



Solar PV Energy System Proposal

3891 Royston Road, Royston BC

May 20, 2021





May 20, 2021

Becky Packer
3891 Royston Road, Royston BC

Re: Rooftop Solar Photovoltaic Energy System

We at Hakai Energy Solutions appreciate the opportunity to provide you with this updated proposal for the above noted project. As part of our detailed site survey, several additional roof areas were identified as viable for solar installation.

This submission offers a solar array on the main southern facing roof portion of the home. Solar electricity produced by the PV system will offset the homes consumption requirements. The system will include an advanced string-inverter solution. Please find included an executive summary of the system, pricing, draft layout and our company profile.

Scope of Work:

Hakai Energy Solutions is prepared to provide the solar PV design, installation, system commissioning, as-built drawings, net metering application and monitoring package for this project as defined in this proposal.

We thank you for the opportunity to be of service and should you require further information please contact the undersigned.

Sincerely,

Mark Tizya
778-892-8766 888-604-3128 ext. 101
mark@hakaienergysolutions.com
HAKAI ENERGY SOLUTIONS

Company Profile

The mission of Hakai Energy Solutions is to promote environmental sustainability and help our clients achieve energy goals through the delivery of robust renewable generation systems.

Hakai Energy Solutions is a highly qualified, full service renewable energy contractor. It is a locally owned and operated licensed electrical/renewable energy contractor based in the Comox Valley. Hakai services both local as well as remote coastal communities, residences, and commercial facilities. Our core business is designing renewable systems and managing logistics to deliver electrical solutions to some of the most rugged coastal locations in British Columbia. The services offered by Hakai Energy Solutions include remote off-grid energy systems, residential and commercial solar PV, portable energy systems, as well as general electrical contracting.

Hakai Energy Solutions is an established contractor in the province of BC with the complete suite of resources to successfully complete a project of this scale and support it in the long term. We have the physical assets, work specific equipment as well as the intellectual property to ensure the effective delivery of this project. The permanency of Hakai also creates an assurance that this installation will be supported for the full life span of the system.

Hakai Energy Solutions is a licensed electrical contractor in the province of British Columbia. It holds general liability and automobile insurance and is an active member in good standing with WorkSafe BC.

Hakai Energy Solutions prides itself on having high level of technical knowledge, strict safety standards, an environmental awareness, and quality workmanship. All of these aspects will contribute to the successful completion of this project.

Project Team

Technical expertise and installation proficiency have been the result of many years with dedicated full-time employees in this very specialized industry. Our staff complement consists of 23 full time individuals, making Hakai Energy Solutions one of the largest renewable energy contractors in British Columbia. All projects are completed by certified Red Seal Journeyman Electricians, Technologists, and Electrical Apprentices registered with the ITA. In addition to post-secondary and on-the-job experience, our staff have received training from some of the most respected individuals and organizations in the industry. Groups of our staff have travelled internationally for advanced solar training programs and have worked in engineering labs where solar industry products are being developed.

Our in-house engineering through to our full-time journeyman electrician installers and IT staff create a team which consistently produces innovative and economical designs, robust installations, and responsive customer support. All our team members live in the Comox valley and are permanent full-time employees. Since Hakai does not subcontract to other installers or rely on temporary labour we are able to maintain a higher level of quality control.

Executive Summary

| | |
|--|--|
| PROPOSAL TO: Becky Packer | |
| PROJECT SITE: 3891 Royston Rd, Royston BC | |
| Contact: Becky Packer | Contact Details: email: beckypacker@gmail.com phone: 250-650-2325 |

Hakai Energy is pleased to submit a proposal to design, supply, install, and commission a solar PV generation system on the rooftop of your home. The system we offer will reduce your energy bills and promote environmental sustainability by producing carbon-free energy every day for the next 35-40 years. With the ability to generate your own electricity you can protect yourself from escalating utility prices while ensuring your home is utilizing clean emission free power.



The proposed system offers (30) 330W modules for a total DC capacity of 9.9 kW and can be expected to produce ~10,679 kWh of electricity annually. Based on your historical consumption of ~15,300kWh/year this system can be expected to cover ~40-50% of your annual energy usage.

An advanced string-inverter system will be utilized to convert the DC energy from the solar array to a usable AC signal. The selected inverter will be mounted on the exterior wall of the house, next to the chimney on the deck level, above the hot tub tie in point. The existing telecommunication boxes on the wall space will be moved up if required for clearance. Wiring from the inverter will follow the hot tub cabling down through the deck and penetrate the wall behind the main electrical panel.

