Low-Cost Solar Retrofit

Grid-Ready Plug-and-Play PV Kit

Low-Cost, Smart-Grid Ready Solar Re-Roof Product Enables Residential Solar and Energy Efficiency Retrofits

Detailed Cost Analysis: GE Smart-Grid Ready Insert & Capture Solar PV

For
Itron, Inc., Program Manager
California Solar Initiative
Research, Development, Demonstration & Deployment
Solicitation #2

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I. Introduction

This report provides a detailed analysis of the likely product cost for the GE PV residential retrofit system beta-tested and evaluated in the CSI RDD#2 project "Low-Cost, Smart-Grid Ready Solar Re-Roof Product Enables Residential Solar and Efficiency Retrofits" by BIRAenergy, with partners GE and SDGE. In the project documents this same GE prototype product is referred to as "GE Insert and Capture PV System", and "Grid-Ready Plug-and-Play PV Kit". References to "Grid-Ready Plug-and-Play PV Kit" are meant to be generic for a new PV retrofit product that is simple and relatively inexpensive to manufacture and install, has minimal parts, pieces and components, and that is represented in this project by the GE system.

A key design goal for this PV system was for the main parts of the system, all those that go on the roof, to be installable by roofing contractors rather than specially trained and certified solar installers. This was achieve through the simple mounting system ("Insert and Capture"), AC electric-system design (microinverters integrated into the PV modules) rather than the typical DC design that requires, by code, a certified electrician to make electrical connections on the roof, and a completely plug-and-play electrical harness, that includes integrated, continuous ground-wiring for connecting the PV modules, and the modules to the roof-side junction box. This design approach was adopted to make the system practical for roofers to carry and sell as part of their product line, and, by eliminating the need for specialized labor on the roof, and potentially reduce the inspection labor time required (insert-and-capture, and plug-and-play simplify mounting and connections, and thereby inspections), the soft costs associated with installation labor costs are reduced, helping to keep the overall installed costs low.

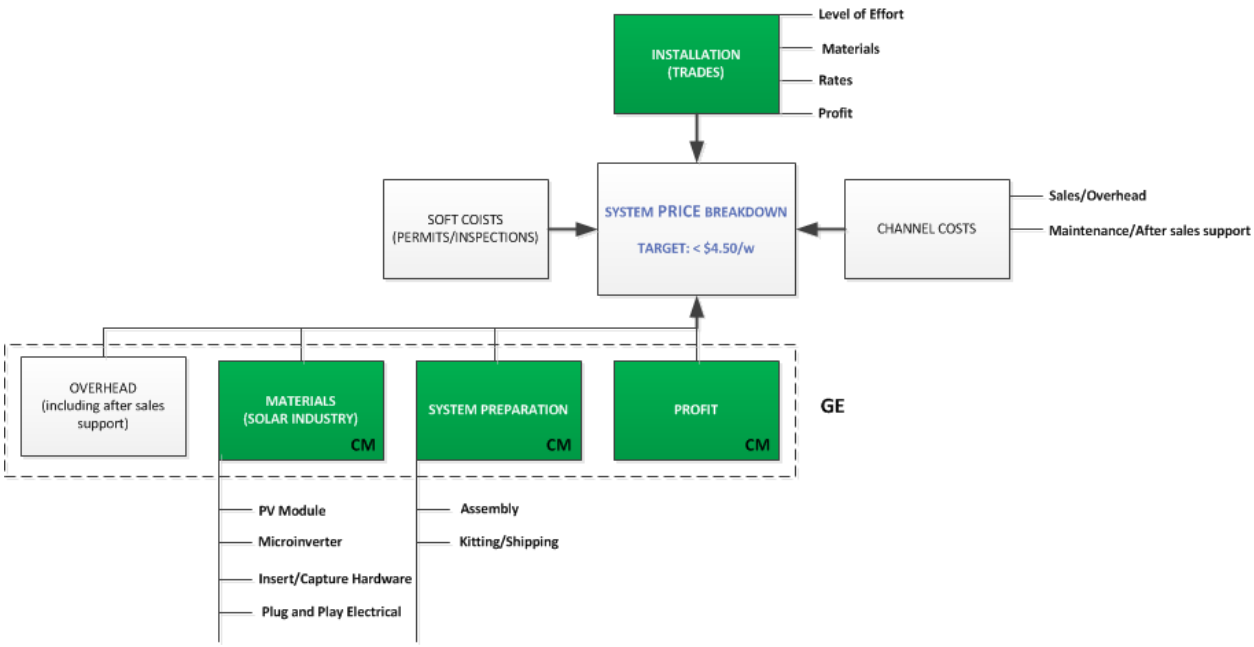

Figure 1. Organization of cost elements as they contribute to the installed system price to consumer

II. System Cost

Figure 1 provides a breakdown of the critical elements of the solar value chain that influence price to the consumer based on the model adopted for this project. As shown the price to the consumer is determined by 1) the cost of the system as provided by a company such as GE including the company's profit, 2) the total cost of the installation both mechanical and electrical also including profit, 3) channel costs which could include financing and other costs associated with distribution, and 4) soft costs associated with local permitting, installation, and inspection requirements. The project addresses those elements that are highlighted: system equipment costs, system assembly and kitting, profit, and the cost of installation. This project does not directly influence channel costs and soft costs but will project the present value of these costs and their effect on meeting the target goal for an installed system price of < $4.50/W.

