	1,861	1,850	1,877	1,957	1,986	1,960	1,757	1,785	1,861
# increase light trucks	56	28	76	-11	27	80	29	-26			
% increase light trucks		1.6%	4.3%	-0.6%	1.5%	4.3%	1.5%	-1.3%			
TOTAL light vehicles	6,825	7,013	7,261	7,249	7,440	7,657	7,793	7,812	7,765	7,906	8,094
# increase light vehicles	236	188	248	-12	191	217	136	19			
% increase light vehicles		2.8%	3.5%	-0.2%	2.6%	2.9%	1.8%	0.2%			
Hybrids	1	6	11	20	37	46	58	68	76	87	97
# increase hybrids		5	5	9	17	9	12	10			
% increase hybrids		500%	83.3%	81.8%	85%	24.3%	26.1%	17.2%			
calculated emissions based on original baseline assumptions											
Avg. Km/yr/light vehicle	14,880	14,523	14,166	13,809	13,451	13,094	12,737	12,380	12,172	11,666	10,952
Total km/yr light vehicles	101,555,338	101,848,294	102,856,913	100,098,179	100,078,636	100,263,167	99,260,976	96,713,179	94,513,721	92,230,162	88,642,320
Litres/ 100 km/automobile	8.5	8.5	8.4	8.3	8.2	8.2	8.1	8	8	8	8
Litres/ 100 km/Light Truck	11	11	11	11	11	11	11	11	11	10	10
Vehicles fuel, litres	9,285,803	9,305,184	9,299,038	8,972,340	8,862,905	8,862,219	8,691,091	8,391,878	8,075,808	7,816,005	7,460,551
Emission factor, kg CO2e/litre	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Total GHG, t CO2e	23,725	23,775	23,759	22,924	22,645	22,643	22,206	21,441	20,634	19,970	19,062
Gasoline Energy, GJ	297,146	297,766	297,569	287,115	283,613	283,591	278,115	268,540	258,426	250,112	238,738
GHG/light vehicle, t CO2e	3.48	3.39	3.27	3.16	3.04	2.96	2.85	2.74	2.66	2.53	2.36

Data shaded in grey are linear trendline projections; data shaded in light grey are based on assumptions used in original baseline report.

Chart 5—Average % annual growth rate of registered vehicles

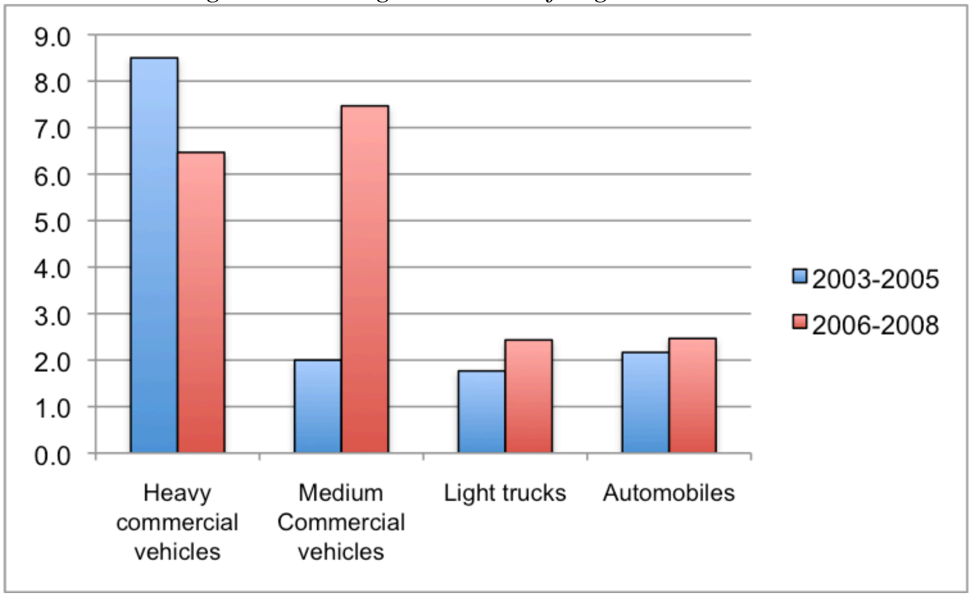


Table 7: Average % annual growth rate of registered vehicles

	2003-2005	2006-2008	2003-2009*
Heavy commercial vehicles	8.5%	6.5%	4.9%
Medium Commercial vehicles	2.0%	7.5%	4.6%
Light trucks and SUVs	1.8%	2.4%	1.6%
Automobiles	2.2%	2.5%	2.1%
Total light vehicles	2.0%	2.4%	1.9%

* note reduced growth in 2009 brings annual average down

4.1 Fuel-efficient light vehicles

The total number of hybrid vehicles has risen from 1 in 2002 to 68 in 2009 (Table 8), and while the percentage of hybrids to total vehicles by model year remains small, ≤ 4%, the average does appear to be slowly rising.

