



# **ADVANCING SUSTAINABLE WASTE AND BIOMASS TO ENERGY IN CUBA**

## **ISWA World Congress & WASTECON 2017**

**Diverting from dumpsites to Waste-to-Energy in Cuba.  
Policy tools and governance**

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# Advancing Sustainable Waste and Biomass to Energy in Cuba ISWA World Congress & WASTECON 2017

## Diverting from dumpsites to Waste-to-Energy in Cuba. Policy tools and governance



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of North America

## KEY ISSUES

- Lack of strategy to educate and inform the community on attaining improved waste behavioral patterns
- Poor systematic environmental education campaigns
- Insufficient socio – cultural community involvement in the waste sector
- Lack of material resources required to support environmental education
- Lack of appropriate waste management awareness by the population, and poor level of knowledge on the relations between MSW management and health

## INTRODUCTION

- First environmental law in Cuba in 1959
- The environmental education and protection system has been characterized by extensive institutionalization and centralization
- Scientific (state) organizations of Cuba, have shown to be insufficient for the protection of environment
- The Ministry of Science, Technology and Environment develops policies and also a number of scientific journals
- The National Environmental Education Strategy is the key document

# PRINCIPLES OF ENVIRONMENTAL LAW IN CUBA

- The enjoyment of a healthy environment is a fundamental right of all men and women.
- The conservation of the environment is a duty of all natural persons and legal entities.
- Faced with the risk of serious and irreversible damage to the environment, the priority is prevention. The lack of absolute scientific certainty cannot be claimed as a reason to stop the adoption of preventative measures.
- It is the right of every citizen to have access to available information about the environment.
- The environmental dimension should be taken into account in all development strategies, programmes and plans.
- Environmental education should have a concise and interdisciplinary focus, aimed at all social sectors and age groups, with a special emphasis on decision makers and children, adolescents and young people.
- Environmental management should involve all organs and bodies, public and private and social and citizen's organisations.
- It is obligatory that the public be aware and the citizenry consulted over decisions and actions that, in one way or another, will affect the environment.
- It is the right of every citizen to rely on the possibilities and appropriate legal mechanisms that allow them to activate legal or administrative mechanisms in order to enforce compliance with the law and other mandatory regulations in terms of the environment.

## KEY POINTS FOR WASTE MANAGEMENT IN CUBA

- A strong framework of quite diverse regulations. A large part of which are discretionarily applied
- Very little official information available. CITMA does not provide information directly to the public or to the press
- No real social movements on the island, due to social design that moves everyday further from social inclusion
- Waste management not considered to be a problem by Cuban authorities
- Waste generated mainly by tourism industry, with a profound environmental impact on ecosystem

## LAWS ON TREATMENT OF WASTE

- National environmental strategy (2015) characterizes as principal environmental problem at national level the deterioration of sanitation and the environmental conditions in human settlements
- Collection and disposal of solid waste can be seen to be seriously affected due to serious limitations in the automobile fleet and availability of depots for waste collection
- The majority of installations that deal with hazardous waste does not provide safe treatment and disposal

## LAWS ON TREATMENT OF WASTE

- **Law 1288/1975** on the waste collection
  - Obligation of State companies to classify recyclable waste at the source
  - Out of date law, makes references to bodies that no longer exist
  - The way in which the Cuban economy is currently organized bears no relation on how it was organized in the era of the law
- **Law 33/1981** on the protection of environment and rational use of natural resources



# CUBAN INSTITUTIONS ON WASTE MANAGEMENT

- A few ministries share responsibilities for the waste management system of Cuba (Ministry of Industry, Ministry of Public Health, Ministry of Physical Planning, Ministry of Environment)
- Union of Enterprises and other state companies participate in waste management (DESEQUIP, CUREF Recycling, FUSA, FUNALCO Smelting Company and many more)
- In each province local companies participate in waste management and are responsible for collection, recovery and processing of waste

## OBSTACLES OF RECYCLING IN CUBA

- No appropriate infrastructure for classification
- Low or zero technical capabilities of the necessary equipment
- Insufficient logistics
- Outdated legal framework
- No data keeping from state organizations – No reliable statistics
- Contacts between parties not updated
- Lack of monitoring
- No specifically trained staff

## Why Waste to Energy in Cuba?

- Part of preliminary study
- To be presented as a paper in Waste Management and Research Magazine and also in the 10<sup>th</sup> ISWA Beacon Conference on WtE
- Key answers to issues around environmental, technical and financial data of implementation
- Analysis on the pollutants and air dispersal of gases

10<sup>th</sup> ISWA Beacon Conference on

# WASTE-TO-ENERGY PROGRAMME

State of the Art and Latest News  
October 25-26, 2017  
in Malmö, Sweden



The International Solid Waste Association Working Group on Energy Recovery  
in cooperation with:



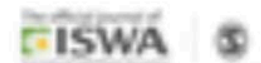
An exclusive tour will take place October 24 to ARC, Copenhill - one of the most technically advanced and most spectacular waste-to-energy plants in the world.

