


CUBA ELECTRIC INDUSTRY

CURRENT SITUATION AND PERSPECTIVES

March, 16th, 2006



 **Head
Quarters**



National Operation Control Office



**National Training
Center**



**Thermoelectrical
Plants (11)**



Electrical Enterprises (15)



**Maintenance
Enterprise**



**Diesel Groups
Service Enterprise**



**Engineering
Enterprise**



**Transmission
Enterprise**



**Import and Export
Enterprise**



**Transportation
Enterprise**



Main Data

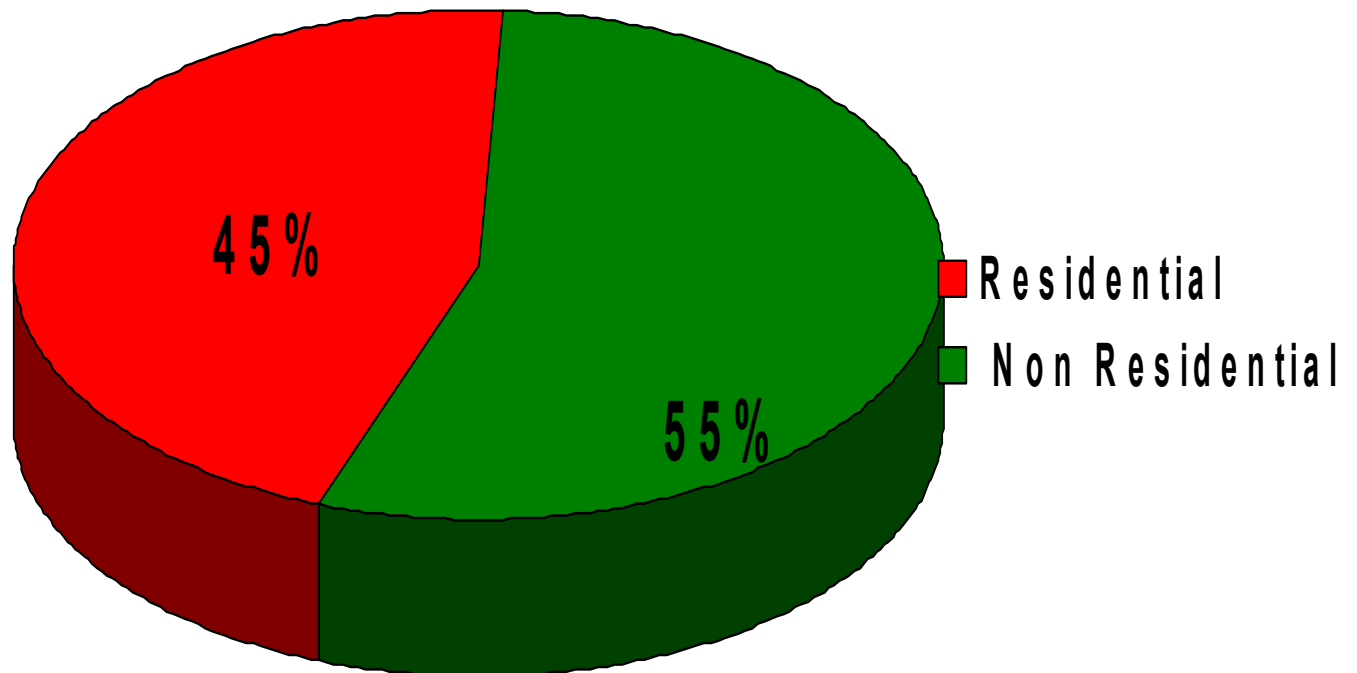
Total number of consumers: 3.179.673

Annual Generation : 13.534,4 GWh

Electrification Levels: 95,5 %

