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**MULTI-YEAR EXPERT MEETING ON COMMODITIES  
AND DEVELOPMENT**

**9-10 April 2014**

**Energy Efficiency  
Renewable Energy**

by

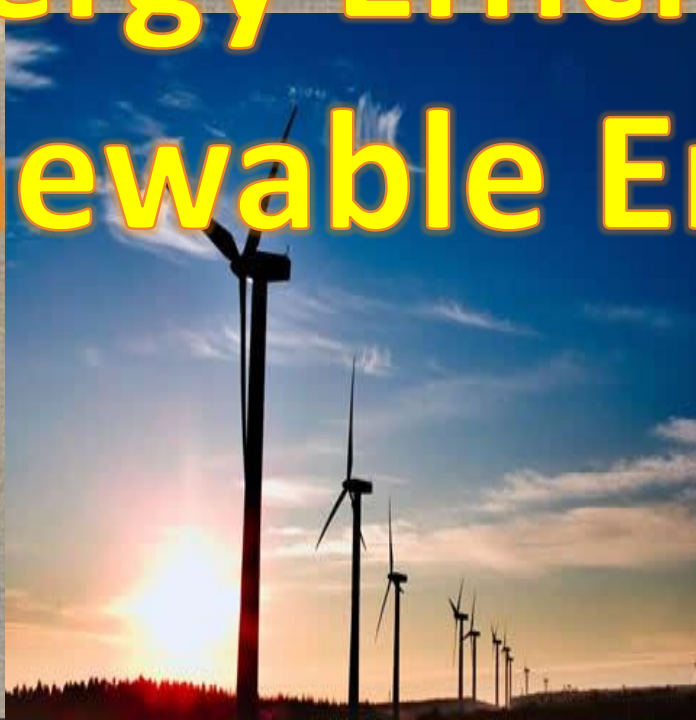
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The views expressed are those of the author and do not necessarily reflect the views of  
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**Energy Efficiency**

**Renewable Energy**







Country	Cuba
Surface	109 884 km <sup>2</sup>
Provinces	15 and a special municipality
Population	11 million people
Density	102.4 people/ km <sup>2</sup>
Life expectancy	77,97 years
Infant mortality rate	4.6 / 1000 born alive
Power level	97,7 %







## Guidelines of the Economic and Social Policy of the Party and the Revolution

### Related to Renewable Energy Sources (RES)

- 247. To boost the utilization of the various renewable energy sources, mainly the use of solar, wind, biomass, biogas, water power, and others;
- 246. To promote the cogeneration and trigeneration in all activities with possibilities. In particular, the power generation will be increased by the sugar industry.
- 267. To prioritize the maintenance and renewal of the tourism infrastructure To increase the renewable energy sources.
- 113. To Prioritize, in the **relationships** of international collaboration organization, the material and technological support in the target development for the deployment of diverse renewable energy sources.





# ENERGY POLICY AND REGULATORY FRAMEWORK

Constitution of the Governmental Commission responsible to elaborate the proposal for the utilization and development of the RES, and its Regulatory Framework, from 2014 to 2030. Appointed by Presidential Decree on December 11, 2012.

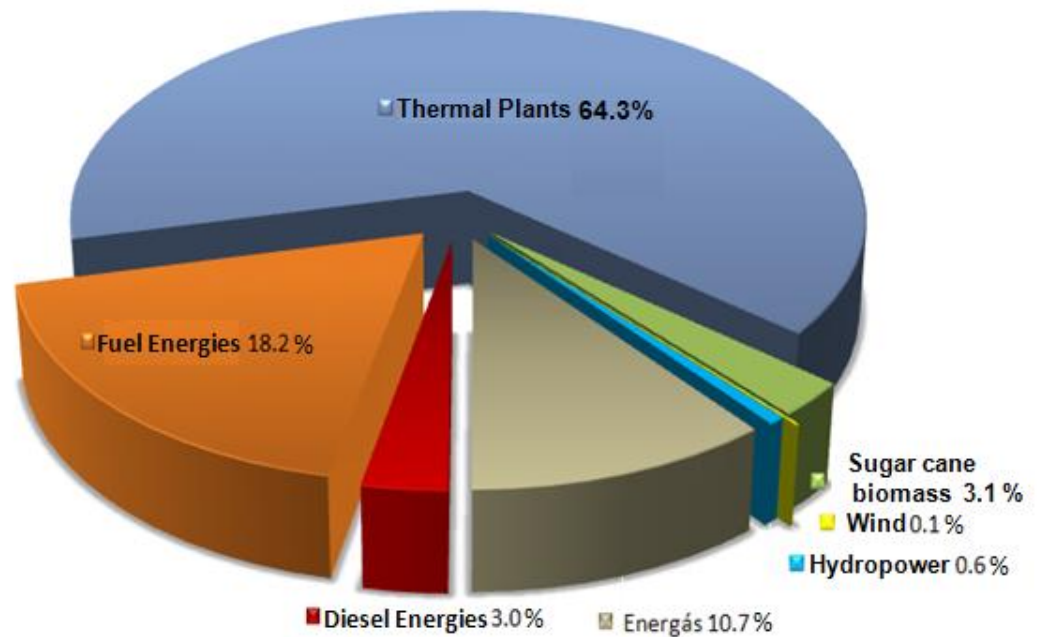
## Targets:

