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Information Item No. 2
Environment and Sustainability Standing Committee
December 7, 2017

TO: Chair and Members of Environment and Sustainability Standing Committee

SUBMITTED BY: Original signed

Kelly Denty, Acting Director, Planning and Development

DATE: November 20, 2017

SUBJECT: **Halifax Solar City Program Update**

INFORMATION REPORT

ORIGIN

March 31, 2015 Regional Council passed the following motion.

MOVED by Councillor Watts, seconded by Councillor Fisher that Halifax Regional Council:

1. Approve the continuation of the Solar City Program for three years at no direct net cost to HRM;
2. Increase the budget for project account CD990001 Solar City Program by $13,112,700 with funding as indicated in the Financial Implications section of the January 14, 2015 staff report;
3. Endorse the project initiation to include solar photovoltaic, solar air, and solar thermal technologies;
4. Direct staff to supply an annual report on the Solar City program; and
5. Direct staff to implement the recommendations from the Grant Thornton report on the pilot project.

LEGISLATIVE AUTHORITY

Clause79(1)(ada) "…Council may expend money required by the Municipality for…(ada) providing for, financing and installing energy-efficiency equipment on private property including, without restricting the generality of the foregoing, solar panels.

Clause104A(1)(a) "…Council may make by-laws imposing, fixing and providing methods of enforcing payment of charges for the for the financing and installation of any of the following on private property with the consent of the property owner…(a) equipment installed pursuant to an expenditure under clause 79(1)(ada);

By-law S-500, the *Solar City by-law*

BACKGROUND

May 12, 2016 Environment and Sustainability Standing Committee (ESSC) 12.3.1 – Update on the Solar City Program, Information Report dated April 21, 2016.

October 1, 2015 ESSC 9.1.1 – Update on the Solar City 2.0 Program, Information Report dated September 18, 2015.

The Solar City 2.0 Program is offered to the following eligible property owners:

- Residential property owners
- Nonprofit organizations
- Places of worship
- Cooperatives
- Charities

The program offers 10-year financing to property owners to install one or more of the following solar technologies:

- Solar Electric (Photovoltaic);
- Solar Hot Air; and/or
- Solar Hot Water.

These technologies can be installed in any fashion that reduces energy costs and greenhouse gas emissions including:

- On or off-grid solar applications;
- Hybrid domestic hot water and space heating systems; or
- Pool heating systems.

The program offers property owners access to innovative solar energy options, which can be financed through the Halifax Regional Municipality. With guidance from the Solar City office, property owners individually select their preferred solar energy system and service provider which is then reviewed and approved by the Solar City office. The office provides a level of review and due diligence to ensure that installed solar energy systems meet industry standards and will provide energy and cost savings over the lifetime of the installation.

The program's financing is the first of its kind in Canada. Several other municipalities, including the Towns of Bridgewater, Berwick and the Municipality of the District of Shelburne, have adopted a similar mechanism to apply energy efficiency and solar energy upgrades to properties. Financing is applied to the property and not the individual, like with a standard Local Improvement Charge (LIC). There are no credit checks required to confirm eligibility. However, properties are only eligible if they are in good financial standing with HRM with respect to taxes, LICs, and any other relevant charges. Financing is repaid separately from the annual property tax bill at a rate of 4.75% over ten years however each participant can pay in full at any time without penalty. If a participant sells their property before full repayment, they have the option to pay in full at the point of sale or pass the charge to the next property owner.

DISCUSSION

Measuring Performance

Key Performance Indicators (KPIs) are tracked to ensure program objectives are achieved. Tables 1 through 4 present a summary of the Solar City Program KPIs.

65 system applications were received for review through the Solar City office, all of which were approved for installation. Each property owner was sent a Solar City Participant Agreement for review and signature before their selected contractor could take out necessary permits and proceed with the installation. As per the agreement, property owners have 30 days to sign before the agreement is considered void. Of the 65 agreements sent, six property owners opted not to proceed with the Solar City financing. The main reasons for not proceeding were that property owners needed to further review their individual finances and/or did not want additional payments. Most of these property owners stated that they will revisit the program within a year.

After signing and returning the agreement, each property owner has six months to complete the approved system installation with their selected contractor. 46 solar permits were issued as a direct result of the program and seven solar permits were issued outside of the program. This means that 46 out of a total 53, or 87 per cent, of solar installations in HRM since June 2016 are a direct result of the Solar City program.

Table 1: Summary of Solar City program KPIs as of October 26, 2017

Key Performance Indicators	Total
Registrations	1,209
System applications received for review	65
System applications approved	65
Total value of systems	$960,949.27
Solar permits issued through Halifax Solar City	46
Solar permits issued through HRM (outside of Solar City)	7
Cost neutrality to HRM	See “Financial Implications”
Feedback survey	See “Continuous Improvement”

As shown in Table 2 below, there have been 21 solar hot water systems approved under the program to date. Twenty of these systems use liquid flat plate technology and one was an evacuated tube collector. All liquid flat plate systems were designed to preheat domestic hot water, while the single evacuated tube collector was installed as a hybrid system for domestic hot water and space heating. Both electricity and furnace oil are offset by the approved systems. All assumptions and feasibility calculations relating to each system and its corresponding fuel offset can be found in Attachment A. Solar hot water heating systems installed under the program are expected to save property owners an average of $395 on their utility bills in the first year of operation. With the expected escalation of fuel costs and inflation, the average property owner can expect to see a system payback in 16.9 years and will save approximately $19,500 over the 25-year analysis period. At the point of payback, the investment has met a return on investment (ROI) of 100%. Since there is still useful life in the system, the average ROI for solar hot water is 115%.

Table 2: Summary of solar hot water installations as of October 26, 2017

Key Performance Indicators	Min	Max	Average	Total
System applications approved	-	-	-	21
Energy avoided per year (ekWh)	1,377	4,863	2,623	55,078
GHG emissions avoided per year (kg eCO2)	884	2,517	1,468	30,824
System Costs	$8,125.90	$16,135.00	$9,291.20	$195,115.20
Internal Rate of Return (IRR)	1.82%	7.66%	4.90%	-
Return on investment (ROI)	38%	185%	115%	-

As shown in Table 3, there have been 37 solar photovoltaic (PV) systems approved under the program to date. Thirty-three of these systems use micro-inverter technology and four are designed using a string inverter. All systems are tied into the grid, making use of Nova Scotia Power Inc.'s (NSPI) Enhanced Net Metering Program. All assumptions and feasibility calculations are included in Attachment A. Solar PV systems installed under the program are expected to save property owners an average of $1,203 on their utility bills in the first year of operation. With the expected escalation of fuel costs and inflation, the average property owner can expect to see a payback in 14.7 years and will save approximately $57,432 over the 25-year analysis period. At the point of payback, the investment has met an ROI of 100%. Since there is still useful life in the system, the average ROI for solar PV is 178%. The average levelized cost of energy[1] for these solar PV systems is 18.704 cents per kilowatt hour (¢/kWh), only 2.89 cents more than the current residential rate. This levelized cost of energy is locked in for the lifetime of the system (at least 30-35 years) independent of increasing NSPI tariffs.

