

Bowen Island Greenhouse Gas Action Plan

Final Report



May 2007

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1 Introduction

The Bowen Island Greenhouse Gas Action Plan is intended to give Bowen Island the tools to successfully reduce greenhouse gas emissions in the short, medium, and long-term. This report builds upon the 2003 Community Energy Planning Options Report, which developed two key pieces:

1. A baseline inventory of energy consumption, costs, and greenhouse gas emissions on Bowen Island to help understand where the greatest impacts and opportunities were likely to be.
2. An investigation of 14 options that Bowen Island could implement to reduce greenhouse gas emissions.

Upon completion of the Options report, Bowen Island Council adopted a target to stabilize greenhouse gas emissions at 2000 levels by the year 2010. Unfortunately, only a limited selection of options was pursued between 2003 and 2007, so greenhouse gas emissions have continued to rise. This report is intended to help remedy that situation by providing a greater degree of focus to the options so that they can become actions.

The report is structured as follows:

- Chapter 2 provides a brief update on the strategies that have been implemented since 2003 and the resulting trends in Bowen Island emissions.
- Chapter 3 summarizes the opportunities available to reduce Bowen Island's greenhouse gas emissions.
- Chapter 4 describes the actions that will position the various greenhouse gas reducing strategies within a comprehensive strategy. These include committing resources, setting targets, planning for evaluation, and communicating with the public.
- Chapter 5 describes the actions that Bowen Island will pursue to reduce their greenhouse gas emissions.
- Chapter 6 compiles the actions in chapters 4 and 5 into a clear implementation plan to ensure that Bowen Island has a clear and substantive path forward in their efforts to reduce greenhouse gas emissions.

2 Current Emissions and Implications

Since 2003, when the target to stabilize emissions at 2000 levels by 2010 was adopted, several actions have been underway to reduce greenhouse gas emissions. The most significant of these are: a) Federal and Provincial programs to support retrofits of existing housing, and b) Bowen Island's rezoning policy for new housing (which was just adopted in 2007). Although these are both initiatives in the right direction, the success they have achieved is relatively minor in comparison with Bowen Island's overall emissions profile. There are two main reasons why these initiatives have been unable to make a significant dent in rising emissions trends:

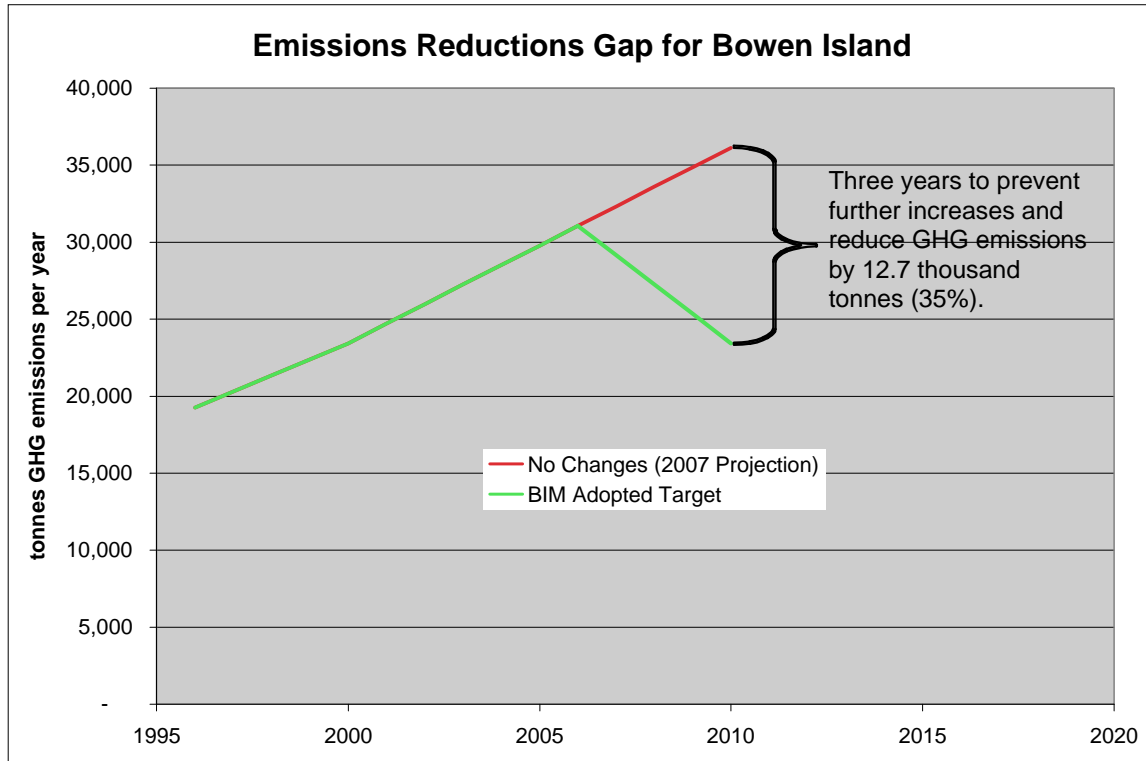
1. The existing initiatives do not target transportation emissions, which are the biggest sources of emissions on Bowen Island. The housing retrofits and new housing policy target a segment of emissions that were estimated to be 2,800 tonnes in the year 2000, which was 9% percent of total island emissions. So even if these initiatives were able to eliminate emissions from housing entirely, they would only reduce projected 2010 emissions to 32,800, which would still be well above 2000 levels.
2. The rate of new housing construction on island has been increasing and based on the 2003 emissions inventory, every new resident increases greenhouse gas emissions by approximately seven tonnes.¹ If this trend continues, it will continue to provide an upward pressure on Bowen Island's greenhouse gas emissions and demand even more creative solutions to reduce those emissions. Other indicators such as population, ferry traffic, and vehicle registrations all tell a similar story.

Based on increasing housing starts, a rough estimate of Bowen Island's emissions is 32,300 tonnes, which is 38% above 2000 levels². This approach to estimating emissions ignores many other changes that could have happened since 2000 (e.g. people changing their commuting habits or buying more efficient vehicles), but given the lack of substantive GHG reduction initiatives, it likely provides a reasonably accurate figure. If present trends continue, the projected emissions for Bowen Island between 2007 and 2010 are shown in Figure 1. As illustrated, in 2010 they would be at 36,100 tonnes, which would require a 35% reduction to get to the targeted level of 23,400 tonnes.

¹ Based on Bowen Island housing reports, between 1996 and 2000, the average number of new housing starts was 26 per year, while that number increased to 33 between 2001 and 2006.

² To be consistent with the 2003 emissions inventory, the 32,300 tonnes includes emissions from residential and commercial buildings, on-island, off-island, and ferry transportation, construction, and wastes.

