Pre-Feasibility Study

District of Summerland

Solar PV plus Battery Storage Project

May 31, 2017

Study Prepared By

Bench Consulting Inc.

Note to Reader

This study was prepared by Bench Consulting (BCI) for the District of Summerland. The study is intended as a high level investigation into the technical and economic feasibility of a 1 MW Solar Photovoltaic (PV) clean energy project combined with 2 MW Battery Storage (the Project) to serve the needs of the District of Summerland Electric Utility. While the conclusions of the study support continued development of the proposed Project, BCI has not performed site inspections and recommends further detailed investigative studies be undertaken by the District of Summerland and other interested parties to confirm results of the preliminary investigations. BCI is a British Columbia based consultancy providing clean energy project advisory, planning, development and management services to public and private clients in the solar and wind power sectors. The principals of BCI have facilitated the development of more than 1 GW of Canadian renewable projects and infrastructure.

CONTENTS

1. STUDY OVERVIEW

The study objective is to determine the feasibility and potential cost of constructing a proposed **1 MW Solar PV Project** and a **2 MW Battery Storage Unit** on municipal owned land within the District of Summerland (Summerland).

The potential benefits to Summerland of operating and managing a Solar PV project combined with battery storage are significant.

Benefits may include:

- Extension of solar hours to support morning and evening peaks,
- Smoothing of solar power variability in daily operations,
- Reducing monthly and seasonal load peaks to reduce wholesale power cost from Fortis,
- Emergency power reserves for critical services in the event of grid disruption.

The potential ability of Summerland to capture cost savings by reducing short term peak load spikes is arguably one of the most important potential benefits of battery storage. Peak capacity demands require electricity supplier Fortis to have standby capacity available. Capacity reserves required to serve short term peaks bring the unintended consequence to Summerland of higher wholesale pricing for extended periods.

Following a desktop review of several District-owned properties by BCI to evaluate their suitability for the project, Summerland has specified two land parcels owned by the District and located in proximity to three-phase distribution lines as well as the Prairie Valley Substation. For the purposes of the pre-feasibility study of a Solar PV project, BCI has focused on these two parcels. The short-listing of these sites was based on a preliminary pre-public consultation assessment conducted by staff, and other sites may be identified during further stages of study and consultation.

BCI has modelled a proposed 1 MW Solar PV project on one of the proposed land parcels using available solar data and industry standard modelling calculators in a manner consistent with a desktop study. Project costs have been factored using current market cost data for similar projects. Costs have been further tested against current market cost estimates for key solar project components. We expect the results may be transferable to any similar land parcel in Summerland.

The study does not include cost estimates for interconnection or any potential network upgrades that may be required for the Solar PV or Battery Storage Unit. Also not included are the costs of site preparation for installation of project components. Those cost items require more detailed project interconnection studies and are beyond the scope of this preliminary investigation.

There are numerous suppliers and manufacturers of solar modules, racking systems, inverters and various configurations of components to achieve the desired rated capacity of a 1 MW Solar PV Project.

There are fewer suppliers of utility scale Battery Storage facilities. BCI has been in contact with battery storage suppliers in respect to the study, and more detailed studies related to the intended purpose and storage management will be required to finalize costs.

2. SUMMARY of COST

SOLAR PV PROJECT COST:

The expected EPC (engineer, procure, construct) cost of 1 MW Solar PV project in Summerland for the period beginning 2018 will be approximately $2.5 Million, or $2.5/watt installed.

The calculations, methods and specifications used by BCI to determine this outcome are contained elsewhere in this report. The cost considers the use of fixed tilt or single axis tracker mounts. This cost projection does not include the cost of interconnection or site preparation, both of which require further site specific studies. The life expectancy of a typical utility scale Solar PV project is 25 to 30 years.

SOLAR PV PROJECT YIELD:

Fixed Tilt Mount

The expected energy output of a 1 MW Solar PV project on Site 1 using premium solar panels attached to Fixed Tilt rack mounting is 1,175,780 kWh per year.

The annual value of the power at a generic $0.12 kWh (kilowatt/hour) is $141,092.00 [1]

Single Axis Tracker

The expected energy output of a 1 MW Solar PV project on Site 1 using premium solar panels attached to Single Axis Tracker rack mounts is 1,449,284 kWh per year.

The annual value of the power at a generic $0.12 kWh (kilowatt/hour) is $173,916.00

STORAGE BATTERY COST:

The expected EPC cost of a utility scale Battery Storage Unit suitable for Solar PV and Substation interconnection is expected to be in the range of $2 to $3 Million depending on technology, capacity and intended duration of operation.