Average Peak Demand : 2.199 MW

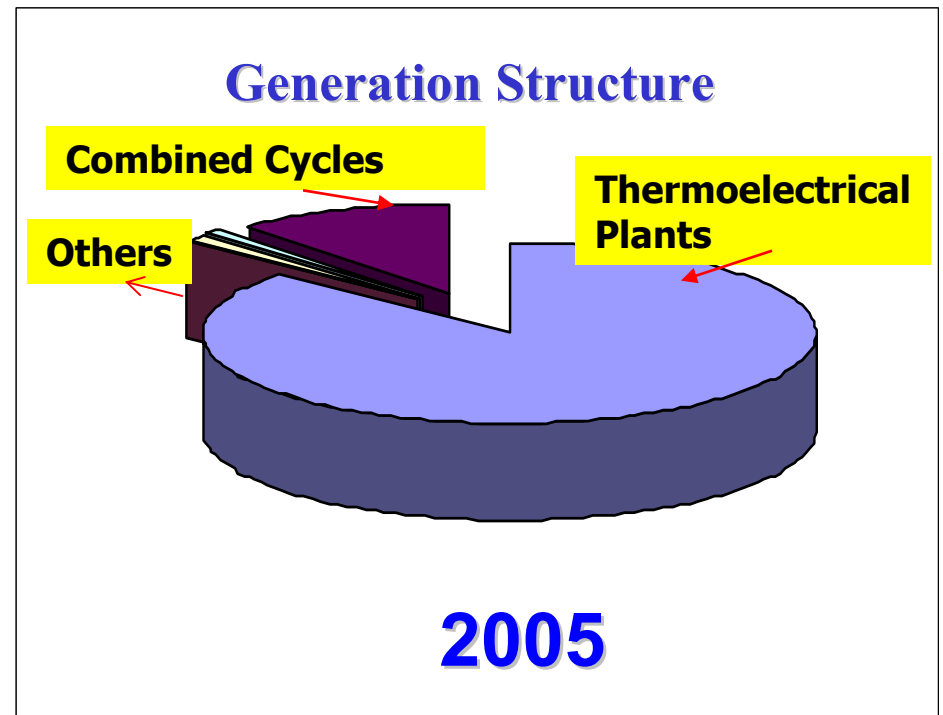
Consumption Structure



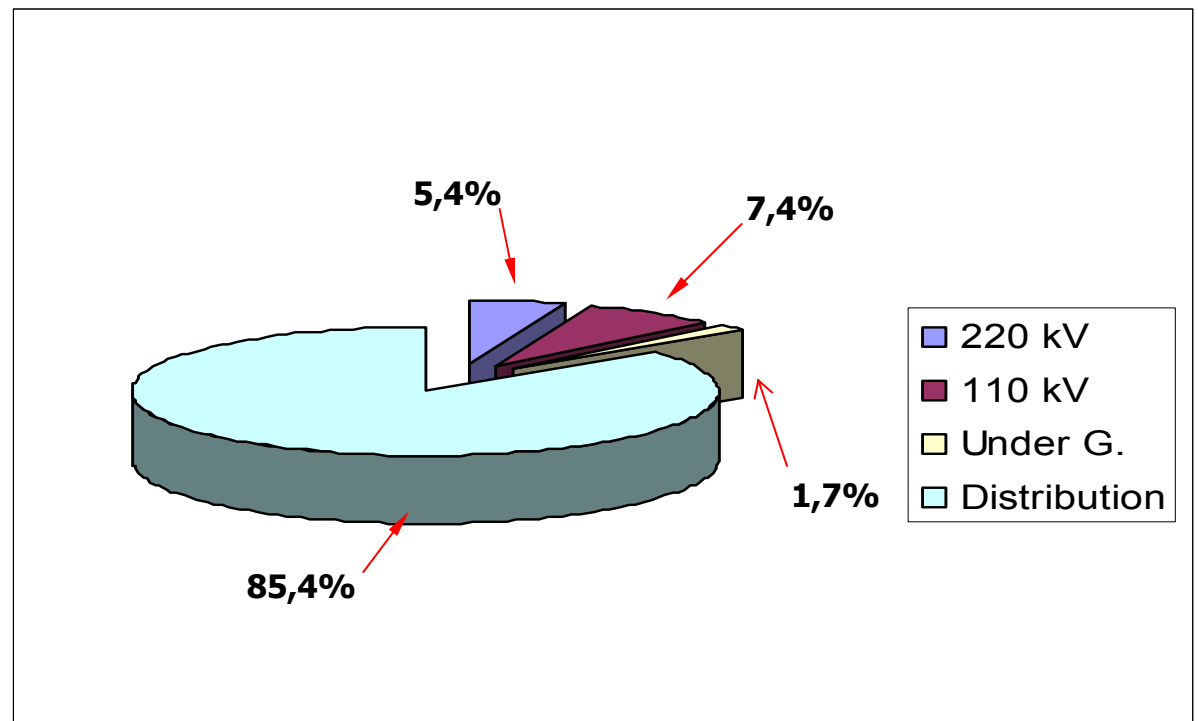
Total: 13.534,4 GWh

Generation Structure

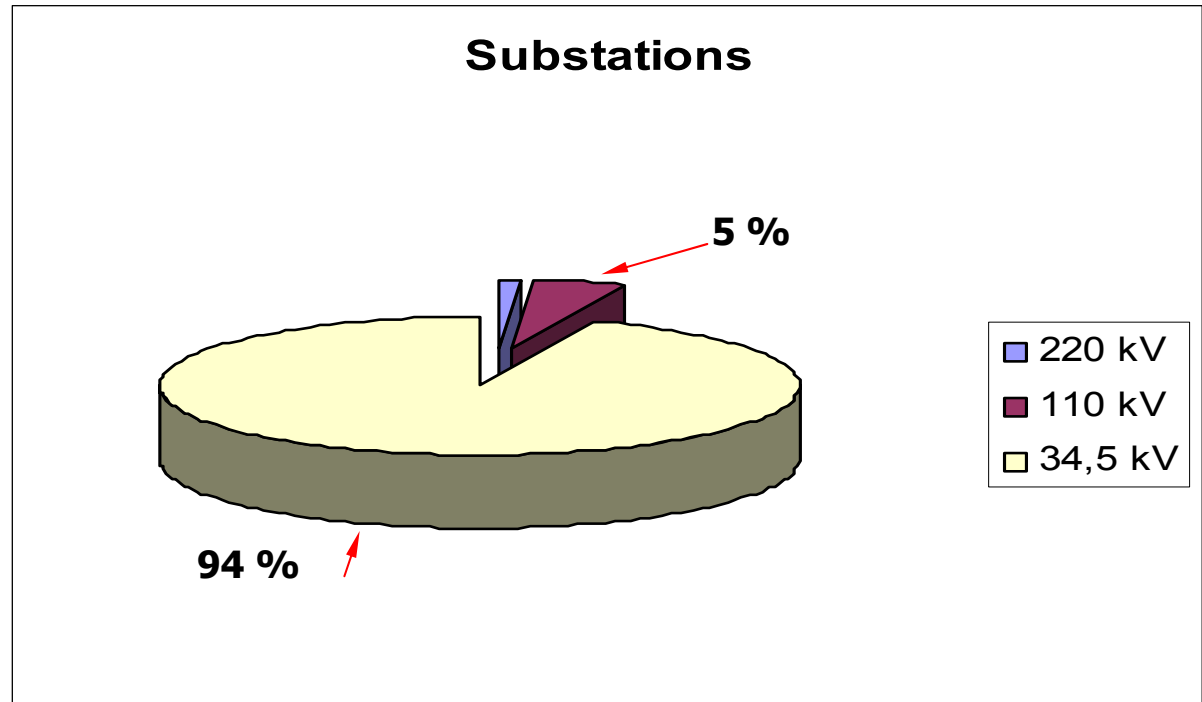
Thermoelectrical Plants
Combined Cycles
Hydroenergy
Gas Turbines
Engines



