The Solar Mapping Project

Final Report, January 30, 2004

Submitted by
Bathurst Sustainable Development

In Partnership with

Eco Action Community Funding Program, the City of Bathurst and ***Eco Perth***
and with the kind assistance of
Alain Ouellett, Team Leader, SNB Assessment Division, Bathurst

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Helping communities create a healthy environment
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The Solar Mapping Project

1.0 Goals

The goal of the project was to conduct a curbside assessment of the buildings in the City of Bathurst to identify which ones were suitable for retrofitting to partial solar energy particularly Solar Hot Water and Solar Air Heating Systems. This valuable information allows building owners to know if their building is suitable. The information collected included if the building had enough area, space, the right orientation, condition of the roof and the right roof slope for roof mounted solar panels. The ability of homeowners to retrofit to partial solar energy and reduce their consumption of fossil fuel generated energy and heating sources will assist individual citizens and homeowners to reduce their Greenhouse Gas Emissions. The file which contains the assessment information for each building, allows the organization and building owner to easily look up their property by Civic number to identify the solar classification given to the building in question by the green teams during their curbside assessment of that building. The Solar Survey Report is at the end of this document.

2.0 Objectives

The original objective of the project was for our green teams to complete approximately 6000 curbside evaluations during the late spring, early summer, and in the fall. Buildings to be assessed were to be all residential and commercial buildings in the City of Bathurst and we were to distribute a Solar Survey to the residents of the City to identify the knowledge and interest of the community in Solar Energy. Information from the curbside assessments will be added to our Arc View digital mapping system, GIS (Geographical Information Systems) to produce **The Bathurst Solar Map**. The map will show the properties that have a building on them in three color codes: Red, Yellow or Green. A Key Code document is being developed to assist property owners to understand the ranking criteria. The city web site will have a link to the BSD web site, solar data and maps.

Results:

BSD completed curbside assessments on **4235** buildings in the City. **72%** of these buildings are either ready for solar retrofit now or could be with sight modifications, such as replacing the shingles. These buildings are shown on the map as Green and Yellow. Properties not suitable are shown as Red. (For more details please see the Curbside Assessment Report and the Key Code report). The Bathurst Property Identification file from Service NB indicates that the City has 7787 properties. However, many of these properties are undeveloped, vacant land, or unserviced lots with no structure built on them yet. For several years we have believed that there were 5300 residential buildings and approximately 6000 buildings in total in the City. However, when we completed our curbside assessments and came up with only a total of **4235** buildings assessed we began to wonder if our previous info had been mistaken or if we had missed some properties. We know that any building that was not clearly visible from the curbside was not assessed and that we did not go onto their private lands, or into their long driveways to assess their property. We will do these buildings if the building owner asks us to and gives us their permission to go onto their land. We also know that some buildings, particularly houses, did not have a visible civic

number that we could see, these buildings were not assessed. If, for some reason such as major construction, the civic number could not be read or the house could not be seen clearly, it also was not done.

To help us clarify this mystery we approached the City of Bathurst who said it would take their GIS technician 3 days to add this info up for us. We then approached the Service NB District Office and came across a wonderful man named Alain Ouellett who in an hour was able to help us retrieve the information. According to the Service NB Tax Code list of properties in the City that actually have a "building" on them, the figure is actually closer to **4586** buildings rather than 6000 that we previous thought. However, the query does not tell us if there is more than one building on each lot.

The break down would be reflected in the following class codes and approximate numbers as identified by a query on the tax assessment software by Alain, the SNB Bathurst Team Leader. The tax assessment codes correspond to the tax assessment codes in our PID file and GIS property mapping system.

Land with Buildings in the City of Bathurst

Tax Code	Description	Number of Properties
100-199	Residential Houses	3872
	Cottages	122
	Apartment Buildings	106
202-299	Commercial Outlets	225
303-399	Industrial	93
	Municipal	22
402-499	Institutional	70 (included churches, halls, KC Irving Center)
	Provincial	31 (included schools, hospitals, etc…)
505-599	Recreational	21 (excluding parks and campsites)
609-699	Farms	19
Exempt Code	Federal	5 (includes Post Offices etc…)
Total		**4586**
Building Assessed by BSD		**4235**

This would mean that BSD completed curbside assessments on approximately **92%** of the Bathurst buildings. **72%** of the buildings BSD assessed are either ready for solar retrofitting now or in the case of flat roofs, could be with slight modifications such as replacing their shingles or mounting the roof mount panels onto a frame to raise them to obtain the correct slope. The buildings not assessed would be because they were not found, not visible from the road or did not have a visible civic number attached to the building.

3.0 Methodology

3.1 What is Solar Mapping?

Solar Mapping is a means of showing the solar potential of buildings in a visual way through producing an easy to read map of the buildings showing a color coded classification system. The file which contains the data for the map, allows the organization to look up a particular property either by its civic number or property identification number to determine what solar classification was assigned to the building during the curbside assessments. Eco Perth, in Perth Ontario, was the first community in Canada, to develop and conduct a Solar Mapping project.

3.2 Identifying the Area

We identified the area to be assessed as the City of Bathurst. GIS files and data for this boundary was placed into the Solar Map. Only buildings which were within the limits of the City of Bathurst were assessed.

3.3 Organization of the fieldwork

In the spring, and early summer it is enjoyable to do the assessments by walking, however, in retrospect, it takes twice as much time to do them on foot as it does to do them from a vehicle. Start early if you are walking and it is summer. Heat stroke can occur on very hot days. The fall assessments were all conducted by car- drive by curb assessments. Each day, field sheets with a map of the streets to be done were printed from the GIS digital map. You also need a compass and a City map, clip boards, pens, water bottles, and binoculars.

3.4 Data Acquisition

BSD has had a data agreement with Province of NB and Service NB for several years since we began to be trained in GIS through our first project for NRCan, called the Sustainable Communities Initiative Project. For the Solar Mapping Project, we ordered from SNB their latest PID files. The files would be approximately one year old when we received them in January 2004.

3.5 Collecting the data

When you plan to do your curbside assessments, plan to do them on a sunny day and in the morning before high noon. If you choose not to use a compass, doing the assessments on a sunny morning gives you a very accurate view of the position of the sun and the orientation of the buildings to the suns direction. You will find that it is very easy to get your orientation without a compass just by doing the assessments in the morning and looking to see where the sun is. However, once you get into the subdivisions or areas with long rows or streets of tall buildings, you can actually loose your view of the sun. Also, once the sun is directly over head and you are in a subdivision, you can, yourself, “loose your orientation”. Using a compass to determine South helps a great deal.

