

The Photovoltaics Promise . . .

Photovoltaics (PV), which uses semiconductor technology to convert sunlight directly into electricity, is good for our energy, our economy, our environment, and our future.

Good for Our Nation's Energy Supply

- ❑ **Versatility.** PV is a versatile electricity technology that can be used for any application, from small (a few milliwatts for solar calculators) to very large (hundreds of megawatts for solar "farms").
- ❑ **Resource.** Sunshine is something we can never overtax or squander. Yearly, the earth receives 6,000 times more sunlight energy than humans consume. As such, it will enable a smooth transition to a sustainable energy future.
- ❑ **Energy Security.** Sunshine is available to everyone. Any community, state, or nation that builds a PV infrastructure will be less vulnerable to international energy politics and volatile fossil fuel markets.

Good for Our Environment

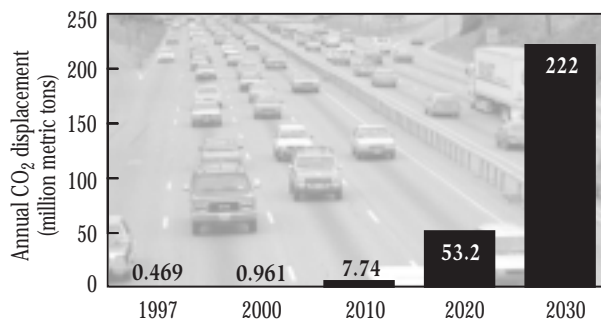
- ❑ **Staying Cool.** PV produces no greenhouse gases, so its use could reduce the probability of global warming and climate change.
- ❑ **Breathing Easier.** PV produces no atmospheric emissions. Its use would curtail air pollution, which produces acid rain, soil damage, plant and animal damage, and human respiratory ailments.

Good for Our Economy

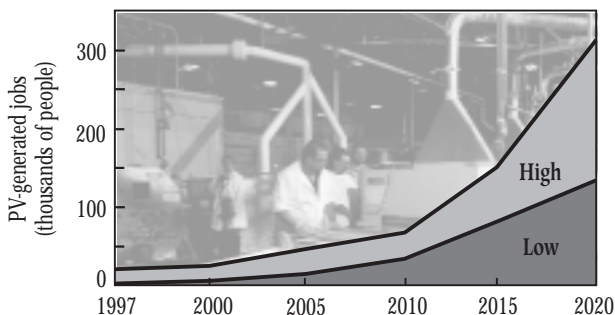
- ❑ **Growing markets.** In 1997, PV module shipments jumped to 125 million watts, resulting in more than \$1 billion in sales. At present growth rates (which averaged 24% for the last 5 years) module shipments will surpass 10 billion watts per year by 2020. This would represent a direct PV market greater than \$15 billion and an indirect market double that.
- ❑ **Job Creation.** Today, the PV industry creates about 3000 direct and indirect jobs for every \$100 million of module sales. As this industry grows toward its potential, it will generate hundreds of thousands of jobs and become one of this nation's, and the world's, most important industries.
- ❑ **Home Grown.** Any nation, state, or community can build a PV industry. Those that do will create domestic jobs, offset payments otherwise spent on imported energy, export energy technology, and keep energy dollars at home for further domestic investment.

Good for Our Future

- ❑ **A Cleaner World.** PV will help relieve pressures on the atmosphere and biosphere, in terms of global warming and the pollution of our environment.
- ❑ **A Safer and More Equitable World.** The resource is huge and the technology can be used by everybody. This circumvents the question of resource depletion and eliminates a cause of international conflict and war.
- ❑ **A More Prosperous World.** PV can be used by anyone, anywhere, for any application requiring electricity, including the powering of any industry, whether remote or centralized.
- ❑ **And Beyond.** PV electricity can be used to produce hydrogen from water. Hydrogen can power industry, heat and cool buildings, and run transportation systems. Electricity and hydrogen from the sun: inexhaustible, clean, and for everyone.



