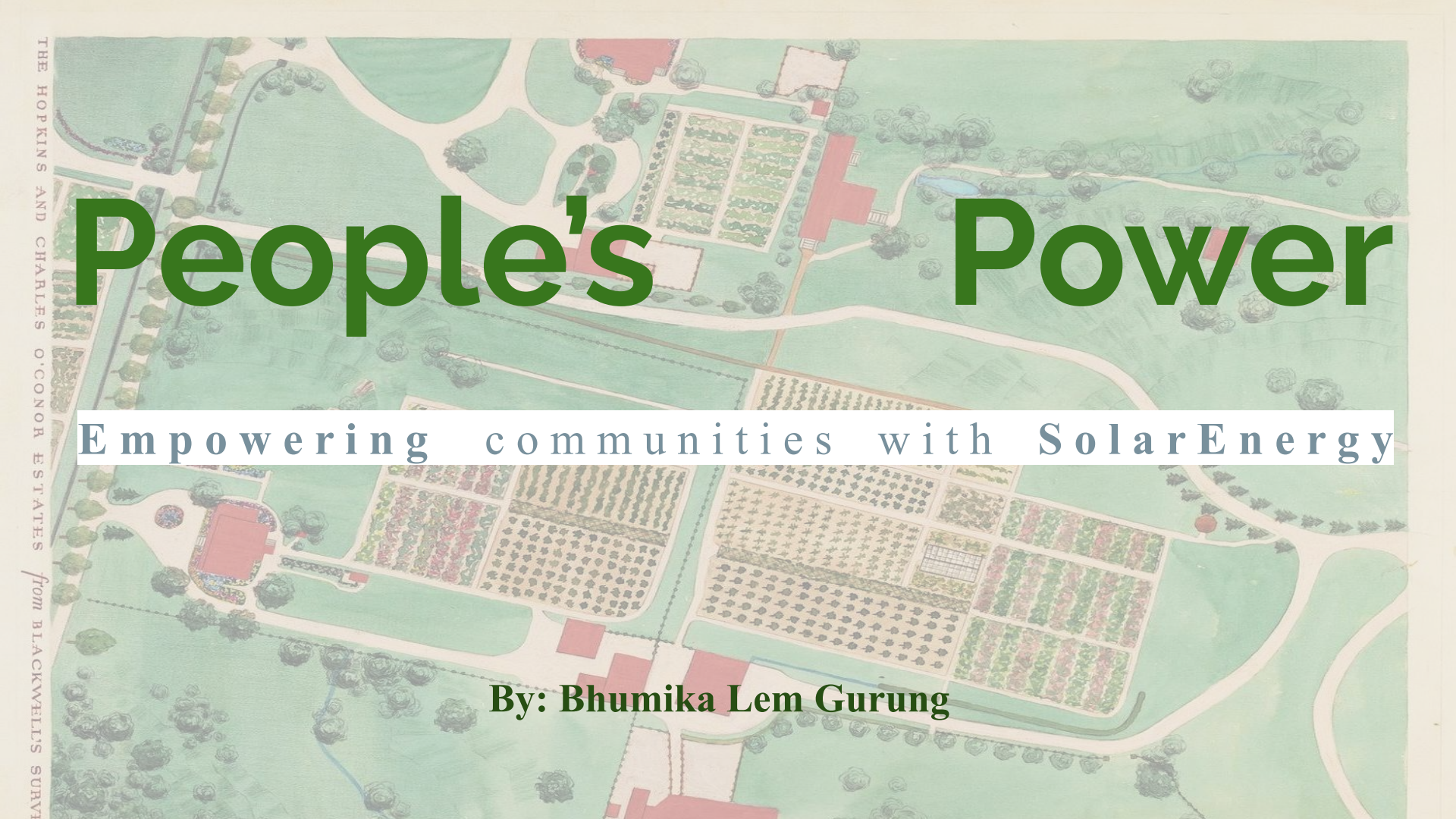


People's Power

Empowering communities with SolarEnergy

By: Bhumika Lem Gurung

People's Power : For the People

- A community-centered project based in **Kamloops**
- Integration of PV panels with agriculture : **Agrivoltaics**
- Allows simultaneous crop cultivation and solar energy generation
- We strive to enhance our local farmer's productivity and generate revenue while creating a resilient local energy grid

Introduction

Agrivoltaics

- Agricultural productivity and PV systems both rely on **land resources** and **solar energy**
- **Dual use of land** (Expansion of PV system and Crop production)
- **Crop yield** : Arrays create a microclimate that alter air, temperature, relative humidity and soil moisture.
- Mitigate **energy rising costs** and **environmental impacts**
- **Agrivoltaics explained**

