

CAPITAL REGIONAL DISTRICT FOOD WASTE DIGESTER PILOT PROJECT

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Executive summary

The food waste digester pilot project was designed to assess the feasibility of the Green Cone as a viable option for organic waste reduction for rural communities without an organics curbside collection program.

It is estimated that approximately one third of all household waste at Hartland landfill is made up of organic material that could easily be composted. The CRD goal of a 60% waste diversion from Hartland Landfill by the year 2013 has resulted in a number of waste diversion pilot project initiatives.

Municipal curbside collection services are not available to every home within the CRD. In many areas of the region, including the Gulf Islands, residents are responsible for their own waste diversion and collection, indicating a need for a practical and economical organic waste disposal system. The Green Cone food waste digester can be used to dispose of kitchen and pet waste in a safe and effective manner. Jurisdictions such as King County in Washington are recognizing the effectiveness of using food waste digesters as part of their organics diversion programs. In the CRD, the Greater Victoria Compost Education Centre (GVCEC) promotes the use of the Green Cone food digester and has sold over 400 units to CRD residents since 2007. The Green Cone food waste digester offers an opportunity to effectively deal with food waste at a residential level in an extremely cost effective and environmentally positive manner. It provides residents with an opportunity to take responsibility for the food waste they produce, and to deal with it simply and effectively in their own backyard.

The Green Cone is a food waste digestion system designed for garden installation. It takes all household food waste, including vegetable scraps, raw and cooked meat and fish, bones, dairy products, and other organic kitchen waste such as tea bags, bread and eggshells. It may also be used for disposal of pet waste providing the system is located at least ten feet away from a food garden or fruit producing tree. As an enclosed system, it is less likely to attract vermin or other animals. The prerequisites for optimum performance of the unit are that it must be located in an area with well-draining soil and in as full sun as possible. There is no need to harvest the finished compost as the Green Cone reduces food waste to its natural components of water and carbon dioxide with a small residue. The unit can be left in place (or relocated every five years to nourish other areas of the garden) and can easily handle the food waste of a household of five to six individuals. In areas with shallow or clay soil, the unit can be installed into a raised garden bed or even into a large plant container with adequate drainage.

In 2009, the CRD developed a pilot project agreement with the GVCEC to conduct a two part pilot program in 2009-2010. For the rural pilot part of the project, residents from three Gulf Islands and one recycling depot were provided with Green Cone food

digesters for participation in the pilot. The rural pilot participants were given a telephone survey one month after distribution of the units, followed by an email survey 3-6 months later. Residents on three Gulf Islands participated in the rural areas portion of the pilot study: A vineyard on Salt Spring Island installed two Green Cones on their property, the Pender Island Recycling Depot installed two at their location, and five Saturna Island residents were provided Green Cones to install on their property. The participants surveyed on Pender and Saturna Island reported ease of use and high satisfaction levels of the unit and will continue to use their food waste digesters, while the private winery on Salt Spring reported difficulties with installation and an overall dissatisfaction with the operation of the digester, largely due to the fact that the unit was not being used as intended.

For the second phase of the project, the GVCEC collected contact information from CRD residents who purchased Green Cone food digesters from the Centre. Green Cones were also distributed to members of the Solid Waste Advisory Committee (SWAC) and CRD staff. In addition, the GVCEC sent the survey out to the Centre's membership contact list to request information from past Green Cone purchasers. In total 125 individuals participated in the surveys.

Each of the responding participants reported a household waste diversion of 20-50% as a result from using their Green Cone for the disposal of their kitchen waste. Most respondents (79%) found the installation and use of the Green Cone straightforward, while others (10%) found digging the hole for the unit was difficult and a few participants (11%) had difficulties with the instructions. Overall, the response from the Green Cone food waste digester pilot project surveys was extremely positive. Of the CRD residents, both urban and rural participating in the trial, 97% reported that they would recommend the Green Cone food waste digester to others. Most residents found the operation and use of the Green Cones to be practical and easy to use. There were minor levels of dissatisfaction which could easily be mitigated with further education and guidance from the GVCEC.

