

IANAS project priority area:
Meeting the energy needs of
the poorest people



IANAS Energy project Agenda
La Paz, Bolivia
April 17 -19, 2012

SOLAR ENERGY FOR THE DEVELOPMENT OF REMOTE ANDEAN RURAL AREAS

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IANAS Energy Project Agenda
Bogota, Colombia
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Country report: Peru

Present situation and perspectives of energy use in Peru (update)

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See at:

http://www.ianas.org/meetings_energy/meeting_2011_bog_presentation.html

Welfare, development, democracy, equity and energy

Assumption (common place):

Without energy, particularly without electrical energy, there is no equity, no development or welfare, and therefore no democracy.

16 % of Peruvians, mostly living in rural areas,
have still no electricity at their home

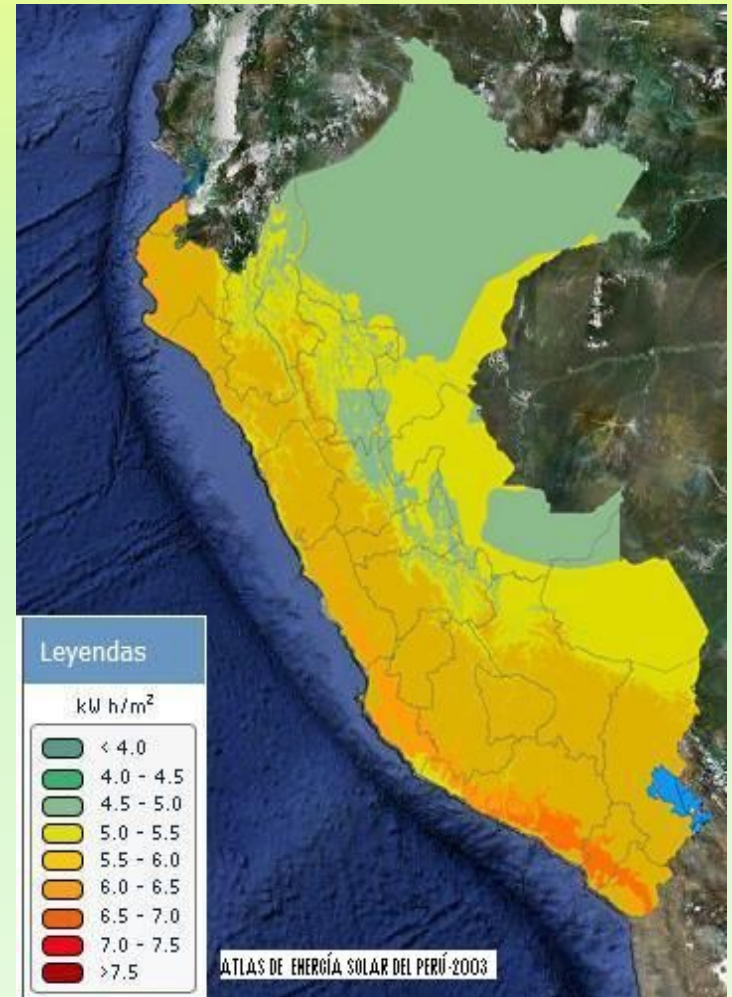
The solar energy resource

Peru is a privileged country with respect to solar energy:

In nearly the whole country , especially in the Andes, the monthly mean solar radiation is during the whole year high

Monthly mean solar radiation in most parts of Peru:

5 ± 1 kWh /m² day



Solar energy for the development of rural areas

- Thermal applications:

- ✓ Solar water heaters for productive and domestic use
- ✓ Heating (important in the high Andean regions)
- ✓ Green houses
- ✓ Solar driers
- ✓ Solar cookers

“Solar house”



"Solar house" in San Francisco de Raymina



Project
CER -UNI
(2011)

Government project "Trombe walls"

In Peru, the Trombe walls are inefficient, because of the geographical situation (within the tropics)



Collacachi – Puno. Fuente:
sallavor.org/resources/MUro%2Btrombe%2B.Proceso%2By%2Bconstrucci%C3%B3n.pdf