Due to final configuration uncertainty, BCI recommends a budget number of CAN $3 Million be adopted for future EPC purchase of a 2 MW lithium-ion battery facility capable of four hours of continuous discharge[2]. Initial estimates from Canadian Energy for 20' custom mod containers fully equipped with HVAC system, fire suppression, all batteries and power electronics (i.e., high voltage hybrid inverters), and excluding custom protections, controls, system interface/integration, and engineering and commissioning were $1.9 Million for a 2 MW storage system. Additional studies and collaborations with Battery Storage designers and suppliers are required to establish the final cost. Final costs may be lower if smaller capacity and shorter duration are satisfactory to the intended use. The life expectancy of a typical battery storage unit is about 10 years.

[1] Power cost increases in future have a positive effect on Solar PV project economics. BCI recommends Summerland model the Project for sensitivity to possible future wholesale and retail cost increases.
[2] Sterling, MA, USA purchase 2017 of NEC 2 MW Battery Storage System

3. BACKGROUND TO THE STUDY

The District of Summerland is a vibrant municipality with a population of 11,615 situated in the dynamic and rapidly growing Okanagan region of British Columbia.

Summerland is generally characterized for its mild sunny climate and beneficial location on the shores of Okanagan Lake. The district is endowed with rural orchards and vineyards — as well as a thriving urban community with parks, a commercial downtown core and expanding residential areas. The beneficial climate and environment of Summerland makes the district a popular seasonal destination community for recreation and the retirement lifestyle. The town centre is in convenient proximity to the larger cities, commercial infrastructure and airports of Penticton (16.5 km), and Kelowna (46km).

One of the most unique characteristics of Summerland is that the district operates its own electrical utility - but does not generate power.

This circumstance is rare in British Columbia, and offers Summerland the opportunity to consider self-generation of clean Solar PV power. The district has engaged with residents in regards to potentially developing Solar PV power, and residents and ratepayers alike have expressed support for concept.

Summerland currently acquires - and then distributes - electrical power to residential, business and industrial customers located within district boundaries. The power is purchased from Fortis at substations located within Summerland district boundaries. While Fortis does some self-generation, it also acquires power from BC Hydro for further distribution within the Fortis service area.

Summerland has commissioned BCI to undertake a pre-feasibility study to determine the characteristics of a proposed solar and storage project. The Project is described as a proposed one (1) MegaWatt solar PV project to be located on municipal land and interconnected with 2 MW battery storage and the Summerland electrical supply substation.

The objectives and benefits of the Project include:

a) Generate clean and renewable solar power;

b) Use utility scale battery storage to manage hour by hour solar variability;

c) Use battery storage to extend solar hours to serve morning and evening peak loads;

d) Reduce wholesale peak capacity charges from short term load spikes; and,

e) Provide emergency back up power for critical services.

4. BENEFITS OF SOLAR

Solar PV is a game changer.

Solar PV (photovoltaic) technology advancements and dramatic cost reductions globally have transformed the renewable energy sector. Solar power has now become the number one clean energy sector investment worldwide.

In North America, solar PV is now the fastest growing clean energy technology, averaging 56 percent annual growth for the past five years. In the US, solar power now closely competes with natural gas in annual capacity growth – growth that is accelerating as more solar capacity is added each year than the one before. There are now more than 200,000 people working in solar in the U.S. And with the extension of the US investment tax credit at the end of 2015, solar PV is expected to continue on its exponential growth curve.

According to Bloomberg, there will be $73 Billion in new US solar investment in the coming five years, surpassing even wind power investment. Bloomberg suggests the new solar investment will result in growth of 20,000 MW of new US solar. That's more new solar than total of U.S. solar capacity installed today. Solar forecasts issued by SEIA (Solar Energy Industries Association) predict $30 billion in U.S. private sector investment annually by 2020, leading to a total U.S. solar capacity of 100 GW, a 3000% increase in just a decade.

100 GW is the equivalent of 100,000 MW of solar.

While British Columbia has a commercial grade solar resource in many areas including the Okanagan region, to date only 1 MW of utility scale solar[3] has been constructed in the province. BCI understands there are utility scale solar projects in various stages of planning by private power producers, but all will require energy purchase agreements (EPA's) from a utility prior to construction. For most BC electrical ratepayers, the ability to benefit from the falling cost of Solar PV development is controlled by the utility BC Hydro.

While solar PV projects have no GHG emissions and are compliant with the growing global desire for clean power, the real driver behind the growth of solar is economic.

1. Solar costs are falling worldwide.
2. Falling costs spur new investments.
3. New investments produce even lower costs.

