



Indoor Environmental Systems, Inc.
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924 W Chatham Cary, NC 27511

Solar PV/Electric System for your Home



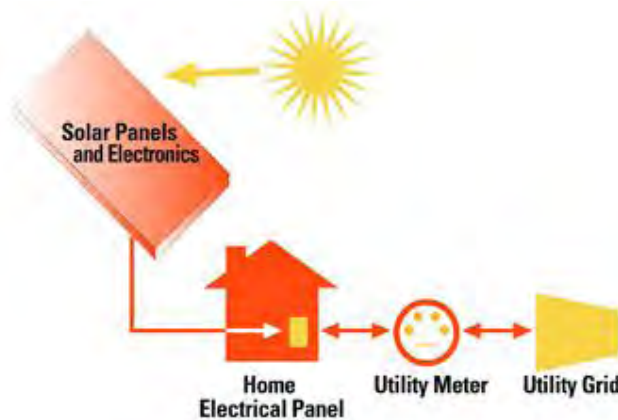
Solar in a Box is the world's first completely pre-assembled all AC solar electric system. High quality and leading edge components are assembled in a factory controlled environment. This significantly reduces the complexity of design and installation of a solar electric system.

The unique Solar in a Box design offers end users distinct performance and aesthetic benefits:

- Microinverters convert DC electricity into AC at each panel. This feature increases the output of each panel and significantly reduces production loss caused by shade.
- Dangerous high voltage DC electricity is eliminated.
- Unsightly exterior wall mounted equipment is eliminated.
- The sleek frame integrates the system into the roof like a skylight.
- Modular design allows for easy future system expansion.
- Pre-assembled design simplifies future roof maintenance.
- Proactive and interactive web-based monitoring included.



Why you Should Buy Solar in a Box



Solar electric (photovoltaic) systems are good for your pocketbook and for the environment.

Solar electric systems cleanly generate electricity from the ultimate renewable source - sunlight. The systems have no moving parts, require minimal maintenance, and will produce power for more than 25 years!

A grid-tied solar electric system reduces the amount of electricity that you purchase from your utility and offers protection from rising electric rates. The power from a solar electric system is cleaner and more sustainable than

electricity from traditional utility sources. The federal government offers a 30% tax credit rebate for solar system purchases, and a 35% up to \$10,500 is available from North Carolina.

The basic technology behind solar electric systems is proven and reliable, with widespread testing and usage in power generation for over 50 years. Solar in a Box is the next step in solar power.

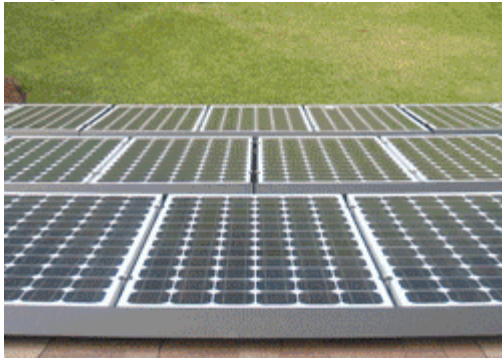


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The Advantages of Solar in a Box

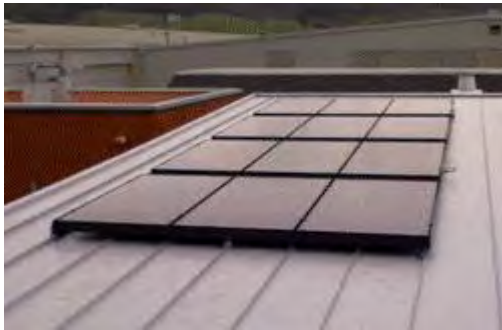
By utilizing the latest available solar technology and researching the most important considerations of homeowners, Ready Solar has developed its system to provide homeowners with unmatched advantages over traditionally available solar installations.

High Performance – Micro inverter design allows each panel to perform independently, maximizing system production under partially shaded conditions and early or late in the day. This provides a 5% to 25% production gain over traditional string inverter systems. In traditional systems, a little shade on any single panel will bring down the production of the entire system. A Solar in a Box system does not have this limitation and will produce more power.



Quality – Solar in a Box systems are assembled and wired in a factory controlled environment. This significantly reduces the opportunity for errors in assembly and wiring - especially on a hot, steep, or wet roof.

Modular Design – Ready Solar systems are easily expanded by simply adding more Rooftop power units. Traditional solar electric systems cannot be expanded without complicated redesign of the system and expensive equipment upgrades.



