Village of Innisfree
Special Council Meeting
Innisfree Council Chambers, Innisfree AB
March 26, 2021 @ 10:00 a.m.

1. Call to Order

2. Agenda
   a. Deletions/Additions:
   b. Adoption of Agenda

3. New Business
   a. Village of Innisfree – Solar Panel Project
      Solar Ninja's Energy Solutions Ltd.

   b. Tinning/Shingling – Birch Lake Campground Administration Building
      Revised Quote Received March 17, 2021

4. Adjournment

STANDARD ENGAGEMENT LETTER

Client Name Village of Innisfree – Aaron Cannan

Client Contact Address 5116 50 Ave Innisfree AB T0B 2G0

Date March 20 2021

Project Engagement Terms

Relationship:

SolarNinjas agrees to be sub-contracted by Innisfree Village Council – Village of Innisfree for electrical & solar design/installation work as required and is accountable directly to Aaron Cannan and/or CAO of Innisfree AB as point of contact. SolarNinjas carries all necessary licenses, insurances, & WCB coverages to perform the requested work.

Below please find the details of our initial work scopes. The Total estimated budget for this initial service is outlined in the Estimated Budgets section C.

A. SolarNinjas will provide the following services at your request:

- Produce a work plan (including costing) for each component of work required, updated to March 2021 pricing. Time and materials to be outlined.
- Update engineering documents and plans as needed to proceed with any or all of 3 solar projects (Town office, Workshop, Water Treatment site)
- Engage with MCCAC and co-ordinate with village officials to get applications submitted for the 3 solar projects
- Co-ordinate with utility and wires owners to pre-approve and review planned solar installations with documented report summarizing each project ready to execute.
- Execute any electrical work requested by the client as needed to prepare for solar installations (separately estimated panel upgrades, lighting upgrades, general wiring repairs as needed while on site).
- Other services as requested by authorized village staff at our rates outlined below.

INITIAL HERE _____

Payment in full will be required prior to document handover. We kindly ask for $1575.00 deposit made available within 1 week of signing to secure our services. This deposit and the final invoice for this contract will be deducted from the cost of the 3 solar projects.

We will be accountable for hours and materials costs on an ongoing basis, and can give an update regarding billable time or progress on request (i.e. weekly). We intend to be on time and budget but a great portion of this depends on the client and site conditions.

The following are important site specific points to note as they impact work flow and cost:

- Our previous work product for the client will make this process quicker and easier and at significantly reduced cost versus starting from scratch.
- Document Work must be done quickly due to regulatory conditions (rebate program budget may run out in the near future so pre-approval stage should be reached as quickly as possible).
- A visit to the town to review site conditions and confirm installation details will be required.

B. **Our Costs:**

The fees for our services on this project will be based on:
$90/hr for Journeymen Electricians
$65/hr for 3rd/4th period Apprentice Electricians
$45/hr for 1st/2nd period Apprentice Electricians
$35/hr for Labour / Unskilled trades work
Daily Truck Charge of $85 per worker on work days.

We are open to utilizing locally provided labour to assist on our projects for cost control and encourage the client to arrange interested persons or local professionals for us to interview who may benefit from the training and experience. We want to contribute to the local community as much as possible by using local service providers for project components where practical (food, supplies, ground work, labour assistance, media and promotion).

C. **Our estimated budgets** for the required services based on our conversations and site visit:

- Update and re-issue Solar PV Design based on existing documentation with new products available. Produce work package ready for permits, including building diagrams, product datasheets, and full cost estimates. Provide solar models indicating power production.
- Estimate and verify electrical work required to current codes (updated since last estimate) including site visit.

Total Budget amount: $3,150 + GST

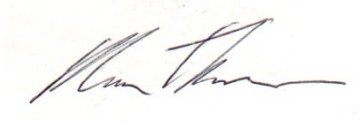
The final invoice amount will be deducted from the cost of your solar project if SolarNinjas is hired to provide this service for you.

At your request, SolarNinjas will provide you an audit on costs as we proceed with your projects.
We intend to be on time and budget and will justify any variance in cost.

If you agree that the foregoing fairly sets out your understanding of our mutual responsibilities, please sign a copy of this letter in the space indicated below, and return it to me by email and/or physical delivery. Please send to **mike@solarninjas.energy**

Payment accepted by certified cheque/bank draft, interact email transfer to payment@solarninjas.energy, cash and credit card. Please inform us if you intend to pay by credit card so we can apply the appropriate processing fee of 3%.

Yours sincerely,



Michael Thomas
Principal, SolarNinjas Energy Solutions Ltd.
#724, 10301 104 St, Edmonton AB (Shipping)
#202, 12908 54 St, Edmonton AB (Offices)
Mike@solarninjas.energy / 780 – 920 – 9120

Agreed and Accepted:

_____

Date, Name, Print & Sign Innisfree Authorized Representative

Village of Innisfree (CAO)

From: Aaron Cannan <aaroncannan@gmail.com>
Sent: March 24, 2021 10:44 AM
To: Village of Innisfree (CAO); debmcmcom@yahoo.com; will.oudshoorn@gmail.com
Subject: Fwd: Grant/Funding Request

---------- Forwarded message ---------
From: **Brunet, Juanita (Stubbs, Shannon - MP)** <juanita.brunet.725@parl.gc.ca>
Date: Wed., Mar. 24, 2021, 10:36 a.m.
Subject: Grant/Funding Request
To: Michael Thomas <mike@solarninjas.energy>, aaroncannan@gmail.com <aaroncannan@gmail.com>

Good day Mike and Aaron,

I received the following information from the Parliamentary Library regarding your request:

Further to your request to the Library of Parliament, here is a list of federal funding opportunities for the Village of Innisfree. They are wanting to add solar power and electric vehicle charging infrastructure (they are a key stopover point between destinations), and LED/Efficiency measures to town owned facilities including the following:

- Water Treatment Facility
- Town office
- Town Maintenance shop
- Town Campground

Programs often have specific requirements, including eligibility, application procedures and deadlines. As well, programs can change, be replaced or terminated without notice. Visiting a program's website regularly for details and updates is recommended.

Federal resources

Farm Credit Canada (FCC)

- FCC AgriSpirit Fund is about enhancing rural communities. If the municipality has less than 150,000 people, the capital component of the project may qualify for a donation between $5,000 and $25,000.

Infrastructure Canada (IC)

- The Federal Gas Tax Fund provides municipalities with a permanent, predictable and indexed source of long-term funding, enabling construction and rehabilitation of core public infrastructure. It offers

local communities the flexibility to make strategic investments across 18 different project categories. Please see the agreement for Alberta for more details.

Federation of Canadian Municipalities (FCM)

- The Green Municipal Fund of the Federation of Canadian Municipalities may be of assistance. Funding opportunities cover plans, studies and capital projects.

Natural Resources Canada (NRCan)

- The Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative covers projects such as new and permanent installation for EV chargers serving on-road, licensed vehicles located in Canada. Municipal governments are eligible. *Note: Request for Proposals of the Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative is now closed, but the Village of Innisfree may wish to monitor this page for future announcements.*

- The Zero Emission Vehicle Infrastructure Program supports "electric vehicle charging infrastructure deployment in parking areas intended for public use. Parking areas can be privately or publicly owned and operated." *Note: Request for Proposals for programme is now closed, but the Village of Innisfree may wish to monitor this page for future announcements.*

Additional resources

The Municipal Climate Change Action Center (MCCAC) proposes many Funding programs that could be of interest to a municipality in Alberta. Especially see:

- Alberta Municipal Solar Program
- Electric Vehicles for Municipalities Program
- Municipal Energy Manager Program

Should you have any further questions or concerns, please do not hesitate to contact our office.

Best regards,

Juanita Brunet

Senior Case Advisor

Office of Shannon Stubbs, M.P. | Shadow Minister

For Public Safety and Emergency Preparedness

Lakeland (Alberta)

E: juanita.brunet.725@parl.gc.ca

T: 780-657-7075

F: 780-657-7079

SolarNinjas

ENERGY SOLUTIONS Ltd.

780 920 9120

mike@solarninjas.energy

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Introduction

This summary document outlines the potential for four sites chosen for consideration as solar installations. They are presented in order with benefits and details documented for each and budget summaries combined at the end.

During the course of this design period:

- An additional "first time" applicant rebate has come available to you from the Municipal Climate Change Action Centre over and above the existing rebate.
- Wires owners (ATCO) have updated and tightened their criteria for approving solar installations dramatically, forcing changes to our plans.

While I am not able to be there in person for your November Council meeting (Nov 21 2018) I will be available to teleconference in for questions and discussion and would be happy to come out on another date to speak individually or as a group at your convenience. There is a great deal of information here to digest.

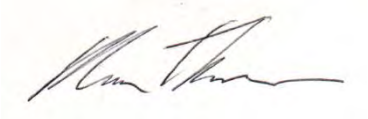
My conclusions are that all 4 sites are viable and beneficial and while two happen to be surplus generators the other two have significant cost offset and other benefits to consider due to location and future uses.

Please keep in mind that we are proposing long-life cycle products here with serious benefits extending out 5 to 50 years. As 5 new natural gas power plants worth billions come online to add costs to power bills, and governments change resulting in the potential elimination of direct incentives for these projects I urge consideration on a number of fronts.

Thank you for your time, attention, support and consideration!

Please phone me directly at any time at 780 920 9120 to discuss or clarify any detail.

Michael Thomas – Principal – SolarNinjas Energy Solutions Ltd.



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Structural Notes

Water Treatment Plant

- Screw piles to be engineered and documented for structural load support
- Ground conditions may require additional lengths and above-ground adjustment to level base plates
- Non Adjustable Racking suggested – Extra attention paid to wind loading

New Public Works

- Anchors must be seated into full trusses, requiring additional strapping material to be installed as needed.
- 3/4 Inch plywood strips to be used as decking (permanent) inside attic to improve walkability for worker and material
- Surface wiring to electrical panel to utilize cantress (unistrut) mounted across studs in-wall.

Village Office

- Vaulted ceilings and age of building necessitate additional care to ensure centre truss anchor installation

Rv Park

- Screw piles to be engineered and documented for structural load support
- Non Adjustable Racking suggested – Extra attention paid to wind loading

No serious negative structural engineering issues identified on any project site

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Site Protection Notes

Water Treatment Plant

- Consider chain link fence with access gate on one side facing the access to existing pump house to remove driving access & simplify buried electrical.
- Consider chain link fence along full length behind array and across the bottom to existing short fence.
- Posts can be installed after screw piles to avoid potential buried line issues after PV installation, completion at some point in the future as needed.
- Double layer landscape cloth and gravel suggested under arrays to eliminate future landscape maintenance (spray once per year with light vinegar/salt-water combo or every several years with approved herbicide from a backpack sprayer)

New Public Works

- No special protection notes
- Protected by location (roof)

Village Office

- No special protection notes
- Protected by location (roof)

Rv Park

- Consider all 4 sides chain link fencing (distance from array and height to be determined)
- Determine level of desired access control and aesthetic balance based on local concerns regarding vandalism or theft and base fencing type and distances on that assessment.
- Consider addition of trail-cam or other motion sensing video monitoring from 2 angles of approach
- Post signage telling the story of the project and intentions of council to encourage buy-in and deter vandalism by community engagement
- Consider planting wild roses or other thorny bushes on slope and to sides of installation area, which can be both beautiful and a low cost deterrence against rear-approach to system from highway and parkland.
- Immediate area under arrays to be converted to sand or gravel on landscape fabric, additional attention to be paid to maintaining natural grassy beauty outside the footprint while limiting maintenance to maybe one annual cutting.

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Project Safety Notes

Water Treatment Plant

- Ensure Alberta-One-Call Report is filed before start of project
- Screw Pile Installation by third party must be insured and follow an equivalent or superior Health & Safety Program to SolarNinjas
- Co-Ordinate with local site management regarding final power connection to ensure safe interconnecting work and no unplanned power outages at facility
- Designated worker for emergency response notification and attendance
- Additional grounding points at array required

New Public Works

- 40ft extension ladder required (devise tie-off method at roofline)
- Specialty fall arrest required (ground based or permanent roof installation on opposite slope) with site specific safety plan
- Full Mask Respirator inside attic space

Village Office

- Standard residential rooftop fall arrest anchor system use
- Nearby overhead power and telecom lines in vicinity of preferred access locations
- Electrical panel replacement for safety advised

Rv Park

- Ensure Alberta-One-Call Report is filed before start of project
- Screw Pile Installation by third party must be insured and follow an equivalent or superior Health & Safety Program to SolarNinjas
- Long distance trench work will require sawhorse, large cone, stake and rope or other barricade while open
- Nearby live underground electrical infrastructure (low voltage single phase)
- Work area next to meter base and distribution cabinet to be barricaded off with rope access
- Additional grounding points at arrays required

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Media Plan

Depending on the extent and scope of selected projects. We propose using the following tools to maximize the exposure Innisfree will receive from going solar.

- Engage with Brazeau County – Drayton Valley Area where a robust "top-up" solar rebate is in place and cross promote as municipalities taking charge of this sector. They have a massive online community reach and friendly local press which leads to mass media stories.
- Ensure HiWay16 News follows the projects and progress with regular updates.
- Directly engage the local public in the following ways
    - Physical notices and invitations to engage to properties within viewable range of projects
    - Town notice boards and email/mailing list notices for all residents
    - Key business/farm/local government personal outreach to their private networks to notify and support.
    - Town social media and website consistent updates and conversation
- Well written press release to several hundred Alberta media organizations, newsdesks, personalities, and tiplines. (This can require paid access for a small fee to an up to date press release roster of up to several thousand contacts)
- Targeted invitations to CBC, TheTyee, GreenBusiness Magazine, Green Energy Futures, Local Members of Parliament and Legislature, relevant provincial and federal government departments/ministries, organizations like Decentralised Energy Canada, NAIT/UofA/Vermillion & Related renewable energy program heads and student groups.
- Outreach to neighbouring municipalities to participate in post-installation celebration and study of system results.
- Ground and Drone based photo and video media generated and utilized for promotion for years to come, released to media with pre-written news-blurbs and ready to release short articles.
- Large highway sign/road sign near RV Park and Innisfree turnoff at gas station in partnership with SolarNinjas for promotion and invitation to the public (in conjunction with electric vehicle charging especially at RV park and town centre office/public works)
- Social media paid ads (blog posts, website page, SM Posts) targeting the geographical region to ensure full capture.
- Pre-Written talking points issued to all stakeholders, local representatives, and interested parties covering:
    - Environmental Benefits of solar at municipal scale
    - Reduced ongoing utility costs
    - Cost certainty for utilities having pre-paid for system installation
    - Technological merit and legitimacy of moving into the future with green technology
    - Other key points as desired

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Electrical Notes

Water Treatment Plant

- Ensure Alberta-One-Call Report is filed before start of project and private locators if needed to mark with extra care and attention around building exterior wall
- PVC Conduit underground suggested with sleeves at points of entry/exit from grade
- Hand Trenching inside fence-line around pump house, mechanical trenching permitted outside fence-line

New Public Works

- EMT Conduit on interior wall surface to ceiling penetration area
- Additional Strapping for strength
- Rooftop AC combiner box will be required with AC Circuit Breakers (Rail Mounted @ south end of solar array. Nema4 stainless.

