



# Project Summary

## PROJECT: **Community Solar Garden**

ORIGINATOR: **Carmen Proctor**

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	1	Dec, 2014	CP
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### **Project Description**

Nelson is a leader in sustainability; one example of this leadership is through its EcoSave Energy Retrofits Program. The program was developed to reduce greenhouse gas emissions within the community by facilitating a simple process for homeowners to make energy efficient upgrades in their homes. The success of this program has led to the continuation and expansion of EcoSave, which includes the development of a community solar garden.

A community solar garden is a centralized solar array installation where members of the community can subscribe to own or lease a portion of the array. The purchasing model can be set up a number of ways. Some systems allow customers to buy individual solar panels and in others kW capacity or kWh of production can be purchased. The solar energy that is generated by the garden is credited to the subscriber's electricity bills in proportion to their investment. This type of project makes solar available to those who could not otherwise access it – e.g. to renters.

The solar array would be installed in one location and would range from 50kW-90kW in size, or larger depending on location and community interest. The solar installation would feed into the Nelson Hydro grid and would become part of Nelson Hydro's capital assets. The program is being developed through the EcoSave Program.

The project concept is that Nelson Hydro would sell solar generation by the panel in 1 kW segments, which would be approximately 4 solar panels. Subscribers could sign up for a minimum of 4 panels or commit to more. There would be two finance models, one being an up front cost and the other an amortization of cost over a number of years using on-bill financing, where the funding is supplied by the City of Nelson and the amount is



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repaid on the Nelson Hydro electrical bill. Twenty-year contract agreements would be set up and would include maintenance costs. Subscriptions could be transferred from one account to another within the Nelson Hydro service area. The solar credit would be measured in kWh for the energy produced, based on the current Nelson Hydro electricity rate, and would go up as the rate increases.

Participation in the solar garden would be voluntary and would be available to all Nelson Hydro customers based upon approval by Nelson Hydro. On-bill financing will only be available within the City of Nelson, because the City is unable to lend money to non-residents. Financing may also be available through the Nelson & District Credit Union like it is for the EcoSave Energy Retrofits Program participants. The contract agreement between the City of Nelson and Nelson Hydro customers will include terms and conditions that specify financing amounts, amortization periods, transfer options and rates.

In 2014, HoboWare Data Logger solar sensors were purchased and installed at Elephant Mountain and on the roof of the Public Works building to measure the solar irradiance for comparative purposes. The software program HoboWare is used to monitor the solar irradiance at each site, which is measured every hour and can be viewed by the hour, day, week and month. This data will be used to improve the energy production estimates for the project.

Utilizing this data, a solar pathfinder, and the PVsyst energy generation modelling software; Jetson Consulting Engineers Ltd provided a project evaluation report in October 2014. This report included the feasibility of a 50kW solar photovoltaic array installation with consideration of expansion to 90kW plus a simple cost comparison for a 1000-watt residential system. The comparison shows that it would be 30-40% less expensive to participate in this project rather than an individual roof top system. Six locations were compared, based on accessibility and security, knowledge of subsurface constructability, room for expansion and permitting, regulatory and social acceptance issues. The sites that were reviewed are:

- 1) RDCK Transfer Station – old location Recycle Center
- 2) Davies Street Park
- 3) Elephant Mountain
- 4) Airport
- 5) City Works Roof
- 6) City Parkade Roof

The Recycle Center ranked the best, however, it has since been discovered that due to the necessary environmental remediation required, that the land would not be available. Other areas that will need further investigation include the airport and Davies Street Park. Another location that was not included in the study is the land near the Public Works building belonging to CPR. Contact with Len Hayley, from CPR, has been made in order



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to initiate discussions on how to proceed with acquiring a land use agreement. The other locations on the report as well as the Nelson Hydro Generation Station will also be looked at to determine if they would be suitable.

A 50 kW array would require a 40m x 40m (1600 sq. m.) area of flat unshaded land and the 90 kW array would require a 40m x 90m area (3600 sq. m.) The array would need fencing around the perimeter with access for maintenance. The solar panels can be configured to fit various shapes of land parcels.

The project evaluation report simulated the annual energy production based on the maximum energy production available for the recycling centre location since it ranked the best, based on this there would be 61.44 MW.h/yr, which would equate to \$5,529.96 or 61,440 kWh per year.

## Need for Project

Through EcoSave events in 2014, and through minimal marketing there are already 90 people in the community who have expressed interest in investing in the project, and with costs coming down the inquiries into net metering have risen over the last few months. One of the interested persons has offered to make a significant investment towards the project in order to see it be expanded in size. It is evident that the community is eager to access solar energy. Not only has the community shown a positive interest in this idea but so has Bullfrog Power Inc., a 100% renewable energy retailer. In December 2014 Nelson accepted a funding proposal from Bullfrog in the amount of \$15,000 for the purposes of investigating the structure of a community solar garden or a shared solar project.