Table 3: Summary of solar PV installations as of October 26, 2017

Key Performance Indicators	Min	Max	Average	Total
System applications approved	-	-	-	37
Energy avoided per year (kWh)	2,527	17,472	7,627	282,189
GHG emissions avoided per year (kg eCO2)	1,693	11,706	5,110	189,066
System Costs	$7,802.46	$44,311.25	$20,251.87	$749,319.07
Internal Rate of Return (IRR)	3.97%	8.55%	6.47%	-
Return on investment (ROI)	107%	244%	178%	-

To date there has been only one solar hot air system installed through the Solar City program. This does not provide enough information to accurately gauge average system expectations. The approved solar hot air system will be supplementing electric space heating.

Table 4: Summary of solar hot air installations as of October 26, 2017

Key Performance Indicators	Min	Max	Average	Total
System applications approved	-	-	-	1
Energy avoided per year (kWh)	N/A	N/A	3,194	3,194
GHG emissions avoided per year (kg eCO2)	N/A	N/A	2,140	2,140
System Costs	N/A	N/A	$16,515.00	$16,515.00
Internal Rate of Return (IRR)	N/A	N/A	2.00%	-
Return on investment (ROI)	N/A	N/A	58%	-

[1] Fixed unit-cost of electricity over the lifetime of a generating asset.

Community Impacts

As summarized in Tables 2 through 4, approximately 220 tonnes of equivalent carbon dioxide (eCO_2) greenhouse gas emissions will be avoided by the 59 approved systems in their first year of operation. This emission reduction can be greatly attributed to the higher than expected number of solar PV installations, as the average solar PV system installed under the program is estimated to offset 3.5 times more greenhouse gas emissions when compared to the average solar hot water system.

Opening the program to a variety of property owners has been well received as several community centers, cooperatives, and places of worship have already expressed interest. The Brown Hall (a community center in Beaver Bank) recently commissioned a 9.9kW solar PV system under the program. Successfully financing the installation of solar energy systems on community-owned buildings helps achieve HRM's Economic Strategy Objective 3.2 - Increase Halifax's environmental sustainability and resiliency. The Solar City Program is also advancing the municipality's climate change mitigation efforts as outlined in the Community Energy Plan, a Priorities Plan of the Regional Municipal Planning Strategy.

Industry Impacts

The program has had, and continues to have, an impact on the solar industry of Nova Scotia. Prior to 2012, solar PV installations were the only systems being tracked since NSPI regulates electric permits. Evaluating structural integrity of a building and following proper installation methods was left up to the discretion of the solar contractor. To regulate and track installations, the Municipality created and introduced a Solar Permit in 2012.

From 2012 to 2015, 407 solar permits were issued and 370 of these were a direct result of the Solar City Pilot Program. Between June 2015 (pilot completion) and June 2016 (the launch of the new Solar City Program) only one solar permit was issued. Since the launch of the new program in June 2016, 53 permits have been issued, 46 of which are a direct result of the program.

The Solar City program's solar PV installations have had a positive contribution to NSPI's Enhanced Net Metering Program. The Net Metering program credits property owners for solar electricity produced but not consumed at the property. In January 2017, NSPI submitted their annual Net Metering report to the Utility and Review Board (UARB)[2]. The report stated that 217.7 kW of solar PV were installed within HRM during 2016, of which 85 kW was installed between the date that the first Solar City Completion Report (October 22, 2016) and the end of the calendar year. During this same timeframe, 61 kW of solar PV was installed under the HRM Solar City program, representing 72% of all solar PV installed in HRM.

Solar City uses an open market approach that welcomes a range of contractors that meet the conditions of the program, which encourages healthy competition within the solar industry. Year over year costs for solar PV systems have decreased, primarily due to decreased costs of panels and inverters while labour costs remain static. This observation reflects global trends in solar PV pricing over the last ten years[3]. At the program outset, the cost of solar PV was approximately $3.10 per installed watt. At the time of this report, the cost of solar PV has dropped to an average of $2.88 per installed watt, saving the property owner approximately $1,320 on the average system cost (6.0 kW). Prices continue to drop as shown in Figure 1, with recent system applications as low as $2.19 per installed watt.

[2] Nova Scotia Utility and Review Board. Net Metering Report. https://uarb.novascotia.ca/fmi/webd#UARB15
[3] International Energy Agency, Technology Roadmap: Solar Photovoltaic Energy. http://www.iea.org/publications/freepublications/publication/TechnologyRoadmapSolarPhotovoltaicEnergy_2014edition.pdf

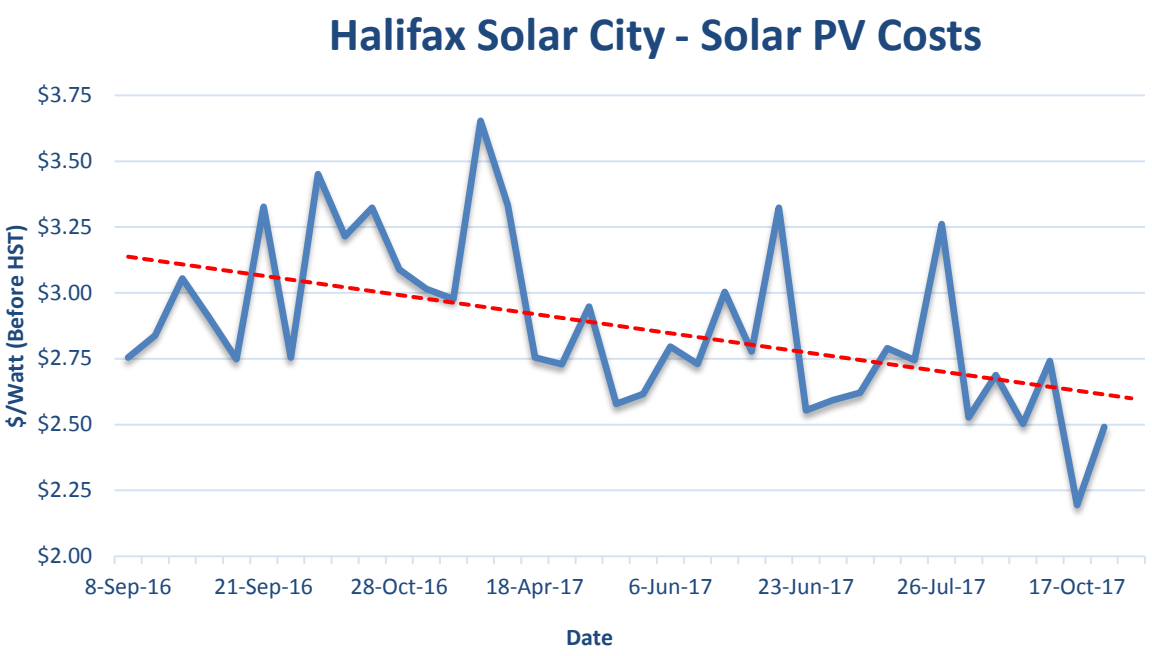

Figure 1: Cost per watt of a solar PV system since the start of the Solar City Program.

