



SOLAR PHOTOVOLTAICS FACT SHEET

Solar Photovoltaics (PVs)—Semiconductors that convert sunlight into electricity

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Advantages of Solar PVs

- ❖ Unlimited “free” resource that reduces our dependence on fossil fuels
- ❖ No water resources are used and no harmful emissions are produced during operation
- ❖ Carbon footprint for generating solar electricity is 30 times less than using coal
- ❖ Does not make noise when in use
- ❖ PV modules have long warranties, ≈20-30 years
- ❖ Can be integrated into new and existing structures
- ❖ Stimulates economy by providing jobs and opportunity for innovation
- ❖ Possible supply of surplus energy

Disadvantages of Solar PVs

- ❖ Requires a large amount of space (i.e. land or building)
 - ❖ Shortage of material available for PV technology
 - ❖ Most effective in areas with clear skies and low humidities because those areas have the large amount of intense direct sunlight
 - ❖ High material and manufacturing costs
- Greater efficiency → Greater cost

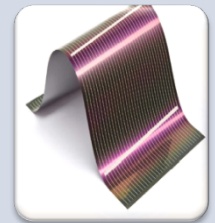
Types of PV Panels



MONOCRYSTALLINE
Efficiency rates: 15%-20%
Performs best in cooler conditions
Excellent life span and warranty
Most expensive



POLYCRYSTALLINE
Efficiency rates: 10%-15%
Slightly better performance in hotter conditions
Excellent life span and warranty
Less expensive than monocrystalline



THIN FILM
Efficiency rates: 6%-10%
Most efficient in hot weather, less effective in cooler conditions
Expected lifespan is less than crystalline panels
Least expensive

HOW A SOLAR SYSTEM WORKS

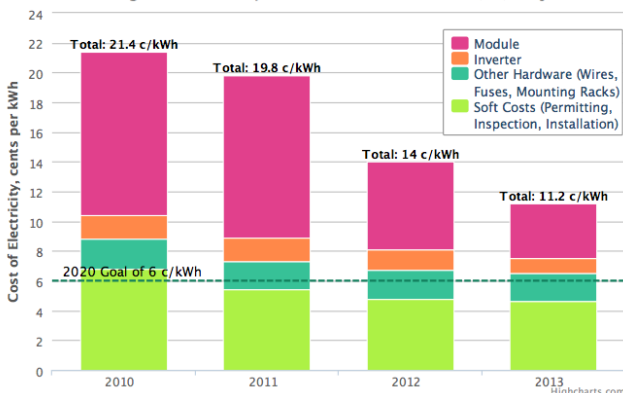
- 1 Solar panels
- 2 Inverter
- 3 Switch board
- 4 Electricity meter
- 5 Electricity mains grid



Current Policies, Practices and the Future

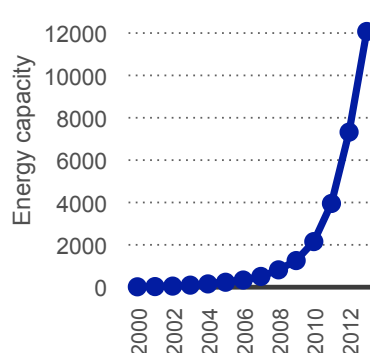
- ❖ U.S. Department of Energy’s SunShot Initiative: aims to reduce the price of solar energy by 75% from 2010 to 2020, which is projected to lead to 27% of U.S. electricity demand being met by solar technologies in 2050
- ❖ ISPPA guidelines: Guidelines for the assessment of PV power plants
- ❖ National Electrical Code (NEC)— The 1984 and later editions of the NEC contain Article 690, "Solar Photovoltaic Systems" which should be followed when installing a PV system.
- ❖ Currently, end-of-life panels do not produce viable waste stream but the industry has made plans to create panel recycling programs as the volume of solar installations grows
- ❖ The actual rate at which solar PV will be of integrated will largely rely on policy because the government has the ability to influence costs and other social aspects
 - Less than 2.5% of the available global renewable energy potential is currently used
 - In 2014, 0.23% of U.S. electricity was generated with solar technologies

The Falling Price of Utility-Scale Solar Photovoltaic (PV) Projects

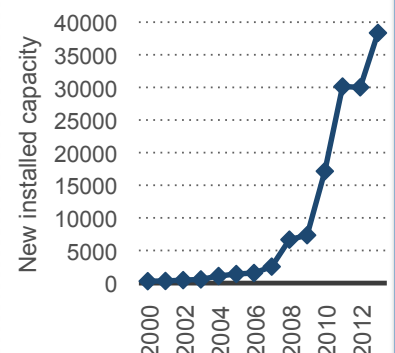


The cost of PVs has declined and additional technical advances will result in further cost reductions.