The positive responses reported as a result of the food waste digester pilot project are an indicator that the Green Cone could be a practical and economically viable way to manage kitchen scraps in rural communities that do not have access to curbside service.

Table of Contents

Executive summary	ii
1.0 Introduction	1
1.1 How the Green Cone Food Digester Works	1
1.2 The Trial.....	2
2.0 Rural Pilot Results	3
2.1. Salt Spring Island	3
2.2 Pender Island	4
2.3 Saturna Island	5
2.4 Summary of Rural Pilot	6
3.0 Results of the Green Cone Purchasers Surveys	6
3.1 Installation	7
3.2 Use	8
4.0 The Problems	8
5.0 Green Cone Ratings.....	9
5.1 Waste reduction potential	10
6.0 Conclusions	10
7.0 Recommendations	11
Appendix I.....	12
Appendix II.....	13

1.0 Introduction

In the Capital Regional District (CRD), **organic waste accounts for over 30% of the material entering the landfill**. It has been identified that in order to achieve the CRD's waste diversion goal of 60% by 2013 this portion of the waste stream must be diverted. The CRD is considering a region-wide organics restriction from the landfill and an enhanced curbside collection program. The food waste digester pilot project offers an opportunity to assess the rate of success of the Green Cone food waste digester as a viable organic waste management option organic for communities within the CRD who may not have access to a curbside organics collection program. The Green Cone food digester offers an opportunity to effectively deal with food waste at a residential level in an extremely cost effective and environmentally positive manner. It provides residents with an opportunity to take responsibility for the food waste they produce, and to deal with it simply and effectively in their own backyard. In jurisdictions across North America such as King County Washington, food waste digesters form part of organics diversion programs. In the CRD, the Greater Victoria Compost Education Centre (GVCEC) promotes the use of Green Cone food waste digesters and provides education and support in the areas of home composting and conservation to CRD residents.

1.1 How the Green Cone Food Waste Digester Works

The Green Cone is a food waste digestion system designed for garden installation. It takes all household food waste, including vegetable scraps, raw and cooked meat and fish, bones, dairy products, and other organic kitchen waste such as tea bags, bread and eggshells. It may also be used for disposal of animal excrement providing the system is located at least ten feet away from a food garden or fruit producing tree. The system is comprised of three main components: the inner black cone, the outer green cone, and the basket (Figure 1). The basket is buried in the soil and acts as a repository for the waste. The cone stands above the ground and uses a solar heating effect between the inner and outer cones to promote air circulation, which facilitates the growth of microorganisms and the aerobic digestion process. As an enclosed system, it is less likely to attract vermin or other animals. **The prerequisites for optimum performance of the unit are that it must be installed in an area with well-draining soil and in as full sun as possible.** For areas with unsuitable soil substrate, the unit can be installed into a raised garden bed or even into a large plant container.

There is no need to harvest the finished compost as the Green Cone reduces food waste to its natural components of water and carbon dioxide with a small residue. The unit can be left in place (or relocated every five years to nourish other areas of the garden) and can easily handle the food waste of a household of five to six individuals. A cereal-based accelerator powder containing effective microorganisms (EM) can be used to encourage microbial activity in the Green Cone in the initial stages of use and throughout the winter if necessary. Once in place, a single unit can handle all of the food waste generated by a household of five to six individuals.

