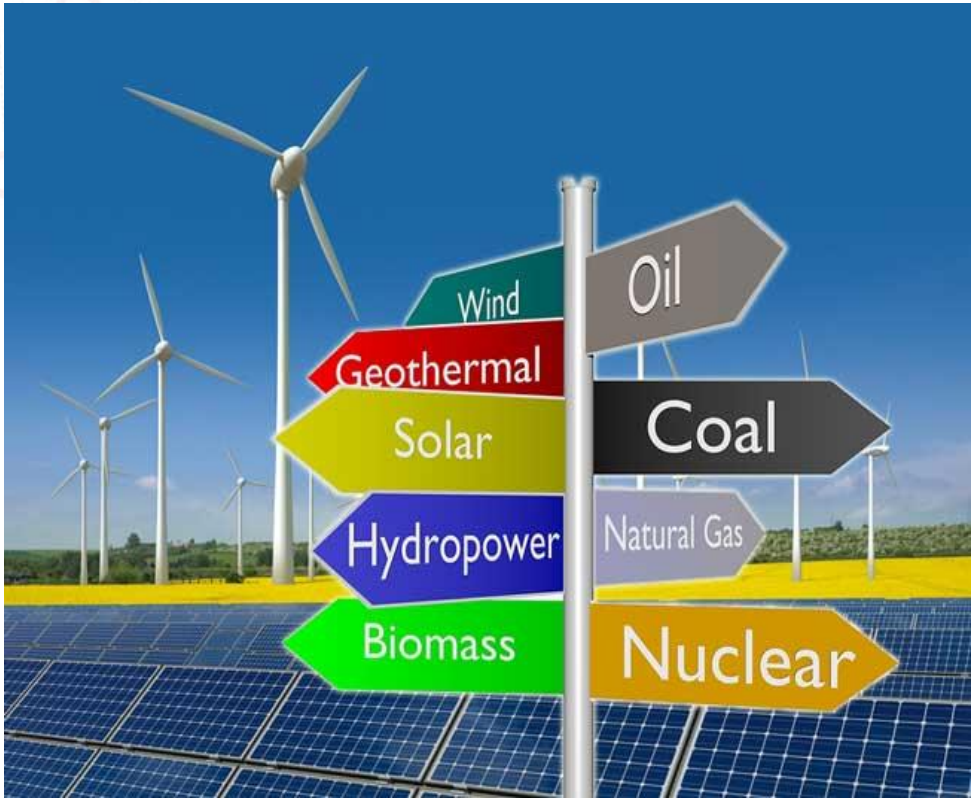
PV Drives Energy Transition

2019 | 1

Dr. Zhengrong Shi

SUNMAN
SOLAR SPECIALIST

Features of Energy

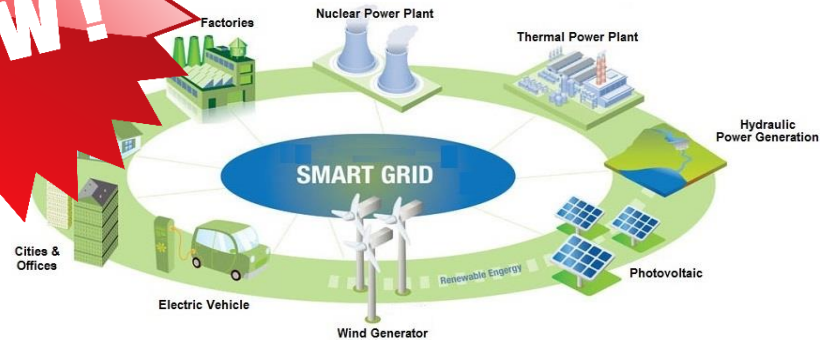


Conventional Energies

Controllable Nuclear Fusion——Disruptive Technology

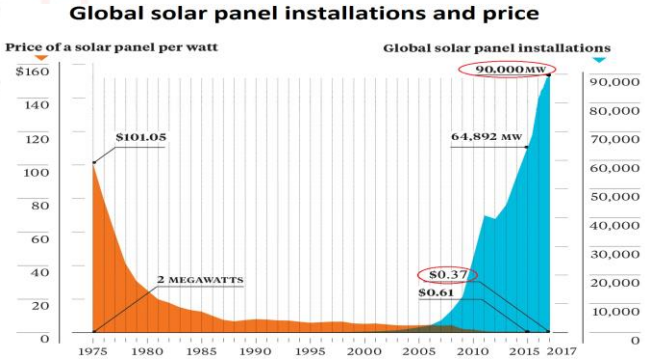
What is available now?

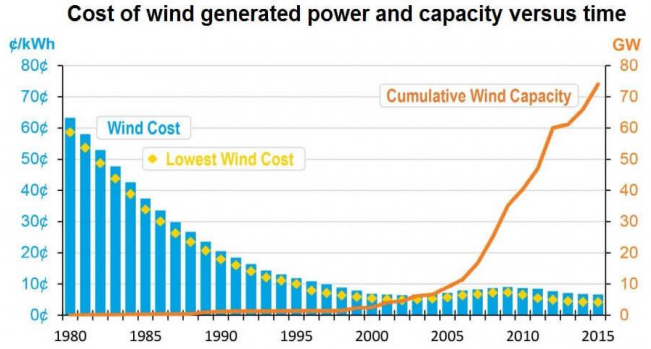
Available Now !