Table 8: Hybrids as % of late model light vehicles

	2006			2007			2008			2009		
	hybrid	total	%	hybrid	total	%	hybrid	total	%	hybrid	total	%
Model year 2003-2004	14	616	2.3%	15	657	2.3%	13	691	1.9%	15	715	2.1%
Model year 2005-2006	19	573	3.3%	25	695	3.6%	27	726	3.7%	29	728	4.0%
Model year 2007-2008	0	17	0.0%	5	242	2.1%	17	588	2.9%	19	720	2.6%
Model year 2009-2010							0	5	0.0%	5	158	2.5%
Total	33	1,206	2.74%	45	1,594	2.82%	57	2,010	2.84%	68	2,321	2.89%

Three Point Motors reported selling a total of 22 Smart Cars to islanders by the end of September 2006. In December 2009 they had 49 Salt Spring Smart Cars in their system. If these are added to the 68 hybrids registered in 2009, fuel efficient light vehicles as a percentage of total late model vehicles was 5%.

4.2 GHG emissions from Salt Spring vehicles

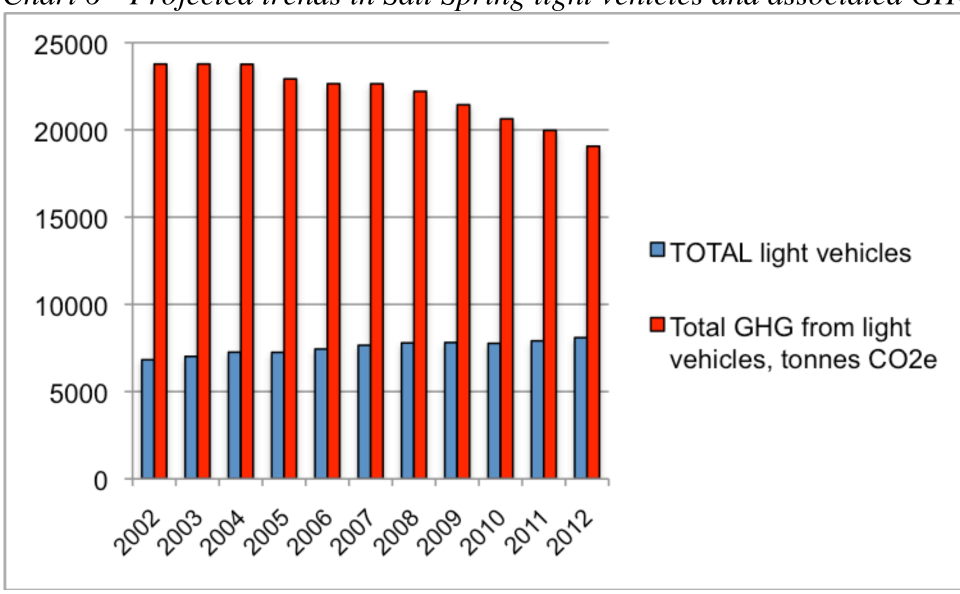
As stated in paragraph 2.3, GHG emissions, expressed as tonnes of carbon dioxide equivalents (t CO2e), are determined by multiplying fuel consumption by an emission factor. Emission factors vary by agency and may change over time due to changes in technology. Table 9 presents some current emissions factors for transportation fuels. The lifecycle emission factors includes energy used for resource extraction and fuel processing etc.

Table 9: Lifecycle and combustion emission factors for transportation fuels[3]

	LIFECYCLE Emissions Factors kg eq Co2 / L	COMBUSTION (Tailpipe) Emissions Factors kg eq Co2 / L
Gas	**3.352**	**2.216**
Diesel	**3.543**	**2.717**
B2 biodiesel	3.488	2.664
B5 biodiesel	3.406	2.584
B10 biodiesel	3.269	2.452
B20 biodiesel	2.995	2.187
B50 biodiesel	2.173	1.391
B100 biodiesel 0.803	0.0008	0.00006
E10 ethanol	3.138	2.143
E85 ethanol	1.344	0.369
CNG	2.939	2.128
Propane	2.107	1.525

We do not know the distance travelled by an average vehicle registered on Salt Spring, nor do we know the average fuel efficiency. Therefore the estimates of fuel use and resulting GHG emissions are based on assumptions. The fuel emission factor used for the 2002 Baseline Report and the first update report was 2.56 kg CO2e per litre, a blended figure representing both gasoline and diesel fuels. NRCan data for BC and the Yukon[4] indicate that average light vehicle fuel efficiency has increased and distance travelled has decreased between 2002 and 2007. Applying the same percentage efficiency increases (4%) and distance decreases (12%) to the 2002 baseline assumptions result in an average fuel efficiency of 9.6 litres/100 km and an average distance travelled of 13,094 km per Salt Spring light vehicle in 2007 (Table 6).