Solar PV is a technology. A solar panel has no moving parts, no sound and no GHG emissions. Reductions in solar PV cost come year after year – as they do with computers and other forms of electrically based and robotic manufactured technology.

At the time of the writing of this study, a new North American "low cost" solar benchmark was set by a Solar PV project in Tucson, AZ. The price paid by a utility for Solar Power combined with Battery Storage is fixed at about USD $0.03 kWh (kilowatt hour) under a long-term power purchase contract.

The rapidly falling cost of Solar PV panels in the current market is creating difficulties for some manufacturers – but a buy opportunity for project developers. A recent 2015 BC Hydro and Fortis utility study predicts BC solar cost to be $1.50 CAD per watt installed by 2020. This expected declining cost trend is important to the Summerland, as utility scale solar PV projects require time to execute. Many industry observers expect no other clean power technology can match solar's new low cost.

[3] Sunmine Solar Project, Kimberly BC

5. BENEFITS OF BATTERY STORAGE

PEAK SHAVING

As noted elsewhere in this study**, t**he potential ability of Summerland to capture cost savings by Peak Shaving is arguably one of the most important potential benefits of battery storage. Peak Shaving is accomplished by discharging batteries to smooth short term "spikes" in electricity demand which occur during periods of exceptionally high electricity usage. For example, during peak dinner hour on the coldest day of the year. During the low-solar winter period, it is contemplated the batteries may be recharged from the substation during periods of low demand, such as late night to early morning. The requirement to service short duration load demand "spikes" requires Fortis to have standby capacity available. Maintaining capacity reserves to meet the short term peaks creates the unintended consequence of setting higher wholesale power pricing for extended short periods that follow the peak (a 'Wires Charge' that is based on the highest peak over the previous 11 months). Additionally, Fortis charges a 'Peak Supply Charge' for the registered peak in each month, which could be reduced through the use of battery storage. BCI recommends further studies be carried out with major storage battery manufacturers to model the economic benefits and available management tools.

SOLAR SMOOTHING

Solar power like other renewables is reliable in the longer term — but may be variable and not firm in the immediate term. Solar panels require solar irradiance to generate power, and weather changes including passing cloud formations can create variability in otherwise time and date predictable energy yields. Having a battery storage unit interconnected with a Solar PV project can bring the benefit of smoothing minute by minute spikes in solar production. There are an increasing number of utility scale solar projects that are specifying battery storage as an operational component. The batteries are charged during moments of high solar energy, and partially discharged as required during moments of low solar energy. The bulk of solar power is not required to maintain the battery, and is delivered to the substation for system use.

EXTENDING SOLAR HOURS

During peak summer solar season, electricity demand for air conditioning can be a peak load driver. But as the climate experiences the winter season, the daily morning and evening periods reemerge as the drivers of peak electrical demand. During these peak periods ratepayers typically turn on electric appliances, lights, heat and other electrically powered devices. Batteries which are charged by solar energy during the daytime period may be discharged during low daylight evening and morning peaks, thus extending the delivery of solar power to the system. It is contemplated that Solar Smoothing and Extending Solar Hours may be software managed.

EMERGENCY BACKUP POWER

Battery Storage maintained by Solar generation or the Substation will provide standby emergency power for an extended period to maintain Summerland emergency services and critical infrastructure in the event of grid or transmission line failure. The duration and number of services which may be supplied on emergency basis will require further study when the specifications of the storage unit are determined.

6. SUMMERLAND SOLAR CLIMATE

Summerland enjoys one of Canada's most beneficial solar climates, with more than 2,000 hours of sunshine annually.[4]

The district climate is described as a humid continental climate with hot, dry summers and cool winters. Summerland has been the location of an Environment Canada climate station which according to records recorded climate data beginning 1990.

Summerland's unique location receives additional climate benefits which further distinguish the district as the ideal location for a Solar Photovoltaic (PV) power plant.

- According to a summary of Environment Canada climate data, Summerland is distinguished by more days with sunshine during the spring than other Canadian locations with climate data.[5] Periods of sunshine have been recorded on average 88.4 days each spring. Extra hours of direct solar irradiance in spring are beneficial for the early seasonal production of solar energy.

- Because Summerland is located on a natural bench above Okanagan Lake, the district stays relatively warm at night. By comparison, the nearby City of Penticton is situated lower and closer to lake level. Penticton experiences cooler nights than Summerland as cool denser air sinks to the valley bottom at lake level. The warm nights in Summerland in a dry climate distinguishes Summerland with one of the lowest Environment Canada recorded morning relative humidities in Canada from May through September.[6] The reduced morning atmospheric humidity is expected to improve spring, summer and fall exposure to solar irradiance.

