



# MSW Management and Biomass – Biowaste and Biogas



# MSW Waste Management and Biomas

## Biowaste and Biogas

*Seville, 20 October 2020*



# Contents

- **MSW Management: how we handle biomass**
- What more can we do
- Available resources



# How we manage MSW



Collection

GSA

- ✓ MSW collection
- ✓ MSW transport and logistics

Treatment

ABORGASE

- ✓ MSW management in Seville and surrounding area
- ✓ Recycling and composting plants
- ✓ Montemarta landfill management

Landfilling

GSA

- ✓ Civil Works related to landfill
- ✓ Constructio, operation and sealing of landfill cells

Closure,  
degasification

Energy production

Enersur

- ✓ Landfill gas to energy plants  
Promotion, EPC and operation

**Aborgase is reference  
in the Municipal Solid  
Waste Management  
sector**

EDIFESA

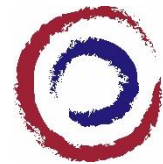
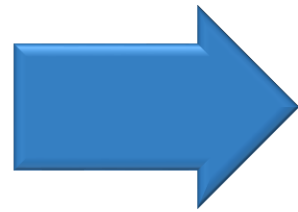
- ✓ Engineering
- ✓ Environmnetal  
consultancy

**Competence in the complete  
Municipal Solid Waste Value  
Chain**

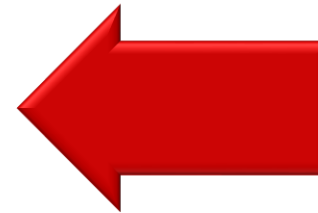
# Chair of Waste Management in Circular Economy

## Challenges

- ✓ Changing environment (regulations, technologies) with increasingly demanding objectives
- ✓ Increasing social sensitivity to the sector challenges



CÁTEDRA  
ECONOMÍA  
CIRCULAR



*Stable and formal collaboration framework*

## Objective

- ✓ Intensify efforts in dissemination, research and education on the subject of CE
- ✓ Diálogo permanente con la Universidad

## Actions

- ✓ Sectoral and academic conferences
- ✓ Scholarships and internships
- ✓ Thesis awards
- ✓ Investigation projects
- ✓ Collaboration with other actors

# How We Manage MSW

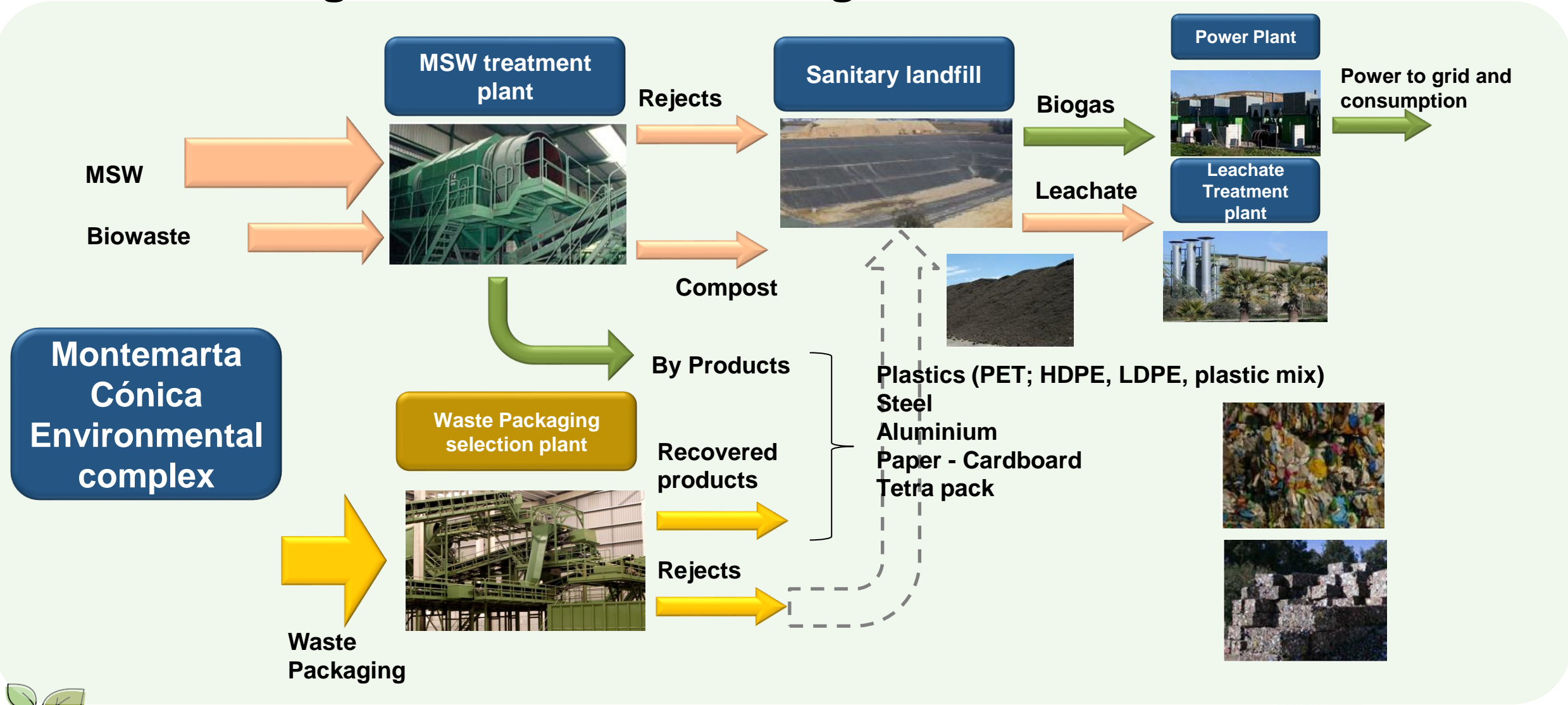
Municipal Solid Waste	
Organic waste (%)	36,05
Glass (%)	5,28
Packaging (%)	7,36
Paper and carton (%)	13,44
Other (%)	37,87