Superior Aesthetics – The patented Solar in a Box frame finishes to less than 2” off of the roof while still allowing 4” underneath solar the modules for cooling and increased production. The beveled frame hides wiring and racking and makes the system blend into the roof like a skylight. Micro-inverter design eliminates the wall mounted inverters and disconnect boxes that are required with traditional systems.

System Monitoring – Solar in a Box comes standard with panel level, web-based, and proactive system monitoring. This unique monitoring system protects a homeowner’s investment by reducing the cost of maintenance, ensuring maximum system production, and providing automatic email notifications if maintenance is required.

Warranty – Solar in a Box comes with an industry leading 25 year module production, 15 year inverter, and 15 year frame warranty.



Total Life Cycle Cost – The low profile design of a Ready Solar system reduces the chance of debris collecting under the solar panels, reducing maintenance. The pre-assembled design means that the system is easy to remove and reinstall should re-roofing be required. Traditional solar systems must be completely disassembled piece by piece and then completely reassembled during re-roofing.



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Safety – A Solar in a Box system is safer than traditional solar because the Microinverters design eliminates the hazardous high voltage DC (600V) wiring run (across the roof and down the side of the house) that is typical of a traditional solar installation.



Sizing a System - Solar in Box systems is fully modular. It is easy to start small and add on later. The right size system is determined by:

1. Your budget.
2. Your available, relatively shade-free, roof space (your contractor can help you assess this).
3. Your desired electric bill savings.

Process:

Qualify: Location and Budget

Location:

1. Go to Google Earth: <http://www.google.com/earth/>
2. Locate your address
3. Check for south facing roof exposure and any shading
4. Measure the length and width of your roof
5. The panel set (2 panels) measure (6' high and 13' wide; a set generates 500 watts)
6. For PV /electric systems - Find the location of your main power box and see if you have any open slots
7. For water heaters systems -locate the water heater.



Example:
Indoor Environmental Systems Building;

This is a South/East Facing Roof
With 3 proposed solar systems for:

1. Hot Water
2. Electric
3. Heating for Tropical fish pond



Budget:

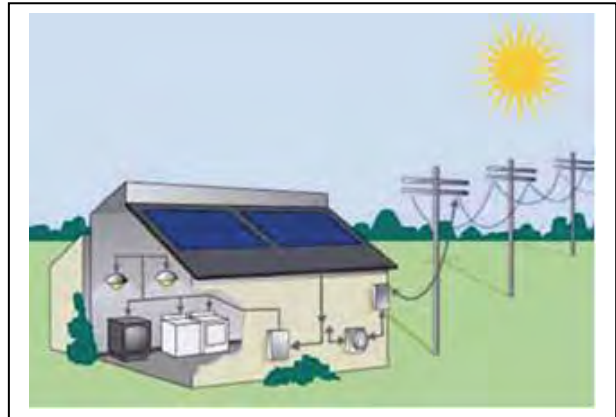
What is your budget: costs range from \$8 to \$12 per watt; more watts less cost.

2 kW Solar in a Box System – 5 units (s solar panels each) = 2000 watts *

- Cost \$20,000.00
- Tax Credit: \$10,900
- Out of pocket \$9,100.00
 - \$27,100 over 25 years
 - ROI 12.7/8 %
 - Protects electrical cost at \$0.13.8
 - Adds \$10,640 to home 2/3 of total cost or 100% of your investment
 - Sell home \$1K + annual saving \$532.00
 - Received value for the \$10,900 in taxes

Things to do:

1. Building Permit
2. NC Green Power Agreement
3. Interconnect agreement
4. Installation
5. Inspection
6. Rebate
7. Monitor



Environmental Benefits:

2kW system will prevent the following pollutants from being released into the atmosphere:

- 89,000 lbs. of CO₂, the leading global warming gas
- 1,000 lbs. or NO_x an SO₂ which causes smog and acid rain
- 18lbs. of fine particulates, which are linked to respiratory illness

The benefits are the equivalent of:

- Planting .8 acres of trees
- Offsetting 114, 0 00 miles driven by the average car

Bottom line: (2kW/2000 watt system in Raleigh, NC)

1. Using your tax dollars for improving the value of your home
 2. Investing \$10,000 at virtually no risk and getting 12% return on your investment
 3. Sell your home you get %100 of your out of pocket expense in increased value of your home
 4. Help the housing market by increasing the value of your home
 5. Lock in your electrical rat at \$0.14 for 15 years
 6. Be part of the solution to pollution
- 2kW System = 5 roof top units = 10 solar panels: 2kW = 2000 watts @ \$10 pre watt = \$20,000.00 cost @ 54% tax credit = \$10,900 . 2kW system costs \$20,000 - \$10,900 tax credit = \$9,100 out of pocket.

