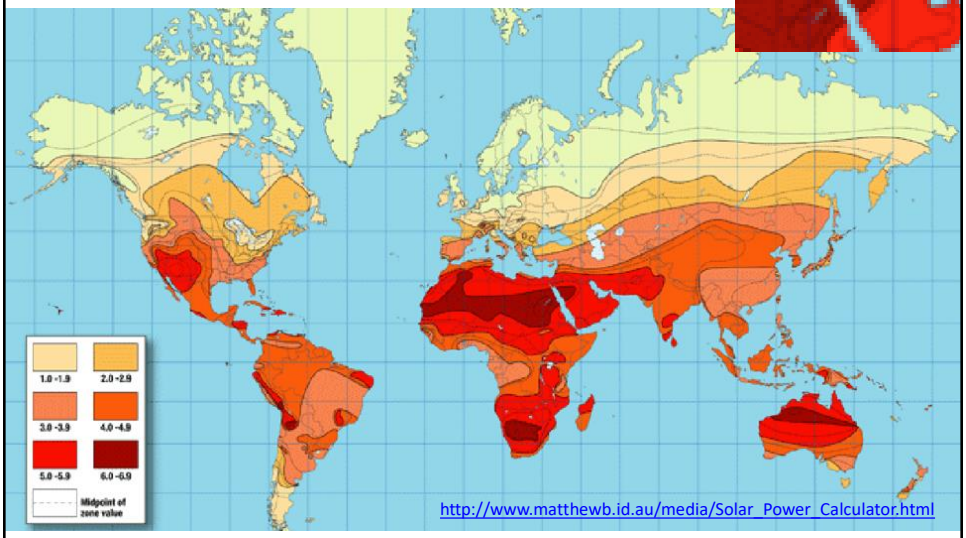
Renewable Energy Systems (12210588)

3. Solar Energy: PV cells

Fathi Anayah, PhD

Lecture 3

Average daily solar insolation



Units: kWh/m^2/day

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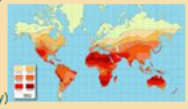
Solar Power Calculator

Parameter	Value
Total size of solar panels (watts)	1000 watts
Installed cost after rebates and RECS	2500 currency
Total size of Solar Panels in metres squared. E.g. 6.4 for 1000 watts of panels. Work out total solar panels area calculator. 6 No. of solar panels 800 Width mm 1600 Height mm Get Total Area For more solar panel specifications see Solar Panel Calculator	6.4 metres squared
Solar panel efficiency (0-1) E.g. 0.16 = 16% Examples: Amorphous Silicon 0.063 , Polycrystalline 0.14, Mono crystalline 0.16	0.16 percent
Your local average daily Solar Radiation World Map Solar Radiation (kWh/m2/day) 	6 kWh/m2/day
Life span in years	30 years
Electricity Cost in Local Currency per kWh example 0.24	0.24 currency
Feed In Tariff in Local Currency per kWh example 0.45 (optional)	0.45 currency

http://www.matthewb.id.au/media/Solar_Power_Calculator.html

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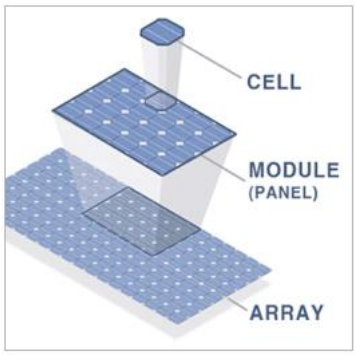
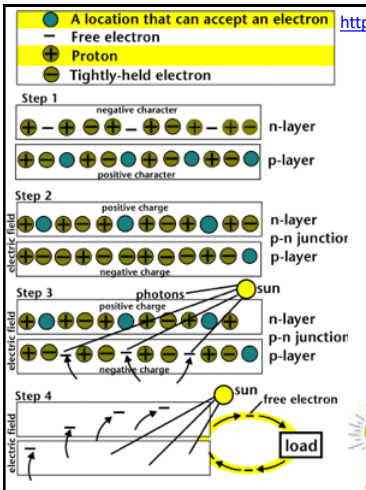
Photovoltaic (PV) array components

