

Photovoltaic Generation and Solar Energy Converters

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Diapositiva resumen

- UPC-Universitat Politècnica de Catalunya
- Worl's literature and the sun
- Photovoltaic generation
- Tema 4
- Photovoltaic generation
- Grid-connected Systems
- DC/AC Converters for Stand-alone and Grid-connected Plants

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Diapositiva resumen (cont.)

- Topologies for DC/AC converters
- Standards and Rules
- Costs and Economic Considerations for Photovoltaic Systems
- Subsidies in the Energy Market
- ANNEXES

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Now is the winter of our
discontent /
Made glorious summer by
this sun of York



**William Shakespeare
in Richard III**

The Sun in the world's literature

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“By the sun that shines on us”!, said Don Quixote.
(Don Quixote-Chapter IV- Of what happened to our knight when he left the Inn

Dijo Don Quijote: Por el sol que nos alumbra, que estoy por pasarlo de parte a parte con esta lanza.

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Alexander...asked him if he lacked anything.

"Yes," said he, "that I do: that you stand out of my sun a little"

Diogenes

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OUTLINE

- Photovoltaic generation
- Photovoltaic Cell Characteristics
- DC/DC Converters for simple applications
- Stand-alone Plants for Local Consumers
- Maximum Power Point Tracking
- Grid connected Plants
- DC/AC Converters for Stand-alone or Grid-connected Plants
- Power Electronics Topologies for DC/AC converters
- Standards and Regulations
- Some Low and Medium Power realisations

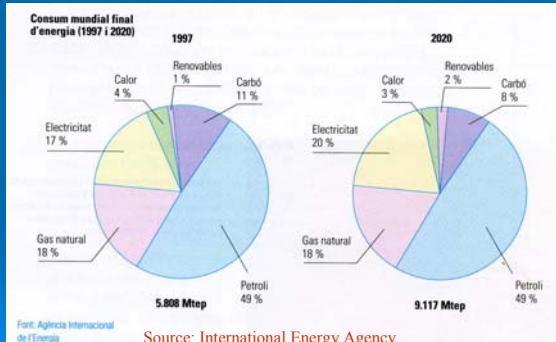
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Photovoltaic generation

Photovoltaic generation

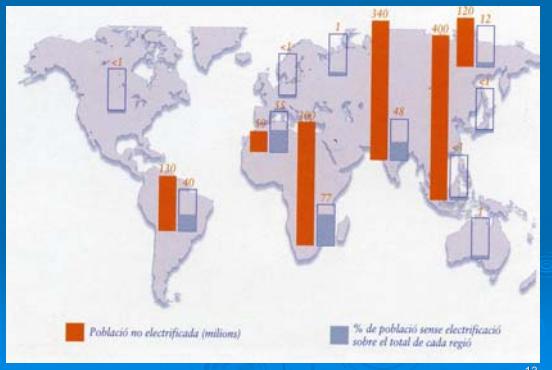
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World Energy consumption 1997 and 2020 projection



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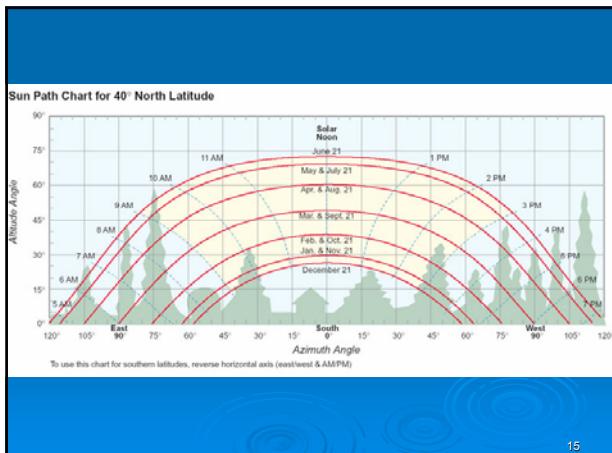
Population without electrical energy supply



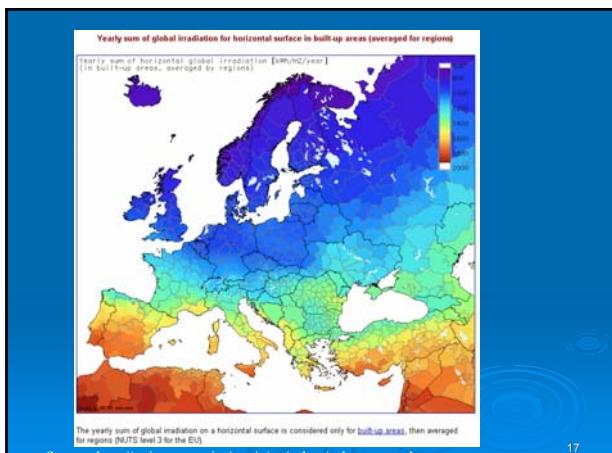
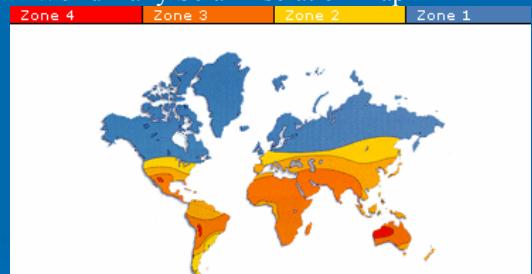
Irradiance emitted and received