Ready Solar's Standardized Systems Include Everything:



- **Patented Ready Solar mounting frame & brackets**
- **Micro-inverters installed on each solar panel: no separate inverter component, DC wiring or DC disconnect required**
- **Each .4 kW unit (2 solar panels):**
 - approximately 6' x 6'
 - 120 lbs.
 - <3 lbs. per sq. ft.
- **Modular panels easily combine into a system of any size:**
 - easily design the system that is the best fit
 - start small and add panels later to increase solar power
- **Low profile looks great**
- **Ground mount option available**
- **Fast-track permit pack including wiring diagram & simple check list**
- **1 year of module-level performance monitoring**
- **Comprehensive Warranty**

Certifications: UL 1703, UL 1741, IEEE 1547, NEC 2005, CEC

Solar in a Box is right for your home if...

- You expect to pay \$50 or more a month for your electric bill
- At least one area of your roof will be facing Southeast, South, Southwest or West and will receive at least 6 hours of sun per day
- There will be minimal shade on your roof

Exclusive Features & Benefits of Solar in a Box

- Manufactured & assembled in a quality controlled environment
- High performance system designed to maximize energy production, even in partially shaded conditions
- Framing system integrates beautifully into your home
- Included web-based monitoring system to track and ensure production
- Low maintenance costs

Financial Benefits of Solar in a Box:

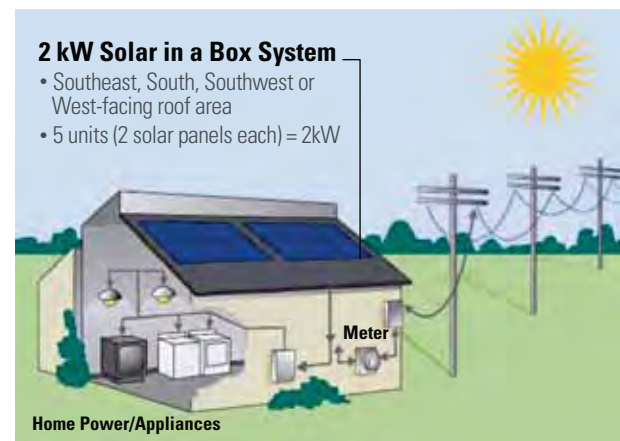
- Federal tax credit and state or utility rebates may be available
- Lock-in electricity costs, hedge against future rate hikes
- Save thousands of dollars in utility bills

Environmental Benefits

- Produce clean, renewable electricity
- Reduce your dependence on fossil fuels

How Solar Works

Solar Energy (Photovoltaic/PV) systems convert sunlight directly into electricity, silently and with no moving parts. These systems are mounted on your rooftop and the electricity they generate is fed into your home's electric system. Excess energy can often be sold to the utility.



Typical for Raleigh, NC:

12% return on investment.

100% of actual cost is added to value of home.

Tax credits cover 50% of the total system cost.



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Solar in a Box®

By utilizing the latest available solar technologies and researching the most important considerations of homeowners, Ready Solar has developed a solar electric system that provides its customers with unmatched advantages over traditionally available installations.