Figure 1 – Emissions Reduction Gap for Bowen Island



Realistically, given the opportunities available to Bowen Island and the time required to implement those opportunities, it is unlikely that the target will be achieved. This reality should not be taken as a reason to scale back ambitions to reduce greenhouse gas emissions, and can be turned into a positive if Bowen Island is able to learn from their experiences. Some of those key lessons should include:

1. Council will need to take a proactive and assertive role to realize reductions. Just exploring opportunities will not lead to them being a reality.
2. In addition to continuing (and likely expanding) initiatives that have been undertaken, the strategy needs to target the biggest pieces of the emissions pie (i.e. transportation).
3. There needs to be a system in place to monitor and understand progress, so that Bowen Island's experiences can be used to adapt the plan as necessary.

3 Available Opportunities

Although Bowen Island has not succeeded in reducing greenhouse gas emissions between 2003 and 2007, it is not because of a lack of opportunities. Through the Community Energy Planning Options Report (2003) and other community input, Bowen Island has access to a long list of potential opportunities to reduce greenhouse gas emissions. These opportunities are summarized in Figure 2.³ The figure includes all of the opportunities that have been put forward and is subject to two caveats:

1. The opportunities listed should not be taken as an indication of what Bowen Island is planning to implement, because only a portion of those shown will comprise the action plan.
2. The opportunities listed should not be taken as a limit to what Bowen Island is willing to consider, as it is likely that additional opportunities will surface in the future.

The opportunities in the figure are categorized as follows:

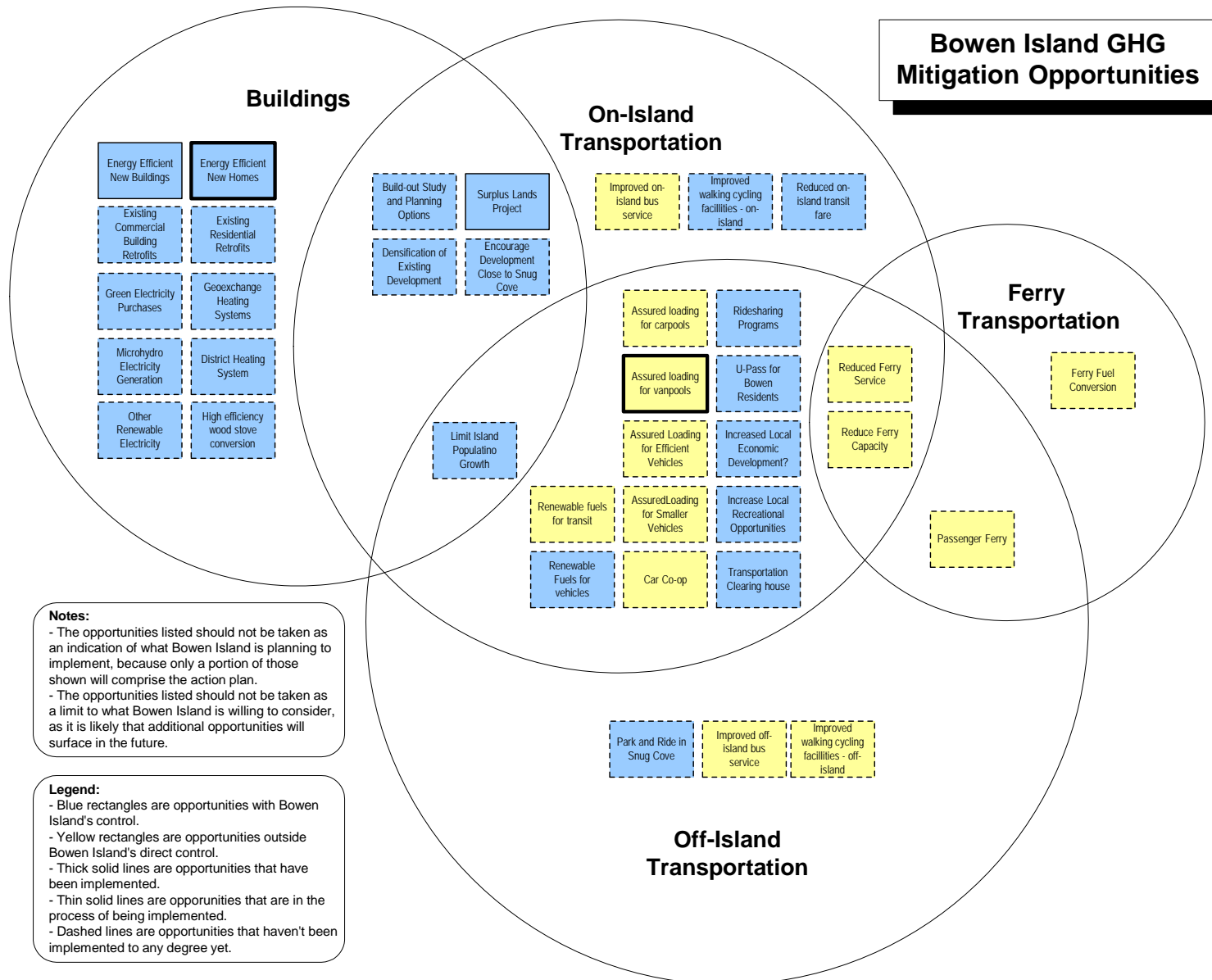
1. *By Sector* – The four large circles delineate whether or not an opportunity is intended to reduce emissions from buildings, on-island transportation, off-island transportation, or ferry transportation. Because of the integrated nature of buildings, land-use, and transportation, many of the actions influence multiple sectors, so they are shown in the areas where sectors overlap.⁴
2. *By Degree of Municipal Control* – Bowen Island must work with a number of other organizations in determining the infrastructure that dictates a large degree of the emissions. This category divides the opportunities into those that Bowen Island has complete control to implement (e.g. on-island bike lanes) and those that it only has an ability to influence (e.g. a new ferry purchase). Although the opportunities that Bowen Island has complete control over are simpler to implement, Bowen Island will need to seriously consider the more challenging opportunities that are outside their direct control because of the large amount of emissions they account for. Opportunities within Bowen Island's control to implement are colored blue, while other opportunities are colored yellow.
3. *By Current Status* – To help make this figure a useful tool to Bowen Island in an ongoing capacity, it also differentiates whether the opportunity has been implemented (thick solid line), is in the process of being implemented (thin solid line), or is under consideration (dashed line).

³ More information is available on the following opportunities in the 2003 Options Report: ferry fuel conversion, reduced ferry service, passenger ferry, improved peak bus service, off-peak bus service, transportation clearing house, green electricity purchases, geo-exchange heating systems, micro-hydro electricity generation, encouraging development close to Snug Cove, high efficiency wood stove conversion, R-2000 homes, retrofitting existing homes, and retrofitting existing buildings.

