

SOLAR ENERGY TECHNOLOGY

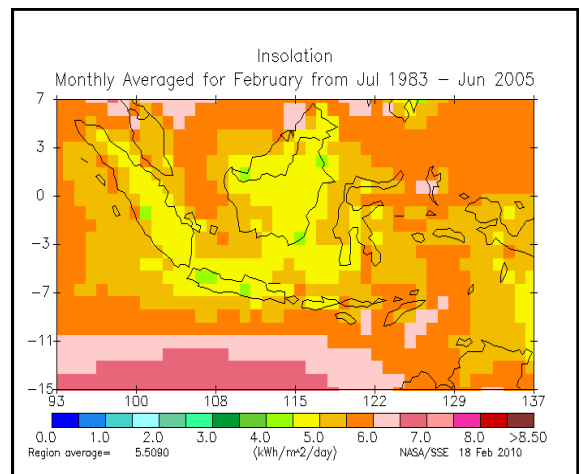
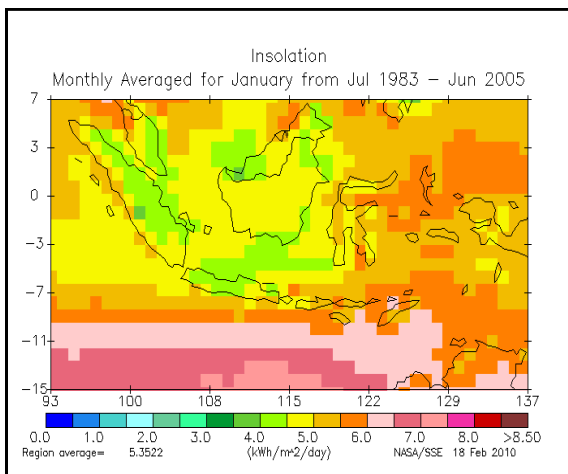
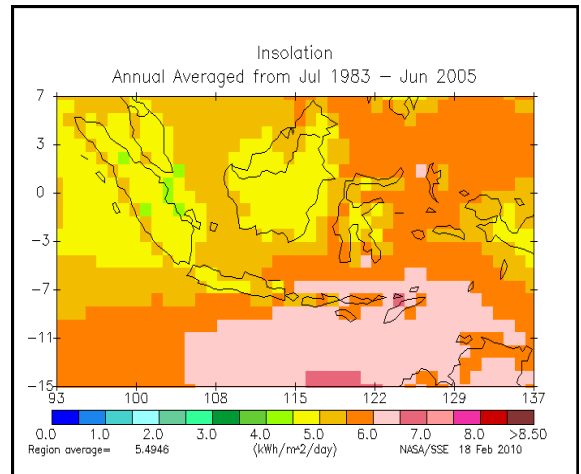
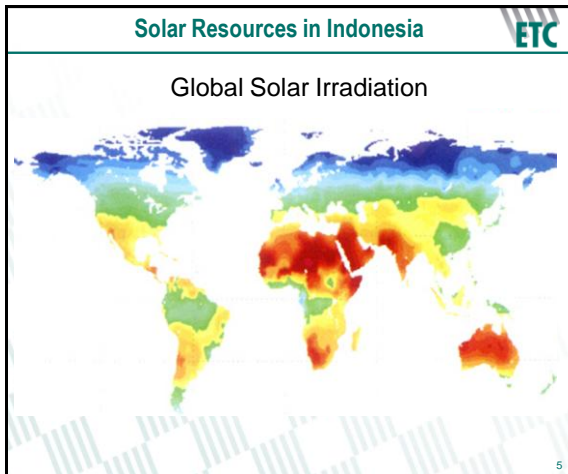
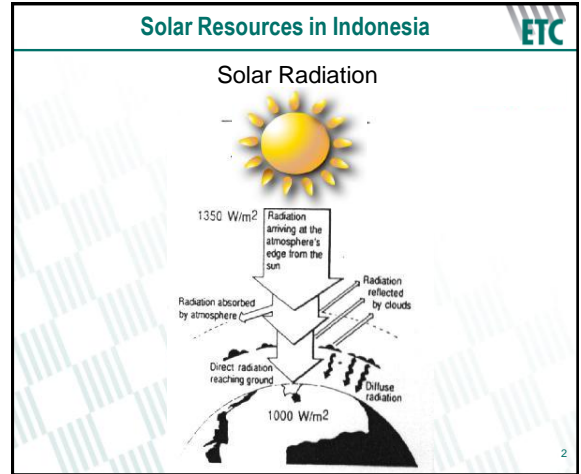
ETC ENERGY