Village Office

- Surface wiring on rear of building advised with teck to PVC transition
- Nearby overhear power and telecom lines in vicinity of preferred access locations
- Electrical panel replacement for safety advised

Rv Park

- Ensure Alberta-One-Call Report is filed before start of project
- Ensure accurate site drawings map precise underground wire locations from array to main utility interaction point.
- Consider additional protection at mid-depth (pressure treated lumber, extra layer of barrier warning tape)
- PVC Conduit (sleeved) for main home run from main combiner box at arrays
- Teck Cable as needed between inverters and main AC combiner at arrays
- 2 ground points per array independent of screw piles (ground rods)

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Innisfree Water Treatment Plant

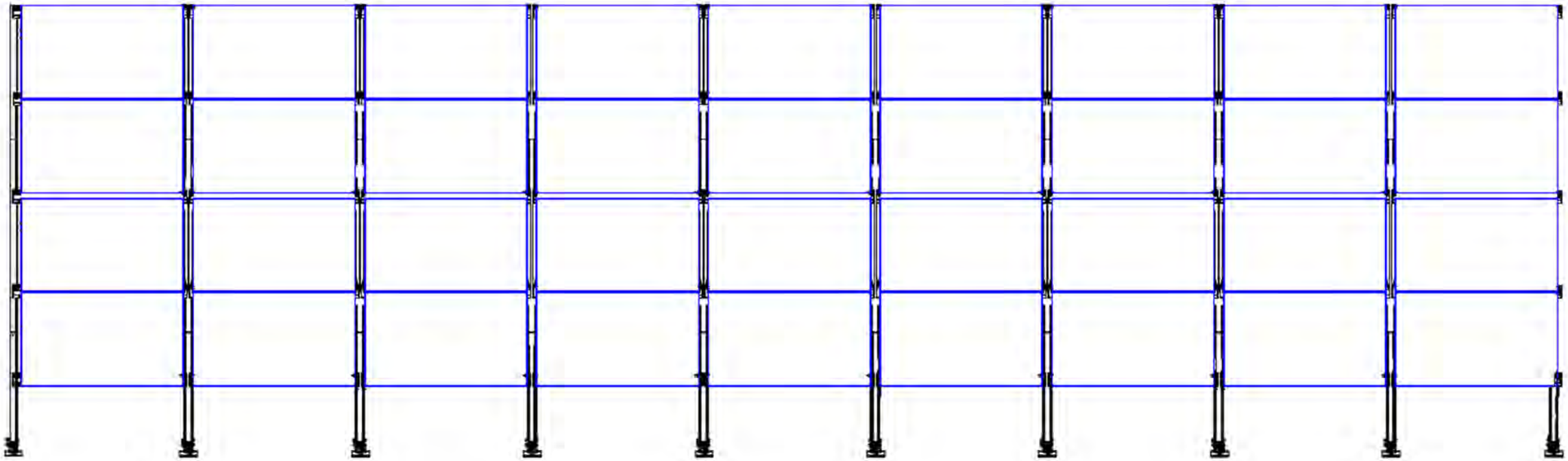
Using 4 year average consumption this site appears to average ~85% energy offset or a real dollars direct energy generation value of approximately $2128 per year initially using August 2018 energy prices. Annual billing for the most recent 12 month period was approximately $6,000.

This savings would scale upwards with the increasing costs of energy from increased demand and from newly constructed power plants (billions of dollars worth) coming online in the next handful of years. This represents a shield against future energy costs that scales upward with the future price of energy.

Transmission and distribution costs would also be impacted in your benefit. These charges are combined on your billing and therefore impossible to calculate specifically however the TRANSMISSION portion tends to be directly tied to KWH energy consumption and would therefore reduce by a portion equivalent to your energy offset. Distribution costs tend to remain the same and are charged as a flat rate. This extra savings on a commercial site this size may range in the $500 to $1,000 annual savings, but cannot be specifically estimated at this time. These savings would also scale up with the costs of transmission increasing.

A benefit from a large visible feature such as this added to the landscape enhances the prestige of the municipality and its ability to attract and retain residents, businesses and investment.

GROUND MOUNT SOLAR PANELS - FRONT VIEW

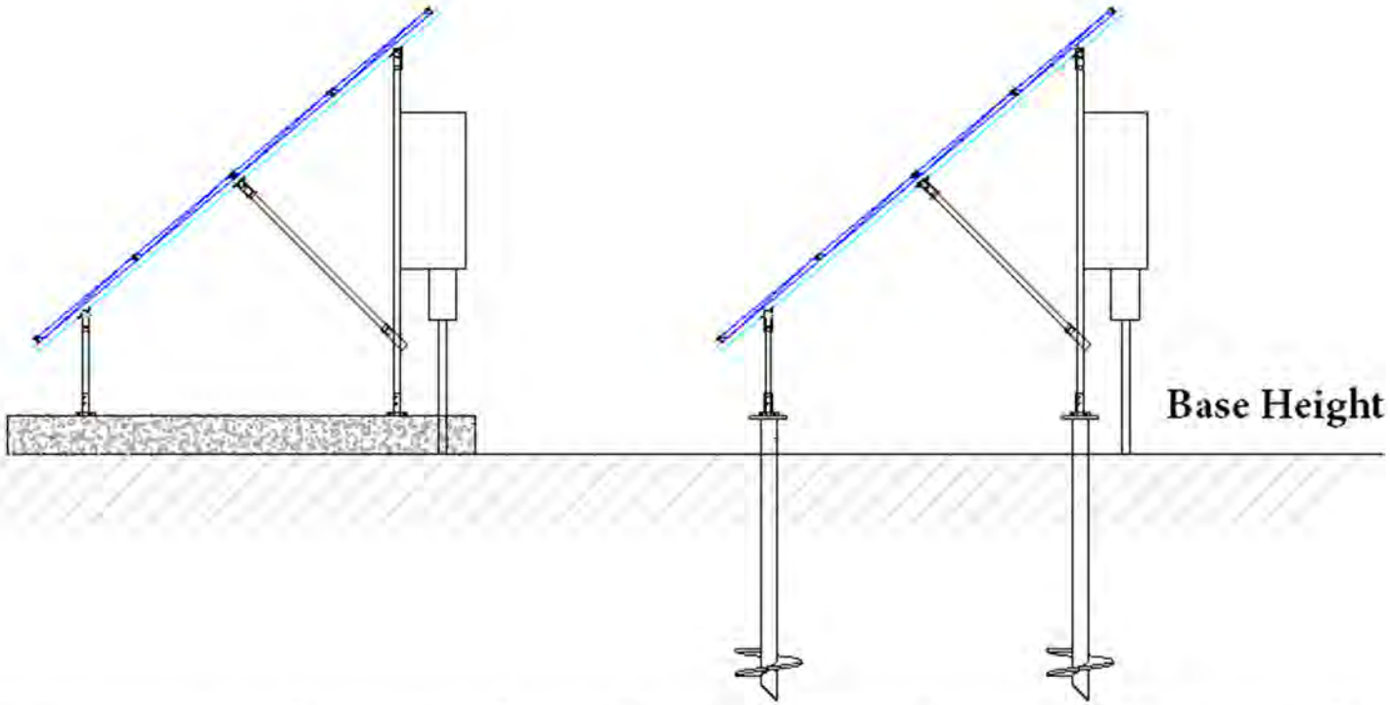


Trina Solar Modules:TSM- 365 Inverter:	Capacity:	Solar Ninjas	SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: Site ID: Land Desc.:	Address: Prepared by: Oluwaseyi Adebola Front View - Ground Mount Solar Panels	Date: October 2, 2018 System KW AC/DC: Array KW AC/DC:	Drawing No. 2

GROUND MOUNT SOLAR PANELS - SIDE VIEW

CONCRETE BALLAST

HELICAL/SCREW PILES



Base Height Adjustable

Trina Solar Modules:TSM- 365 Inverter:	Capacity:	Solar Ninjas ENERGY SOLUTIONS	SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: Site ID: Land Desc.:	Address: Prepared by: Oluwaseyi Adebola Side View - Ground Mount Solar Panels	Date: October 2, 2018 System KW AC/DC: Array KW AC/DC:	Drawing No. 1

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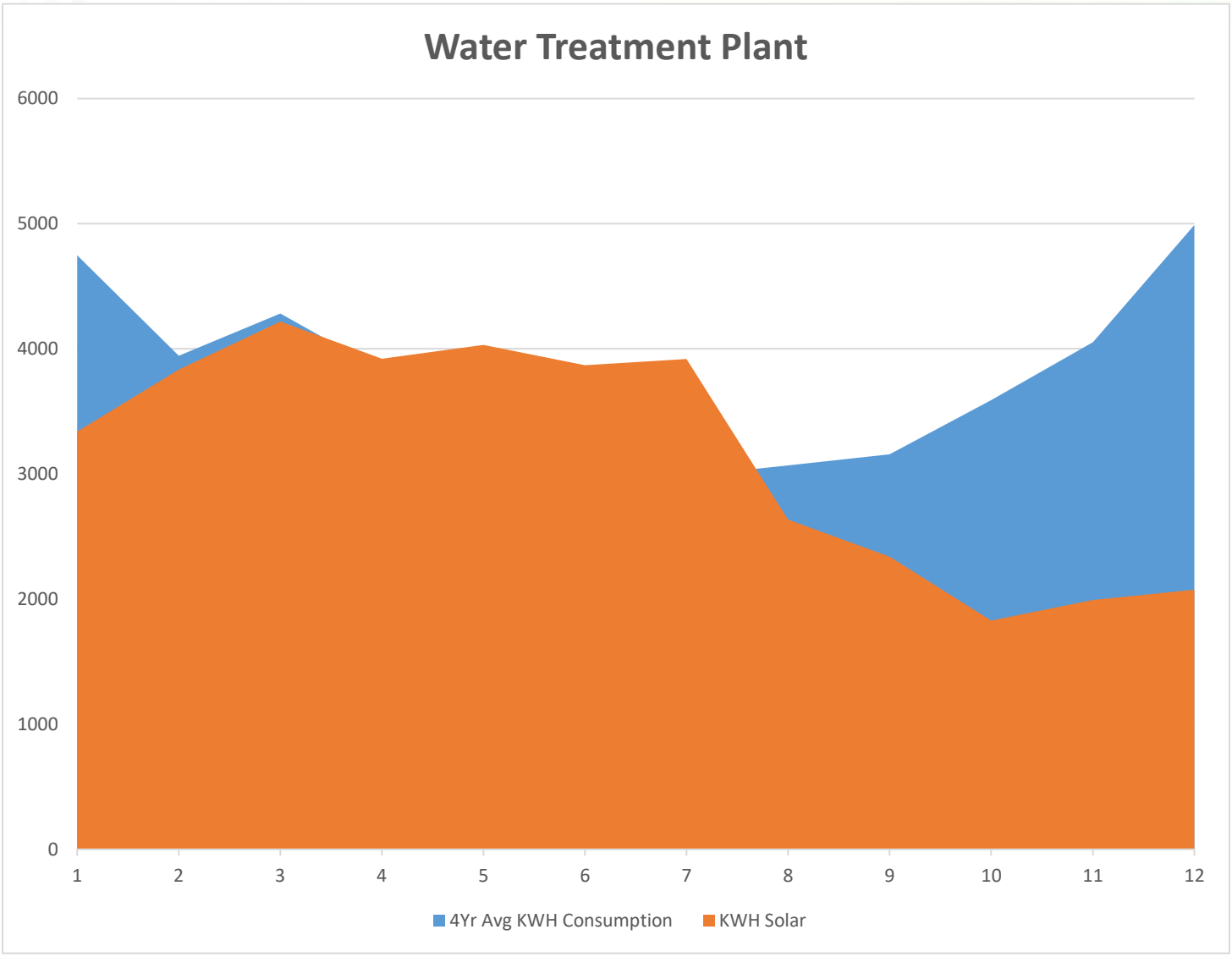


Estimate Month	4Yr Avg KWH Consumption	KWH Solar	Difference KWH	Energy Offset
1	4747.5	3339.6	1407.9	70.34%
2	3945	3834.4	110.6	97.20%
3	4282.5	4218.5	64	98.51%
4	3827.5	3920.5	-93	102.43%
5	3577.5	4030.5	-453	112.66%
6	2745	3869.9	-1124.9	140.98%
7	2982	3918.5	-936.5	131.41%
8	3067.5	2636.5	431	85.95%
9	3157.5	2338.8	818.7	74.07%
10	3590	1829	1761	50.95%
11	4053.333	1992.7	2060.633	49.16%
12	4990	2075	2915	41.58%
Total or Average	44965.333	38003.9	6961.433	84.52%

WTP Ground Mount (Trina365s+SE) Innisfree WTP, Innisfree AB

Report

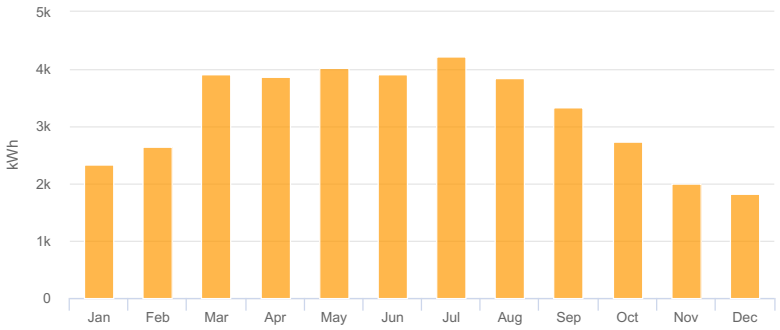
Project Name	Innisfree WTP
Project Address	Innisfree AB
Prepared By	Michael Thomas mike@solarninjas.energy

System Metrics

Design	WTP Ground Mount (Trina365s+SE)
Module DC Nameplate	26.3 kW
Inverter AC Nameplate	28.8 kW Load Ratio: 0.91
Annual Production	38.65 MWh
Performance Ratio	82.4%
kWh/kWp	1,470.8
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)
Simulator Version	9b6ea3edba-740144e756-4cf1fffc4d-a6b7ed69dd

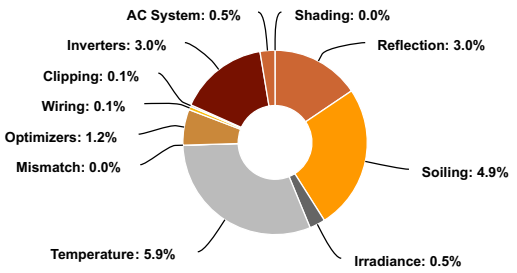
Project Location

Monthly Production



Month	GHI (kWh/m²)	POA (kWh/m²)	Shaded (kWh/m²)	Nameplate (kWh)	Grid (kWh)
January	34.8	100.9	100.9	2,386.2	2,338.8
February	55.7	115.3	115.3	2,726.8	2,636.5
March	109.5	171.1	171.1	4,213.0	3,918.5
April	142.4	177.5	177.5	4,351.0	3,869.9
May	180.8	189.9	189.9	4,632.3	4,030.5
June	192.5	189.4	189.4	4,613.0	3,920.5
July	203.8	207.6	207.6	5,062.8	4,218.5
August	161.8	185.3	185.3	4,524.3	3,834.4
September	110.0	158.1	158.1	3,881.5	3,339.6
October	68.1	122.2	122.2	3,008.6	2,723.3
November	35.9	89.3	89.3	2,106.7	1,992.7
December	25.1	78.8	78.8	1,859.8	1,829.0

Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,320.4	
	POA Irradiance	1,785.3	35.2%
	Shaded Irradiance	1,785.3	0.0%
	Irradiance after Reflection	1,732.2	-3.0%
	Irradiance after Soiling	1,647.9	-4.9%
	Total Collector Irradiance	**1,647.9**	**0.0%**
Energy (kWh)	Nameplate	43,366.0	
	Output at Irradiance Levels	43,136.6	-0.5%
	Output at Cell Temperature Derate	40,603.2	-5.9%
	Output After Mismatch	40,603.1	0.0%
	Optimizer Output	40,115.9	-1.2%
	Optimal DC Output	40,070.4	-0.1%
	Constrained DC Output	40,047.9	-0.1%
	Inverter Output	38,846.5	-3.0%
	Energy to Grid	**38,652.3**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp		7.1 °C
	Avg. Operating Cell Temp		25.4 °C
Simulation Metrics			
	Operating Hours		4602
	Solved Hours		4602

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	8	8	4	4	4	4	4	4	4	4	8	8
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	TSM-DE14A(II) PERC MONO 365 (Trina Solar)	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Characterization										
	P400 NA (SolarEdge)	Mfg Spec Sheet										
	SE14.4KUS (SolarEdge)	CEC										

Components

Component	Name	Count
Inverters	SE14.4KUS (SolarEdge)	2 (28.8 kW)
Strings	10 AWG (Copper)	5 (30.2 m)
Optimizers	P400 NA (SolarEdge)	72 (28.8 kW)
Module	Trina Solar, TSM-DE14A(II) PERC MONO 365 (365W)	72 (26.3 kW)