III. Brief discussion of each cost elements

1. *Overhead.* Overhead is associated with all critical support functions. For this project the assumption made is that GE will not be directly involved in sales to the consumer. However GE sells product into the channel and will therefore have to maintain a sales operation and also a marketing function. Other operations include accounting, legal, and engineering/product support. The cost of these operations will factor into the "operating margin" or OM.

2. *Materials.* GE is responsible for all of the mechanical and electrical components of the system kit that it delivers into the channel - whether developed in-house or sourced. If developed in-house, these costs will also include the non-recoverable engineering expenses. Specifically these components include the photovoltaic module, the microinverter, all of the insert and capture mounting system hardware, and all of the plug and play electrical system hardware (up to the point where the electrical contractor takes over from the roofing contractor to complete the interconnection to the load panel).

3. *System Preparation.* GE is responsible for the configuration of the system kit that will be shipped into the channel. There is assembly associated with the kit primarily around the plug and play electrical components including assembly of the interconnection harness and pre-wiring of the junction ac-switch. GE has defined and implemented a packaging approach for the system kit for delivery to the installation site. The cost of shipping will also be included.

4. *Profit.* For this project a 30% contribution margin was assumed based on using the cost of items 1-3 (listed above) as the basis.

IV. Market Effects and Market Actors

Up until 2011 integrator/installers have been responsible for 95% of all residential solar installations in the U.S. and as the main interface to the residential customer, they have been able to set system prices. As early as the first quarter of 2010 the average U.S. price for a residential solar electric system was over $7.00/W, with some systems still installed at > $8.00/W. At this time module prices were still above $ 2.50/W. Over the past two years the industry has experienced an unprecedented drop in module prices to under $0.80/W. As shown in Figure 2 there has also been a drop in system pricing to under $6.00/W. Pricing in New York as shown in the figure has trended lower than the U.S. average.

From earlier studies up to 50% of the system price can be attributed to combination of the channel costs, soft costs, and installation costs. This project deals with the installation costs and focuses on an installation model that is dependent upon the use of standard contracting trades instead of specially trained and certified installers.

This project does not deal directly with soft cost reduction although features of the insert and capture/plug and play technology which is the focus of the projects including integral grounding are expected to have an impact on reducing the soft costs associated with inspections. Also, while the GE system is not limited to any particular channel, the completeness of the system design is expected to simplify its entry into the channel by eliminating the need for traditional distribution and the associated costs of designing and specifying system components. For example, the GE system can be directly delivered to customer installation sites reducing total handling and transport costs.

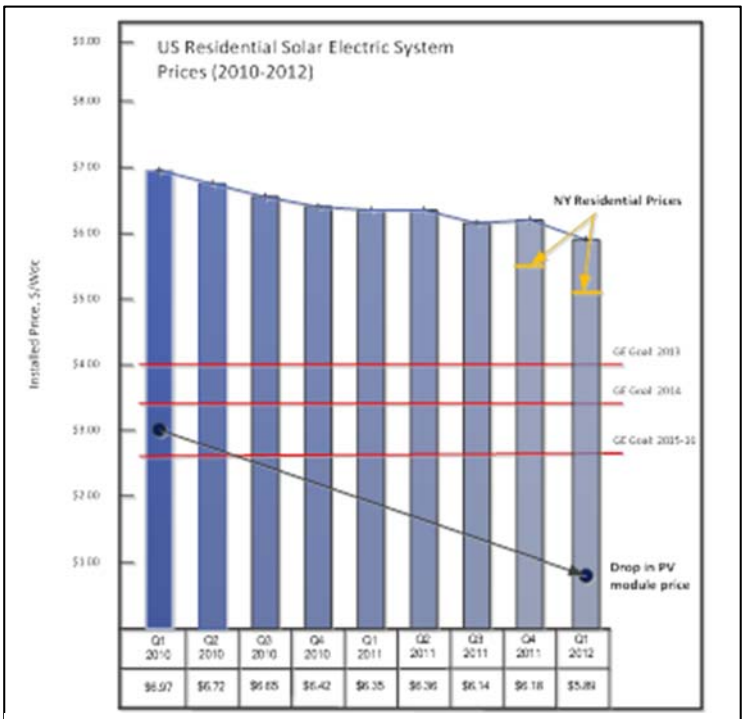

Figure 2. Pricing history for residential solar electric systems in the U.S. from 2010

V. Components and Materials Costs – Baseline System

Figure 3 shows all of the system components that comprise a complete kit for a 2.4 kWdc (10-module) installation. The 10-module 2.4kWdc system is the baseline system in that the 10 modules fill the 3-rail insert-and-capture mounting system, and the wiring harness accepts up to 10 PV modules, and the roof-side junction box has a single input connector. A 4.8 kW system kit will have twice the number of components, and is actually two baseline systems.