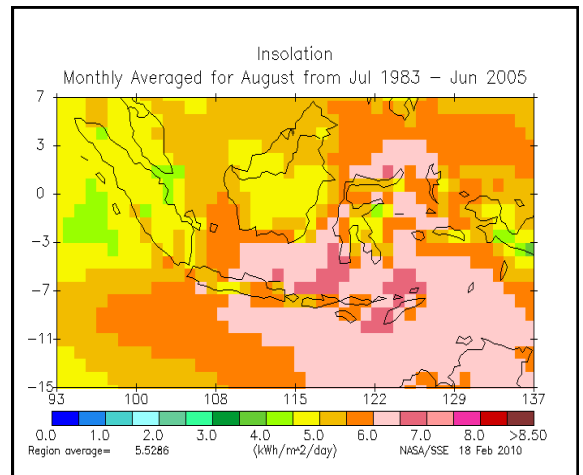
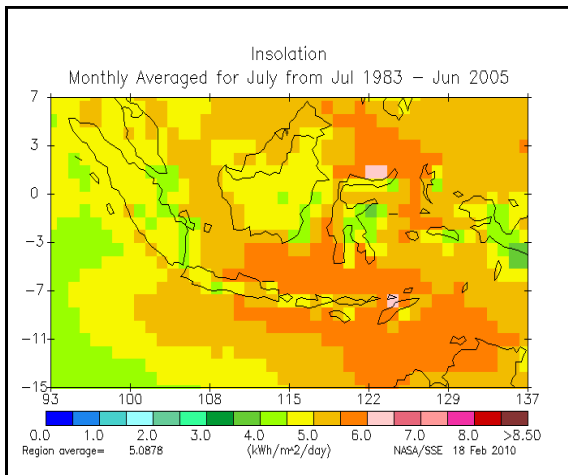
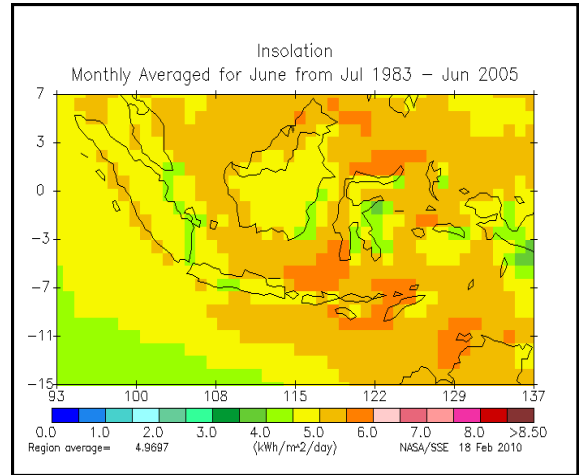