1. To increase the efficiency in the production and consumption of electricity, achieving cost reduction.
2. To increase the Renewable Energy Sources (RES) in the generation and consumption of power matrix and to reduce the oil importation dependency.
3. To increase the environmental sustainability of the economy.

# POWER GENERATION CURRENT STRUCTURE AND FEATURES

## Features:

- High dependence on fossil fuel
- High Costs and Low Efficiency.
- Main Pollution Source.



**This situation is worst due to the economic-financial blockade.**



# ENERGY EFFICIENCY PROGRAM (EE) DEVELOPED IN CUBA

**In the Residential Sector were Replaced**

9,4 millions (100%) Incandescent Bulbs

2.6 millions of Refrigerators

1.0 million of fans

260 thousand pumps

247 thousand TV.

230 thousand Air Conditioning

**Industrial and Commerce Sector**

Replaced over 2 thousand 500 inefficient water pumps.

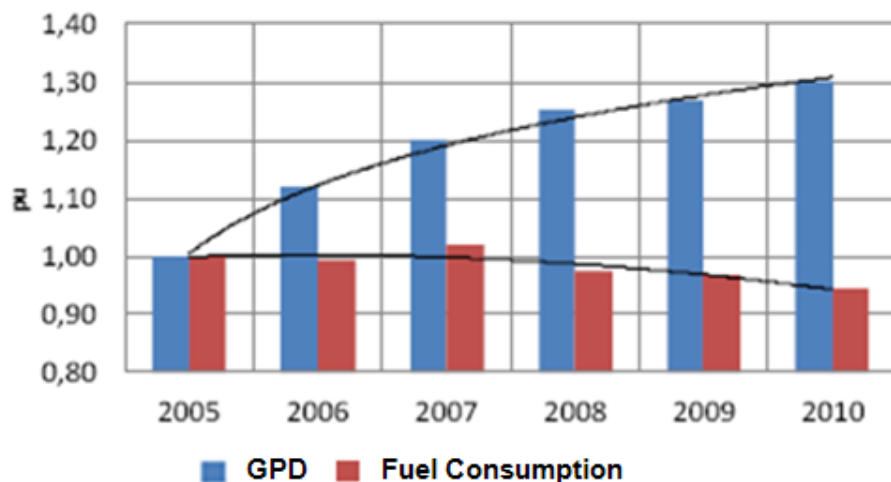
**Installed**

807 thousand fluorescent lamps of 32 W

Condenser banks in high consumers

# RESULTS OF ENERGY EFFICIENCY PROGRAMS NATIONWIDE

## GDP vs Fuel Consumption p.v.



**GDP**



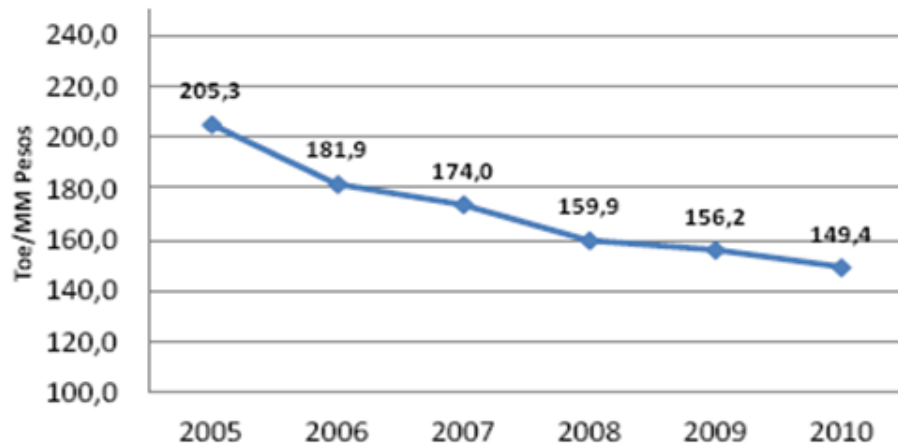
**30%**

**Crude Fuel  
consumption  
And derivatives**



**5%**

## Energy Intensity in Cuba



**Energy Intensity  
decreased by 27 %**



# EVALUATION PROJECTS

## **Energy Efficiency Increment for the Power Generation:**

- Installation of New Combined Cycle.
- **Replacing Inefficient Thermoelectric Units.**

## **Loss Reduction in Electrical Networks:**

- Voltage Conversion and changes in conductor gauge.
- Replacing sodium lamps by LED lamps in the street lighting.
- Installation of Prepaid meters in consumers.

## **Increment in the energy efficiency in the industrial and commercial sector:**

- Technological improvements in airconditioning, refrigeration, steam generation and distribution, pumping and compressed air systems.
- Replacing inefficient and oversized motors by high efficiency motors.
- Establishment of certified energy management systems (NC ISO 50001 Standard).
- Installation of solar heaters.

## **At the Residential Sector:**

- Replacement of fluorescent lamps by LED lamps.
- Replacement inefficient electric resistance cookers.
- Installation of solar heaters.

# FACILITIES USING RENEWABLE ENERGY SOURCES CURRENTLY





# ONGOING PROJECTS

## **Sugarcane Biomass**

- **20 MW Bioelectrical Plant at Jesús Rabí Sugar Mill, Matanzas Province.**