Cumulative Solar PV Capacity in the U.S. from 2000-2013 (in megawatts)



New Global Installed Solar PV Capacity from 2000-2013 (in megawatts)



U.S. Department of Energy (DOE). "Solar Energy Glossary." U.S. Department of Energy (DOE): Office of Energy Efficiency & Renewable Energy. Web. <http://energy.gov/eere/sunshot/solar-energy-glossary>

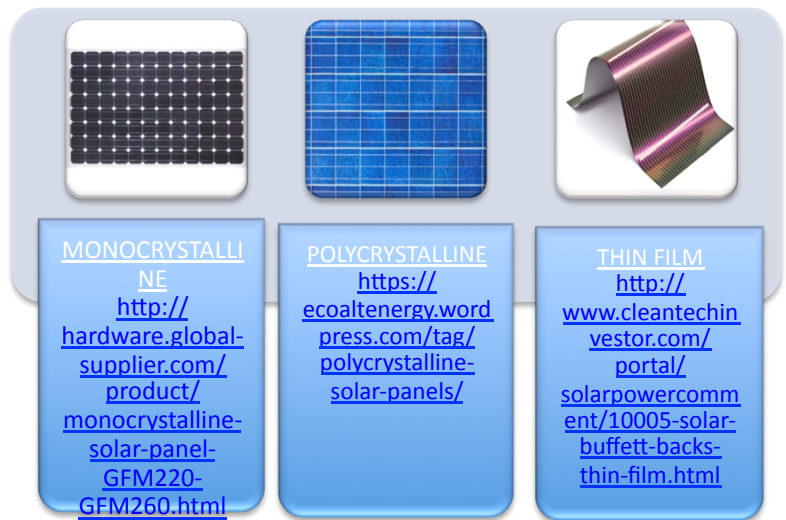
Krutz, Jamie. "Photovoltaics: A Diverse Technology." Energy Efficiency & Renewable Energy: Solar Multimedia. U.S. Department of Energy (Jan 2011). Video. https://www.eeremultimedia.energy.gov/solar/videos/photovoltaics_diverse_technology

IPCC (2011): Summary for Policymakers. "IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation." Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IPCC (2011): Summary for Policymakers. "IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation." Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

<http://www.solarpanelsforyourhome.us/how-solar-work/how-does-photovoltaic-grid-tie-solar-system-work/>

U.S. Department of Energy (DOE). "Photovoltaics." U.S. Department of Energy (DOE): Office of Energy Efficiency & Renewable Energy. Web. <http://energy.gov/eere/sunshot/photovoltaics>



The image displays three types of solar panels in a grid format. Each panel is shown in a separate box with a corresponding label and URL below it. The first panel is Monocrystalline, the second is Polycrystalline, and the third is Thin Film.

MONOCRYSTALLINE	POLYCRYSTALLINE	THIN FILM
http://hardware.global-supplier.com/product/monocrystalline-solar-panel-GFM220-GFM260.html	https://ecoaltnenergy.wordpress.com/tag/polycrystalline-solar-panels/	http://www.cleantechinvestor.com/portal/solarpowercomm/10005-solar-buffett-backs-thin-film.html

Solar Energy Industries Association (SEIA). "PV Recycling". Issues & Policies: Environment. Web. <http://www.seia.org/policy/environment/pv-recycling>

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EPIA (2014). "Cumulative Solar PV Capacity in the U.S. from 2000 to 2013 (in megawatts)." U.S. renewable energy: cumulative solar PV capacity through 2013. Statistica. Web. <http://0-www.statista.com.libcat.lafayette.edu/statistics/232863/cumulative-solar-pv-capacity/>

EPIA (2014). "New Global Installed Solar PV Capacity from 2000 to 2013 (in megawatts)." Solar PV - new installed capacity worldwide through 2013. Statistica. Web. <http://0-www.statista.com.libcat.lafayette.edu/statistics/280253/global-cumulative-installed-capacity-share-by-country/>