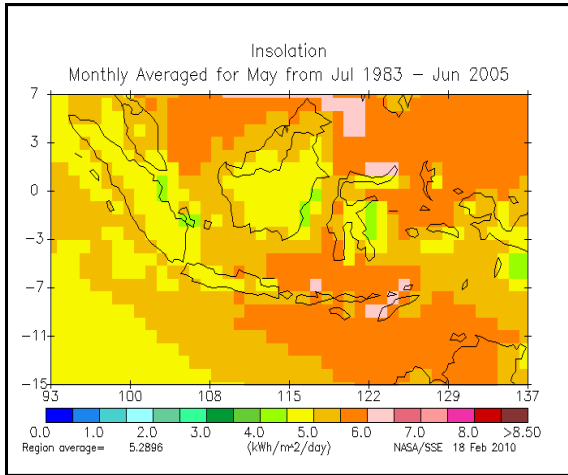
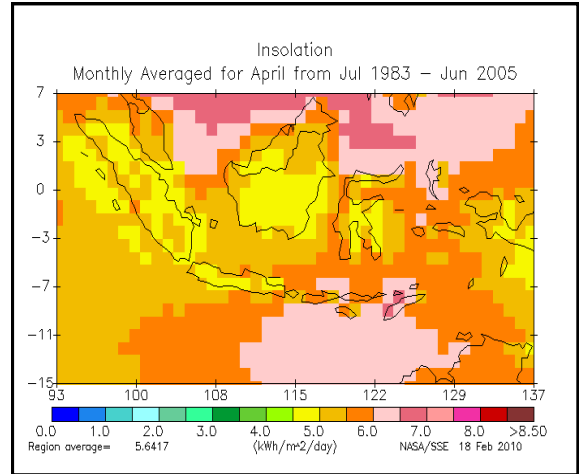
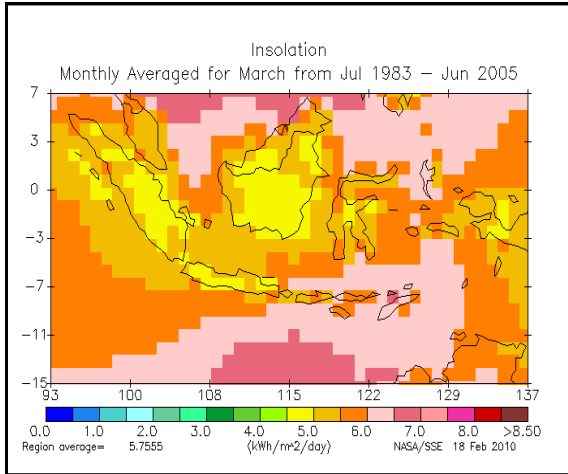
Solar Resources in Indonesia