Chart 6—Projected trends in Salt Spring light vehicles and associated GHG emissions



Although Salt Spring light vehicle fuel consumption and GHG emissions estimates are based on provincial trends, there are several Salt Spring indicators that suggest these trends apply to Salt Spring. Increased fuel efficiency is indicated by the annual growth rate in the number of automobiles (2.1%) relative to SUVs and pickup trucks (1.6%), and by the increase in the number of Smart Cars and hybrids, which represented 5% of total late model vehicles in 2009, up from 0% in 2002. Decreased distance travelled is suggested by the decline in the number of underheight and overheight vehicles on BC Ferries (3.2% fewer trips in 2008 than in 2002), and by the Salt Spring Transit ride numbers (estimated avoided trip distance in 2009 is 0.6% of total km travelled). Therefore there is some confidence that the 2012 projections for light vehicle emissions are realistic despite the increase in the number of vehicles.

If the targets were to be met today through reduction of registered vehicles alone, 987 light vehicles, 20 medium commercial vehicles and 19 heavy commercial vehicles would have to be removed from Salt Spring roads.

4.3 GHG emissions impact of the Salt Spring bus

The Salt Spring bus system was introduced in January 2008. Transit systems encourage pedestrian modes and have a positive influence in reducing automobile use beyond the direct and measurable use of the transit service. For example, Ganges residents may choose to not own a car because the bus service is available. The data source for the transit analysis was Salt Spring Island Transit System Operator Ineke de Jong. Table 10 illustrates the direct impact of the Salt Spring bus service in 2009. Several assumptions have been made in developing the avoided trip figures and these are noted below the table.

Table 10: Salt Spring Transit energy and emissions for 2009

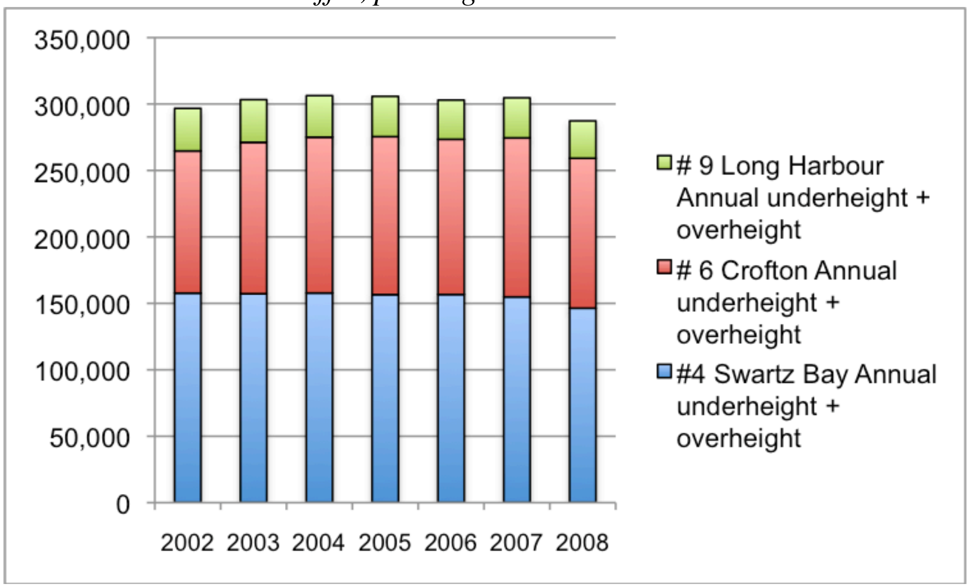
	# rides	Total Distance, km	# Units	Consumption litres	Litres/ Unit	Energy GJ	emission factor kg CO2e /litre	GHG CO2e(t)
SS Transit, 2009, diesel	58,365	112,477	3	24,891	8,297	963	2.72	68
Avoided trips, 50% of rides	29,183	583,650	29,183	52,529	2	1,681	2.56	134
Annual savings				**27,638**		**718**		**67**

Assumptions for avoided trips: average trip length is 20 km (Fulford-Ganges, anecdotally the most popular route); Avoided trips @ 50% of rides because some riders would have hitch-hiked, or chosen not to travel, or car-pooled; Average light vehicle fuel efficiency is 9 litres/ 100 km.