Electrical Network



Substations



Situation in March 2005

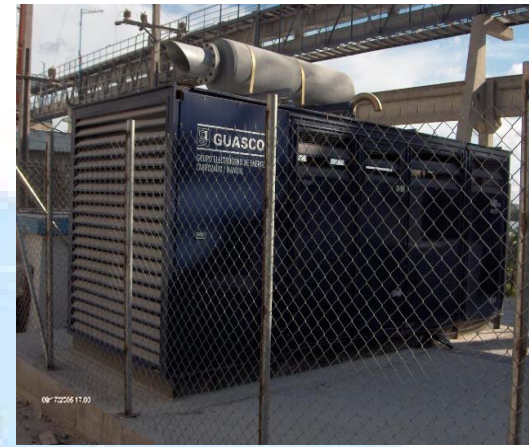
- **11 inefficient big thermoelectric plants, with 25 years average of work, a 60% off availability, frequently failures and high incomes.**
- **Frequently Blackouts in the hours of maximum demand (peak load).**
- **High % of electrical losses in power Transmission and Distribution lines.**

Strategy

- **New power generation distributed all over the country.**
- **Rehabilitation off the networks.**
- **Energy saving programs in the whole country supported by the government and Regulation off industrial loads at the hours off maximum demand.**
- **Use and develop of renewable energy source.**

NEW CONCEPTS FOR THE DEVELOPMENT OF THE ELECTROENERGETIC SYSTEM FOR DISTRIBUTED GENERATION OF ENERGY IN CUBA

Cuba



- **LOW CONSUME OF OIL.**
- **MORE THAN 90% AVAILABLE AT ANY TIME.**
- **POSSIBILITY OF FAST START THAT MAKE POSSIBLE GET FACE MORE EFFICIENTLY TO PEAKS DEMANDS.**
- **REDUCTION OF ELECTRICAL LOSSES**

Implementation of a wide program of networks rehabilitation

- The process of rehabilitation of networks has begun in order to reduce loss in distribution and eliminate low voltage levels in consumers.
- The production of distribution transformers will be triplicated.
- New brigades of linesmen are being formed in the whole country.



Implementation of a wide program of networks rehabilitation

- The technical conditions of the installed transformers will be checked. Electric posts and leads in bad conditions will be replaced.
- Modern and efficient fleet of transports for the improvement of the service provided by our linesmen (trucks, cranes, and specialized vehicles.)
- Resources will be dedicated to keep the level of availability of the most efficient units of the current thermoelectrical plants.



Situation in February 2006

- **More than 300 MW in new Diesel Groups were installed and synchronized with the power grid.**
- **A reduction off the maximum demand (peak) in more than 200 MW was obtained with the energy saving program.**
- **No Blackouts since december 2005.**