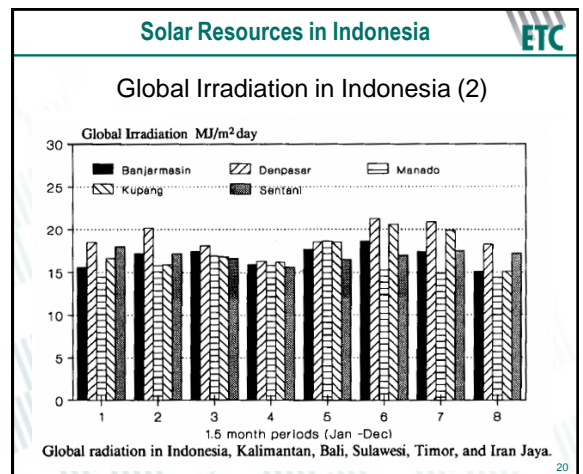
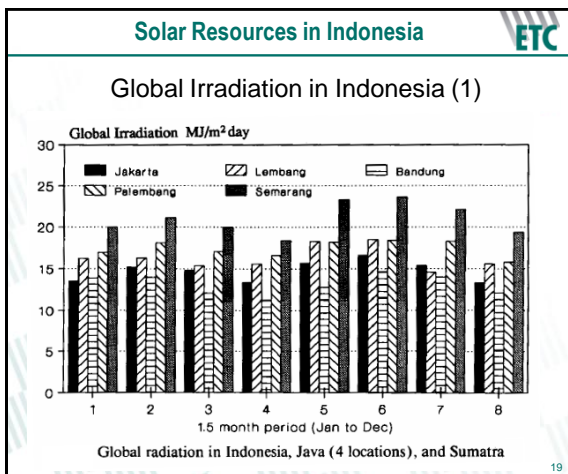
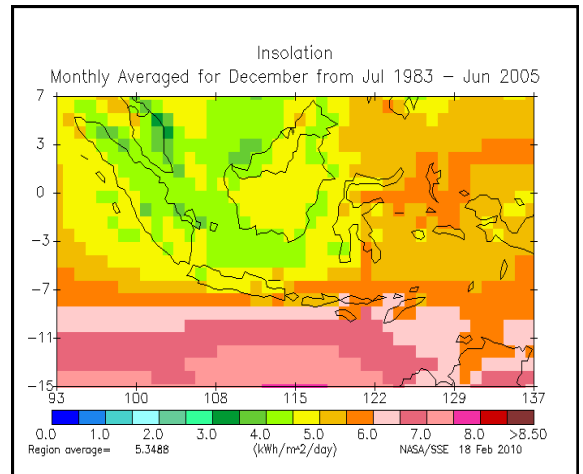
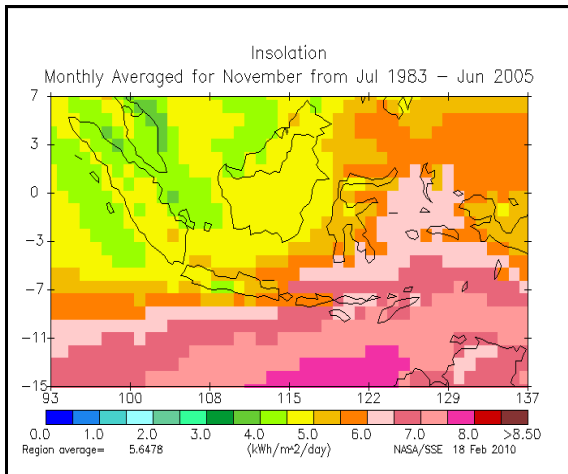
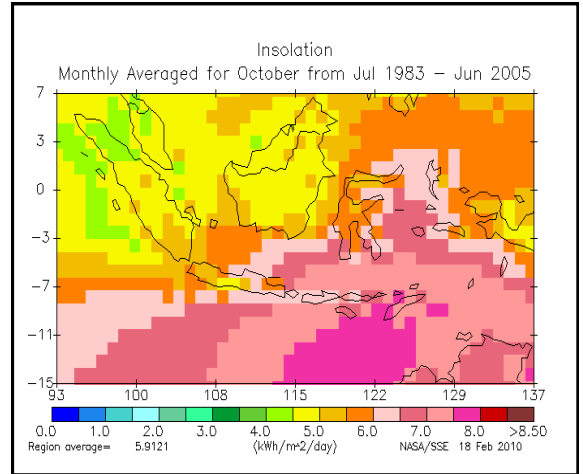
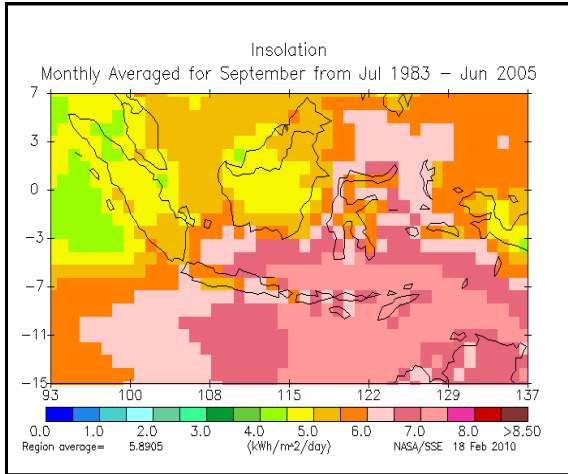
Gerrit Jacobs