SOLAR SYSTEM COMPARISON



READY SOLAR

TRADITIONAL SOLAR

Aesthetics	Patented framing system finishes to less than 1" off roof, while still allowing 4" airflow for cooling. System blends into roof like a skylight. No exterior wall mounted equipment.	Racking system elevates solar panels 3" to 6" off roof. Racking, wires, and underside of solar panels often visible from ground level. Visible exterior wall mounted equipment.
Performance	Micro inverters allow each panel to perform independently, maximizing system production under partially shaded conditions and early or late in the day. 5% to 25% production gain.	Single, central inverter causes significant system production loss even if only one panel is partially shaded. If inverter goes down, the whole system goes down.
Quality	Complete system assembled and grounded to NEC code under factory controlled conditions, then simply mounted on roof. Reduced opportunity for errors in installation.	All system components assembled on roof, often in unfavorable conditions (steep or hot, bad footing). Maximum opportunity for errors and mistakes in assembly, wiring, and waterproofing.
Modular Design	Micro inverter design allows a smaller, less expensive starting system to be installed, with the ability to easily add small increments to the system's size.	Central inverter design means that there is less flexibility in system size. Wiring must be in "strings" of typically 8 to 12 panels making it difficult and expensive to increase system size.
System Monitoring	Panel level, web-based, proactive (notification alert sent if something requires attention) system monitoring is included with every system.	If offered, system monitoring is typically an added cost and only reports what the whole system is doing. Individual panels are not monitored.
Warranty	25 year production warranty on solar panels. 15 year warranty on inverters with 100% uptime guarantee.	25 year production warranty on solar panels, 10 year warranty on inverter.
Total Life Cycle Cost	Low profile design reduces chance of debris collecting under panels. Pre-assembled product makes it easy to remove and reinstall if new roof is required. Longer warranty.	Increased maintenance cost to clear debris from under panels. Significant costs to disassemble and reassemble system for roof work.
Safety	Micro inverters convert low voltage DC to AC at each solar panel. No high voltage on roof and no DC disconnect required.	Central inverter design requires high voltage (600 volt) wire on roof and down side of house to inverter. Fire marshals require DC disconnects, but DC is still live even if disconnected.

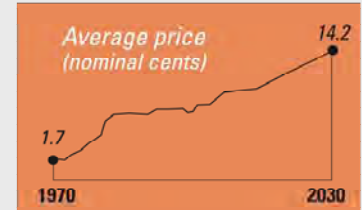


Economics of Solar Energy Systems

Grid connected solar electric (photovoltaic or PV) systems provide significant economic benefits to homeowners. There are several ways to consider the benefits of these highly reliable systems:

Solar is a hedge against future electric rate increases.

According to the U.S. Department of Energy, national average electric rates have increased 5% per year since 1970, and this trend is expected to continue through 2030. This means that today's \$100 monthly electric bill will likely be \$160 in 10 years and \$340 in 25 years. With 25 years of guaranteed production, a solar energy system allows a homeowner to "pre-pay" for their electricity at a fixed rate.



Source: Energy Information Administration / Annual Energy Outlook 2009

Solar adds value to a home.

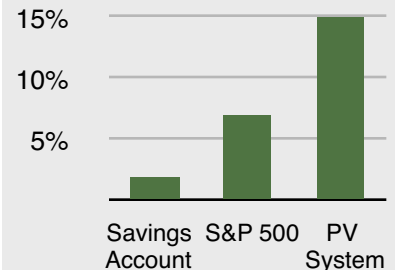
As long as the system is installed in an aesthetically pleasing way, solar immediately adds resale value to a home. In fact, the exact value is very easy to quantify. The panels are guaranteed to produce power for 25 years. At any given time the remaining production under warranty can be calculated and multiplied by the current electric rate (with escalation, if desired) to come up with an accurate value that the system adds to the home. A solar equipped home has lower operating costs (monthly bills) than a comparable non-solar home.

Typical 2.5 kW System:

\$10,000 Net price after all rebates and incentives	\$25,000 25 year tax adjusted bill savings
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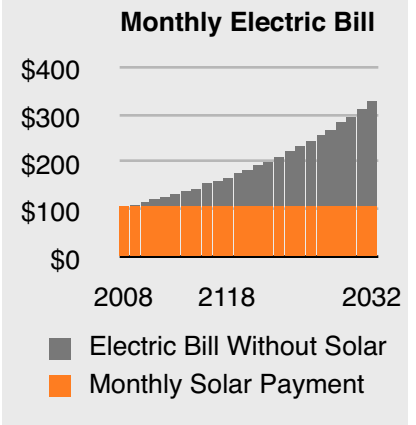
Solar pays back.

Over its lifetime a solar energy system will typically provide electric bill savings equal to 2-3 times the initial price of the system.



Solar provides a significant return on investment.

Solar provides a significant, reliable, and long lasting return on investment. Consider that returns from investments in the stock market or savings accounts are taxable income. The investment in solar provides electric bill savings, which are not taxable. To compare an investment in solar to other investments, it is important consider the value of the electric bill savings in pre-tax dollars. Depending on state rebates and local electric rates, the 25 year electric bill savings from an investment in solar typically provides a 10% to 20% average annual return on the initial investment.



When financed, solar can provide immediate savings.