**Aprox. 300 kt year**

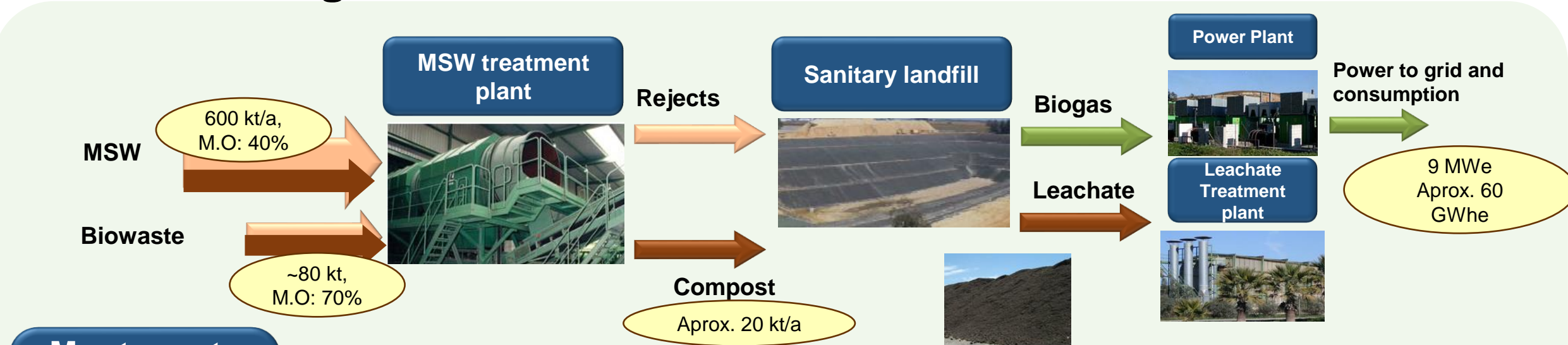
Organic Fraction of Municipal Solid Waste	
Organic waste (%)	60
Glass (%)	6
Packaging (%)	7
Paper and carton (%)	11
Other (%)	15