3.6 Challenges

There were plenty of unpleasant dogs barking while we stopped at the curbside. There were many, many, rainy days causing us to loose assessment time. The green teams report that they had to walk a lot during the assessments which resulted in weight loss and fatigue for the staff. Some quit in July. In the fall we switched to doing the assessments by car. Many were done by

our Community Development Coordinator on Sundays since there is very little traffic on those days. You can actually just put your car blinker on, pull over to the side of the road and assess the properties on either side of the road.

No assessments were done during the last week of July until the cooler weather arrived in the fall.

This project took at least twice the hours of human resources as previously planned plus the added cost of the vehicle and gas.

We had two different staff doing the assessments in the spring and early summer and two different staff doing it in the early fall, and then the Project Manager spent 8 Sundays completing the rest.

In retrospect, we should have made firm decisions together, before any assessment began, on the issue of entering data for shading. For example: One technician entered N meaning "no shading" the other entered N meaning "the building has too much shading" and one entered a Y meaning "yes the shading was OK" while the fourth staff who entered Y meant yes they have a problem with shading!!! Therefore, the over all classification that a building has too much shading on their property to power solar panels had this column filled in by way of the comments section with the written word "shade", meaning the building has too much shade.

3.7 Data Compilation

The entry of the assessment data into the Curbside assessment File was a long and very time consuming task. The file however, is your foundation document for future solar programs and solar suitability information to the citizens in your City. It is a valuable tool which, unless a house is greatly modified, will be applicable to the existing buildings in your City for decades. It is well worth the effort to complete. The Solar Map is on permanent display at our Environmental Resource Center at the Bathurst Farmer's Market and online on our web site. In under 30 seconds, we or a building owner can, by looking up the civic number of the building, obtain a solar assessment of their building.

3.8 Merging the excel file data with GIS mapping

If you have no GIS skills, hire a GIS technician for this part. If you do have GIS skills, make the Curbside Assessment File a layer in your GIS system, add in the base map of your City and the road names to produce the Solar Map. Give some orientation to citizens looking at the map such as identifying Downtown, the main bridge etc…

4.0 General Facts

The final Solar Map and it's accompanying Key Code and Curbside Assessment File is helping many citizens be introduced for the first time to the wonderful world of GIS. Many people have never seen what modern progress has done to the simple paper map. Many citizens are unfamiliar with the term PID. We know this because we have asked for this info from them twice; on a transportation survey and for the solar survey. On the Solar Survey most citizens gave us the serial number off of their hot water tank.

5.0 Data Compilations

After entering all the data in the excel file, it was possible to extract valuable information and statistics. The following sections will help understand the results and will show them in various forms.

5.1 GIS requirements

5.2 Section 1-General Information

In this section, we collected general demographic and geographic information about the buildings, the streets, and the City. We also gathered information about the assessment of the suitability for installing a solar system on the properties.

5.2.1 Items Assessed

The items assessed for the properties are the area/ space available for solar panels, the orientation of the sun to the roof- south, south west and south east are needed. the condition of the roof and shingles, the slope of the roof and the height of the properties in terms of the number of floors.

5.3 Section 2- Classification of data

The solar data must be very understandable to the general public. Keep your terms simple. Before you begin the project, decide with your team, what you will enter for such items as shading and stay uniform when entering the data. We had one staff and a summer student doing some of the assessments and they did them differently than the two staff that did the fall assessments. This makes it more of a challenge for entering the data into the excel file.

G= Green, ready for solar retrofit

Y= Yellow some things to consider before installing solar (space, flat roof, etc…)

R= Red not suitable for solar

Roof= roof needs repairs before installing solar panels

1 = 1 story building

F= Flat roof, needs angled frame to mount solar panels in order to tilt them

O- orientation

Shade= building has too much shade

2= two story building

Slope- Poor angle for solar panels

5.4 Solar Suitability

5.4.1 Area

We assessed the south side of the roof of the buildings for space and condition.

5.4.2 Space

The roofs were assessed to see if the building had room for one or two solar panels. The panels are 4x 8 in length each. The Solar Max is 4 x 7 in length and is a wall mounted domed panel. We were ½ way through the City assessments when we were informed that the Solar Max Air Heating system must be wall mounted. Citizens registering for our solar grants and wanting to install the wall mounted panel are being reassessed by our project manager for their suitable wall space. Also, since the Solar Max was installed by the Farmer's Market and is now locally available for citizens to see both the exterior panel as well as the interior vents, homeowners are easily able to see what it looks like, how much space it takes and can assess their own wall space.

5.4.3 Orientation

The orientation for the solar panels has to be between the southeast, southwest or the best result is south for maximum of solar radiation.

5.4.4 Height

The height of the properties was indicated in how many floors the property has.

5.4.5 Condition

The condition of the roof depended on if the roof shingles were curling, old, missing shingles, moss growing on the shingles, signs of rot, broken sections, patches.

5.4.6 Developing a Key Code

The Key Code was developed by BSD in Microsoft Word Format, to provide citizens and viewers of the Bathurst Solar Map and Solar Mapping Project documents with explanations and details of the various aspects of this project. At the end of the Key Code, is a listing of 450 buildings which were assessed for their Solar Suitability, but which, for various reasons, were not in our PID file and so are listed at the end of the Key Code Document, instead of being listed in the Solar Assessment File. Since they were not

listed in the Solar Assessment file, they have not been linked to the properties PID number and so would not have been merged into the GIS. Therefore, these properties do not show on the Solar Map with any assigned solar classification or color and are so are shown as white. If you see on the Solar Map, that your property has not been assigned any solar classification, please see the end of the Key Code document and search for your property there. Properties that are vacant land are listed as white on the Solar Map. Properties that were not visible from the road or had no visible civic number are also shown as white on the Solar Map.

5.4.7 Key Code Descriptions

A key code is being developed to assist property owners to understand the ranking criteria. Buildings will be rated: green (ready to install, no issue), yellow (need roof repairs or others issues) or red (poor orientation, not suitable for solar panels).

G= Green ready for solar retrofit

Y= Yellow some things to consider before installing solar (space, flat roof, etc…)

R= Red not suitable for solar

Roof= roof needs repairs before installing solar panels

1 = 1 story building

F= Flat roof, needs angled frame to mount solar panels in order to tilt them

O- orientation

Shade= building has too much shade

2= two story building

PID number- Property Identification Number

5.4.8 Missing data

Some properties were not listed in the excel file. These properties solar assessments are listed in the Key Code document.

5.4.9 Missing properties

There are a few buildings missing and one small lane not found. These anomalies are listed in the Key Code.