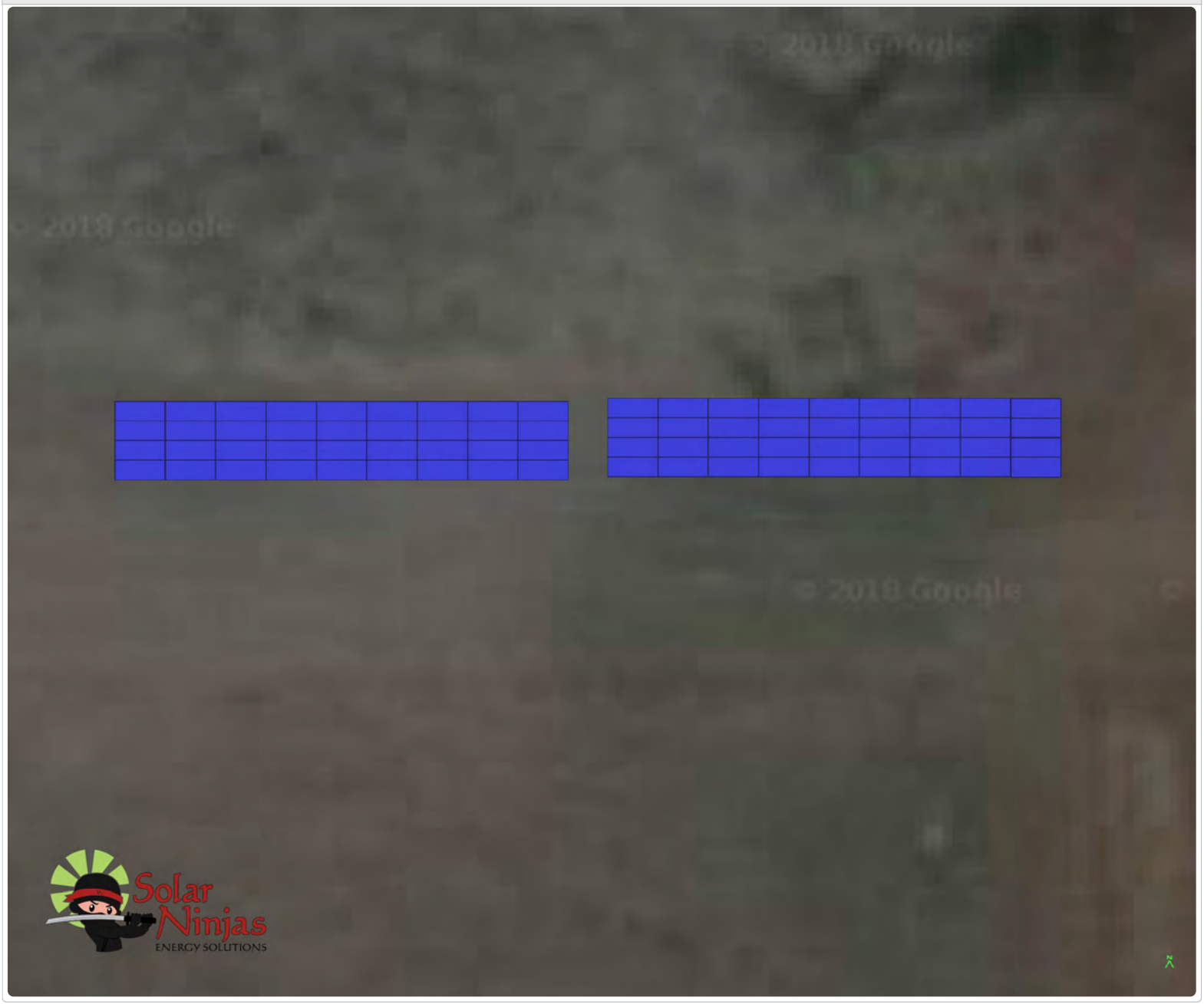
Wiring Zones

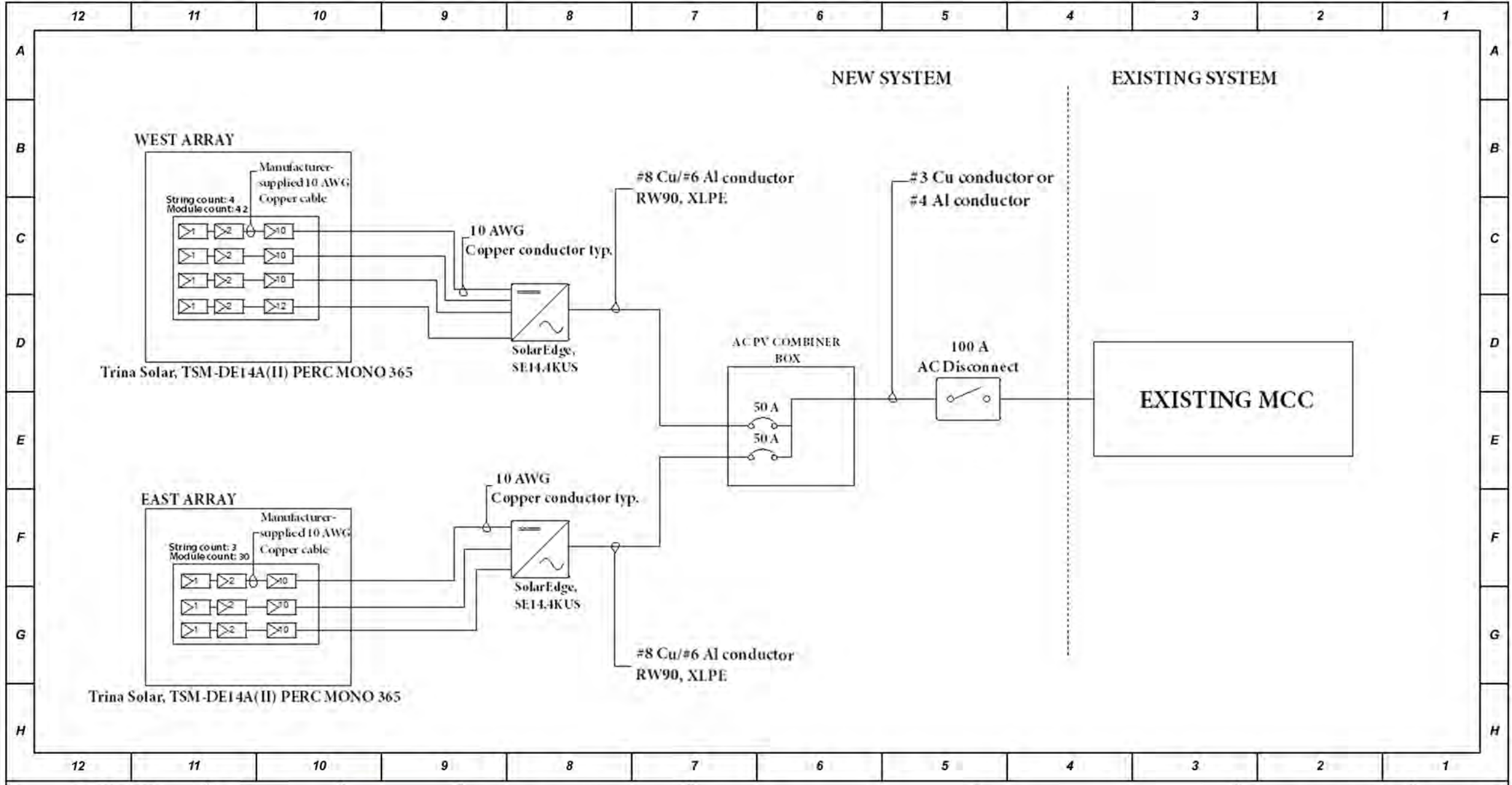
Description	Combiner Poles	String Size	Stringing Strategy
East	12	9-16	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
East	Flush Mount	Landscape (Horizontal)	40°	180°	2.4 m	4x1	12	36	13.1 kW
West	Flush Mount	Landscape (Horizontal)	40°	180°	2.4 m	4x1	9	36	13.1 kW

Detailed Layout





Modules: 72x Trina Solar TSM- 365	Capacity: 26.28kWDC	Solar Ninjas	SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: Water Treatment	Address:	Date: October 2, 2018	Drawing No. 1
Inverter: 2x Solar Edge SE14-4KUS				Site ID:	Prepared by: Oluwaseyi Adebola	System KW AC/DC: 18.8/26.28	
				Land Desc.:	SINGLE-LINE DIAGRAM	Array KW AC/DC:	

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Innisfree New Public Works Building

The new public works building has a long future of expanding usage including transition to electric equipment & vehicles. It has a beneficial roof slope for solar. So beneficial in fact that it is indicating a strong annual surplus of energy that we will have to document a plan for in order to meet ATCOs interpretation of the Micro-Generation Regulation. The system will completely maximize the electrical panel, without exceeding one third of the roof space leaving lots of room for future upgrades.

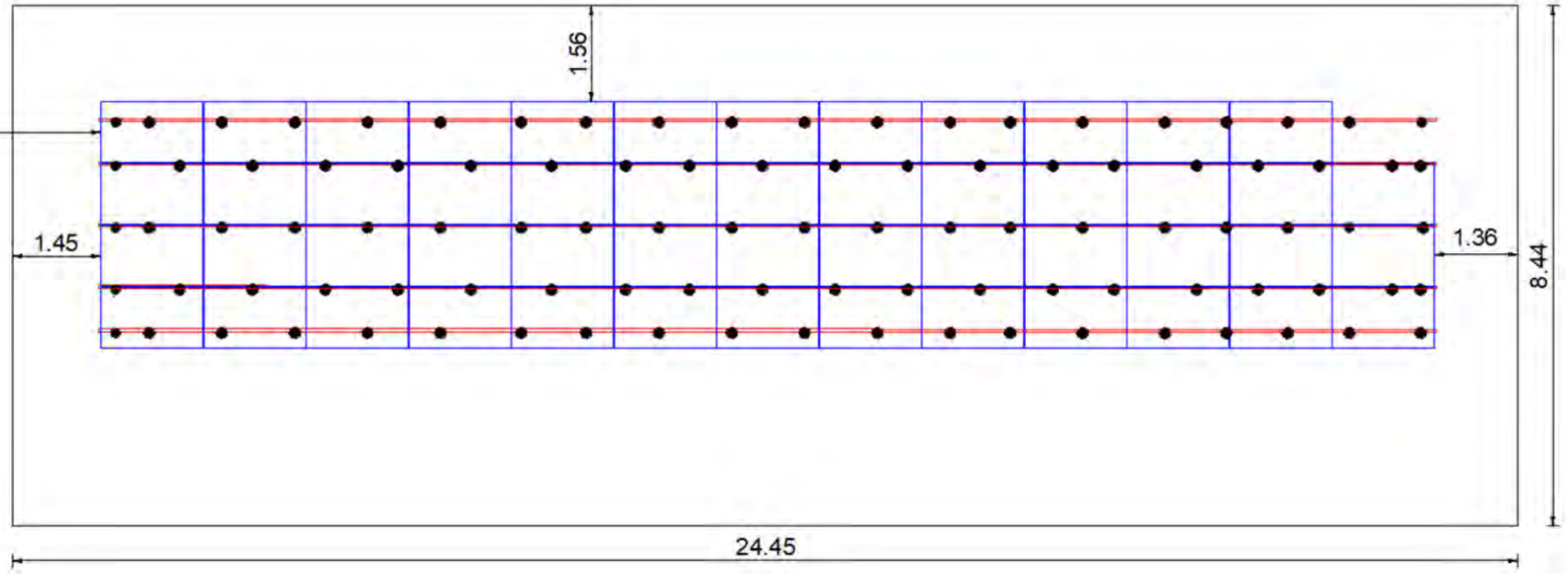
Solar energy value using September 2018 rates are initially almost $670 per year. Energy billing for the previous 12 months was only $618 for energy and a total of $2485 including GST and transmission/distribution costs.

Based on 3year averages, solar is estimated to offset 135% of energy consumption at the site however the previous 12 months would have been a 149% offset indicating strong efficiency gains. Transmission savings will magnify this amount.

This site matches equipment with the village office and in combination would net some additional equipment cost and installation time savings.

Surface of roof material to top of solar module less than 6"

ALL DIMENSIONS IN METERS



Existing Structure is capable of supporting extra loads of the array being installed

Roof Vent	Roof vent shall be moved as required
Rail	Rail: Kinetic rapid rail, Extruded Aluminium, Alloy 6060 SF - T54
Anchor	Anchor: Kinetic 5 inch welded hanger bolt with additional strapping as required

Andy Smith P.Eng
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Edmonton AB T6L1V2
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For Structural Engingeering only

For Structural Engineering only

Modules: 38x Trina Solar TSM- 300	Capacity: 11.4kWDC	Solar Ninjas ENERGY SOLUTIONS	SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: Innisfree Village Public Works Building	Address:	Date: September 04, 2018	Drawing No. 1
Inverter: 20x APS YC500i	Azimuth: 90°			Site ID:0010042971613	Prepared by: Oluwaseyi Adebola	System KW AC/DC: 9.50/11.4	
	Tilt: 9.5°			Land Desc.:	EAST ARRAY LAYOUT	Array KW AC/DC:	

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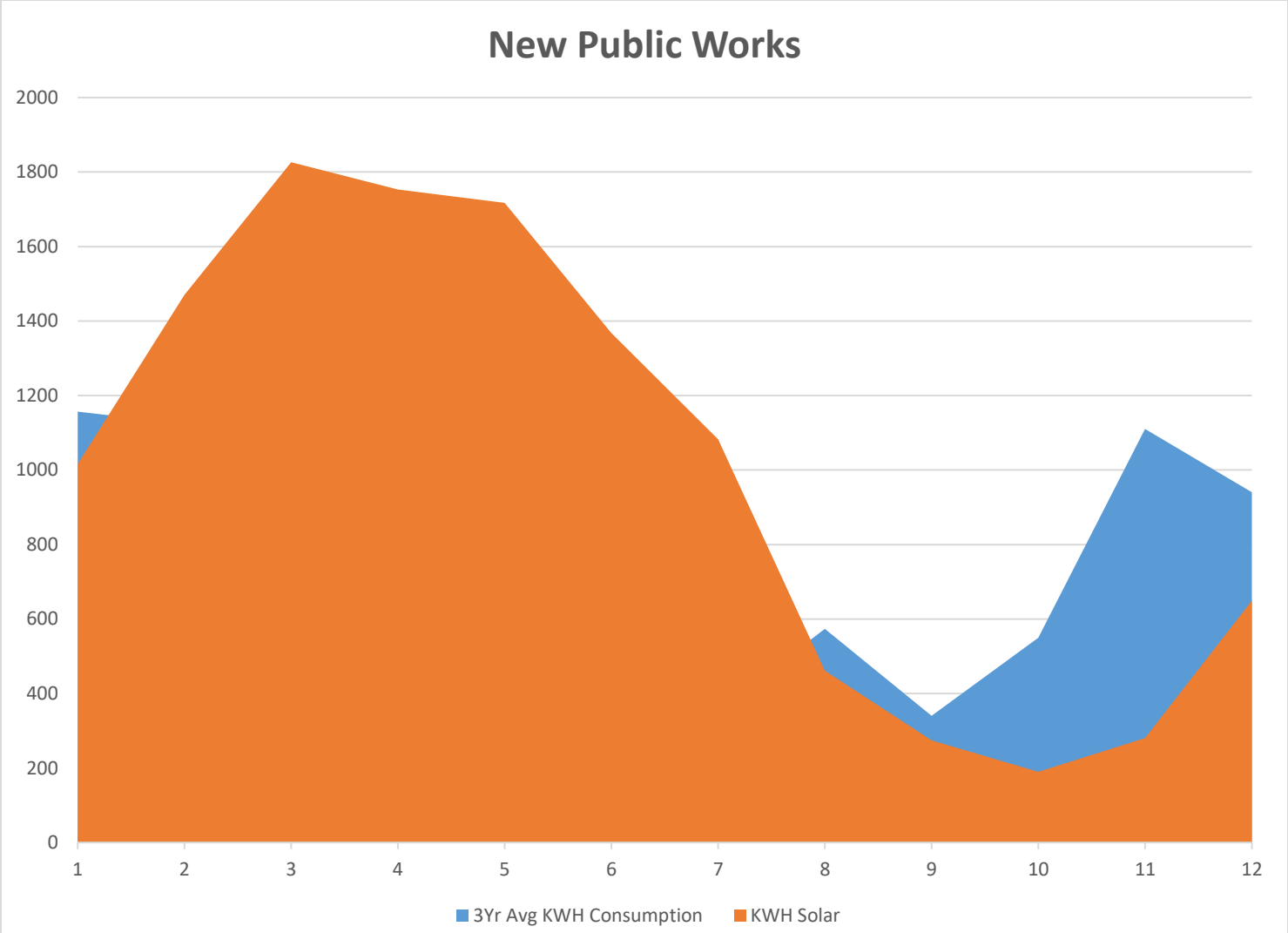


