

## Form E – Equipment Proposal for Solarize Dummerston

Bidding company or consortium: Integrated Solar Applications

All information provided in form E for the successful bidder will be publicly available throughout the Solarize program.

The equipment on this form is associated with a (check all that apply);

- Single discounted price
- Tiered pricing that reduces as the total KW contracted increases
- Community Solar

### **Proposed Standard Equipment**

The chart below must include all equipment required for a typical Solarize solar PV installation (all-inclusive) as represented in the associated pricing proposal outlined on E1 and/or E2.

If more than one variety of equipment might be used without impacting project cost, please indicate below. Please also write in any relevant items not listed here and any available warranties on individual components.

Include a description of why you have chosen those brands/manufacturers.

Describe warranty provided for Proposer's labor and workmanship.

Describe and list all model names/numbers of equipment and components installer intends to install including panels, roof attachments, type of racking system, and type of inverters.

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**Please provide a narrative outlining the features and merits of the equipment you have proposed for standard equipment in terms a layperson would understand. Please also comment on any possible product sourcing issues which might arise, including your contingency plan should any of the promised equipment become unavailable during the program.**

The equipment typically used by Integrated Solar is as follows:

**Inverters, SMA Solar Technology AG** – The SMA brand is a market leader for inverters. This German company has a high quality product, sophisticated technology and an excellent track record for low defects and for supporting, servicing and repairing their products. Their monitoring equipment is very good. In the event a system includes batteries now or in the future the SMA brand offers the market and technology leading Sunny Island inverter. SMA has recently introduced a new line of inverters, the TL (Transformer-Less), which provides excellent design flexibility with lower operating voltages and 2 MPPT (maximum power point trackers) per inverter thereby allowing higher production. SMA inverters have standard 10 year warranties, extendable at a cost up to a total of 20 years.

**Inverters, Fronius USA, LLC** – Fronius is an Austrian company also with a reputation for high quality and sophisticated equipment. They do have a US headquarters and manufacturing facility in Indiana. Integrated Solar uses SMA inverters first. Then when the system specifications warrant it Fronius inverters are a second choice. Fronius has historically had a wider operating voltage range making it the only inverter of choice in certain situations. SMA's recent product line enhancements have negated that advantage. Fronius does offer larger inverters for single phase operation. Fronius inverters have standard 10 year warranties, extendable at a cost up to a total of 20 years.

**Inverters, Enphase Energy** – Enphase, a California based company, is a dominant market leader in the US microinverter marketplace. Microinverters mitigate shading challenges and provide improved solar production by isolating each panel as a separately functioning generator. Enphase has leading system monitoring technology that allows customers to observe each panel in real-time and includes extensive historical data with a user friendly interface. Enphase inverters are warranted for 25 years. The company is very good about product replacements. The majority of Integrated Solar's installations have become Enphase systems given the performance opportunities.

**Panels, REC Solar ASA** – ISA has used primarily REC Solar panels for several reasons, price competitiveness, US manufactured silicon, high quality, excellent performance record and ownership by a Norwegian company with a very strong cash based balance

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sheet. In November 2014 REC was sold to a state-owned Chinese Chemical Company, China National Bluestar. While our distribution channels, pricing and service have not been changed by this sale of the company it does change our long term view of continuing to use REC modules.

**Panels, General Discussion** - The largest panel manufacturers in the world by rank are as follows (2014 ranking):

1. Trina Solar (China)
2. Yingli (China)
3. Canadian Solar (China)
4. Jinko Solar (China)
5. JA Solar (China)
6. Sharp (Japan)
7. Renesolar (China)
8. First Solar (USA)
9. Hanwha (China)
10. Kyocera (Japan)

These companies are dominant players but there are other credible module manufacturers not far behind, such as Solar World, Suntech and REC. All these companies are considered top tier manufacturers. There's no denying that China is the dominant force in PV production.

In the US there are a very limited number of domestic headquartered manufacturers, First Solar, Suniva and SunPower. Several well-known manufacturers have gone out of business such as Evergreen Solar, Inc. and Solyndra, Inc., both in 2011. US made panels have historically sold at a significant price premium when compared to foreign made panels.

ISA has installed many different panels, REC, Hanwha, Yingli, Solar World, Canadian Solar, Astronergy and others. No one knows the fate of various manufacturers 2 years out never mind 25. At this point we are essentially panel agnostic. We will shop for the best top tier panel available at the best price. We are focused on a quality product with industry standard warranties and a stellar service record. All top tier manufacturers offer a 10 year workmanship warranty and a 25 year performance guaranty at 80% of the original nameplate rating.