5.4.10 Variables

Some properties are not listed in the PID file according to their civic street number; instead, they are listed on their rural route number.

5.4.11 Gaps in Knowledge

Gaps in knowledge- Our PID file is over one year old, new houses and buildings have both been constructed and torn down in that time. Buildings not listed in the Curbside Assessment File are listed in the Key Code.

5.4.12 Results

We were able to obtain general information on the solar suitability of **92%** of the buildings in the City limits of Bathurst. After compiling this information, we were able to publish useful and practical tools for the community to use to help it move into a greater use of solar energy.

5.4.13 Barriers

We encountered barriers such as the hot humid weather made the assessments difficult to do if you were walking. 450 properties are not in the excel file so we had to create a Key Code for these properties.

5.4.14 Conclusions

Overall, the curbside assessment gave us a great insight on the solar suitability and potential in this City. Originally, we were committed to only assessing the residential and commercial properties, instead, we chose to do all of the buildings, or as many as we could in the City. We achieved and surpassed the goals and objectives that were set.

5.4.15 Recommendations

Recommendations from the Project Assistants: Have all the properties with buildings listed on the compilations sheets because we ended up with the compilation sheets not matching the actual number of houses on some streets. We then had to write the data in the field on blank paper which is not as efficient or organized.
Doing the assessments by car it is much faster than doing it by walking the streets.

Recommendations from the Project Manager/GIS Technician: Do not use the PID file as your compilation sheets. In the field, the buildings are not identified by their PID

numbers. The actual civic number on a building is the only easy way for the field assistants to identify a building. Next time, I would recommend simply naming the street on a piece of loose leaf, setting up your assessment columns on each sheet and then write down on each line as you do your assessment the civic number of each building that you physically find in the field on each street. Then enter the data for these properties into your PID file. This is because there are many vacant lands, and it is confusing to the field assistants. Also, there is the issue that some buildings on some streets are not listed in the PID file on the local street name and instead are listed on the rural route or highway name.

5.4.16 Next Steps "**The Solar City Project"**

The next steps would be to have information session for the public about the solar systems and get citizens interested in retrofitting to partial solar energy.

We have written the **Solar City Project** in which we would conduct the ***first residential solar grant pilot project in Eastern Canada.*** In the pilot project, we will make available, with the assistance from the Renewable Energy Deployment Initiative of Natural Resources Canada, solar incentives (grants) for 25% of the total installed cost installing a solar air heating or solar hot water heating systems into residential homes. The Solar City Project has received funding approval from Eco Action. It begins January 1, 2005.

The two solar systems for the pilot project were identified by BSD by conducting a tender through the Canadian Solar Association. The two systems approved for the pilot project had to be REDI compliant, and commercially compliant for the commercial market.

We also will submit an application in the coming months to conduct the curbside assessments in the surrounding communities. We have opened an Environmental Resource Center at the Bathurst City Farmer's Market. There, we have on display a Solar Showcase which consists of the Solar Max Model R.A.240 and the Enerworks Solar Hot Water System. The Solar Max has been purchased and installed into the building by the Bathurst Farmer's Market and is providing solar generated supplementary heat to the building. The solar systems are suitable for residential and all properties and both of the solar systems qualify for a Solar Grant though our Solar City Project and solar grants from REDI. These two systems target the two items which cost home owners the highest energy costs in terms of money as well as the highest production of Greenhouse Gas Emissions, if their current energy is produced by fossil fuel generated energy.

The Solar Map is posted at our Environmental Resource Center, and online. We continue to direct citizens to our web site to see the map and read the documents. As well, we will continue to assess citizen's homes as they request us to, to assist them in making their final decision to retrofit to solar air heating or solar hot water heating. We will continue to promote the Solar Map during all of our presentations and public engagements.

6.0 Results and Closing Remarks

Bathurst Sustainable Development would like to take this opportunity to acknowledge the contribution of its staff and partners on this project including the City of Bathurst. Thank you goes to the EcoAction Community Funding Program for providing financial support.

Thanks to Eco Perth! BSD would like to personally extend our sincere thanks to Eco Perth for allow us to model their excellent project and for generously providing us with mentorship and training on this project. !

Solar Mapping- Modeling Eco Perth, Ontario News!

EcoPerth has developed a Solar Mapping system that is a good way to determine the solar retrofit potential of any community. The Solar Map becomes a powerful tool for engaging members of the public and community partners in solar retrofit activity.

Each residential and commercial building in the community is assessed for its retrofit potential for solar domestic hot water system or solar photovoltaic array. A simple curbside checklist assesses several factors, including orientation, slope, area, shading, roof condition, accessibility, etc. The results indicate whether the property is suitable or not for retrofit or if minor correction would make it suitable.

EcoPerth has mapped all 2,200 properties in the Town of Perth. Because Perth is laid out 45° off the north-south grid, fully 74% of our homes and businesses are good candidates for retrofit. We have entered the solar mapping on a database that is being integrated with the town's GIS system that will allow anyone in the town to access the information on their home through the web.

The Solar Map is a key component of our business plan that calls for retrofitting 700 households (50% of the potential) over the next 5 years, with the initial units being installed this coming spring.

EcoPerth is developing a Solar Mapping kit that will allow other municipalities to prepare their own Solar Map.

Perth has set out on the road to show what a small town can do to respond to the issues of climate change. ecoPerth is a nationally-recognized, community-based project that is helping individuals and organizations make the Town of Perth an "Eco-Efficient" community. Outreach is very important to us, and we are involved on several fronts, including:

- Founding member of the Ontario Sustainable Communities Association (OSEA)
- Associate Member of Green Community Association
- Member of Partners for Climate Protection (PCP), the FCM/ICLEI initiative and EcoPerth is the recipient of the first FCM Sustainable Communities Award.

Solar Survey Report

December 30, 2004

Submitted by
Bathurst Sustainable Development
www.bathurstsustainabledevelopment.com

In partnership with

The Eco Action Community Funding Program

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Solar Survey Report

1.0 Introduction

The following report will address the survey section of the Solar Energy Study being conducted by Bathurst Sustainable Development as part of the Solar Mapping Project supported by Environment Canada, Eco Action Community Funding Program.

2.0 Goals

The goal of the survey was to identify the knowledge level and interest of our citizens in solar energy and the potential for partial retrofitting to solar systems, particularly domestic hot water and solar air systems. The data collected will also reflect various points of interest of our energy use and knowledge of solar energy.

3.0 Objectives

The first objective was to deposit the solar survey at the household mailbox while conducting the curbside assessments. About halfway through the project it was determined that this drop off method was taking too much time so the rest of the surveys were mailed out to the homeowners in Bathurst.