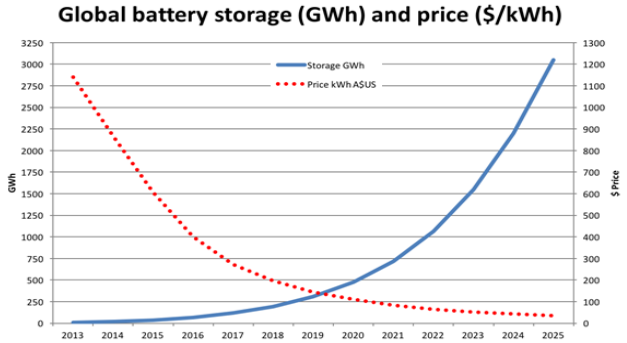


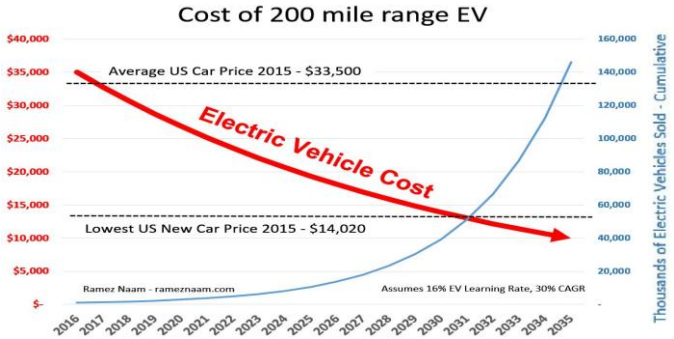
SVMAN
SOLAR SPECIALIST

Cost vs Capacity









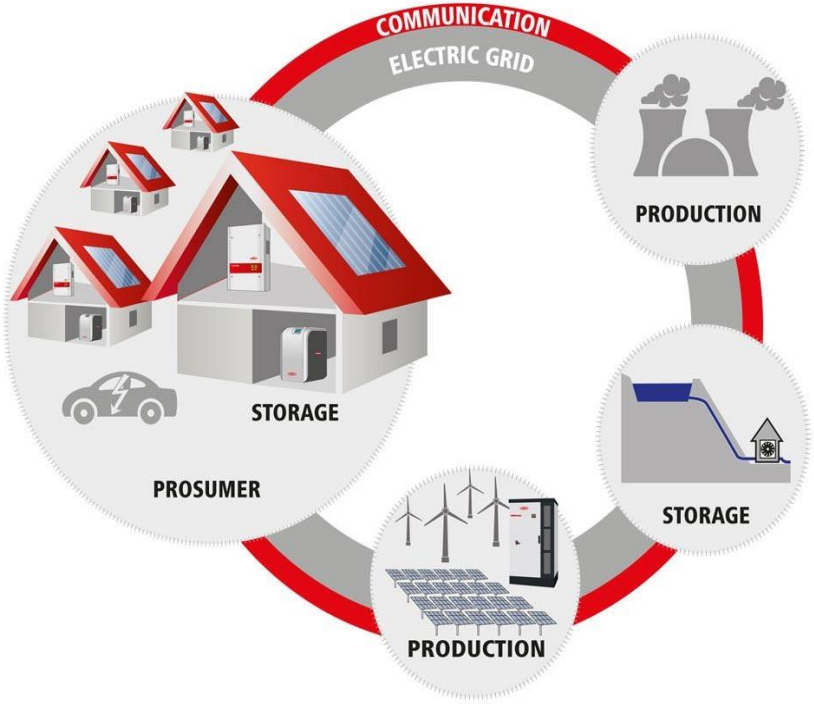
SVMAN
SOLAR SPECIALIST

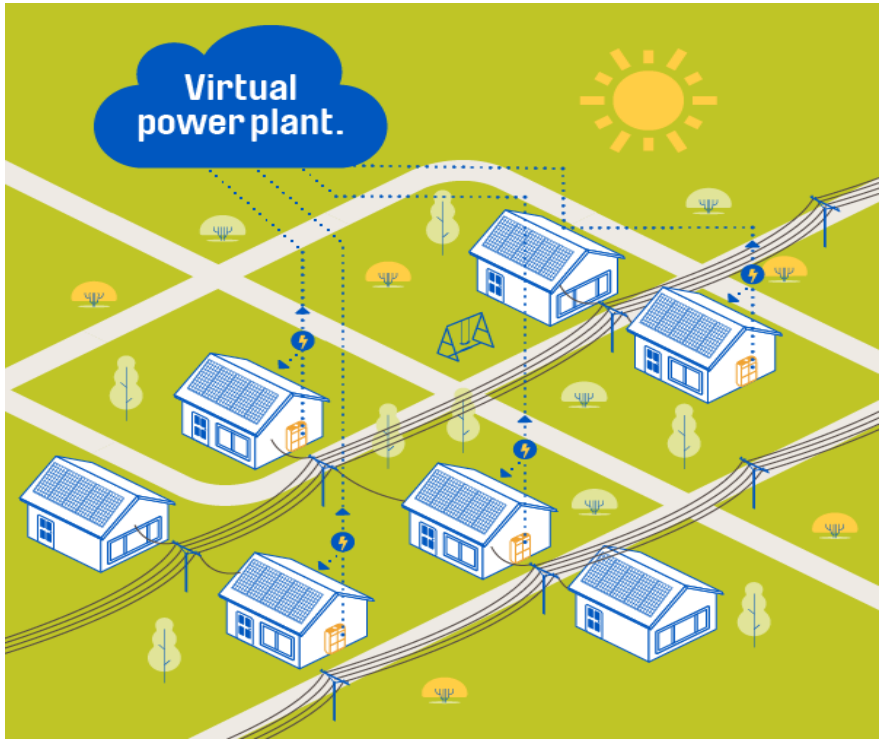
Roller Coaster of Solar

Emergence of Grid Parity

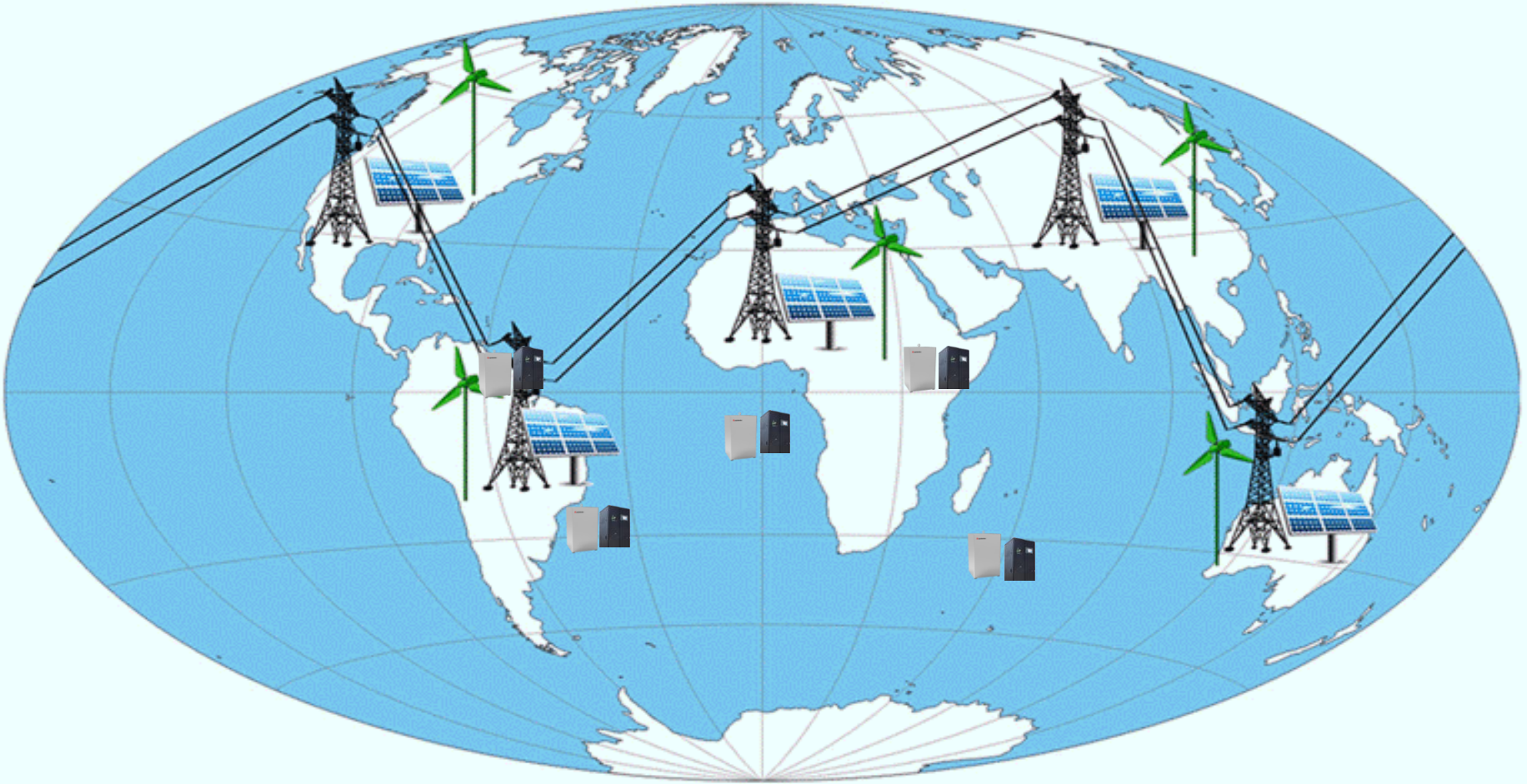
SUNMAN
SOLAR SPECIALIST

Virtual Power Plant with Solar and ESS

