A Comparative Discussion of Utility Scale Solar versus Distributed Solar

Characteristic	Utility Scale - Solar Electrical Facility	Distributed Model
Definition:	Medium- to large-scale solar energy installations, either using thermal energy collection or photovoltaic cells (PV), often placed on large expanses of gently- or non-sloping vacant land and designed to generate large amounts of electricity to be place directly onto the large-scale regional grid at a specific point. Designed as stand-alone facilities. Tried-and-true thermal solar technology has been the most commonly used method to date, but improvements in PV cell efficiency are making them more economically attractive.	Very small- to medium-scale solar energy installations, most commonly PV, designed to generate moderate amounts of electricity to be placed onto the local electrical distribution system at the point of both generation and use. Designed as stand-alone facilities or could be used to generate greater electrical energy in conjunction with other similar nearby installations.
Common Locations:	Large flat expanses of open land in rural or semi-wild areas, such as farmland, desert, prairies, gentle hills. Preferred sites are nearer existing infrastructure such as substations and power line corridors. Lands used can be naturally pristine, in agriculture or otherwise disturbed. Physically possible to construct in urbanized settings, but the difficulty of coordination of many landowners and the probably substantial costs of permitting in urban zones would be prohibitive at present.	Can be anywhere developed infrastructure exists, but most commonly in urban or suburban areas where utility scale cannot be easily constructed. These are or could be placed on building rooftops, parking lots, roadways, corporate yards and smaller private or public areas, or any location where local requirements of space, need for sunlight and visual sensitivity will permit.
Relative Cost per kW	The larger the scale of these facilities, the lower per-kilowatt installation costs may be compared to smaller installations. Costs are reduced in permitting and maintenance as well due to economy of scale, and thus this type of facility is favored by utility companies. This assumes that the facility is located immediately adjacent to existing transmission lines and substations; higher costs and greater line loss over longer lines would increase the per-kW costs. Permitting costs can be substantial at the beginning, and the costs of impact mitigation may be prohibitive in sensitive areas of biology and farmland. The costs of solar generation are improving overall through the combination of improved technology and efficiency, and greater market penetration as time goes on, especially for PV installations; as this occurs, all solar will become more cost-effective.	The normally smaller scale of these facilities in themselves result in a relatively higher cost per kilowatt, which means that they can be affordable on an individual basis but are not desirable by utility-scale energy purveyors. However, their location at the site of use and ability to place energy directly onto the local network where it is needed means that long transmission lines are unnecessary and line losses are negligible, which helps bring costs down. There are also few or no permitting costs associated with distributed solar in most communities. The costs of solar generation are improving overall through the combination of improved technology and efficiency, and greater market penetration as time goes on, especially for PV installations; as this occurs, all solar will become more cost-effective.

