

RENEWABLE ENERGY SOLUTIONS

Harnessing the sun's energy



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The amount of sunlight reaching the surface of the earth every hour contains enough energy to meet the world's energy demand for an entire year. As a global leader in energy efficiency and sustainability, Johnson Controls wants to help you harness a portion of the sun's energy to help you meet your energy needs using this most renewable of resources. If you choose to work with us, we can take responsibility for everything, from design and engineering to financing help, to operations and maintenance of the system. And, we'll help you improve the financial return from your solar installation by leveraging whatever federal, state and local grants, rebates and incentives are available.

Solar Applications

Solar energy can be converted directly or indirectly into electricity and heat through photovoltaic devices and thermal collectors. The resulting electricity and heat can offset utility costs and reduce, or possibly eliminate, the need for water heaters.

■ Photovoltaic energy

Photovoltaic energy is the conversion of sunlight to electricity through a photovoltaic cell (PV), a non-mechanical device usually made from silicon alloys. As sunlight strikes a PV cell, it creates an electron imbalance between the front and back surfaces of the cell. Electricity occurs when these two surfaces are joined together by a conductor, such as a wire. Individual PV cells are electrically connected into a packaged, weather-tight module. Depending on the power output needed, modules can be further connected to form a PV array, essentially a generating plant made up of any number of modules.

■ Thermal energy

Solar thermal energy is created by absorbing the heat of the sun with collecting devices such as flat-plate solar-energy collectors. Air or a heat transfer fluid passes through tubes within the solar collectors where it is warmed and then distributed to the appropriate heating system. Solar thermal power plants take the heated fluid process one step forward through the use of a heat transfer system to produce steam. The steam can then be converted into mechanical energy in a turbine, and into electricity from a conventional generator coupled to the turbine.

Technology with no boundaries

Johnson Controls is a \$32 billion leader in energy and environmental solutions. Our contracts often include a performance guarantee, reducing your risk. Our global experience in energy supply- and demand-side businesses, along with 120 years of building expertise, make us well suited for these applications. With 500 offices around the world, we can deliver solutions anywhere you need them.



Norman N. Glick Middle School, Modesto, California uses photovoltaic panels to help meet the school's electrical demand, while providing a comfortable shaded break area for students.

SOLAR POWER FACTS:

- Worldwide photovoltaic installations increased by 1,744 MW in 2005, up from 1,460 MW the previous year. In 1985, annual solar installation demand was only 21 MW.
- For comparison purposes, total worldwide wind energy installations in 2000 were around 4,000 MW, growing at about 35% per annum.
- Cumulative solar energy production accounts for less than 0.01% of total Global Primary Energy demand.
- Solar energy demand has grown at about 25% per annum over the past 15 years (hydrocarbon energy demand typically grows between 0-2% per annum).
- The U.S. market showed 33% growth in 2006.

(Source: Solarbuzz.com)

WHERE WE'RE WORKING:

29 Palms Marine Base

Johnson Controls installed a 1.1 MW photovoltaic plant at the Marine Air Ground Task Force Training Command in 29 Palms, CA. This is one of the highest-capacity non-utility solar power plants in the world. The plant's photovoltaic cell array spans eight acres of land on the base, and is used to supplement electric capacity during peak load periods. It can supplement approximately one-fifteenth of the base's annual electricity requirements.

Denver Federal Center

Johnson Controls partnered with the U.S. General Services Administration and incorporated innovative strategies such as updating an existing solar domestic water heating system and improving an irrigation control system.