A Net Metering agreement will be put in place between BC Hydro and the client. This process will be managed by Hakai. Hakai will arrange the electrical permit and post construction inspection.

Hakai Energy Solutions will carry out a thorough commissioning service for the entire PV system. Operational aspects and monitoring systems will be programmed and tested to ensure full system functionality has been achieved. One on one training with the client will be performed to ensure product awareness, safety and maintenance requirements are understood.

| TECHNICAL SUMMARY | | | | | |
|---|----------------------|------------------------------------|--|-------------------|---------------|
| Rooftop Grid-Connected Solar PV System: The solar PV system will inject renewable power generated from solar irradiation into the existing electrical distribution system to offset energy consumption of the site loads. | | | | | |
| | Proposed System | | | | |
| | Capacity | Estimated Annual Energy Production | Average Rate of Return (over 35 year period) | Return Of Capital | Cost |
| Solar system (30 panels) | 9.9 kW _{DC} | 10,679 kWh | 10.66 % | 12 yrs | \$22,770+ gst |



Financial Proposal

To design, supply, install, and commission the solar PV system as specified.

The estimate is in Canadian dollars. Prices will be inclusive of all permits, freight, insurance costs, taxes, and fees. After this preliminary proposal is refined to form a final design, Hakai Energy Solutions will be prepared to offer a fixed price quote. This project estimate carries the following costs:

30 PANEL SOLAR PV SYSTEMS

| ITEM | COST |
|------------------------|--------------|
| 9.9 kW Solar PV System | \$ 22,770.00 |
| GST | \$ 1,138.50 |
| Total | \$ 23,908.50 |

All pricing is PST exempt based on Renewable Energy tax incentive

ASSUMPTIONS AND EXCLUSIONS

- If design/system requirements are altered from this proposal, pricing will change and/or a change order process will be followed.
- Pricing does not include supply or installation of additional networking equipment should the home internet service not be sufficient to reach the solar system ECU device.
- Pricing does not include drywall repair, should any be required following cable installation.
- This proposal assumes that traditional solar roof attachments can be used and additional structural reinforcing or blocking in the attic is not required.



Warranty Summary

All components and installation methods for this solar PV system will be consistent with the high quality electrical workmanship that Hakai prides itself on. As such the full manufacturer warranty (see below) for all products will be upheld.

MODULES

| |
|--------------------------------------|
| 330W (60 cell) ALL-BLACK FRAME |
| 25 years (Linear Power) |
| 10 years (Materials and Workmanship) |

