

Solar 101

How PV works and how it is applied

How PV Works



The PV cell absorbs the photon. This extra energy excites the electrons in the cell and causes them to flow.

This flow of electrons is in the form of direct current and is what we refer to as electricity.









Niagara Science Museum

Edmund Becquerel discovered the Photovoltaic Effect in 1839



1891 The first commercial solar water heater was invented by Clarence Kemp in Baltimore, MD. Kemp called the water heater the Climax Solar-Water Heater, and marketed it to men whose wives had "gone off with their maids to summer at some resort."



Vanguard 1 Satellite with 0.5W PV Cell





EDMMUNITY Cost & Efficiency

c-Si SOLAR CELL DEVELOPMENT wafer thickness in µm & silicon usage in g/Wp











Source: EIA, Piper Jaffray Research.

Source: U. S. Department of Energy, Energy Efficiency and Renewable Energy

source: EU PV Technology Platform Strategic Research Agenda, C-Si Roadmap ITPV, EPIA roadmap 2004.

EDMMUNITY PV Global Capacity

GLOBAL EVOLUTION OF PV INSTALLED CAPACITY MW



THE WORLD PV MARKET IN 2009



source: Global Market Outlook for Photovoltaics until 2014, EPIA, May 2010.



Using PV









Group of PV cells is a Module Group of PV modules is a Panel Group of PV panels is an Array







Applications









System Components





Irradiance or Radiation

- the rate of solar radiation falling on an area at a moment in time – kW/m2

Irradiation or Insolation

- the amount of solar energy over time
- kWh/m2/day

Production or Output or Generation (Annual)

- kWh/kWp
- MWh/MW-AC

Capacity Factor

- ratio of the actual output of a power plant over a period of time to its potential output

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Performance Ratio

- ratio of the actual yield (output) to the target or expected generation