5.0 BC Ferries Vehicle Traffic

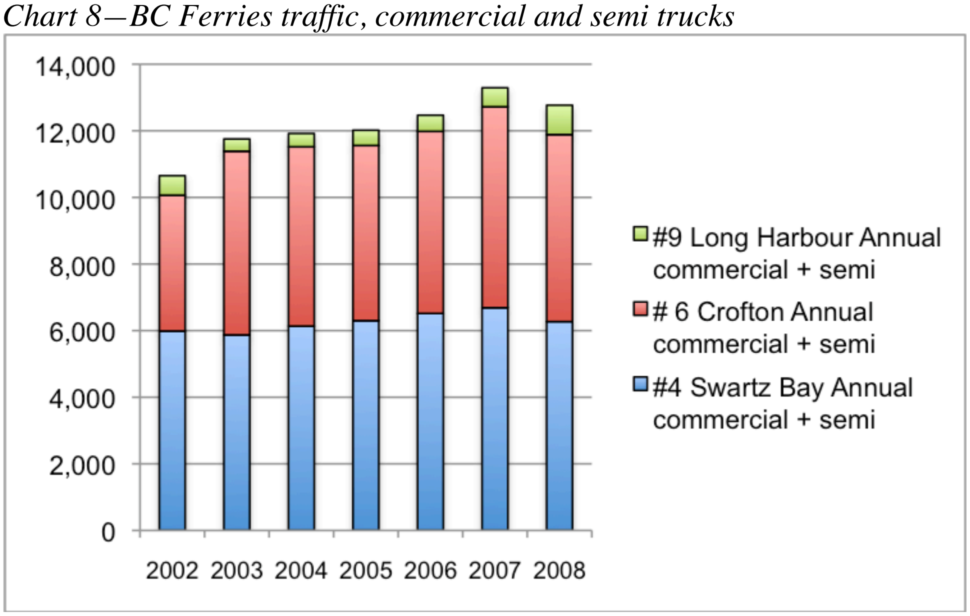
The data presented in this section were provided by BC Ferries and represent one-way traffic from the respective terminals. The data are for fiscal years, i.e. 2009 data is for the period beginning April 1, 2008 and ending March 31, 2009. For ease of comparison with other sections, we have used the previous year for the label on the charts, i.e. fiscal 2009 is labeled 2008. The amount of ferry traffic provides an indication of the number of vehicles on Salt Spring roads, and the number of off-island road trips taken.

Chart 7—BC Ferries traffic, passenger vehicles



Route 4 (Swartz Bay) underheight and overheight vehicle traffic (i.e. private automobiles, vans and pick-up trucks) continued to decline, with a total decline of -7.26% between 2003 and 2008. For Route 6 (Crofton) the figures are 5.71% growth for underheight plus overheight. For Route 9 (Long Harbour) the figures are -12.69% decline for underheight plus overheight. If these trends continue, by 2012 Route 6 will be carrying almost as much ferry traffic as Route 4.

Chart 8—BC Ferries traffic, commercial and semi trucks



Between 2003 and 2008, Route 4 commercial and semi truck traffic grew by 5.08%. For Route 6 the figures are 37.89% growth for commercial and semi. For Route 9 the figures show an 64.08% increase for commercial and semi (although the total number of trucks is modest).

Combining the data for all routes shows that 287,313 private automobiles, vans and pick-up trucks made ticketed one-way trips to or from Salt Spring in 2008 (round trips would presumably be approximately the same), versus 296,764 trips in 2002, a decrease of 3.1% over six years. The number of one-way trips by heavy vehicles (semis and trucks) over the same period increased from 10,651 in 2003 to 12,768 in 2008, an increase of 19.9% over six years.

Table 12: Ferry traffic, annual growth rates, %

	avg. annual growth % 2003-2005	avg. annual growth % 2006-2008	avg. annual growth % 2003-2008	total growth % 2003-2008
#4 Swartz Bay Annual underheight + overheight	-0.23	-2.19	-1.21	-7.26
#4 Swartz Bay Annual commercial + semi	1.74	-0.05	0.85	5.08
# 6 Crofton Annual underheight + overheight	3.59	-1.68	0.95	5.71
# 6 Crofton Annual commercial + semi	10.17	2.46	6.31	37.89
# 9 Long Harbour Annual underheight + overheight	-1.86	-2.37	-2.11	-12.69
#9 Long Harbour Annual commercial + semi	-4.63	25.98	10.68	64.08