To better assist contractors, property owners, and the public at large in understanding the solar potential in HRM and Nova Scotia, an open dataset is currently being created to display the data from all solar PV systems installed under the program. Detailed system data will be logged on HRM servers for future in-house and academic analysis and will be used to verify system performance. This data set is expected to be released by February 2018.

Continuous Improvement

Contractor Feedback

Throughout May 2017, one-on-one sessions were held with each of the contractors who had participated in the program to gather feedback (see Attachment B for meeting minutes).

After reviewing the feedback, it was determined that the key areas for improvement were:

- Increasing participant interest and education at the point of registration;
- Simplifying the Solar City financing application and Solar City financing approval process; and
- Reevaluating mandatory monitoring for solar hot water and solar hot air systems.

HRM's redesigned website provided an opportunity to improve the registration (Step 1) of the Solar City process. Prior to the new website, a property owner who registered would have to wait one to three weeks before receiving a response from the Solar City office. The former website lacked the ability to issue automatic emails to registered property owners, and the registration could not be sent directly to the Solar City office. Fortunately, with the new halifax.ca website, new registrants receive an automatic email after registering with contact information for the Solar City office. At the same time, the Solar City office receives an immediate notification of a new registrant.

The average time between registration and submitting a system application for Solar City review is steadily declining. Before the above-noted changes were implemented, the average time between registration and submitting a system application for review was 94 days. Today, property owners are well informed and the average time is only 23 days.

Property Owner Feedback

In August 2017, registered property owners took part in a survey on their experience with the Solar City Program. Full survey results can be found in Attachment C. Of the 774 registrants, 125 responded (16% response rate) and the feedback received was helpful in determining the challenges faced by property owners between registration and the signing of a Solar City Participant Agreement. Participants could select more than one reason for not proceeding through the program and the major barriers for non-participation were:

- System costs are too high (39% of responses);
- I haven't found the time to complete the process, but I'm still interested (35% of responses);
- Unsure of which contractors to contact (22% of responses);
- Unsure of the most suitable technology for my home (21% of responses);
- Unsure of the benefits of the program (18% of responses); and
- Not getting a response from contractors (17% of responses)

Of the 125 respondents, only four stated that they had secured better financing elsewhere.

Feedback Considerations

To address process confusion experienced by both contractors and property owners, the six-step process has been simplified to clearly define which stakeholder is responsible for each step (Attachment D).

There will also be an increase in communication and education efforts for property owners at the point of registration. The technologies offered will be outlined and potential participants will be educated on what technology would work best for their energy consumption habits. Average system costs and associated savings in the program to date will also be outlined. As noted in the survey results, several property owners stated that they were not getting a response from contractors and ultimately lost interest in the program. Through telephone conversations with solar contractors, it was discovered that most contractors were at, or nearing, capacity during the installation season and unable to respond to the higher than average volume of inquiries. It is anticipated that the increased communication and education at the point of registration will help inform participant expectations and will allow contractors to streamline their estimation process and provide more timely responses to interested property owners.

Property owners will no longer be required to complete the technical system application to be approved for financing. This step proved too cumbersome and most contractors were charging an additional fee to complete the application on the property owners' behalf. Instead, once the property owner is comfortable with a proposed system design and quotation, they are to email the Solar City office with their Solar City ID and contractor selection. The Solar City office will then reach out to the chosen contractor and perform a detailed technical review to ensure the contractor:

- Has third party liability insurance and is in good standing with the Workers Compensation Board;
- Has applied for mandatory building and electrical permits;
- Is supplying certified equipment for use in Nova Scotia; and
- Has supplied the property owner with an accurate feasibility assessment

If all above conditions are met and the overall project has a positive return on investment, financing will be approved and a Solar City Participant Agreement will be sent to the property owner for review and signature. This new procedure should not increase a contractors' workload as they will be providing the Solar City office with the same information they are providing property owners when providing a cost estimate.

Mandatory solar monitoring has been removed for both solar hot water and solar hot air installations as no economically-viable monitoring solutions are currently available. Current monitoring solutions for solar hot water and hot air cost close to 10% of the total system cost, and in most cases, do not result in a positive ROI. The pilot program had external funding sources to offset the cost of the WELserver monitoring systems. Monitoring for solar PV systems will remain mandatory. The program modifications have been well received and financing applications are trending stronger month over month as evidenced in Figure 2.