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**Racking, UniRac** – Rooftop systems are typically installed using UniRac hardware designs. UniRac is a US company located in New Mexico. UniRac provides all the stand-off, rail and hardware attachments. UniRac’s product warranty is 5 years for finish (i.e.: peeling, cracking or chalking) and 10 years for general workmanship.

**Racking, IronRidge** - In the last year ISA has begun using IronRidge racking given its superior design strength and flexibility as well as an attractive warranty. The warranty provides for no visible defects for 3 years, structural defects for 10 years and functional defects for 20 years. IronRidge is a California based company.

**Roof Flashings, EcoFasten Solar** - ISA is pleased to have an important and high quality flashing manufacturer here in Morrisville, VT. EcoFasten provides flashing details and hardware for all types of roof attachments.

**Racking, Schletter, Inc.** – ISA has used Schletter ground mounting systems almost exclusively. Schletter designs, engineers and provides stamped drawings for all installations. This versatile racking system can accommodate a full range of systems from small to very large in landscape and portrait. Schletter manufactures its products in North Carolina. The Schletter warranty is for a 20 year period for product defects and workmanship deficiencies.

**Monitoring** - All monitoring that will be used for the solarize program will be provided by the respective inverter manufacturer, SMA, Fronius or Enphase. These systems are integrated with the inverter technology. Typical monitoring warranties are for 1 year.

**ISA Warranty** - ISA provides a 5 year warranty for the system design and installation. ISA will process any equipment warranty claims during the 5 year period.

**Equipment model Numbers** - Many different equipment model numbers will be selected based on individual system design requirements and are therefore not listed here.

**Product Sourcing** – When product sourcing issues arise typically alternative distribution channels or alternate equipment selections can be found.

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Major Component (Standard Equipment)	Manufacturer, Model #	Country Where Produced	Warranty	Notes
Inverter(s) Specify Type's (I.E. Micro, String)	SMA Fronius Enphase	Germany Austria California	10 Yrs 10 Yrs 25 Yrs	See above
PV Modules	REC Hanwha Solar World First Solar Other	Singapore China Germany USA	10 Yr Wkmnshp 25 Yr Perform	See above
Roof Mounting System	Unirac Iron Ridge	New Mexico California	5/10 Yr 3/10/20 Yr	See above
Ground Mounts	Schletter	N. Carolina	20 Yr	See above
Data Acquisition System	SMA Fronius Enphase	See above	5 Yr 2 Yr 2 Yr	See above

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Meters	Hialeah	Florida	2 Yr	Generally all meters are provided by the utility co., ISA will install a temporary Hialeah meter.
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### Adjusted Pricing Factors Chart (a.k.a. System Cost Add ons)

- It is understood that features of certain installations will result in higher costs.
- The assumption is that all costs to most homeowners are factored into the base price, and that an additional charge, if necessary, is reserved for unique homeowner circumstances and options.
- Installers are highly encouraged to keep their pricing proposals and list of adders **simple**. While a comprehensive list of adders may provide homeowners with many options, some adders can be perceived negatively by community representatives and homeowners. Adders should be for unusual circumstances or to satisfy customer preferences, **NOT** to address common issues that many or all projects will require. For example, installers should avoid adders for items such as “steep roofs,” but should consider this a factor in establishing their base pricing based on the installers assumptions about the frequency of such roof types. Avoiding a perception of “nickel and diming” will lend credibility and favorability to your proposal.
- Any additional charges not included in the \$/watt price must be explicitly explained and quantified in the proposal (either \$/W or flat fee) (e.g., charges for electrical upgrades, steep roofs, specific roofing types/materials, multiple array locations, small system size, customized racking, tree trimming, etc).
- Please specify any additional cost to the homeowners for securing historic permits, or other permits or approvals that go above and beyond normal permitting requirements.
- Should a participant require roof repairs or replacement at a later date independent of Proposer’s PV installation, please specify if Proposer is able to remove and reinstall the original PV installation, and at what cost to the participant.