Chart 9— Ferry traffic, annual growth rates, %

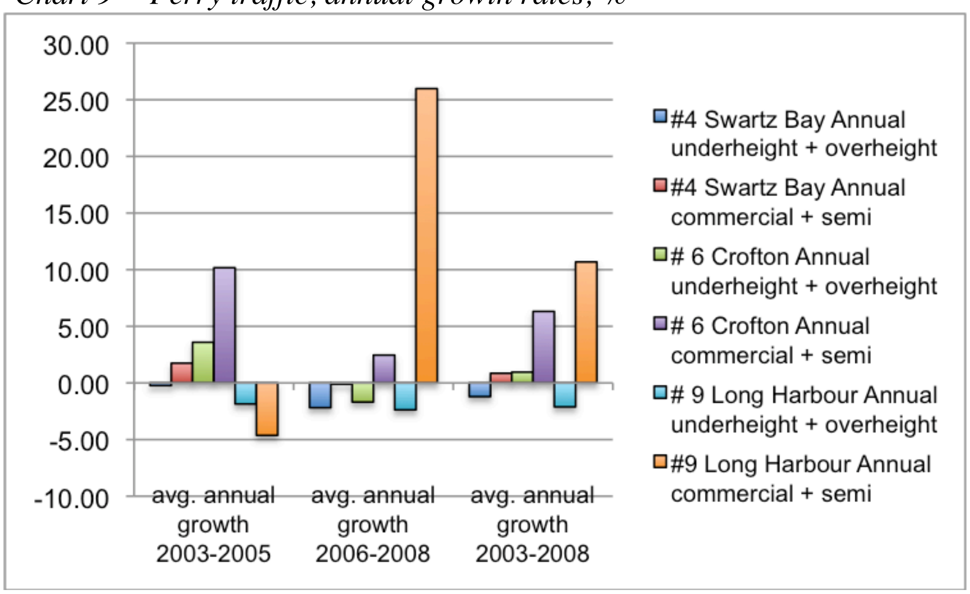


Table 13: BC Ferries one-way traffic data

DEPARTURE TERMINAL	(fiscal 2003) 2002	(fiscal 2004) 2003	(fiscal 2005) 2004	(fiscal 2006) 2005	(fiscal 2007) 2006	(fiscal 2008) 2007	(fiscal 2009) 2008	(fiscal 2010) 2009	(fiscal 2011) 2010	(fiscal 1012) 2011	(fiscal 2013) 2012
#4 Swartz Bay Annual underheight + overheight	157,681	157,247	157,781	156,570	156,672	154,847	146,396	155,089	154,600	154,112	153,623
% increase		-0.28	0.34	-0.77	0.07	-1.16	-5.46				
#4 Swartz Bay Annual commercial + semi	5,987	5,872	6,136	6,299	6,517	6,687	6,271	6,809	6,969	7,129	7,289
% increase		-1.92	4.50	2.66	3.46	2.61	-6.22				
# 6 Crofton Annual underheight + overheight	107,017	113,926	117,274	118,885	116,806	119,660	112,781	122,941	125,040	127,139	129,238
% increase		6.46	2.94	1.37	-1.75	2.44	-5.75				
# 6 Crofton Annual commercial + semi	4,079	5,514	5,384	5,260	5,466	6,035	5,615	6,241	6,513	6,784	7,056
% increase		35.18	-2.36	-2.30	3.92	10.41	-6.96				
# 9 Long Harbour Annual underheight + overheight	32,066	32,116	31,285	30,304	29,473	30,168	28,136	29,062	28,536	28,011	27,485
% increase		0.16	-2.59	-3.14	-2.74	2.36	-6.74				
#9 Long Harbour Annual commercial + semi	585	370	399	459	484	570	882	511	520	529	539
% increase		-36.75	7.84	15.04	5.45	17.77	54.74				
Total Annual underheight + overheight	296,764	303,289	306,340	305,759	302,951	304,675	287,313	307,092	308,177	309,261	310,346
% increase		2.20	1.01	-0.19	-0.92	0.57	-5.70				
Total Annual commercial + semi	10,651	11,756	11,919	12,018	12,467	13,292	12,768	13,561	14,002	14,443	14,884
% increase		10.37	1.39	0.83	3.74	6.62	-3.94				

Data shaded in grey are linear trendline projections

6.0 Indirect energy associated with grocery purchases

The objective for this update is to establish a protocol for a better determination of the impact of local food production on Salt Spring's energy and GHG emissions. The baseline report used population and oil equivalency figures of 1,514 litres per person per year to calculate indirect GHG emissions from purchases of conventionally grown imported food:

> Our food purchases have a large impact on the amount of fossil fuel energy we consume and the GHGs we produce. Energy is used at every step of food production: to manufacture fertilizers, pesticides and herbicides, for tillage and harvesting, for processing and packaging, and last but not least for transportation. The average North American's annual grocery shopping cart represents 1,514 litres (400 US gallons) of oil equivalents. (Source: Pimentel, D. and Pimentel, M. 'Food, Energy and Society' published by University Press of Colorado,1996. (363pp.) Pimentel, D. and Pimentel, M. 2003. World Population, Food, Natural Resources, and Survival. In, World Futures 59: (3-4) 145-167, and personal communication).

The Energy Strategy target for food is to replace 10% of Salt Spring's imported food with local products by 2012 to provide about 23% of the total reductions needed. Note that this target is more aggressive than the targets for other sectors.

6.1 Literature review

There is no question that the food system contributes very significantly to total global GHG emissions. Estimates of food-related emissions range from 17% of total global emissions to 51%, depending on what is included in the calculations. The Salt Spring Baseline Report estimated food-related emissions at 38% of total calculated emissions in 2002, although the true percentage would be somewhat lower since the report (and subsequent updates) does not estimate emissions from all sectors.

Since the original Baseline Report was prepared in 2004, much international research has been published. A review of recent research (key sources listed at the end of this section) provides the following, sometimes apparently somewhat contradictory, observations:

- A global switch to organic food production systems could offset GHG emissions from all sources by 11% through soil carbon sequestration;
- A global switch to local organic food systems could reduce total global energy consumption by 17.3% and global GHG emissions by 32.1%, largely through soil carbon sequestration and transportation savings;
- Emissions from transportation represent about 11% of the GHG emissions from food;
- Changing the type of food eaten, particularly the type of protein, has more impact on GHG emissions than where the food was grown;
- How a crop is grown significantly affects the resulting GHG emissions;
- Grain-fed beef production produces more GHG emissions than any other crop.

The following tables and charts are reproduced from various research papers as noted. They have been selected because they may provide some context for the Salt Spring discussion.