**Aprox. 2000 t  
2018**

# How We Manage MSW – Waste Management Model



# How We Manage MSW: Biomass Flows



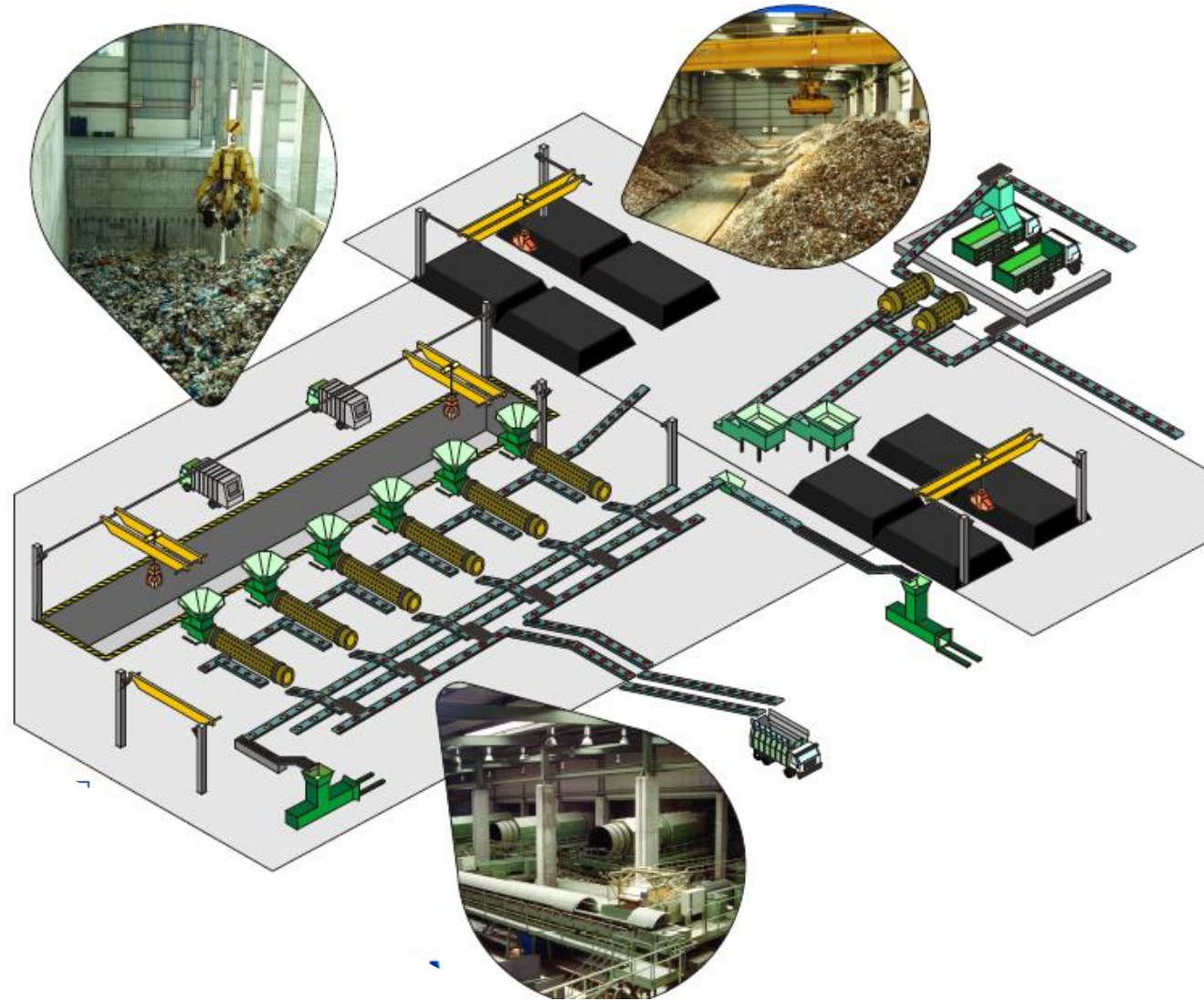
Currently, MSW and biowaste management involves the management of significant amounts of biomass.