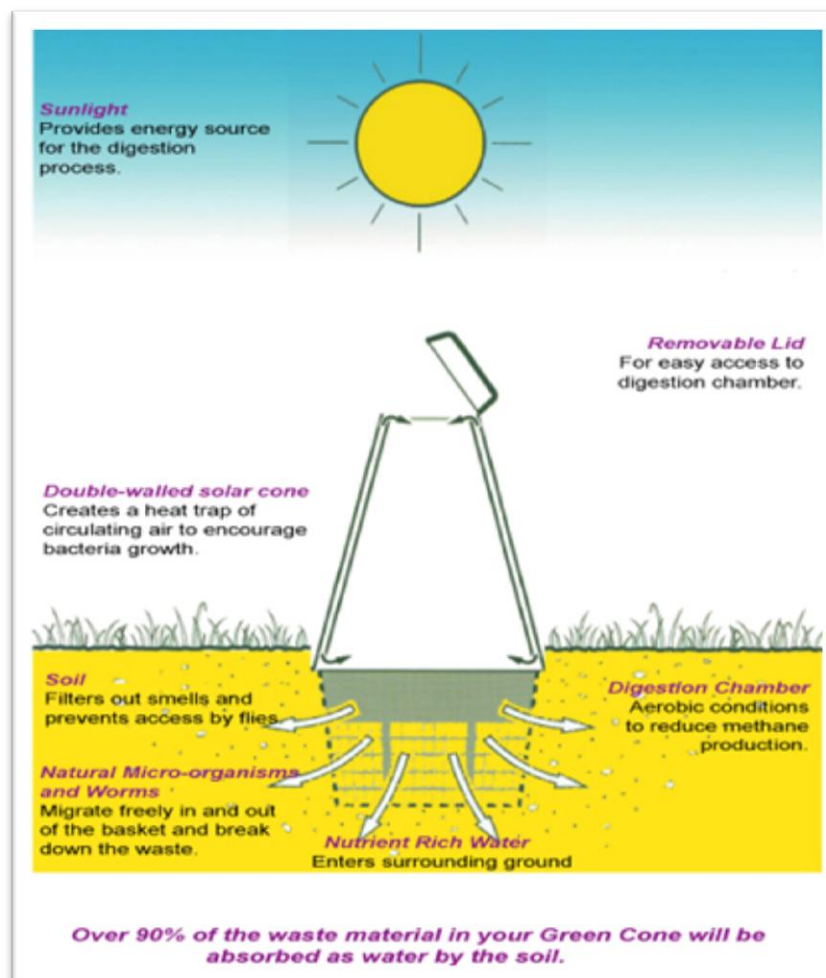


Figure 1 How the Green Cone food waste digester works.

1.2 The Trial

The Green Cone food waste digester pilot project was designed to assess the feasibility of the Green Cone as a viable option for organic waste reduction for rural communities where an organics curbside collection program is not feasible. In the Capital Regional District (CRD), the Greater Victoria Compost Education Centre (GVCEC) promotes the use of Green Cone food digesters and has sold over 400 units since 2007. The CRD developed a pilot project agreement with the GVCEC to conduct a two part pilot program in 2009-2010. Part one of the food waste digester pilot project involved rural residents of the CRD and Rural Recycling Depots. A limited number of rural residents

were provided with Green Cone food digesters for participation in the pilot. Rural Recycling Depots in the Southern Gulf Islands and Salt Spring Island were offered one or more Green Cones (up to a maximum of five). CRD and GVCEC staff administered bin distribution along with educational support during the trial period. Gulf Island participants were also offered kitchen containers for the storage and transport of their food waste to the depots. The GVCEC included these rural participants in the user surveys of the food waste digesters (Appendix I & II).

In addition to the feedback collected from the rural pilot participants, the GVCEC also gathered information about the use and satisfaction levels from CRD residents who purchased Green Cone food waste digesters from the Centre. The GVCEC created a database of purchasers, monitored use of the digesters across the CRD, provided educational support throughout the trial and conducted a user survey at one and three-six months after purchase of the Green Cone (Appendix I & II). Additionally, the GVCEC sent the survey out to their member contact list inviting past purchasers of the Green Cone to report on their usage and satisfaction levels of the unit.

2.0 Rural Pilot Results

Residents on three Gulf Islands participated in the rural areas portion of the pilot study: A Vineyard on Salt Spring Island installed two Green Cones on their property, Pender Island Recycling Depot installed two at their location, and five Saturna Island residents were provided with Green Cones to install on their property. Participants were each supplied with a 10 L kitchen scrap collection bucket for ease of food waste collection and disposal. The pilot participants were given phone and email follow-up surveys the results of which are detailed in the tables below.

