

# Solar Power at Central Park Strata, 909 Pembroke

## Introduction

At our 2011 AGM, several owners expressed support for investigating solar power for our building. This document explains the options, costs, and benefits.

## Solar Options

There are two commonly used, well understood ways to collect free energy from the sun:

- PhotoVoltaic (PV) systems turn sunlight into electricity. Solar panels generate electricity, and a control system feeds it into the BC Hydro electricity grid.
- Solar Thermal systems, also known as Solar Hot Water (SHW) heat water. Solar panels or tubes either directly heat water or another heat transfer fluid. This heat is used to pre-warm water before it goes into our existing natural gas hot water boiler.



Solar Hot Water Panels

Although these systems are not yet common in Victoria, there are millions of both types in use around the world.

## Solar Opportunity

The Central Park Strata is very suitable for solar power because:

- We have a large flat roof with no shade, and an easy route for service connections down the side of the building.
- We use significant electricity to light the hallways and common areas
- We have a shared boiler to heat all of our hot water

## How it pays back

	PhotoVoltaic	Solar Hot Water
Financial	The electricity coming out of a PV system reduces the amount of electricity we have to buy from BC Hydro. On a sunny day, the electric meter ‘runs backwards’ and power goes into the grid. BC Hydro calculates the amounts each year and we only pay for the ‘net energy’ we use – this is called ‘net metering’.	The heat coming from a Solar Hot water system pre-heats water going into our natural gas boiler, reducing the amount of gas we need to purchase from FortisBC for laundry and the hot water in your suite.
Carbon Pollution	The BC Hydro grid is connected to the rest of North America. We hope that Electricity generated on our roof would reduce the use of coal to generate electricity somewhere else (e.g. Alberta)	Natural gas is a fossil fuel, so a SHW system directly reduces carbon pollution from burning the gas.

## Cost/Finances

Central Park Strata would pay for installation (capital cost) of a solar system from the Contingency Reserve Fund, and the owners would pay for it with our monthly strata assessments. A ¾ vote would be required first – 75% of the owners at a General Meeting of the strata would have to approve the cost.

This document includes cost estimates for planning purposes. If the owners wish to proceed further, council will get firm quotations to use before the formal ¾ vote to decide whether to proceed. The 'per unit' cost is an average for 63 units – in reality 1 bedroom units would pay less, 2 bedrooms a bit more.



Photo Voltaic Panels

### System Sizing

Our large roof could collect a lot of energy – more than we use in the common area – so a system should be small enough that we can use all of the energy it collects. There is a fundamental difference in the two however:

- None of the solar energy gathered from a PhotoVoltaic (PV) system will be wasted – it can all be 'pushed back' into the BC Hydro grid at any time.
- A Solar Hot Water system needs backup hot water storage tanks (in the boiler room) so that heat captured during the day can be used in the evening or in the morning. Once this is up to temperature, there is no way to use any extra heat.

For planning purposes, this document proposes either

- a 10 kilowatt (10 kw) PV system, which would generate about 11,000 kilowatt hours of electricity per year
- a 20 kilowatt (20 kw) PV system, which would generate about 22,000 kilowatt hours of electricity per year
- a SHW system with 20 collector panels, which would generate about 170 GJ (GigaJoules) of heat energy per year

### Roof surface

Our roof surface is rolled asphalt, applied hot to 'glue' it to the plywood deck surface. Any solar system installed on the roof would be on 'sleepers', or horizontal wood pieces bolted down and covered with roofing material, installed by a qualified crew.

When the roof is replaced, the panels would be disconnected, taken aside, and replaced onto the new roof.

### Government grant

The Capital Regional District, under its Solar CRD program, has offered to pay for ¼ (25%) of the cost of a SHW system as a demonstration project on a multi-unit residential building. To be eligible, the system must be fully installed and functioning by March 31, 2015. Installation would take about 6 weeks after a contract was signed.

There are currently no grants or subsidies available for PV systems, but BC Hydro has simplified the application process and electrical standards for net metering to make these installations routine.

Both types of systems are exempt from 7% Provincial Sales Tax (PST). They must pay federal 5% GST.

### Maintenance

- A PV system has no moving parts. Once it is set up, it will need virtually no maintenance except occasional cleaning of the panels and visual inspection of the meters and components.
- A SHW system has a pump, tanks, fluid and sensors which must be checked and serviced periodically. They would be located in or controlled from the boiler room. The system must be designed to avoid two harmful scenarios:

1. Freezing water or coolant in the outdoor panels or piping
2. Boiling (overheated) water or coolant in the solar panels

### Service life

- Solar PV panels are warranted for 25 years, but can last much longer. They typically lose a small percentage of their efficiency (power output) over time.
- Solar Hot Water panels last for decades unless they freeze or boil. The circulation pump would need to be replaced periodically – perhaps every 10-20 years.

### Electricity and Gas Costs in BC

PV: Electricity prices in BC are among the lowest in North America, but are forecast to rise 28% over the next four years. There are no credible forecasts for increases after that, but new sources of electricity in BC will be much more expensive than the big old dams built in the 1960s and 1970s. This document assumes a conservative continuing increase of 2% per year after 2019. On April 1, 2015 our rate will increase to 13.54 cents per kilowatt-hour (kwh) including PST and a 5% BC Hydro rate-rider.

SHW: Natural gas prices have fallen in the last few years as the fracking boom has create huge supplies, and North America has very little capacity to export natural gas overseas. If BC is successful in creating Liquefied Natural Gas terminals – a high priority of our current premier – this may gradually increase prices.

BC currently has several different prices for natural gas. Vancouver Island’s price has been higher for 20 years to pay for the pipeline built across Georgia Strait in the 1980s. This year (2014) the BC Utilities Commission ruled to allow FortisBC to move towards one natural gas price for all of BC. This is expected to lower our gas price by about 25% in relation to prices on the mainland.

### Costs Avoided

The energy collected from these systems reduces the amount of electricity and/or natural gas that the strata must purchase. By collecting free energy from the sun into the future, we can avoid future increases (or decreases) in electricity or natural gas prices.

### Financial Summary

See attached graphs for detailed analysis of the three options.

System Type	Total install cost	Average install cost per unit	Forecast Energy Savings per unit in 2015	Forecast Energy Savings per unit in 2030
10 Kilowatt PV	\$31,500	\$500	\$24	\$34
20 Kilowatt PV	\$60,000	\$950	\$47	\$68
20 panel Solar Hot Water	**\$60,700	\$950	\$33	\$??

\*\* net cost: \$80,900 before 25% Solar CRD rebate

Bruce Mackenzie  
 Strata President, Central Park, 909 Pembroke St., Victoria  
 Bruce.Mackenzie@shaw.ca