- **60 MW Bioelectrical Plant at Ciro Redondo Sugar Mill, Ciego de Ávila Province.**

## **Wind**

- **51 MW Wind Farm at La Herradura Beach, Jesús Menéndez Municipality, Las Tunas Province (34 wind turbine of 1,5 MW each one)**

## **Photovoltaic Solar**

- **10 MW in construction and commissioning in 7 areas, located at Guanantánamo, Santiago de Cuba, Pinar del Río, Cienfuegos, Isla de la Juventud and La Habana.**

## **Other Projects:**

- **2,5 MW Biogas Plant, at Santa Cruz del Norte Rum Factory.**
- **6 Biogas Industrial Plants to generate power at swine facilities.**
- **500 small biogas plants at swine and livestock of the state and rural sector.**
- **0,5 MW Forest Biogas Plant, at La Isla de la Juventud.**
- **Production and Installation of 6532 solar heaters.**
- **Production and Installation of 1523 windmills.**

# EVALUATION PROJECTS

## Biomass sugar cane

- Bioelectric over 700 MW



## Wind

- Wind farms until 633 MW



## Solar photovoltaic (FV)

- The solar potential radiation in the country is about 5 KWh/per day per square meter.
- Solar Farms PV 400 MW



## Other Projects

- Hydropower: 55 MW
- Biomass not sugar cane: 47 MW
- Biogas programs: 27 MW
- Wind mills: 16 500 U
- The necessary investments in the domestic industry for spare parts and components for renewable energy systems are being studied.



# Evaluation Projects



# EXPECTED RESULTS

- To have all power required for the economical and social development of the country.
- To reduce the energy cost in order to contribute with the competitiveness of the enterprise system.
- To increase the contribution of the renewable energy sources in the agricultural production, with a more ecological, social, economical and sustainable approach..
- To develop the domestic industry reducing the FRE investment costs.
- To remove the main pollution sources of the phreatic mantle (aquifer) and watersheds
- To stop emitting to the atmosphere more than 50 million tonnes of CO<sub>2</sub>.



“An important biological species is in risk of disappearing due to the rapid and progressive destruction of its natural habitat live conditions: The man

Now we are aware of this problem when it is almost too late to avoid it.”

**Fidel Castro**

**Río de Janeiro, June 12, 1992.**