2.1. Salt Spring Island

Two Green Cone food waste digesters were installed in the grounds of a private winery. The winery has 2 households living on the property. The specific feedback is reported in Table 1.

Table 1. Results from the Green Cone digester survey for Salt Spring Island.

Installation of Green Cone Food Digester	
Any problems with installation?	Yes, difficult to dig in hard, rocky soil
Who installed the digester?	Winery owners
Items Disposed in Green Cone Food Digester	
Meat, fish or bones	No
Cooked food leftovers	No
Raw fruit and veggie scraps	Yes

Cooked fruit and veggie scraps	No
Coffee grounds and teabags	yes
Pasta and bread	No
Dairy products	No
Pet waste	No
Yard and garden waste	Yes
Other	
Operation of the Green Cone Food Digester	
Use of the digester	Easy to use but concerned will attract rats so no cooked food or meat added
Other feedback	Large fly problem during summer Prefer to have finished compost
Overall satisfaction level	Dissatisfied and would not recommend the Green Cone to others

2.2 Pender Island

Two Green Cone food digesters were installed at the Pender Island Recycling Depot. Ten households participated in the project and brought their food waste to the depot to be disposed of in the digesters. The participating households were provided with 10 L kitchen waste collection buckets for ease of collection and disposal of food waste. The specific feedback is reported in Table 2.

Table 2. Results from the Green Cone digester survey for Pender Island.

Installation of Green Cone Food Digester	
Any problems with installation?	Easy to install
Who installed the digester?	Various-family and friends
Items Disposed in Green Cone Food Digester	
Meat, fish or bones	Yes
Cooked food leftovers	Yes
Raw fruit and veggie scraps	Yes
Cooked fruit and veggie scraps	Yes
Coffee grounds and teabags	Yes
Pasta and bread	Yes
Dairy products	Yes
Pet waste	No
Yard and garden waste	No
Other	
Operation of the Green Cone Food Digester	

Use of the digester	Easy to use-no unpleasant odours Opening at top a bit too small
Other feedback	Nice to see garbage greatly reduced Slow to digest waste in Spring/Winter
Overall satisfaction level	Very pleased with digester Would recommend to others

2.3 Saturna Island

Green Cone food waste digesters were distributed to five Saturna Island residents. The specific feedback is reported below. Of the five households provided with digesters; three residents installed the unit and participated in the surveys, one resident gave the unit to friends due to having unsuitable soil substrate for digging, and one resident did not respond to the survey. The participating households were all provided with 10 L kitchen scrap collection buckets. The specific feedback is reported in Table 3.

Table 3. Results from the Green Cone digester survey for Saturna Island.

Installation of Green Cone Food Digester	
Any problems with installation?	Fairly easy-no issues with digging
Who installed the digester?	Various-family and friends and hired help
Items Disposed in Green Cone Food Digester	
Meat, fish or bones	Yes
Cooked food leftovers	Yes
Raw fruit and veggie scraps	Yes
Cooked fruit and veggie scraps	Yes
Coffee grounds and teabags	Yes
Pasta and bread	Yes
Dairy products	Yes
Pet waste	Yes
Yard and garden waste	Yes (small amount)
Other	
Operation of the Green Cone Food Digester	
Use of the digester	Easy to use-greatly reduces garbage Complements conventional composting units
Other feedback	Some areas of Saturna difficult to dig-shallow soil
Overall satisfaction level	Very satisfied-all respondents happy with their digester and would recommend unit to others

2.4 Summary of Rural Pilot

Overall, the responses from the participants in the rural pilot project were generally positive with the majority of respondents reporting their complete satisfaction with the Green Cone food waste digester.