BCI recommends the installation of a solar climate station on the preferred solar site should the project proceed. A properly maintained solar monitoring station should be maintained for a minimum of one year of ground based observation to further reduce uncertainties. The station should be capable of recording solar irradiance and other climate data which may be correlated with satellite observation. The site monitoring program would yield highest probability predictions.

[4] Environment Canada, Summerland 2,058 mean sunshine hours annually.
[5] Environment Canada Climate Normals, District of Summerland.
[6] Environment Canada, Climate Normals, District of Summerland.

7. THE SOLAR SITES

Following a desktop review of several District-owned properties by BCI to evaluate their suitability for the project, two (2) potential municipal sites which may be suitable for a one (1) MW solar PV project emerged as the most desirable. BCI was directed by the client to undertake a pre-feasibility look at these sites, with a focus on Site #1 due to its proximity to a substation, historical use, and security features (details described below).

The two optional sites are described as SITE #1 and #2. Site #1 is a large municipal owned parcel described as 13500 Prairie Valley Road. Site #1 is nearest the substation of the two options. Site #2 is also large municipal owned parcel described as 17400 Highway 40. Site #2 is the furthest from the substation.

The findings are as follows:

SOLAR SITE #1 – 13500 Prairie Valley Road

Site #1 consists of an elevated ridge top with good east, south and west solar exposure and existing road access. The elevation is approximately 570 meters, or about 35 meters above the elevation of the Prairie Valley Road.

Site #1 appears to be heavily impacted by past gravel extraction and other industrial activities. Site remediation activities may be required prior to construction of a Solar PV project. There are no known "site use" conflicts. BCI has not inspected the site and recommends further engineering and environmental ground truthing studies be undertaken by Summerland to confirm its suitability for the intended use.

Due to its raised elevation above the surrounding topography, the proposed project site is generally not visible from the lower elevation residential and rural areas which surround the site. Visual impacts from a solar PV project are considered minor. Visual effects may be screened in most instances due to the relative low profile of panel arrays. The single vehicle gravel road access up the west side of the ridge is currently gated and provides excellent security.

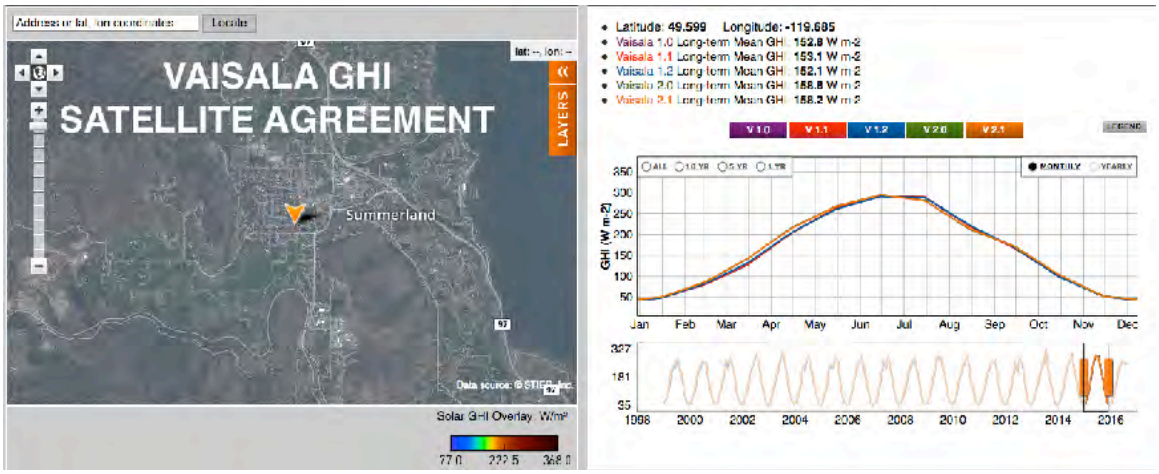
The road entrance to Site #1 is adjacent a potential Point of Interconnection (POI) to three-phase power approximately 2.2 km from the Summerland substation. BCI recommends further study be undertaken to determine interconnection feasibility.

Depending on the type of solar panel mounting system chosen for the project and based on average industry experience, it is expected a 1 MW solar PV project would require between about 2 and 3 hectares (5 to 7.5 acres) of developable land area. The developable area in the disturbed portion of Site #1 appears at a high level to be about 4 ha (10 acres) in area; Therefore, subject to a field engineering study, the site would be expected to be suitable for development of a 1 MW solar PV project. [7]

BCI has undertaken preliminary desktop modelling of potential power generation from a 1 MW solar PV project at Site #1 using the industry standard solar calculator PV Watts.