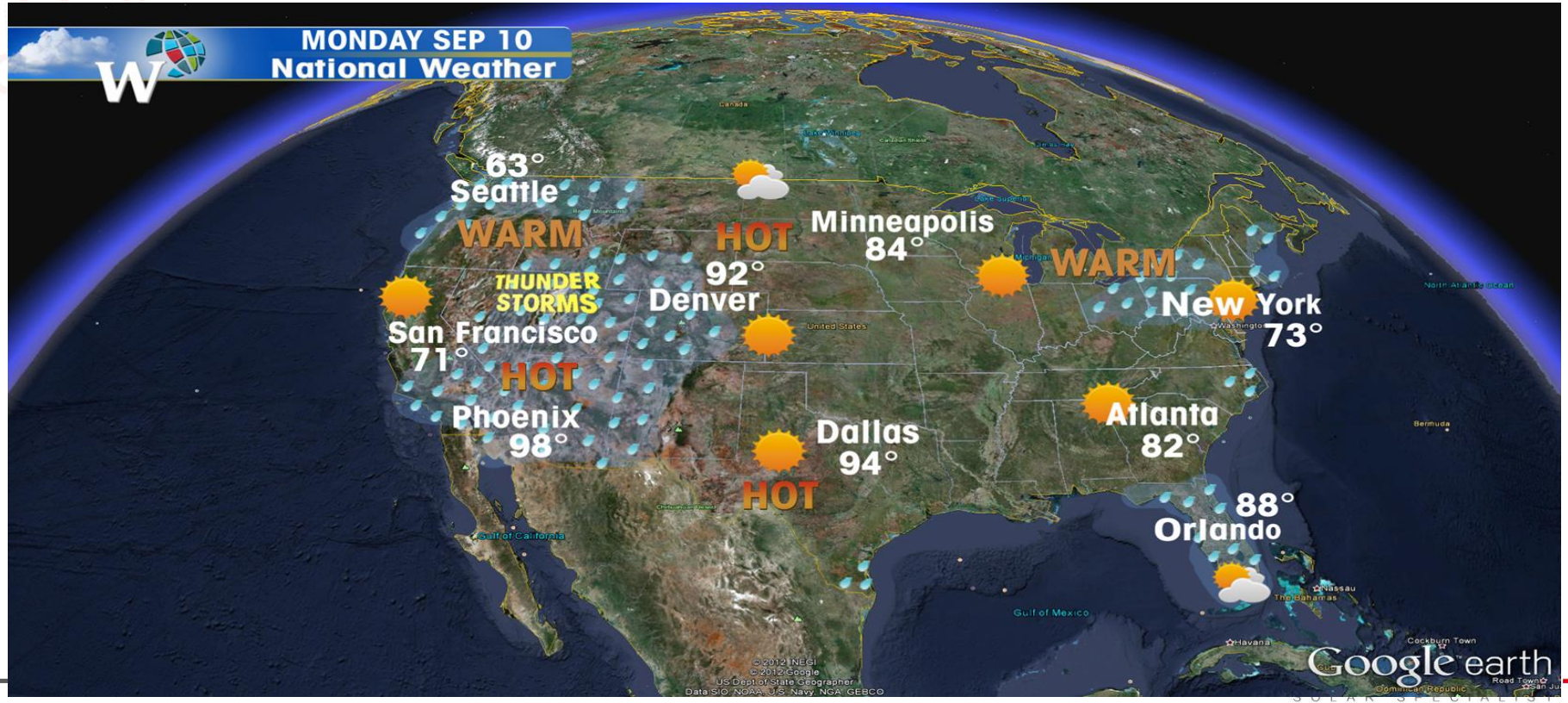




Global Renewable Energy Grids



Reduction of Intermittency with Trans-regional Solar Grid

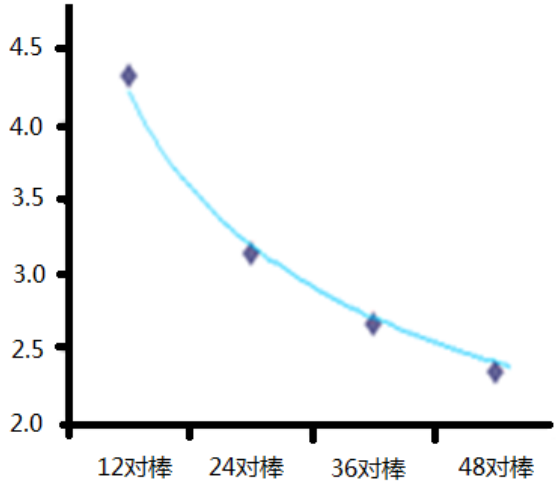


Polysilicon

- Number of polysilicon rod per CVD reactor increase from 12, 24, 36 to 48
- Power consumption reduce from250kWh/kg to 42kWh/kg

12 Polysilicon rods(SINOSICO)

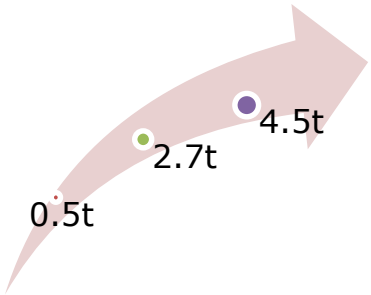
