

## Solar FAQ

### **What is The Claude Laval WET Incubator?**

Designed to establish the Central Valley as a world leader in water and energy innovation, the Claude Laval Water and Energy Technology (WET) Incubator is the region's latest economic development booster. Opened in March 2007, the resources of business incubation, education and industry are utilized in the \$5 million project which is a collaborative venture among the [Central Valley Business Incubator](#), [California State University, Fresno](#), and the [International Center for Water Technology](#).

The WET Incubator, located at the southwest corner of Barstow and Chestnut avenues on the Fresno State campus, houses five on-site members developing companies around water or energy technology. The WET Incubator is a center of activity for entrepreneurs who have access to industry, incubation services and the technical expertise and research capabilities of Fresno State.

The International Center for Water Technology was established to provide education and research to assist in developing and adopting innovative solutions and technologies that improve water use efficiency. The program's broad mandate includes water supply and quality; flood protection; and environmental enhancement. Activities focus on extended education, laboratory and field research, and policy development. Water is a finite resource. Responsible management requires the inclusion of all stakeholders to determine appropriate long-term use and allocation. While the program targets opportunities and issues within the San Joaquin Valley region, solutions and experiences are applicable worldwide.

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### **How are solar customers billed under net metering?**

Your utility will continue to read your meter monthly. Under a Net Metering agreement, you will receive a monthly statement indicating the net amount of electricity you consumed or generated during that billing period.

On the anniversary of your agreement, you will be billed for the net electricity you consumed for the previous twelve months. If you prefer, you may have the option of requesting monthly billing. Depending on the type of agreement you have, your meter might show a credit during some or all billing periods, even though the actual kilowatt-hours you generate and consume are equal. Your utility is not required to pay you or credit your account for your excess generation each year.

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### **For net metering, can I use my current electric meter?**

Your utility will provide a bi-directional time-of-use meter. Contact your utility for more information

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### **How does net metering work?**

Net Metering is a special metering and billing agreement between you and your utility or electric service provider (ESP). Normally your electric meter spins forward as it measures how many kilowatt-hours of electricity you buy, and is read by your utility once a month.

Net Metering agreement allows you to use the electricity you generate first, reducing what you would normally buy from your utility or ESP. If you generate more electricity than you use, the excess goes through your electric meter and into the grid, spinning your meter backward. Your meter shows the net amount, measured as the difference between the electricity you generate and the electricity you purchase from your utility or ESP.

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### **What is net metering?**

Net metering allows your electric meter to go backwards when you are producing more electricity than you are using. Essentially, it indicates how much electricity you pulled from the grid rather than the amount of electricity that you used.

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### **What is a solar rating?**

The solar rating is a measure of the average solar energy (also called "Solar Irradiance") available at a location in an average year. Radiant power is expressed in power per unit area: usually Watts/sq.meter, or kW/sq.meter

The total daily Irradiation (Wh/sq-m) is calculated by the integration of the irradiance values (W/sq-m).

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### **What maintenance is required?**

Typically, solar thermal systems need valves replaced every 3-5 years and storage tanks replaced every 10 years. Collector life is usually in excess of 15 years. This assumes "good" water quality is used in your system, and it was properly installed.

Solar electric (PV) systems typically do not require maintenance, other than periodic cleaning of the solar panels. PV panel life is typically 25 years. If you have a battery system, the batteries may require periodic maintenance such as "equalization" or water topping off.

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### **What kind of warranty is typical with renewable energy?**

Most solar photovoltaic modules come with at least 25 year warranties. The inverter(s) and solar racking or mounting system comes with a 10 year warranty. Check with your installer.

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### **Do I need a building permit to install renewable energy?**

Yes, the PV installer will generally apply for the local permit(s). If you have a home owners associaiton (HOA), you may also want to contact them to learn of any others requirements specific to your neighborhood.

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### **What is the Expected Performance-Based Incentive (EPBI) and how is it calculated?**

The EPBI is the method used to calculate the incentive. The EPBI calculation accounts for specific performance characteristics, including when the power is produced, detailed module and inverter efficiencies, a default estimate of expected system power losses, module orientation, tilt and mounting type, shading, and geographic location. The EPBI payment is determined through the use of the Energy Commission's PV Calculator.

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### **Are there any state or federal incentives for installing PV on my home?**

The California Solar Initiative offers cash incentives on solar systems - currently, \$1.55 a watt for existing homes in PGE and \$2.20 a watt in SCE territories. California Solar Initiative incentives, combined with the 30% federal tax credit, can cover a significant portion of the total cost of a solar system.

The actual incentive for a particular system and installation is dependent on the EPBI calculation of the system's performance compared to the reference system.

For current rebate level status, view the California Solar Initiative [Statewide Trigger Point Tracker](#).

Also, the Database of State Incentives for Renewable Energy (DSIRE) is a comprehensive source of information on state, local, utility, and selected federal incentives that promote renewable energy and energy efficiency. [Visit DSIRE](#).