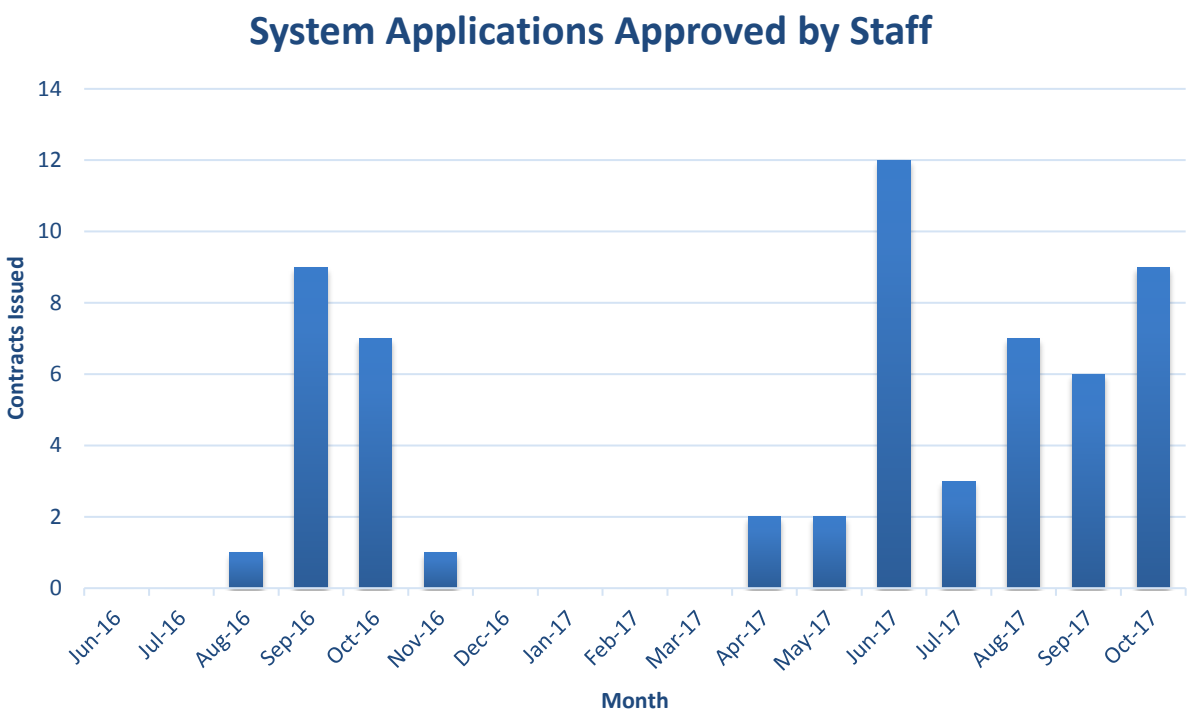

Figure 2: Approved Solar City applications by month

Approved Project Cost Breakdown

As of October 26, 2017, $960,949.27 in system applications have been approved through the Solar City Program. To date, $627,120.71 has been billed and a repayment method has been confirmed for all but $224,992.16 ($210,043.31 of this amount was billed the week of October 16th 2017 and property owners have until December 1st 2017 to determine their method of repayment). Table 5 summarizes current repayment trends.

Table 5: Summary of Solar City Program repayment as of October 26, 2017

Repayment Method	Project Value	% of Re-payment Method
Paid in full	$80,114.75	20%
Annual installments	$151,303.93	38%
Bi-weekly pre-authorized payment	$116,545.87	29%
Monthly pre-authorized payment	$54,164.00	13%
Billed but re-payment method to be determined	$224,992.16	-
Installation in progress	$333,828.56	-
Total	**$960,949.27**	**100%**

Marketing and Communications

Marketing efforts were strong from June to September 2016 to raise awareness for the program through media websites such as the Metro and the Coast, print advertisements, radio and social media. A similar marketing campaign will begin in winter 2017 with an increased focus on social media.

Moving Forward

Planned next steps for the Solar City Program include:

- Launching the next phase of the marketing campaign
- Holding information sessions and pop-ups with HRM employees and the public
- Continuing to explore funding opportunities to help reduce program and system costs
- Continuing data collection and reporting to verify program and system performance

FINANCIAL IMPLICATIONS

Financial analysis of the program to date indicates that the program is not currently cost neutral to the general tax base. However, as previously noted, program participation is trending upward with an average of 7.40 approved projects per month over the past four months. It is anticipated that cost neutrality could be achieved by the end of the three-year program if the average approvals per month increase to 9.33 (based on current average system costs). The program is gaining momentum, and will continue to grow with marketing and education efforts along with improvements outlined in this annual review. Staff will continue to search for funding opportunities to increase program performance. The Solar City office will provide an update on cost neutrality at the 2-year and 2.5-year marks of this 3-year program.

COMMUNITY ENGAGEMENT

Community engagement was not formally conducted as part of this report. Engagement with the community has been ongoing through the Solar City office as inquiries have been received by email or phone.

ATTACHMENTS

Attachment A: Solar Energy Simulation Method and Assumptions
Attachment B: Solar Contractor Feedback – May 2017
Attachment C: Property Owner Feedback Survey – September 2017
Attachment D: Solar City 6 Step Process

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

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Attachment A: Solar Energy Simulation and Assumptions

Solar Hot Water Systems

RETScreen 4 was used to simulate the annual kWh generation of each system using historical weather data from the Shearwater International Airport. Required inputs such as system specifications, collector slope, collector azimuth and number of full time residents were provided by the contractor and confirmed by the Solar City office. In addition to the inputs listed above, the following assumptions were made:

- Average of 60 litres of hot water consumption per person seven days a week
- Domestic hot water temperature supply of 60°C

Solar PV Systems

System Advisor Model (SAM) Version 2016.3.14 was used to simulate the annual kWh generation of each system using historical weather data from the Shearwater International Airport. Required inputs such as system specifications, collector slope, collector azimuth and number of full time residents were provided by the contractor and confirmed by the Solar City office. Simulation assumes a single meter with rollover credits in kWh.

Solar Hot Air Systems

RETScreen 4 was used to simulate the annual kWh generation of each system using historical weather data from the Shearwater International Airport. Required inputs such as system specifications, collector slope, collector azimuth and seasonal usage were provided by the contractor and confirmed by the Solar City office. In addition to the inputs listed above, the following assumptions were made:

- Indoor Temp of 21°C
- Air Temp- Max of 35°C
- Wall R-Value of 20
- Design Airflow Rate of 150 m^3/h
- Operating 8 hours per day

Fuel Rate & Greenhouse Gas Emissions

Electricity

Results are based on 2017 tariffs[4]. All systems to date have been simulated using the Domestic Service Tariff, Rates Codes 02, 03, 04 at a rate of 15.816 ¢/kWh. This rate includes applicable taxes and the 10% provincial rebate. Since 2007, the domestic service tariff has increased an average of 3.6% annually as highlighted in Table A1. This value will be adjusted accordingly as the program progresses. Greenhouse gas emissions first year annual reduction is based on 670g of equivalent carbon dioxide per kilowatt hour (eCO_2/kWh) of electricity[5].

Table A1: Historical summary of electrical rate changes for (Domestic) Residential Rate Class[6]

Domestic (Residential) Rates Only				
Year	¢/kWh (Incl. energy efficiency charge & FAM)	HST (Less rebate)	Total ¢/kWh	Percent Change
2007	10.670	14%	12.164	
2008	10.670	13%	12.057	0.00%
2009	11.796	5%	12.386	10.55%
2010	11.805	5%	12.395	0.08%
2011	12.538	5%	13.165	6.21%
2012	13.923	5%	14.619	11.05%
2013	14.363	5%	15.081	3.16%
2014	14.947	5%	15.694	4.07%
2015	14.947	5%	15.694	0.00%
2016	14.800	5%	15.540	-0.98%
2017	15.063	5%	15.816	1.78%
		Average Increase		3.59%

[4] http://www.nspower.ca/site/media/Parent/2017%20Tariffs.pdf
[5] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php
[6] https://nsuarb.novascotia.ca/sites/default/files/NSUARB-%23254242-v1-Electricity_Rate_History_to_2019_0.pdf

#2 Fuel Oil (furnace oil)

Results are based on a cost of $0.935/litre for #2 fuel oil in year one, including applicable taxes, and an annual fuel escalation of 3.85%. This value will be adjusted accordingly as the program progresses. To convert the annual kWh generation estimated in RETScreen to equivalent litres of #2 fuel oil offset, a 65% boiler efficiency rate was used with a higher heating value of 38 megajoules per litre (MJ/L)[7]. Greenhouse gas emissions reduction is based on 2762.89g of eCO_2/l of #2 fuel oil[8].