⁴ Many of the off-island transportation opportunities could have been integrated with the ferry transportation options because although they may not directly impact the ferry's emissions, they aim to reduce the number of vehicles on the ferry, which creates opportunities for a ferry with reduced vehicle capacity in the future (and correspondingly reduced emissions). To simply the diagram, these interactions were omitted.

The four categorizations help to understand the opportunities so that Bowen Island can decide on a suite of actions that are manageable given the municipalities resources and will lead to short-term reductions while also setting a course for deeper medium and long-term reductions. Opportunities deferred at this time can always be revisited at a later time as resources become available and as the municipality learns from initial efforts.

Figure 2 – Greenhouse gas reducing opportunities for Bowen Island



4 Enabling Actions

The actions in this section are designed to create an effective frame for the direct actions in Chapter 5 to operate within. Once in place they help provide overall direction to the municipality's efforts and a systematic approach for understanding and communicating success. Bowen Island has indicated a clear intent to moving quickly with actions that will yield short and medium term results, and these actions do not impose any limitations on those near-term actions proceeding. They are not prerequisites and should instead move forward in parallel and ultimately help accelerate progress on Bowen Island's action plan. The enabling actions include: setting medium and long-term targets, setting sector specific targets, developing an evaluation strategy, developing a communications strategy, and securing sufficient resources.

4.1 Set Medium and Long-term Targets

Presently, the only target that Bowen Island has adopted for greenhouse gas emissions reductions is for 2010. This type of short-term target should also be complemented with medium and long-term targets. Providing a longer time-frame which focuses on increasingly deeper cuts in emissions can help a municipality look at the medium and long term potential of actions that may not offer immediate returns (e.g. energy efficient new housing), and it also helps focus the thinking on a broader set of opportunities that might not be explored through a short-term lens.

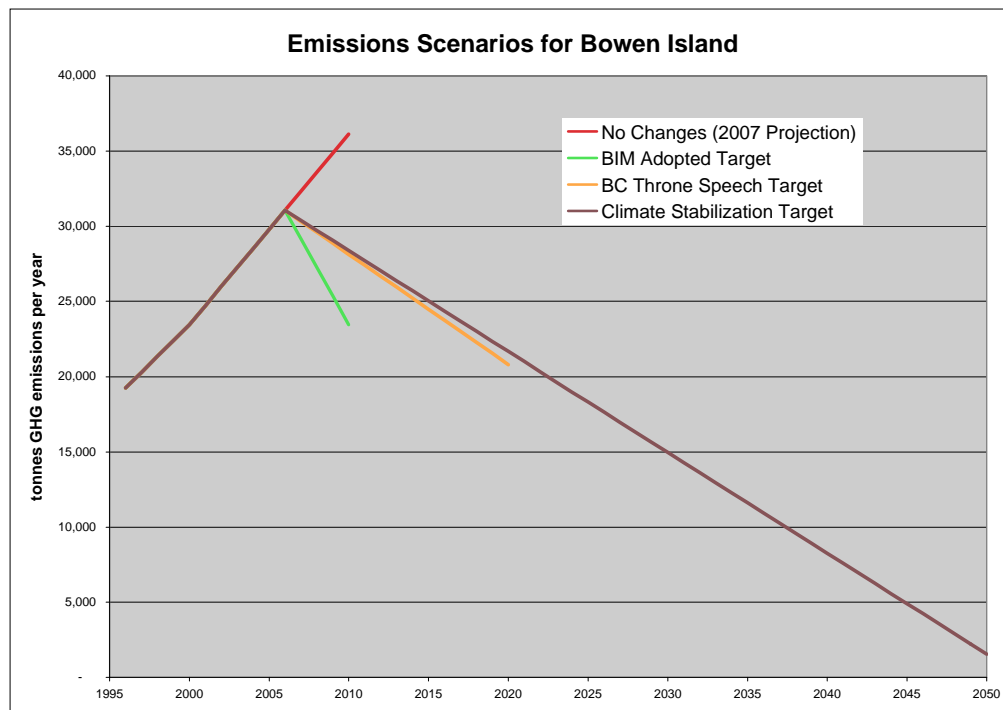
Bowen Island's ferry service provides an excellent example of how medium and long term targets can help to reframe thinking about actions. In the short term, Bowen Island will be able to achieve moderate reductions without reducing ferry emissions. With 7,400 tonnes of greenhouse gas emissions per year from the ferry however, Bowen Island will not be able to get below 24% of current emissions if the actions do not find ways of dealing with ferry emissions (assuming all other emissions were completely eliminated). Even though Bowen Island will not be achieving deep cuts in emission in the short-term, the fact that major infrastructure decisions, such as a ferry, will last for thirty or more years, it is never too early to consider them.

The scientific rationale for deep cuts in greenhouse gas emissions is strong. To have a reasonable chance of preventing an increase in global temperatures by more than 2 degrees and thereby avoiding severe climate change scenarios, global concentrations of carbon dioxide will need to be stabilized at 400 parts per million in the atmosphere. 2004 levels were at 377 parts per million, which results in a need to reduce global greenhouse gas emissions by upwards of 50 percent below 1990 levels by 2050.⁵ Translating this global reality to a Canadian context, points to reductions of 80% below 1990 levels by 2050. To achieve this target in the long-term, medium term reduction targets in the range of 25 percent below 1990 levels by 2020 would be necessary. Achieving these levels of reductions is a significant challenge, but not attempting to meet the challenge will essentially ensure a climate in which society will be dealing with the dangerous impacts of climate change.

⁵ Bramley, Matthew, 2005. The Case for Deep Reductions: Canada's Role in Preventing Dangerous Climate Change. Pembina Report.

Figure 3 illustrates what some deep reductions paths for Bowen Island might mean in terms of greenhouse gas emissions. The key message from the figure should be that the current short-term targets (i.e. stabilizing at 2000 levels by 2010) represent a minor step in comparison to the changes that will need to happen if targets in line with a goal of stabilizing carbon dioxide concentrations at 400 parts per million are to be achieved. Even the BC Government’s recent target of a 33% reduction from 2006 levels by 2020 is only one third of the way to a deeper reduction scenario.

Figure 3 – Emissions Scenarios for Bowen Island



Through the process of developing this action plan, two recurring concerns have been expressed about the idea of Bowen Island setting targets for deep cuts in greenhouse gas emissions:

1. *“The on-island population is growing quickly, which is leading to an increasing demand for energy and producing more greenhouse gas emissions. Because this population growth is expected to continue, it is unrealistic to expect significant cuts in Bowen Island’s greenhouse gas emissions.”*
2. *“Many of the decisions affecting Bowen Island’s greenhouse gas emissions are outside the control of Bowen Island’s council or residents, so it is unreasonable for Bowen Island to adopt a target that presumes reductions in all of those emissions.”*

These are both valid concerns that should influence the specific opportunities that Bowen Island chooses to pursue and strategies with which it pursues them, but they should not influence the overall emissions reductions targets for two reasons:

1. The case for deep cuts in greenhouse gas emissions is based on ecological thresholds that are currently being exceeded, and those thresholds measured against absolute emissions levels, not emissions per capita. Without question, an increasing population makes reducing greenhouse gas emissions more challenging, but adopting a less assertive target

sets a false bar that will be of minimal benefit in averting dangerous climate change impacts.