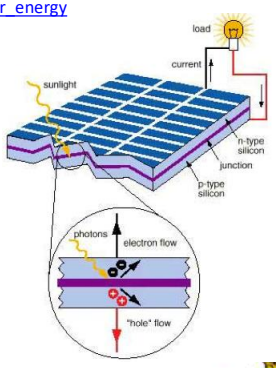
- PV cells
- Modules
- Arrays



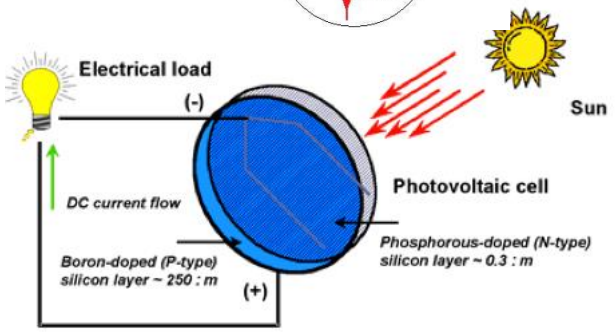
http://www.northamericansolarstores.com/how-solar-pv-works.php



http://www.station57.org/solar_energy

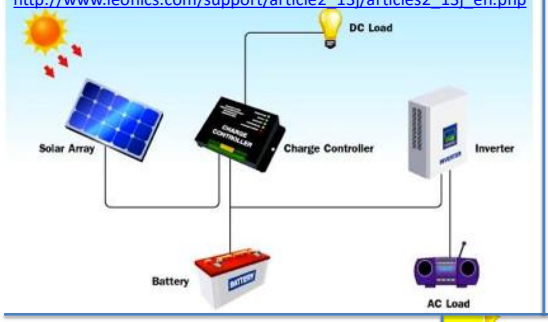


Photovoltaic cell



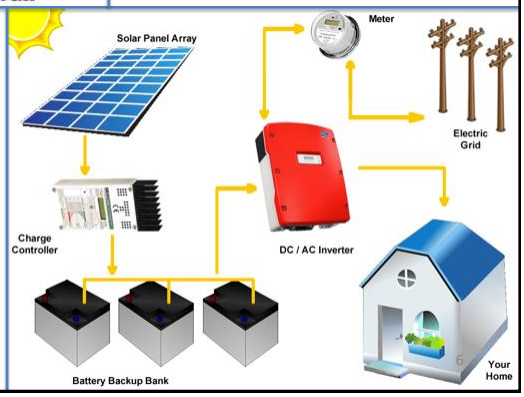
http://www.fsec.ucf.edu/en/consumer/solar_electricity/basics/how_pv_cells_work.htm

http://www.leonics.com/support/article2_13j/articles2_13j_en.php



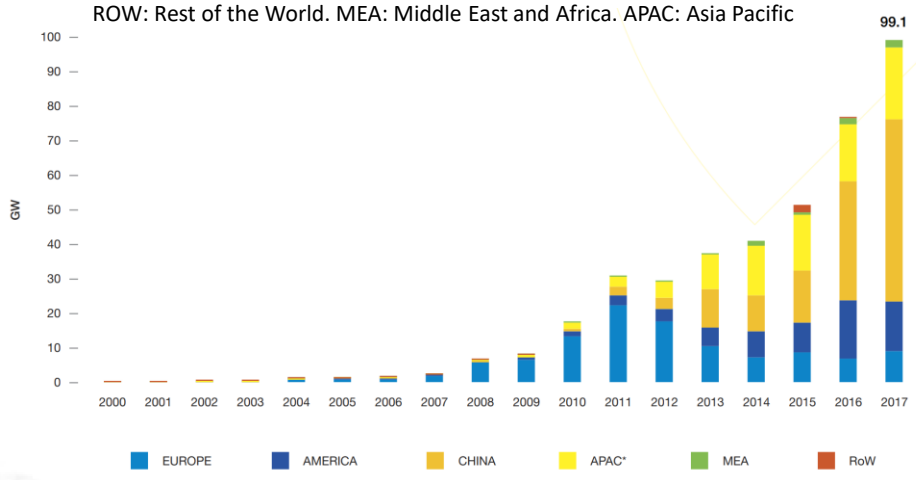
PV system components

Net metering



Evolution of global annual solar PV installed capacity 2000-2017 (GW)

ROW: Rest of the World. MEA: Middle East and Africa. APAC: Asia Pacific



https://www.solarpowereurope.org/wp-content/uploads/2018/09/Global-Market-Outlook-2018-2022.pdf