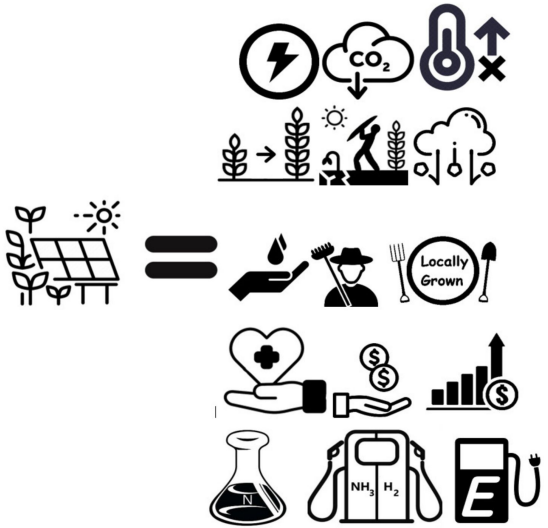
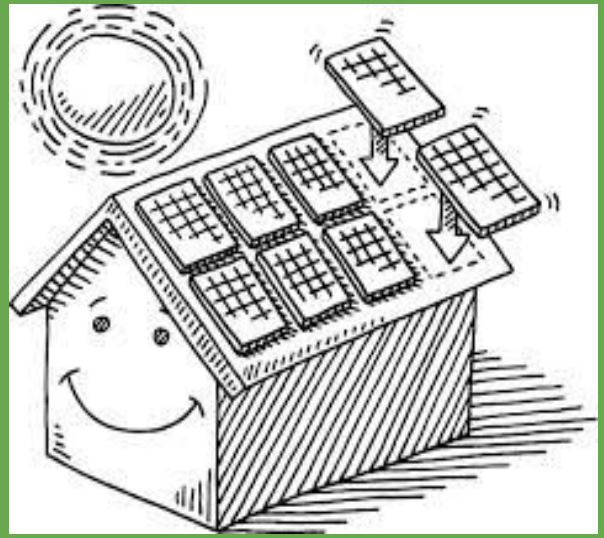


Fig 1. Services and benefits provided by agrivoltaic applications. (Uzair et al, 2023)

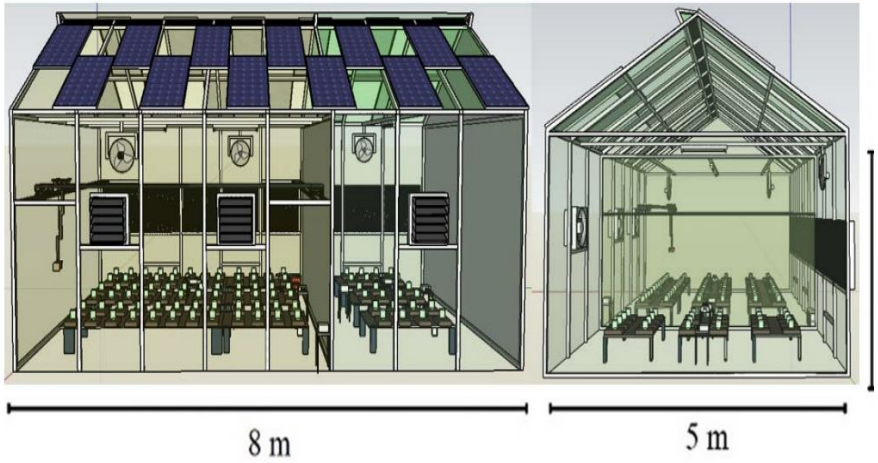
Project Description

- 52 acre of land
- North West of Kamloops (48.5 km away from TRU)
- Power generation: 6.4 MW
- Approximately **27.9 acre**s of land required for generating 6.4 MW of electricity.