By financing solar in a 30 year mortgage or other secured loan, the net loan cost (after tax benefits) is often equal to or less than the first year monthly electric bill savings. This means that the homeowner is "cash positive" on the investment from day one. Additionally, the loan is a fixed payment, while electric rates are always increasing.

Specific economic returns of solar energy systems vary by geographic location and are affected by state and utility rebates, current and future electric rates, and average sunlight for an area. Contact your Ready Solar representative for more information about specific locations.



Product Details and Frequently Asked Questions

Ready Solar is changing the way Solar Electric (Photovoltaic) systems are installed. Ready Solar provides standardized residential solar electric systems that are pre-engineered and pre-assembled, making them the easiest and most cost-effective way to install solar. Ready Solar's Solar in a Box is available to General Contractors, Electrical Contractors, Homebuilders and other trades with basic electrical proficiency.

Product Details

Solar in a Box systems include:

- Fully modular solar units designed for rapid installation
- Patented pre-assembled frame and mounting brackets - no site built racking
- Solar modules pre-wired and grounded to NEC code
- Pre-installed micro-inverters - no string sizing, inverter installation, or DC wiring
- Complete systems arrive ready to install and connect to the load center
- Fast-track permit pack includes wiring diagram & simple checklist
- Installation guide and support
- Comprehensive warranty
- Module level, web based monitoring included

Frequently Asked Questions

How does a solar electric system work?

Solar electric, or photovoltaic (PV), systems generate electricity silently and without any moving parts. The systems consist of solar panels, which create direct current (DC) power from sunlight, and inverters, that convert direct current power to the alternating current (AC) power that matches the utility grid. A solar electric system sends power into a home by tying directly into its electrical system at the load center or a sub-panel, offsetting the amount of electricity purchased from the utility.

Is this for hot water?

No. A Solar in a Box system only produces electricity. Solar thermal systems heat water.

What is a grid-tied solar system?

A grid-tied solar system is connected to the utility grid via a home's electric system. With the approval of the electric utility, electricity will flow back and forth between the home and the grid.

What is net-metering?

Net-metering laws require utilities to credit homeowners for any excess power that is generated from solar on their homes. If the solar electric system is producing more power than the house is using (for example, on a sunny day when everyone is at work or school), the electric meter “spins backwards” and the excess power is sent into the grid for a credit on the next electric bill. At night, or whenever power is needed, the utility provides electricity. Net-metering laws vary by state.

Will a Solar in a Box system work if the utility grid power goes out?

If the grid power goes down, the utility requires that the system shut down. This is to protect line workers that may be attempting to repair the grid outage. The system will automatically shut down if power is lost, and it will automatically restart when grid power is restored.

Are batteries part of this system?

Batteries are not part of a Solar in a Box system. Grid-tied systems are tied to the utility and do not require battery storage. PV systems with batteries are very complicated and custom designed for each project. A seasoned PV professional is required to design, install, and maintain a battery based system. The batteries typically need to be replaced every 5-7 years. For emergency power backup, standard generators are typically a more environmentally friendly and cost effective option.

Do panels work in cloudy weather?

Yes, although they produce less electricity. Production estimates for solar electric systems typically take into account 30 year historic weather data from The National Renewable Energy Laboratory. This means that any losses due to weather are already factored in, usually within plus or minus 9% for any given year.

Do the panels need to face South?

Generally South produces optimal power. Systems facing Southeast and Southwest are also effective at generating power year round.

What is the effect of shade on a Solar in a Box system?

Ready Solar’s unique design significantly reduces the impact that shade has on production. Traditional solar systems are dramatically impacted by shade on the panels - partial shade on one or two panels can bring down the production of those systems to almost zero. With a micro-inverter design, Solar in a Box allows all panels to function independently. This maximizes production under partially shaded conditions.

What will a Solar in a Box system look like on my home?

Ready Solar systems are designed to be aesthetically pleasing on a home. The patented framing system has a sleek beveled edge and is mounted nearly flush to the roof with a low profile. The systems resemble skylights on the roof.

How is Solar in a Box better than other solar systems?

For installers, the pre-assembled product makes design and installation simple and reduces the opportunities for errors that are inherent in traditional solar installations. For homeowners, Ready Solar systems provide increased production, are aesthetically superior due to the sleek framing system, and include a proactive web based monitoring system to ensure performance and satisfaction.

How much solar do I need?