2. Setting the target presents an emissions path that Bowen Island will seek to achieve, but it does not presume that Bowen Island will be responsible for achieving all of the reductions. Other levels of government and other agencies will clearly have a role in achieving reductions in greenhouse gas emissions, and without a coordinated effort working toward similar goals, the targets will not be achieved. This view of targets does not mean that Bowen Island plays no role in the share of the targets they are not directly pursuing. Instead, it becomes their responsibility to communicate with those other levels of government and other agencies to ensure their activities will support Bowen Island's objectives.

Some examples of medium and long-term targets in other municipalities include:

- Toronto's targets of reducing emissions by 30% below 1990 levels by 2020 and 80% below by 2050.
- London's (UK) targets of reducing emissions 20% below 1990 levels by 2015, 25% below by 2020, 30% below by 2025, and 60% below by 2050.
- New York's target of reducing emissions by 30% below 2006 levels by 2030.
- Maple Ridge's 2030 vision of being carbon neutral.

Enabling Action 1: Bowen Island adopt targets for 2020 and 2050 that are consistent with a global effort to minimize the risks of dangerous climate change.

4.2 Set End-Use Specific Targets

The target adopted for 2010, and the medium and long-term targets recommended in Section 4.1 focus on the overall goal of reducing Bowen Island's total greenhouse gas emissions. An end-use target on the other hand focuses on a specific activity (e.g. number of vehicles per person or percentage of trips taken by transit). The overall targets are important, but they suffer from two weaknesses that make them insufficient on their own:

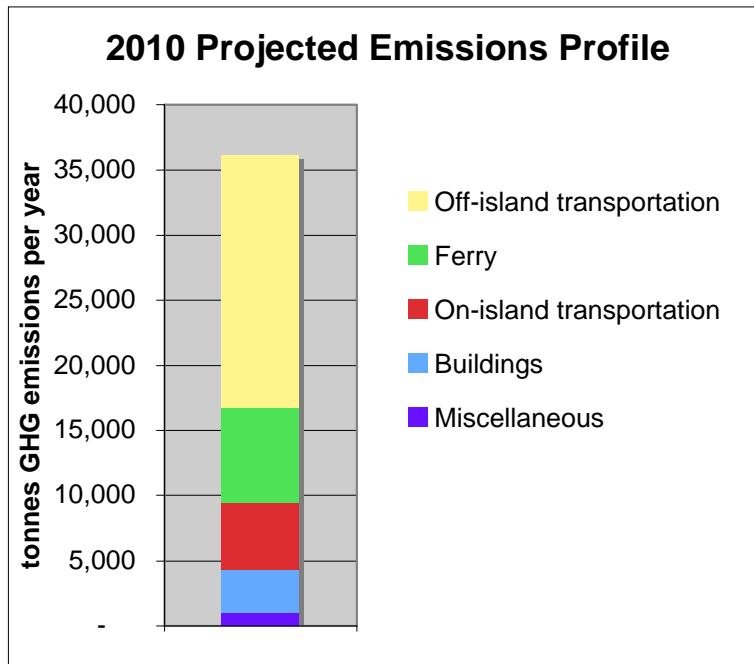
1. They do not provide direction on the emissions reductions needed from each of the various end-use sectors (e.g. transportation, buildings, etc.) to achieve the overall targets.
2. The metric of greenhouse gas emissions is often quite an abstract concept in many decisions and doesn't relate well to tangible conceptions of what is happening on the ground.

To address these weaknesses, it is recommended that Bowen Island set end-use specific targets to communicate how they anticipate the overall targets being achieved. Examples of end-use specific targets include the BC Government's energy efficiency targets for buildings (e.g. all new homes achieving an EnerGuide rating of 80 by 2010) and oil and gas flaring (e.g. 100% reduction in routine flaring by 2016), or Vancouver's targets for different mode shares (e.g. 18% of trips will be from walking or cycling by 2021).

An emissions profile (as shown in Figure 4 for Bowen Island) can be a useful starting point when setting end-use specific targets by simply assuming that the reductions will be proportionally distributed across the major sectors. To illustrate this approach, the existing target for 2010

requires overall projected emissions to be reduced by 35% to get them to 2000 levels, so the proportional expectation for on-island transportation would also be a 35% reduction, which amounts to 1,800 tonnes from projected 2010 levels.⁶ At the same time, proportional does not mean equal, and because of the transportation sector's large share of emissions, it should receive a larger share of the emissions reduction effort.

Figure 4 – 2010 Projected Emissions Profile for Bowen Island



Separating the target by sectors is a helpful first step, but the targets can still be made more tangible (and therefore more achievable). For example, a 35% reduction in on-island transportation emissions does not help people understand the types of changes that would need to happen in terms of their personal behavior. That 35% reduction could be accomplished in a number of ways, where two examples include:

1. Getting all vehicles to be approximately 35% more efficient (about a 3 litre per hundred kilometer improvement). Note this action would also lead to savings in the off-island fraction.
2. Getting 35% of on-island vehicle trips to shift to transit, walking, or cycling. Or not driving your car 4 out of 7 days of a week.