The participants from Salt Spring Island reported issues with difficulties digging the initial two foot installation hole due to the hard, rocky substrate. From their survey results, it was also clear that the unit was not being used as it is intended to be but rather as a conventional backyard composter with only the addition of raw fruit and veggie peelings and garden waste. Attempts were made by the GVCEC to provide education and guidance about the correct usage of the unit; however the land owners were too concerned about attracting rodents to add any of the other recommended items, and would prefer to only compost raw food and garden waste in a conventional compost unit. They also reported a fly infestation problem during the warmer months and advice was given to them by the GVCEC about food waste storage and Green Cone maintenance.

Participants from Pender Island using the Green Cone food waste digesters at the Recycling Depot reported an overall satisfaction of the use and efficiency of the unit. Some concern was expressed about the size of the opening making disposal of the food scraps difficult, as well as a concern that the two units were full to capacity in the cooler months. This may be an indication that the volume disposed of was higher than the two units can handle. Participants were pleased to see their household garbage reduced by 20-40% as a result from access to the Green Cones.

The Saturna Island residents who participated in the pilot project also reported an overall satisfaction of the use and efficiency of the Green Cone food waste digesters. There was an issue regarding an inability to dig the required installation hole reported by one of the participants and their unit was passed on to a friend whose contact details were not made available to the GVCEC. One participant did not respond to the survey, however the remaining three households reported complete satisfaction with their units and were all using the digester correctly, adding all of their food and pet waste. All households reported that their Green Cone was working well with no pest or odour problems and were pleased to report a 25-50% decrease in their household garbage.

3.0 Results of the Green Cone Purchasers Surveys

The GVCEC collected contact information from 84 Green Cone purchasers who volunteered to be contacted about the installation and use of their Green Cone with a telephone survey one month after purchase, followed by an email survey three-six months after purchase. The survey was also sent out to the GVCEC member contact list to capture information from past purchasers of Green Cone food waste digesters and 41

CRD residents responded, bringing the total number of participants who responded to the survey to 125. Education and support from the GVCEC was offered to all participants throughout the duration of the pilot project. The number of residents per household varied from 1-6 people. Approximately 75% of participants already had a composting system in place while 25% of participants had never composted previously and the Green Cone food waste digester was their first home composting system.

3.1 Installation

Most trial participants installed their Green Cones with little to no difficulties. Of the 125 respondents who answered this question 74% were able to install the system themselves while 22% required assistance from family or friends to install their Green Cone; 3 % never installed the unit while just 1% required hired help (Figure 2). Reported difficulties included trouble with digging the required two foot hole, difficulties attaching the screws to the base and lid and difficulty with locating a suitable area to meet the sun and drainage requirements (Figure 3).

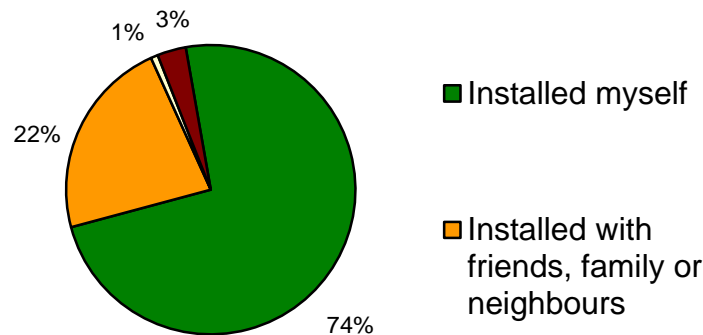


Figure 2 Percentage of households that were able to install the Green Cone food waste digester by themselves (N=113).