- The irradiance emitted from the sun surface is of 63500 kW/m².
- The irradiance hitting the earth is 1,37 kW/m²

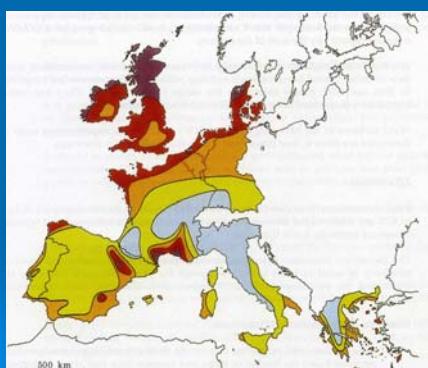
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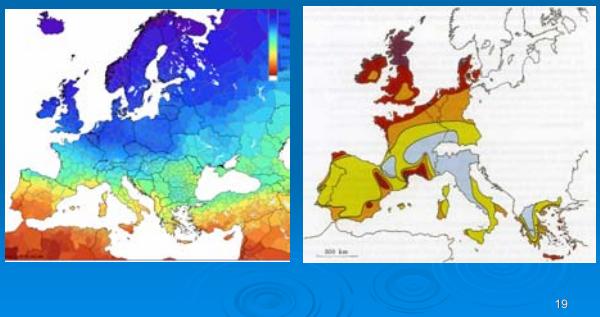
World Daily Solar Insolation Map



Europa Wind Map



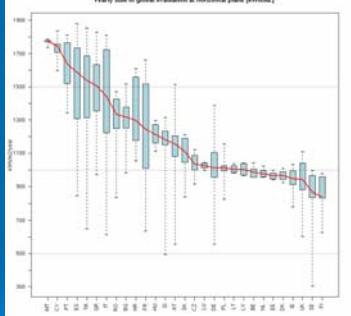
Europa solar and wind maps



Yearly medium radiation in Europe



Yearly sum of global irradiation at horizontal plane [kWh/m² year⁻¹]

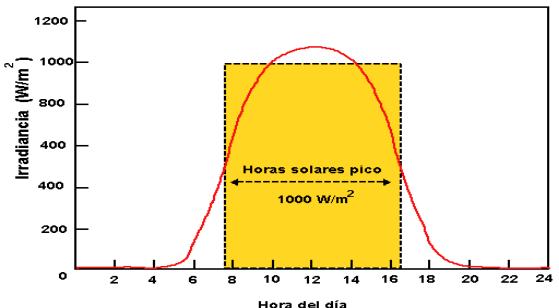


Yearly sum of the horizontal global irradiation in the EU28 Member States [kWh m⁻² year⁻¹]. The values show maximum of 90% occurrence, maximum of the 90% occurrence in residential areas, average, minimum of the 90% occurrence in residential areas, and minimum of 90% occurrence for modules at horizontal position.

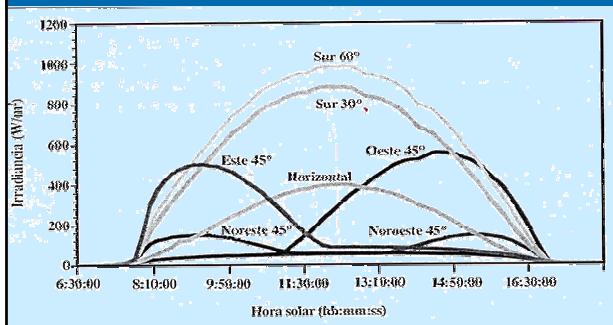
Source: <http://re.jrc.ec.eu.int/pvgis/pv/solres/solreurope.htm>

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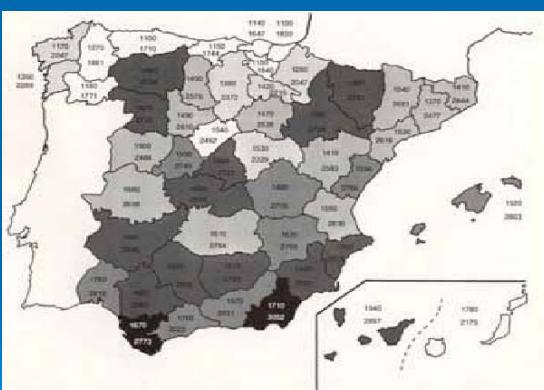
Typical daily Irradiance in W/m²



Solar radiation as a function of the receiving surface situation in a winter day (data from Madrid- lat 40,45)



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