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### **I'm interested in having a solar energy system installed on my home or business. Where do I start?**

Join us on the tour! If there is not a tour in your area one of the best places to start the process is at [Findsolar.com](#). FindSolar.com's mission is to serve as a convenient, user-friendly means for home and small commercial building owners to make preliminary evaluations of solar energy options for their location, and to help find qualified professionals who can design, install and service solar energy systems. Go to [Findsolar.com](#).

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### **What is Solar Hot Water and Space Heating and Cooling?**

Solar hot water heaters use the sun to heat either water or a heat-transfer fluid in collectors. A typical system will reduce the need for conventional water heating by about two-thirds. High-temperature solar water heaters can provide energy-efficient hot water and hot water heat for large commercial and industrial facilities.

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### **How much PV do I need for my house?**

How much PV you need depends on how many kWh's you use. If you wanted to completely replace your current electrical purchases from the utility with a PV system, you could look at your kWh usage on your electric bills for a year, calculate a daily average, and divide that by the number of average daily sun hours for your location. An example could be 10,800 kWh/yr divided by 365 days/yr equals approximately 29 kWh/day, divided by 5.4 sun-hours per day (for central California), equals 5.5 kW. This would indicate that a 5.5kW system would, over the course of an average year, produce enough energy to replace the power you are currently using.

However, if you design an energy efficient home, you could cut the annual electricity usage dramatically, reducing the size of the system. In the real world, the majority of home systems range from 2 kW to 7 kW. Where you live, if you are on the grid or off, and how you live, will dictate the size of your system, and its ultimate cost and value.

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### **What does PV cost? Aren't PV systems expensive?**

Price varies on a number of factors. Every application is unique. Depending on the size of your household, the amount of electricity you use, the particular solar energy system you choose, how much sunshine you receive in your area and available government funding to name only a few. Be wary of low price contractors. A quality install is much more important than saving a few bucks up front.

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### **Are PV systems reliable?**

PV systems have no moving parts. There is nothing that can wear out. They are essentially silicon or glass panels, like a window. They are made to withstand hot, direct sunlight and harsh weather conditions. They will continue to work as long as sunlight falls on the surface. Most modules have a 25 year production warranty from the manufacturer. It's estimated that PV panels should could

50 years or longer.

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### **How long has PV been around?**

The photovoltaic effect was first recognized by Edmund Becquerel, in France, in 1839. Scientists made solar cells of selenium in the 1880s. And, modern PV technologies were developed at Bell Labs and RCA Labs in the mid 1950s. These cells had efficiencies of less than 4%.

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### **What is Photovoltaics (PV)?**

Photovoltaic (PV) cells convert sunlight directly into electricity. PV cells are the solar cells that are often used to power calculators and watches. PV cells are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic effect.

PV cells are typically combined into modules that hold about 40 cells; about 12 of these modules are mounted in PV arrays that can measure up to several meters on a side. These flat-plate PV arrays can be mounted at a fixed angle facing south, or they can be mounted on a tracking device that follows the sun, allowing them to capture the most sunlight over the course of a day. About 12 to 36 (or more) PV arrays can provide enough power for a typical household in our area; for large electric utility or industrial applications, hundreds of arrays can be interconnected to form a single, large PV system.

Some PV cells are designed to operate with concentrated sunlight. These cells are built into concentrating collectors that use a lens to focus the sunlight onto the cells. This approach has both advantages and disadvantages compared with flat-plate PV arrays. The main idea is to use very little of the expensive semiconducting PV material while collecting as much sunlight as possible. But because the lenses must be pointed at the sun, the use of concentrating collectors is limited to the sunniest parts of the country. Some concentrating collectors are designed to be mounted on simple tracking devices, but most require sophisticated tracking devices, which further limit their use to electric utilities, industries, and large buildings.

The performance of a PV cell is measured in terms of its efficiency at turning sunlight into electricity. Only sunlight of certain energies will work efficiently to create electricity, and much of it is reflected or absorbed by the material that make up the cell. Because of this, a typical commercial PV cell has an efficiency of 15% – about one-sixth of the sunlight striking the cell generates electricity. Low efficiencies mean that larger arrays are needed, which could increase cost. Improving PV cell efficiencies while holding down the cost per cell is an important goal of the PV industry, NREL researchers, and other U.S. Department of Energy (DOE) laboratories, and they have made significant progress.

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### **What is Passive Solar Heating, Cooling and Daylighting?**

Buildings designed for passive solar and daylighting incorporate design features such as large south-facing windows and building materials that absorb and slowly release the heat of the sun. No mechanical means are employed in passive solar heating. Incorporating passive solar designs can reduce heating bills as much as 50 percent. Passive solar designs can also include natural ventilation for cooling.