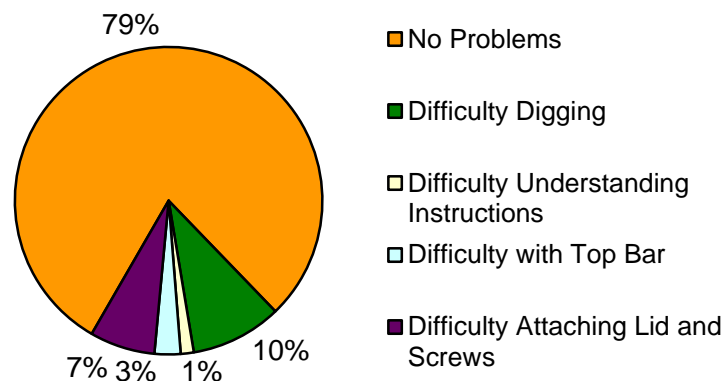


Figure 3 Ease of installation of the Green Cone food waste digester (N=117)

3.2 Use

All types of food waste can be disposed of in the Green Cone as well as pet waste (under specified conditions). Figure 4 illustrates the type and percentage of waste added to the Green Cone by the participants during the trial.

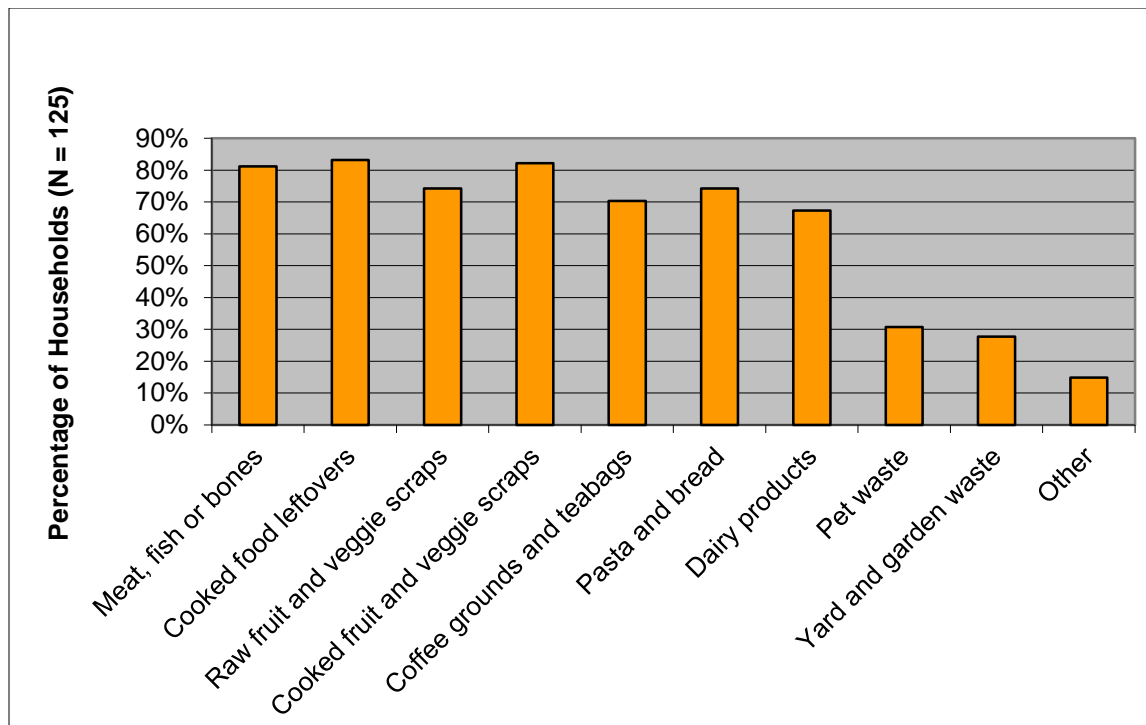


Figure 4 Materials composted in the Green Cone food waste digester (N=125)

4.0 The Problems

Of the trial participants surveyed both rural and urban, most reported no problems or issues with use. A small number of participants reported minor problems with the usage and/or installation of the Green Cone food waste digester. The difficulties that were encountered included:

- Difficulty digging the 2 foot installation hole
- Difficulty locating a suitable location for installation
- Green Cone filled with water during the rainy season
- Lots of fruit flies in the warmer months
- Digestion process slowed down in the winter
- Filled up very quickly and level remained quite high
- Cross bar on the outer cone gets in the way

Most of these issues can be easily solved with a little bit of trouble shooting and further education and guidance provided to the participants. Each CRD resident who had experienced problems with their Green Cone was contacted by a GVCEC staff member or volunteer in an effort to resolve these issues and increase the success rate of the Green Cone food waste digester.