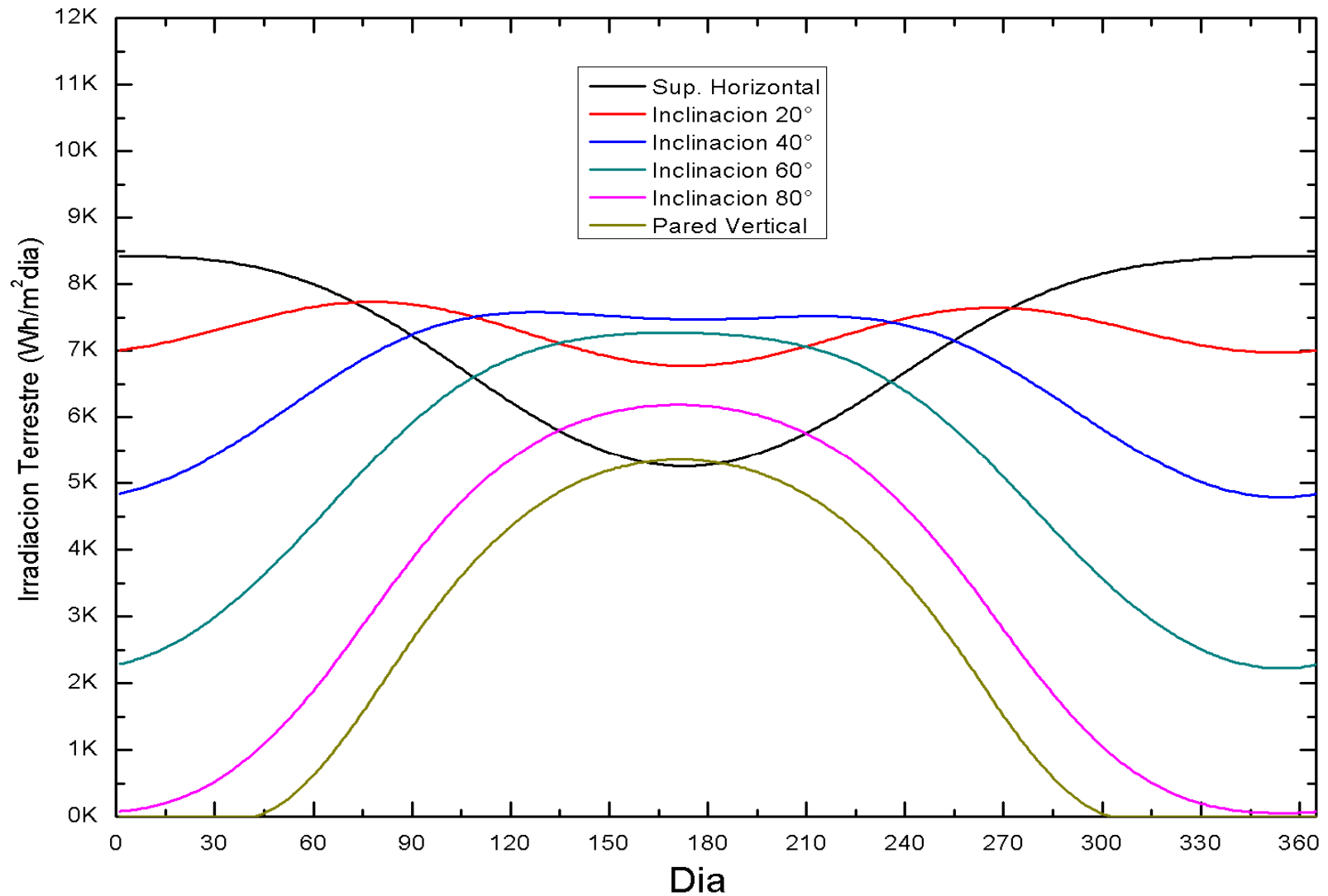
Coachico – Puno.

Fuente: <http://www.muladarnews.com/2010/07/caritas-del-peru-campana-calor-patrio-2010/>



Puno. Fuente: www.andina.com.pe

Solar radiation on inclined surfaces in Puno



A horizontal surface gets more energy than a vertical north wall

Productive applications of solar energy

COMMUNITY OF SAN FRANCISCO DE RAYMINA, VILCAS HUAMÁN, AYACUCHO

- Organic flours
- Aromatic herbs
- Cheese production
- Family and communal greenhouses
- Ecotourism



a dairy plant in Raymina: manufacturing of cheese

Exterior view of the plant



Interior view of the plant



Solar energy for the development of rural areas

- **Photovoltaic applications:**

The photovoltaic technology is a very appropriate technology for electrification of remote regions distant from the electric grid, it is reliable and accepted by users. In many with prospects for sustainability.

There exist PV systems for every need, from large installations (MW) through systems of some kWp (for schools, health posts, community workshops, etc..), SFD of 50 -150 Wp to "Pico PV" systems of 2 -10 Wp

PV rural electrification in Peru

Pilot project:

1990: Taquile island in Titicaca lake, 420 SHS (UNI, subsidized credits)

2010: total: \approx 12 000 SHS

The Peruvian government established tariffs for off grid electricity supply:

for a 50 W SHS, the installer /operator of the SHS (electricity company, NGO, etc.) gets US\$ 16 - 18 /month (depending on location) , with 80% paid by the government (cross subsidized by urban grid households)



Light for the poorest, with Pico PV

Rural grid connected households consume in Peru, on the average, 12 kWh/month, mainly for lighting, using incandescent light bulbs. The same luminous energy can be obtained with a modern Pico PV system (2 W LEDs, 5 Wp PV)



With the support of GIZ, CER-UNI tested last year 11 different LED lamps in the laboratory. GIZ made then a 5 month field test with the 3 best lamps. With the results of these evaluation, we hope now that a massive dissemination program of Pico PV will start.

Conclusions

Rural electrification and, in general, rural energizing, is necessary to maintain social peace and solar energy, especially photovoltaic electricity, is today in many cases the best option, and possibly the only sustainable.

To avoid repeating the mistakes made in previous projects, new projects should be evaluated with great care. We need more trained people, both technically and professionally to understand really the possibilities and limitations of renewable energies.

Finally: You can not supply power to remote rural regions with costs similar to those in urban areas, but more expensive is not supply power to these regions. The most expensive energy is the energy that you do not have.

IANAS project priority area:

Building the necessary human, educational and institutional capacity

Training programs of the National Engineering University (UNI); Lima:

- SEPES (since 1980): a one year specialization program for professionals (engineers, physicists, architects, etc.), Mostly by internet, plus 4 weeks laboratory work.

See detailed program in <http://fc.uni.edu.pe/postgrado>

- Master program in renewable energies and energy efficiency (since April 2012): a two year post graduate program based on research in, initially, one of the three fields:

- Nanostructured solar cells
- Thermal comfort for rural Andean houses
- Lighting efficacy for LEDs

See detailed program in www.posgradociencias.org



Asociación Peruana de Energía Solar
APES

**IXX Simposio Peruano de Energía
Solar
(IXX - SPES)**

12 al 17 de noviembre de 2012

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