Solar Energy Payback

ENERGY PAYBACK

Producing electricity with Renewable Energies (RE) emits no pollution, produces no greenhouse gases, and uses no finite fossil fuel resources. These are great environmental benefits. However energy is required to manufacture RE systems. Do these systems recover the energy required to construct them?

Energy Pay Back Time In Years	RE technology	Efficiency	Harvest Factor over 20 Years
1.4-3.4	Amorphous PV	6 -8%	5.8-14.1
2.1 - 4.8	Poly-crystalline	12 - 14%	4.2-9.6
4.0 - 6.3	Mono-crystalline PV	14.5 - 15.5%	3.2 – 5
0.4-2.0	Solar water heaters	70%	10- 50
0.2-1.8	Wind Turbine (Depending on average wind speed.)	30-50%	11- 93
Harvest Factor			

How many times during its lifetime does a RE technology pays back its manufacture energy input?

This is indicated by the harvest factor: · It is site dependent. A solar system in Kenya has a higher harvest factor than the same system in Northern Europe. · It depends on the irradiation, climate, on the projected area of the surface perpendicular to the incoming sunlight and used solar cell type. · Harvest factor = life time cycle / EPBT. · With an energy payback time of 1.4 to 6.3 years and assumed life expectancy of 20 up to 30 years PV (photovoltaic) systems will energetically amortize several times during its performance. A solar water system will payback even more often than a PV system (s. harvest factor) this is due to the fact that thermal heat will not be converted into electric energy. Wind technologies perform best, although they are not able to extract the maximum wind resource.

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