The table below from *Organic Agriculture and Localized Food & Energy Systems for Mitigating Climate Change*, by Mae-Wan Ho, suggests that increased reliance on local organic food production has the potential to reduce total (not just food-related) energy and emissions by 17.3% and 32.1% respectively. The largest contributions come from soil carbon sequestration and reduced transport.

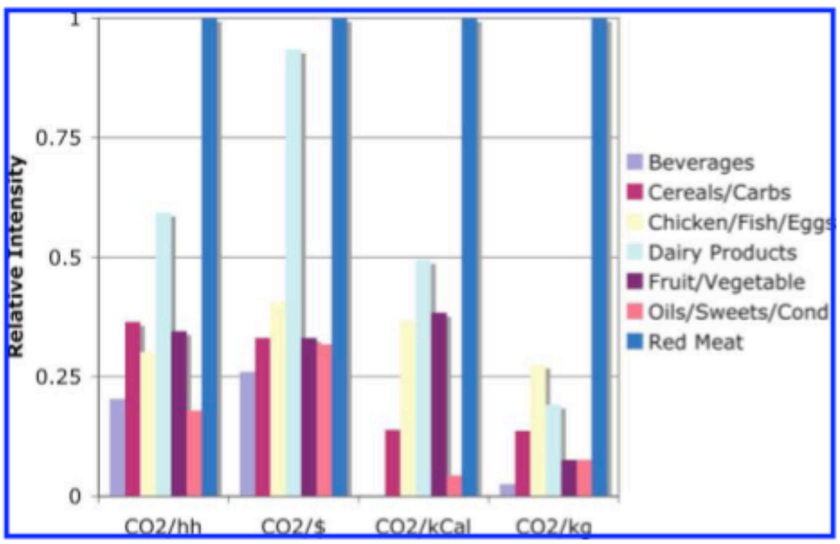
Global potential of organic sustainable food systems for mitigating climate change*

Greenhouse gas emission	**%**	***Energy***	
Carbon sequestration in organic soil	11.0%	No deforestation	5.0%
No deforestation	9.0%	Localising food system	
Localising food systems		Reduced transport	5.0%
Reduced transport	3.0%	Reduced building & infrastructure	1.0%
Reduced building & infrastructure	1.0%	Reduced processing & packaging	3.5%
Reduced processing & packaging	1.5%	Reduced wastes & waste treatment	0.5%
Reduced wastes	0.5%	Reduced livestock by half	1.0%
Reduced livestock by half	1.6%	Phasing out N fertilizers	
Phasing out N fertilizers		Reduced wastes & waste treatment	0.5%
Reduced nitrous oxide emissions	3.8%	No fossil fuels used	2.3%
No fossil fuels used in manufacture	0.7%	**Total**	**17.3%**
Total	**32.1%**		

* from *Organic Agriculture and Localized Food & Energy Systems for Mitigating Climate Change,* Dr. Mae-Wan Ho, October 2008

The following figure from *Food-Miles and the Relative Climate Impacts of Food Choices in the United States* by Christopher L . Weber and H. Scott Matthews, Environ. Sci. Technol. 2008, 42, 3508–3513 illustrates the relative GHG intensity of various food types.

Comparison of normalization factors for total GHG of food. All values shown relative to the value of red meat (2500 kg CO2e/yr, 2.4 kg CO2e/$, 10.8 g CO2e/kcal, 22,1 kg CO2e/kg)



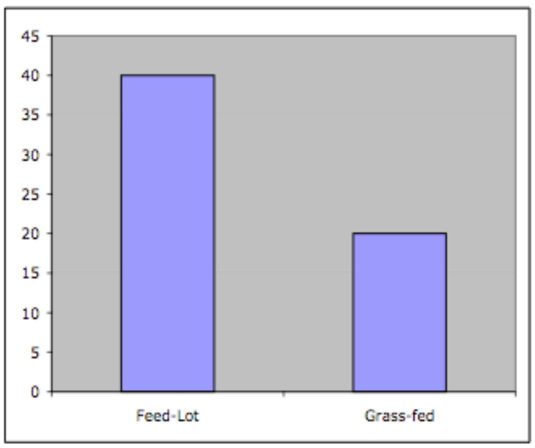
From the same paper: “We find that although food is transported long distances in general (1640 km delivery and 6760 km life-cycle supply chain on average) the GHG emissions associated with food are dominated by the production phase, contributing 83% of the average U.S. household’s 8.1 t CO2e/yr footprint for food consumption. Transportation as a whole represents only 11% of life-cycle GHG emissions, and final delivery from producer to retail contributes only 4%. Different food groups exhibit a large range in GHG-intensity; on average, red meat is around 150% more GHG- intensive than chicken or fish. Thus, we suggest that dietary shift can be a more effective means of lowering an average household’s food-related climate footprint than “buying local.” Shifting less than one day per week’s worth of calories from red meat and dairy products to chicken, fish, eggs, or a vegetable-based diet achieves more GHG reduction than buying all locally sourced food.”