A community solar garden would provide Nelson Hydro customers with a renewable energy option. This is well aligned with the City of Nelson's commitment to a sustainable future. The project would increase energy independence and reduce the community's carbon footprint. Nelson Hydro purchases approximately 50% of the electricity that is needed from FortisBC, who purchases it from a variety of sources, some which include electricity generated from coal. The electricity generated by solar would mean that less electricity would need to be purchased.

The cost of solar has decreased significantly over the last few years, making it more affordable. While this suits those who have a roof that can accommodate solar, it leaves those who cannot unable to access solar energy.

In the US, solar has taken off with unprecedented growth in recent years, however, according to the National Renewable Energy Lab as much as 75-80% of consumers such as renters, those with old or unsuitable roofs, and shading are disqualified from participating in rooftop solar. We can assume those same roofing type issues would be the case here in Canada. Community shared solar projects expand access to those who



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cannot install or afford individual systems, plus offer those even with suitable roofs a less expensive option.

## Project benefits

This opportunity of installing and maintaining a Solar Garden is timely for the electric utility because a solar garden and residential solar are examples of distributed generation. Distributed generation is forecast to become more common in electrical grids as the costs of small scale generation technology continues to drop and consumer interest in locally generated clean power increases.

Distributed generation may significantly change the business model for electric utilities and in fact in regions of North America, with higher priced energy than we have, solar is already starting to make a significant presence. The cost of solar generation is now competitive with traditional sources in the higher cost regions of North America. It is expected that solar will continue to become more competitive in all regions of the continent (and world).

There are two primary benefits to the electric utility from implementing this solar garden;

- It gets Nelson in the game of distributed solar generation, providing an excellent opportunity for first-hand experience on both the business and technical aspects of solar PV, which positions the electrical utility better to adapt to a change to the business model in the future and makes it possible to capitalize on new opportunities (like installing solar gardens in other areas) and
- It is an excellent customer service opportunity, Nelson Hydro strives to be a utility that not only services the needs of its customers but is also viewed as a good corporate citizen – the solar garden is another opportunity for delivering a good program that goes above and beyond offering pure electrical energy to its customers.

There are also several benefits to individuals that may participate in the solar garden. One being that they will be paying less than those installing individual roof top systems because of economies of scale. Secondary advantages to participating in this project will include:

- Elimination of individual building code and zoning issue concerns that could arise from construction of panels on residential rooftops.
- Savings in time and energy of participants, as they don't need to research solar panels, hire a contractor, coordinate the installation etc.
- Expanded access to renters, business owners, and non-profit organizations.



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- Access to those who own houses with unsuitability issues, such as roof size, configuration, adjacent buildings, shading and other factors that may reduce power output.
- An opportunity to contribute towards the advancement and growth of solar energy.

## Cost Estimate

Jetson Consulting Engineers provided costs for the capital installation of the solar array. Cost estimates were calculated for both a 50kW array and a 90kW array. Additional project costs such as land acquisition and design work were assessed by Nelson Hydro and added to the capital costs in order to estimate the total project costs.

<b>PROJECT COSTS</b>	50 kW	90 kW
Site Preparation/Foundations	\$32,000	\$60,000
Materials (Panels, Framing, Inverters)	\$76,514	\$132,651
Installation (Frame & Panels)	\$30,000	\$50,000
Electrical Balancing	\$10,000	\$15,000
Construction Management & Commissioning @20%	\$30,000	\$40,000
Contingency @20%	\$30,000	\$40,000
Subtotal (Capital Cost)	<b>\$208,514</b>	<b>\$337,651</b>
Land Rights*	\$50,000	\$70,000
Program Development	\$10,000	\$10,000
Engineering & Design @12%	\$25,000	\$30,000
Subtotal (Owner's Cost)	\$85,000	\$110,000
<b>Total Estimate</b>	<b>\$293,514</b>	<b>\$447,651</b>

\* Based on review of current market values, price could be reduced if land is donated/discounted or project is located outside of Nelson

## Funding Sources

	50 kW	90 kW
Bull Frog Power Contribution	\$15,000	\$15,000
Other Contributions	60,000	50,000



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Nelson Hydro	\$25,000	\$25,000
Customer Buy In 50 x \$4,000 (90 x \$4,000)	\$ 200,000	\$360,000
<b>Estimated Contributions</b>	<b>\$300,000</b>	<b>\$450,000</b>

Additional Nelson Hydro contributions:		
Annual System Maintenance	\$2,000/year	\$3,000/year
Total for operating 20-years	\$40,000	\$60,000

## Schedule

Marketing the offer to the public will begin in March 2015. Individuals will need to provide a firm commitment if they wish to participate in the project. The offer to pre-purchase panels in 1 kW segments will be open until May 30, 2015.

Construction will begin in July and be completed by the end of August, providing 60% or more of the capacity is pre-sold for a minimum 50 kW array

## Updates

Rev

- 1 Initial draft and budget estimates
- 2 Project costs updated
- 3 Project description and project schedule updated.
- 4 Updated Cost Estimate, Need for Project and added Project Benefits