The surveys were sent to residential and commercial buildings.

Table 1 Targets to reach

Sent	3994	surveys to residential
Sent	225	surveys to business

4.0 Methodology

4.1 Reaching the general population

In order to survey the population of the region, BSD decided to drop off the survey at the properties during the curbside assessments, however, it was soon identified that this was slowing down the green teams and their assessments. About half way through the project we sent them out by regular mail to the property addresses in the Bathurst region.

4.2 Reaching the specified groups

The residential properties and businesses will receive the solar survey. They are also encouraged to return them in the same way as the general public did during

the transit project, which is by dropping them off in the BSD mail box outside our office or by fax or regular mail.

4.3 Collecting the survey

After completing the survey, people are invited to return them by mail, by fax, drop off box, by e-mail or by direct delivery to BSD office.

4.4 Reception period

The cut-off date for the return of the survey was set for September 1, 2004

4.5 Data compilation

The data will be compiled into an excel file. We will be able to generate the needed statistics and charts.

4.6 Storing the surveys

Surveys will be stored into files until compilation. A code will be assigned to them based on the files they are stored in.

5.0 General Facts

After identifying all the destinations for the mail out, the printer prepared the copies needed. At this point we were ready to mail out.

No return stamped envelope was included. The three most frequently used methods of return were by regular mail, fax and the drop off box outside our office.

After reception, the surveys will be compiled and the results analyzed.

6.0 Data Compilation

After entering all the data in the excel file, it was possible to extract valuable information and statistics. The following sections will help understand the results and will show them in various forms.

In total we received 159 surveys back.

Table 2 Breakdown of return surveys per categories

Group/ Recipients	Total Sent Out	Received	Percentage
Residential Sector	3994	146	3.7%
Business Sector ***Total Survey Return***	225	13	6 % ***9.7%***

6.1 Breakdown the survey

The surveys where broken down in three (3) sections, General information, Energy use, Solar energy. In these sections, sub section where created to facilitated analysis. They will all be addressed later on.

6.2 Section 1-General Information

In this section, we collected general demographic and geographic information. We also gathered information about their knowledge about solar energy and energy use.

6.2.1 Do you own, rent or lease your hot water tank

Table 3 Own, rent or lease your hot water tank

	Own	Rent	Lease
Total	77	55	22
159	50%	36%	14%

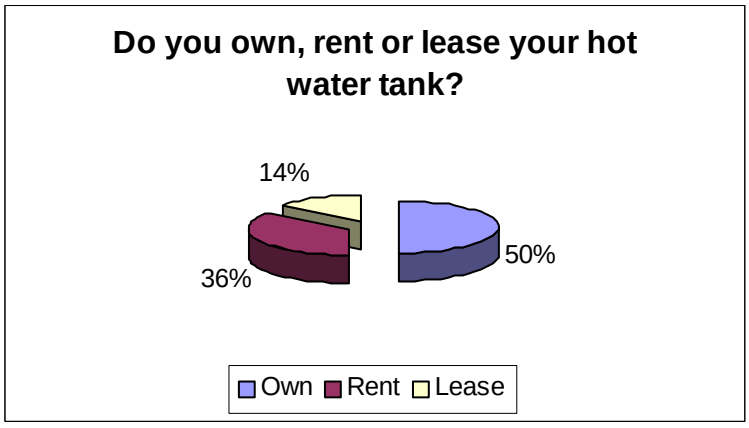

Figure 1 Own, rent or lease your hot water tank

In this table we clearly see that the population owns their hot water tank.

6.3 Section 2-Energy Use

6.3.1 Primary type of water heater used

Table 4 What primary type of water heater used

	Electric	Natural gas/Propane	Oil	Other
Total	146	0	12	1
159	91%	0%	8%	1%

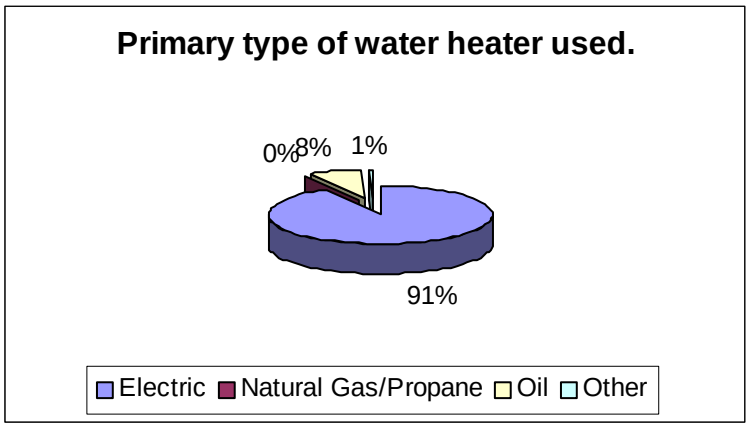

Figure 2 Primary type of water heater used in %

In this table, we clearly see that the population used electric (91%) as a primary type of water heater used. From this table, can also extract the second type of heating is oil (8%) and other (1%) is the use of wood heating.

6.3.2 What is the temperature setting on your water heater?

Table 5 Do you know what is the temperature setting on your water heater?

	Yes	No
Total	54	101
159	35%	65%

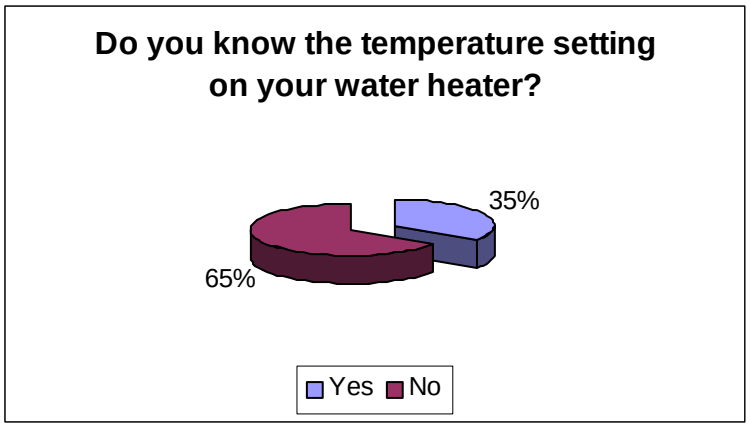

Figure 3 Are you aware of the temperature setting of your water heater

This indicates that (65%) of the population is not aware of their temperature setting of the hot water tank and (35%) know the temperature setting.

6.3.3 The cost per month of operating your water heater.

Table 6 Do you know the cost per month of operating your water heater?