Estimate Month	3Yr Avg KWH Consumption	KWH Solar	Difference KWH	Energy Offset
1	1156.667	1015.6	141.067	87.80%
2	1123.333	1470.3	-346.967	130.89%
3	1123.333	1826.2	-702.867	162.57%
4	870	1753.4	-883.4	201.54%
5	460	1716.9	-1256.9	373.24%
6	326.666	1368	-1041.334	418.78%
7	353.3333	1082.4	-729.0667	306.34%
8	573.3334	461.7	111.6334	80.53%
9	340	274.2	65.8	80.65%
10	550	189.7	360.3	34.49%
11	1110	280.4	829.6	25.26%
12	940	649.4	290.6	69.09%
Total or Average	8926.6657	12088.2	-3161.5343	135.42%

38 Module Yc500i Innisfree Public Works Building, Innisfree, AB T0B 2G0

Report

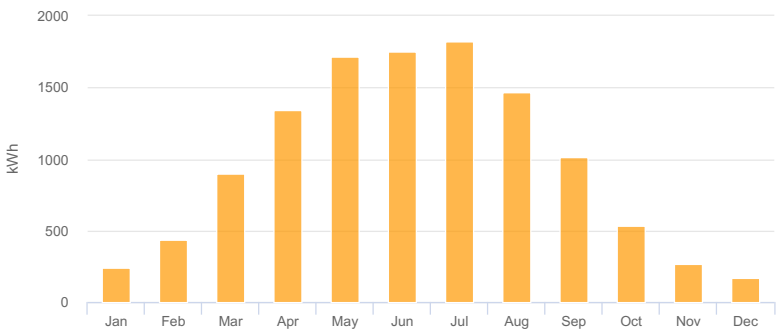
Project Name	Innisfree Public Works Building
Project Address	Innisfree, AB T0B 2G0
Prepared By	Michael Thomas mike@solarninjas.energy

System Metrics

Design	38 Module Yc500i
Module DC Nameplate	11.4 kW
Inverter AC Nameplate	9.50 kW Load Ratio: 1.20
Annual Production	11.66 MWh
Performance Ratio	77.5%
kWh/kWp	1,022.9
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)
Simulator Version	1468d8055c-52441aee5c-623e099696-b542d03352

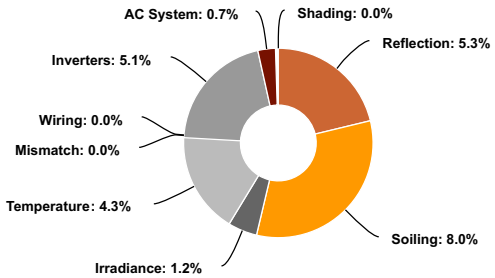
Project Location

Monthly Production



Month	GHI (kWh/m²)	POA (kWh/m²)	Shaded (kWh/m²)	Nameplate (kWh)	Grid (kWh)
January	34.8	34.9	34.9	242.5	239.0
February	55.7	55.8	55.8	437.4	432.8
March	109.5	108.7	108.7	933.6	900.2
April	142.4	142.1	142.1	1,466.9	1,342.1
May	180.8	183.7	183.7	1,948.9	1,716.9
June	192.5	192.7	192.7	2,048.3	1,753.4
July	203.8	203.6	203.6	2,163.0	1,826.2
August	161.8	160.8	160.8	1,699.8	1,470.3
September	110.0	108.9	108.9	1,137.0	1,015.5
October	68.1	67.9	67.9	573.4	537.5
November	35.9	35.9	35.9	273.7	262.4
December	25.1	24.9	24.9	169.3	164.9

Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,320.4	
	POA Irradiance	1,320.0	0.0%
	Shaded Irradiance	1,320.0	0.0%
	Irradiance after Reflection	1,250.7	-5.3%
	Irradiance after Soiling	1,150.0	-8.0%
	Total Collector Irradiance	**1,150.0**	**0.0%**
Energy (kWh)	Nameplate	13,093.8	
	Output at Irradiance Levels	12,932.6	-1.2%
	Output at Cell Temperature Derate	12,373.1	-4.3%
	Output After Mismatch	12,367.4	0.0%
	Optimal DC Output	12,367.4	0.0%
	Constrained DC Output	12,381.5	0.1%
	Inverter Output	11,748.7	-5.0%
	Energy to Grid	**11,661.2**	**-0.7%**
Temperature Metrics			
	Avg. Operating Ambient Temp		7.1 °C
	Avg. Operating Cell Temp		19.9 °C
Simulation Metrics			
	Operating Hours		4602
	Solved Hours		4602

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	30	25	20	5	3	3	3	3	3	20	25	30
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	TSM-DD05A(II) 300W (Trina Solar)	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Characterization										
	YC500i (240V) (APS)	Spec Sheet										

Components

Component	Name	Count
Inverters	YC500i (240V) (APS)	19 (9.50 kW)
AC Panels	3 input AC Panel	1
AC Home Runs	12 AWG (Copper)	1 (55.7 m)
AC Branches	8 AWG (Copper)	3 (60.5 m)
Module	Trina Solar, TSM-DD05A(II) 300W (300W)	38 (11.4 kW)

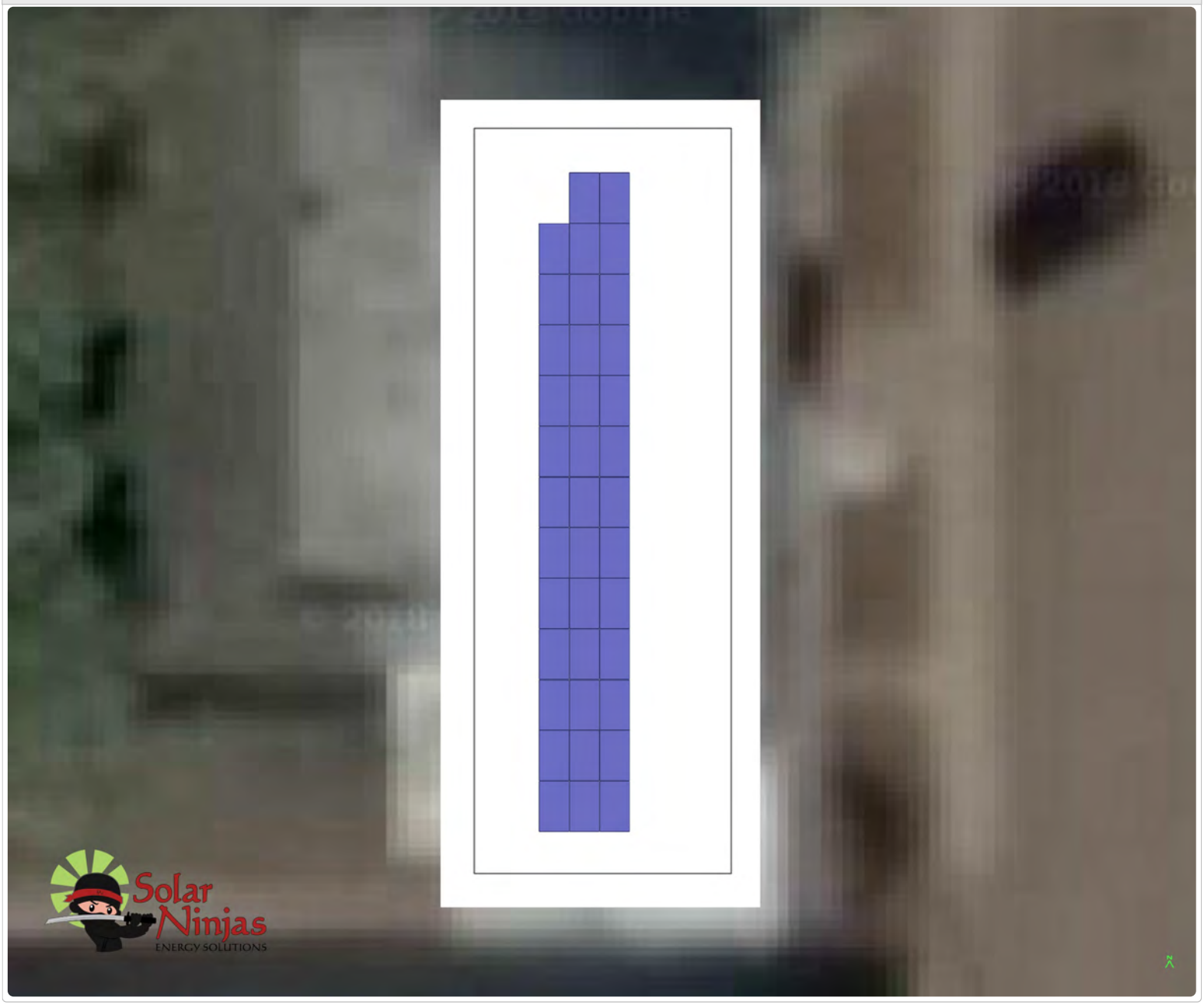
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
East Zone	12	1-1	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
East Section	Flush Mount	Landscape (Horizontal)	9.5°	90°	0.0 m	1x1	38	38	11.4 kW

Detailed Layout



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Innisfree Village Office

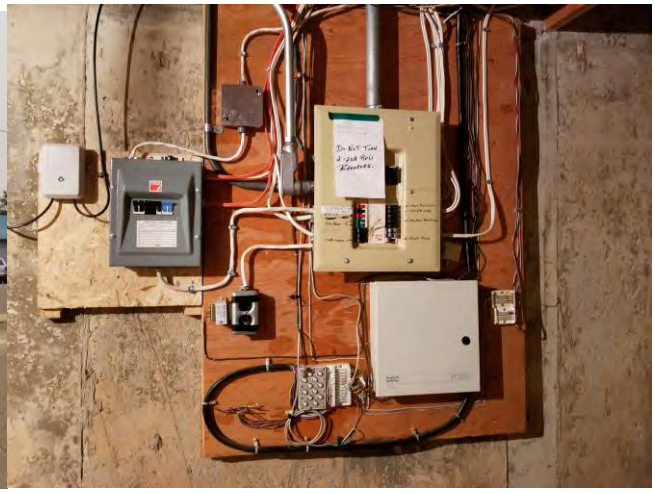
The Village Office represents a residential type solar installation and would be a beautiful showpiece. There are many opportunities to improve energy efficiency in the building, and solar based on a 4 year average is estimated to offset ~86% of energy use. This could reach net zero consumption with efficiency improvements and a little luck. Our ability to fit more solar on the roof around obstacles and use of advanced micro-inverters helps improve performance and project quality.

Late spring currently indicates a net surplus situation with small energy sales according to generation timetables. We advise replacing the main electrical panel and combining the subpanel circuits into a new service meeting current electrical codes.

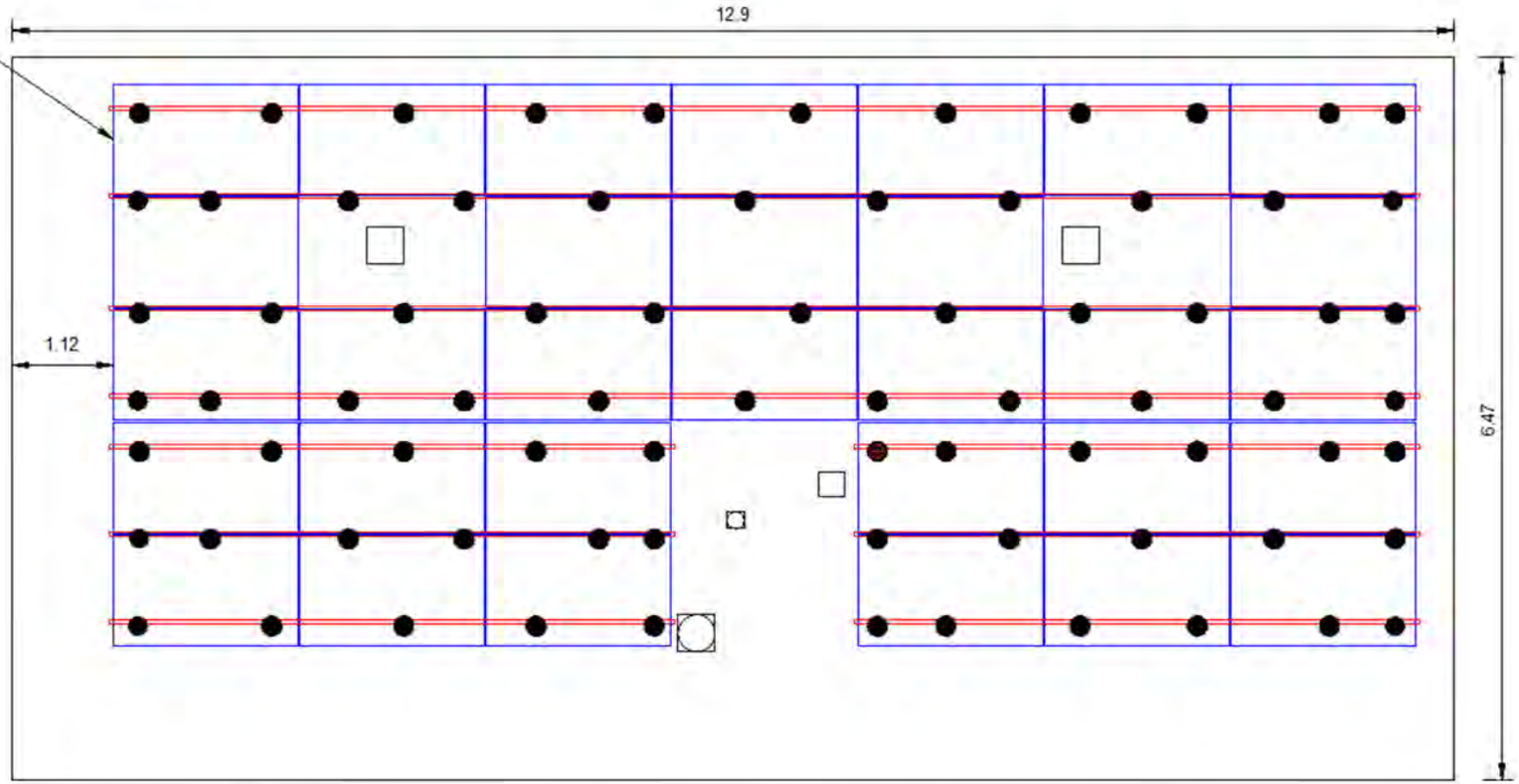
Averaged solar generation estimates result in direct energy value using August 2018 energy rates of approximately $520 per year initially. 2018 billing shows $861 in energy costs and $2652 in overall costs including GST and transmission charges.

Exorbitant transmission and distribution costs will be addressed to some degree proportionally to solar generation, as transmission costs are usually tied to consumption. Distribution costs tend to be flat.

Equipment choices are based on fall 2018 product availability and may change slightly into spring 2019.