In the current management model the main treatments given to biomass are:

- ✓ Organic fraction composting (or anaerobic digestion)
- ✓ Biogas energy recovery



# Organic fraction treatment





# Organic fraction treatment

Reception

Fermentation

Maduration



15-20 days

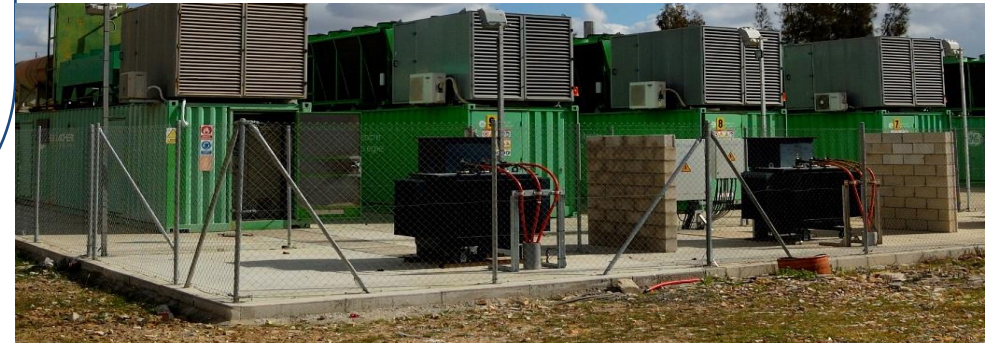
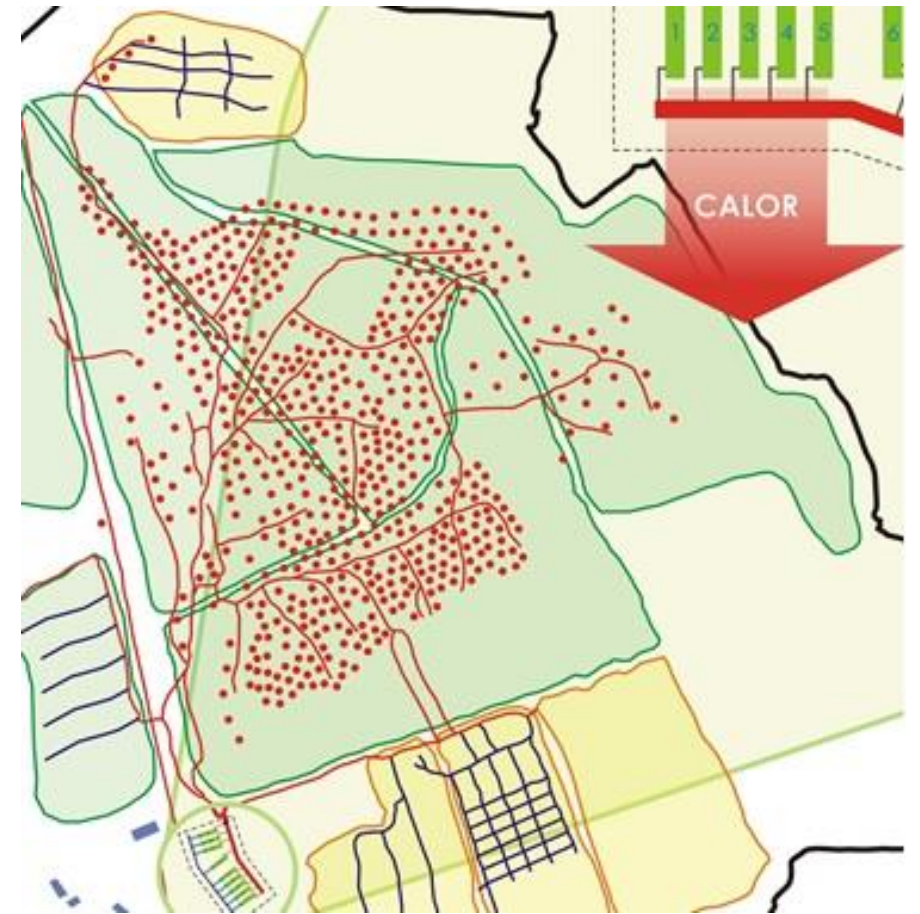


5 months



# Energetic recovery of biogas

- Start 2001 - 2 MW
- Growth up to 10 MW
- More than 800 wells. Gas extraction at the same time as discharge
- Supply to the center and export of 60,000 MWh (55,000 inhabitants)
- Heat from 2 motors for evaporation of leachates.
- Reference in Spain