	Yes	No
Total	26	115
159	18%	82%

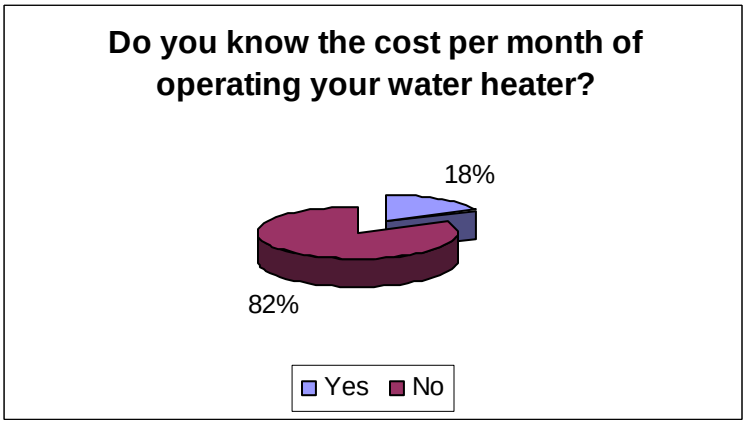

Figure 4 Know the cost per month of operation

The results indicate that 82% said they know the cost was $4.89 per month for heating their hot water and of operating but this is the cost of leasing the cascade tank not the cost of operating and heating the water and 18% said they didn't know at all.

6.3.4 Aware of aware of any home/building energy efficiency programs

Table 7 Are you aware of any home/building energy efficiency programs

	Yes	No
Total	48	104
159	32%	68%

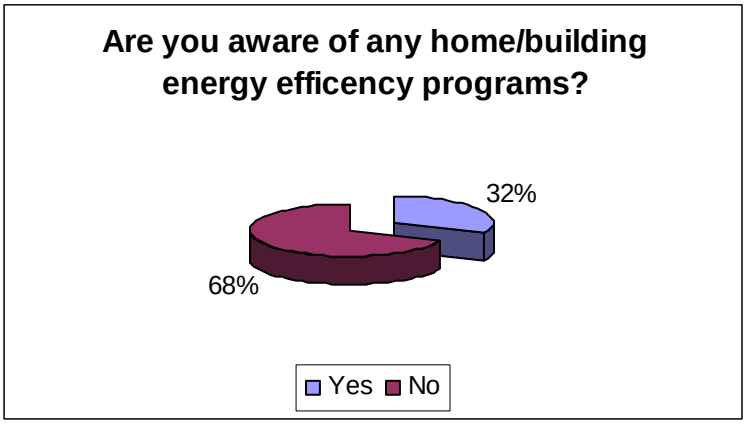

Figure 5 Aware of any energy efficiency programs

This section indicates more than half (68%) are not aware of energy efficiency programs and (32%) are aware of programs

6.3.5 Total energy bill cost and klw consumption per month

Table 8 what is your total energy bill cost and klw consumption per month?

	Oil	Electric	Propane	Other
Average	$142	$197	$40	$41

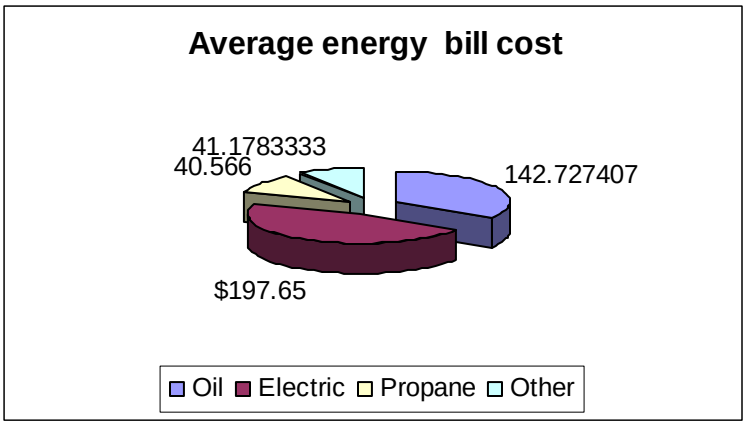

Figure 6 Average energy bill cost

The average consumption is 1440 klw per month in energy.

6.4 Section 3 -Solar Energy

6.4.1 Aware you have an option of installing a solar system.

Table 9 Are you aware you have an option of installing a solar system in your property?

	Yes	No
Total	55	103
159	35%	65%

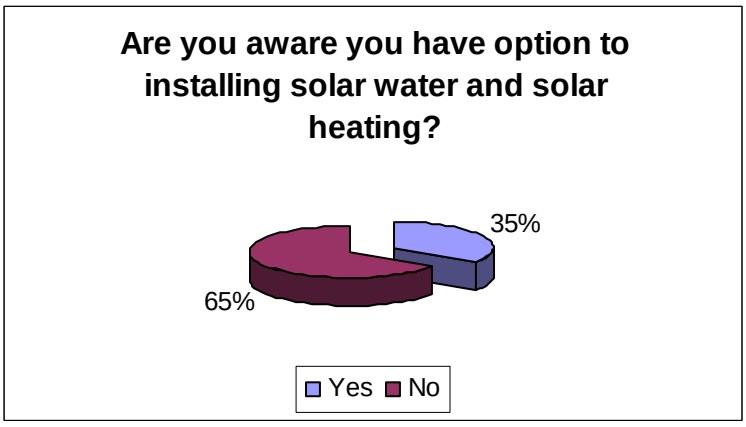

Figure 7 are you aware you have an option of installing a solar system

The numbers indicate that the majority of the population is not aware 103 (65%) of the availability of installing a solar water heater as well as solar air heating system in their properties.

6.4.2 How much do you believe a solar water heater would cost.

Table 10 How much do you believe a solar water heater would cost to purchase and install?

	Under $1,000	$1,001 to $1,999	$2,000 to $2,999	$3,000 and up
Total	29	36	20	49
159	22%	27%	15%	36%

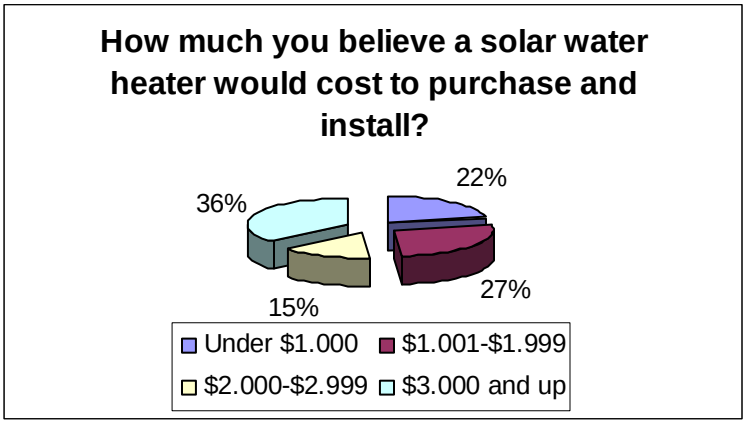

Figure 8 How much do you believe a solar water heater would cost?