**Energy Efficiency
and Renewable
Energy Experience
in Cuba**

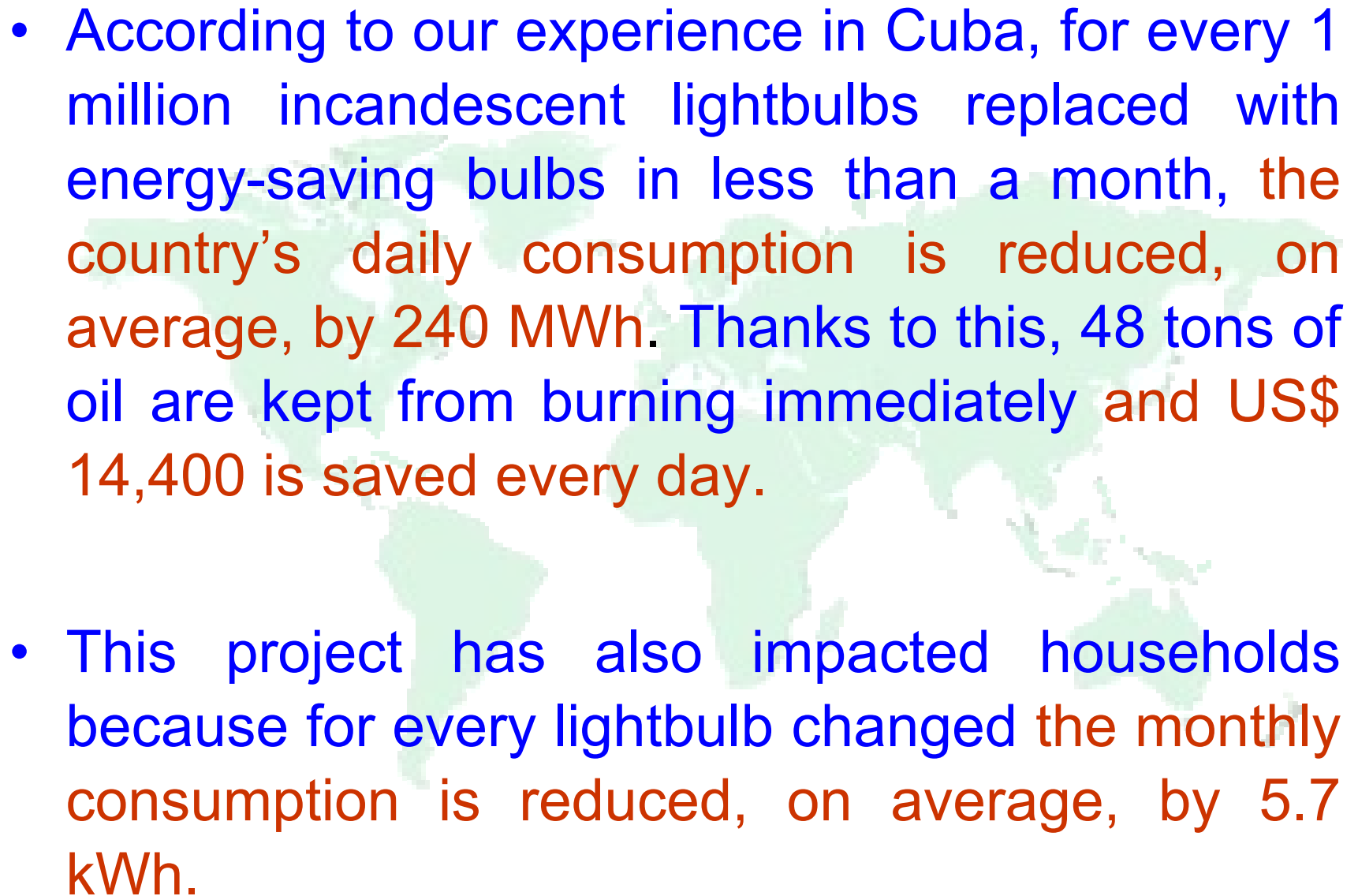
Energy-Saving Project:

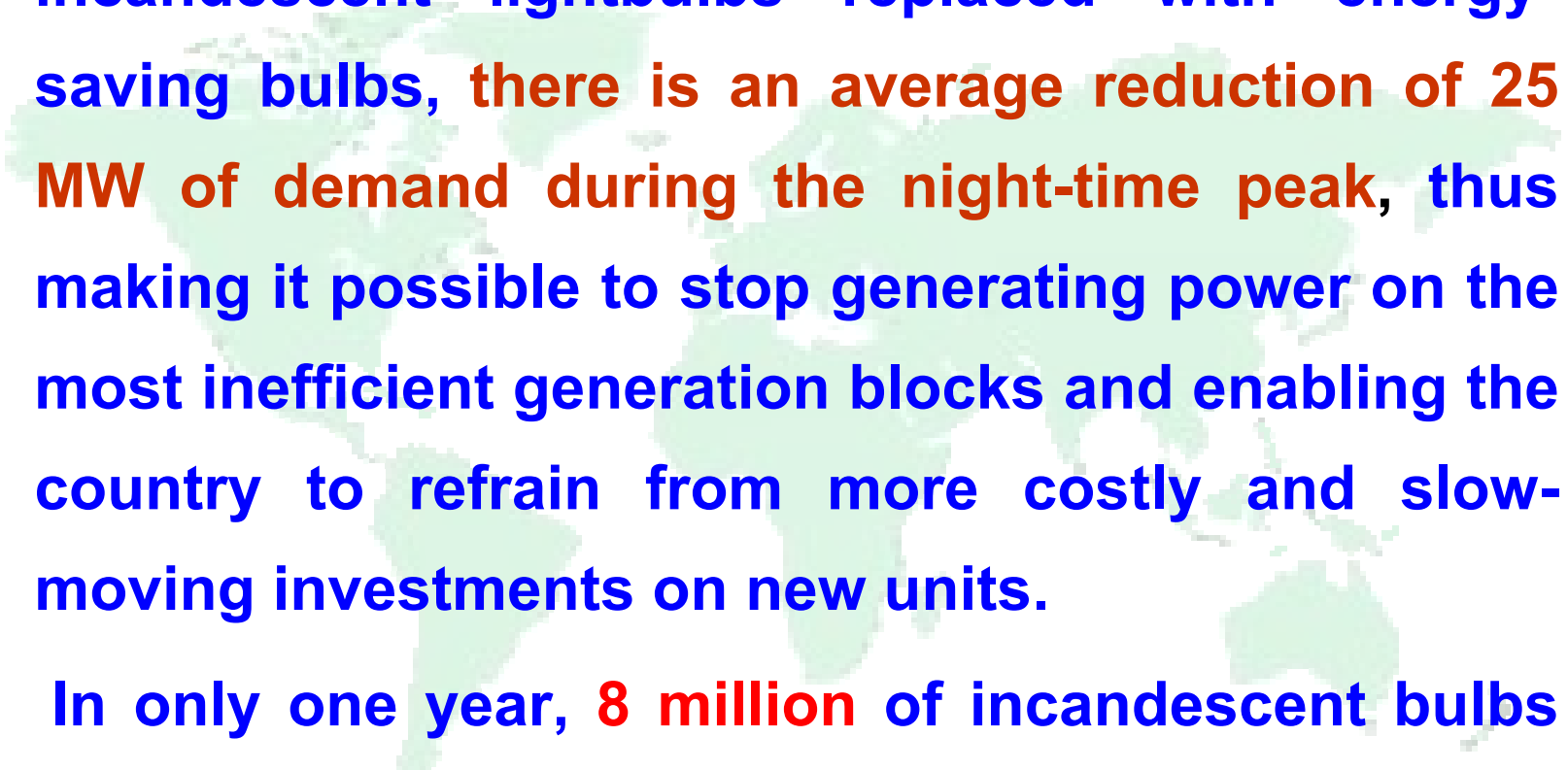
“Replacement of incandescent lightbulbs with energy-saving bulbs”



BENEFITS

- The energy-saving lightbulb provides the same amount of light and **spends 80% less electricity** than the incandescent one.
- The energy-saving lightbulb **last 5-6 times more** than the incandescent one.
- The energy-saving lightbulb **does not generate heat**, because almost all the electricity it consumes is used to produce light.

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- According to our experience in Cuba, for every 1 million incandescent lightbulbs replaced with energy-saving bulbs in less than a month, the country's daily consumption is reduced, on average, by 240 MWh. Thanks to this, 48 tons of oil are kept from burning immediately and US\$ 14,400 is saved every day.
 - This project has also impacted households because for every lightbulb changed the monthly consumption is reduced, on average, by 5.7 kWh.

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- According to Cuba's experience, for every 1 million incandescent lightbulbs replaced with energy-saving bulbs, there is an average reduction of 25 MW of demand during the night-time peak, thus making it possible to stop generating power on the most inefficient generation blocks and enabling the country to refrain from more costly and slow-moving investments on new units.
 - In only one year, 8 million of incandescent bulbs were changed in Cuba, reducing in 200 MW the maximum demand (peak).

Other Energy Saving Projects in execution in Cuba.