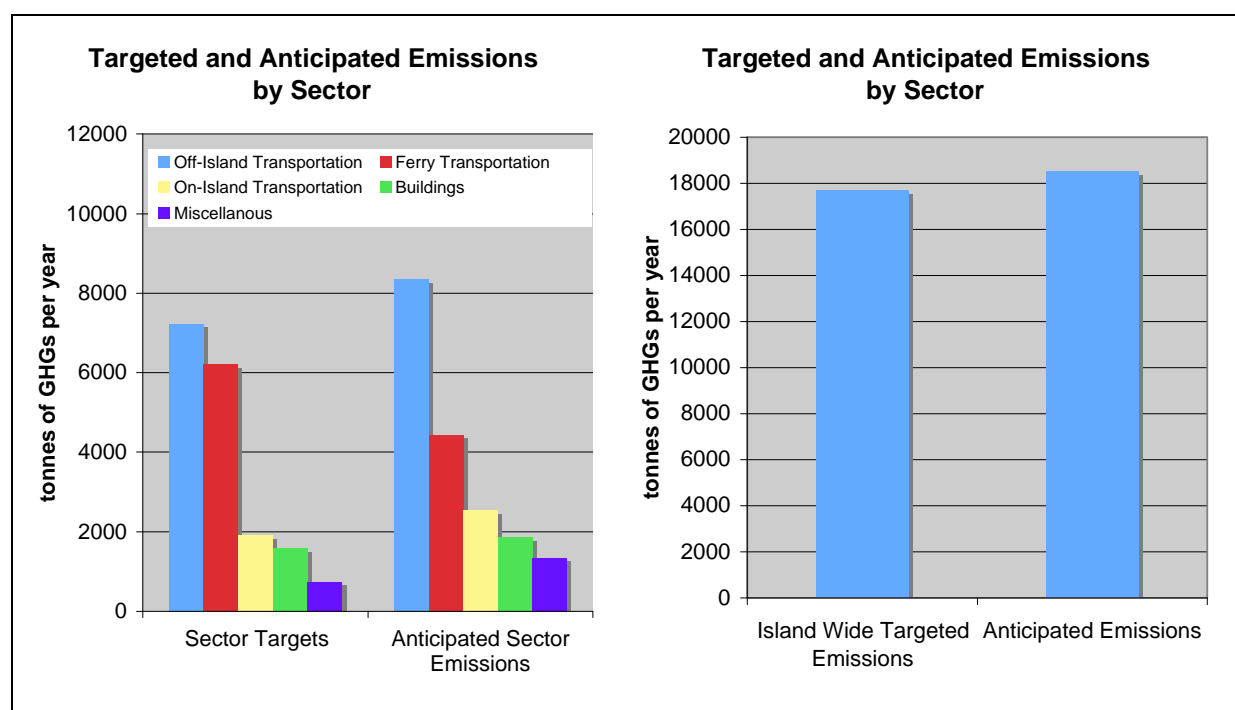
To enable Bowen Island to experiment with different ways of distributing the target across end-uses, a simple spreadsheet tool has been provided with this report. The tool allows users to first allocate the overall target to each of the main sectors and then experiment with different mixes of end-use targets to achieve the overall targets. A sample output from this tool is provided in Figure 5. In this example, the graph compares the targeted emissions with the anticipated emissions on a sector-by-sector basis. The second graph compares the overall targeted emissions with the overall anticipated emissions.

⁶ Although the opportunities and costs of emissions reductions will not be proportionally distributed, using a proportional distribution is a reasonable starting point because within a context of deep emissions reductions, it will be important for Bowen Island to understand how to achieve reductions in all end-uses. In other words, it will be very difficult to be successful if any end-uses are ignored.

In the scenario shown in Figure 5, the end-use targets were not quite sufficient, because they resulted in the anticipated emissions being about 5% higher than the targeted emissions of 25% below 2000 levels by 2020. The end-use targets selected to produce these outcomes, each of which can be manipulated using the spreadsheet tool, were:

- 75% of vehicles being replaced with an average improvement in fuel efficiency of 35%
- A 10% reduction in the GHG intensity of gasoline and diesel used on Bowen Island
- A 35% reduction in off-island vehicle trips and a 25% reduction in on-island vehicle trips
- A 20% reduction in ferry service and 25% improvement in ferry fuel efficiency
- 75% of homes and buildings being retrofitted to reduce greenhouse gas emissions by 40% on average.
- A 40% improvement in the efficiency of new homes and buildings
- A 20% reduction in the size of new homes and buildings
- 35% of homes and buildings installing renewable energy to meet 25% of their energy needs on average.

Figure 5 – Illustration of outcomes of spreadsheet tool to explore end-use targets



Although Bowen Island can start using this tool immediately to understand and begin developing end-use specific targets, it will almost certainly be necessary to revise those targets as the potential for change is better understood. It will also likely be necessary to further refine the tool so that the end-use targets can be easily related to Bowen Island's strategies. For example, most of the variables in the tool are currently presented in terms of relative changes (e.g. decreasing single occupancy vehicle trips by a certain percentage), but if the current situation was better understood, the end-use targets could be presented in terms of absolute changes (e.g. decreasing single occupancy vehicle trips from 80% to 60% of trips).

Enabling Action 2: Bowen Island develop and adopt end-use specific targets that effectively communicate the technology and behavioral changes that are expected in order to achieve the overall short, medium, and long-term targets.

4.3 Develop Evaluation Strategy

At present, Bowen Island does not have a strategy to evaluate its initiatives to reduce greenhouse emissions. This has not presented a significant problem to date, because it is easy to understand why emissions have not decreased when not much effort has been expended. As Bowen Island moves forward with the implementation of this action plan however, real reductions will be expected from specific end-uses so it will be important to know if those reductions are happening and where efforts may be falling short of expectations.

Although the details of a full evaluation strategy are beyond the scope of this report, one area worthy of comment is the development of useful indicators to assess progress. An obvious (and useful) indicator is overall greenhouse gas emissions, but as discussed in section 4.2, it is a limited metric in that it does not provide any information on specific end-uses. For example, if overall emissions was the only indicator that Bowen Island had access to, it would be impossible to understand the degree to which the various components of the strategy were meeting expectations.

In developing indicators, the following guidelines or characteristics will be helpful:

1. Ensuring that the indicators cover both end-use specific and island wide targets. Having just the end-use specific indicators makes it impossible to understand overall trends that more detailed indicators may overlook, while having just the island-wide indicators does not provide enough information to understand why emissions are changing.
2. Ensuring that the specific end-use indicators are linked to end-use specific targets so that the evaluation is as direct as possible.
3. Ensuring that the indicators are relatively easy to collect so that Bowen Island does not become overwhelmed by its own evaluation efforts. Ideally, the majority of indicators will come from readily available data sources.

Several data sources are already readily available to serve as useful indicators. These include:

- Although it is not expected to be available until the fall of 2007, the BC Ministry of Environment is developing a system that will produce regular snapshots of community-wide greenhouse gas emissions. Some of the key issues that have yet to be resolved that have particular relevance to Bowen Island are ferry emissions and oil heating emissions. Also of note is that although the initiative is expected to include transportation emissions, those emissions will likely be based on ICBC registrations that are not reflective of the amount that people are driving their vehicles.
- Natural Resources Canada keeps records on all of the energy efficiency housing retrofits that have gone through the federal program for analysis and grants. This data can be filtered by postal code, so it is relatively easy for Bowen Island to know how many retrofits have happened in the community each year and how much greenhouse gas emissions were reduced.

- BC Ferries keeps statistics on the number of passengers and number of vehicles on its service between Snug Cove and Horseshoe Bay, so it will be relatively easy to track if Bowen Island is having success at reducing the number vehicles on the ferry, which would be closely linked with the off-island transportation emissions.
- Bowen Island will have data on the number of new houses built each year and the number of those houses that have agreed to build to an EnerGuide 80 plus Builtgreen Gold standard. This information will provide a useful metric of new housing efficiency, but it will suffer from the weakness that nothing is known about the houses that don't agree to the development standard.
- There may also be Translink data on ridership for different routes, but the availability of this data was not investigated as part of this report.