Utility 'Friendliness'	Large Solar Farms are controlled by utilities or IPPs; this results in greater political acceptance from utilities which generally control energy transmission, and may allow easier acceptance of solar energy. Utilities are eager to purchase this kind of energy to help achieve the California 33% Renewable Energy Portfolio requirement.	Distributed or 'rooftop' solar is generally in the ownership of residential owners or commercial owners; utilities thus see little or no profit from this arrangement, and in some cases are obliged to buy some amount of excess energy produced by the rooftop installation (this is what is meant by the 'meter turning backwards'). In general, utilities would not support this and may push back against the concept; in California we now have a 33% renewable portfolio standard to which these small installations could contribute, but so far they are not considered important by utilities for reasons described above.
Electricity Transmission Costs	A Grid Connection in itself leads to additional costs for solar farms along with the potential costs of new transmission leaders.	Distributed solar can almost always use existing transmission infrastructure at little or no cost.
Grid Stability	Large solar farms supply 100% of their outputs to the existing grid at discrete points that are often remote from use areas and which may also physically compete with existing large electrical point-sources. This makes managing the existing grid more difficult when solar penetration increases.	Much of Distributed Solar is consumed locally, at or near the point of generation, and those generation points can be theoretically spread across the area where it would be used. This results in even distribution and high grid stability, with decreased instances of accidental or rolling blackouts and brownouts.
Planning & Permitting Issues	Issues include Zoning and General Plan provisions for large-scale industrial and utility-type uses on lands usually reserved for agriculture and/or open space/wildlife habitat. Land conservation contracts, such as Williamson Act Contracts, and conservation easements, as well as designations of special status farmlands (Prime, Unique Farmland) can be obstacles to approval of large utility scale solar projects unless provisions are made to either mitigate the impacts to loss of agriculture or place a finite lifetime on the solar project, after which it must be removed and the land restored. Finally, the presence of water rights for agriculture and the potential loss of those rights in the event of onsite agricultural dormancy could be an obstacle to eventual ag restoration and thus to permitting of the solar facility. Various other ordinances and policies on biological, cultural and visual resources are important, along with water conservation policies if the proposed installation is a thermal installation (which require large amounts of water, unlike PV installations).	Very few planning and permitting issues exist for distributed solar energy installations. The California Solar Rights Act has provided most landowners the automatic right to take advantage of the sunlight incident on their properties, and when installed on developed areas or rooftops, virtually all issues related to biology, stormwater, noise or any other possible environmental impact disappear. Jurisdictions are permitted to set reasonable limits for setbacks and height as they would for any other accessory use on the site. The foregoing assumes that the distributed system installed on a site is not significantly much larger than what is required for the site itself. If the facility were to be made larger, then it would become a utility scale installation, and possibly subject to additional local regulation.

	Large Utility scale installations, as a result of the potential effects and large scale conversion of land use, typically require use permits and environmental analysis before construction can commence, and the size and intensity of the use dictates to permitting jurisdictions that the operator should prepare a site restoration plan in anticipation of possible abandonment, along with financial assurance bonds to guarantee that there would be no public cost associated with site restoration.	
Space Requirements-limitations and opportunities	It has been estimated by engineers, and generally agreed upon based upon current solar technologies and U.S. energy demands, that the entire U.S. power grid could be fully loaded with solar energy using approximately 11,000 square miles of solar panels (this number has remained remarkably constant for about 50 years, with growth in energy demand outpacing improvements in solar technology efficiency by about 0.02% per year). Utility scale solar, while cost effective for large energy developers, the economy of scale provided by large consolidated facilities, requires first and foremost a great deal of land, preferably flat, in sunny open areas. While there is a great deal of land of this type available, especially in the West, this land also is frequently either wildlife habitat or extensively used for agriculture. Such is the case in Alameda County, where the most desirable land for solar energy, and that land closest to the existing grid connections, is also the remaining land calculated to be the most valuable for agriculture.	The Census Bureau reported an **urban area** total in the United States of 56 million acres in 1990 and, based on a revised definition, 59.2 million acres in 2000 and 59.6 million acres in 2002. Assuming (conservatively) 60,000,000 acres of urbanized land in 2011, this amount translates to 93,750 square miles of urbanized land in the United States. Based on the calculation that 11,000 square miles of solar facilities are required to power the entire United State using solar, if even 1/8 of the urbanized developed land in the United States could be utilized for solar panel installation, and assuming fairly reasonable levels of off-peak storage ability, the need for any major electric source besides solar would be greatly diminished and mostly eliminated **just using urban solar installations,** which lends itself primarily to distributed solar installation as of 2011.
Environmental Issues	The potential loss of open space, agricultural land and biological habitat are usually cited as the main concerns with large scale solar development. Loss of prime land, loss of habitat and displacement of sensitive species are considerations. If the land is highly disturbed and degraded by prior human activities, this kind of impact may be reduced considerably; there is current State legislation that addresses the issue of streamlining review for solar installations on disturbed lands.	In urban settings, where most impacts to the natural world have already occurred, the effect of adding additional development in the form of solar panels on parking lots, rooftops and other developed areas is minimal and often results in no impact. Only visual quality in the marginal sense might be addressed, if it is necessary at all in a developed setting. Water quality, air quality, traffic and noise would all be of no significant concern. To date, staff has seen very little information on disposal of spent PV cells at the end of their useful lives. However, the glass, metals and quantities of heavy metals involved in the