RACKING

| |
|-------------------------|
| ALUMINIUM SOLAR RACKING |
| 20 years |

INVERTERS

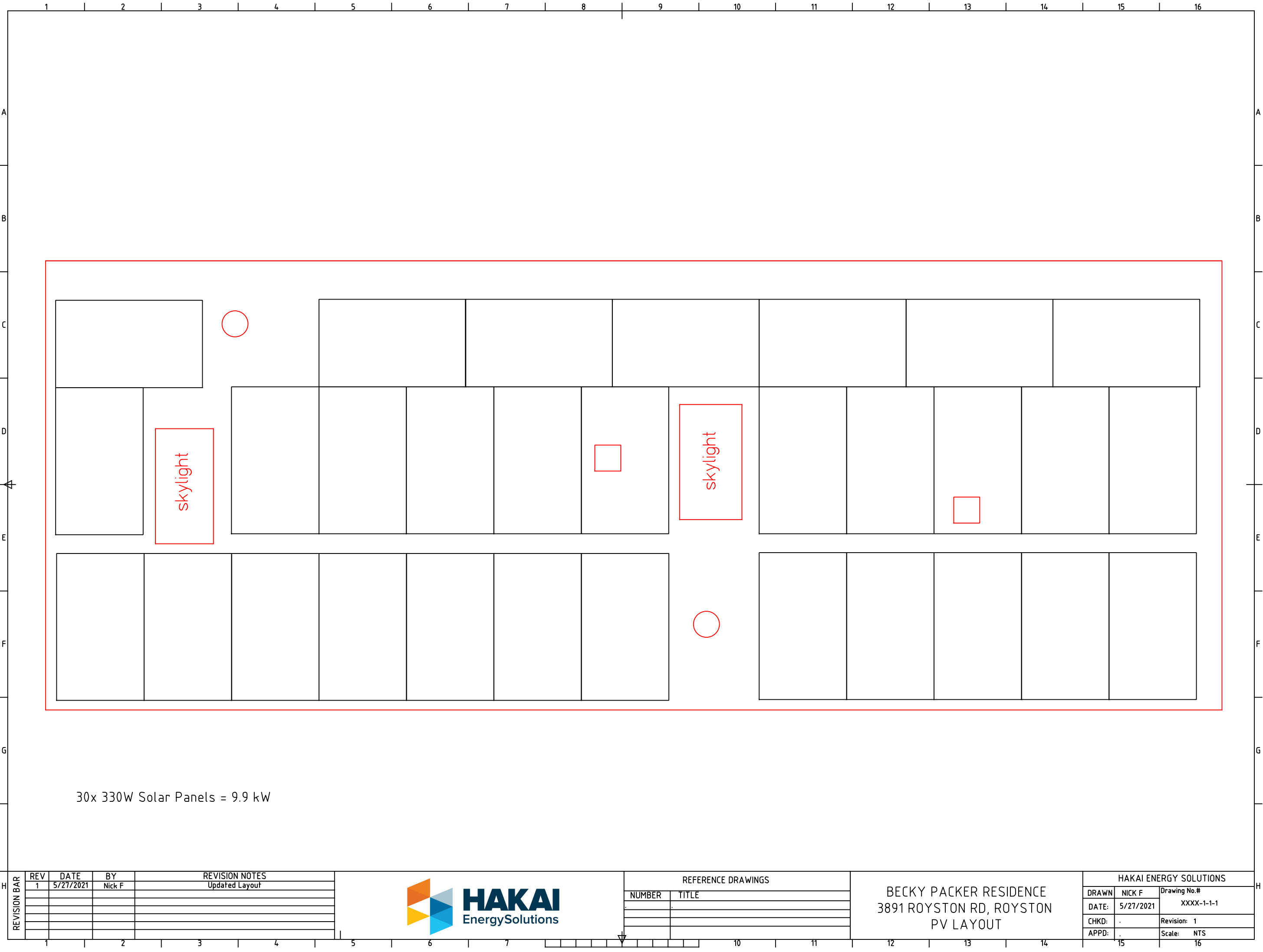
| |
|-------------------------|
| Fronius String-INVERTER |
| 10 years |

OPTIONAL WARRANTY EXTENSIONS TO 25 YEARS

If warranty extensions (up to 25 years) are desired on the inverters, we would be happy to facilitate the process to secure these extension certificates - at an additional cost.



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30x 330W Solar Panels = 9.9 kW

| REVISION BAR | REV | DATE | BY | REVISION NOTES |
|--------------|-----|-----------|--------|----------------|
| | 1 | 5/27/2021 | Nick F | Updated Layout |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