To help support the development of an evaluation strategy, some additional indicators that will likely be of value include: the energy efficiency of all new homes and buildings, the number of retrofits and greenhouse gas reductions from existing commercial buildings, the amount of energy generated from renewable sources, the efficiency of vehicles, the average annual driving distance for vehicles, and the percentages of trips happening by different modes. Also of relevance would be a review of evaluation approaches that other municipalities have used. A particularly useful local example is Whistler's "Measuring Progress" website⁷, which publicly communicates how the municipality is doing on each of its established indicators.

Enabling Action 3: Bowen Island develop and adopt a strategy to monitor and evaluate the activities comprising Bowen Island's greenhouse gas reduction strategy. A core component of this strategy should be indicators that are directly linked to the overall and end-use specific targets.

Implementing "Enabling Action 3" may take some time because the details of the evaluation strategy will depend on a number of initiatives that have yet to be finalized. To avoid an unreasonable delay that could lead to a loss of momentum on the action plan, it is possible to establish a plan for interim evaluation reporting. This reporting could simply look at all of the actions committed to as part of the action plan and comment on Bowen Island's success at implementing them. It would be qualitative in that specific results would not be measured, but it would provide some measurable outcomes in that progress would be expected on most if not all of the action items. In addition to the action items in the action plan, the interim evaluation could also comment on additional actions that have been advanced even though they were not part of the action plan.

Enabling Action 4: Bowen Island will commission an annual report, starting in May 2008 to assess the performance to date on the recommendations in this action plan. The composition of that report will be adapted to reflect the evaluation strategy once it is developed.

4.4 Develop Communications Strategy

If Bowen Island is to have success reducing greenhouse gas emissions, they will have to effectively communicate with residents and businesses, because they will be the ones making the changes that lead to reductions in greenhouse gas emissions. The municipality (in combination

⁷ <http://www.whistler2020.ca/whistler/site/allIndicators.acds?context=1967970&instanceid=1967971>

with other governments and agencies) can provide the alternatives (e.g. improving bus service) and send signals to encourage those alternatives (e.g. changing ferry rates to encourage walk-ons), but individuals, families, and businesses will ultimately need to decide to take advantage of those alternatives.

In the broadest sense, developing an effective communications strategy can be a key piece in understanding what alternatives are needed to facilitate change and ensuring potential users are aware of the alternatives and the reasons why Bowen Island favors them. For the purposes of this action plan, the assessment of the alternatives needed to facilitate change are discussed as consultation items in Section 5.

Developing an effective communications strategy is outside of the scope of this action plan, but to help provide some direction, some local examples include Vancouver’s “One Day” and BC Hydro’s “Make a Difference Today”. A more comprehensive review of articles and case studies can be found at the community based social marketing website (www.cbsm.com).

Enabling Action 5: Develop a communications strategy that effectively informs Bowen Island residents and businesses why they are being asked to reduce greenhouse gas emissions, what changes they are being asked to make, and the ways in which Bowen Island is taking action to enable and encourage those changes.

4.5 Commit to Providing Sufficient Resources

Moving forward on Bowen Island’s action plan will require resources in terms of council time, staff time, volunteer time, and consultant time. Underlying most of these is a need for financial resources. If any of these factors are not provided for any of the action items, the overall success of Bowen Island’s action plan will be limited. As illustrated in Table 1, the necessary resources can come from a mixture of sources. It clearly makes sense for Bowen Island to seek support from the potential “external opportunities”, but it is equally important that there be a willingness to move forward on action with their own resources independently of external opportunities.

Table 1 – Possible Financial and Staff Resources to Support Bowen Island’s Action Plan

Sources of Financial Support	Sources of Staff Support
<ul style="list-style-type: none"> ➤ Bowen Island’s Budget ➤ Community Action on Energy Efficiency ➤ Federation of Canadian Municipalities ➤ Local Government Grants ➤ Municipal Infrastructure Fund 	<ul style="list-style-type: none"> ➤ Bowen Island Staff ➤ Translink ➤ GVRD ➤ BC Ministry of Environment

Enabling Action 6: Commit to providing sufficient resources for greenhouse gas reduction efforts through a mix of internal and external resources.

5 Greenhouse Gas Reducing Actions

The enabling actions described in the previous section are intended to provide the foundation that will allow the actions in this section to lead directly to greenhouse gas emissions reductions. The actions have been selected with an objective of maximizing the potential for short, medium, and long-term reductions. They also recognize the limitations of Bowen Island's influence, but they have not stayed away from actions that will rely on Bowen Island engaging with other partners (e.g. Translink and BC Ferries). The categories of actions include: developing an active transportation and transit strategy, extending the use of assured ferry loading, improving the efficiency of existing housing, exploring renewable energy options, and engaging with partners.

5.1 Develop an Active Transportation and Transit Strategy

Bowen Island has expressed a strong desire to reduce greenhouse gas emissions from transportation sources. To have success, Bowen Island will need to provide attractive alternatives for residents to access friends, family, shopping, work, and recreation that are far less reliant on vehicles. Evidence from around the world shows that these types of alternatives can be successful if designed in a way that meets residents' needs. At the present time however, Bowen Island only has a partial understanding of those needs, and does not currently know enough to design a successful system. To overcome this hurdle, this section of the action plan attempts to plot a course for developing and determining which of those options make the most sense.

Bowen Island has completed a study of summer and fall ferry travel to understand where people are going when they get off the ferry, what they are doing at their destination(s), and how they are traveling. This study provides ample information to begin developing transit and carpooling options that service people traveling off island, but it does not provide enough information about how people travel around on Bowen Island. For these trips, an additional study of on-island transportation patterns would examine the following questions:

- Where do people live, where are they traveling on-island, at what times are they traveling, how are they traveling, and what they are doing at their destination(s)?
- If they drive, are there specific reasons why they don't use other modes of transportation (e.g. safety, picking up or dropping off passengers, etc.)?
- Could the municipality do something to make them much more likely to use other modes of transportation on a regular basis?

Greenhouse Gas Reducing Action 1: Continue studying transportation patterns including increased effort directed at on-island transportation.

This effort to better understand transportation habits should not stand in the way of other actions, where the necessary information is already available. In particular, quite a bit is already known

about the transportation patterns of residents traveling off island. Given the information that is already available Bowen Island is in a position to develop tangible transit and carpooling alternatives that might be more attractive to off-island travelers. Some of the ideas that should be incorporated into these alternatives include:

- Opportunities to use different sized buses more effectively service routes with moderate levels of ridership.
- Possible staff arrangements to respond to rush hour peak loads that meet commuter needs, but don't lead to significant over-capacity during off-peak times.
- Opportunities to streamline or eliminate the need to transfer buses in Horseshoe Bay.
- Different destinations and locations to stop along the way and different schedules.
- Opportunities to give transit and carpools/vanpools priority over vehicles to reduce traveling time (see Section 5.2 for a similar discussion on ferry loading).