Most believe a solar water heater would cost to purchase and install $3,000 and up (36 %) and in second the population believes it would cost $1,000 to $ 1,999 for the solar water heater.

6.4.3 What would motivate you replace your heating system?

Table 11 What would motivate you replace your heating system to solar heating system?

The total of 159 surveys were returned

Rebate	Grant	Loan	Leasing option	Annual saving	Return in Investment	Environmental Rating	Climate Change	Other
50	53	13	16	104	55	46	39	9

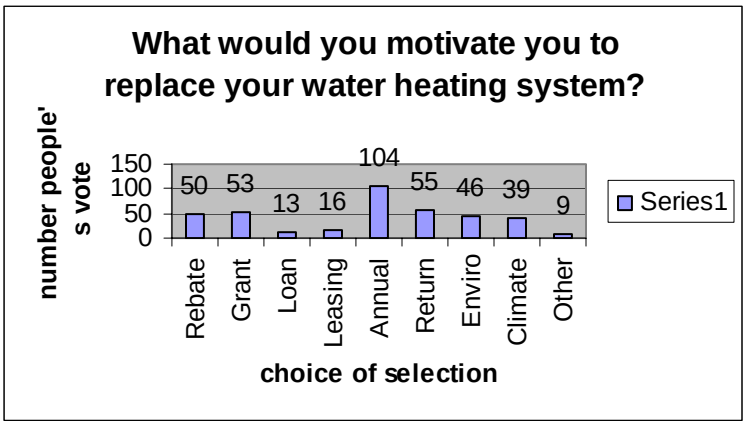

Figure 9 The motivation for changing the heating system

This section asked "What would motivate you to replace your water heating system" Table 9 will breakdown the information.

6.4.4 Would you purchase a solar system if was $3,000 to $5,000?

Table 12 Purchase a solar water system at cost $3,000 to $5,000

	Yes	No
Total	61	73
159	46%	54%

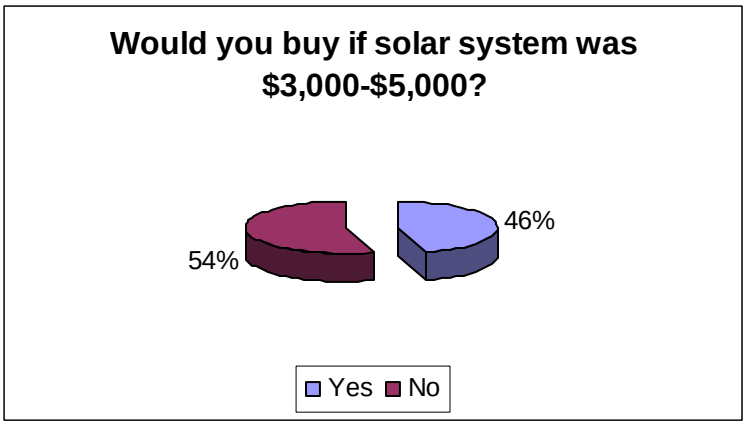

Figure 10 Would purchase of a solar system if available at $3,000 to $5,000

This section the results are close 61 (46%) said yes and 73 (54%) said no they would not purchase a solar system at $3,000 to $5,000

6.4.5 If a solar hot water heating system were affordable would you consider replacing?

Table 13 if a solar system was affordable?

	Yes	No
Total	131	20
159	87%	13%

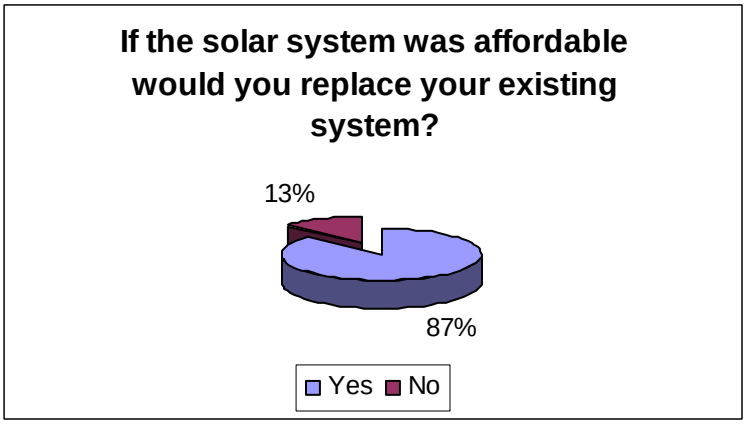

Figure 11 An affordable solar system

In this section, the respondents where asked if it were possible to have a affordable solar hot water heating system most said yes 131 (87%) and very fewer said no 20 (13%).

6.4.6 Have you ever seen any use of solar power?

Table 14 Have you seen solar power?

	Yes	No
Total	71	87
159	45%	55%

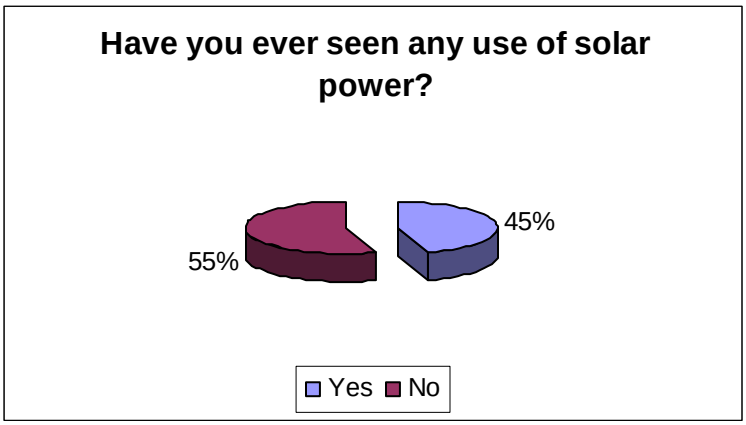

Figure 12 Have you seen solar power?

This question revealed that half have seen solar power (45%) and half have not seen solar power (55%).

6.4.7 Do you use solar energy in your property?

Table 15 Do you use solar energy in your property now?