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### **Can I use solar for my home or business? How do I know if I have enough sun?**

Most places have enough solar energy to meet some or all of their needs with solar energy systems. You can get more specific information by contacting a local solar system designer, installer, solar architect or builder to discuss your power requirements, particulars of your property, what type of systems would suit your needs, sunlight availability, etc. In general, solar energy systems produce energy even under cloudy skies (although less than under full sunlight).

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### **How fast is the use of solar energy growing?**

Shell International predicts that renewable energy will supply 60% of the world energy by 2060. The World Bank estimates that the global market for solar electricity will reach \$4 trillion in about 30 years.

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### **How fast is the need for electricity growing?**

The World Bank projects that the world electrical generating capacity will increase to 5 million megawatts by the year 2020, up from about 3.18 million in 1999.

Vice President Dick Cheney, in his well-known energy policy speech of April 30, 2001, claimed that America must build 1,900 new power plants by 2020. That is one new power plant per week for the next two decades in order to meet projected electricity demands.

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### **How does renewable energy improve national security?**

Our national energy security continues to be threatened by our dependency on fossil fuels. These conventional energy sources are vulnerable to political instabilities, trade disputes, embargoes, and other disruptions.

U.S domestic oil production has been declining since 1970. In 1973, the United States only imported about 34% of its oil. Today, our country imports more than 53%, and it is estimated that this could increase to 75% by 2010.

Most of the world oil reserves are now in the Middle East. We have witnessed this shift in economic influence through the last three sharp increases in the world oil prices: the Arab Oil Embargo in 1974, the Iranian Oil Embargo in 1979, and the Persian Gulf War in 1990. It has resulted in periods of negative economic growth and a rising trade deficit.

But with renewable energy, we can decrease our dependency on foreign oil imports. For example, the U.S. Department of Energy estimates that if we displace 10% of our petroleum use for transportation with biofuels, which are produced from organic material, we could save about \$15 billion from 2000 to 2010. A 20% displacement could save us about \$50 billion from 2010 to 2030. This would strengthen our energy security, as well as our economic and national security.

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### **How does renewable energy help our economy?**

Many U.S. communities have to import fossil fuels, such as oil and natural gas, to provide electricity, heating, and fuel. The cost of these fossil fuels can add up to billions of dollars. And every dollar spent on energy imports is a dollar that the local economy loses. Renewable energy resources, however, are developed locally. The dollars spent on energy stay at home, creating more jobs and fostering economic growth.

Renewable energy technologies are labor intensive. Jobs evolve directly from the manufacture, design, installation, servicing, and marketing of renewable energy products. Jobs even arise indirectly from businesses that supply renewable energy companies with raw materials,

transportation, equipment, and professional services, such as accounting and clerical services.

In turn, the wages and salaries generated from these jobs provide additional income in the local economy. Renewable energy companies also contribute more tax revenue locally than conventional energy sources.

The economic advantages of renewable energy also extend far beyond the local economy. The whole country benefits. In 1997, the United States spent about \$65 billion dollars outside the country to pay for fossil fuels. But as one of the world leading manufacturers of renewable energy systems, we can bring in more money with the increased use of renewable energy sources around the world. Currently, for example, the United States manufactures about two-thirds of the world photovoltaic (PV) systems. And it exports about 70% of these PV systems, mostly to developing nations, resulting in annual sales of more than \$300 million.

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### **What are the benefits of renewable energy systems?**

Renewable energy sources are clean and inexhaustible. The money spent on renewable energy installations tends to remain in the community, creating jobs and fueling local economies. The use of renewable energy equipment also reduces our dependence on foreign and/or centralized sources of energy, and is an important strategy in the process of creating a truly secure and sustainable energy future.

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### **Why is energy efficiency important?**

Energy efficiency means using less energy to accomplish the same task. By improving your energy efficiency, you reduce the size (and cost) of the renewable energy system needed to power your home. Improving your energy efficiency is the first and most important step toward adopting renewable energy.

The more efficient use of energy throughout our country results in less money spent on energy by homeowners, schools, government agencies, businesses, and industries. The money that would have been spent on energy can instead be spent on consumer goods, education, services, and products. For more information, see the American Council for an Energy-Efficient Economy and the Alliance to Save Energy Web sites.

An energy-efficient economy can grow without using more energy. In 1998, for instance, the U.S. gross domestic product increased 3.9%, while U.S. energy use decreased by 0.3%.

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### **Why is renewable energy important?**

Renewable energy is important because of the benefits it provides. The key benefits are: (1) Environmental benefits (2) Energy for our children and grandchildren (3) Jobs and the economy (4) Energy security.

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### **What is renewable energy?**

The United States currently relies heavily on coal, oil, and natural gas for its energy. Fossil fuels are nonrenewable, that is, they draw on finite resources that will eventually dwindle, becoming too expensive or too environmentally damaging to retrieve. In contrast, renewable energy resources – such as wind and solar energy – are constantly replenished and will never run out.

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