48 polysilicon rods(Asia Silicon)



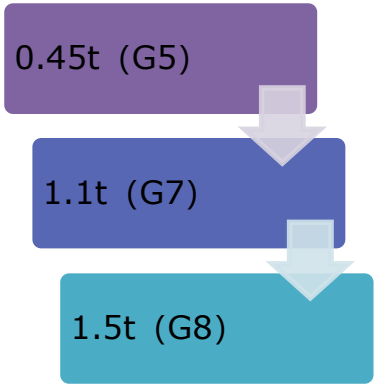
Ratio of surface area to volume of CVD reactor

Silicon Rod, Ingot and Wafer

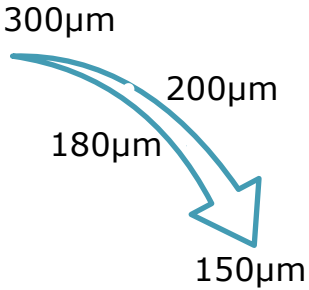
Production Capacity of Monocrystalline Silicon Growing Furnace per Month



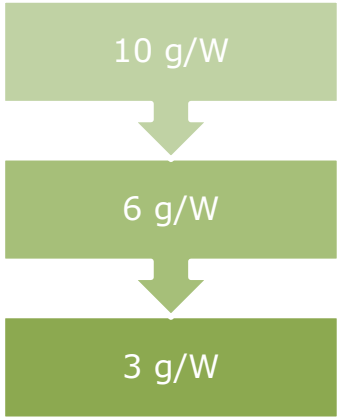
Material Input of Muticrystalline Silicon Casting Furnace