The bill of materials (BOM) for a 4.8kW system kit is provided in Table 1. Each component designation is assigned a vendor part number and in addition to the unit cost, number of units per system, and total costs, the component weights are also provided. All costs are based upon vendor quotations for volumes of 1000 systems (5 MW). The BOM shows costs for two system configurations. A 4.8 kW system that meets up to 130 mph wind loading requires 48 stanchions (8 per 16-ft. rail). A 4.8 kW system that meets up to 80 mph wind loading requires only 30 stanchion (5 per 16-ft. rail) resulting in a less expensive BOM. The BOM cost for the 4.8 kW insert and capture system meeting the 80 mph wind loading requirement in New York is $8,530. This includes all of the mechanical components including the ac module and the electrical components in the ac circuit up to the switch/connection box that is mounted onto the side panel or rail. None of the labor costs for assembly are included in the BOM nor is the monitoring system included. For the 4.8 kW system the total materials cost corresponds to $1.81/W. For a system meeting 130 mph wind loading the total material cost rises to $9,316 or $1.98/W.

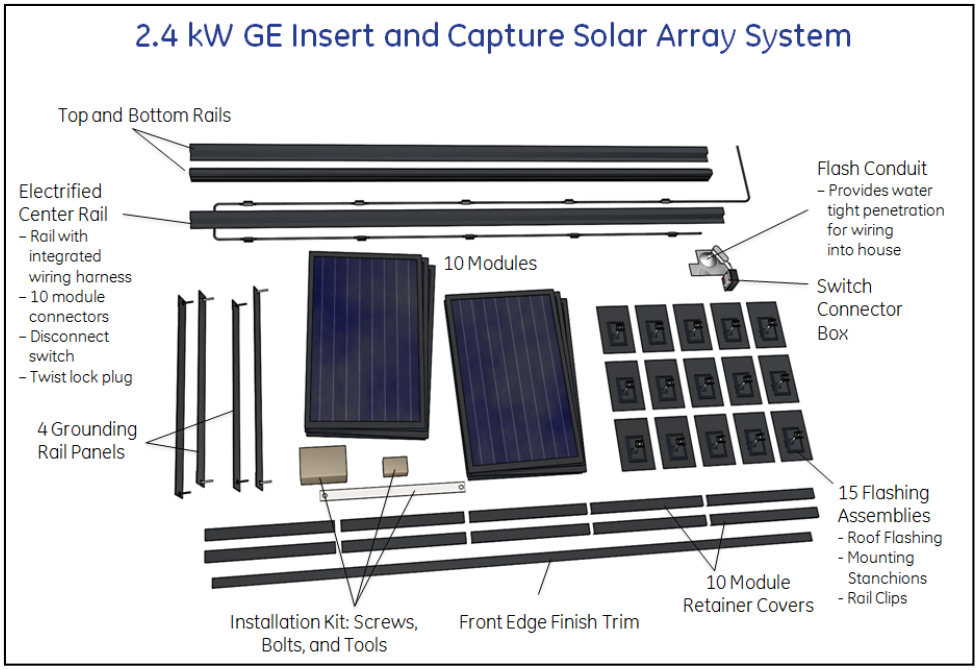

Figure 3 GE 2.4 kW insert and capture system kit designed for 80 mph wind loading

In addition to the electrical components included within the kit there are additional components that are provided by the electrical contractor to complete the installation of the ac circuits. These costs will be added to the level of effort labor costs along with a margin to generate a total electrical contractor cost. The "baseline" scenario for the lowest cost installation references the block diagram in Figure 4 which shows the ac circuit for a 2.4 kW building block routed from the switch/connector box.