BCI has further verified the indicated solar Global Horizontal Irradiance (GHI) value with Vaisala data releases based on long term satellite observation. There is near parallel observation agreement from 5 different satellites in respect to GHI values for the Summerland location, further reducing uncertainty.

The Vaisala Global dataset calculation for Site #1 global horizontal irradiance (GHI) based on satellite observation is 153.122 Watts per square meter, per day. The dataset provides average annual GHI at a 3km spatial resolution. Average values are based on more than 10 years of hourly GHI data and derived from actual, half-hourly, high-resolution visible satellite imagery observations via the broadband visible wavelength channel at a 2 arc minute resolution. While further investigations are recommended, the information is considered suitable for decision-making activities, excluding financial commitments.



[7] Depending on the solar panel mounting system and terrain, the industry average area required for a 1 MW solar PV project is between 2 and 3 hectares (5 to 7.5 acres) of developable land.

8. ENERGY CALCULATION

SOLAR SITE #1

FIXED TILT MOUNT

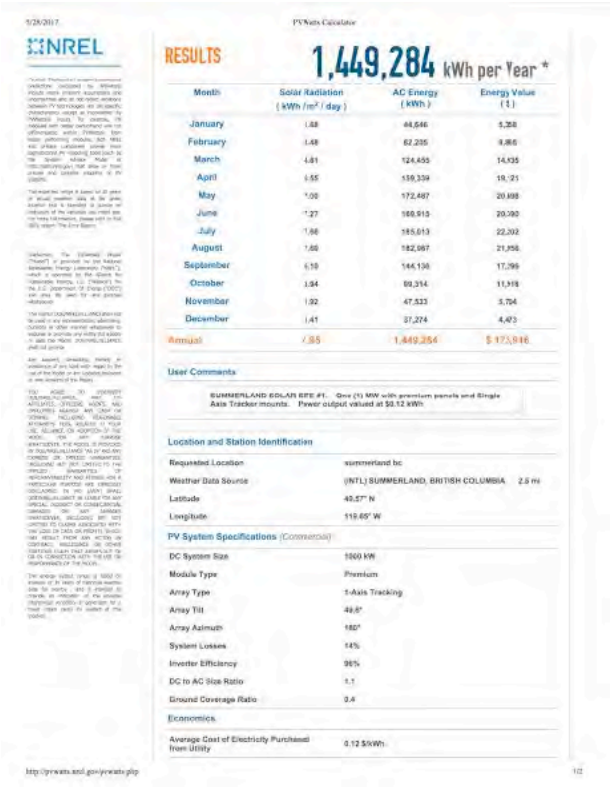
Attaching solar panels to a Fixed Tilt mounts is the lowest cost system, but also produces the lowest yield of three mounting options. Due to the current falling cost of solar panels, many developers are considering fixed tilt mounts -- and simply adding more solar panels to achieve yields comparable with the more costly tracking systems.

The indicated energy output of a 1 MW Solar PV project on Site 1 using premium solar panels attached to Fixed Tilt rack mounting is 1,175,780 kWh per year.

The annual value of the power at a generic $0.12 kWh (kilowatt/hour) is $141,092.00

SINGLE AXIS TRACKER

Attaching solar panels to Single Axis Tracker mounts increases yield, but also brings higher equipment and O&M costs. BCI recommends the economic benefit be carefully modeled against with fixed tilt for sensitivity to the current market price of solar panels at time of final design.


NREL

RESULTS 1,449,284 kWh per Year *

Month	Solar Radiation (kWh /m² / day)	AC Energy (kWh)	Energy Value ($)
January	1.68	44,646	5,358
February	1.68	62,235	7,468
March	4.81	124,455	14,935
April	5.55	159,339	19,121
May	7.00	172,487	20,698
June	7.27	169,913	20,390
July	7.66	185,013	22,202
August	7.66	182,067	21,848
September	6.19	144,136	17,296
October	3.84	99,314	11,918
November	1.92	47,533	5,704
December	1.41	37,274	4,473
Annual	4.55	1,449,284	$ 173,916

User Comments

SUMMERLAND SOLAR SITE #1. One (1) MW with premium panels and Single Axis Tracker mounts. Power output valued at $0.12 kWh

Location and Station Identification

Requested Location	summerland bc
Weather Data Source	(INTL) SUMMERLAND, BRITISH COLUMBIA 2.5 mi
Latitude	49.57° N
Longitude	119.65° W

PV System Specifications (Commercial)

DC System Size	1000 kW
Module Type	Premium
Array Type	1-Axis Tracking
Array Tilt	49.6°
Array Azimuth	180°
System Losses	14%
Inverter Efficiency	96%
DC to AC Size Ratio	1.1
Ground Coverage Ratio	0.4

Economics

Average Cost of Electricity Purchased from Utility	0.12 $/kWh

The indicated energy output of a 1 MW Solar PV project on Site 1 using premium solar panels attached to Single Axis Tracker rack mounts is 1,449,284 kWh per year.