	Other issues may include visual quality both at a distance and in close proximity; water usage (by thermal solar) and water quality for large expanses of disturbed earth. Noise, air quality, traffic effects and public services impacts are not normally of significant concern. To date, staff has seen very little information on disposal of spent PV cells at the end of their useful lives. However, the glass, metals and quantities of heavy metals involved in the manufacture of PV cells suggest that a program for safely recycling these materials should be developed.	manufacture of PV cells suggest that a program for safely recycling these materials should be developed.
Market for Solar	The market is substantial for this type of energy. PG&E and others will enter into purchase agreements for a great deal of solar energy, especially as a result of the required 33% renewable energy portfolio standard adopted by the State of California, which most industry observers expect will be difficult to meet by 2020.	Starting on February 1, 2008, PG&E began to purchase power from customers who installed eligible renewable generation up to 1.5 MW in size. Eligible renewable generation is defined by the Legislature in PU Code Section 399.12.1 Once customers sign the power purchase agreement and interconnect to PG&E's grid, they are paid for energy they generate, but don't apply to serve on-site load. The CPUC determined that PG&E will pay the market price referent (MPR), a per-kWh price that is determined periodically in the renewable portfolio standard proceeding. The most recently adopted MPR for baseload-type generators include prices adjusted for Time-of-Day factors, which recognize the higher value of power supplied during the on-peak hours, and the lower value of power supplied during the off-peak hours.
State Policy	Although not yet formal policy, some scholars feel that both state and local governments in California should facilitate the planning process for appropriate large-scale renewable energy development. State agencies and local governments can utilize agreed-upon criteria determined by stakeholders and policy makers to identify appropriate land for development and to use permit streamlining incentives to encourage development on those parcels. Local governments, potentially by including an energy element in their general plans, should also plan for renewable energy development in advance to encourage appropriate development and analyze impacts at a broad scale. These local plans should also be consistent with state criteria	To meet the 33 percent renewable energy goal, California will need a mix of centralized, large-scale projects as well as localized renewable energy generation, such as from solar panels on large buildings or along highways. In his campaign platform for achieving a broader renewable energy portfolio, Governor Brown called for 8,000 new megawatts of renewable energy from large-scale facilities and 12,000 megawatts of localized generation, out of the approximately 20,000 megawatts needed to meet the 33 percent RPS. This logically extends the policies of Governor Brown's predecessor Gov. Schwarzenegger, who began the process with the 'Million Solar Rooftop' policy and legislation.

	and mapping efforts. Finally, state and local leaders should devise mechanisms to fund this additional planning effort and promote existing resources. Ultimately, the state has an interest in removing permitting barriers for desirable projects that do not compromise biological, environmental, or agricultural resources. County general plans represent an appropriate vehicle for broad-level planning for appropriate renewable energy development. The state could assist by requiring renewable energy planning to be an element of general plans and by issuing guidelines about how to undertake this analysis to ensure development in appropriate parcels. The state should also ensure that local government plans are consistent with state mapping efforts and/or criteria for converting farmland to renewable energy production. AB 13 (Perez) authorizes up to $7 million for qualified counties to engage in this type of planning, with funds coming from project impact fees California's ambitious renewable energy goals will require the deployment of large-scale renewable energy facilities. To meet the target of 33 percent renewable energy by 2020, Governor Jerry Brown has called for 8,000 megawatts of energy from such large-scale installations (where one megawatt provides roughly enough energy to power 750 homes for a year). In order to produce the required energy in the next decade, developers of these facilities may need as much as 100,000 acres of land across the state.	

Sources: Wikipedia – many links; and

http://www.greenworldinvestor.com/2011/03/05/largest-photovoltaic-solar-farms-are-they-advantageous-over-distributed-rooftop-solar-and-why-utilities-love-them/)

http://www.greenworldinvestor.com/2010/10/26/are-the-subsidized-huge-solar-thermal-plants-in-california-a-massive-waste-of-public-money/)

http://www.greentechmedia.com/articles/read/where-will-solar-power-plants-be-built-deserts-or-rooftops/)

http://www.law.berkeley.edu/files/HarvestingCleanEnergy.pdf

www.pge.com/feedintariffs

Various Supporting Information for the Table
"A Comparative Discussion of Utility Scale Solar versus Distributed Solar."