Thickness of Wafer

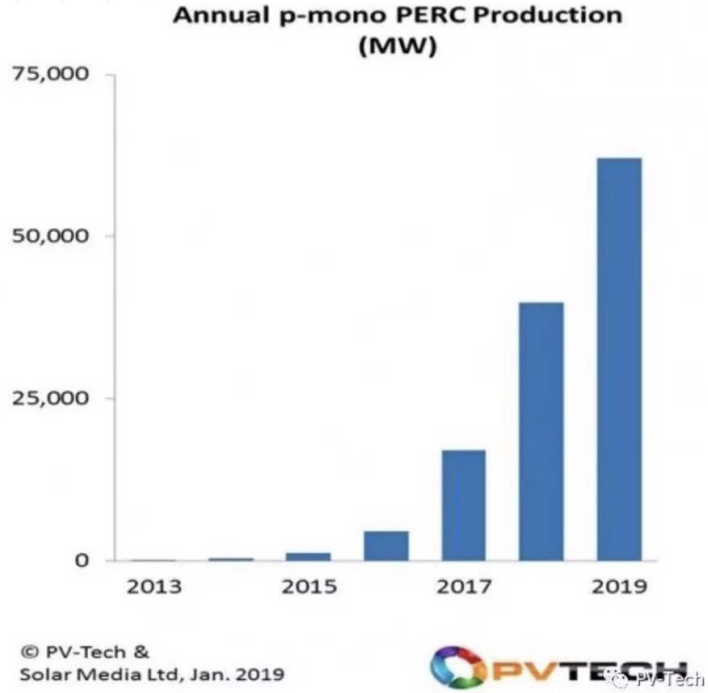


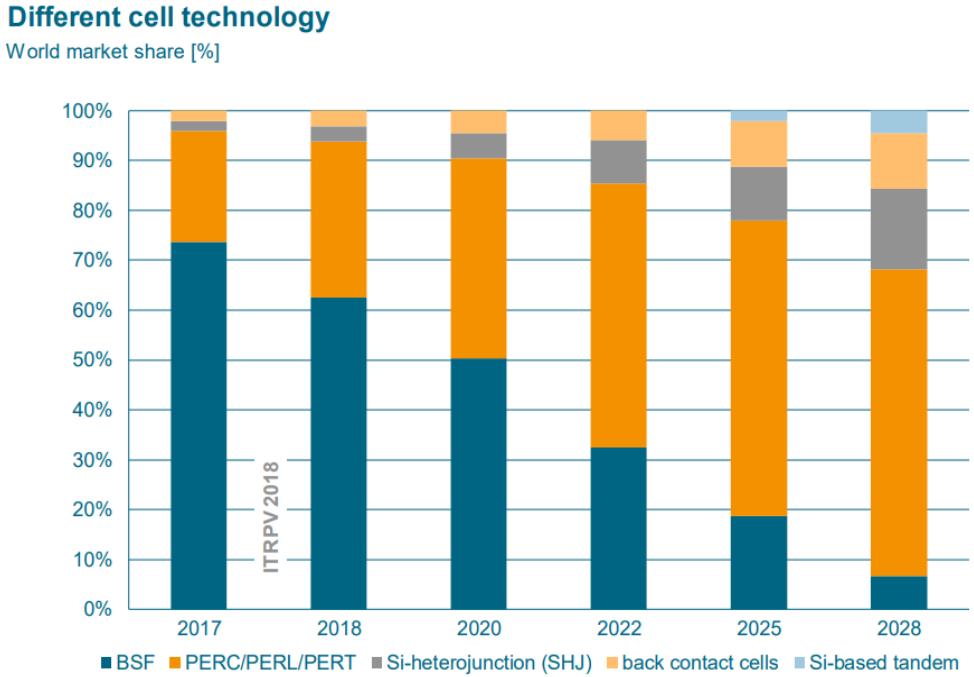
Consumption of polysilicon



SUNMAN
SOLAR SPECIALIST

PERC Capacity



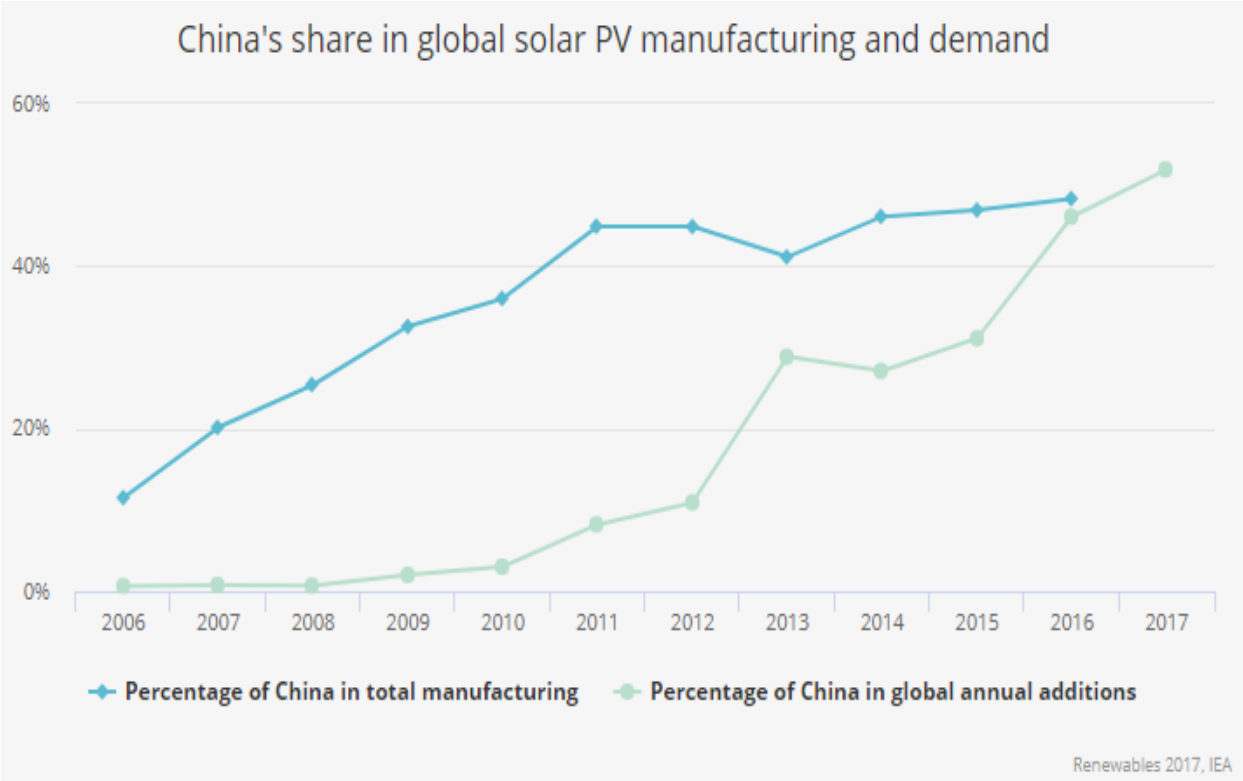


Roadmap of Cells and Modules

Power of Module (60 cells)	
Module Type	Power (W)
Multi + additive	270
Multi + RIE	270~275
Mono	280~285
Multi +RIE+PERC	285~290
Multi + RIE + PERC+ Half Cell	290~295
Multi + RIE + Half Cell + MBB	295~305
Mono +PERC	300~310
Mono + PERC +Half Cell	310~320
Mono + PERC + Half Cell + MBB	325~335
N type + PERC + Half Cell	315~320
N type + Shingling	>330