- **Efficient household electrical appliances are being distributed in order to improve the living standards of the population. High energy consumption appliances are being replaced all over the country in a very fast way.**



Other Energy Saving Projects in execution in Cuba.

In the Industrial sector we are doing a lot of projects such as:

- Replacement of inefficient lighting.**
- Replacement of water pumps, motors, for efficient ones.**
- Compensation of power factor with capacitors in the consumers.**
- Displacement of loads from the peak demand to midnight.**



AN ESSENTIAL AIM IN OUR ENERGY REVOLUTION IS TO CREATE A NEW ENERGY SAVING CULTURE IN THE CUBAN SOCIETY

- In all educational levels, teachers gave childrens subjects about Rational Use of Energy and care off the environment.**
- Kids with the supervision of teachers make drawings, paintings, narrations and have a competition in order to select the best works related to energy saving programs.**
- Regulations guarantee that only efficient appliances commercialize in Cuba.**
- Electrical tariff was changed in order to stimulate that families save energy.**

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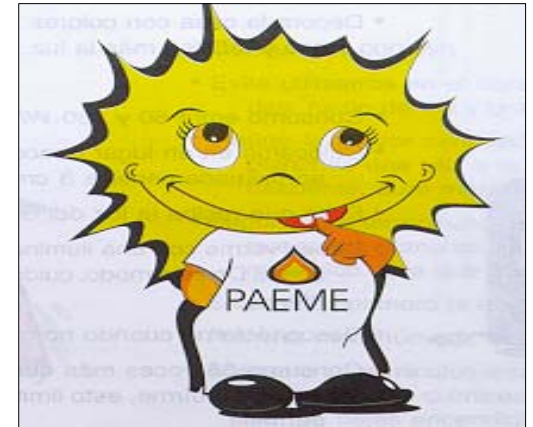


MINED

PIONEERS

FEEM

- Campaigns are carried out in order to promote an awareness of energy saving in the present and future generations.