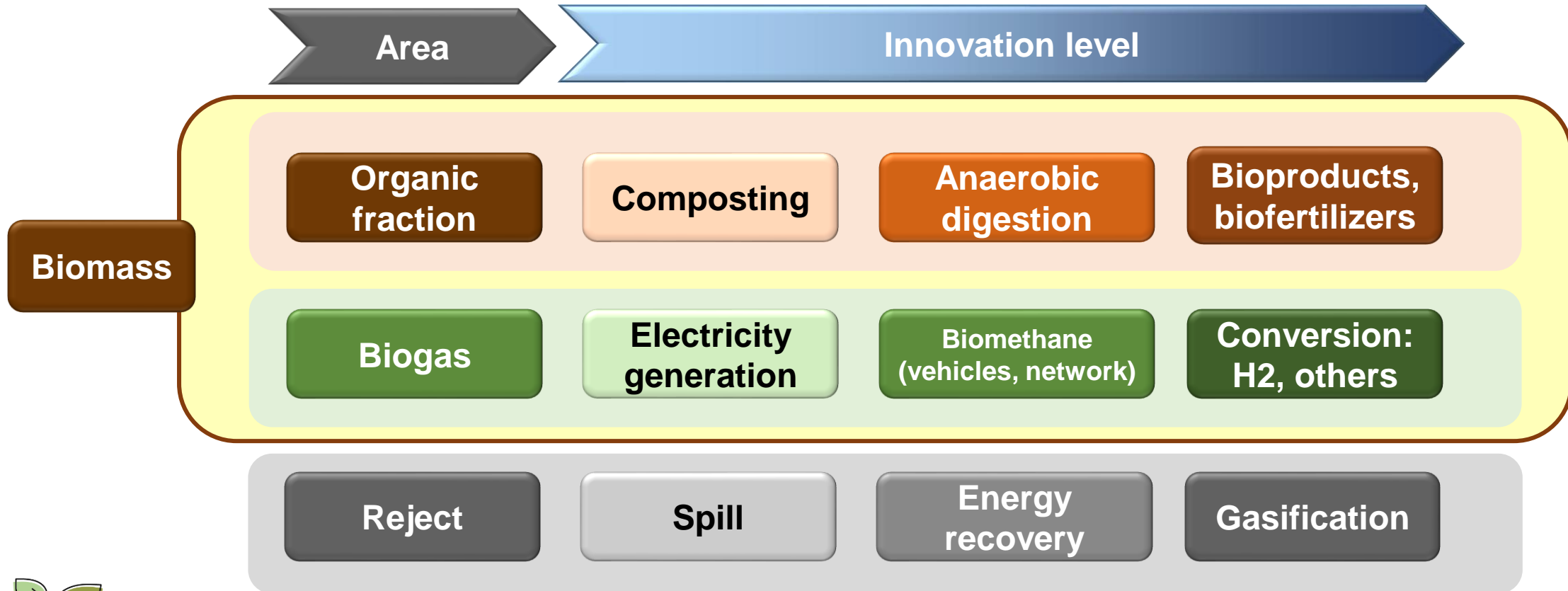
# Contents

- MSW Management: how we handle biomass
- **What more can we do**
- Available resources



# Technological potential to recover waste fractions

- Mature and developing technologies to treat each of the fractions.
- Introduce innovation in waste management and its fractions to make it more circular



# Biowaste valorization: Biostimulants production

## Project

- C-Biofert: Production of biostimulants / biofertilizers from the organic fraction of MSW\*.

## Objetive

- Develop a OFMSW valorization process for the production of biostimulants / biofertilizers microorganisms of agricultural interest.

## Activities

1. Isolation, identification and selection of potential microbial strains to present a fertilizing / stimulating effect.
2. Development of a MSW hydrolysis process, to obtain an extract rich in organic compounds assimilable by the selected microorganisms.
3. Development of proofs of concept capable of producing the microorganism from OFMSW.
4. Field tests with the materials produced.

## Collaborati ons

- ITENE, Technological Center focused in promotion of sustainability in the fields of packaging, logistics, transport, mobility and environmental bioengineering processes.
- IRNAS-CSIC, Institute of Natural Resources and Agrobiology of Seville is to conduct research on the use and conservation of soil-plant-water natural resources.