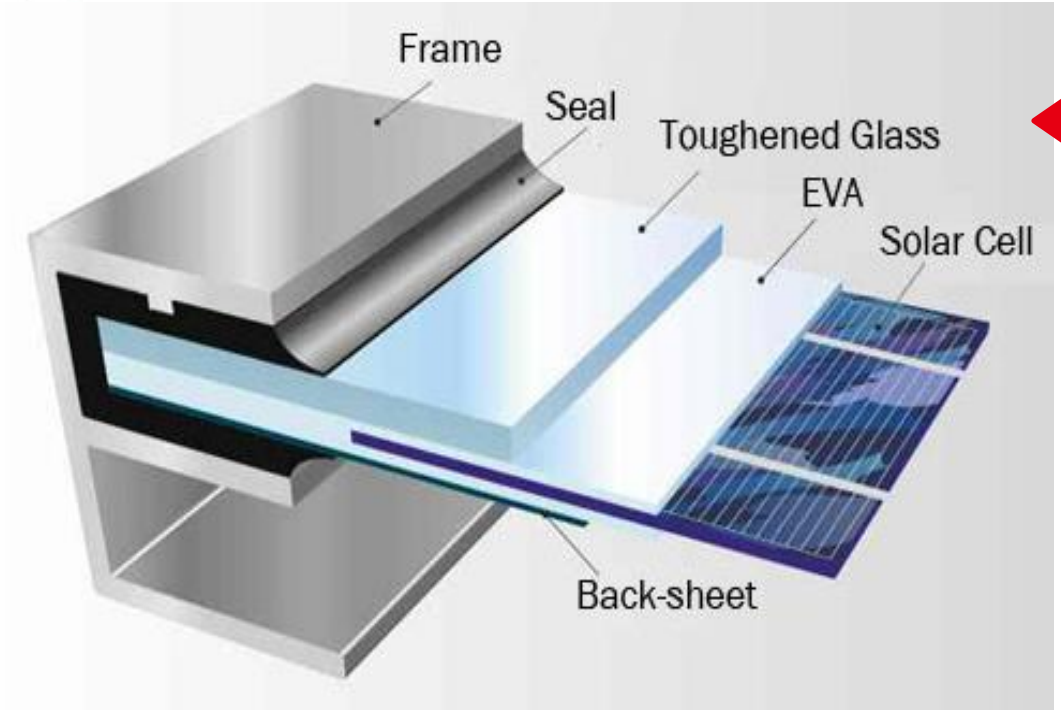
Modernizing PV Equipment

PV Applications



PV is One of the Highlights in China

Conventional Solar Panel



Weight of panel= 20 kg

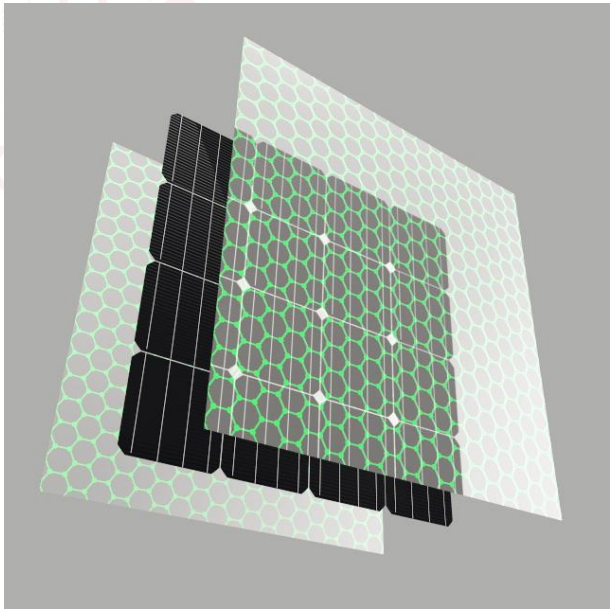
Weight of cell= 0.72 kg

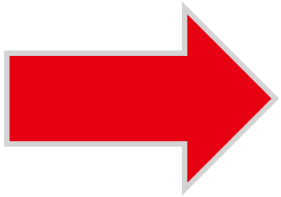
Thickness of panel = 40 mm

Thickness of cell= 0.5 mm

SVMAN
SOLAR SPECIALIST

An Innovative Module Structure





Optics

Insulation

Mechanical

Durability

Performance

Accreditation

Easy installation

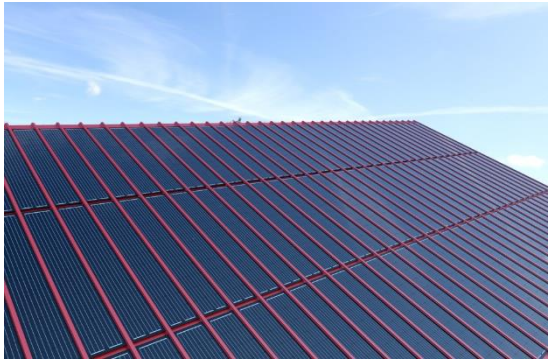
Aesthetics

Safety

Recycle

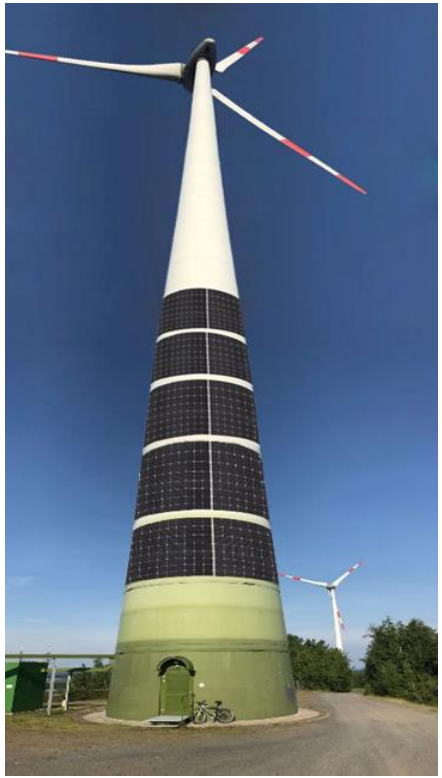
SVMAN
SOLAR SPECIALIST

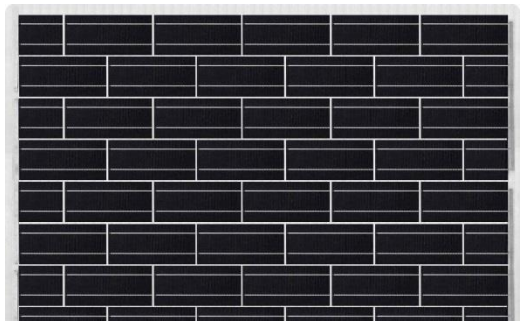
Solar Roofs