Photo: Christoffer Reglid



# WASTE MANAGEMENT & RESEARCH

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# Case of Havana

## Energy production

Electricity produced	211,281	MWh/year
Electricity produced per ton	528	kWh/ton
Electricity for sale	179,589	MWh/year
Gross electricity efficiency	26.3%	
Net electricity efficiency	22.3%	
R1	0.6967	

Plant capacity: 400 000 ton/year

Temperature	400	°C
Pressure	40	bar

# Case of Havana

## Financial analysis

Capital Expense	126,000,000	€
Loan	100,800,000	€
Equity	25,200,000	€
Operating Expense @ constant prices	7,882,000	€/year
Operating Expense @ constant prices	19.705	€/ton
Payroll	900,000	€/year
Residuals treatment	2,200,000	€/year
Chemicals	1,200,000	€/year
Maintenance	2,772,000	€/year
Insurance	378,000	€/year
Other administrative costs	432,000	€/year
Revenues @ constant prices	19,175,343	€/year
Revenues @ constant prices	47.9	€/ton
Income from Gate Fee	8,000,000	€/year
Income from Electricity	10,775,343	€/year
Income from Metals sales	400,000	€/year
<u>Financial evaluation based on 25 yrs operation</u>		
Gate Fee for IRR 11%	20.0	€/ton
Net Present Value	33,931,158	€
Payback Period (incl. 3 yrs erection)	14.3	years

# Case of Havana

## Environmental assessment

<u>Ash production</u>		
Bottom ash	100,000	tpa
Fly and boiler ash	12,000	tpa
<u>Emissions</u>		
Dioxins	0.280	gr/year
Particles	28,000	kg/year
HCl	28,000	kg/year
HF	2,800	kg/year
SO <sub>2</sub>	140,000	kg/year
NOx	560,000	kg/year
Hg	140	kg/year
Sb +As +Pb +Cr +Co +Cu +Mn +Ni +V	1,400	kg/year

## Case of Santiago de Cuba

- Same approach as in the case of Havana
- Closure of all illegal dumpsites
- Waste diverted to once central facility
- Energy recovery of MSW in the framework of Cuban administration to develop an energy sufficient economy by 2025

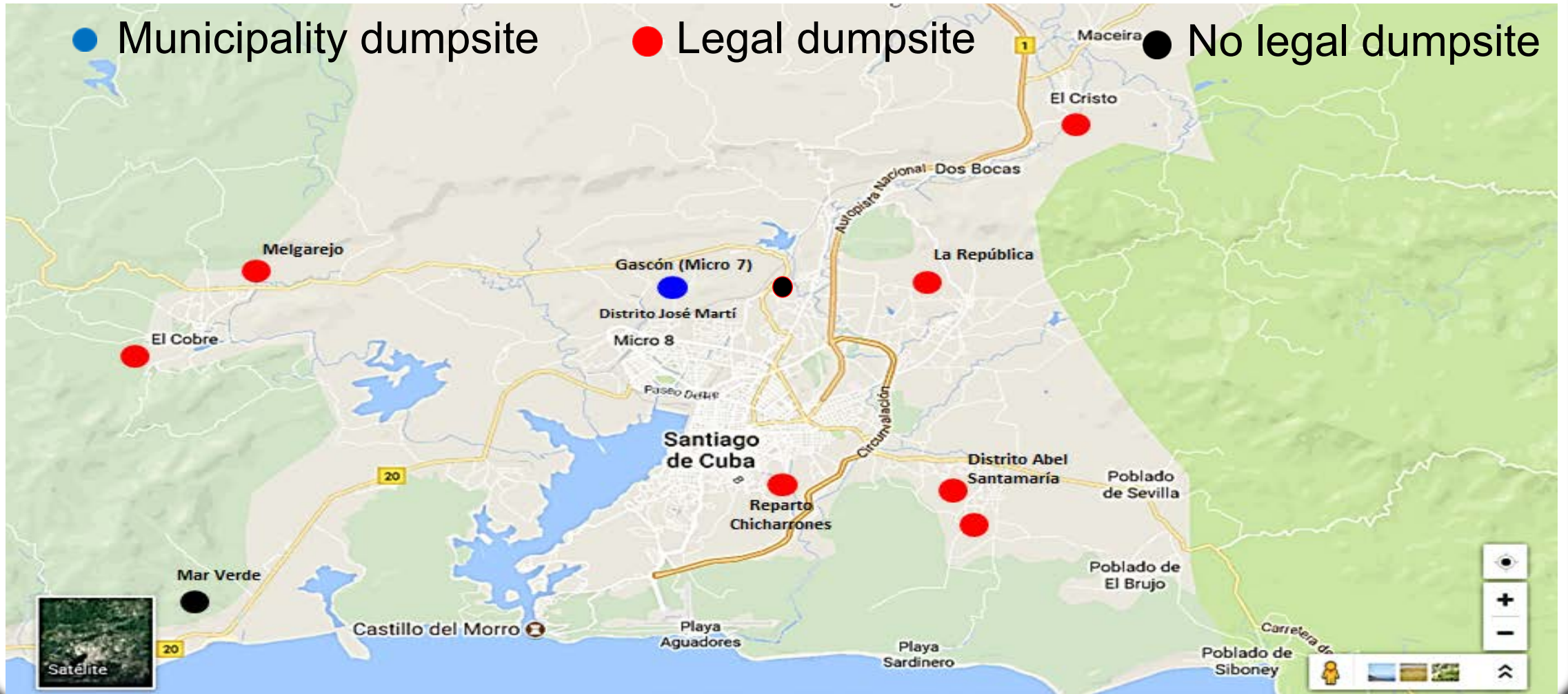


# Location of dumpsites in the city of Santiago de Cuba

● Municipality dumpsite

● Legal dumpsite

● No legal dumpsite



**Thank you for your attention!**

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**Questions?**