Technical Aspects



Design / Placement of Solar Panels



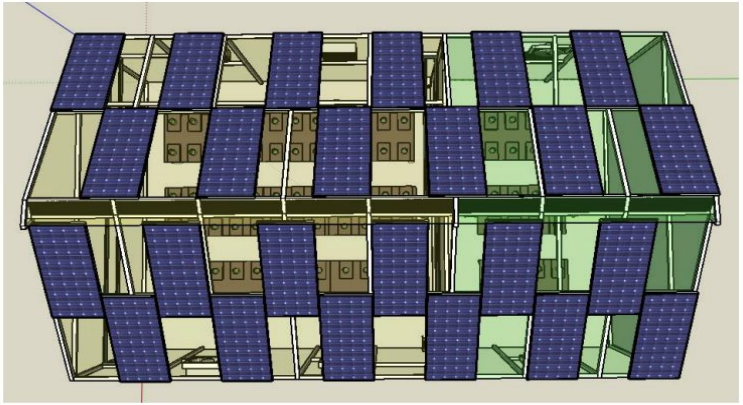


Fig 2. PV configuration design & three dimensional design.https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9501592

Types of Greenhouses

Full Closure Green Houses with Solar PV

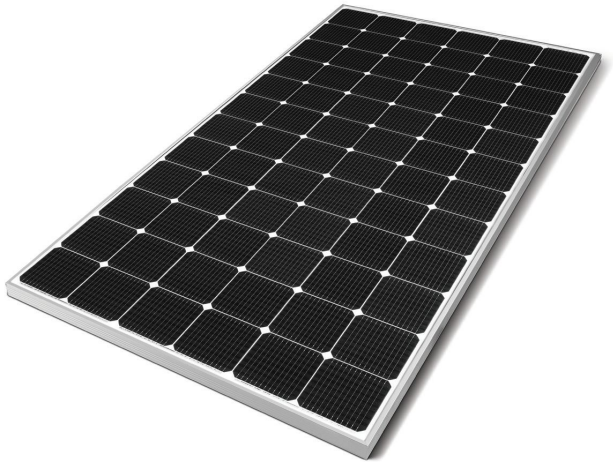
Agrivoltaic

Spread of Solar Arrays

Hanwha 340W Bifacial

LG 400W

LG 380W



Location

Legend

Photovoltaic potential, annual (kWh/kWp)	0 - 500	500 - 600	600 - 700	700 - 800	800 - 900	900 - 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400
Photovoltaic potential, monthly (kWh/kWp)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140	140 - 160	160 - 180	180 - 200
Mean daily global insolation (kWh/m2)	0 - 0.8	0.8 - 1.7	1.7 - 2.5	2.5 - 3.3	3.3 - 4.2	4.2 - 5	5 - 5.8	5.8 - 6.7	6.7 - 7.5	7.5 - 8.3
Mean daily global insolation (MJ/m2)	0 - 3	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	18 - 21	21 - 24	24 - 27	27 - 30

Amount of power

6.4 MW - 1004 Sun days

3633 Solar Panels from Red Deer Polytechnic = 1605 kW

3633 x 5 = **14532** Panels

1605kw x 4 = 6.4MW~

Connection To The Grid

Requesting information from BC Hydro's Distribution Generator Interconnections team to evaluate potential impacts on the distribution system. Following this, optional screenings and a required **System Impact Study** (SIS) will assess safety, reliability, and necessary infrastructure upgrades. Once the SIS is complete, a Facilities Study will outline specific equipment needs and design costs for interconnection. These steps help ensure our project meets BC Hydro's technical standards.

After the studies, we enter into a formal interconnection agreement with BC Hydro, comply with technical standards, and secure necessary permits from local and provincial authorities. Once construction and testing are completed in coordination with BC Hydro, our solar array can safely supply power to the grid.

Finances

Market Analysis

- **98%** of B.C. relies on renewable energy, making renewable energy a big investment sector for energy companies.
- Fortis BC wants to invest in a new project and this project would fit their guidelines
- BC Hydro is our biggest competition due to hydro making up for about **89%** of B.C.'s power.
- Solar makes up less than **0.1%** of B.C.'s power, so there is room for growth when it comes to solar power.
- People do not like change, so getting consumers on board for this is will take time and advertising, but be worth it in the end

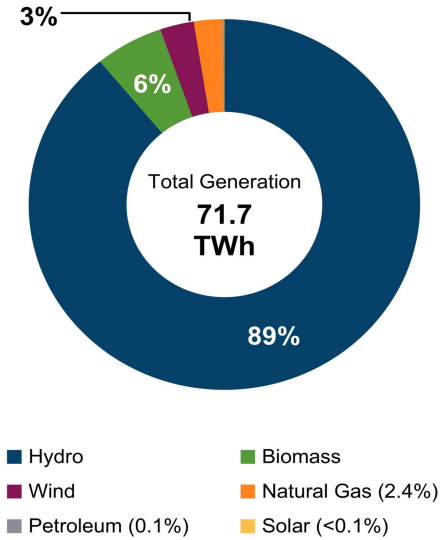


Fig 3. Renewable energy usage in B.C. https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html

Financial Overview

The planned Solar PV Farm near Kamloops will require a substantial investment, starting with the purchase of 52 acres of land at **$318,000**. This land will serve as the foundation for a 5MW minimum-capacity solar farm, installed with the capability for grid connection. Given the average high-end cost of solar power installation in British Columbia—$3.17 per watt—this translates to an estimated cost of approximately **$15,850,000** for solar panels and installation.