	Yes	No
Total	7	149
159	4%	96%

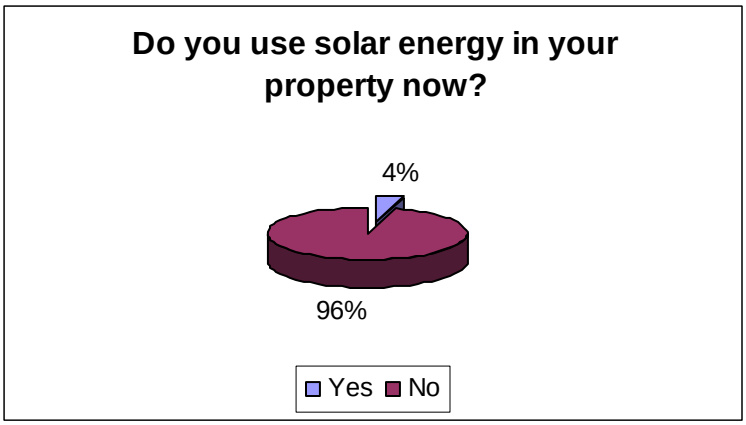

Figure 13 Do you use solar energy in your property?

In this section, people were asked “Do you use solar energy in your property”. Only 4% said they use solar energy and 96% said they didn’t use solar energy.

6.4.8 Would you consider converting part of your energy use to solar power?

Table 16 Converting solar energy

	Yes	No
Total	126	18
159	87%	13%

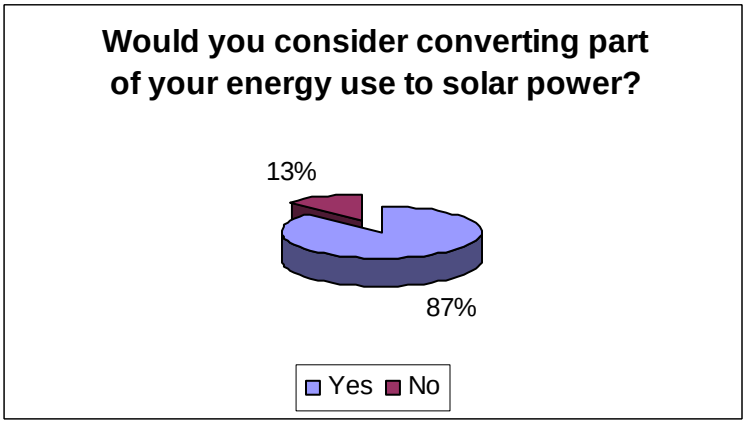

Figure 14 Converting solar energy

The responding persons indicated they would convert their present system to solar system 126 (87%) and 13% said no they would not change.

6.4.9 Would like to learn more on solar energy?

Table 17 Like to know more about solar energy

	Yes	No
Total	93	12
159	89%	11%

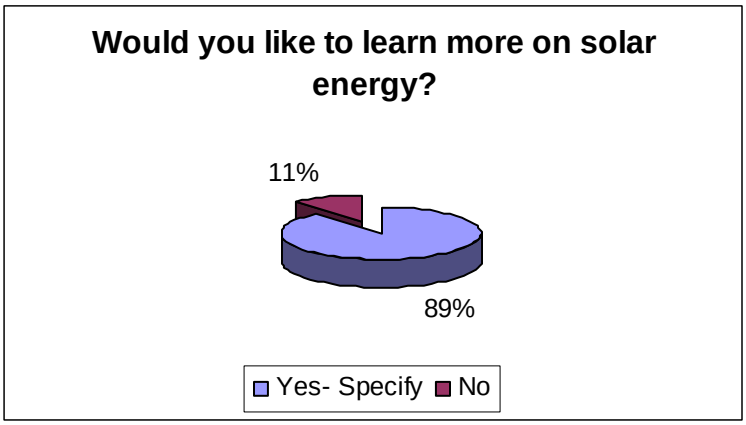

Figure 15 would like to learn more on solar energy?

This section indicates that 93 (89%) would like to know more and 12 (11%) are not interested at this time.
For the French part of this survey this question was accidentally not on the survey, so only surveys respondents who filed out their survey in English have answered this question.

6.4.10 Would you like to learn more about the work of Bathurst Sustainable Development in your community?

Table 18 Learn more about BSD

	Yes	No
Total	115	27
159	81%	19%

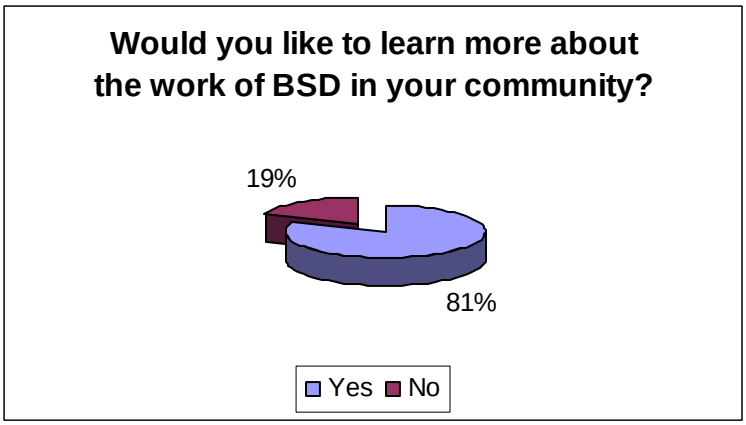

Figure 16 would you like to know more about BSD?

This question revealed that 81% are interested in learning more about the work of Bathurst Sustainable Development.

8.0 Overall Analysis

8.1 Goals and objectives

As we look at the results obtain from the survey, it is possible to say that we achieved our primary goals and objectives to obtain information but that the over all return was much lower than anticipated.

8.2 Methodology

Overall, we used the voluntary approach that citizens would take the initiative to see that they returned their survey in one way or another. As expected, we made some adjustments along the way, as we identified new challenges.

8.3 Returns

The return rate was low overall, approximately 4%.

8.4 Results

Demographic postal codes

For this survey, we did not map the postal code respondents on our GIS.

8.5 Overall

Overall, we were able to obtain general information on the respondents and their habits. After compiling this information, we were able to extract valuable information. This part of the project helps us to have an overall view of the responses.

8.6 Results of interest

8.6.1 Cost to purchase

After compiling the survey, it was clear that the majority of the respondents 36% (Table 9) believe a solar water heater would cost to purchase and install $3,000 and up.

8.6.2 Motivation to replace

It is interesting to see that 104 out of 159 total (figure 8) respondents have chosen an annual saving that is 65% (Table 10) that would motivate them to replace their existing water heating system with a solar water system.

8.6.3 If cost was $3,000-$5,000

The survey indicated us that 54% of the respondents (table 11) would not purchase $3,000-$5,000 for a solar water heater or a solar air system.