The size of a solar electric system is determined by balancing the desired electric bill savings, available roof space, and homeowner’s budget. All three factors help to determine the size of a system. The local weather patterns will also influence system production. Ready Solar provides an easy to use calculator to help determine the approximate system size based on geographic location and desired kWh savings.

What is a kiloWatt (kW) and what is a kiloWatt hour (kWh)?

A kiloWatt, or kW, is a power rating equal to 1000 Watts. Ten 100 Watt light bulbs have the same rating (10 x 100 = 1000). A kiloWatt hour, kWh, is the amount of power used when 1 kW of appliances are turned on for 1 hour. Ten 100 W light bulbs left on for 1 hour would consume 1 kWh of electricity. The electric utility charges per kWh used.

How much bill savings will a Solar in Box system provide?

The electric bill savings provided by a Ready Solar system will depend on the rate that the homeowner is currently paying for electricity. (This is the total electric bill divided by the number of kWh used in a month.) The approximate number of annual kWh that a Ready Solar system will provide multiplied by the electricity billing rate is about how much savings will be provided in the first year. Here is an example:

Total current monthly electric bill:	\$100
KiloWatt hours for month:	700 kWh
Electric billing rate:	$\$100 \div 700 \text{ kWh} = 14\text{¢ per kWh}$
On an average month,	
a 2 kW system can produce:	300 kWh
Monthly electric bill savings:	$300 \times 14\text{¢} = \42 per month

Electric bill savings will increase every year as electric rates go up!

How much value will a solar electric system add to a home?

According to The Home Appraisal Journal, an energy efficiency improvement like solar will add 20x the first year savings to the value of the home. A solar equipped home will have lower operating costs than a non-solar home.

When will the system “pay back”?

The electric bill savings provided by a system will typically pay for the system in 8-12 years, depending on local rebates, incentives, and electric rates. When factoring in even a modest increase in the price of electricity, systems typically pay back 2-3 times over their 25 plus year lifetime.

What rebates and incentives are available?

The federal government has a new tax credit that will run from January 1, 2009 to December 31, 2017 and will give a tax rebate of 30% of the net system price. Many electric utilities have rebate or buy down programs to reduce the upfront costs of solar. Some state governments pay out rebates directly or give personal tax credits for solar purchases. Rebates and incentives vary by state and utility. Visit www.dsireusa.org for a complete listing of all incentives and rebates by state.

What types of roofs can Solar in a Box be installed on?

Options include waterproof systems for composition shingle, tile, and metal roofs. A ground mount option is also available.

Is there a warranty on the system?

Solar in a Box comes with a comprehensive warranty: 25 year power production warranty on solar modules, 15 year warranty on Ready Solar frame components, and an industry leading 15 year warranty on the micro-inverters.

What is the lifespan of the system?

The solar modules, which make up 50% of the system cost will likely produce power for more than 30 years.

What about extreme weather conditions, like wind and hail?

Solar in a Box systems are built and tested to UL-standards to withstand 125-mph winds and 1" diameter hail at 50 mph.

How long will it take for snow to clear off the panels?

The glass surface of the panels is slick and dark in color. When the sun comes out, the panels will heat up and snow should shed off of the panels quickly. In very high snowfall conditions, it may be necessary to manually clear the snow.

Will the modules require cleaning periodically?

Panels do not typically require cleaning in areas with periodic rainfall. If necessary, a hose stream is usually sufficient to clean the panels. (The panels should be cleaned early in the day, before they get hot.)

What are the environmental benefits of solar energy?

Traditional electric grid electricity is primarily generated by burning coal (49%) or natural gas (22%), or at nuclear facilities (19%). The clean power from a 2 kW Ready Solar system will prevent the following pollutants from being released into the atmosphere:

- 89,000 lbs. of CO₂, the leading global warming gas.
- 1,000 lbs. of NO_x and SO₂ which cause smog and acid rain.
- 18 lbs. of fine particulates, which are linked to respiratory illness.

These benefits are the equivalent of:

- Planting .8 acres of trees.
- Offsetting 114,000 miles driven by the average car.

What are the other “big picture” benefits of solar energy?

- Solar generated electricity is completely renewable. The only fuel source is sunlight. Fossil fuels like coal and natural gas are finite.
- By producing electricity where it is needed (called distributed generation), solar reduces the strain on the existing electrical grid.
- As electric and plug-in hybrid vehicles become more available, solar electricity is a local source of energy that reduces the dependence on foreign sources of oil.