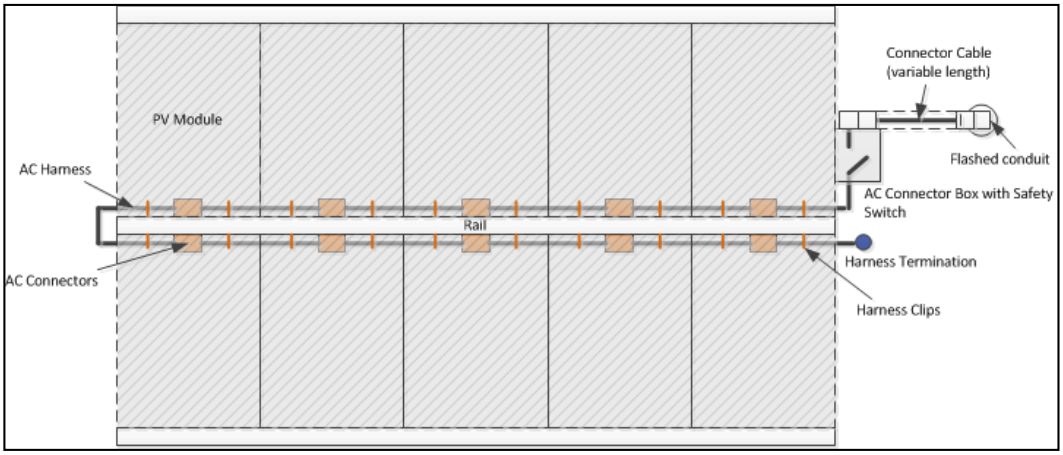

Figure 4. Roof Elements of a 2.4 kW AC System – the Baseline System

4.7kW - Bill of Materials for Residential Solar System

Assy.	Part Description	Qty.	Manufacturer	Manufacturer Part #	Material	Weight (lbs)	4.7kW Cost	Cost/Unit
Main Asm								
Roof Mounting System								
Stanchion	**Stanchion**	-	-	-	-	-	$ 1,572.24	-
	Stanchion Base	54	American Douglas	15283251	SS (304)	0.949	$ 731.70	$ 13.55
	Standoff	54	American Douglas	15283250	SS (304)	-	$ -	$ -
	5/16" x 3.5" SS Lag Bolt	54	American Douglas	587A0384	SS (304)	-	$ -	$ -
	Rail Clip Assembly	108	McMaster-Carr	901123A247	SS (316)	-	$ 24.60	$ 0.23
	Rail Clip	54	American Douglas	15283252	SS/Al	0.278	$ 326.16	$ 6.04
	SS Washer (0.75" ID, 1.5" OD)	54	American Douglas	12C8432	Al (6061)	-	$ -	$ -
	SS External Retaining Ring (for 0.75" diameter shaft)	54	McMaster-Carr	96853A281	SS (18-8)	-	$ -	$ -
		54	McMaster-Carr	91590A128	SS (PH 15-7 MO)	-	$ -	$ -
	Flashing	54	Rapid Sheet Metal Inc.	12C8445	Al (6061)	0.636	$ 458.46	$ 8.49
	Grommet	54	McMaster-Carr	63595K32	PVC (Flexible)	-	$ 31.32	$ 0.58
Rail	**Rail**	-	-	-	-	-	$ 713.07	-
	Short Click Rail (196" length)	6	American Douglas	15283248	Al (6061)	20.384	$ 402.42	$ 67.07
	Capture Strap (39" length)	20	American Douglas	15283253	Al (6061)	0.860	$ 152.40	$ 7.62
	Face Plate (196" length)	2	American Douglas	21307326	Al (6061)	9.800	$ 105.16	$ 52.58
	SS Counter-sunk Socket Cap Screw 10-24 x .5"	150	McMaster-Carr	93791A491	SS (18-8)	-	$ 16.98	$ 0.11
Splice Block		3	American Douglas	15283249	Al (6061)	0.210	$ 8.13	$ 2.71
	SS Screw 10-24 x 3/8"	12	McMaster-Carr	97763A214	SS (18-8)	-	$ 1.85	$ 0.15
Wire Harness Block		12	American Douglas	15283256	Al (6061)	0.035	$ 20.04	$ 1.67
	Wire Capture Straps	24	DIGIKEY	WHC-375-01-ND	NYL	-	$ 2.40	$ 0.10
	SS Screw 10-24 x 3/8"	24	McMaster-Carr	97763A214	SS (18-8)	-	$ 3.69	$ 0.15
Endcaps	**Endcaps**	-	-	-	-	-	$ 78.51	-
	Rail Tie Front	2	American Douglas	12C8442	Al (3003 H14)	2.824	$ 33.84	$ 16.92
	Rail Tie Back Left	1	American Douglas	12C8444	Al (3003 H14)	2.576	$ 19.16	$ 19.16
	Rail Tie Back Right	1	American Douglas	12C8443	Al (3003 H14)	2.576	$ 19.16	$ 19.16
	SS Thread Forming Screw 1/4 - 20 x 0.75" (Phillips Head)	12	Horizon	THWTFPXTAP025C050A	SS	-	$ 5.88	$ 0.49
	SS External Tooth Washer (Screw Size: 1/4")	12	McMaster-Carr	95584A207	SS (18-8)	-	$ 0.47	$ 0.04
Appliance	**AC Module**	-	-	-	-	-	$ 6,235.10	-
	Motech 235 Watt Module	20	Motech	MTPVp-235-MSB	-	43.700	$ 3,995.00	$ 199.75
	Enphase Micro-Inverter	20	Enphase	M215-60-240-S25	-	3.500	$ 2,208.00	$ 110.40
	SS Flange Button Head Socket Cap Screw 5/16" - 18 x5/8"	20	McMaster-Carr	97654A304	SS (18-8)	-	$ 19.24	$ 0.96
	SS External Tooth Washer (Screw Size: 5/16")	20	McMaster-Carr	95584A209	SS (18-8)	-	$ 1.89	$ 0.09
	SS Hex Nut w/ External Tooth Washer (5/16" - 18)	20	McMaster-Carr	96278A519	SS (18-8)	-	$ 5.36	$ 0.27
	SS Self-Drilling Screw 10 - 16 x 1/2"	20	McMaster-Carr	90821A355	SS (18-8)	-	$ 5.61	$ 0.28
AC Wiring		-	-	-	-	-	$ 716.85	-
	Enphase Trunk Cable for M215 Portrait Installation (Qty. is per module)	20	Enphase (Civic Solar)	ET10-240-001	-	1.000	$ 337.20	$ 16.86
	Installation Kit (1 Disconnect Tool, 4 Terminators, 5 Watertight Caps)	1	Enphase (Civic Solar)	ET-INSTL	-	-	$ 69.58	$ 69.58
	Electrical Flashing (SolaDeck: 3" Fixed Din Rail))	1	SolaDeck (Civic Solar)	SD-0783-41	Galv. Steel	-	$ 66.32	$ 66.32
	Over Current Protection	0	Citel	DS72RS-120	-	0.840	$ -	$ 119.00
	Twist Lock Connector	0	???	???	-	-	$ -	$ -
	10/3 AWG w/ Ground (estimated per foot)	130	Lowes	Cerro Wire Estimate	-	-	$ 243.75	$ 1.88