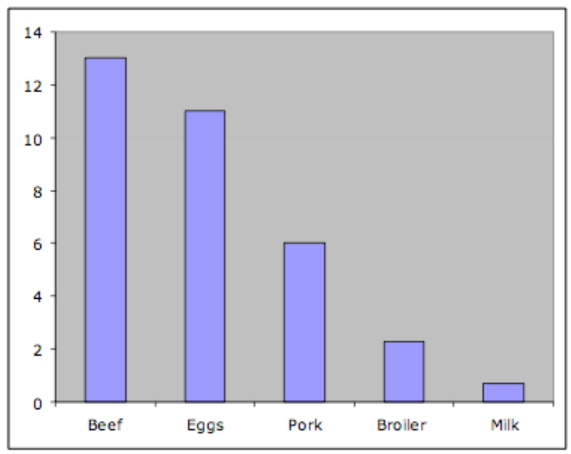
The following table shows energy use in organic crops relative to conventional systems, from *Monitoring and management of energy and emissions in agriculture* by Tony Little

Energy use in organic crops relative to conventional systems (From Cormack and Metcalfe 2000)

Crop	Comparison of energy inputs	
	Per Ha	Per Tonne Product
Winter wheat	60% less	30% less
Potatoes	45% less	14% less
Carrots	59% less	27% More
Cabbage	47% less	35% less
Onion	31% less	7% less
Calabrese	70% less	40% less
Leeks	60% less	

The chart on the left below shows the fossil energy input (kcal) per kcal of beef protein produced in feed-lot compared to organic grass-fed beef, from *Impacts of Organic Farming on the Efficiency of Energy Use in Agriculture,* David Pimentel, Cornell University, An Organic Center State of Science Review, August 2006





The chart on the right above, also from *Impacts of Organic Farming on the Efficiency of Energy Use in Agriculture*, shows grain inputs in kilograms per kilograms of livestock products produced.

6.2 Estimating quantities of food grown on Salt Spring

There were no data available for local food production in 2002. In 2005, a study by Island Natural Growers (Salt Spring Island Local Produce Study, Nov. 2005) found that commercial fruit and vegetable production on Salt Spring was equivalent to about 5% of annual consumption. This represents 2.2% (5% of 44%) of our total annual food requirements by weight. A study by the Farmers' Institute the previous year arrived at a similar percentage for meat production.

In 2006, an Area Farm Plan and a Food Security project were started. Objectives of both are to increase the amount of food grown on Salt Spring:

Commercial food production volumes

In 2004 there were about 232,000 pounds (105,455 kg) of vegetables and fruit grown on Salt Spring, about 1680 sheep, cattle and pigs were sold for food, and about 4100 poultry were marketed by farmers. A quick calculation shows that these volumes would provide about 23 pounds (10.5 kg) of vegetables and fruits and less than ½ a chicken per resident per year.

> There is no commercial dairy production on the island. There is one dairy that produces milk for its own on-farm cheese processing. There is some commercial fishing and some seafood production on the island but data on volumes is not readily available.
>
> There is no commercial human food grain and pulse production on the island and no other non-meat protein produce being grown.
>
> Grocers are trucking more than 4 million pounds of produce onto the island annually. The hospital (the island's largest institutional food server) is trucking in about 95,000 pounds of produce and meat annually.
>
> Farmers are producing enough meat and produce to provide only about 5% of the total amount of food eaten by Salt Spring residents and visitors. Most of this food is only available seasonally. [5]

The *Report on Salt Spring Island Livestock Production in 2008*[6] found that the number of cattle, sheep, pigs and goats on Salt Spring farms has decreased by about 44% since 2004. The number of poultry raised for meat has decreased by about 52% since 2004. One reason for the decline is the change to provincial meat regulations, which now require market animals to be slaughtered in approved facilities, which do not exist on Salt Spring.

Anecdotally, the production of fruit and vegetables is increasing. An update to the 2005 Produce Study is currently underway and will quantify current production levels.

6.3 Tracking progress in reducing food-related energy and GHG emissions

There is as yet no recognized protocol for communities to estimate and track food-related energy and GHG emissions, which is probably why no other community to this author's knowledge has addressed food. However because emissions related to food consumption, albeit indirect emissions, was estimated to be 38% of total community emissions tracked in the first baseline report, some attempt at ongoing tracking and refinement of GHG emissions estimates from food is needed. Further, ongoing provincial, national, and international research on this subject will result in better information in the future.

Any tracking system should ideally involve a relatively small number of variables, and the data should be accessible, i.e. already collected on a regular basis for other purposes.

Table 14: Population and energy associated with grocery purchases

	1996	2001	2006	2012
Population, from Stats Can CRD region F	9,247	9,279	9,640	9,853
kilo-litres of oil equivalent (1)	14,000	14,048	14,595	14,917
Emission factor, kg CO2eq / kL diesel (2)	2,717	2,717	2,717	2,717
GHG emissions, tonnes CO2eq.	38,038	38,170	39,655	40,530
Total energy, GJ	541,518	543,392	564,533	576,991

1. based on 1,514 litres / person / year, source: D. Pimentel, Cornell University
2. from NRCan GHGenius version 3.11

Based on population growth, Salt Spring's indirect emissions associated with grocery purchases are fairly stable, growing by 1% between 2001 and 2006 and projected to increase another 1% by 2012. Total emissions in 2012 are now projected to be 2,500 tCO2e greater than they were in 2001.