| REFERENCE DRAWINGS | |
|--------------------|-------|
| NUMBER | TITLE |
| | |
| | |
| | |
| | |

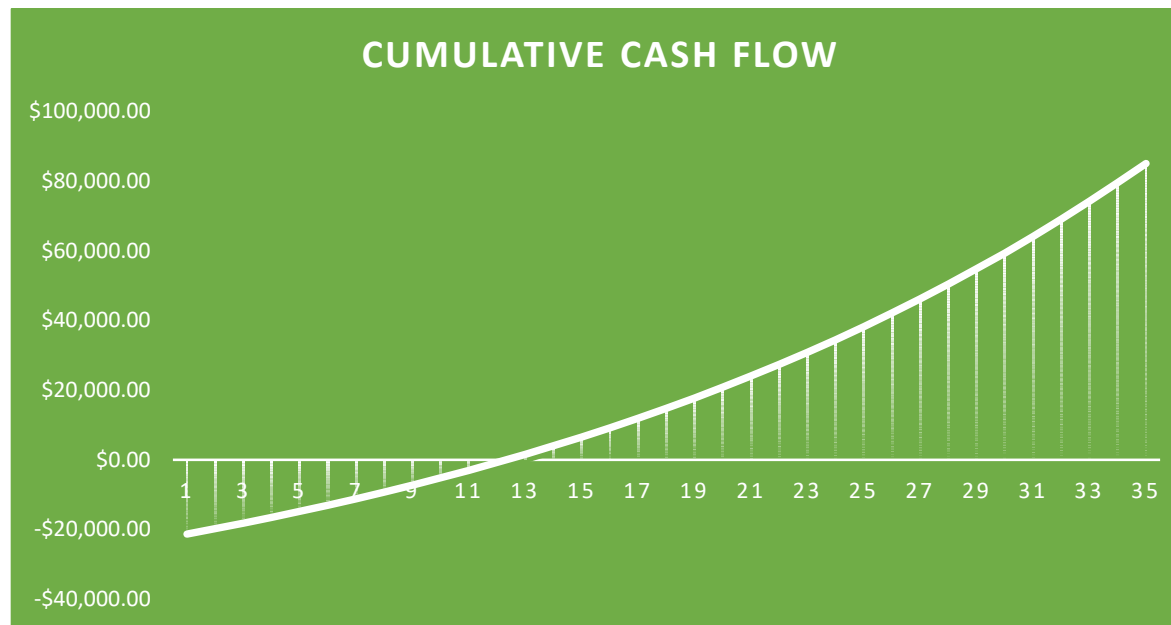
BECKY PACKER RESIDENCE
3891 ROYSTON RD, ROYSTON
PV LAYOUT

| HAKAI ENERGY SOLUTIONS | | |
|------------------------|-----------|--------------|
| DRAWN | NICK F | Drawing No.# |
| DATE: | 5/27/2021 | XXXX-1-1-1 |
| CHKD: | | Revision: 1 |
| APPD: | | Scale: NTS |

PV System Investment Calculator

| | |
|---|-------------|
| System Cost | \$22,770.00 |
| System Size (kW) | 9.90 |
| Yearly Production (kWh/kW) | 1,079 |
| Est. Utility Rate Increase | 4.0% |
| Present Value of Offset Energy - kWh - (incl tax) | \$0.137 |

| | |
|--|-------------|
| Annual Solar Production (kWh) | 10,679 |
| Years For Capital Cost Payback | 12 |
| 35 Year Investment Yield | \$84,984.90 |
| Average Annual Rate of Return | 10.66% |
| Projected Average Annual Cost of Utility Electricity over system lifetime (\$/kWh) | \$0.29 |
| Projected Average Annual Cost of Solar Electricity over system lifetime (\$/kWh) | \$0.06 |
| Anticipated Property Value Increase | \$41,382.00 |





Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at <https://sam.nrel.gov>) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

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The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

10,679 kWh/Year*

| Month | Solar Radiation (kWh / m ² / day) | AC Energy (kWh) | Value (\$) |
|-----------|---|----------------------|-----------------|
| January | 1.19 | 314 | N/A |
| February | 1.93 | 459 | N/A |
| March | 2.96 | 781 | N/A |
| April | 4.64 | 1,164 | N/A |
| May | 5.82 | 1,467 | N/A |
| June | 6.27 | 1,503 | N/A |
| July | 6.35 | 1,555 | N/A |
| August | 5.55 | 1,359 | N/A |
| September | 4.09 | 990 | N/A |
| October | 2.08 | 538 | N/A |
| November | 1.17 | 295 | N/A |
| December | 0.96 | 254 | N/A |
| Annual | 3.58 | 10,679 | 0 |

Location and Station Identification

| | |
|---------------------|------------------------------------|
| Requested Location | 3891 royston rd, royston bc |
| Weather Data Source | Lat, Lon: 49.65, -124.94 0.4 mi |
| Latitude | 49.65° N |
| Longitude | 124.94° W |

PV System Specifications (Residential)

| | |
|---------------------|--------------------|
| DC System Size | 9.9 kW |
| Module Type | Premium |
| Array Type | Fixed (roof mount) |
| Array Tilt | 18° |
| Array Azimuth | 140° |
| System Losses | 10% |
| Inverter Efficiency | 98% |
| DC to AC Size Ratio | 1.2 |

Economics

| | |
|---------------------------------|---------------------------|
| Average Retail Electricity Rate | No utility data available |
|---------------------------------|---------------------------|

Performance Metrics

| | |
|-----------------|-------|
| Capacity Factor | 12.3% |
|-----------------|-------|



hakaienergysolutions.com

We are dedicated to working with communities
to develop energy systems that are sustainable
and cost effective while providing
reliable power year-round.

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