Knowledge and Skills:

- Carpentry skills desirable
- Electrical – DC theory/AC
- Comfortable with any hand tool
- Basic trigonometry & geometry
- Ability to translate decimals into feet & inches
- Comfortable on roofs & pitches
- Ability to lift 50 lbs – 75 lbs
- Ability to read schematics & plans
- Basic knowledge of PV module
- Knowledge of NEC
- Knowledge of local codes
- Problem solving skills
- Bending EMT and PVC tube
- Knowledge of system design
- Experience with all types of equipment mounting
- Roof knowledge – walking on tile
- People/communication skills

Future Trends and Concerns:

- Trend will be rackless mount
- Need for price to come down
- Industry need for better grounding system
- Need for higher incentives
- Industry will be negatively impacted by one to two disastrous fires
- Need high level craftsmanship
- PG&E should pay for excess power output
- Trend to more efficient modules
- Move toward European standards
- Standardize permitting
- Potential for electrical unions to muscle out installers
- Quality concerns for new companies popping up

Worker Behaviors:

- Respectful of coworkers, customers & property
- No alcohol and/or drugs
- Read environment for appropriate behavior
- Use music responsibly
- Wear professional attire
- Good hygiene
- Able to resolve conflict
- Ask questions to clarify
- Relay customer questions to qualified personnel
- Good communication skills
- Professional
- Punctual
- Have common sense
- Flexible with travel & hours
- Enthusiastic, interested
- Able to work independently
- Able to take feedback
- Notify supervisor of damage

Acronyms:

- EMT: Electrical Metallic Tubing
- GEC: Grounding Electrode Conductor
- GFIC: Ground Fault Interrupting Circuit
- GFPD: Ground Fault Protection Device
- NEC: National Electric Code
- OSHA: Occupational Safety & Health Admin
- PV: Photovoltaic
- PVC: Poly Vinyl Chloride tubing
- USE-2: Universal Service Entrance (sunlight resistant wire)

Tools, Equipment, Supplies & Materials

- Impact drills
- 18-volt cordless drill
- Nail bags
- Basic electrician tools
- Multi meter
- Chalk box
- Hammer
- Tape measure
- Torpedo level
- Channel locks
- Pair of dykes
- Caulk gun
- Drill index
- Mechanical tools, wrenches
- Utility knife
- Tool bag/belt
- Mask, safety glasses, gloves
- Flashlight or headlamp

Panel of Experts

Charlie Dearie
REgrid Power

Chris Sommerfeld
IES

Jon Valle
Akeena Solar

Mathew Welch
Harmony Solar

DACUM Facilitators

Peter Davis
David Esmaili

Skills Profile for Installer

Produced for:

Who?

Date: November 7, 2007

DACUM Chart for Installer

Duties ← **Tasks** →

Duties								
A System Completion	A – 1 Detail system (paint, etc.)	A – 2 Verify all source circuits for voltage/current	A – 3 Label equipment per NEC	A – 4 Commission the system	A – 5 Clean the job site	A – 6 Take down secured ladder	A – 7 Inventory tools	A – 8 Inventory materials
	A – 9 Educate the customer	A – 10 Turn off all disconnects	A – 11 Conduct or Coordinate in house quality control inspection	A – 12 Schedule/call for inspection	A – 13 Drive to the shop	A – 14 Confirm the "As Built"		
B Set Up Job Site	B – 1 Maintain data folder for job site (permits, plans)	B – 2 Position truck in optimal position	B – 3 Secure the van	B – 4 Plug in batteries	B – 5 Set up ladder	B – 6 Identify obstacles at site	B – 7 Designate rough work area	B – 8 Identify previous damage
	B – 9 Obtain 1st quarter task/job duties	B – 10 Lay out the array	B – 11 Stage the materials	B – 12 Remove customer's personals to safety				
C Organize and Maintain Resources	C – 1 Order system kit/package	C – 2 Maintain back stock items	C – 3 Stock parts in van/truck	C – 4 Organize tool bags	C – 5 Maintain data library for installation	C – 6 Clean vehicle	C – 7 Recycle excess material	C – 8 Clean the shop
D Communicate Clearly with Others	D – 1 Contact supervisor daily	D – 2 Obtain directions to site	D – 3 Speak with customer	D – 4 Go over layout with customer	D – 5 Review site plan with crew/team	D – 6 Confirm equipment with designer	D – 7 Delegate tasks to sub	D – 8 Demonstrate proper procedure
	D – 9 Clarify standard operating procedure	D – 10 Coordinate with subcontractors	D – 11 Coordinate all deliveries	D – 12 List needed materials				