Surface of roof material to top of solar module less than 6"



ALL DIMENSIONS IN METERS

Existing Structure is capable of supporting extra loads of the array being installed

Roof Vent	Roof vent shall be moved as required
Rail	Rail: Kinetic rapid rail, Extruded Aluminium, Alloy 6060 SF - T54
Anchor	Anchor: Kinetic K flash Zilla Double Stud XL

For Structural Engineering only

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Edmonton AB T6L1V2
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For Structural Engingeering only

Modules: 31x Trina Solar TSM- 300	Capacity: 3.1kW-DC		SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: Innisfree Village Office	Address:5116 50 Avenue, Innisfree AB	Date: September 04, 2018	Drawing No. 1
Inverter: 16x APS YC500i	Azimuth: 270°			Site ID: 0010635116014	Prepared by: Oluwaseyi Adebola	System KW AC/DC: 7.75/8.3	
	Tilt:18.4°			Land Desc.:		Array KW AC/DC:	

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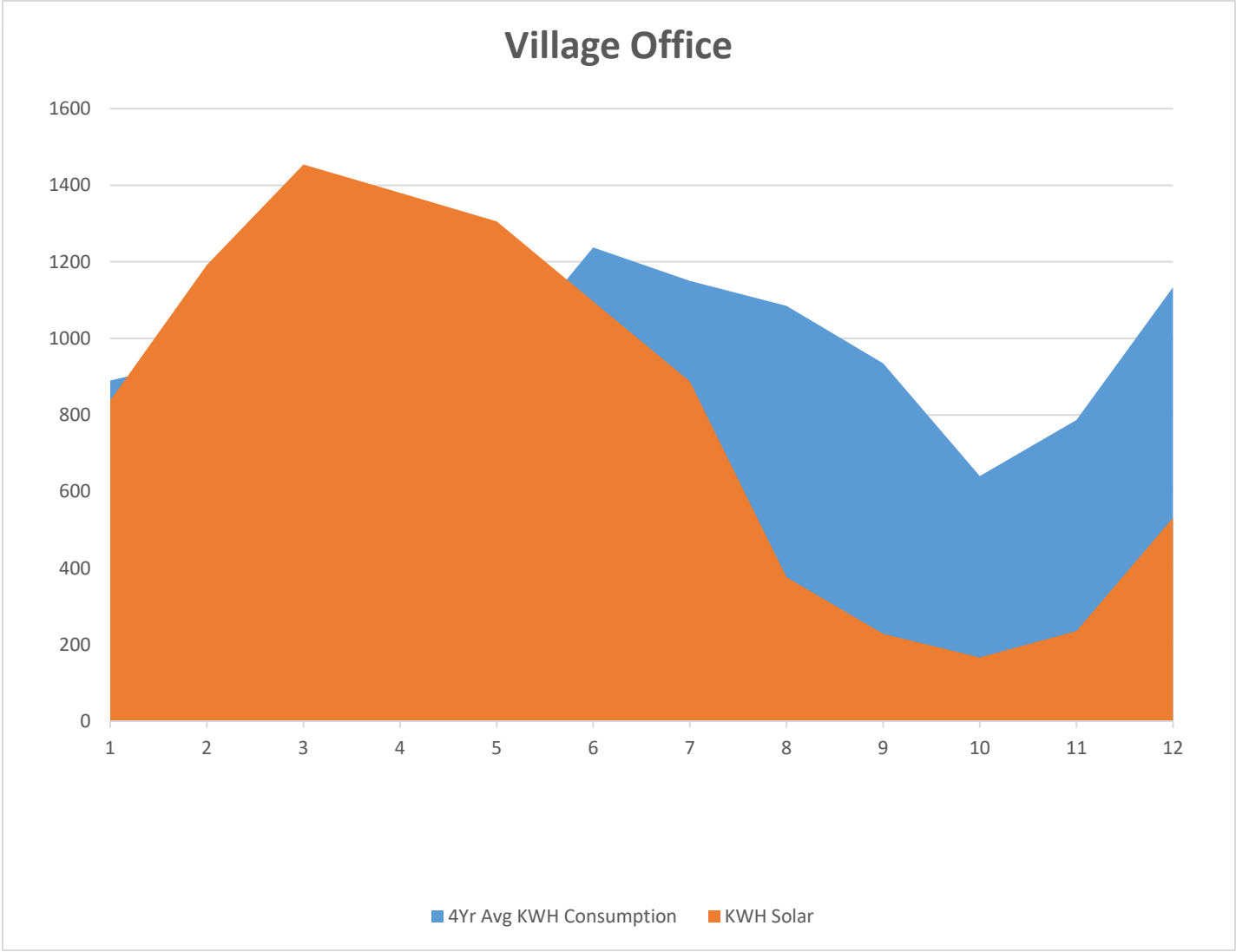


Estimate Month	4Yr Avg KWH Consumption	KWH Solar	Difference KWH	Energy Offset
1	890	837.7	52.3	94.12%
2	950	1191.7	-241.7	125.44%
3	925	1454.2	-529.2	157.21%
4	695	1380.5	-685.5	198.63%
5	932.5	1305.4	-372.9	139.99%
6	1237.5	1096.4	141.1	88.60%
7	1150	887.9	262.1	77.21%
8	1085	376.2	708.8	34.67%
9	935	228.1	706.9	24.40%
10	640	166.6	473.4	26.03%
11	786.6667	235.3	551.3667	29.91%
12	1133.333	531.6	601.733	46.91%
Total or Average	11359.9997	9691.6	1668.3997	85.31%

31 Module YC500i Innisfree Village Office, 5116 50 Avenue, Innisfree Alberta

Report

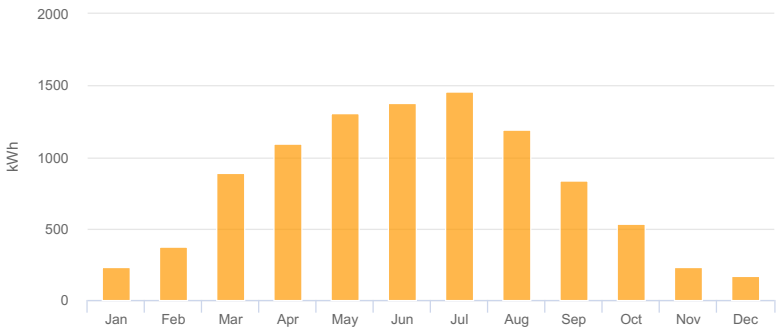
Project Name	Innisfree Village Office
Project Address	5116 50 Avenue, Innisfree Alberta
Prepared By	Michael Thomas mike@solarninjas.energy

System Metrics

Design	31 Module YC500i
Module DC Nameplate	9.30 kW
Inverter AC Nameplate	8.00 kW Load Ratio: 1.16
Annual Production	9.691 MWh
Performance Ratio	80.2%
kWh/kWp	1,042.1
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)
Simulator Version	0014cd4152-234c7eae7a-1d399bca3a-9b26f1b083

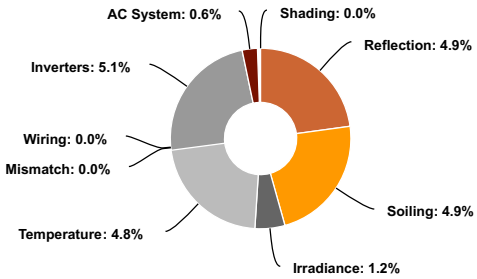
Project Location

Monthly Production



Month	GHI (kWh/m²)	POA (kWh/m²)	Shaded (kWh/m²)	Nameplate (kWh)	Grid (kWh)
January	34.8	35.2	35.2	231.5	228.1
February	55.7	55.5	55.5	381.9	376.2
March	109.5	109.3	109.3	933.0	887.9
April	142.4	140.0	140.0	1,206.5	1,096.4
May	180.8	171.7	171.7	1,486.5	1,305.4
June	192.5	186.2	186.2	1,616.3	1,380.5
July	203.8	199.3	199.3	1,730.7	1,454.2
August	161.8	160.3	160.3	1,386.6	1,191.7
September	110.0	110.5	110.5	944.9	837.7
October	68.1	68.1	68.1	574.1	531.6
November	35.9	36.6	36.6	245.9	235.3
December	25.1	26.1	26.1	170.1	166.6

Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,320.4	
	POA Irradiance	1,298.8	-1.6%
	Shaded Irradiance	1,298.8	0.0%
	Irradiance after Reflection	1,235.0	-4.9%
	Irradiance after Soiling	1,174.4	-4.9%
	Total Collector Irradiance	**1,174.4**	**0.0%**
Energy (kWh)	Nameplate	10,908.1	
	Output at Irradiance Levels	10,782.2	-1.2%
	Output at Cell Temperature Derate	10,267.0	-4.8%
	Output After Mismatch	10,262.1	0.0%
	Optimal DC Output	10,262.1	0.0%
	Constrained DC Output	10,274.4	0.1%
	Inverter Output	9,748.8	-5.0%
	Energy to Grid	**9,691.5**	**-0.6%**
Temperature Metrics			
	Avg. Operating Ambient Temp		7.1 °C
	Avg. Operating Cell Temp		20.0 °C
Simulation Metrics			
	Operating Hours		4602
	Solved Hours		4602

Condition Set

Description	Condition Set 1										
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)										
Solar Angle Location	Meteo Lat/Lng										
Transposition Model	Perez Model										
Temperature Model	Sandia Model										
Temperature Model Parameters	Rack Type	a	b	Temperature Delta							
	Fixed Tilt	-3.56	-0.075	3°C							
	Flush Mount	-2.81	-0.0455	0°C							
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	20	20	3	3	3	3	3	3	3	3	20	20
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	TSM-DD05A(II) 300W (Trina Solar)	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Characterization										
	YC500i (240V) (APS)	Spec Sheet										

Components

Component	Name	Count
Inverters	YC500i (240V) (APS)	16 (8.00 kW)
AC Panels	3 input AC Panel	1
AC Home Runs	12 AWG (Copper)	1 (32.5 m)
AC Branches	8 AWG (Copper)	3 (63.8 m)
Module	Trina Solar, TSM-DD05A(II) 300W (300W)	31 (9.30 kW)

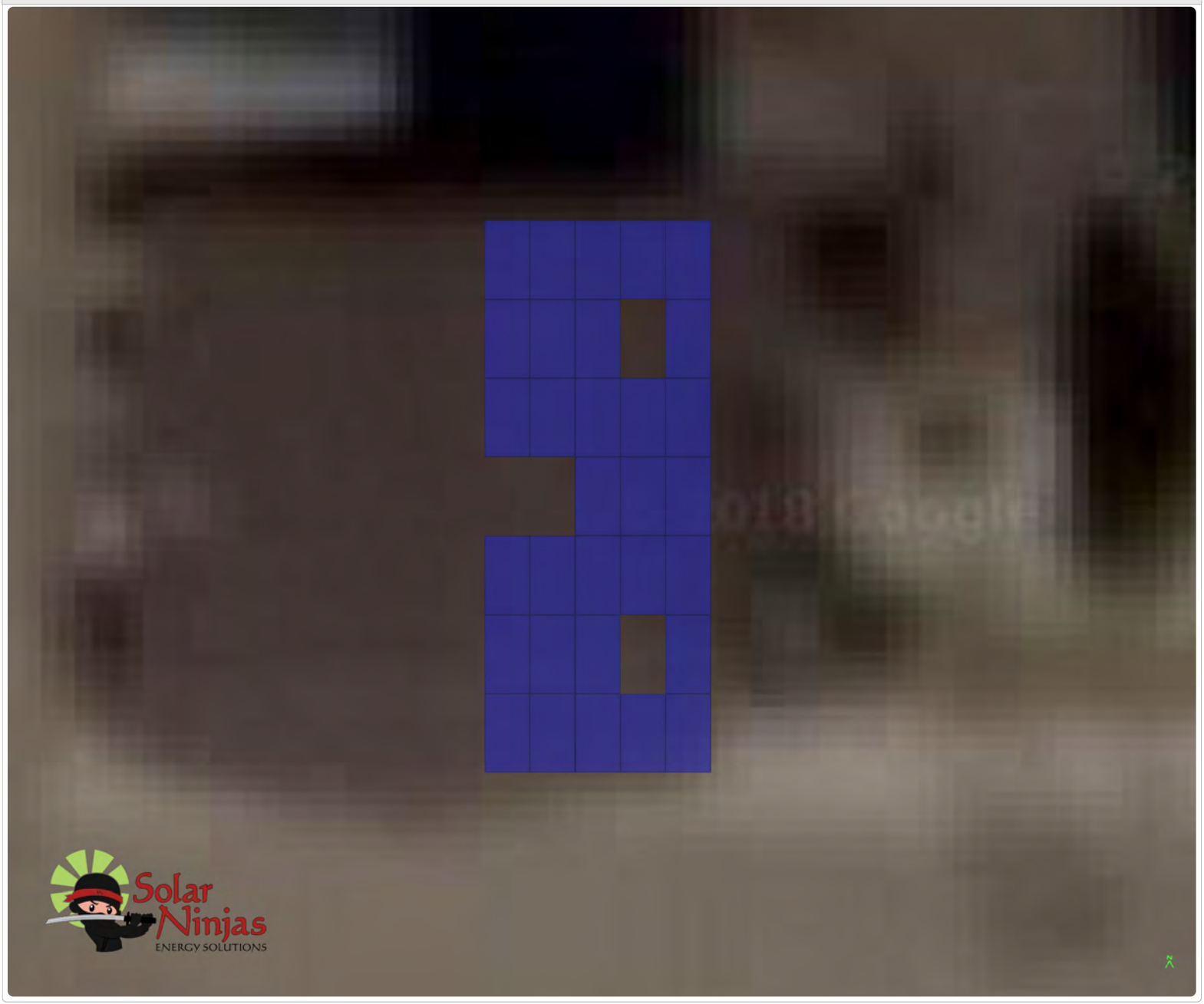
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	1-1	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
West Section	Flush Mount	Landscape (Horizontal)	18.4°	270°	0.0 m	1x1	31	31	9.30 kW

Detailed Layout



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Innisfree RV – Recreation Park

The RV Rec Park field nestled against the slope below the highway is in full sun and sure to be an attraction as well as a generator. We were able to match the curve of the landscape with the arrays to enhance performance with reflectivity and maintain a uniform appearance with the environment. It is a long distance from main power connection but well worth the consideration.

Park Energy demands vary dramatically year over year, in order to gain approval from ATCO we used 7 years of records to get a higher average. Actual performance will likely dramatically outpace these estimations, and even so we will be required to submit a detailed plan for how the municipality will use this extra energy in the future in order to meet the requirements of the Micro-Generation Regulation. Site performance is expected to be stellar and we have designed to the limit of the electrical service to maximise benefit.

Solar generation is estimated to offset approximately 130% of consumption based on 7 year averages. Based on previous 12 months it would offset 260% of consumption resulting in SIGNIFICANT energy sales and room to grow usage with amenities. Estimated solar energy value using August 2018 energy rates is $2194 with previous 12 months consumption at $1190, and total charges with GST and Transmission being $2805.

With reductions in transmission charges accompanying the reduced consumption and surplus sales this site is on the cusp of being net zero total billing and appears to be quite easily net positive generation in even the worst conditions. Scaling these savings up with future energy costs gives a very rosy picture of savings.