The annual value of the power at a generic $0.12 kWh (kilowatt/hour) is $173,916.00

DUAL AXIS TRACKERS

Attaching solar panels to Dual Axis Tracker mounts may create the highest potential energy yield, but it also bring the highest potential equipment and O&M costs. Dual Axis Trackers consist of multiple tables of solar panels supported by individually operating pedestal solar trackers. The industry is not embracing this technology in any significant way for utility scale projects. One reason may be due to the current falling cost of solar panels. Other contributing negatives are greater land use per kWh, and the higher costs of equipment and O&M over life of the project.

The indicated energy output of a 1 MW Solar PV project on Site 1 using premium solar panels attached to Dual Axis Tracker rack mounts is 1,645,105 kWh per year.

The annual value of the power at a generic $0.12 kWh (kilowatt/hour) is $197,414.00

The model output is considered to be sufficiently reliable for decision making at the level of accuracy consistent with a pre-feasibility study.

SOLAR SITE #2

BCI has not undertaken detailed cost or energy modeling of Solar Site #2 at this time as Site #1 is likely to be a more optimal location due to the factors described above (proximity to substation, disturbed nature of the site, etc.), as well as the current use of the site as a recreational activity area (although the site has not been formally dedicated as a park). Regardless, not considering potential unknown constraints or user conflicts, BCI believes Solar Site #2 is suitable for development of the Summerland Solar PV Project.

The site is described as 17400 Highway 40 (Princeton/Summerland Road) and is located north of the District of Summerland landfill. The terrain consists of level and gradually south to north sloped bedrock terrain with excellent southern exposure. Desktop mapping analysis suggests the site may be capable of supporting a solar project larger than 1 MW. The cost and energy yield analysis for Solar Site #2 would generally be consistent with the estimate for Solar Site #1.

SOLAR PANEL MOUNTING RECOMMENDATION

BCI recommends Summerland consider only Fixed-Tilt or Single-Axis-Tracker mounts in the current market – and not Dual-Axis Trackers.

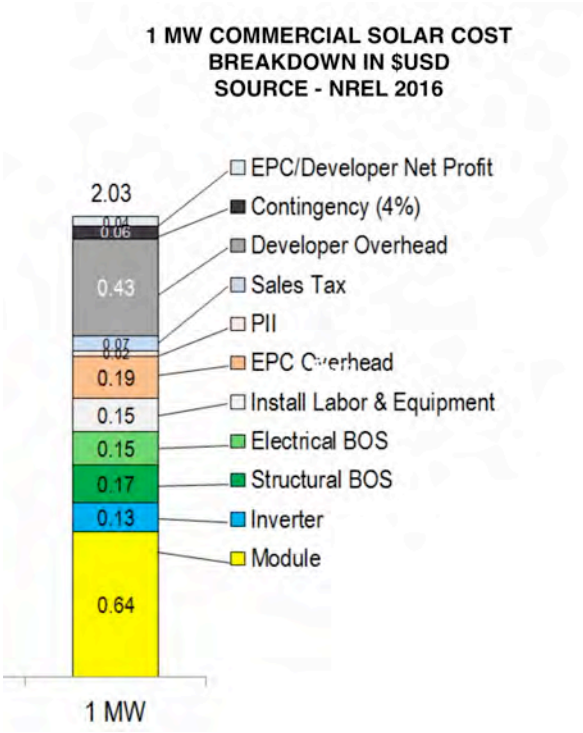
Under this scenario, a 1 MW Fixed Tilt Solar PV project with “added” panels would be modelled against Single Axis Tracker producing the same yields. Equipment costs, land area availability, terrain and slope, and finally operations and maintenance (O&M) costs must be carefully considered.

9. SOLAR PROJECT COST[8]

The cost of equipment and installation of 1 MW Solar PV project in Summerland would be expected to be approximately $2.5 Million, or $2.5/watt installed.