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- If you offer multiple options for panels (i.e. American-made vs. not American- made), inverters (i.e., central inverters vs. micro-inverters) or roof attachments/racking, please specify components and costs for each option in the second table.
- Please also list any services not provided by the installer that, if required, could add to total project cost (e.g. tree removal or structural reinforcement of rafters):

**Equipment Add-on's required for some systems - Please read the summary on pages 12-14**

Example Required Add-ons	Description of Cost Adder	Increased Cost \$/W or flat rate (*1)	Notes
<b>Site Specific</b> e.g. · Multiple roofs · Roof material · Slate roof			Multiple roofs and roof materials falls under degree of difficulty.  We do not install on slate roofs.  Not to exceed .75/ Watt
<b>Electrical</b>  · Electrical panel upgrade · Meter upgrade · Interior conduit run Additional wire			These additional costs will be determined at the time of the site proposal and will be customized for the given situation.

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length for ground mount			
<b>Example Required Add-ons</b>	<b>Description of Cost Adder</b>	<b>Increased Cost \$/W or flat rate (*1)</b>	<b>Notes</b>
<b>System Size</b> e.g. additional cost per kW for systems under X kW, or discount for larger systems	a. Roof top smaller than 4kW a. Roof top larger than 10kW b. Ground mount smaller than 7kW b. Ground mount larger than 15kW	+.55 -.50 +.55 -.50	a) Roof-top: These systems smaller than 4 kW will have an additional charge of \$.55/Watt. Systems larger than 10 kW will receive a price reduction of \$.50/Watt. b) Ground mounted systems: These systems smaller than 7 kW will have an additional charge of \$.55/Watt. Systems larger than 15 kW will receive a price reduction of \$.50/Watt.
<b>Other</b>			

[1] Including system design, permitting, applicable materials and equipment, transportation, labor, and all equipment and workmanship warranties. Price should be independent of any available tax credits or incentives.



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### Optional Equipment Add-on's

Describe any Optional Add-on's that you will offer.

Describe if proposed system components offer online monitoring, and if such services are included in the cost of installation, or are optional. Please specify if such monitoring would be on the system level or panel-by-panel.

Example Optional Add- ons	Description of Cost Adder	Increased Cost \$/W or flat rate (*1)	Country Where Produced	Warranty	Notes
<b>Site Specific</b> e.g. · Ground mount vs roof mount · Seasonally adjustable tilt racking.					<ul style="list-style-type: none"> <li>• Please see above</li> </ul> We are not offering Seasonal tilt or trackers for the solarize program.
<b>Panels:</b> · Alternative panel options					If a customer demands a specific panel and they can only be acquired by paying a premium that premium will be passed onto the customer. This will be disclosed at the time of proposal.
<b>Optional or                      enhanced                      System                      Monitoring</b>					Our monitoring system cost assumes a working internet connection. At times a monitoring system may require a booster or another device due to the internet connections speed or frequency. This is sometimes not

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					known until the monitoring system is installed. A change order will be completed and the customer can choose to upgrade based on the disclosed cost and efficacy of service or not. We have seen these cost go as high as \$750
Example Optional Add- ons	Description of Cost Adder	Increased Cost \$/W or flat rate (*1)	Country Where Produced	Warranty	Notes
<b>Inverters:</b> · Alternative inverter options · Other Options .Inverters with off grid capabilities	Micro-inverters	+.20			Inverters are described above in detail. The only adder is for the use of micro-inverters.  If the customer requests an off-grid system this is custom designed and priced for each specific site.

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<p><b>Other</b> e.g. . other upgrades extended warranties . maintenance contracts . other upgrades</p>					<p>ISA is not offering extended warranties on our designs or installations. Our warranties are for five years.</p> <p>A customer can buy extended warranties from the component companies directly. ISA will assist them through this process at no cost.</p> <p>ISA provides free maintenance for the first five years under our warranty for design and installation excluding snow removal or washing. If a customer would like a maintenance contract beyond the first five years then ISA will provide a maintenance agreement at that time.</p>
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[1] Including system design, permitting, applicable materials and equipment, transportation, labor, and all equipment and workmanship warranties. Price should be independent of any available tax credits or incentives.

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Please provide a narrative outlining the features and merits of the equipment you have proposed for equipment add-on's in terms a layperson would understand. Please also comment on any possible product sourcing issues which might arise, including your contingency plan should any of the promised equipment become unavailable during the program.

The table below titled Summary Of Pricing Adjustments provides for 9 different price adjustment factors.