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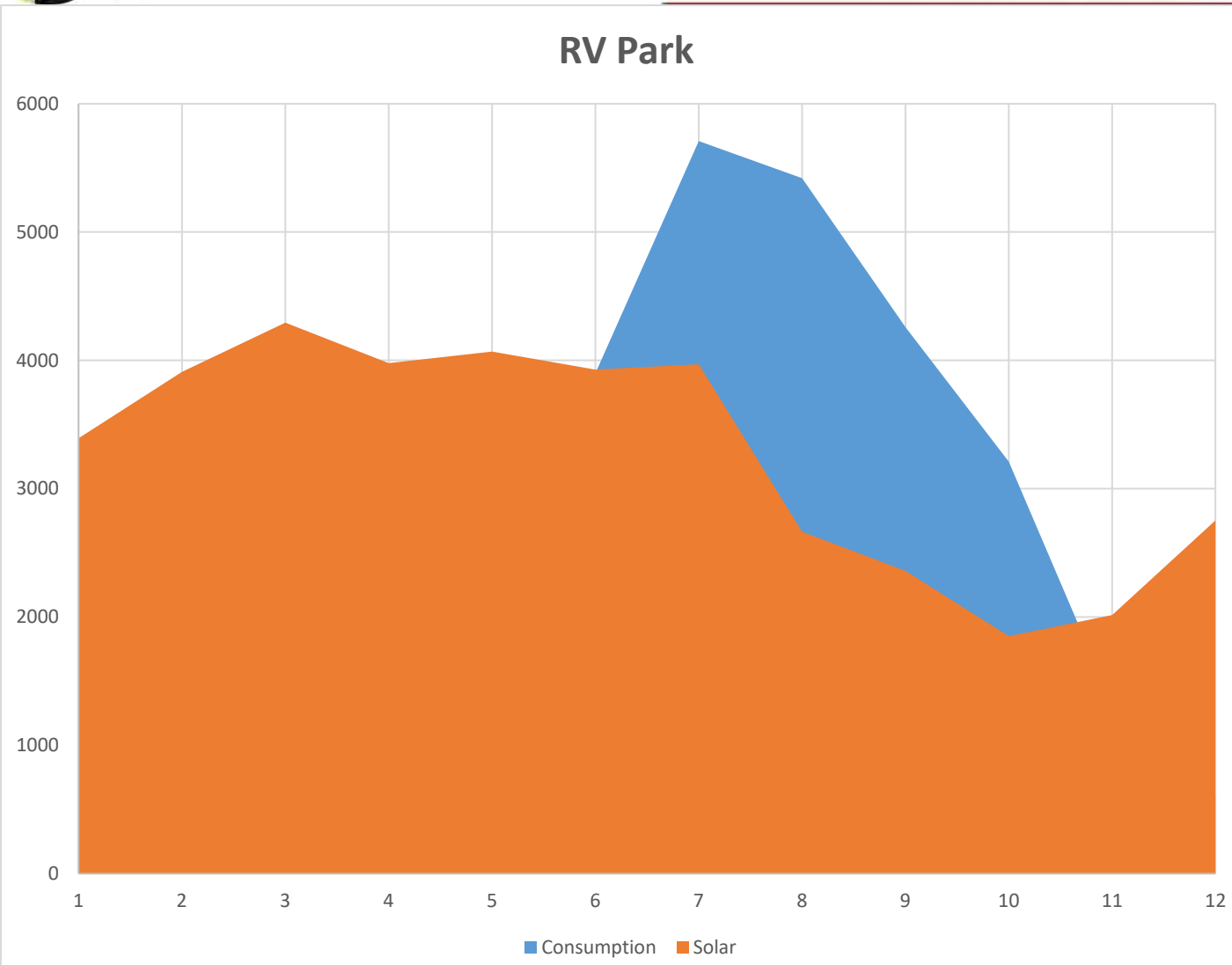


Estimate month	7yr Avg Consumption	KWH Solar	Difference KWH	Energy Offset
1	424.125	3393.1	-2968.975	800.02%
2	311.625	3911.3	-3599.675	1255.13%
3	485.25	4294	-3808.75	884.90%
4	1021.143	3978	-2956.857	389.56%
5	3390.5	4068.2	-677.7	119.99%
6	3899.25	3927.5	-28.25	100.72%
7	5709	3970.7	1738.3	69.55%
8	5420.5	2664.5	2756	49.16%
9	4259.875	2359.9	1899.975	55.40%
10	3210.571	1850.9	1359.671	57.65%
11	1326.857	2015.5	-688.643	151.90%
12	607.667	2751.5	-2143.833	452.80%
Total or Average	30066.363	39185.1	-9118.737	130.33%

SolarEdge Landscape 3 array Innisfree RV Park, Innisfree AB

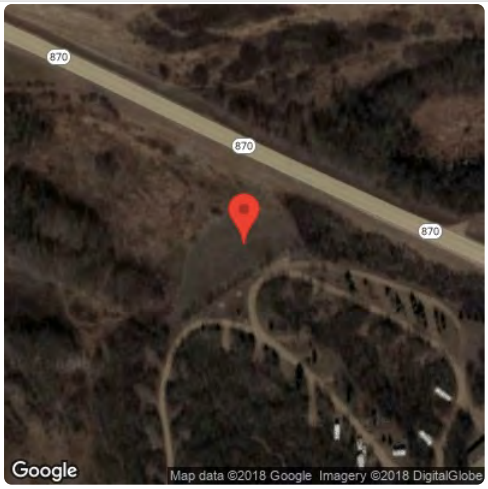
Report

Project Name	Innisfree RV Park
Project Address	Innisfree AB
Prepared By	Michael Thomas mike@solarninjas.energy

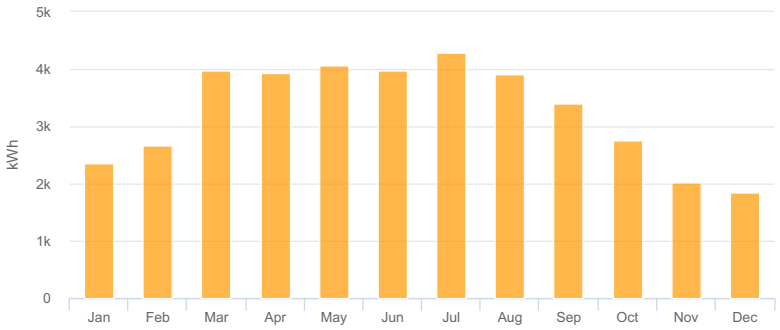
System Metrics

Design	SolarEdge Landscape 3 array
Module DC Nameplate	26.3 kW
Inverter AC Nameplate	22.8 kW Load Ratio: 1.15
Annual Production	39.19 MWh
Performance Ratio	83.9%
kWh/kWp	1,491.1
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)
Simulator Version	1468d8055c-52441aee5c-623e099696-b542d03352

Project Location

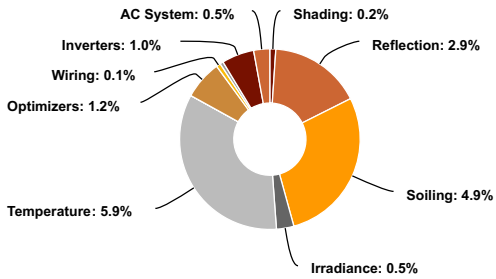


Monthly Production



Month	GHI (kWh/m²)	POA (kWh/m²)	Shaded (kWh/m²)	Nameplate (kWh)	Grid (kWh)
January	34.8	99.9	99.9	2,360.5	2,359.9
February	55.7	114.3	114.3	2,702.2	2,664.5
March	109.5	170.3	170.0	4,187.7	3,970.7
April	142.4	177.0	176.6	4,332.3	3,927.5
May	180.8	188.1	187.7	4,585.3	4,068.3
June	192.5	188.5	188.0	4,590.5	3,978.1
July	203.8	207.1	206.6	5,054.2	4,294.1
August	161.8	185.3	184.9	4,526.7	3,911.3
September	110.0	157.8	157.5	3,868.7	3,393.0
October	68.1	121.3	121.2	2,982.8	2,751.5
November	35.9	88.6	88.5	2,088.6	2,015.5
December	25.1	78.2	78.2	1,845.1	1,850.9

Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,320.4	
	POA Irradiance	1,776.6	34.5%
	Shaded Irradiance	1,773.3	-0.2%
	Irradiance after Reflection	1,722.6	-2.9%
	Irradiance after Soiling	1,638.8	-4.9%
	Total Collector Irradiance	**1,638.7**	**0.0%**
Energy (kWh)	Nameplate	43,124.6	
	Output at Irradiance Levels	42,892.5	-0.5%
	Output at Cell Temperature Derate	40,357.4	-5.9%
	Output After Mismatch	40,357.4	0.0%
	Optimizer Output	39,873.1	-1.2%
	Optimal DC Output	39,820.5	-0.1%
	Constrained DC Output	39,780.0	-0.1%
	Inverter Output	39,382.2	-1.0%
	Energy to Grid	**39,185.3**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp		7.1 °C
	Avg. Operating Cell Temp		25.2 °C
Simulation Metrics			
	Operating Hours		4602
	Solved Hours		4602

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid, meteonorm (meteonorm)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	8	8	4	4	4	4	4	4	4	4	8	8
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	TSM-DE14A(II) PERC MONO 365 (Trina Solar)	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Characterization										
	P400 NA (SolarEdge)	Mfg Spec Sheet										
	SE7600H-US (SolarEdge)	Spec Sheet										

Components

Component	Name	Count
Inverters	SE7600H-US (SolarEdge)	3 (22.8 kW)
Home Runs	10 AWG (Copper)	6 (29.1 m)
Combiners	1 input Combiner	3
Combiners	2 input Combiner	3
Strings	10 AWG (Copper)	6 (79.3 m)
Optimizers	P400 NA (SolarEdge)	72 (28.8 kW)
Module	Trina Solar, TSM-DE14A(II) PERC MONO 365 (365W)	72 (26.3 kW)

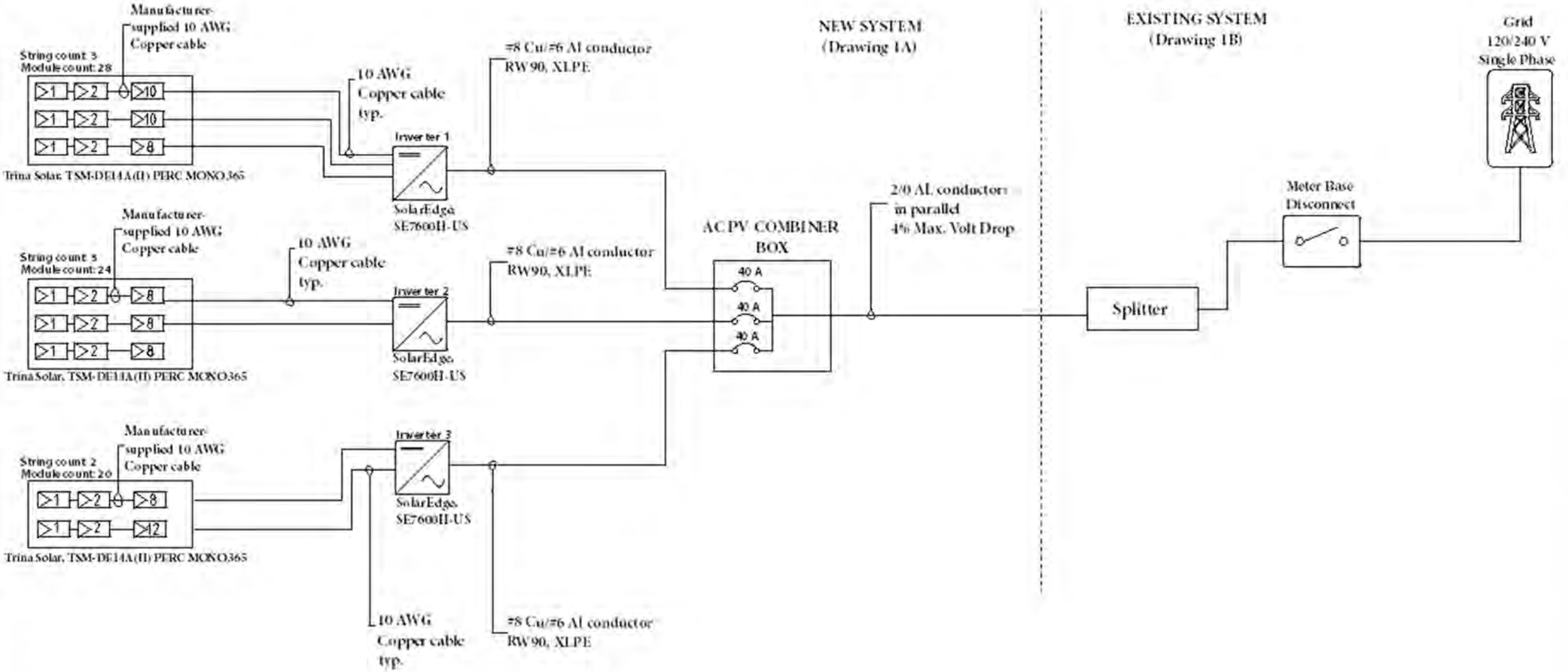
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Centre	12	12-12	Along Racking
West	12	12-12	Along Racking
East	12	12-12	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
East	Flush Mount	Landscape (Horizontal)	40°	192°	0.0 m	4x6	2	24	8.76 kW
Centre	Flush Mount	Landscape (Horizontal)	40°	190°	0.0 m	4x6	2	24	8.76 kW
West	Flush Mount	Landscape (Horizontal)	40°	185°	0.0 m	4x6	26	24	8.76 kW

Detailed Layout



72x Trina Solar Modules: TSM- 365	Capacity: 26.28kWDC	Solar Ninjas ENERGY SOLUTIONS	SolarNinjas Energy Solutions Ltd. #724, 10301 104 St Edmonton AB weshouldhire@solarninjas.energy Http://www.SolarNinjas.Energy Phone : (780) 920.9120	Client: RV Park	Address: Alberta 870, Innisfree, Alberta, T0B 2G0, Canada	Date: October 2, 2018
Inverter: 3x SolarEdge SE7600H-US				Site ID: 0010808198911	Prepared by: Oluwaseyi Adebola	System KW AC/DC: 22.8/26.0
SLD-Overview-1				Land Desc.: Rec Park NE 34 50 11 W4	SINGLE-LINE DIAGRAM	Array KW AC/DC:

Drawing No. 1

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Www.SolarNinjas.Energy

Budget Notes

Water Treatment Plant

- Single Project PV Cost Approximately $74,692 + GST
- Alberta Municipal Solar Program Rebate Approximately $19,725
- BONUS REBATE 25cents/watt for first time MCCAC application @ $6,575
- Screw Pile Installation Estimated at approximately $4,700 + GST
- Electrical from Array Combiner to main power to be performed at cost-plus based on agreed upon rates to best adapt to conditions & save costs with local labour.
- Electrical hookup for utility connection from PumpHouse Circuit Breaker to arrays (100ft distance) Approx $3725 + Labour
- 25 Year Solar Panel Warranty
- 12 year Inverter Warranty (Extendable to 25 year @ approx. $500 ea)

New Public Works

- Single Project Cost Approximately $37,620 + GST
- Alberta Municipal Solar Program Rebate Approximately $8,550
- Post-Rebate system cost Approximately $29,070
- 25 year Solar Panel Warranty
- 25 year micro-inverter Warranty
- Conditionally Maintenance Free System.

Village Office

- Single Project Cost Approximately $30,690 + GST
- Alberta Municipal Solar Program Rebate Approximately $8,370
- Post-Rebate system cost Approximately $22,320
- 25 year Solar Panel Warranty
- 25 year micro-inverter Warranty
- Conditionally Maintenance Free System.
- Electrical main panel replacement cost $2,850 to $4,200 depending on work scope and additional wiring repairs required to bring main service up to current code and eliminate subpanel (all into one new panel).

Rv Park

- Single Project PV Cost Approximately $74,692 + GST
- Alberta Municipal Solar Program Rebate Approximately $19,725
- Screw Pile Installation Estimated at approximately $4,700 + GST
- Electrical from Array Combiner to main power to be performed at cost-plus based on agreed upon rates as we can find great cost savings with a local/farmer for trenching instead of electricians.
- Electrical Materials for utility connection from Meter Cabinet to array (600 feet distance) Approx $5,300 + Labour
- 25 Year Solar Panel Warranty
- 12 year Inverter Warranty (Extendable to 25 year @ approx. $700 ea)

All above prices based on single project cost. Combining 4 projects will result in group savings.

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Budget Notes

Please note the following summary includes some additional costs such as screw pile installation and electrical material but omits some costs such as permits & electrical labour for final connections which are always unknown in the case of commercial work. Therefore expect that these values will fluctuate slightly on the water treatment plant and RV – Recreation park based on items like trenching costs, and electrical labour for final days of work doing utility connections. We expect that some savings can be found exploring local options for trenching, labour assistance, and possibly screw pile installation. Communications methods for the two ground mount systems have not been included as they will depend on your choices of cellular or long distance network cabling at an additional cost due to the long distances involved.

The price of our estimation and study package will also be deducted from any work issued based on the scale of the work volume.

Project	Individual Estimated Budget	Rebate	Post-Rebate Estimated Cost
Water Treatment Plant	$84,117.00	$26,300.00	$57,817.00
New Public Works	$37,620.00	$8,550.00	$29,070.00
Village Office	$30,690.00	$8,370.00	$22,320.00
RV - Recreation Park	$86,792.00	$19,725.00	$67,067.00

We anticipate a group savings of $10,000 to $12,000 in total should all 4 projects be executed together in a timely fashion.

In pairs, the projects match as follows for some efficiency savings:

- New Public Works
- Village Council office

- RV Rec Park
- Water Treatment Plant

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Additional Information & Documents

Suggested Installation Schedule & order if all four projects authorized:

Ground mount systems can be constructed in winter with a small additional cost for drilling screw piles through frozen ground, however trenching components and electrical connection would have to wait for spring and so we advise another order.