Duties ← **Tasks** →

E Wire the System

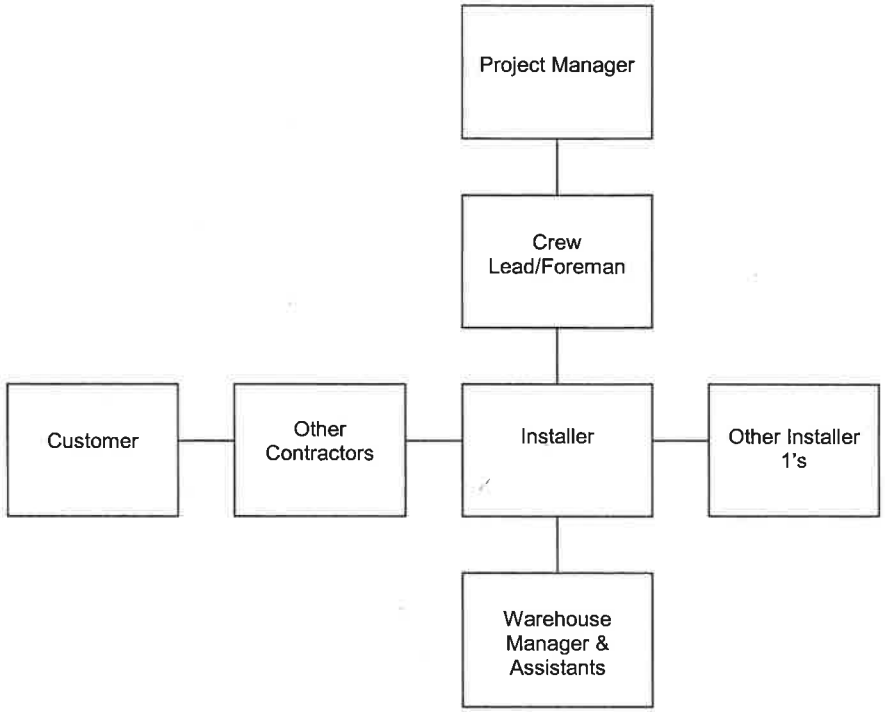
E – 1 Gauge correct size wire	E – 2 Construct the conduit runs	E – 3 Pull wire through conduit	E – 4 Create string layout	E – 5 Run "USE-2" to RAILS	E – 6 Label all conductors	E – 7 Land/terminate all equipment	E – 8 Install point of connection
E – 9 Install (GEC) grounding electrode system	E – 10 Read product manuals	E – 11 Verify array voltage to spec	E – 12 Verify utility voltage	E – 13 Verify polarity phasing			

F Maintain Job Site Safety

F – 1 Hold weekly tailgate meetings (OSHA)	F – 2 Survey job site hazards	F – 3 Set up ladder to OSHA standards	F – 4 Keep directions to hospital on site	F – 5 Maintain cell phone, radio communication with team	F – 6 Keep first aid on site	F – 7 Wear proper clothing	F – 8 Wear appropriate safety equipment
F – 9 Utilize/wear fall protection	F – 10 Hydrate personnel	F – 11 Maintain good housekeeping	F – 12 Maintain fire extinguisher				

G Mount the System

G – 1 Establish array perimeter	G – 2 Verify shade analysis	G – 3 Locate the rafters	G – 4 Drill pilot hole	G – 5 Weatherproof all penetrations	G – 6 Select appropriate flashing	G – 7 Attach rail supports	G – 8 Construct/adjust plum rails/racks
G – 9 Install array (also ground)	G – 10 Mount combiner box	G – 11 Locate utility service	G – 12 Install new load center	G – 13 Mount AC/DC disconnects	G – 14 Drive/install the ground rod	G – 15 Set batter boards for ground mount system	G – 16 Auger pillar holes (concrete footings)
G – 17 Pour concrete footings for ground mount	G – 18 Construct ground rack (when necessary)	G – 19 Dig feeder trench	G – 20 Check battery voltage (exercise caution)				


Project Manager
Crew Lead/Foreman
Customer
Other Contractors
Installer
Other Installer 1's
Warehouse Manager & Assistants