Solar Farms consisting of thousand of solar panels installed on hundreds or thousands of acres of land are increasing rapidly in the U.S. While the European governments are discouraging the use of large installations of solar panels, the U.S. is going the opposite way in installing these power plants. The U.S. government recently approved of a number of Solar Thermal Power Projects totaling several gigawatts recently through 2010 and 2011.

List of 10 Largest Photovoltaic Solar Farms in the World (in MW)

Sarnia	Canada	97
Montalto di Castro	Italy	84
Finsterwalde Solar Park	Germany	81
Rovigo Photovoltaic Park	Italy	70
Olmedilla Photovoltaic Park	Spain	60
Strasskirchen Solar Park	Germany	54
Lieberose Photovoltaic Park	Germany	53
Puertollano Photovoltaic Park	Spain	50
Moura Photovoltaic Park	Portugal	46

Five Largest Proposed PV Solar Farms

Ordos Solar Project	China	2000	Thin film CdTe from First Solar completion date 2019
Topaz Solar Farm	USA	550	Thin film CdTe from First Solar
Desert Stateline	USA	300	Scheduled to be completed in 2015
Desert Sunlight	USA	300	Scheduled to be completed in 2015
Aqua Caliente	USA	290	Scheduled to be completed in 2014

(Source : Wikipedia)

Advantages of these solar farms over rooftop solar installations.

1) **Lower Cost and Scale** – The greater scale of these plants allows lower per-kilowatt installation costs compared to smaller installations. The costs are reduced in permitting and maintenance as well.

2) **Use of Disturbed Land** – Solar Farms can be built on disturbed land like in Germany where they have been built on former airbases (although farmland and open space, like that most often proposed for development in California, is arguably not disturbed in the strictest sense).

3) **Utility Friendly** – Large Solar Farms are controlled by utilities or IPPs while rooftop solar is generally in the ownership of residential owners or commercial owners. This results in less pushback from utilities which generally control transmission and allow easier acceptance of solar energy.

Disadvantages

1) **Long Delays in Permitting, Environment Clearance, Land Siting** – Large Solar Farms have to go through a myriad of regulations and clearances. There have also been many instances of lawsuits against solar thermal and solar PV plants in California by wildlife and environmental groups, as well as local Indian tribes.

2) **Electricity Transmission Costs** – Grid Connection leads to additional costs for solar farms while rooftop solar can use existing transmission infrastructure.

3) **Less Grid Stability** – A Large Part of Distributed Solar is consumed locally while Farms supply 100% to the existing grid. That makes managing the existing grid difficult when solar penetration increases.

Summary

Distributed Solar Energy will become more and more important as the costs of solar energy decline. Governments around the world are also coming around the view to promote solar energy while utilities favor large scale solar farms. With increasing penetration of solar energy the whole raison d'etre of utilities become non-existent, so they favor solar farms. On the other hand rooftop solar makes energy more democratic and also ultimately reduces transmission costs as well. However in the near future, both solar farms and rooftop solar should coexist.

(Source: http://www.greenworldinvestor.com/2011/03/05/largest-photovoltaic-solar-farms-are-they-advantageous-over-distributed-rooftop-solar-and-why-utilities-love-them/)

****

Are the Subsidized Large Solar Thermal Plants in California a Waste of Public Money?

26 Oct, 2010

California and the Federal Government have recently approved a number of big Solar Thermal Plants totaling around 2800 MW. These plants utilize Concentrated Solar Thermal (CSP) Technology and use a mirror-towers system instead of familiar PV panels. The haste with which these plants were permitted and approved was due mainly to the expiry of the Treasury Grant Scheme by end of 2010. According to the American Stimulus rules, only Green Projects which have broken ground or spent 5% of their costs would be eligible for the 30% Cash Subsidy. Six large Solar Thermal Plants have been approved in California as of October 2010. The **capital costs for these plants are high at around $5.5 – $6 / watt**. PV panels can be installed at around $3 - $3.5 / watt, about 40-50% lower. Despite the higher capacity factors for Solar Thermal Plants and their ability to store energy for a short period, **the cost difference is substantial.**

CSP Technology is fast losing ground to Solar PV technology with rapid advancements being made both by Thin Fim Technologies and rapid improvements in Crystalline Silicon Technology. **By the time these newly approved plants are built in about 3 years, expect Solar PV costs to decline by another 30 - 40%**. This factor suggests that PV installations should be favored strongly over CSP technology, especially when public funds are concerned.