1. Screw piles and layout for Water Treatment Plant and RV Rec Park can be marked and installed.
2. New Public Works Building
    a. This job can be executed in winter as the roof is not asphalt shingles and the building is heated for us. There will be some additional labour time for cold weather but even in early spring it is the likeliest first candidate.
    b. Good weather in January 2019 would be suitable.
3. Village Office
    a. Once temperatures are 2 degrees above or below zero and snow is off the roof, installation can proceed.
    b. Good weather in March 2019
4. RV Park
    a. Extensive mechanical trenching is required which should be possible by early spring
    b. Good weather in March – April 2019 (likely completion May 2019)
5. Water Treatment Plant
    a. Simultaneous execution with RV Park but final utility interconnection at both sites will depend on weather and ground conditions.
    b. Good weather in March – April 2019 (likely completion May 2019)

Special details for surplus generating sites:

Wires owners are within their rights to force us to justify extensively any surplus generation by providing engineered and paid plans for how you will utilize this energy, a strict and unreasonable interpretation of the MicroGeneration Regulation. ATCO has (after negotiations) agreed with us that as a municipality you should be afforded additional flexibility in those future plans. Increasing power consumption demonstrably at both sites through the winter to demonstrate your increased usage is helpful if you decide to go ahead, and we will work with you to document energy use increases through the use of electric vehicle charging, heat and light as needed to justify the system sizes for your maximum benefit. This applies only to two sites (RV Park and New Public Works Building) where sizeable surplus is expected. This stricter interpretation is new (as recent as October) and we are adapting to meet the requirements.

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Additional Efficiency Measures:

While there is nothing required at this time for the RV Rec Park, Water treatment Plant, or New Public Works Building, various measures to be considered for the Village Office include:

- LED lighting upgrade for any remaining fluorescent or incandescent fixtures and bulbs.
- Addition of motion or timer sensor light switches in bathroom
- Upgrade main electrical panel and improve system bonding
- Upgrade all old type electrical outlets and light switches to eliminate arcing, worn, or loose connections, installing dimmers or timers where appropriate.
- Check air conditioning unit for healthy operation, age and efficiency. Adapt its use in summertime to reduce energy demand and if replacement ever warranted ensure highest efficiency model available is chosen.
- Restrict use of block heaters in winter to cords with timers attached, triggered 2 hours before closing hours if in use by staff.
- Study and reduce/eliminate electric heater use in winter for comfort by servicing gas heat system, modifying behaviour slightly, providing warm slippers/boots and comfortable clothing for the season.
- Check operation of any exterior lights and ensure motion sensors are working properly, any lights are LED, and timers are used as appropriate.

Local Opportunity & Involvement:

- Every one of the 4 projects has available work hours for labour assistance to be hired locally which will include trades experience and solar training.
- Nearby Schools to be invited to visit worksites at completion, presentations including material exhibits can be brought to classes to “show & tell”.
- Advice and awareness of local law enforcement to be sought so that opportunity crime, theft, or vandalism is reduced during the initial “it’s new and expensive looking” period of adjustment while extensive outreach is done to engage community support.

SolarEdge Three Phase Inverters for the 208V Grid for North America

SE9KUS / SE14.4KUS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

Three Phase Inverters for the 208V Grid[1] for North America

SE9KUS / SE14.4KUS

	SE9KUS	SE14.4KUS	
OUTPUT			
Rated AC Power Output	9000	14400	VA
Maximum AC Power Output	9000	14400	VA
AC Output Line Connections	4-wire WYE (L1-L2-L3-N) plus PE or 3 wire Delta		
AC Output Voltage Minimum-Nominal-Maximum[2] (L-N)	105-120-132.5		Vac
AC Output Voltage Minimum-Nominal-Maximum[2] (L-L)	183-208-229		Vac
AC Frequency Min-Nom-Max[2]	59.3 - 60 - 60.5		Hz
Max. Continuous Output Current (per Phase)	25	40	A
GFDI Threshold	1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes		
INPUT			
Maximum DC Power (Module STC)	12150	19400	W
Transformer-less, Ungrounded	Yes		
Maximum Input Voltage DC to Gnd	250	300	Vdc
Maximum Input Voltage DC+ to DC-	500	600	Vdc
Nominal Input Voltage DC to Gnd	200		Vdc
Nominal Input Voltage DC+ to DC-	400		Vdc
Maximum Input Current	26.5	38	Adc
Maximum Input Short Circuit Current	45		Adc
Reverse-Polarity Protection	Yes		
Ground-Fault Isolation Detection	1MΩ Sensitivity	350kΩ Sensitivity[3]	
CEC Weighted Efficiency	96.5	97	%
Night-time Power Consumption	< 3	< 4	W
ADDITIONAL FEATURES			
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional)		
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect[4]		
RS485 Surge Protection	Supplied with the inverter		
STANDARD COMPLIANCE			
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07		
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)		
Emissions	FCC part15 class B		
INSTALLATION SPECIFICATIONS			
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG	3/4" minimum / 8-4 AWG	
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG		
Number of DC inputs	2 pairs	3 pairs[5]	
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260		in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight	73.2 / 33.2	99.5 / 45	lb / kg
Weight with Safety Switch	79.7 / 36.2	106 / 48	lb / kg
Cooling	Fans (user replaceable)		
Noise	< 50	< 55	dBA
Operating Temperature Range	-40 to +140 / -40 to +60[6]		˚F / ˚C
Protection Rating	NEMA 3R		

[1] For 277/480V inverters refer to: http://www.solaredge.com/files/pdfs/products/inverters/se-three-phase-us-inverter-datasheet.pdf
[2] For other regional settings please contact SolarEdge support
[3] Where permitted by local regulations
[4] P/N SE9K-US0xxxxxx has Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)
[5] Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1
[5] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

RoHS

solaredge

Single Phase Inverter

with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

HD wave

Single Phase Inverter
with HD-Wave Technology for North America
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

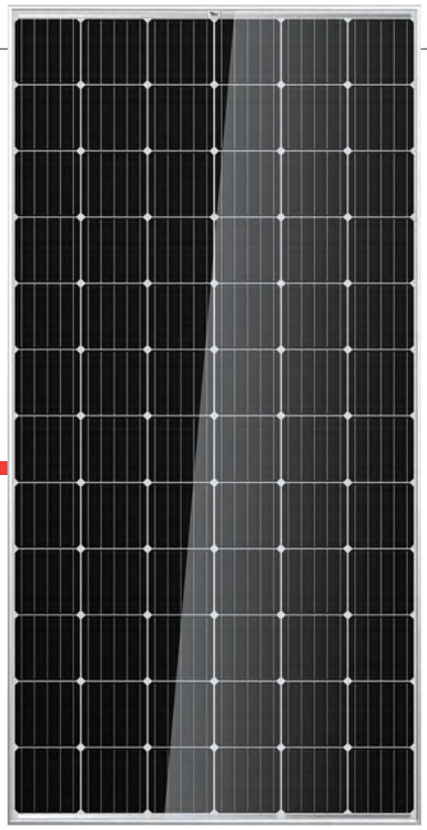
	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400	VA
Max. AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400	VA
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-		-		-	-	-	Vac
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)								Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current 208V	-	16	-	24	-	-	-	A
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	-	
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current 208V	-	9	-	13.5	-	-	-	
Maximum Input Current @240V	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99							%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional[2]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	3/4" minimum / 14-6 AWG					3/4" minimum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection				Natural convection			
Operating Temperature Range	-13 to +140 / -25 to +60[3] (-40˚F / -40˚C option)[4]							˚F / ˚C
Protection Rating	NEMA 3R (Inverter with Safety Switch)							

[1] For other regional settings please contact SolarEdge support
[2] Revenue grade inverter P/N: SExxxxH-US000NNC2
[3] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
[4] -40 version P/N: SExxxxH-US000NNU4

RoHS

THE TALLMAX M PLUS

FRAMED 72-CELL MODULE



72 CELL
MONOCRYSTALLINE MODULE

335-365W
POWER OUTPUT RANGE

18.8%
MAXIMUM EFFICIENCY

0~+5W
POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. we believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

Trinasolar

Excellent low light performance on cloudy days, mornings and evenings

- Advanced surface texturing
- Back surface field
- Selective emitter

Maximize limited space with top-end efficiency

- Up to 188 W/m^2 power density
- Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control

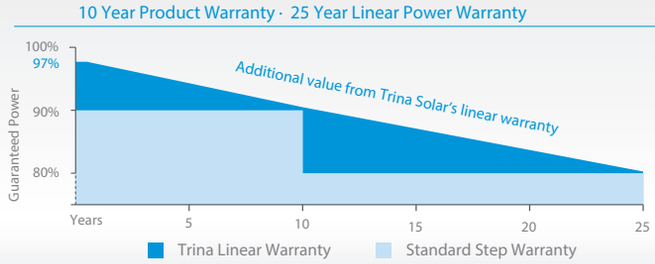
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 100% EL double inspection

Certified to withstand the most challenging environmental conditions

- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

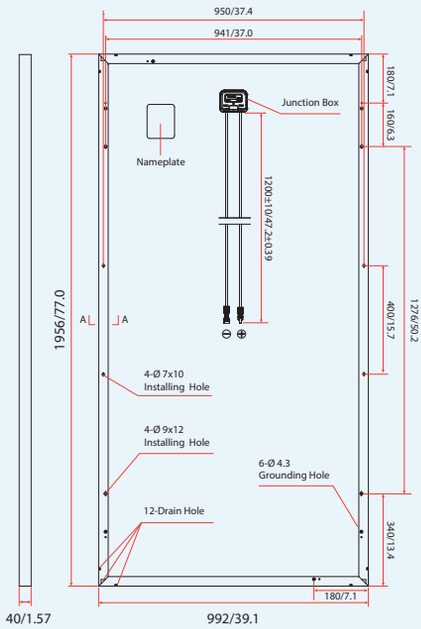
LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty · 25 Year Linear Power Warranty

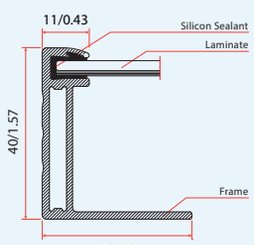


PRODUCTS	POWER RANGE
TSM-DD14A(II) STD MONO	335-345W
TSM-DD14A(II) PERC MONO	350-365W

DIMENSIONS OF PV MODULE (mm/inch)

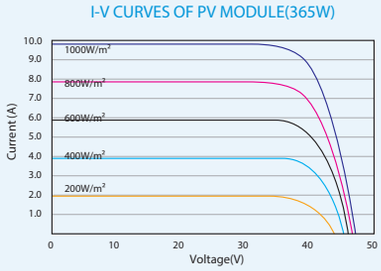


Back View

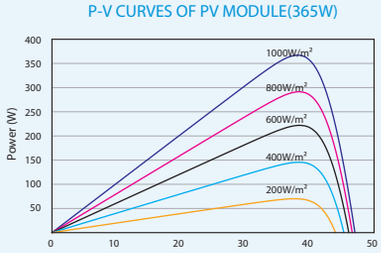


(A-A)

I-V CURVES OF PV MODULE(365W)



P-V CURVES OF PV MODULE(365W)



ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	335	340	345	350	355	360	365
Power Output Tolerance-P_{MAX} (W)	0 ~ +5						
Maximum Power Voltage-V_{MPP} (V)	37.9	38.2	38.4	38.5	38.7	38.9	39.1
Maximum Power Current-I_{MPP} (A)	8.84	8.90	9.00	9.09	9.17	9.26	9.35
Open Circuit Voltage-V_{OC} (V)	46.3	46.5	46.7	46.9	47.0	47.2	47.3
Short Circuit Current-I_{SC} (A)	9.36	9.45	9.50	9.60	9.69	9.79	9.88
Module Efficiency η_m (%)	17.3	17.5	17.8	18.0	18.3	18.5	18.8

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.
*Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Maximum Power-P_{MAX} (Wp)	250	253	257	261	264	268	272
Maximum Power Voltage-V_{MPP} (V)	35.1	35.2	35.5	35.6	35.8	35.9	36.1
Maximum Power Current-I_{MPP} (A)	7.12	7.19	7.25	7.33	7.40	7.47	7.54
Open Circuit Voltage-V_{OC} (V)	43.1	43.2	43.4	43.5	43.7	43.8	43.9
Short Circuit Current-I_{SC} (A)	7.56	7.63	7.67	7.75	7.82	7.88	7.95

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline 156.75 × 156.75 mm (6 inches)
Cell Orientation	72 cells (6 × 12)
Module Dimensions	1956 × 992 × 40 mm (77.0 × 39.1 × 1.57 inches)
Weight	26.0 kg (57.3 lb) with 4.0 mm glass; 22.5 kg (49.6 lb) with 3.2 mm glass
Glass	4.0 mm (0.16 inches) for PERC Mono; 3.2 mm (0.13 inches) for Standard Mono, High Transmission, AR Coated Tempered Glass
Backsheet	White
Frame	Silver Anodized Aluminium Alloy
J-Box	IP 67 or IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), 1200 mm (47.2 inches)
Connector	MC4 or Amphenol H4/UTX
Fire Type	Type 1 or Type 2

TEMPERATURE RATINGS

NOCT(Nominal Operating Cell Temperature)	44°C (±2°C)
Temperature Coefficient of P_{MAX}	- 0.39%/°C
Temperature Coefficient of V_{OC}	- 0.29%/°C
Temperature Coefficient of I_{SC}	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC (IEC)
	1000V DC (UL)
Max Series Fuse Rating	15A for 335-350W
	20A for 355-365W

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

10 year Product Workmanship Warranty
25 year Linear Power Warranty

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 27 pieces
Modules per 40' container: 648 pieces

Trinasolar

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

APsystems
ALTENERGY POWER

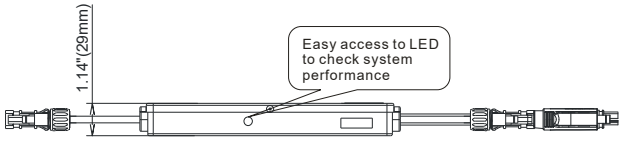
Leading the Industry in
Solar Microinverter Technology

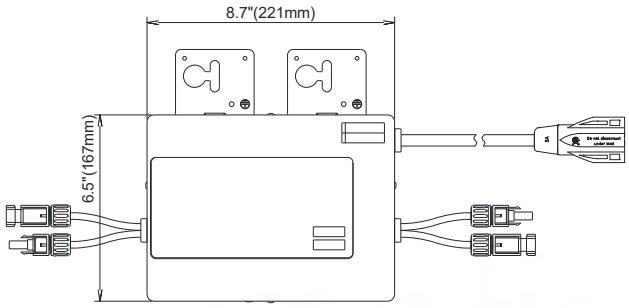
YC500I

Microinverter

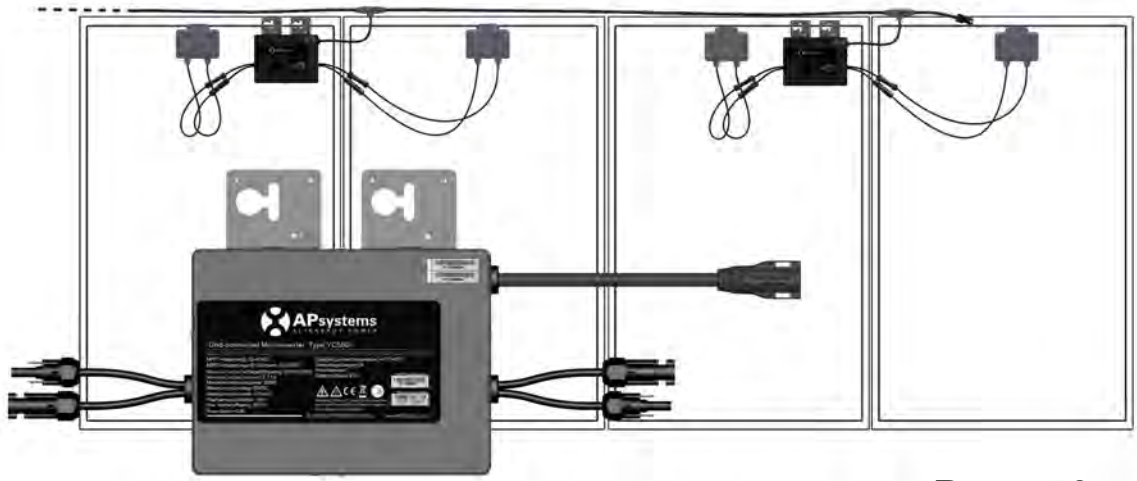
- Single unit connects two solar modules
- Individual MPPT for each module
- Maximum continuous output power 500W

DIMENSIONS





Our flagship product, the APsystems YC500I is a grid-tied microinverter with intelligent networking and monitoring systems to ensure maximum efficiency. Highly dependable and cost effective, the YC500I delivers 250W AC per module with dual MPPT. Half the inverters and half the installation means real cost savings for residential and commercial customers.