We have tested the cost estimate against published average US installed costs for commercial projects of 1 MW capacity. The stated cost does not include site preparation, which is project specific and requires further study. According a recent study by the US National Renewable Energy Laboratory (NREL), the US dollar cost of a 1 MW Solar PV project averages approximately USD $2 Million[9] . The cost of solar panels, inverter and racking constitutes about 46% of that cost.

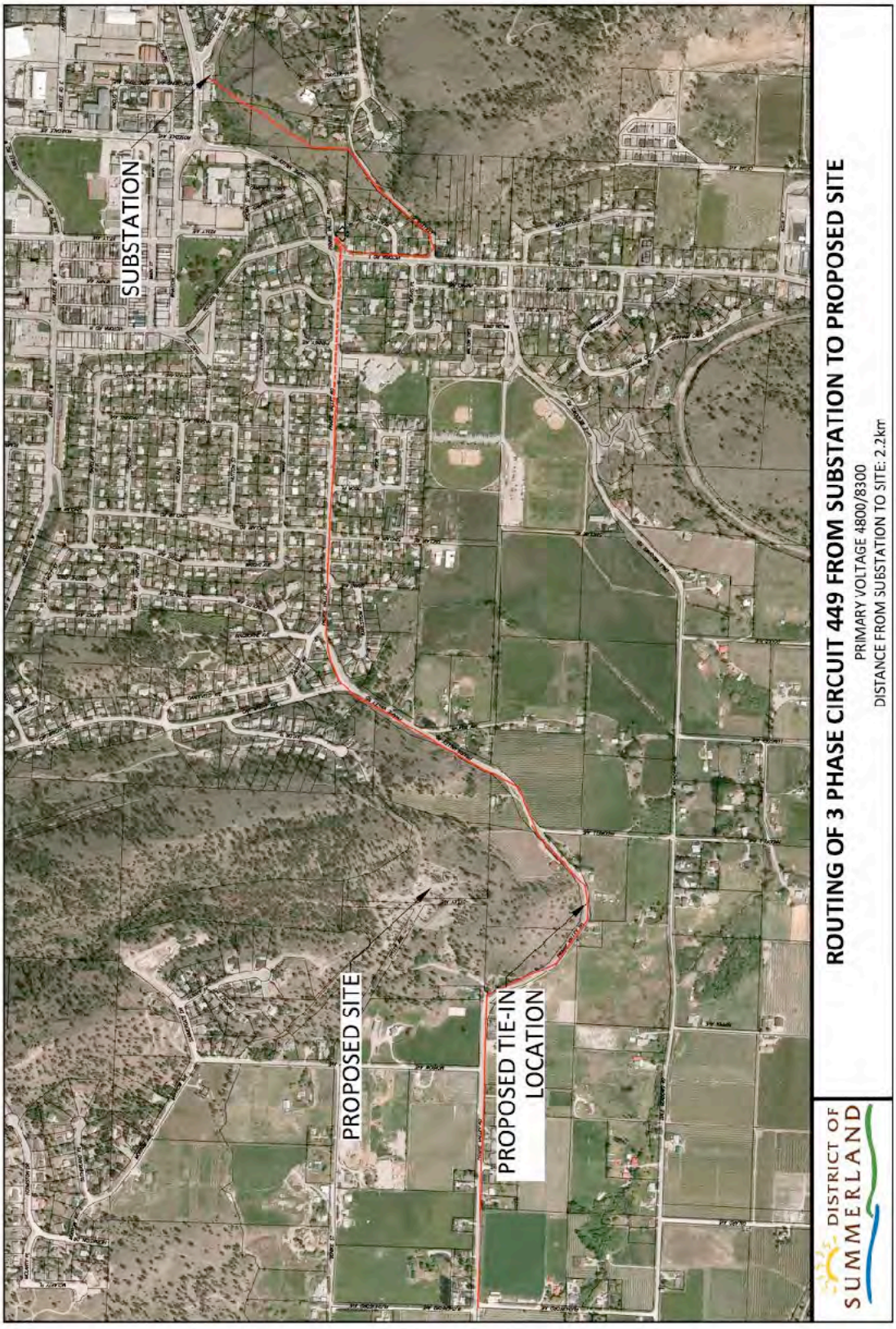
BCI has tested the NREL costing assumptions with a May 2017 supply cost estimate in Canadian dollars for solar panels, inverter and racking (less footings) for a 1 MW Solar PV project. Presuming the 3 quoted components are consistent with the NREL model and constitute 46% of total cost, the total project cost would be approximately **CDN $2,320,000**.