(Source: http://www.greenworldinvestor.com/2010/10/26/are-the-subsidized-huge-solar-thermal-plants-in-california-a-massive-waste-of-public-money/)

Where Will Solar Power Plants Be Built—Deserts or Rooftops? 21 Ventures' David Anthony says there's less red tape in going local. (February 2010)

By any measure, the sun is a powerful and virtually limitless source of energy and it is imperative that we capitalize on this clean energy source by increasing our use of solar energy and reducing our reliance on fossil fuels. How do we begin to capitalize on such a rich source of energy? Both distributed and utility-scale solar energy projects are vital to accommodate the world's growing energy needs as they are both suited to harness the extraordinary power of the sun. The underlying technology used by utility and distributed solar is different and understandably, each has its own proponents and detractors. For the most part, utility-scale solar projects use solar collectors to generate enough heat to power a steam turbine that in turn generates electrons. Distributed solar energy derives primarily from the use of photovoltaic panels that capture photons and convert them into electrons. Distributed PV efficiency is improving all the time. Currently, there is a conversion efficiency of approximately 17% for crystalline silicon panels and 10% for thin film panels -- a dramatic improvement from only a few years ago.

In California alone, there are plans for 35 utility-scale projects that would generate approximately 12,000 Megawatts (MW) of energy annually -- an amount of energy comparable to the combined power of ten nuclear power plants. The Mojave Solar Project and the Genesis Solar Energy Project, both located in southern California, are two of the largest projects under consideration and are each aiming to generate 250M watts of energy. These projects are expensive, however, in terms of both dollars and natural resources required. The federal government has promised to help reduce the financial cost by allocating a portion of the stimulus plan for this purpose. Companies that have their plants ready to be opened by the end of this year will receive a portion of the $67 billion of federal money that has been set aside for renewable energy projects (including loan guarantees and grant programs).

Despite these incentives, it is risky to undertake a large-scale enterprise like utility-scale solar power in an uncertain economic climate, as financial institutions are reluctant to be involved in billion-dollar projects. Another issue is the fact that such solar 'farms' require huge tracts of land. The Bureau of Land Management (BLM) has been tasked with finding 24 tracts of public land of three square miles each with good solar exposure, favorable slopes, road and transmission line availability. Additionally, the land set aside for utility-scale solar farms must not disturb native wildlife or endangered species such as the desert tortoise, the desert bighorn sheep, and others. The wildlife issue has proved to be a contentious one. Projects in California have been halted due to the threat caused to endangered species resulting in a backlog of 158 commercial projects with which the BLM is currently contending.

Another challenging issue for utility-scale solar projects is the use of water. Combined, the Genesis and Mojave projects would use 1.24 billion gallons of water per year due to the wet cooling systems involved. One alternative to wet cooling systems, dry cooling, uses 90% less water, but can only handle the full cooling load up to temperatures of 85˚-90˚F. As a result, dry cooling in deserts is not cost efficient. Just as challenging is the fact that to date, there are no affordable storage solutions for utility-scale solar projects. Without the means to capture and store excess electricity produced by solar farms, an enormous inefficiency is created.

An alternative to utility-scale projects is the use of distributed solar energy. There are various types of renewable power technologies in use, but sub-utility scale power photovoltaics (PV's) account for 98% of the distributed solar energy market. Unlike utility-scale projects, distributed energy is solar power on a small scale and entails the installation of solar panels on the roofs of buildings. Toward the end of 2009, the California Public Utilities Commission unanimously voted for the Southern California Edison's Plan. This plan recommended scattering solar panels on rooftops all over the region in an effort to create 500MW of energy. Like utility-scale, the plan benefited from the 30% federal tax credit for renewable energy projects.

