

City of Victoria Solar Benefit Calculator Project – Phase 2

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Executive Summary

As part of a broad strategy to reduce energy and greenhouse gas emissions, the City of Victoria (City) is developing an online decision support tool to inform its residents of potential benefits of investing in solar hot water (SHW) and photovoltaics (PV) systems for their home and business. Benefits include reducing energy use, utility costs and carbon footprints.

Phase 1 – City-wide Solar Irradiance Map for Individual Rooftops

Phase 1 of the project includes a city-wide solar irradiance map. The solar mapping project began in December 2013 in partnership with UVic and with funding from NSERC. Phase 1 of the project was to create a rooftop irradiance map of Victoria from 8 point per square meter classified LiDAR and meteorological information from the School Based Weather Network. The solar map incorporates localized irradiance data over the course of a year to generate daily irradiance values for rooftops across the city. Phase 1 was completed in May 2015.

Phase 2 – Solar Potential Cost Benefit Calculator and Demand Side Management Messaging

Phase 2 of the project is the development of the decision support information and recommendations in a manner that communicates the solar renewable energy potential of individual buildings. The solar map and accompanying calculator tool will benefit building owners as well as other stakeholders in energy sector and building design and construction industry (Utilities, Province of BC, architects and mechanical system engineers, and mechanical/solar contractors). This will engage the community and increase their awareness on energy efficiency and conservation measures relevant to their buildings to achieve energy savings from their existing systems or any future solar installation.

Procedure:

All data requirements including rooftop irradiance data, PV and SHW cost information, financing options, and heating systems were identified. Local vendors were interviewed for available PV and SHW system costs for different configurations and capacity. Future price escalation for electricity and natural gas rates were identified. The program was developed to design and calculate PV and SHW system for any residential building. Using the irradiance values from Phase 1, total cost of ownership, along with energy cost savings, and greenhouse gas offset potentials based on current and projected energy prices over the lifetime of the applicable systems were calculated. Financial metrics including discounted payback, return on investment, net present value of investment option for PV and SHW systems were quantified and calculated. A database of data tables and stored procedures were created in MS SQL Server such that data can be communicated to the online platform.

Solar Benefit Calculator (Phase 2) Key Features:

- Calculating and recommending applicable PV and SHW systems for individual buildings
- Having the capability to perform calculations based on monthly and annual solar data
- Performing lifecycle costing, with and without financing, for PV and SHW systems
- Calculating monthly, annual and lifetime energy savings from PV and SHW systems
- Calculating Carbon offsets by PV and SHW systems
- Future-proofing capabilities – Opportunities to update and integrate new information when available
- The calculator has the capacity to be integrated with an online platform, sending and receiving information.

Future Work:

- **Development of the Web-based Tool:** The project is at a stage to develop a web-based product, integrating the solar map and the calculator for the public to use.
- **Making the System Dynamic:** Dynamic tool allows user inputs/overrides of default assumptions to support solar vendors and clients in reviewing total cost of ownership of different installation options.
- **Advancing the solar benefit calculator:** Incorporating building information and energy rates for non-residential (commercial) buildings.