Under present growth trends, by 2030 installed PV systems will offset 222 million tons of CO₂ yearly—equivalent to that generated by 50 million cars.



The PV industry will generate an enormous number of jobs (high and low estimates).



. . . The Federal Role

The purpose of the U.S. Department of Energy PV Program is (1) to accelerate the development of PV as a global energy option and (2) to assure U.S. technology and global market leadership.

Building Technology Leadership

Technological leadership is basic to U.S. industrial competitiveness in PV. Today, PV is a \$1 billion industry growing at more than 20% per year. But to capture much larger markets, especially the electric utility market, PV costs must be dropped fivefold by addressing key technical issues, including:

- ❑ making dependable PV devices that convert sunlight to electricity efficiently;
- ❑ developing low-cost, high-yield processes for manufacturing PV modules; and
- ❑ developing a strong scientific base to ensure the continued technical progress that will enable PV cost to become competitive for large, price-sensitive energy markets.

Working with the U.S. PV Community

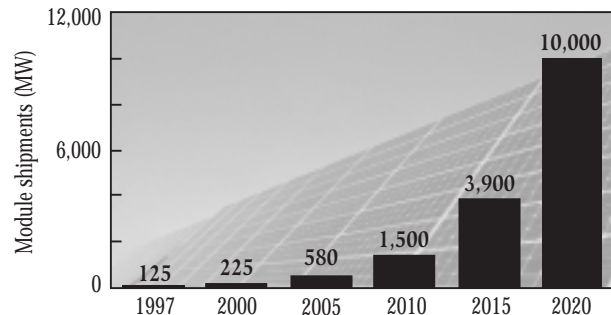
The DOE Program addresses technical issues by working with the U.S. PV community through public/private partnerships. The Program implements partnerships by supporting work at leading U.S. PV companies, leading universities, and the National Center for Photovoltaics at the National Renewable Energy Laboratory and Sandia National Laboratories.

- ❑ Companies compete for solicitations and share costs of R&D contracts. They then integrate results of successful research into their manufacturing processes and products.
- ❑ Universities perform advanced R&D, working closely with the national laboratories and companies.
- ❑ The national laboratories participate through (1) centralized technical support; (2) innovative research in new device and processing approaches; and (3) technical program management and strategic planning.
- ❑ All partners participate in national R&D teams formed within each PV technology. The scientists on the teams define critical problems and cooperate to find solutions.

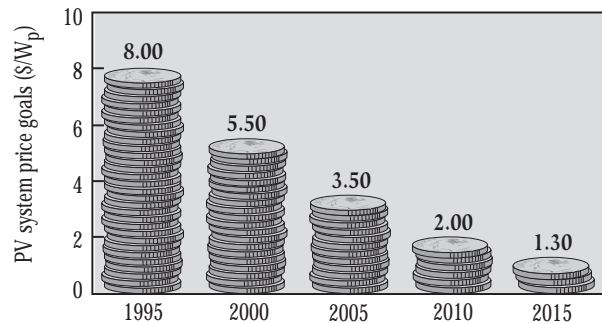
Paying Off

The federal investment is paying off:

- ❑ U.S. industry and research laboratories are today's world leaders in PV technology.
- ❑ The photovoltaic industry has grown to more than \$1 billion in annual system sales, has opened up large international markets, and has created thousands of U.S. jobs.
- ❑ And the future is even more promising—the Program is making substantial progress in PV technologies with the potential to meet the low-cost goals that would make PV competitive with electric utilities.
- ❑ PV is a semiconductor technology with the potential to become one of the world's most important industries. To reach that potential, the DOE Program and its partners will continue to address scientific and technical challenges using the complementary strengths of the public and private sectors.



At the present average growth rate, PV module shipments will surpass 10 billion watts by 2020.



By addressing key technical issues, the DOE PV Program's goal is to drop system prices fivefold—this will make PV more competitive and accelerate market growth.