5.0 Green Cone Ratings

Of the CRD residents participating in the trial, 97% reported that they would recommend the Green Cone food waste digester to others (Figure 5).

The majority of feedback reported in the one-month and three-six month surveys for both new users and past purchasers was very positive. Reported feedback and comments have included:

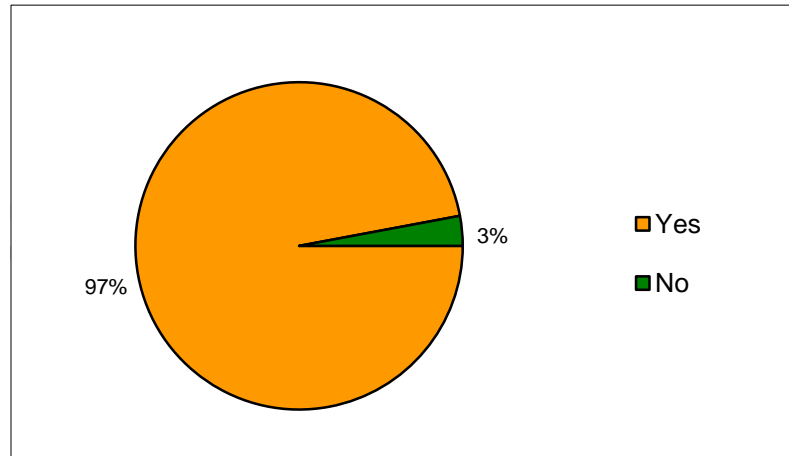


Figure 5 Percentage of residents that would recommend the Green Cone food waste digester to others (N=125).

- Overall the digester is brilliant. My friends and family are very impressed. We love the fact our garbage is now reduced to almost nothing
- Very easy to use. No maintenance required
- I find the Green Cone amazing in that it totally solves the problem of kitchen waste disposal if you live in the Gulf Island area
- Every home and apartment complex should have these, they really are great, I never thought I would be able to cut down on my garbage so much but I only put out one small bag a week now
- We were able to cut our garbage pickup in half; we actually called our service and cancelled one of our cans. I was so happy to have a place to put our pet waste
- Garden health improved close to digester
- Couldn't be easier. Dump stuff in and forget about it.

5.1 Waste reduction potential

Based on the survey results, participants estimated that their household waste was reduced by 20-50% as a result of using their Green Cone food digester. The Green Cone food digester has the potential to divert a large range of organic material from the landfill including the following items:

- Meat, fish and bones
- Cooked food leftovers
- Raw fruit and veggie scraps
- Cooked fruit and veggies scraps
- Coffee grounds and teabags
- Pasta and bread
- Dairy products
- Pet waste
- Yard and garden waste (in small amounts)

As an estimate, if every trial participant disposed of at least one 4 L ice cream pail of food waste in their Green Cone every week, it would amount to a greenhouse gas emissions savings equivalent to 5.74 MT of carbon dioxide annually (GVCEC Black Gold Calculator)

6.0 Conclusions

The trial of Green Cone food waste digesters by both urban and rural volunteer households and recycling depots within the Capital Regional District (CRD) aimed to assess the viability of their use in diverting kitchen waste from landfill sites for communities that do not have access to curbside service. This forms part of the CRD's Solid Waste Reduction Strategy, which aims to restrict organics from entering the landfill by 2012. The Green Cone food waste digester offers an opportunity to effectively deal with food waste at a residential level in an extremely cost effective and environmentally positive manner.