Part Count: 1017

Tools Needed: Tape Measure, Chalk Line, Clutched Drill, 1/2" Socket Drive, Adjustable Crescent Wrench, 1/8" Allen Drive, Phillips Driver Size: #3

4.7kW System Layout

System Weight	Excluding Hardware
1235.56	

System Area	2 times 2.35kW Area
391.04	

lbs / sq Ft
3.16

	24" Spacing	48" Spacing
Total Cost:	$ 9,315.76	$ 8,529.64
Total Cost / Watt:	$ 1.98	$ 1.81

Hardware Cost / Watt:	$ 0.50	$ 0.34
Stanchion Cost / Watt:	$ 0.33	$ 0.17
Rail Cost / Watt:	$ 0.15	$ 0.15

Appliance Cost / Watt:	$ 1.48	$ 1.48
AC Module Cost / Watt:	$ 1.33	$ 1.33
AC Wiring Cost / Watt:	$ 0.15	$ 0.15

Table 1. Bill of Materials (BOM) for 4.8kW GE Insert and Capture PV System

In cases where the installation is more involved, the electrical contractor cost varies from the baseline. If the ac wiring cannot be easily routed through the roof and then down to the load panel an alternative approach is taken. Examples include several New York performance test site installations. In both cases conduit had to be run on the roof and down the side of both residences resulting in increased labor and materials costs. Table 2 summarizes the electrical contractor material costs.

Table 2. Electrical contractor material costs (costs in Blue apply to CA installations).

MATERIAL	QUANTITY	UNIT	UNIT COST	TOTAL
3/4" SEALTIGHT	50	ft.	$ 0.87	$ 43.50
3/4" SEALTIGHT CONN STRAIGHT	6	ea.	$ 4.17	$ 25.02
3/4" SEALTIGHT CONN 90 DEG	6	ea.	$ 6.77	$ 40.62
1/2" STRAIN RELIEF CABLE CONN	2	ea.	$ 3.21	$ 6.42
3/4"-1/2" THREADED REDUCERS	2	ea.	$ 0.23	$ 0.46
RED WIRENUTS	8	ea.	$ 0.11	$ 0.88
#8 THHN GROUND WIRE	100	ft.	$ 0.38	$ 38.00
#10 THHN STRANDED CONDUCTOR	600	ft.	$ 0.23	$ 138.00
3/4"EMT	40	ft.	$ 0.39	$ 15.60
3/4"EMT CONNECTORS	6	ea.	$ 0.30	$ 1.80
3/4"EMT COUPLINGS	4	ea.	$ 0.44	$ 1.76
4" SQUARE BOX	2	ea.	$ 1.88	$ 3.76
4" SQUARE BOX BLANK COVER	1	ea.	$ 0.87	$ 0.87
4" SQUARE BOX RAISED COVER	1	ea.	$ 1.44	$ 1.44
15A DUPLEX RECEPTACLE	1	ea.	$ 2.81	$ 2.81
SINGLE GANG DEEP ALUM BOX W/3/4" KO	2	ea.	$ 11.76	$ 23.52
SINGLE GANG ALUM BOX COVER	2	ea.	$ 1.23	$ 2.46
2 POLE CB (PER PANEL)	2	ea.	$ 20.96	$ 41.92
1 POLE CB (PER PANEL)	1	ea.	$ 7.95	$ 7.95
3/4"EMT STRAPS	10	ea.	$ 0.15	$ 1.50
3/4" SEALTIGHT STRAPS	10	ea.	$ 0.16	$ 1.60
3/4"EMT LB CONDULETS GASKET AND COVER	6	ea.	$ 6.97	$ 41.82
3/4"EMT TEE CONDULETS GASKET AND COVER	2	ea.	$ 8.55	$ 17.10
#8 CRIMP LUGS	6	ea.	$ 1.23	$ 7.38
UF SPLICE KITS	2	ea.	$ 17.60	$ 35.20
TOTAL MATERIALS				**$ 501.39**
$/W				**0.093**
BASE				**$ 243.90**
$/W				**0.045**