Stats Can provides data on foods available at Canadian supermarkets. Fruit and vegetables combined, including processed produce, make up by far the largest portion of the Canadian diet at 44%.

Table 15: Foods available to Canadians, 2008

2008	*kg/person/yr*	*%*
Vegetables	173	25
Fruit	137	19
Dairy (includes fluid milk)	129	18
Cereals	82	12
Red meat	56	8
Fish and poultry	48	7
Sugars & syrups	33	5
Oils & fats	27	4
Pulses & nuts	10	1
Eggs*	9	1
Total	704	100

Amounts rounded and simplified from Stats Can data and include fresh and processed foods.

* 15 doz @ 0.63 kg/doz Source: Regulations Respecting the Grading, Packing, Marking and Inspection of Eggs and International and Interprovincial Trade in Eggs. (Statute: Canadian Agricultural Products. Current at January 10, 2010)

Fruit and vegetables are proven Salt Spring crops and have a low GHG intensity relative to other crops, suggesting that a focus on growing a greater percentage of these crops, supplemented by other agricultural products such as poultry, eggs, nuts, and grass-fed lamb, is appropriate. A decline in island meat production indicates a reduction in associated GHG emissions, but less meat production also means less animal manure available for fruit and vegetable crops. The long-term maintenance of soil fertility and high levels of fruit and vegetable production may depend in part on some grass-fed meat production.

Because agricultural production on Salt Spring takes place on such a small scale with very low levels of mechanization, its carbon footprint is likely to be lower than that cited in the literature for organic production of the same crops elsewhere in the developed world. Tracking quantity and type of foods grown on Salt Spring will enable general trends to be determined.

It is not possible at this point to quantify energy and GHG emissions savings from increase in local food production with any confidence.

7.0 Solid Waste

Emissions attributable to Salt Spring's solid waste are tentatively estimated to be 2,229 t CO2e in 2007, based on 4,205 tonnes of general refuse delivered to Hartland Landfill. This figure does not include CRD estimates of gas generated and measured gas captured at Hartland. CRD methods are similar to CEEI protocols, but are considered more accurate because site specific. More information has been requested from CRD.

Table 16: Salt Spring Island's solid waste received at Hartland Landfill

year	*general refuse tonnes*	*biosolids cake weight, tonnes*	*Total, tonnes*
2003	3,250	not available	
2004	3,658	not available	
2005	3,729	not available	
2006	4,064	627	4,691
2007	4,205	600	4,805
2008	3,711	533	4,244

Salt Spring's biosolids (dewatered sewage sludge) are also landfilled at Hartland. When the CEEI emissions factor of 0.53 is applied to both general refuse and biosolids cake for 2007, a total of 2,547 tCO2e result (Table 17).

Table17 : Solid waste emissions for 2007, preliminary estimate

SOLID WASTE	*Type*	*Estimation Method*	*Mass (t)*	*emission factor**	*CO2e(t)*
Baseline update 2007	general refuse	waste in place	4,205	0.53	2,229
Baseline update 2007	biosolids cake	waste in place	600	0.53	318
Total Baseline			4,805	0.53	2,547

* from CEEI Technical Guidance Document

SOURCES

Statistics Canada (population and food data)

National Inventory Report-greenhouse gas sources and sinks in Canada, Environment Canada, April 2009

BC Climate Action Toolkit– a climate action resource for local governments (several relevant publications and calculators) http://www.toolkit.bc.ca/

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ENDNOTES

[1] ICBC *'Vehicle Population on Salt Spring Island for the period 06/2006 — 12/*2009' from the Communications Division at ICBC

[3] from NRCan GHGenius version 3.11, 2009

[4] NRCan Historical Database–August 2009, British Columbia and Territories (see table below)

NRCan Historical Database Aug 2009, British Columbia and Territories

	2002	2003	2004	2005	2006	2007
Average Distance Travelled per Year (km)						
Small Cars	19,563	18,145	18,968	18,068	17,250	17,164
Large Cars	20,404	18,844	19,738	18,587	17,950	17,990
Small Cars On-Road Average Fuel Consumption (L/100 km)						
Motor Gasoline	8.5	8.5	8.4	8.3	8.2	8.2
Diesel Fuel Oil	5.8	5.8	5.7	5.6	5.6	5.6
Large Cars On-Road Average Fuel Consumption (L/100 km)						
Motor Gasoline	11.0	11.0	10.9	10.9	10.8	10.7
Diesel Fuel Oil	8.5	8.7	8.1	7.6	7.3	7.3

[5] *Salt Spring Island Food Security—A Discussion And Planning Paper,* Pat Reichert for the SSI Community Food Security Project Steering Committee, September 2006

[6] *Report on Salt Spring Island Livestock Production in 2008*, prepared by Patricia Reichert and Margaret Thomson for the Salt Spring Island Agricultural Alliance, December 2009