Table A2: Historical summary of rate changes for #2 fuel oil[9]

#2 Fuel Oil (furnace oil)				
Year	Canada ($/L)	Halifax ($/L)	Percent Change - Canada	Percent Change - Halifax
2000	57.989	60.289	-	-
2001	53.965	54.204	-6.94%	-10.09%
2002	50.775	53.160	-5.91%	-1.93%
2003	57.490	60.467	13.22%	13.75%
2004	63.919	67.637	11.18%	11.86%
2005	79.848	83.835	24.92%	23.95%
2006	83.444	86.683	4.50%	3.40%
2007	86.096	85.034	3.18%	-1.90%
2008	113.438	110.037	31.76%	29.40%
2009	78.465	75.612	-30.83%	-31.29%
2010	90.250	85.942	15.02%	13.66%
2011	113.037	107.481	25.25%	25.06%
2012	117.646	112.352	4.08%	4.53%
2013	120.392	115.866	2.33%	3.13%
2014	125.287	125.542	4.07%	8.35%
2015	105.096	99.079	-16.12%	-21.08%
2016	95.166	89.580	-9.45%	-9.59%
2017	94.038	93.450	-1.19%	4.32%
	Average Change		4.06%	3.85%

[7] http://www.engineeringtoolbox.com/fuels-higher-calorific-values-d_169.html
[8] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php
[9] nrcan.gc.ca

Return on Investment

The return on investment estimate is based on the fuel escalation indicated above and a 1.9% inflation rate as calculated in Table A3. This value will be adjusted accordingly as the program progresses. Return on investment is calculated over the next 25 years. Estimates are based on a lump sum payment of the quoted price less available rebates. The estimate assumes first minimum payment is made within 60 days of making the Approved Payment.

Payback

Payback for Solar City projects is estimated when the sum of the non-discounted savings (energy savings including inflation and fuel escalation) is greater to or equal to the sum of the non-discounted costs (capital investment and financing interest)[10].

Table A3: Historical summary of inflation[11].

Nova Scotia Consumer Price Index (2002=100)		
Date	CPI	% Change
1992	83.5	
1993	84.5	1.20%
1994	85.5	1.18%
1995	86.6	1.29%
1996	88.2	1.85%
1997	90	2.04%
1998	90.6	0.67%
1999	92.1	1.66%
2000	95.3	3.47%
2001	97.1	1.89%
2002	100	2.99%
2003	103.4	3.40%
2004	105.3	1.84%
2005	108.2	2.75%
2006	110.4	2.03%
2007	112.5	1.90%
2008	115.9	3.02%
2009	115.7	-0.17%
2010	118.2	2.16%
2011	122.7	3.81%
2012	125.1	1.96%
2013	126.6	1.20%
2014	128.8	1.74%
2015	129.3	0.39%
2016	130.9	1.24%
Average Change		1.90%

Canadian Consumer Price Index (2002=100)		
Date	CPI	% Change
1992	84	
1993	85.6	1.90%
1994	85.7	0.12%
1995	87.6	2.22%
1996	88.9	1.48%
1997	90.4	1.69%
1998	91.3	1.00%
1999	92.9	1.75%
2000	95.4	2.69%
2001	97.8	2.52%
2002	100	2.25%
2003	102.8	2.80%
2004	104.7	1.85%
2005	107	2.20%
2006	109.1	1.96%
2007	111.5	2.20%
2008	114.1	2.33%
2009	114.4	0.26%
2010	116.5	1.84%
2011	119.9	2.92%
2012	121.7	1.50%
2013	122.8	0.90%
2014	125.2	1.95%
2015	126.6	1.12%
2016	128.4	1.42%
Average Change		1.80%

[10] A Manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies. National Renewable Energy Laboratory. 1995. p. 65. https://www.nrel.gov/docs/legosti/old/5173.pdf

[11] Stats Canada - Consumer Price Index, historical summary, by province or territory

Attachment B: Solar Contractor Feedback – May 2017

Contractors Meeting #1

Date: 2017/05/09
Location: 40 Alderney Drive

- System Application
  - Cost breakdown is somewhat difficult as contractor gets a full package from supplier.
    - Solution: if sold as full package we will not require individual component costs.
  - Happy to adopt Solar City office feasibility parameters for consistency sake
- Monitoring
  - Very happy to hear solar hot water and hot air monitoring is no longer mandatory. Contractor stated that close to 30 property owners did not go through solar city because of this
- Permitting
  - Expensive but understands why it is necessary. Contractor will comply and is certain that an economical agreement can be made with the engineer due to the predicted increase in solar city installations
- Additional comments
  - Contractor has employees going door to door to promote Solar City. Has concern that property owners will then go to other contractors for quotations even though they have done the leg work.
    - Solution: screen out property owners that state the contractors name under "How did you hear about us?" on the initial registration
  - Suggests that we create a simplified contractors list of currently participating contractors.

Contractors Meeting #2
Date: 2017/05/09
Location: 40 Alderney Drive

- System Application
  - Contractor did not work through the original financing procedure but states that new procedure looks simple enough.
- Monitoring
  - Unhappy about non-mandatory solar monitoring for solar hot water and hot air but understands the decision. States that it could be an issue for future troubleshooting.
- Permitting
  - No comments
- Additional comments
  - Suggests that six step process be clearly labeled with who is to complete the task. i.e. Step one is done by property owner, step two is done by solar contractor etc.
  - Suggests holding public information sessions and inviting contractors

Contractors Meeting #3
Date: 2017/05/10
Location: 40 Alderney Drive

- New Financing Procedure
  - Very happy about keeping property owners away from the application
- Monitoring
  - No comments
- Permitting
  - No comments
- Additional comments
  - Suggests we contact NSPI about their certified solar contractors list (this is not publicly available)
  - Very happy about the new streamlined process