8.6.4 If cost was affordable

131 out of 159 total or 87% (table 12) said they would install a solar hot water system if it would reduce the yearly hot water heating costs and the price of installation was affordable (figure 10).

8.6.5 Consider converting

This section gave us an overall idea the respondents are ready for a green change in their way of life. The respondent's answer 87% (table 15) would consider converting part of their energy use to solar power (figure 13).

9.0 Conclusions

Overall, the response to the survey gave us a great insight on the views of the respondents. While we fell very short in our number of returned surveys, we did obtain some valuable insight as to what people know and don't know and what would motivate them to retrofit to solar energy. The survey confirms that annual energy savings together with a financial incentive in the form of a government grant, would motivate building owners to retrofit to solar energy.

We feel that it was a big mistake to send out the survey in the summer. We should have waited until fall and sent it out then, at a time which other survey reports, show a higher

level of returns. Also, many citizens do not know much about solar energy yet in our City and it may be that some people felt a lack of confidence in answering the questions. Others, may not have understood the questions, and finally, BSD ourselves, may not have produced the right questions. Having a prepaid envelope for citizens to use to return their survey would have also helped.

10.0 Closing remarks

Bathurst Sustainable Development would like to take this opportunity to acknowledge the contribution of its staff and partners on this project. The City of Bathurst, EcoAction Community Funding Program, Eco Perth, were supports in the overall success of this study.

Solar Energy Survey Comments from Respondents

- Very interesting, will need more information.
- Good initiation, Bravo
- I would like information associated with the cost and the economics in short to long term
- I would not support solar energy in this region where in the winter we have only a few hours of sun. Wind Power would be the better alternative.
- At our age it is not feasible for extra expenses, living on a fixed income.
- Is there a contractor or certified installer for solar heating system in Bathurst? There is no advertising or publication in Bathurst for this subject.
- It all sounds very interesting but I could not think of doing anything to change the system. I am an old senior 80+.
- Solar energy is the only way to go due to location and site in this region. Glad someone finally had the vision. Bravo.
- I would like to know more about the cosmetic effect on the house.
- If you are to help me get this system please do not play with me and get my hopes up and get shot down, it will hurt, Ok.
- Would like to have the house evaluated for Energy Guide.

- Would be nice to see a study/pilot project of an actual solar installation in this area. An actual “Living off the grid” example. Will you be covering the Middle River area for your solar survey?

- If there were more payments options for seniors, then we would go for that, as my mother would make the application for energy savings if needed.

- In 1945 wood was our only choice along with oil wood furnace for heat and cooking. Electricity then come along, oil heating then became popular too many problems. Now on electric baseboard heating, propane range for cooking what will be next.

- Once science perfects solar energy collectors, it will be our infinite source of energy for all our needs. But as I understand it’s today’s’ technology (especially for our heating needs in the northern hemisphere) is not adequate to warm our homes economically. Having said that however, I firmly believe the sun will eventually meet our needs.

- If you have any information please contact my home. Unfortunately our business is in a rented space and we do not have options for such things.

- Keep up the good work! We don’t feel solar energy will be reliable of affordable enough in the next future for us to consider it, but we hope things change for the better for the environment. Love your water conservation/rain bucket project!

- This house is 55 years old and owned by a senior citizen. We would not consider solar energy for this house because we would not likely get a return on our investments but we plan to build something new next year so information would be welcome. Thank You!

- Our system has just been changed from wood and oil to baseboard electric with a thermostat in every room.

- Please send us some information on this please. Thank You.

- What is the return on investment for installation of a solar panel for the water tank heater?

- Would be interested in coveting to solar if there was a grant or rebate available and if it was hooked up with an electrical back up for nights.

- We would like to know if our house is well situated to implement the solar system.

- Please notify me when there is an information session.

- Conversion to solar energy should be made very affordable. If not, only the wealthy will be able to participate in this type of program. For this project to make a real impact, everybody should be able, if they want to make the change to an energy efficient program.

- Other ecological system like: geothermal and thermo pump (heat pump)

- I got a new oil furnace so I don't need to invest a lot of money in the heating system. For the water heating system I am interested.

- Kindly arrange to send to me all available pamphlets studies/calculations for my understanding with available benefits and equipment guaranties and life of equipment.

- What are the costs of maintenance of the solar energy? Do you know what it requires to heat with solar energy if so why not inform us of these details before you ask us financial questions with no possible way to answer correctly.

- Our home is designed to install solar panels, we have a southern exposure and the roof is sloped 45. If the costs of solar panels are reasonable we would consider solar very seriously.

- I would like more information on the cost of installation and operation.

- If it were feasible I would allow with discussion the complete change and be a local example of a home Solar System.

- Before even considering converting to solar heating system I would have to know more about it and seeing one system in place, the maintenance aspect, no roof climbing? Talking with people who have used one for some time etc.

- Please send more information of your system.

- Is it possible for an apartment building?

- Please notify me of seniors.

- I am very interested by the solar system. I am renovating a house and I would appreciate receiving information about this subject.

- We are talking about the inconvenient of the global warming of the earth; it may have also some advantages.

- It is always nice to know people are willing to work towards improving environmentally friendly energy sources. Thanks for the good work.

- Looking forward to results.

- I am glad to see such pro-active activity in NB and especially in Bathurst. We are new to the area and I do feel NB is quite lagging in the environmental field. Good job! P.S. My husband was a pioneer of solar energy in the 1970's (photo-voltaic).

- I have 2 rooflines that face South East and due south. They are not obstructed and have a direct view of the sun year round.

- We would like more information on the proposed recycling program for Bathurst. Can we get involved?

- I would need more information before making a decision.

- I am interested to know more about wind power.

- Keep up the good work.

- Thank you for the work you are doing in this area.

- The important thing is the isolation, an air exchange and reuses the hot air. Having a house type R 2000.

- We are too old to consider new enterprises. We are in our eighties

- Is it possible to look at the possibility of wind power in our home and at what cost? Do you have any facts on solar and wind energy for Moncton?

- It would be greatly appreciated if we could reduce the price of heating for our house.

- We already heat our house with a geothermic pomp we researched that this is one of the system that is the most economical and environmentally friendly. That is why we are not interested to change our system.

- Would be very interested in solar and wind setup for large residential use with help of grant and loans.

- I don't understand how solar cells mounted on the roof can function in our climate when we are dealing with snow loads on the roof during the winter months.

- I would like to know if there is any financial assistant to change the energy installation in my house, mainly to install solar batteries (cell) and water heater as parallel installation to electricity.