Adding the land purchase and additional installation fees, the total project expenditure is approximately **$16,168,000,** with a rounded project budget of **$17 million** to account for additional costs related to landscaping and utility connections.

Installation and Power Breakdown

- The project installation will be managed by **Kuby Energy**, a company with proven experience in large-scale solar projects, having previously managed a 1.6MW system at Red Deer Polytechnic.
- They are well-equipped to handle the scale and complexity of a 5MW solar project.

Although we lack a direct quote from Kuby Energy, their previous work involved 3,633 solar modules across various brands, including LG and Hanwha, to reach the 1.6MW capacity. Scaling up this configuration, we would anticipate approximately **15,000 panels** to meet or slightly exceed our 5MW requirement, ensuring energy demands are reliably met.

KUBY
RENEWABLE ENERGY LTD.

Kuby Energy

Kuby Renewable Energy Ltd.

Red Deer College alternative energy initiative by KUBY

KUBY
RENEWABLE ENERGY LTD.

Maintenance Costs / Operational Costs

- Annual maintenance costs are projected at around $15,000 per megawatt. For a 5MW system, this averages approximately **$96,000 annually** for upkeep, cleaning, and general maintenance.
- The Solar PV Farm project near Kamloops requires an estimated **$17 million** for initial setup and installation, with Kuby Energy leading the installation due to their proven track record.
- The estimated time for setup and grid integration is around 9 to 12 months (without thinking about Grid Connection and permit wait-times), plus preparatory landscape work.

Funding options should be explored early on, potentially leveraging government grants to offset costs. After installation, an annual maintenance budget of approximately $96,000 will ensure sustained efficiency and longevity for the farm.

Stakeholder Engagement

- Work directly with Fortis who would be our major investor in this project, and listen to their requests.
- Hear feedback from the community and make sure the agriculture sector of Kamloops doesn't feel that we are trying to step over them.
- The farmers of the area would hopefully see the self sustaining farm and become inspired to create their own version, helping to spread the usage of solar power through B.C.
- Presentations, seminars, and info sessions would be available throughout the development of the project for anyone who has questions or concerns and just to spread the general information of our project.

Funding / Financial Support Guideline

- Funding for projects of this scale often involves multiple sources.
- Red Deer Polytechnic's project received approximately $7 million in funding from the Provincial Strategic Infrastructure Fund (PSI-SIF) and Red Deer College. While this project is not directly affiliated with a post-secondary institution, exploring similar funding sources or government grants may provide valuable financial support, though these funds are not guaranteed.

Strategic Operations

Risk Assessment and Mitigation Strategies

- The biggest risk that we may face is loss to wildfires
- Kamloops and the surrounding area is a very dry place, especially in the summers, leading to a devastating wildfire season
- To mitigate these risks, we will have a suppression system in place with sprinklers surrounding our property.
- We also hope the community can come together and use safe fire practices to help lower the impact of wildfires altogether.

Environmental considerations

- Site selection- choosing a land that supports both solar and agriculture.
- Soil health- maintain soil quality for farming.
- Water management- use techniques like drip irrigation.
- Environmental protection- follow BC's **Environmental Protection Act** and **Agricultural Land Commission Act.**
- Waste management- ensure proper disposal to reduce impact.
- Regular monitoring- track soil quality, water quality, and biodiversity for sustainability.

Regulatory and Permitting Considerations

- **ALR compliance**- approval from Agricultural Land Commission (ALC) if on agricultural land.
- **Environmental Impact Assessment**- required under environmental protection act.
- **Water use**- following the water sustainability act for irrigation/ cleaning.
- **Permits**- building and electrical permits needed for construction.
- **Waste management**- proper waste disposal plan.
- **Community and indigenous engagement**- talk to local communities and indigenous groups.

Project Proposal Conclusion

Conclusion

- Valuable resource for the local community, provides the opportunity to benefit from surplus of energy
- Remaining land offers a significant potential for community engagement and agricultural sustainability

Group Activity

Leftover Acreage Design : **23 acres**

What **innovative** and **sustainable** strategies could be employed to make the best use of the remaining land ?

Thank you !

Public work

Special thanks to Feba, Luke & William

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