Distributed solar power does not involve the legal red tape, the large tracts of land, or the vast quantities of water that utility-scale projects require, and has the ability to generate enough energy for homes, schools and hospitals. Installation is easily addressed and solar panels can last for up to 30 years if well maintained. The price of solar panels has dropped dramatically to approximately $2.40 per watt (price depending on scale of order) for silicon panels and is likely to drop even further in 2011. Furthermore, unlike utility-scale projects, distributed solar projects such as the Southern California Edison's Plan spread capacity evenly, distributing benefits and drawbacks. If a utility-scale project "crashes," it affects a huge area. With distributed energy, only individual units are affected in the case of a power outage.

In many locations and in certain circumstances, distributed solar projects are less expensive than utility-scale solar projects because of the avoidance of both new transmission lines and line losses -- the latter of which typically accounts for approximately 7% of the power shipped over transmission systems. The costs associated with utility-scale solar projects are often not included in the side-by-side economic comparison made between the two forms of solar power development. An additional benefit of distributed solar is its ability, when developed in clusters (i.e., local micro-grids), to alleviate the need to upgrade distribution substations and add local peaking plant capacity.

As mentioned, distributed solar plans have their detractors. Solar certainly is not the cheapest source of electricity and is only effective in areas with a high percentage of sunshine. More than 50 million Americans live in Community Associations where we might expect to see efficient adoption of distributed solar plans. But these locations commonly have policies limiting the use solar equipment due to height restrictions or other specifications regarding roofing materials.

Utility-scale projects may have the capacity to generate enormous amounts of energy but they represent a huge financial risk, irretrievable waste of resources, and threats to endangered species, all of which are problems that may take years to solve. On the other hand, distributed solar power entails a fraction of the risk posed by utility-scale projects and is poised to capitalize on the vast opportunity offered by 140 million residential rooftops in the U.S. alone, not including all of the commercial rooftops available for PV installation. Distributed energy is certainly the way forward in the field of solar energy use.

(Source: http://www.greentechmedia.com/articles/read/where-will-solar-power-plants-be-built-deserts-or-rooftops/)

****

Frequently Asked Questions: PG&E’s power purchase agreement for small renewable generation

What is the small renewable generation power purchase agreement?
Starting February 1, 2008, PG&E will purchase power from our customers who install eligible renewable generation up to 1.5 MW in size. Eligible renewable generation is defined by the Legislature in PU Code Section 399.12.1 Once customers sign the power purchase agreement and interconnect to PG&E’s grid, they can be paid for energy they generate, but don’t apply to serve on-site load. There are two tariffs that are applicable to our customers: Schedule E-PWR (for public water and wastewater customers) and
Schedule E-SRG (for all other customers).

Why is PG&E offering this opportunity to customers?
In 2006 the Legislature passed AB 1969, authorizing a power purchase agreement for renewable generation installed by public water and wastewater agencies. The CPUC extended this power purchase agreement to all customers who install renewable generation up to 1.5 MW.

If I install renewable generation, can I use the electricity for my own needs and only sell excess electricity?
Yes. As PG&E proposed to the CPUC, customers can use the generated electricity first to meet their own needs. PG&E will purchase any power that is exported to the grid.

How much will PG&E pay me for the excess power?
The CPUC determined that PG&E will pay the market price referent (MPR), a per-kWh price that is determined periodically in the renewable portfolio standard proceeding. The year you sign a contract, and the length of that contract, will determine which MPR will be in effect for the life of your contract. The specific $/kWh will be based on the year your generator starts working. Here is the most recently adopted MPR for baseload-type generators (the prices will be adjusted for Time-of-Day factors, which recognize the higher value of power supplied during the on-peak hours, and the lower value of power supplied during the off-peak hours):

The 2009 MPR values are as follows: (Nominal - dollars/kWh)

Adopted 2009 Market Price Referents
(Nominal - dollars/kWh)

Resource Type 10-Year 15-Year 20-Year
2010 Baseload MPR 0.08448 0.09066 0.09674
2011 Baseload MPR 0.08843 0.09465 0.10098
2012 Baseload MPR 0.09208 0.09852 0.10507

1 PU Code Section 399.12 defines renewable generation as meeting Public Resources Code 25741, which describes renewable generation as an in-state facility using biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current.