For all of these, Bowen Island will need to develop estimates for the cost of service delivery, the expected ridership levels, and the anticipated greenhouse gas emissions reductions. Translink has offered the services and experience of their planners to help answer these questions and identify which ideas are the most likely to be successful. Additionally, there may be opportunities to share resources with other North Shore municipalities that are also looking at ways of improving their transit systems.

Greenhouse Gas Reducing Action 2: Develop specific options to increase the viability of transit and carpooling for the residents of Bowen Island traveling to the mainland.

In addition to finding ways to improving options for off-island transportation, there is an interest in improving on-island options. Although on-island emissions are not as significant as off-island emissions, the on-island trips may be more amenable to alternative transportation modes because they are not as dominated by commuting trips, which are often less flexible. The development of alternatives for transit, carpooling, walking, and cycling on-island will take more time than the off-island options because less is known about the current patterns. Once that information becomes available the types of questions to consider will be similar as discussed above. As possible resources to support the development of on-island options, Bowen Island could engage with local groups such as Better Environmentally Sound Transportation (www.best.bc.ca), the Vancouver Area Cycling Coalition (www.vacc.bc.ca), Smart Growth BC (www.smartgrowth.bc.ca), and the Victoria Transportation Policy Institute (www.vtpi.org/tdm)

Greenhouse Gas Reducing Action 3: Develop specific options to increase the viability of transit, carpooling, walking, and cycling for the residents of Bowen Island traveling on-island.

For all of the transit options that Bowen Island considers, there will be a parallel question dealing with how much of the cost should be paid through fares and how much should be paid through general revenues. These questions are not considered in detail at this point because based on descriptions of current transit service, costs do not appear to be a significant barrier to many potential users. Once more viable options are being made available however, these will be a need to explore these questions and some of the opportunities that Bowen Island has already put forward (e.g. reduced on-island rates and U-Passes for island residents). Widbey and Camano

Islands in Washington State offer an interesting local island example of a pricing model where all transit services are paid from general revenues and no fare is collected at the point of service (see <http://www.islandtransit.org>).

5.2 Extend the Use of Assured Ferry Loading

Bowen Island has recently adopted a policy of assured ferry loading for vanpools in an effort to reduce commuter greenhouse gas emissions and free up capacity on the ferry, and this practice could be extended to offer the same benefit to more efficient vehicles and to carpools.⁸ At present, not enough is known about the feasibility of these options, but if they were implemented, the importance that users association with ferry access would ensure an impact. The use of assured ferry loading would encourage direct reductions in on-island and off-island emissions while also helping open up a broader set of options for new ferries by reducing the vehicle space requirements.

In exploring the feasibility, the following key questions should be answered:

- Is BC Ferries willing to explore these types of policies?
- Should there be any priority between the three types of preferred modes (i.e. vanpools, carpools, efficient)? For example, in California's high occupancy vehicle highway lanes, they also permit access to efficient vehicles, but only when carpools are not fully utilizing the capacity.
- Would it be possible to enforce the assured loading on both sides?
- What should be the thresholds for efficiency (maximum L/100 km) and carpooling (minimum passengers per vehicle) to qualify for assured loading?
- Where would the prioritized vehicles be marshaled on both sides?
- What systems would BC Hydro need to distinguish efficient vehicles from inefficient vehicles? Possibilities could include an annually updated list of eligible vehicles, or a sticker that would need to be purchased from BC Ferries.
- What costs would be entailed in implementing this type of system?
- What reduction in greenhouse gas emissions could be anticipated?
- What change in occupied vehicle space on ferries could be anticipated?
- How would residents react to the use of these types of policies?
- Would any groups be unfairly impacted by these types of policies?

Greenhouse Gas Reducing Action 4: Explore the feasibility of using assured loading to encourage more efficient vehicles and carpooling on the ferry.

⁸ Assured loading for smaller vehicles has not been included in the action plan because of the problems that could be anticipated with this approach. To illustrate, smaller does not necessarily mean more efficient, and it would be an extremely unpopular (and ineffective) policy if a highly inefficient small vehicle (e.g. a sports car) was given priority over a relatively efficient mid-size vehicle.

5.3 Improve the Efficiency of Housing Efficiency

There is a considerable amount of research pointing towards home retrofits as one of the most cost-effective ways to reduce personal greenhouse gas emissions. For example, energy retrofits happening in Bowen Island and Lion's Bay during the past five years have resulted in improvements to 98 homes that reduced energy consumption by an average of 35%. Apart from the current Federal Eco-Energy initiative, nothing is supporting the retrofit of existing buildings, and based on current rates it will take over 100 years to retrofit Bowen's existing homes. To address this lack of urgency, Bowen Island will hire a housing energy efficiency coordinator with the following responsibilities⁹:

- Auditing a substantial percentage (e.g. 20%) of Bowen Island's housing stock per year. In their audit role, the coordinator will be a trained EnerGuide auditor, but the audits will be free to homeowners as they will be covered by the coordinator's salary. To achieve these levels of audit penetration, the auditor will need to proactively engage with homeowners to explain the service to them.
- Following up on all completed audits (including those conducted prior to 2007) to encourage retrofit work, explain grants that are available for that work, and connect homeowners with contractors capable of doing the work.
- Reporting to the Municipality annually on the number of audits completed, the number of homes retrofitted, the energy and greenhouse gases saved, reasons why some homeowners are choosing not to participate, and the common improvements being implemented.
- Meeting with realtors and developers to explain the program and the energy efficiency rating system.
- Once the information on renewable energy has been assembled, the coordinator will also be responsible for discussing and encouraging recommended renewable energy technologies.

This type of program is not unique, so prior to launch, it will be valuable to engage with local organizations that have conducted similar programs to ensure that the job description and workplan is as realistic and effective as possible. Relevant organizations to contact would include Natural Resources Canada, BC Hydro, Terasen Gas, and the Ministry of Energy, Mines, and Petroleum Resources. If the scope ends up needing to be expanded, possible directions would be to include existing commercial buildings, pursuing a more aggressive audit schedule, or sharing the position with other nearby municipalities.

Greenhouse Gas Reducing Action 5: Develop a job description and detailed budget for an energy-efficient homes coordinator to pursue changes that result in significant improvements in the energy and greenhouse gas performance of existing housing on Bowen Island.

The effectiveness of this program will in part be limited by the size of the incentives available to homeowners to encourage the retrofits. Depending on the experiences of the energy-efficient homes coordinator, Bowen Island may need to also investigate the possibility of providing additional support to homeowners who complete retrofits.

⁹ Currently, Bowen Island has no private energy audits, with the audits that have been completed requiring off-island support.