Contractors Meeting #4
Date: 2017/05/17
Location: 40 Alderney Drive

- System Application
  - Make sure it is clear on the web page that property owners do not need 3 quotes to qualify, this is more of a recommendation
- Monitoring
  - No comments
- Permitting
  - No comments
- Additional comments
  - Suggests getting in touch with builders to promote the program
  - Include section on website that explains the systems in more detail
  - Would like the city to release a registered property owner list
  - Suggests we contact solar city pilot email list
  - Educate realtors about program and its benefits

Contractors Meeting #5
Date: 2017/05/10
Location: 40 Alderney Drive

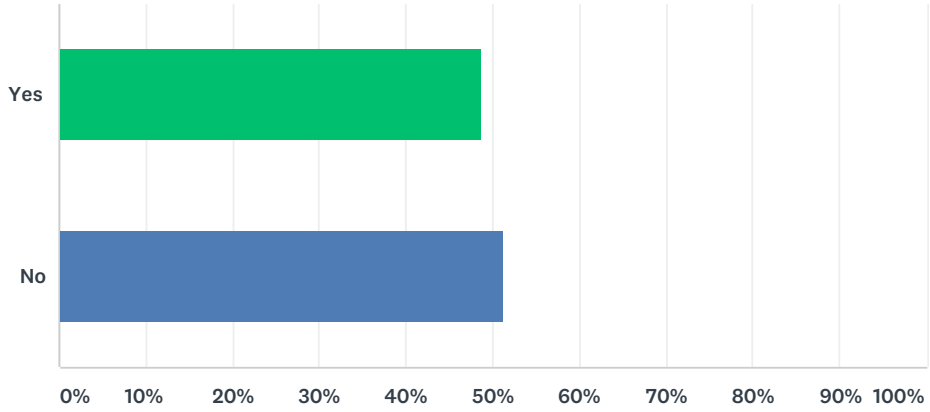
- System Application
  - Very happy about keeping property owners away from the application
- Monitoring
  - No comments
- Permitting
  - Would like standardized permit apps. Example: no Engineer stamp needed if the home has truss A and fasteners B are utilized, like deck permits (removal of repetitive engineering) – consider micro-fit permitting in Ontario
- Additional comments
  - Would like some form of upfront payment to the contractor
  - Would like us to work with NSPI to streamline net metering app

Q1 What is your Solar City Halifax project ID (SLC####)*

Answered: 125 Skipped: 0

Q2 Have you contacted a solar contractor to solicit quotes and discuss a custom solar energy assessment?

Answered: 125 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	48.80%	61
No	51.20%	64
TOTAL		125

Q3 Which solar contractor(s) did you contact?

Answered: 46 Skipped: 79

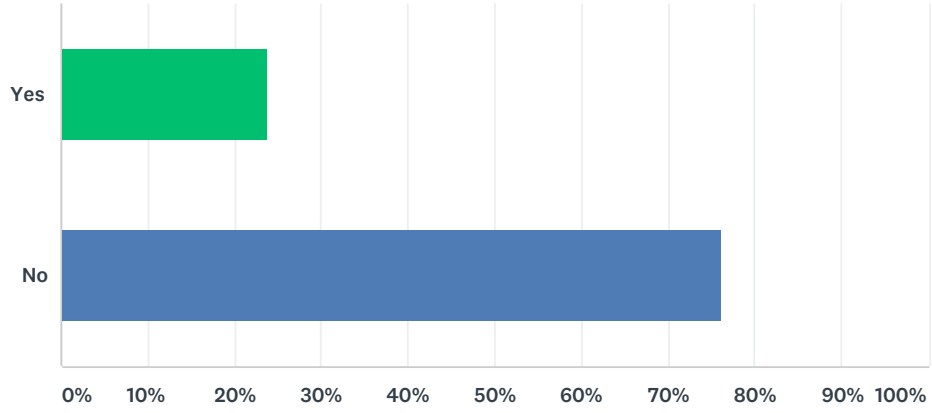
ANSWER CHOICES	RESPONSES	
Contractor #1	100.00%	46
Contractor #2	56.52%	26
Contractor #3	34.78%	16
Contractor #4	15.22%	7
Contractor #5	6.52%	3
Contractor #6	2.17%	1

Q4 Why have you not contacted a contractor?

Answered: 64 Skipped: 61

Q5 Have you had a solar energy system installed in the last year?

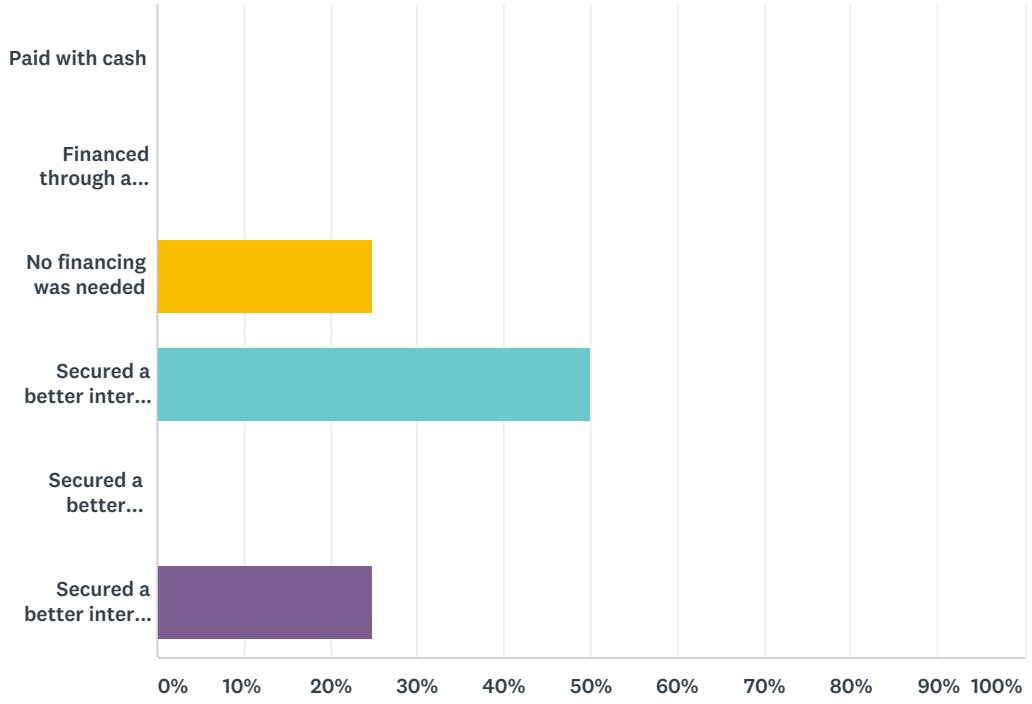
Answered: 46 Skipped: 79



ANSWER CHOICES	RESPONSES	
Yes	23.91%	11
No	76.09%	35
TOTAL		46

Q6 If you did not finance the installation of the solar energy system through the Municipality's program, was it because:

