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In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries" energy security through reliance on an indigenous, inexhaustible, and mostly import-independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating global warming .... these advantages are global".[1][4]

The total solar energy absorbed by Earth"s atmosphere, oceans and land masses is approximately 122 PW?year = 3,850,000 exajoules (EJ) per year.[12] In 2002 (2019), this was more energy in one hour (one hour and 25 minutes) than the world used in one year.[13][14] Photosynthesis captures approximately 3,000 EJ per year in biomass.[15]

Solar technologies are categorized as either passive or active depending on the way they capture, convert and distribute sunlight and enable solar energy to be harnessed at different levels around the world, mostly depending on the distance from the Equator. Although solar energy refers primarily to the use of solar radiation for practical ends, all types of renewable energy, other than geothermal power and tidal power, are derived either directly or indirectly from the Sun.

In 2000, the United Nations Development Programme, UN Department of Economic and Social Affairs, and World Energy Council published an estimate of the potential solar energy that could be used by humans each year. This took into account factors such as insolation, cloud cover, and the land that is usable by humans. It was stated that solar energy has a global potential of 1,600 to 49,800 exajoules (4.4x1014 to 1.4x1016 kWh) per year (see table below).[22]

We have proved the commercial profit of sun power in the tropics and have more particularly proved that after our stores of oil and coal are exhausted the human race can receive unlimited power from the rays of the Sun.

A solar chimney (or thermal chimney, in this context) is a passive solar ventilation system composed of a vertical shaft connecting the interior and exterior of a building. As the chimney warms, the air inside is heated, causing an updraft that pulls air through the building. Performance can be improved by using glazing and thermal mass materials[34] in a way that mimics greenhouses.

Solar energy may be used in a water stabilization pond to treat waste water without chemicals or electricity. A further environmental advantage is that algae grow in such ponds and consume carbon dioxide in photosynthesis, although algae may produce toxic chemicals that make the water unusable.[52][53]

The salt melts at 131 ?C (268 ?F). It is kept liquid at 288 ?C (550 ?F) in an

insulated "cold" storage tank. The liquid salt is pumped through panels in a solar collector where the focused irradiance heats it to 566 ?C (1,051 ?F). It is then sent to a hot storage tank. This is so well insulated that the thermal energy can be usefully stored for up to a week.[57]