APsystems YC500I Microinverter Datasheet

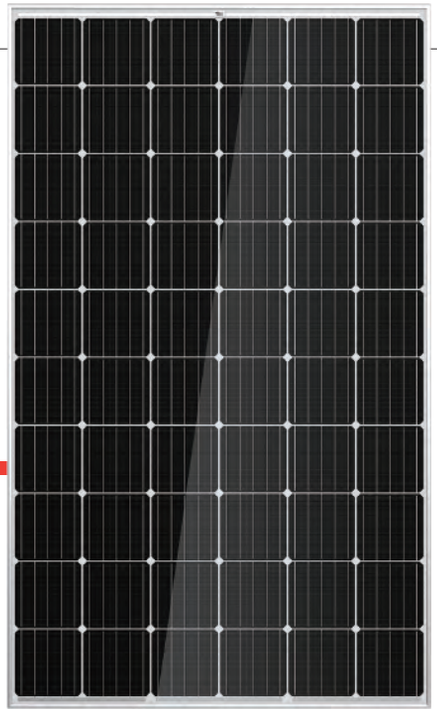
Region	North America	
Model	YC500I-NA	
Input Data (DC)		
MPPT Voltage Range	22V-45V	
Operation Voltage Range	16V-52V	
Maximum Input Voltage	55V	
Startup Voltage	22V	
Maximum Input Current	12A x 2	
Output Data (AC)		
Nominal Output Voltage	208V*	240V*
Peak Output Power	548W	548W
Maximum Continuous Output Power	500W	500W
Nominal Output Current	2.4A	2.08A
Default Output Voltage Range	183V-229V**	211V-264V**
Maximum Output Fault Current (peak)	33.4A	54.8A
Maximum Output Fault Current (RMS)	2.79A	4.85A
Maximum Output Fault Current Duration	1.875ms	1.639ms
Reactive Current	0.1A	
Extended Output Voltage Range	181V-298V	
Nominal Output Frequency	60Hz	
Default Output Frequency Range	59.3Hz-60.5Hz**	
Extended Output Frequency Range	55.1Hz -64.9Hz	
Power Factor	>0.99	
Total Harmonic Distortion	<3%	
Maximum Units Per Branch	6 for 20A Breaker***	7 for 20A Breaker***
Efficiency		
Peak Efficiency	95.5%	
CEC Weighted Efficiency	95%	
Nominal MPPT Efficiency	99.5%	
Night Power Consumption	120mW	
Mechanical Data		
Operating Ambient Temperature Range	-40° F to +149 ° F (-40 °C to +65 °C)	
Storage Temperature Range	-40 °F to +185 °F (-40 °C to +85 °C)	
Dimensions (W x H x D)	8.7” × 6.6” × 1.1” (221mm X 167mm X 29mm)	
Weight	5.5lbs (2.5kg)	
AC Bus	12AWG	
Enclosure Rating	NEMA 6	
Cooling	Natural Convection - No Fans	
Features & Compliance		
Communication(Inverter To ECU)	Power Line Communication	
Emissions & Immunity (EMC) Compliance	FCC Part15; ANSI C63.4;ICES-003	
Monitoring	Via EMA Software	
Transformer Design	High Frequency Transformers, Galvanically Isolated	
Safety Class Compliance	UL1741，CSA C22.2 No.107.1-01	
Grid Connection Compliance	IEEE1547	

*The default AC output is 240V mode. For 208V mode, please set the AC output range through ECU.
**Programmable through ECU to meet customer need.
***Depending on the local regulations.

Specifications subject to change without notice - please ensure you are using the most recent update found at www.APsystems.com

THE ALLMAX M PLUS

FRAMED 60-CELL MODULE



60 CELL
MONOCRYSTALLINE MODULE

275-305W
POWER OUTPUT RANGE

18.6%
MAXIMUM EFFICIENCY

0~+5W
POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. we believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

Trinasolar

Excellent low light performance on cloudy days, mornings and evenings

- Advanced surface texturing
- Back surface field
- Selective emitter

Maximize limited space with top-end efficiency

- Up to 186 W/m² power density
- Low thermal coefficients for greater energy production at high operating temperatures

Highly reliable due to stringent quality control

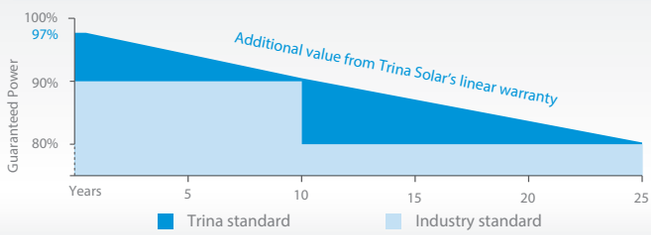
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 100% EL double inspection

Certified to withstand the most challenging environmental conditions

- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

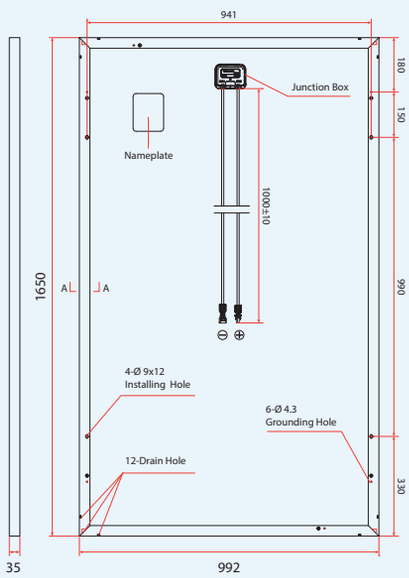
LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty · 25 Year Linear Power Warranty

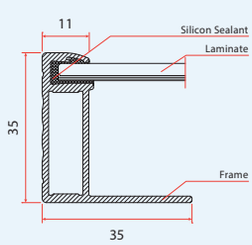


PRODUCTS	POWER RANGE
TSM-DD05A(II)	280-305W
TSM-DD05A.08(II)	280-305W
TSM-DD05A.05(II)	275-300W

DIMENSIONS OF PV MODULE(mm)

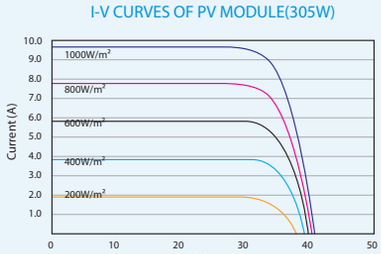


Back View

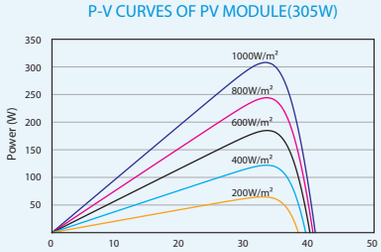


(A-A)

I-V CURVES OF PV MODULE(305W)



P-V CURVES OF PV MODULE(305W)



ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	275	280	285	290	295	300	305
Power Output Tolerance-P_{MAX} (W)	0 ~ +5						
Maximum Power Voltage-V_{MPP} (V)	31.4	31.7	31.8	32.2	32.5	32.6	32.9
Maximum Power Current-I_{MPP} (A)	8.76	8.84	8.97	9.01	9.08	9.19	9.28
Open Circuit Voltage-V_{OC} (V)	38.7	39.0	39.3	39.5	39.7	39.9	40.2
Short Circuit Current-I_{SC} (A)	9.26	9.35	9.45	9.50	9.55	9.64	9.72
Module Efficiency η_m (%)	16.8	17.1	17.4	17.7	18.0	18.3	18.6

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.
*Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Maximum Power-P_{MAX} (Wp)	205	209	212	216	220	223	227
Maximum Power Voltage-V_{MPP} (V)	29.2	29.4	29.6	29.9	30.2	30.4	30.6
Maximum Power Current-I_{MPP} (A)	7.02	7.10	7.17	7.23	7.28	7.35	7.42
Open Circuit Voltage-V_{OC} (V)	36.0	36.3	36.6	36.7	36.9	37.1	37.3
Short Circuit Current-I_{SC} (A)	7.48	7.55	7.63	7.67	7.71	7.78	7.84

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline 156.75 × 156.75 mm (6 inches)
Cell Orientation	60 cells (6 × 10)
Module Dimensions	1650 × 992 × 35 mm (65.0 × 39.1 × 1.38 inches)
Weight	18.6 kg (41.0 lb)
Glass	3.2 mm (0.13 inches), High Transmission, AR Coated Tempered Glass
Backsheet	White [DD05A(II), DD05A.08(II)]; Black [DD05A.05(II)]
Frame	Silver Anodized Aluminium Alloy [DD05A(II)]; Black Anodized Aluminium Alloy [DD05A.08(II), DD05A.05(II)]
J-Box	IP 67 or IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm² (0.006 inches²), 1000 mm (39.4 inches)
Connector	QC4 / TS4

TEMPERATURE RATINGS

NOCT(Nominal Operating Cell Temperature)	44°C (±2°C)
Temperature Coefficient of P_{MAX}	- 0.39%/°C
Temperature Coefficient of V_{OC}	- 0.29%/°C
Temperature Coefficient of I_{SC}	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC (IEC) 1000V DC (UL)
Max Series Fuse Rating	15A

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

10 year Product Workmanship Warranty
25 year Linear Power Warranty

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 840 pieces

Trinasolar

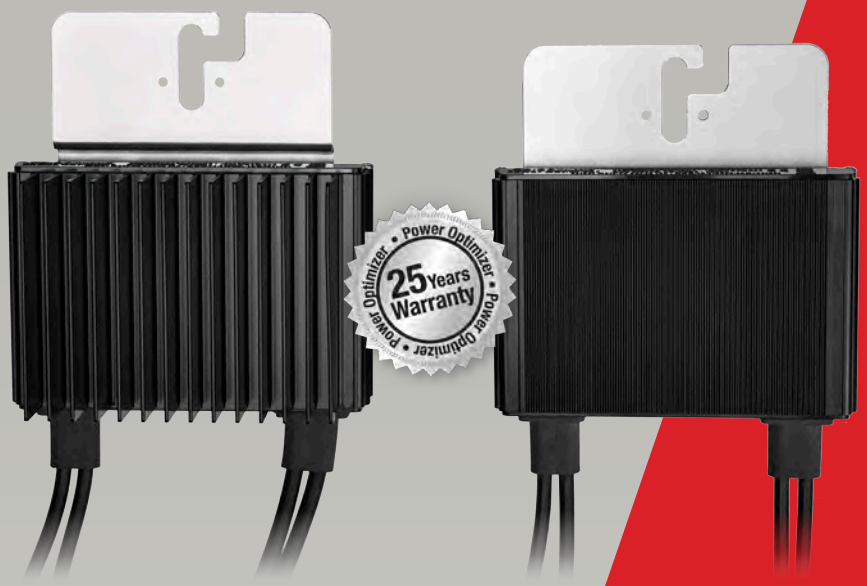
CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

solaredge

Power Optimizer

P320 / P370 / P400 / P405 / P505

POWER OPTIMIZER



PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

Power Optimizer

P320 / P370 / P400 / P405 / P505

OPTIMIZER MODEL (typical module compatibility)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power[1]	320	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48	60	80	125[2]	83[2]	Vdc
MPPT Operating Range	8 - 48	8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11		10.1		14	Adc
Maximum DC Input Current	13.75		12.63		17.5	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8				98.6	%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	15					Adc
Maximum Output Voltage	60			85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1		128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32	mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[3]					
Output Wire Type / Connector	Double Insulated; MC4					
Output Wire Length	0.95 / 3.0	1.2 / 3.9				m / ft
Operating Temperature Range	-40 - +85 / -40 - +185					˚C / ˚F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER[4][5]		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	P320, P370, P400	8		10	18	
	P405 / P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[6]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[7]	12750[8]	W
Parallel Strings of Different Lengths or Orientations		Yes				

[4] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P405/P505 with P320/P370/P400/P600/P700/P800 in one string
[6] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
[7] For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
[8] For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

Invoice #110

From **SolarNinjas Energy Solutions Ltd.**
780 920 9120
mike@solarninjas.energy
Http://Www.SolarNinjas.Energy
#724. 10301 104st Edmonton AB
T5J1B9

Client Phone 780-787-0574

Bill To 5116 50 Ave
Innisfree, Alberta T0B 2G0

Issued 2018-11-20

Due **2018-11-20**

Innisfree Village Council

5116 50 Ave
Innisfree, Alberta T0B 2G0

For Services Rendered

SERVICE / PRODUCT	DESCRIPTION	QTY.	UNIT COST	TOTAL
2018-11-21				
Design Consult services for Innisfree village for 4 sites	4 potential solar assessment locations will be studied and the following work product will be produced for the village of Innisfree: - Solar Installation Design complete with equipment suggestions and pricing for individual sites and complete package of 4 sites. - Solar Generation estimations for each site - Shade or other performance issues identified and mitigation plans documented. - Electrical estimating complete for all projects. - Photo documentation of each site - Engineer reviewed structural and electrical drawings for each site - Cost savings estimated based on billing data for each site from utility accounts. - Manufacturer technical information provided on all equipment chosen. - Installation schedule outlined for each project. - Media Plan (How we intend to enable Innisfree to get maximum attention as a result of any projects executed) - Efficiency Improvement plan for energy use at each site (additional tasks to reduce energy use etc) - Plans reviewed by regional authorities (permit issuer, FORTIS etc) for pre-approval of designs. Documentation packages suitable for comparison shopping or issuing for tender.. or approving for us to proceed.	1	$4,355.00	$4,355.00

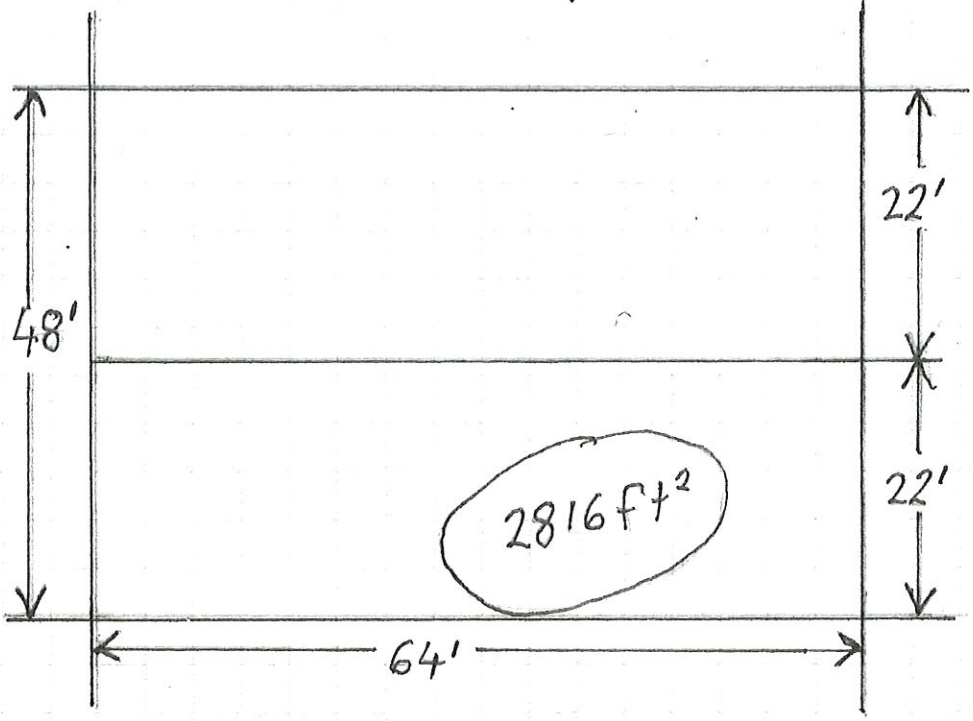
Thank you for your business. Please contact us with any questions regarding this invoice.

GST 76535 8692

Subtotal	$4,355.00
GST # (5.0%)	$217.75
Total	**$4,572.75**
Account balance	**$4,572.75**

Recieved: BM
2021-03-17

Innisfree Camp Admin Office



- 3072ft² @ 12'×3' panels 29gage
- 130 ft eave flashing
- 100ft gable flashing
- 4" plumbing vent boot
- 116' strapping 1×4" rough lumber
- 70' ridge cap

- 2816ft² @ $3.00/sqft = $8448.00

Total materials	$6144
Total labour	$2304
Total	$8448.00

Kevin Moyen
587-280-8388
P.O. Box 56 Innisfree ab.
T0B 2G0
kevinmoyen10@gmail.com