\* Project granted by CDTI in R+D+I call



# Biogas valorization: Biomethane

Innovation



**POWER4BIO**  
REGIONS FOR  
BIOECONOMY

- Methane production for automotive use, in fletes or another types of vehicles adapted to natural gas.
- Reach natural gas specifications for injection in gas grids.

- Methane reforming to hydrogen decentralized production, and fuel cells uses.
- Methane conversion in other high value added molecules.
- Conversion of CO<sub>2</sub> from biogas to methane → Power to Gas

## Maturity / Challenges

Technology and available use

Challenge: get grid specifications

Available technologies

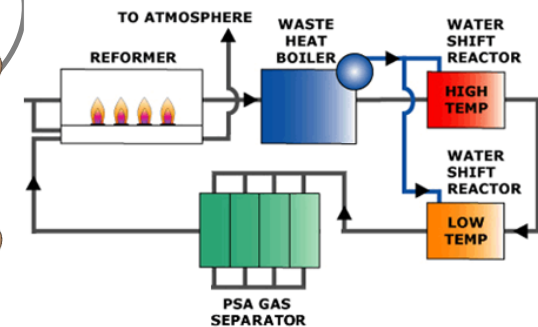
Challenge: biogas cleaning

Cost (H<sub>2</sub> production)

## Upgrading



## Reforming



Waste Management and Biomass



# Biogas valorization: Biomethane

**Electricity**

**10,17 Mwe**



**23.315 homes**  
(IDAE: 3.487 kWh )

**Biomethane -  
Grid**

**197 GWth**



**71.929 homes**  
(IDAE: 2.745 kWh)

**Biomethane -  
Movility**

**20 million  
liters eq.**



**Seville Local Fleets**

- Lipasam: 2,88 MI  
(Management Report 2018)
- Tussam: 4,54 MI + 100 GWh  
(EMAS Declaration 2018)

- Biomethane production from landfill gas presents significant challenges
- The potencial is huge, however currently landfill gas is already being used for power



**POWER4BIO**  
REGIONS FOR  
BIOECONOMY

**Waste Management and Biomass**



**CÁTEDRA  
ECONOMÍA  
CIRCULAR**



# Biogas valorization: Hydrogen production

## Project

- LFG2H2: Recovery of landfill biogas by converting it into hydrogen\*.

## Objective

- Develop a process for converting landfill biogas into hydrogen through catalytic reforming.

## Activities

1. Gas Cleaning: process design and catalyst selection
2. Catalysts synthesis adapted to the needs of the process.
3. Biogas reforming tests in a microactivity reactor in lab and with real landfill gas.

## Collaborations

- AICIA, Asociación de Investigación y Cooperación Industrial de Andalucía, Innovation and Technology Centre linked to Escuela Técnica Superior de Ingeniería de Sevilla.
- CIEMAT, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, center focusing on energy and environment and the technologies related to them.

\* Project granted by CDTI in R + D + i call



# Contents

- MSW Management: how we handle biomass
- What more can we do
- **Available resources**