CDR

PRESS

TV

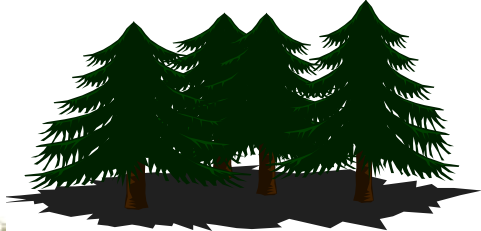


USE OF ALL POSSIBLE KINDS OF RENEWABLE ENERGY

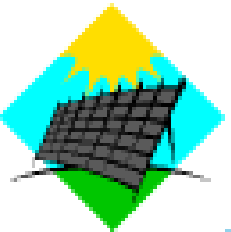
Energias Renovables



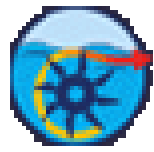
BIOMASS



SOLAR



AEOLIAN



HYDRAULIC

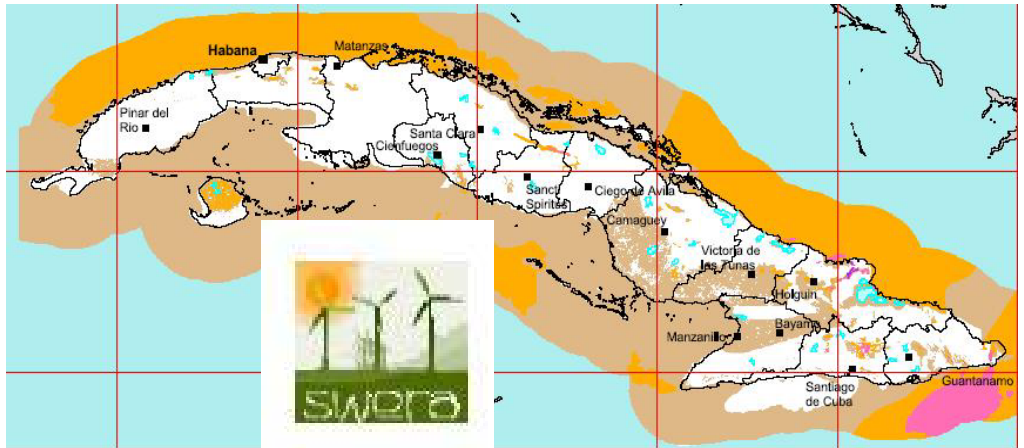




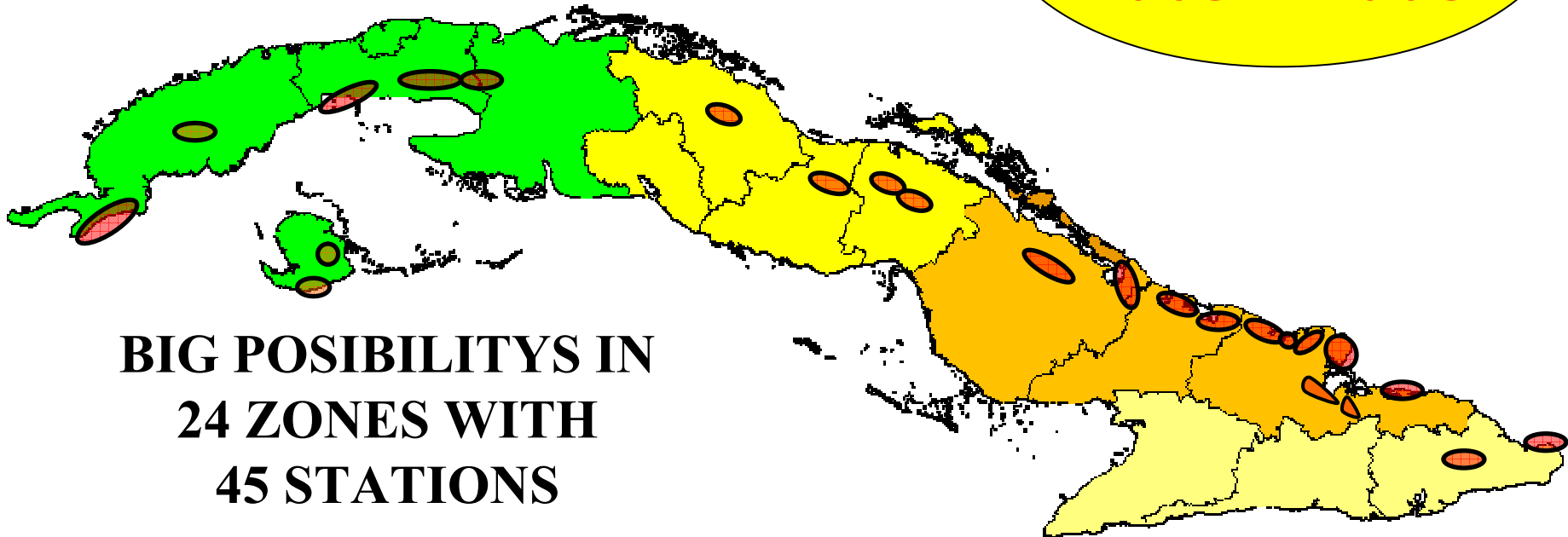
AEOLIAN



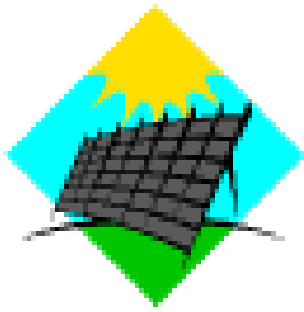
**Turiguanó 2 x 250 kW
2004 → 437 MWh**



**100 MW
2005 - 2008**



**BIG POSIBILITIES IN
24 ZONES WITH
45 STATIONS**



SOLAR

SOLAR :
NOW- 5 318 SYSTEMS , 426 kW
Solution in isolated areas.

- **2 360 Schools**
- **350 Medical centers**
- **150 TV and Video centers**
- **32 Houses → 19,8 kW**



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