The components in blue would have also been included in the baseline CA BOM. The total cost is $501 or $.09/W which is 2x that for the baseline material cost. Table 3 summarizes the GE system material costs for the different installation scenarios.

VI. Installation Costs

As a part of the development of best practices for installation initial estimates were made for the level of effort associated with the individual process steps shown the flow charts of provided earlier. The assumption is made that all material necessary to complete the installation is at the site. In all cases for this project the level of effort was based on a 2-person installation crew and the use of an automated power ladder for moving the rails and ac modules up to the roof surface. Table 4 summarizes the estimated level of effort for these operations.

Table 3. Bill of material costs for installation scenarios

Bill of Material Costs for Installation Scenarios			
Installation Scenario	***BOM Costs ($)***	***BOM Costs ($/W)***	***Comments***
2.4kWdc (80 mph) baseline	$4549.53	$1.94	48-in stanchion spacing per rafter (option to stagger) 5 stanchions per 16-ft. rail
2.4kWdc (130mph) baseline	$4928.04	$2.10	24-inch stanchion spacing per rafter 8 stanchions per 16-ft. rail
4.8kWdc (80mph) baseline	$8529.64	$1.81/W	5 stanchions per 16-ft. rail
4.8kWdc (130mph) baseline	$9315.76	$1.98/W	8 stanchions per 16-ft. rail
4.8kWdc (80mph) extended snow load	$8905.18	$1.86/W	Additional 13 stanchions required redistribute roof stress under snow loading.

Table 4. Estimated times for installation of 2.4kW baseline system using 2-person roofing crew

Estimated times for installation of 4.8kW baseline system using 2-person roofing crew	
Mechanical Process Step	***Estimated Time (man-hours)***
Site Preparation (safety)	1
Layout Verification	1
Install 1st stanchion row	2.5
Install 2nd and 3rd stanchion rows	3
Install flashings	2
Align and install rails	1
Install and connect modules	1
Wire dressing (additional)	1
Install module retainers	1
Install side panels	.5
Install front finishing panel	.5
Install electrical components	1
Cleanup	.5
TOTALS	**16 (8+8)**

Table 5. Estimated times for installation of a 4.8kW 2xbaseline system using 2-person electrical contracting crew (one licensed electrical contractor (LEC) and one unskilled helper (LBR))

Estimated times for installation of 4.8 kW 2xbaseline system using 2-person electrical contracting crew					
Electrical Process Step	***Est. Time Plug/Play wired on-site***		***Est. Time – Pre-wired System (man-hours)***		
	LEC (mh)	LBR (mh)	LEC (mh)	LBR (mh)	
Electrify rail (ground)	0.5	1.0	0	0	All plug and play components are delivered to the site pre-wired
Pre-wire switch/connector box (on the ground)	0.25	0.5	0	0	
Pre-wire flashed penetration	0.25	0.5	0	0	
Run ac line to the load panel	2	3	2	3	
Install circuit breakers in load panel	1.0	0.5	1.0	0.5	
Install Envoy (including outlet)	.5	0.25	.5	0.25	
Install Nucleus	0	0	0	0	No Nucleus
Cleanup		0.25		0.25	
Commission system (including preparation of interconnect letter)	0.5	0	0.5	0	
Support electrical inspection	1.0	0	1.0	0	
TOTALS	**6**	**6**	**5**	**4**	

Conversion of the estimated man-hours of labor to an unburdened cost is based upon an average labor rate for roofing contractors of $60 per hour and $80/hr for licensed electrical contractors and $40/hr for helpers. All of the hardware components necessary for the roofing contractor to complete installation of the solar system are provided in the GE kit. Additional materials as needed, e.g. roofing nails, spare composite shingles, and any sealants or mastics have not explicitly been included but are assumed to be a component of the installation markup which is 30% based on raw labor costs. The electrical contractor is expected to supply materials to complete the installation beyond the switch/connector box that is mounted on the system. These additional materials costs have been detailed above in Table 2. The installation costs are summarized in Table 6.