SVMAN
SOLAR SPECIALIST

Solar Facade





SVMAN
SOLAR SPECIALIST

Solar Tiles

SVMAN
SOLAR SPECIALIST

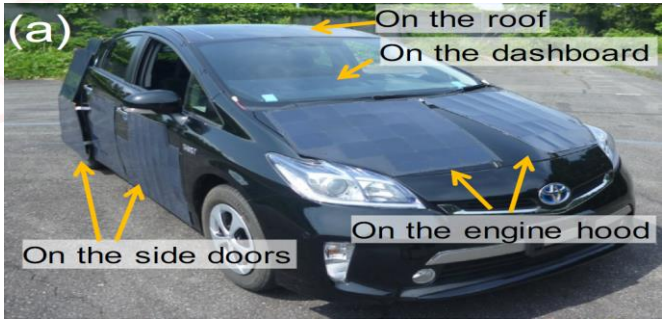
Solar Sunshades

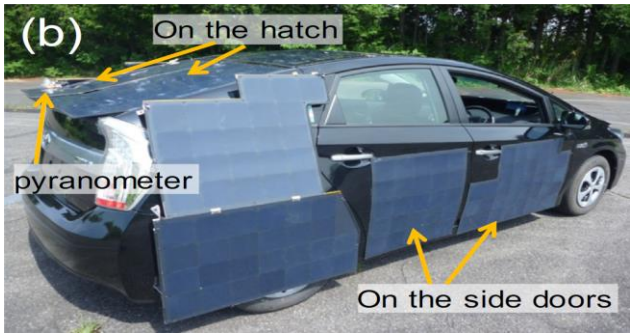
Solar Household

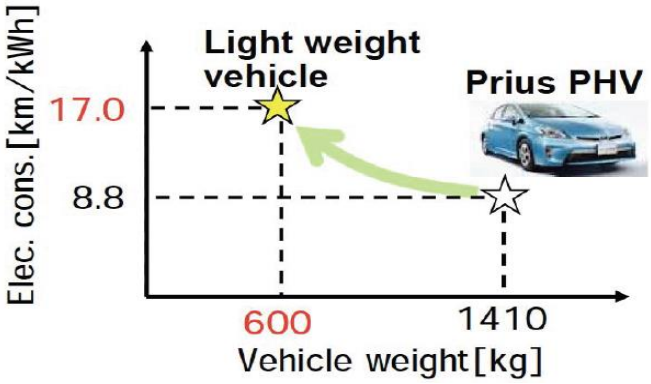
Solar Carports

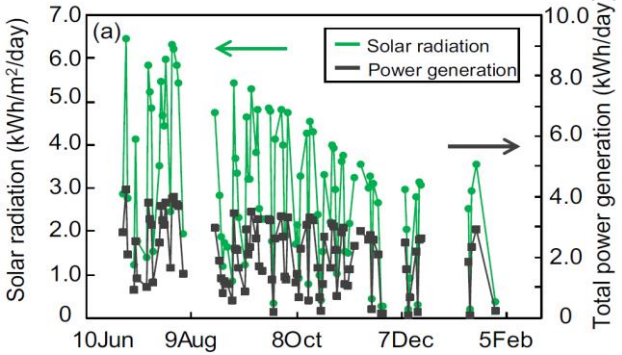
Solar Powered Automobile

- Solar Car with 422 cells (125mm, 1.3kW)







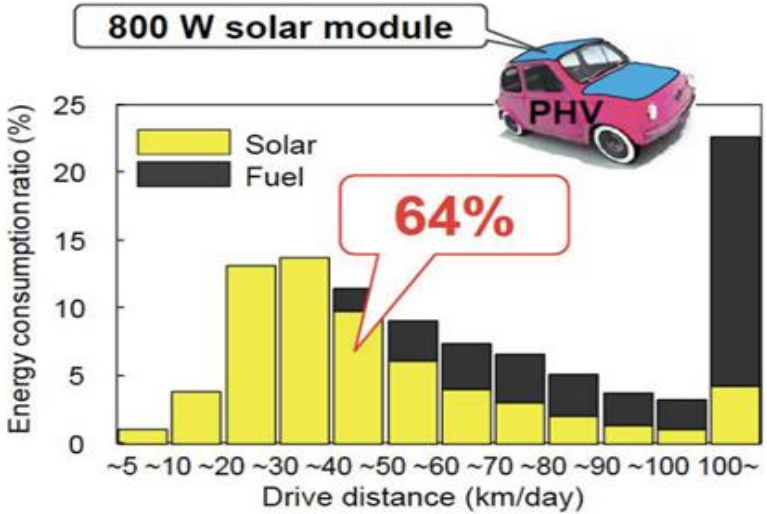


Average irradiation=3.0 kWh/m²/day
Average power generation=2.1 kWh/day
Drive distance= 36 km/day

SUNMAN
SOLAR SPECIALIST

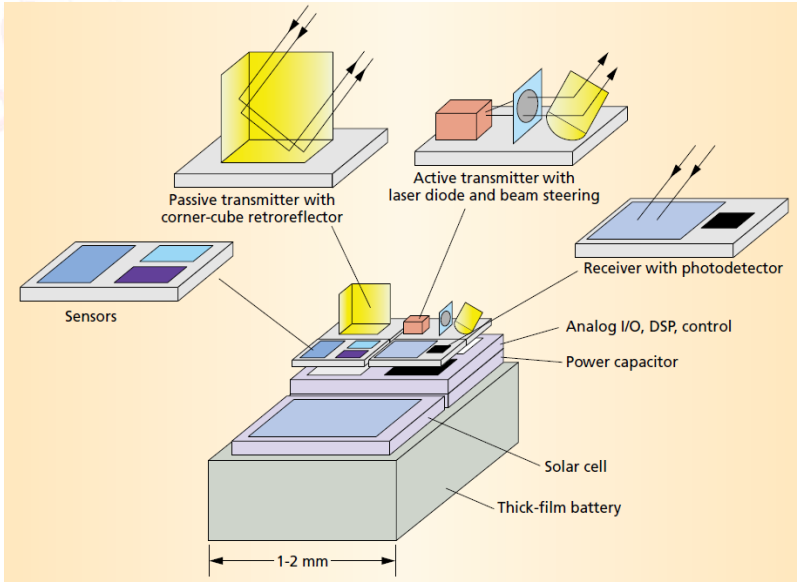
Solar Powered Automobile

- Solar car can reduce 64% CO_2 emission.