The data gathered from the trial shows that the use of Green Cones by the responding volunteer households was largely a success, with a waste diversion rate of 20-50% per household. An impressive 97% of trial participants reported that they would recommend the Green Cone to others. Most residents found the installation and operation of the Green Cones to be fairly easy and practical. There were minor levels of dissatisfaction, which can mostly be attributed to non-compliance with instructions and seasonal effects such as fruit flies and fluctuating weather.

7.0 Recommendations

The positive responses reported as a result of the food waste digester pilot project are an indicator that the Green Cone could be a practical and economically viable way to manage kitchen scraps in rural communities that do not have access to curbside service.

As some households may be concerned about the unsuitability of a Green Cone due to lack of garden space or unsuitable soil substrate, a number of alternative installation suggestions could be offered. The manufacturers of the Green Cone food waste digester have developed an excellent resource guide for alternative installation including installing the unit into a large raised garden bed, directly into a large plant pot or into a half cask barrel. With the correct education and instruction, most households would be able to install and operate a Green Cone on their property.

Should the Green Cone food waste digester be incorporated into the CRD waste diversion program in rural communities, it would be recommended that there be a series of workshops to educate residents about the correct installation, use and requirements for optimum performance. Educational support would ensure a higher success rate of the program, help residents minimize the amount of waste they produce and increase public awareness around waste diversion initiatives.

Additionally, the Green Cone food waste digester pilot project could potentially be extended to allow for further surveys to be conducted by the GVCEC as the Green Cone continues to be a popular item purchased from the Centre.

Appendix I One Month Green Cone Purchasers Survey

1-Month Phone Survey for Digester Purchases

1) Have you begun using your digester?

- Yes
- No

If no, why not?

2) How did you install you digester?

- Installed myself
- Installed with friends, family, or neighbors
- Hired someone to install it
- Never installed it

3) What do you put in your digester?

- Meat or fish
- Raw fruit and veggie scrap
- Cooked fruit and veggie scraps
- Coffee grounds and tea bags
- Pasta and bread
- Dairy
- Pet waste
- Garden waste
- Other:

4) Have you had issues with any of the following:

- Installation – Please describe:
- Pests – Please describe:
- Using digester – Please describe:
- Operation of digester – Please describe:
- Smell – Please describe:
- Leachate – Please describe:
- Stopped working – Please describe:
- Other – Please describe:

5) Would you recommend the Green Cone food waste digester to others:

- Yes
- No

If no, please tell us why:

6) Please share any other comments.

Appendix II Green Cone Food Waste Digester Email Survey**CRD Greencone Pilot Program Survey**

Name:
Address:
Phone Number:
Email:

1) How long have you had your digester?

- Less than a year
 Between 1 and 2 years
 More than 2 years

2) Are you currently using your digester for composting?

- Yes
 No

3) Do you currently use other composting systems as well as, or instead of the Green Cone digester?

- Yes
 No

If yes, please tell us why:

- Not enough room in digester
 Want to process garden waste also
 Want to have finished compost
 More convenient

Other:

4) Who installed your digester?

- Installed myself
- Installed with friends, family, or neighbors
- Hired someone to install it
- Never installed it

5) What do you put in your digester?

- Meat, fish or bones
- Cooked food leftovers
- Raw fruit and veggie scraps
- Cooked fruit and veggie scraps
- Coffee grounds and tea bags
- Pasta and bread
- Dairy products
- Pet waste
- Yard and garden waste

Other:

8) Do you collect your kitchen waste in another container prior to taking it to your digester?

- Yes
- No

If yes, what do you collect your kitchen waste in?

- A 9L Kitchen Catcher
- A 4L Kitchen Catcher
- A 4 L Ice Cream Bucket

Other, please describe:

9) Have you experienced any issues with:

- Installation of digester:
- Use of digester:
- Operation of digester:
- Maintenance of digester:

Please describe:

- Other – Please describe:

10) Have you had issues with any of the following:

- Pests
- Odours
- Leakage
- Other – Please describe:

11) Would you recommend the Greencone digester to others:

- Yes
- No

If no, please tell us why:

12) Please share any other comments.