Table 6. Installation costs for the GE 4.8 kW insert and capture system

Installation Costs for the GE 4.8 kW pre-wired Insert and System						
Category	*Roofing Contractor Costs*		*Electrical Contractor Costs*		*Totals*	
	$	$/W	$	$/W	$	$/W
Materials	50		250			
Effort	800		480			
Margin	255		219			
Total	**1105**	**0.23**	**949**	**0.20**	**2054**	**0.43**

On this basis, the cost of installing a 2xbaseline (4.8 kW) system having 20 ac modules and two dedicated 240V electrical circuit is $2054 based on a materials and level of effort for roofing and electrical contractors.

VII. Channel and Soft Costs

The GE system can enter into the market through several different channels as illustrated by Figure 5. The channel strategies shown are entry through a retailer such as Lowes or through a third party power purchase agreement provider (PPA) such as Sunrun or Sungevity.

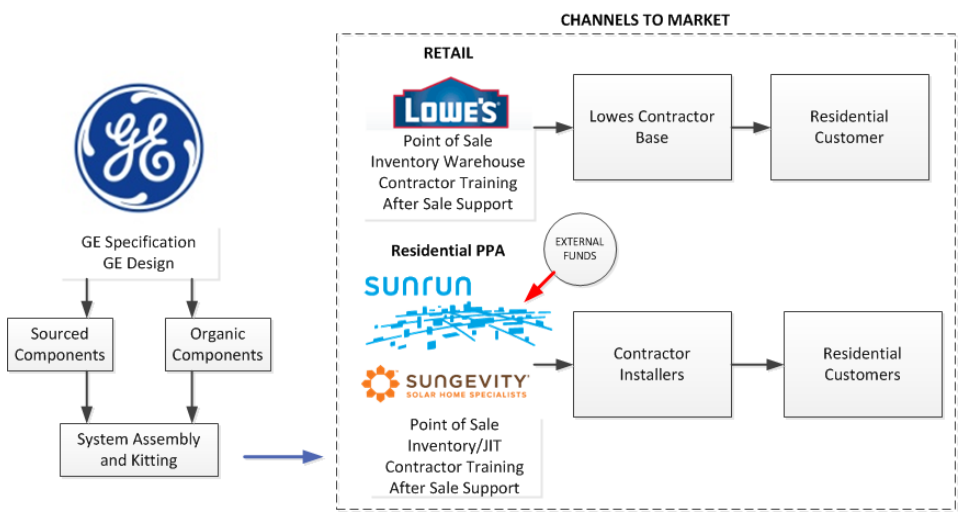

Figure 5. Channels to Market

There are different overhead costs associated with either strategy. For example in both cases the responsibility for point of sale falls onto the channel partner and includes the tasks: lead generation, initial site analysis, proposal, and customer follow up. The channel partner will also be responsible for inventory management, and after sales support. For both the retail and PPA channels the assumption is that installations will be outsourced to the contractor trades and handled as a cost of doing business. In this case GE would be providing a best practices installation document. The PPA channel has another cost associated with their business model. All of the residential PPAs are backed by tax equity or similar funds that have to make a fixed return. This shows up as an additional cost of doing business. The determination of actual channel costs is outside the scope of this project. A placeholder however is included in the cost road map based on a 30% margin.

VIII. Cost and Price Summary

Based upon the costs that have been established through the bill of materials and assembly/kitting analyses and the determination of installation level of effort and cost, the expected cost/pricing for a residential system that can be delivered to a customer in 2013 is summarized by Figure 6 for a 2xbaseline (48-in. stanchion spacing) 4.8kW GE system.