Preface - Solar systems are not one size, one layout, one set of equipment fits all. Likewise, all properties vary and therefore solar system design is unique to each property. Pricing per watt can vary for any given ground or roof mount system by up to \$2/watt. Solar pricing done in the absence of a full site visit and design analysis does not serve well the client's or the contractor's objectives. Solarize programs by intent attempt to standardize pricing with pricing matrices and tiers, provide pricing discounts and simplify the sales process to accelerate the pace of solar adoption in a community. That's an admirable goal! However, some Solarize programs have resulted in a miss-match between customer expectations (perhaps the standard quoted base rate) and reality (the final project cost). Some of these programs have resulted in "a race to the bottom" with pricing and therefore poor quality system installations or aborted Solarize programs when the contracts were never installed. That is a bad result for the community, the customer, the contractor and the solar industry. Therefore, it is our hope that the Solarize committee recognizes this and that it is the intention of all involved to make this clear to all participating potential customers. A full disclosure should be included in all marketing materials and should be part of all outreach and community meeting efforts.

The 9 pricing adjustments are discussed as follows:

1. **Distance** – There will be no additional charge for properties located in Dummerston. Properties outside of Dummerston at a distance of more than 20 miles will be charged a travel fee for each mile beyond 20 miles at a rate of \$.005/watt/mile.
2. **Difficulty** – The difficulty of an installation varies based on factors such as, but not limited to, the number of stories, slope of roof, staging requirements, access for vehicles and personnel, obstructions in the area of access (decks, landscaping, other structures), and the location of the solar array from the point of interconnection. These factors need to be assessed for each property and the appropriate charge needs to be determined. ISA agrees that such Difficulty additional charge will not exceed \$.75/watt.
3. **Electrical Upgrades** – All properties differ in the status of the existing electrical service and equipment. Older properties with obsolete, compromised or non-code compliant equipment can require upgrades. These upgrades can only be determined after a review by a master electrician. These additional costs will be determined at the time of the site proposal and will be customized for the given situation.
4. **Blocking** – Blocking of rafters and roof systems can be easy and quick or it can be difficult to access, extensive and take multiple

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- days. These additional costs will be determined at the time of the site proposal and will be customized for the given situation.
5. **Ground Mount** – Ground mounted systems will add \$1.00/watt to the base system cost.
  6. **Extra Ground Trenching** – In the event the wire and conduit run for a ground mounted system exceeds 200 feet there will be an additional charge of \$5/foot for each foot beyond 200 feet.
  7. **Monitoring** – There will be an additional charge for equipment to provide system monitoring. For string inverter systems the charge will be \$900.00. For microinverter systems the charge will be \$750.00.
  8. **Micro-Inverters** – Systems with micro-inverters (rather than string inverters) will be charged an additional amount of \$.20/Watt.
  9. **System Size** – a) Roof-top: These systems smaller than 4 kW will have an additional charge of \$.55/Watt. Systems larger than 10 kW will receive a price reduction of \$.50/Watt. b) Ground mounted systems: These systems smaller than 7 kW will have an additional charge of \$.55/Watt. Systems larger than 15 kW will receive a price reduction of \$.50/Watt.

A solar system design may identify related scope of work items not included with a base proposal. Tree trimming is typically identified for the customer but the actual scope of work to cut the trees is the customer's responsibility. Custom carpentry may be necessary to provide a level of finish consistent with the existing property. Landscaping features such as stone walls, ponds, paved areas, irrigation and other obstacles may result in a higher cost for a ground system installation and/or require work by others at customer's expense. In the event special permitting beyond a standard Certificate of Public Good is required given the nature of the customer's property such as a historic or archeological review then the customer will be responsible to such cost of permitting.

If the customer wishes to re-roof a property after the initial system installation ISA can remove the system and re-install it when the roof has been replaced. In general we do not recommend installing systems on roofs with an expected remaining life less than 20 years. In the event this removal becomes necessary ISA will provide a quotation for such work at that time (20 years in the future).

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### SUMMARY OF PRICING ADJUSTMENTS

<u>#</u> <u>DESCRIPTION</u>	<u>COMMENTS</u>	<u>AMOUNT</u>
1 DISTANCE	Non-Dummerston, Beyond 20 miles	+.005/W/mile
2 DIFFICULTY	Staging, steep roof, access	Custom, + up to \$.75/W
3 ELECTRICAL UPGRADES	Panel or electric system	Custom
4 BLOCKING	Rafter Reinforcement	Custom
5 GROUND MOUNT		+\$1.00/W
6 EXTRA GROUND TRENCHING	Beyond 200 feet	+\$5/ft
7 MONITORING	Internet monitoring system	String +\$900/Micro +\$750
8 MICROINVERTERS		+.20/w
9 SYSTEM SIZE	Roof-top	<4kW - Add \$.55/W
		>10 kW - Deduct \$.50/W
	Ground Mount	<7 kW - Add \$.55/W
		>15 kW - Deduct \$.50/W