14-18 June 2010
Jakarta
Indonesia

Training Course on Renewable Energy Part II - MEMR
CASINDO





Solar Resources in Indonesia

Solar Energy in Indonesia

- Average annual irradiation is 4 to 5.5 kWh/m² per day (1kWh=1MJ/3600*1000)
- Average mid-day irradiation approximately 1000W of energy on every m² of ground surface


Solar energy regime in Indonesia is highly suited to solar electricity generation and solar pumping

21

Solar Resources in Indonesia

Putting Solar Energy into Perspective


The Earth receives from solar radiation in 10 days as much energy as the known fossil reserves



- 2007 World energy primary consumption: 138×10^{12} kWh
- But about 100×10^{12} kWh of equivalent electricity
- Growing at a rate of 2.3%/y
- Equivalent to the energy produced annually by 10^9 CPV dishes of 36 kWp each
- Requires 360,000 km² or an area of 600 x 600 km

Area of solar generation for world consumption

Solar Resources in Indonesia



INDONESIA

Area of solar generation for world consumption

0 500 km
0 300 miles

Solar Resources in Indonesia

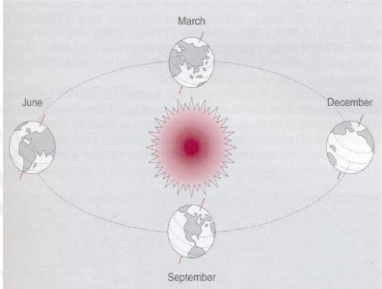
Springerville Solar Generating Station, Arizona
8 GWhrs p.a. 0.00004 % of global electricity generation



Solar Resources in Indonesia

Tilt and Orientation

The earth circles the sun with its polar axis tilted at an angle of 23.5°. In summer the sun appears higher in the sky, giving a higher energy density.



25

Solar Resources in Indonesia

Tilt and Orientation

To collect as much radiation as possible, a surface must be tilted towards the sun. How much is dependent on the latitude and the time of the year most solar collection is required.

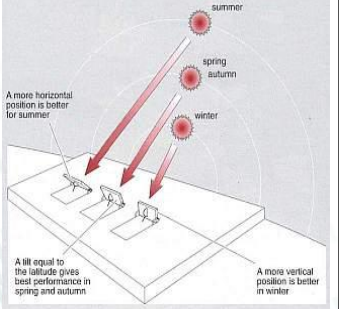
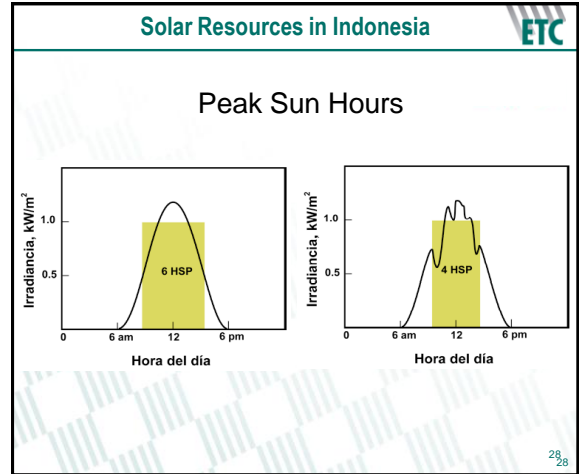
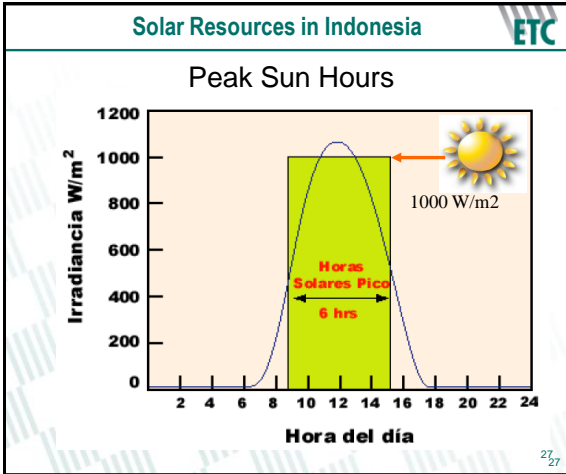


Figure - Optimizing the tilt for different seasons

26



ETC

QUESTIONS ?

Gerrit Jacobs
ETC Energy
winter@etcnl.nl
PO Box 64
3830 AB Leusden
the Netherlands
T: +31 33 432 6025
F: +31 33 494 0791

29