5.4 Explore Renewable Energy Options

Even with an enormously successful energy efficiency program, emissions from housing and buildings will still be 50% to 75% of current levels (depending on the amount of new construction), so there will be a need to pursue renewable energy options to address the remaining emissions. There are many options that could be pursued, and given that little is known about their costs and performance on Bowen Island, a broadly focused analysis would be a good starting point. A broad starting list of energy options for consideration would be¹⁰:

- Space and water heating from solar panels
- Space and water heating from wood pellet furnaces
- Space and water heating from ground source, air source, and water source systems
- Space and water heating from a district heating system
- Electricity from solar photo-voltaics and wind power*
- Electricity from the grid*

* In both cases, electricity could be used for lighting, appliances, and equipment and also potentially for space and water heating.

Prior to launching into a detailed analysis of each technology option, Bowen Island could easily limit the scope without compromising the analysis by working with experts to filter the list of possible technologies based on experiences in other jurisdictions. For example, Vancouver has recently completed some analysis on solar systems in single-family homes, which would be very relevant to Bowen Island. Once the list of technologies has been streamlined, the following key questions should be answered as part of the study:

- What is the potential for the technology to meet various energy needs on Bowen Island (e.g. how much electricity could solar energy provide per Bowen Island home)?
- What are the life-cycle costs of the technology on Bowen Island (e.g. how much does each kilo-watt hour of electricity cost from a household solar panel system)?
- How cost-effective is the technology at reducing greenhouse gas emissions (e.g. what is the cost per tonne of emissions reductions from wood pellet heating systems)?
- Are there are other important characteristics of the technology that should be considered (e.g. a Bowen Island small hydro system would have non-negligible impacts on the source stream)?
- What would be involved in implanting the technology broadly on Bowen Island (e.g. financial support from the municipality, bylaw requirements for new construction, municipal infrastructure project, external energy production partners, etc.)?

¹⁰ Run of river hydro is a low-impact renewable energy opportunity that has not been included in the list because no high value local opportunities seemed to justify the high cost of studying hydro systems.

A recent Pembina Institute report on residential scale renewables provides a good example of the type of analysis that would be needed to answer the first three bullet points.¹¹ At the completion of this study, Bowen Island should be able to decide which technologies make sense on Bowen Island and determine how/if they will be supporting the deployment of those technologies.¹²

Greenhouse Gas Reducing Action 6: Conduct a study to compare and contrast the economic and environmental costs and benefits of the various renewable energy options available to reduce greenhouse gas emissions from homes and buildings on Bowen Island.

5.5 Engage with External Partners

As has been discussed, Bowen Island only has direct control over some of the emissions they are seeking to reduce, so there is a need to engage with external partners to ensure that those other sources of emissions are also targeted. With that intent in mind, Translink, BC Ferries, and the Buildings Policy Branch have been highlighted as the three key external partners to engage with in terms of greenhouse gas reduction opportunities. That is not to say they are the only ones. Moving forward, there will be additional opportunities for Bowen Island to engage with other partners in the hopes of creating or strengthening an opportunity to reduce greenhouse gas emissions. Possibilities include: other municipal and regional governments, local social and environmental groups, and other branches of the provincial government.

5.5.1 BC Ferries

The Ferry Advisory Committee is in the process of understanding the implications of different options for ferry service in the future, and their suite of options only includes ferries with the same or increased vehicle capacity. This represents a significant challenge for Bowen Island's emissions reduction strategy for two reasons:

1. A ferry that is the same size or larger will have similar emissions to the existing ferry (recognizing that there will be some improvements in efficiency), and once purchased that boat will likely be in use for forty or more years. Assuming that the ferry was 25% more efficient than the current ferry, emissions would be 5,500 tonnes per year, which would limit Bowen Island to a maximum reduction of 82% below current levels if all other emissions were eliminated.
2. A ferry that has the same vehicle capacity or greater will limit the effectiveness of any transportation demand management strategies advanced by Bowen Island, because there will be limited to no constraint on the ability to drive on to the ferry. To provide a strong and consistent signal, the provision of alternatives (e.g. improved bus service) should be accompanied by a limit on the provision of standard options.

Based on information provided by the Ferry Advisory Committee, BC Ferries does not need to decide on a new ferry for Bowen Island immediately. As a result, there is time to plan for the

¹¹ Horne, Matt et. al., 2007. "Economic Instruments for On-Site Renewable Energy Applications in the Residential and Farm Sectors". Pembina report.

¹² For the options that lead to large infrastructure projects (most notably the district heating and run-of-river hydro options), the scope of this study would not be sufficient to advance these options to the point of being "implementation ready". In both cases, additional study on the construction details and utility governance issues would be required.

decision and advance a transportation demand management strategy to see if the need for increased ferry capacity can be negated. A successful transportation demand management strategy could even reduce demands on ferry capacity so that a ferry with reduced vehicle capacity was a reasonable option for ferry replacement.

Greenhouse Gas Reducing Action 7: Communicate to BC Ferries Bowen Island's targets for reducing greenhouse gas emissions and request that they proceed with their planning with similar targets for Bowen's ferry service. Additionally, request that BC Ferries delay any short-term decisions on new or retrofitted ferries for Bowen Island until after a transportation strategy can be developed, implemented, and evaluated.

5.5.2 Translink

Translink is obviously a key partner in the development of any transit options for Bowen Island as they will ultimately need to approve any changes in service or fare structures. Although the exact nature of the desired improvements to transit are still unclear, now is a good opportunity to engage with Translink to ensure they understand Bowen Island's reasons for wanting to improve transit and to begin exploring possibilities for Bowen Island and Translink to develop the necessary solutions collaboratively.

Greenhouse Gas Reducing Action 8: Communicate to Translink Bowen Island's targets for reducing greenhouse gas emissions and request that they proceed with their planning for North Shore transit improvements with similar targets in mind. Additionally, explain the transportation strategy that is being developed and request Translink's support.

5.5.3 BC Government, Buildings Policy Branch

Bowen Island has been actively involved in the deployment of energy efficiency standards for new housing through their Community Action on Energy Efficiency Initiatives, and has also begun to look at requirements for new commercial and apartment buildings as part of the Surplus Lands Project. These examples of municipal leadership have helped to pave the way for the forthcoming BC Green Building Code, which has been promised in the 2006 Throne Speech and is intended to include requirements for energy efficiency and possibly renewable energy. Bowen Island does not need to play an active role in the development of the new code, but there is an interest in seeing the new code build on the work that has already been done by Bowen and other municipalities.

Greenhouse Gas Reducing Action 9: Communicate to the BC Government Bowen Island's interest in seeing a new BC Green Building Code that includes strong standards for energy efficiency and renewable energy that will follow a model of continuous improvement to remain in line with Bowen Island's and BC's targets for greenhouse gas emissions reductions.

6 Coordinating the Actions

This action plan has presented six enabling actions and nine greenhouse gas reducing actions for Bowen Island to implement. Figure 6 on the following page illustrates those 15 actions, the sectors they target, approximate timing for implementation, and the interactions between actions.

Figure 6 – Greenhouse gas reducing actions for Bowen Island

