

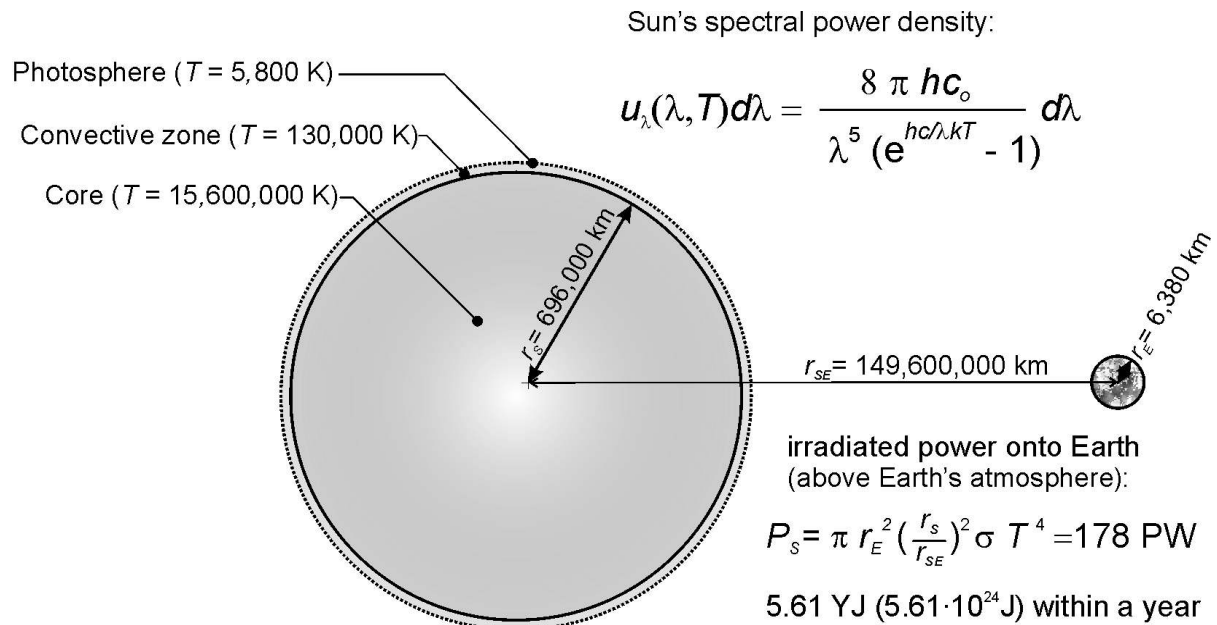
Preface by Dr. Hermann Scheer

Member of German Parliament since 1980, President of the European Association for Renewable Energies, General Chairman of the World Council for Renewable Energies since 2001. Laureate of the World Solar Award 1998, Alternative Nobel Prize 1999, Word Award for Bioenergy 2000, “Hero of the Green Century” of TIME-Magazine 2002, World Award for Wind Power and Global Renewable Energy Leadership Award 2004.

Sun’s true energy contribution

Solar energy already contributes to 94% of our planets energy use: it warms up Earth’s surface and its atmosphere from space’s -273.2°C to $+14.5^{\circ}\text{C}$ in average and is thus enabling all forms of life.

Without solar energy Earth would be a dead piece of rock in space with a temperature close to absolute zero. To allow a human habitat under that conditions, we would need approximately 15 times more commercial energy than we consume today ($15 \times 429.4 \text{ EJ}$). All fossil fuel resources would be exhausted within a couple of years.



All existing fossil resources of energy such as coal, oil and gas are derived from biomass, photosynthesis and solar energy: Our planet has absorbed sunlight for hundreds of millions of years to create all those fossil resources that last just for 200 years of industrial human civilization.

Photovoltaics - the most versatile application of solar energy

Solar electric power generated via the direct conversion of solar radiation into electricity - Photovoltaics (PV) - enables humanity to make use of sunlight in a clean, ever lasting and highly versatile way. Nowadays commercial PV converts 15% of the incoming solar irradiance for at least 30 years into sustainable electricity on all parts of the planet.

This book provides an ample amount of information treating human-caused climate-change, the potential of PV to reduce greenhouse gases for different scenarios (on- and off-grid, application in the Tropics and in Central Europe) and a Life-Cycle-Analysis, including recycling of the system. The results are based on an extensive model for the calculation of the actual electricity yield of PV power plants. That model considers all optical interfaces and layers passed by the sunlight from the sun into the solar cell, thermal layouts of any PV module and its heat transfer mechanisms, its related actual electrical properties, allowing an accurate calculation of the yield and an optimization of PV system components, thus reducing costs for solar electricity.

The book with its tables and reference data is a valuable source of information for PV-system-engineers, students of physics, engineering and environment, but also for everyone interested in the subject of solar electricity.

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Dr. Hermann Scheer