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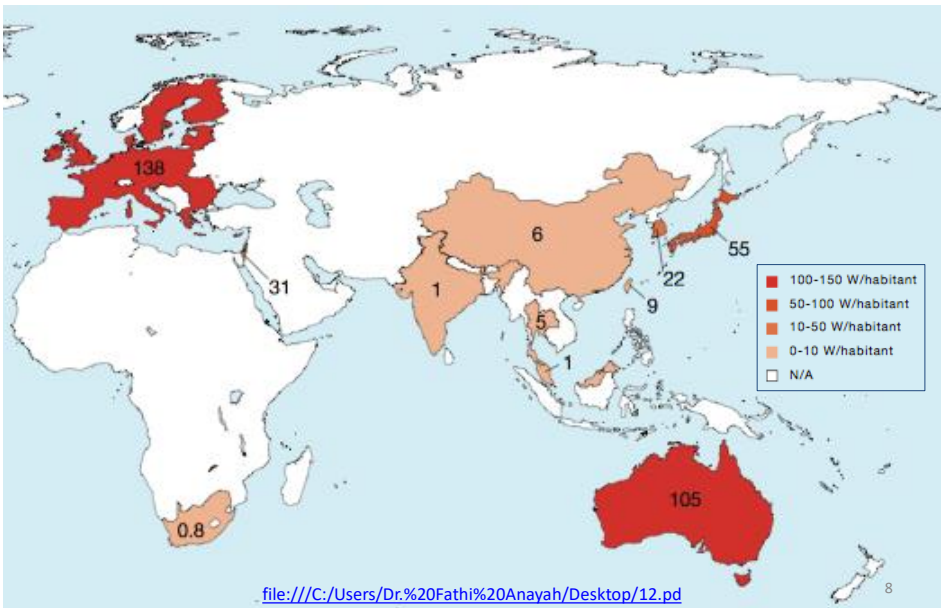
Global PV power map 2013-2017 (MW)



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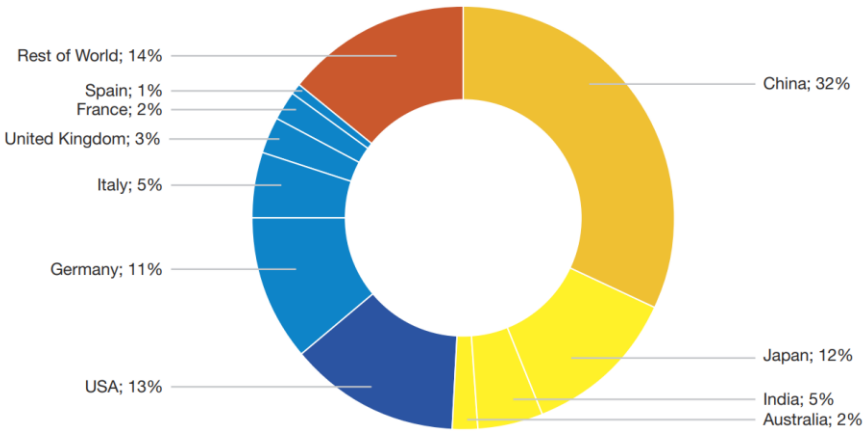
Global top 10 solar PV markets total installed shares by end of 2017



https://www.solarpowereurope.org/wp-content/uploads/2018/09/Global-Market-Outlook-2018-2022.pdf 9

Solar energy pros and cons

Pros

- Renewable
- Clean
- Sustainable
- Free
- Good for remote areas

Cons

- Inefficient and costly equipment
- Part time source
- Reliability depends on location
- Environmental impact of PV cell production

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PV applications in Palestine

- Promotion of PV technologies for electrification of houses in different sites in Palestine
- Using PV systems for public lighting in Wadi Gaza Bridge and Wadi An-Nar street
- Electrification of seven isolated clinics through PV system (lighting, refrigeration, small medical equipment)
- Providing Emnazeil village (Hebron) with electricity using PV cells (45 houses)
- Providing electricity to Innab Alkabeera village (Hebron) with by hybrid "solar + wind" energy technology (12 houses)
- Implementing a pilot project of rural electrification with micro-grids of solar hybrid cells of Atouf village (Tubas)
- Solar water pumping project in Beitello (Ramallah)
- Solar cells for Bedouins surrounding
- Jerusalem and the Jordan Valley

Conclusion

- Photovoltaic solar cell technology is a viable source of renewable energy
- It has already been implemented in homes and businesses of many countries
- The market of PV is growing annually because it is a practical energy alternative
- This is a technology that every homeowner can look for
- Information is abundant
- local market lacks experts of renewable energy

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