2013 Baseload MPR 0.09543 0.10223 0.10898
2014 Baseload MPR 0.09872 0.10593 0.11286
2015 Baseload MPR 0.10168 0.10944 0.11647

2016 Baseload MPR 0.10488 0.11313 0.1202
2017 Baseload MPR 0.10834 0.11695 0.12404
2018 Baseload MPR 0.11204 0.1209 0.128
2019 Baseload MPR 0.11598 0.12499 0.13209
2020 Baseload MPR 0.12018 0.12922 0.1363
2021 Baseload MPR 0.12465 0.13359 0.14064

What is a Time-of-Day factor?
The MPR value in the table above will be multiplied by a Time-of-Day factor to reflect the fact electricity produced during peak times is more valuable than electricity produced during other times. The Time-of-Day factors for PG&E are:

Monthly Period Super-Peak Shoulder Night
June – Sep 2.20 1.12 0.69
Oct-Dec, Jan-Feb 1.06 0.93 0.76
Mar-May 1.15 0.85 0.64

If I sell some or all of my renewable power to PG&E, who owns any Renewable Energy Credit (REC)?
You will own any RECs for the power that you generate and use at your own site. PG&E will own any RECs for the power that we purchase under the power purchase agreement.

Can I get a rebate from PG&E for building a renewable generator and also sell my power to PG&E?
No, not at this time. The Commission decided that customers who are selling their excess power to PG&E under the power purchase agreement could not also get a rebate from PG&E's Self Generation Incentive Program, or the California Solar Initiative.

Can I be on a net metering tariff and still sign a power purchase agreement?
No. The Commission decided that customers who are selling their power using these tariffs have to sell all of their exports; they can't split exports between net metering and the power purchase agreement.

How will PG&E know how much to pay me?
We will meter your usage and separately meter your exports to the grid.

Will I have to pay for two meters?
If your existing meter is capable of separately metering usage and exports, then you will not have to pay for two meters. You may have to pay a reprogramming charge, though, so your meter will collect the information needed. If your existing meter cannot separately meter usage and exports, then a meter capable of doing so will need to be installed at your expense.

I've heard that I have to interconnect using FERC rules, not CPUC rules. Why is this? All wholesale power purchase agreements are under FERC jurisdiction, unless FERC allows an exception – which they did for retail net metering arrangements and qualifying facility (QF) power purchase agreements in which the generator is selling power to its serving utility as a QF. E-PWR and E-SRG do not fall into either of these exceptions to FERC jurisdiction.

Can I sell power "as a QF" under these tariffs if I am a QF?
No. These power purchase agreements do not meet this requirement. However, PG&E will be seeking approval for a QF power purchase agreement in 2010.

How long are these tariffs available?
Both tariffs are available on a first-come, first-served basis. E-PWR will end when PG&E's public water and wastewater customers have installed 104.6 MW of renewable generation under the tariff. Similarly, E- SRG will end when PG&E's other customers have installed 104.6 MW of generation under the tariff. So a total of 209.206 MW of renewable generation from our customers can participate in these tariffs.

Is there any minimum size?
No.

Are there any special steps I need to take if my facility will be interconnecting in San Francisco or Oakland?
Yes. Customers planning on interconnecting generators in **San Francisco** or **Oakland** should contact PG&E's Generation Interconnection Services (GIS) department while in the planning stage of their project, before purchasing equipment and beginning installation. If the planned generator site is in an area served by a secondary network, the customer will not be able to export power to the grid. A non-export option may be available. Please contact GIS at (415) 972-5676 to ask about the specifics of your plans
before you make any purchases, and we will discuss your options with you.

How do I sign up?
Go to our website at www.pge.com/feedintariffs. For additional questions, contact Velvet Voelz at Feed-inTariffs@pge.com, or call the Feed-in Tariff Hotline at 415-973-1444.