# Biomass from Waste

## Positive aspects

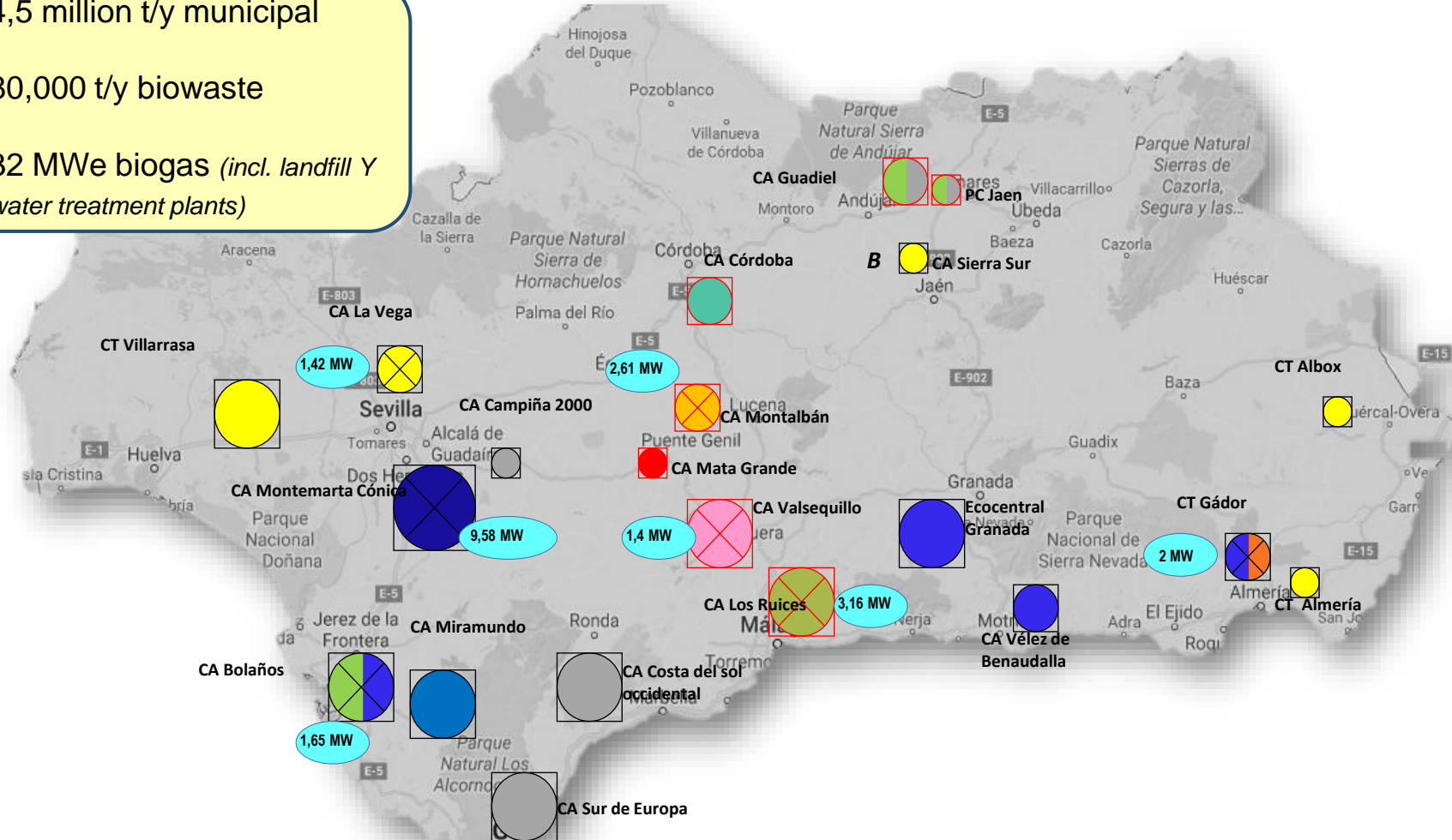
- ✓ They are collected continuously and taken to a treatment center
- ✓ European Waste Directive and the Waste Decree: Selective collection and differentiated treatment of bio-waste
- ✓ Constant and predictable flows.
- ✓ Administration: lots of information

## Challenges

- ❖ Quality:Calidad:
  - Heterogeneity
  - Improper
  - Humidity
- ❖ Competition in cost of treatment
- ❖ Administration: Law of Contracts of the Administration

# Andalusian Waste Plan Photo

- 4,5 million t/y municipal
- 80,000 t/y biowaste
- 32 MWe biogas (incl. landfill Y water treatment plants)



- 1. Tipo de instalación**
  - Planta de reciclaje/compostaje
  - Vertedero
  - ◻ Planta de reciclaje/compostaje con vertedero
- 3. Residuos de entrada (TN)**
  - < 50.000
  - 50.000 ≤ X ≤ 100.000
  - 100.000 ≤ X ≤ 200.000
  - 200.000 ≤ X ≤ 500.000
  - > 500.000
- 4. Planta de Biogás de Vertedero**
  - ⊗ Con Aprovechamiento energético
  - Sin Aprovechamiento energético
- 5. Incineradora**
  - △ Con Incineradora
- 6. Biometanización**
  - B Biometanización



# Main Ideas

- ✓ Biomass in MSW management: biogas and organic fraction
- ✓ Available and technologies under development for organic fraction, biogas and rejects
- ✓ Abundant and localized resource, with significant challenges

# Thanks for your attention!!

## Questions?

***pcaraballo@aborgase.com***