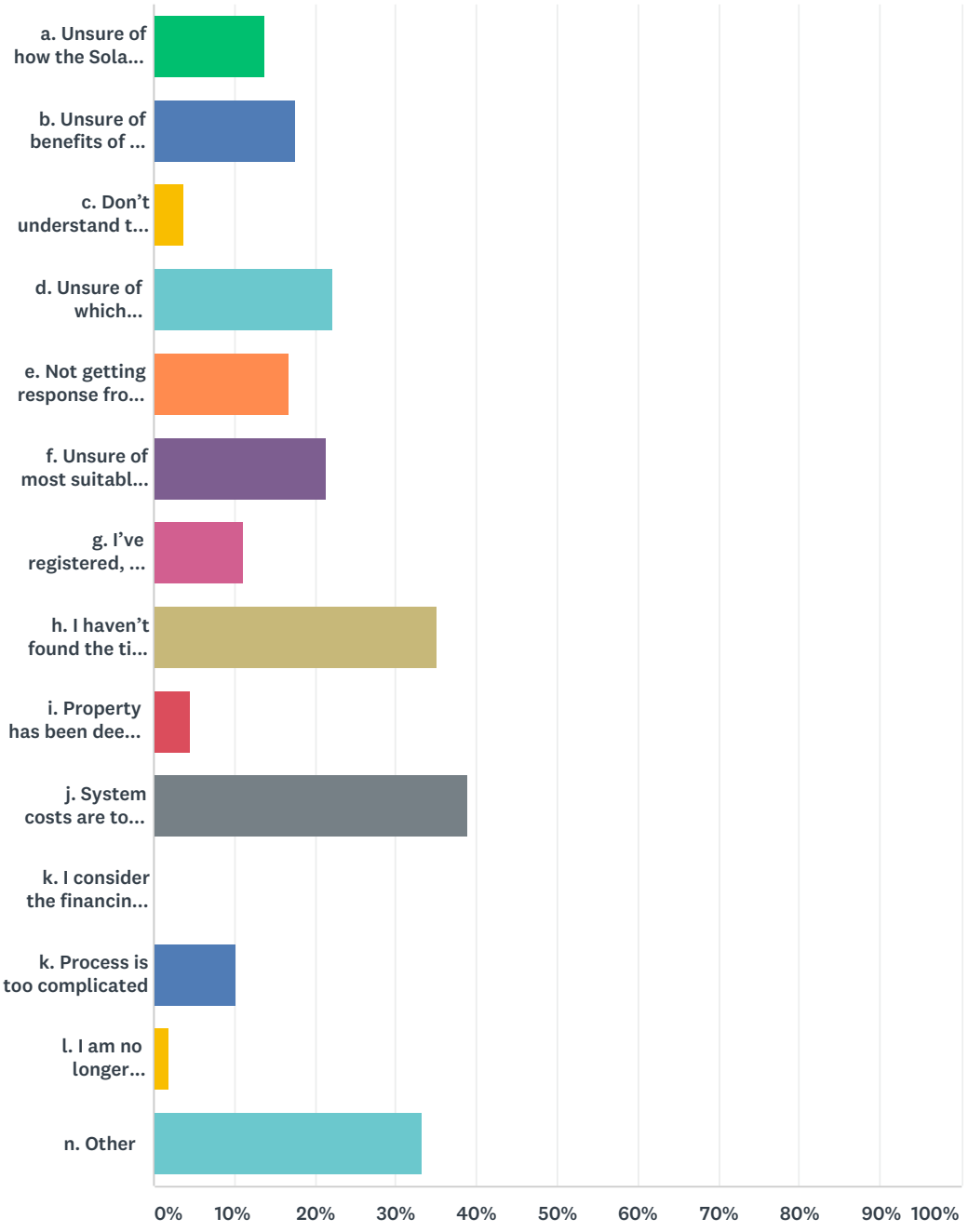
Answered: 4 Skipped: 121



ANSWER CHOICES	RESPONSES	
Paid with cash	0.00%	0
Financed through a banking institution	0.00%	0
No financing was needed	25.00%	1
Secured a better interest rate elsewhere	50.00%	2
Secured a better amortization period elsewhere	0.00%	0
Secured a better interest rate and amortization period elsewhere.	25.00%	1
TOTAL		4

Q7 Of the following factors, which do you consider to be a barrier to installing a solar energy system through the Solar City program? (select all that apply)

Answered: 108 Skipped: 17

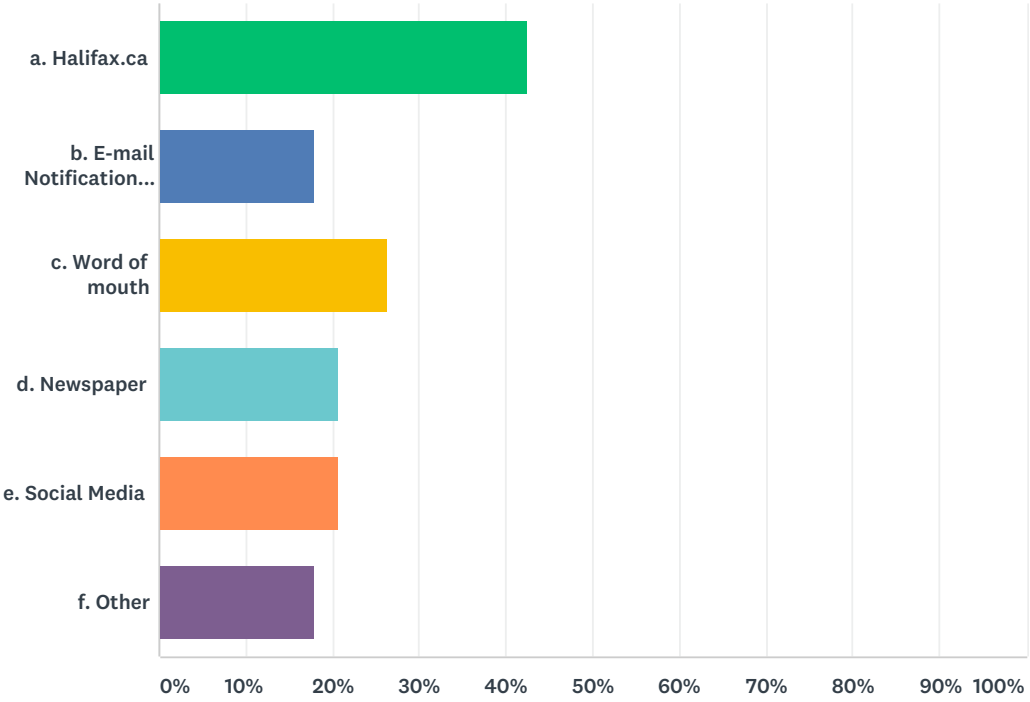


ANSWER CHOICES	RESPONSES	
a. Unsure of how the Solar City program works	13.89%	15
b. Unsure of benefits of the program	17.59%	19
c. Don't understand the technology	3.70%	4