TRANSMISSION and SUBSTATION UPGRADE COST

As noted elsewhere in this report, the proposed Summerland Solar PV Project is located approximately 2.2 km distant from the Fortis substation which feeds the district utility. Transmission, Interconnection and possible Facilities or Network Upgrade Studies will need to be undertaken by the Utility to confirm the feasibility of interconnecting the 1 MW Solar PV project to the system, including interconnection to the Battery Storage facility. The cost of any upgrades at the substation will be identified by the studies. This work is beyond the scope of this pre-feasibility study.

[9] NREL, U.S. Solar PV System Cost Benchmark, Q1, 2016
[9] NREL, U.S. Solar PV System Cost Benchmark, Q1, 2016


SUBSTATION
PROPOSED SITE
PROPOSED TIE-IN LOCATION
ROUTING OF 3 PHASE CIRCUIT 449 FROM SUBSTATION TO PROPOSED SITE
PRIMARY VOLTAGE 4800/8300
DISTANCE FROM SUBSTATION TO SITE: 2.2km
DISTRICT OF SUMMERLAND

10. BATTERY STORAGE SYSTEM & COST

The typical utility scale Battery Storage facility consists of one or more steel “shipping container” structures containing racks of lithium-ion batteries, along with control systems and transforming equipment. The units are typically installed adjacent a solar project, but may also be located at a substation, or in another key location on the distribution line between the two. Depending on the configuration, either solar or substation power can be used to charge the batteries,. Discharges feed the distribution system for the benefit of electric ratepayers.

The development of final costing for a Summerland battery storage system will require further studies and engagements with battery manufacturers. Key factors which help determine storage system cost are total battery capacity, expected duration of discharge, the composition of the battery, complexity of objectives, and the management tools available to ensure the facility is fully integrated and will function as planned.

BCI recommends that Summerland engage with major battery storage providers to develop the criteria for EPC contract process that will set out all the key objectives and characteristics. Regardless, using publicly available information from similar recent projects it is possible to set a budget number with a reasonable degree of reliability.

A recent award-winning project commissioned in Sterling, Massachusetts, contemplates the use of battery storage to meet all the principal objectives of Peak Shaving, Solar Smoothing, Solar Extension and Emergency Backup Power.

The battery storage container is located at the utility’s electrical substation. The container houses 2 MW of lithium-ion batteries, capable of nearly four hours of continuous maximum discharge. The batteries, along with a 3-MW solar array, can be islanded in case of a power outage and will support the town’s police station and emergency dispatch center for at least two weeks — and more with solar recharging.[10]

The 2 MW battery system cost is USD $2.7 Million, but with Peak Shaving cost benefits the system is expect to pay for itself in 7 years.

Initial estimates from Canadian Energy for 20' custom mod containers fully equipped with HVAC system, fire suppression, all batteries and power electronics (i.e., high voltage hybrid inverters), and excluding custom protections, controls, system interface/integration, and engineering and commissioning were $1.9 Million for a 2 MW storage system. This estimate also did not include site preparation or interconnection costs, which will need to be determined through more detailed analysis.

Further studies will be required to determine the optimum Battery Storage unit to serve Summerland objectives. Major utility scale battery storage providers include such corporations as Tesla, NEC, NextEra, ABB, ESS and others. Setting a budget of not to exceed CAN $3 Million is recommended until further detailed information becomes available from interactions with the leading storage providers.

[10] http://www.renewableenergyworld.com/ugc/articles/2017/04/14/sterling-massachusetts-changes-the-business-of-electricity-in-new-england--forever.html

11. CONCLUSIONS

Among British Columbia municipalities, Summerland has unique characteristics that demonstrate the suitability of a Solar PV and Battery Storage project.

As reported elsewhere in this study, those characteristics include:

- Summerland owns its electric utility. This allows the district to self-generate and distribute electrical power. The proposed Solar PV and Battery Storage project would become municipal infrastructure beneficially operated by the utility.

- The cost of Solar PV systems have fallen dramatically. This creates a market opportunity for British Columbia municipalities who wish to create or support clean Solar energy projects.

- Summerland has the potential to reduce electrical costs, support the fight against climate change, and improve community security by constructing and operating the project.

- Summerland has a commercial solar resource with more than 2,000 hours expected annually.

- Summerland has unique solar characteristics, including high recorded sunshine hours during the Spring season and low morning humidity. These locational advantages increase project certainty.

BCI believes the Summerland Project is a forward looking model consistent with sector leading developments globally. If constructed, BCI believes the Project would be studied by other British Columbia municipalities, NGO's, utilities and academic institutions seeking to reduce power costs, combat climate change and generally improve civic life. The project will demonstrate how locally generated and distributed Solar PV power and Battery Storage can interface to produce remarkable benefits to help power BC's clean and energetic future.