

The Science of Solar: Solar Energy – Is It Practical?

Solar Discovery Series

We've learned some of the basics about solar energy in the first two articles of this series, and it makes sense that it should work. We've all seen solar panels, or at least pictures of them, on buildings. But how practical is solar energy? Is it being used today, other than in a few, select situations? When will it become more widespread? What are some of the obstacles to its broad use?

Some of the main areas where solar energy is being used today include:

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RESIDENTIAL HOMES – Grid-connected systems are becoming increasingly popular around the world, as individuals and companies want to get their electricity from clean, non-polluting and renewable sources, even if it does cost a small premium.

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HOLIDAY AND VACATION HOMES – In remoter locations, off-grid systems are often used to power these part-time-use residences. For these systems, intermediate storage of electricity in rechargeable batteries is required.

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INDUSTRIAL APPLICATIONS – Solar energy has been the power choice for applications in remote regions for things like repeater stations for microwave, radio and television. It is also used in highway lighting, as shown at left.

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COMMERCIAL BUILDINGS – Dow Corning's construction industry talks a lot about curtain walls. Did you know that solar cells can be assembled between layers of glass in curtain walls and windows? This is referred to as building integration photovoltaics, or BIPV.

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CONSUMER PRODUCT APPLICATIONS – Solar energy powers many products, from calculators to rechargeable batteries in boats and recreational vehicles.

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CENTRAL POWER STATIONS – Pilot plants have been set up in Italy, Spain and the U.S. in the same configuration as a utility would set up a major power station.

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OUTER SPACE APPLICATIONS – As early as 1964, Azur Space Solar Power GmbH, a German company, started developing and producing solar cells for application in outer space. Since then, more than 340 satellites have been equipped with solar cells.

WHAT ARE SOME OF THE OBSTACLES THAT KEEP SOLAR ENERGY FROM BEING USED MORE BROADLY?

According to a report by the National Renewable Energy Laboratory (NREL), there are 10 major nontechnical issues surrounding the use of energy efficiency/renewable energy (EE/RE) in industrialized countries. Many are closely related to technical issues as well. They include:

- Lack of government policies supporting EE/RE
- Lack of information dissemination and consumer awareness about energy and EE/RE
- High cost of capital to replace established technologies
- Inadequate financing options for EE/RE projects
- Lack of stakeholder and community participation in energy choices and EE/RE projects
- Higher per-kilowatt-hour cost for solar and other EE/RE technologies, compared with conventional energy

This last obstacle is the one being targeted by technology improvements – driving down the cost of converting solar power into electricity, and it is where many of Dow Corning's efforts are concentrated.

SO WHAT DOES THIS MEAN FOR THE AVERAGE CONSUMER AND A COMPANY LIKE DOW CORNING?

A 2.5 kilowatt solar system comprising modules, inverters, cabling and mounting hardware to outfit a standard residential home will cost approximately 20,000 USD today. To further reduce the system price, Dow Corning is developing new and disruptive technologies to make solar power more competitive.

The sun will be an important source of our energy future, and many advances in photovoltaic science are leading the way to make it a reality.

HOW DO WE MAKE SOLAR ENERGY MORE PRACTICAL?

To make solar energy a viable energy option for more people, it has to be easier to harness.

Dow Corning and Hemlock Semiconductor both play significant roles in the solar energy industry. Dow Corning provides materials and services for the entire solar industry, from the basic building blocks of silicon feedstock for ingot and wafer production to solar module frame assembly and sealing materials. Hemlock Semiconductor is a world leader in the production of polycrystalline silicon, the cornerstone material used to produce solar cells that harvest energy from sunlight.

Dow Corning Corporation, based in Midland, Michigan, provides performance-enhancing solutions to serve the diverse needs of more than 25,000 customers worldwide. A global leader in silicon-based technology and innovation, offering more than 7,000 products and services, Dow Corning is equally owned by The Dow Chemical Company and Corning, Incorporated. More than half of Dow Corning's annual sales are outside the United States.

Hemlock Semiconductor Group is a world leader in the production of polycrystalline silicon and other silicon-based products used in the manufacturing of semiconductor devices and passive solar cells and modules. Headquartered in Hemlock, Michigan, Hemlock Semiconductor is owned in majority by Dow Corning Corporation. For more information, please visit hscpoly.com.

LEARN MORE

Dow Corning has sales offices and manufacturing sites, as well as science and technology laboratories, around the globe. For more information, please visit dowcorning.com/solar or e-mail solar.solutions@dowcorning.com.

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