d. Unsure of which contractors to contact	22.22%	24
e. Not getting response from contractors	16.67%	18
f. Unsure of most suitable technology for my home	21.30%	23
g. I've registered, but am unsure what to do next	11.11%	12
h. I haven't found the time to complete the process, but I'm still interested	35.19%	38
i. Property has been deemed unsuitable for a solar energy system	4.63%	5
j. System costs are too high	38.89%	42
k. I consider the financing rate (4.75% fixed rate) to be too high	0.00%	0
k. Process is too complicated	10.19%	11
l. I am no longer interested	1.85%	2
n. Other	33.33%	36
Total Respondents: 108		

Q8 How did you hear about the Solar City program? (select all that apply)

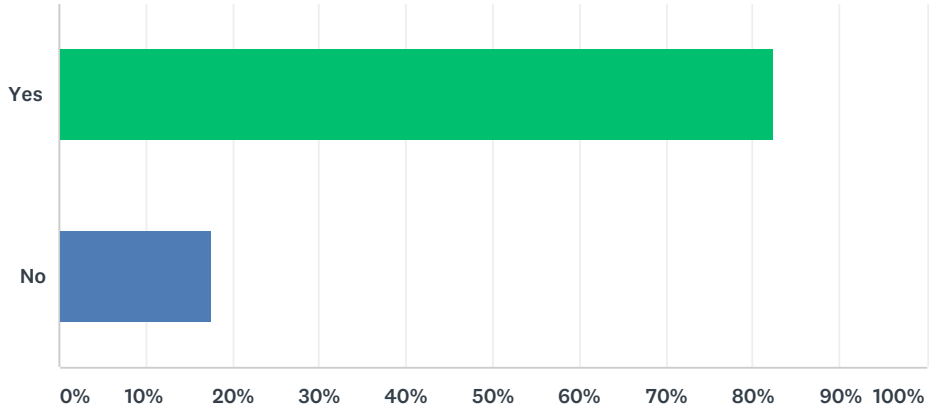
Answered: 106 Skipped: 19



ANSWER CHOICES	RESPONSES	
a. Halifax.ca	42.45%	45
b. E-mail Notification from Solar City	17.92%	19
c. Word of mouth	26.42%	28
d. Newspaper	20.75%	22
e. Social Media	20.75%	22
f. Other	17.92%	19
Total Respondents: 106		

Q9 Are you still interested in participating in the Solar City Halifax Program?

Answered: 108 Skipped: 17

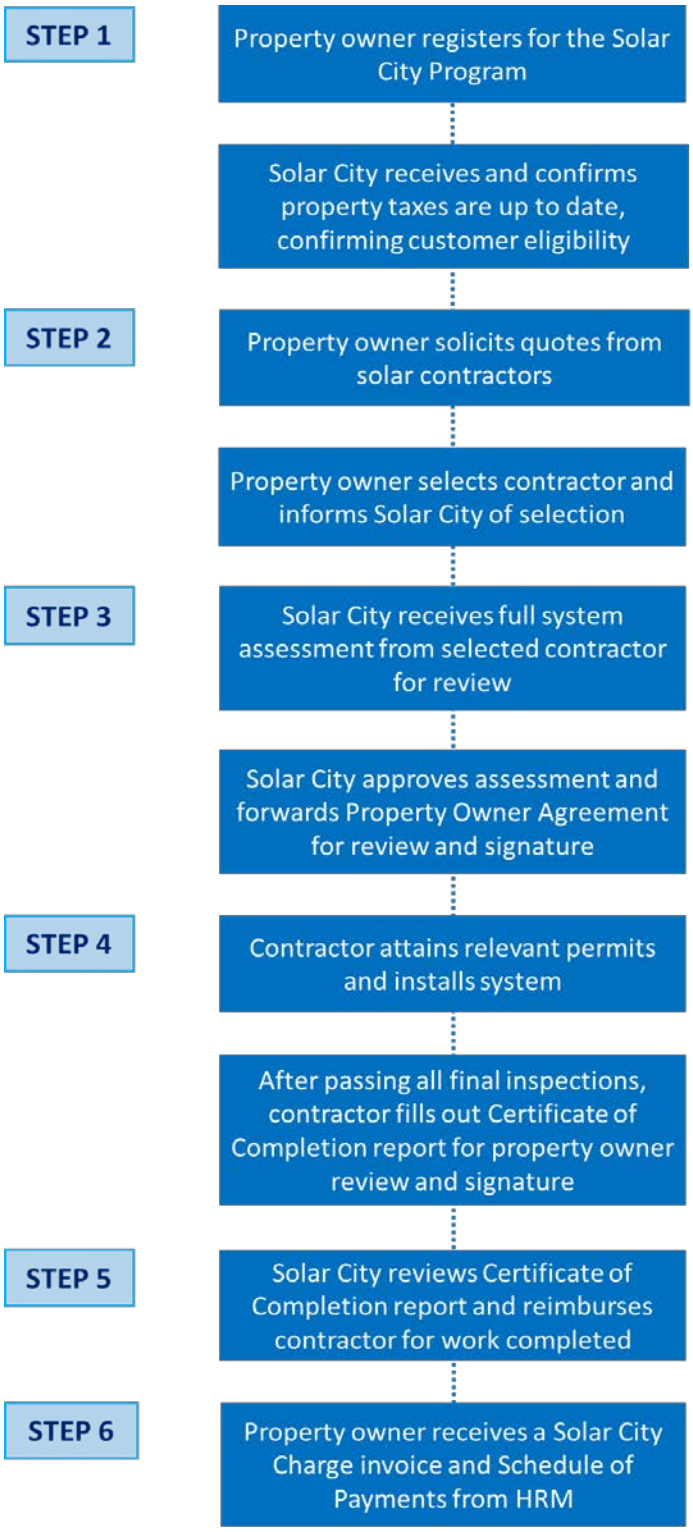


ANSWER CHOICES	RESPONSES	
Yes	82.41%	89
No	17.59%	19
TOTAL		108

Q10 Please tell us why you are not interested in participating the Solar City program?

Answered: 19 Skipped: 106

Attachment D: Solar City Halifax 6 Step Process



Further detail can be found in the Property Owner Guide at https://www.halifax.ca/home-property/solar-projects/property-owner-guide.