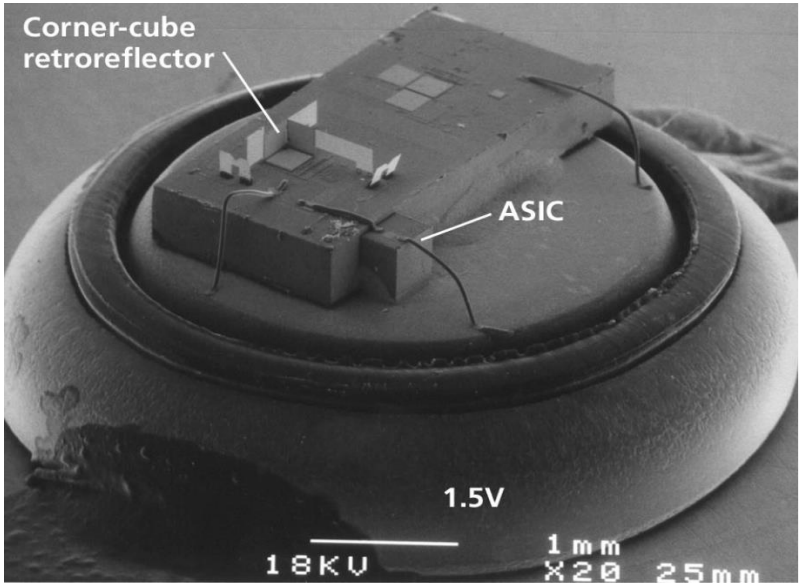


SUNMAN
SOLAR SPECIALIST

Mini-Solar Power

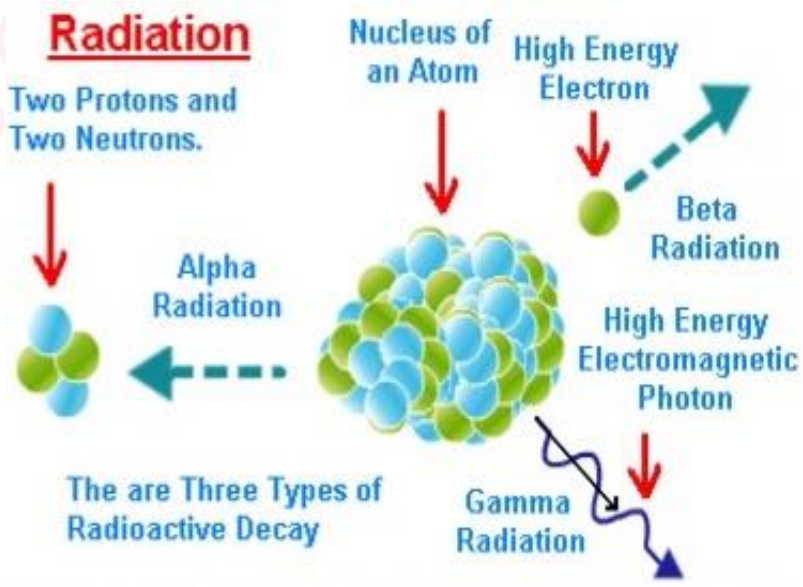


Smart dust mote with sensor optical receiver, passive and active optical transmitters, and power source

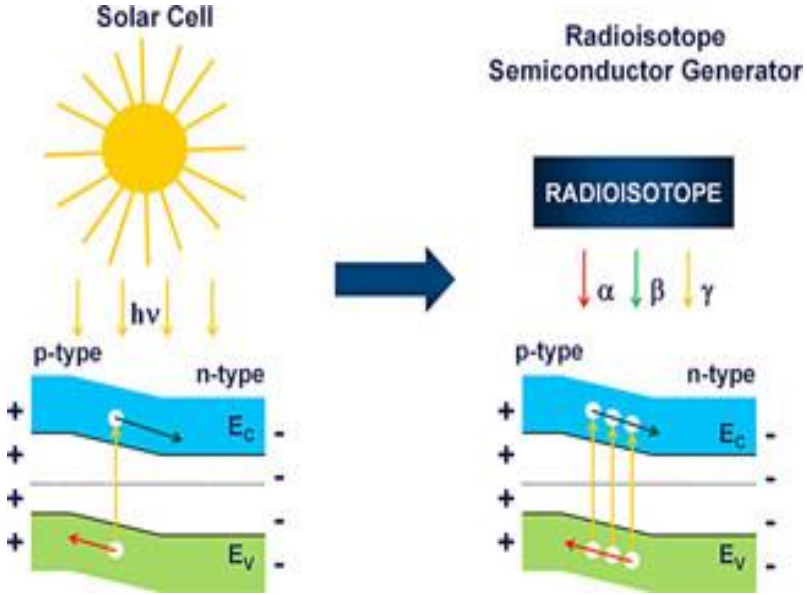


63mm^3 mote with a optics chip containing a CCR for communication, a CMOS ASIC for control, and a battery for power.

Beta Voltaic



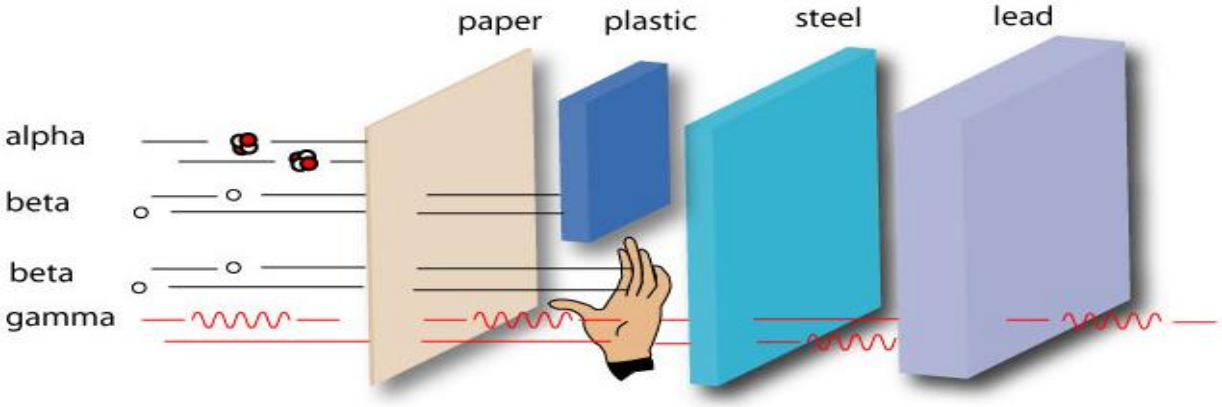
Radiation type



Solar cell vs nuclear battery

Beta Voltaic

- Penetration of rays



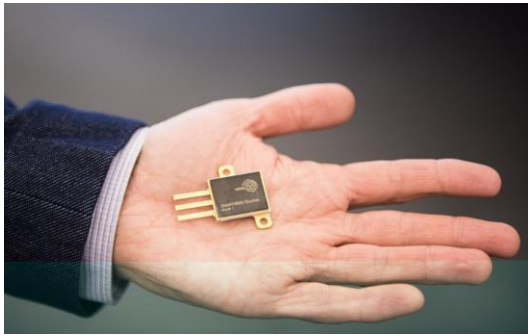
Radiation source	Radiation type	Half-life (year)	Time to 10 % initial activity (year)	Max. energy (keV)	Avg. energy (keV)
^{3}H	β	12.3	36.9	18.6	5.7
^{63}Ni	β	100.2	300.6	66.9	17.4

Beta Voltaic

Nuclear battery

Pacemaker

Power supply of sensor



Device with nuclear battery

Military battery

Consumer electronics

THANKS!

SUNMAN

SOLAR SPECIALIST