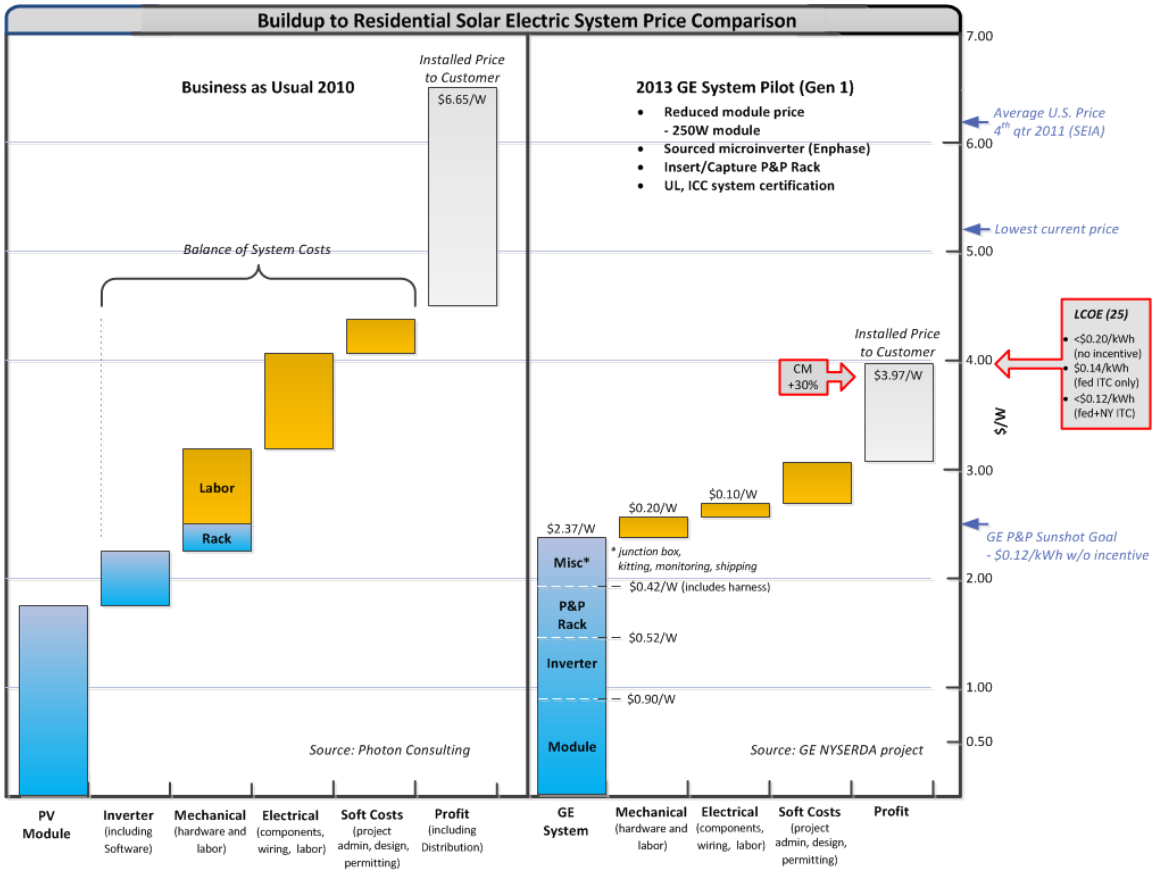

Figure 6. 2013 Price/Cost roadmap for GE residential solar system vs. 2010/11 market pricing

Figure 6 shows a built up to a minimum installed price of $3.97/W as segmented by the cost of the system components, the mechanical and electrical installation cost, and soft costs associated with permitting, interconnection, and inspection. All of the material costs are based on quotation received in March of 2012 for a volume of 1000, 4.8kW (20 ac module) systems. All of the cost elements are presented in Table 7 below. The major elements of the GE system demonstrated in the project include the ac module at $1.53/W (photovoltaic module at $0.85/W, microinverter at $0.48/W, assembly at $0.20/W) and the insert and capture/plug and play mounting system at including electrical harness at $0.40/W. The total cost of materials (outside of installation) is $2.37/W.

Table 7. Material and Installed Cost Summary

System Component	Cost (Pilot) 2013 $/W	Comments
PV Module	$ 0.85	1. Silicon module through 2013 - expected power to increase form 235W TO 245W per module in 2013 (Motech) - expect price decrease to $0.85/W
Microinverter	$ 0.48	1. Enphase microinverter 2013 - expect price decrease to $0.46/W in 2013
AC module assembly and packaging	$ 0.20	1.Based on quotation from Motech incl. testing
Monitoring (Envoy in 2012-13)	$ 0.10	1.No expected change
Insert and Capture Rack (48-inch spacing)	$ 0.34	1.Expect price decrease w/sourcing in 2013
Plug and Play Harness	$ 0.06	1. Simplified harness integration with rack -50%
Flashed J-box and AC Wiring	$ 0.08	1.Lower cost flashed conduit - 50%
System Kitting and Shipping	$ 0.15	1. Better logistics will lower costs
TOTAL MATERIAL COST	**$ 2.26**	DELTA OF $0.25/W EXPECTED IN 2013
Installation Labor and Margin		
Roofer 2p 8hr @ $60/hr	0.23	Standard trades; margin competitive
Electrician 1p 6 hr @ $80/hr	$ 0.20	Standard trades; margin competitive
TOTAL INSTALLATION COST	**$ 0.43**	To account for profit this number be + $0.20
Other Costs		
Permitting and Inspection	**$ 0.20**	This number will be lower in NY than CA - $0.15
Margin (30%)	$ 1.10	
INSTALLED COST	**$ 3.99**	
Goal <	*$ <4.50*	

The installation costs are broken out for the mechanical (roofing) and electrical contracted components although there is some overlap whereas the roofing contractors install pre-wired electrical components such as the flashed conduit. The total installation cost of $0.43/W does include a 30% margin over materials and level of effort. There is opportunity to take additional cost out of the materials in 2013 and the soft cost assessment of $0.20/W is high for NY. This cost rollup assumes a net margin of $1.10/W which is to be split between GE and channel partner. Since the $3.99/W projection is well under the project target of $4.50/W, there would be room to revise the margin during commercial discussions.