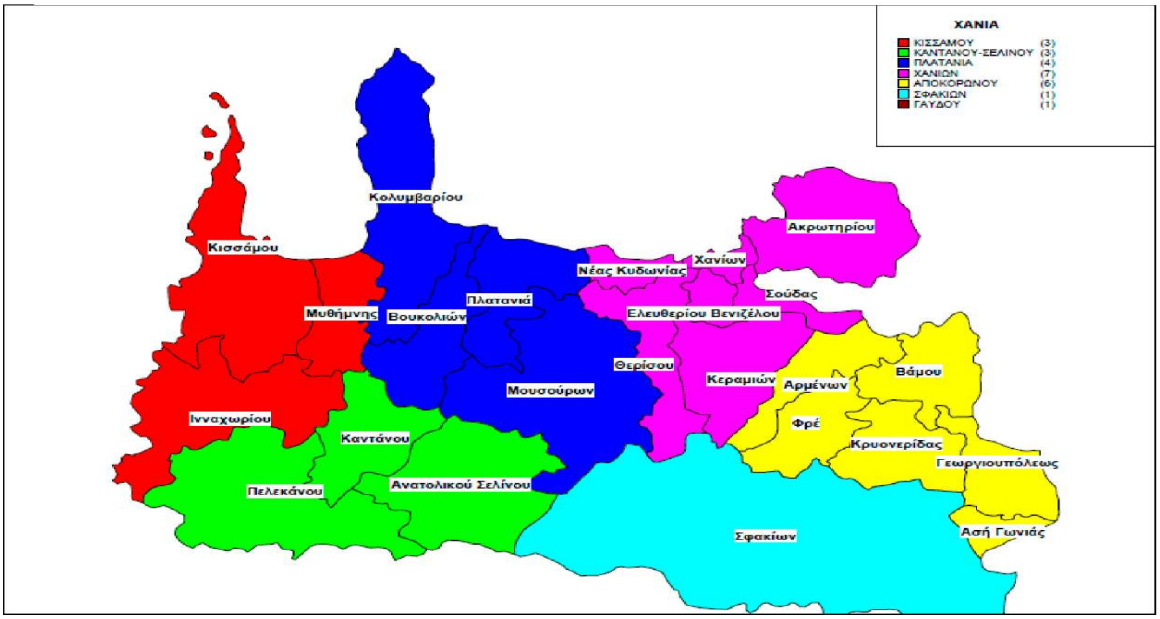
Reference case for the prefecture of Chania, Crete

Contents

1 Demographics and Waste Production

1.1 Location, Population

The prefecture of Chania is the westernmost prefecture of Crete, in the south of Greece. It consists of seven municipalities: Chania, Apokoronas, Kantanos-Selinos, Kissamos, Platanias, Sfakia and Gavdos (small island).



The population reaches 156,220 inhabitants, which equals to about 25% of the total population of Crete, according to temporary data from the 2011 inventory conducted by the Hellenic Statistics Service.

1.2 Waste streams and quantities

1.2.1 Quantity of MSW

In the prefecture of Chania an integrated waste management system is in operation, that serves the majority of the municipalities of the area.

The core of the system is the Mechanical Biological (aerobic composting) Treatment Plant, located in Korakia. Next to the MBT, a sanitary landfill for the residues is in operation.

The facility was designed to handle the waste of 9 municipalities (according to "Kalikratis "plan the municipalities merged to 7 and currently 5 of them transfer their waste to the MBT). At this time, the plant processes 92.000 tons/year and the operation is set in 2 shifts, 6 days/week. The facility (MBT

plant and SL) receives mixed MSW, commingled recyclables from the separation at source system ("blue" bin) and small quantities of green waste and bulky waste.

Table 1: Waste Quantities

WASTE STREAM	*TONS/Y*
MIXED WASTES	79.122,00
RECYCLABLES FROM SELECTION AT SOURCE	13.158,00
GREEN WASTES	960,00
BULKY WASTES	1.201,5

1.2.2 Composition of MSW

The composition of wastes as they enter the facility are presented in the following table:

Table 2: Composition of MSW in the facility of Chania

	RECYCLABLES	***MIXED WASTES***	***GREEN WASTES***
Mixed paper/Cardboard	28,47% / 42,2%	13,14%/6,10%	
Plastic (white film/mixed)	4,32%/ 6,28%	6,28 %	
PET	1,08 %	14,25 %	
PP	0,46%		
PE	1,06 %		
Ferrous Metals	1,62%	2,78 %	
Aluminum	0,22%		
Glass	2,52%	2,23 %	
Tetrapak	0,086%	1,77 %	
Textiles/Leather/Rubber/Wood	3,12%	7,15 %	
Organic material	2,54%	37,17 %	100 %
Inner materials	6,11 %	5,58 %	
Other		3,55 %	

1.3 Present waste management system

As already mentioned, the waste management system in Chania, is based on the operation of the integrated waste management faciltity (MBT and Landfill) in Korakia.

The responsible Waste Management Authority is DEDISA: Trans-Municipal Enterprise of Solid Waste Management in Chania.

The MSW management system includes:

- Collection (no transfer stations at the moment)
- Separation at source of paper and commingled recyclables (blue bin: metals, paper, glass, plastics)
- Processing of mixed MSW at the MBT plant
- Landfilling

1.3.1 Short Description of the activities of DEDISA

DEDISA employs 181 employees (10% scientific staff) and has developed a large number of activities, in the context of integrated management of waste, such as:

- Collection and transportation of MSW from Municipalities with fleet equipped with GPS to optimize routes.
- Bulky Waste Management
- Source Separation of packaging waste (except for glass packaging) and printed paper in 22 out of the 23 municipalities of the area.
- Source Separation of glass packaging
- Operation of the MBT and Landfill
- Management of "special types" of solid waste:
    - Separation at source of small sized waste (i.e. batteries)
    - Separation at source of Waste Electrical and Electronic Equipment (WEEE)
    - Door-to-door collection of large WEEE
- Information and awareness of the public

1.3.2 Description of the Integrated Waste Management Facility

The IWM facility is installed in Chania, at the Korakia Cape. The facility was built with a total budget of 30 million euro, with 75% co-financing from the Cohesion Fund II (2000-2006) and the rest 25% by the Public Investment Fund.

The facility includes:

- Weighbridge
- Waste Reception
- Mechanical pretreatment – manual sorting
- Composting
- Refinery of compost, maturation and storage
- Sanitary Landfill of the residues
- Tertiary treatment of leachate

The IWM facility receives 93,000 tons of waste per year. From that, about 13,000 tons are recyclables collected via the separation at source system. These recyclables are hand-sorted in the MBT plant and separated into paper, cardboard, ferrous metals, aluminium, glass and plastics.

About 25.000 tons per year of mixed municipal waste are processed at the MBT plant to recover ferrous and non-ferrous metals and to produce compost. The produced compost is being checked for

its characteristics by the chemical laboratory within the IWM facility but also by the Mediterranean Agronomic Institute and the Crete Technical University. It has been used for dumpsites restoration, in gardens, in areas were a fire has caused damages, etc., with exceptional results.

The rest of the mixed waste (55,000 tpy) are landfilled at the Sanitary landfill adjastent to the MBT plant.

The flow chart of the MBT plant is presented below:

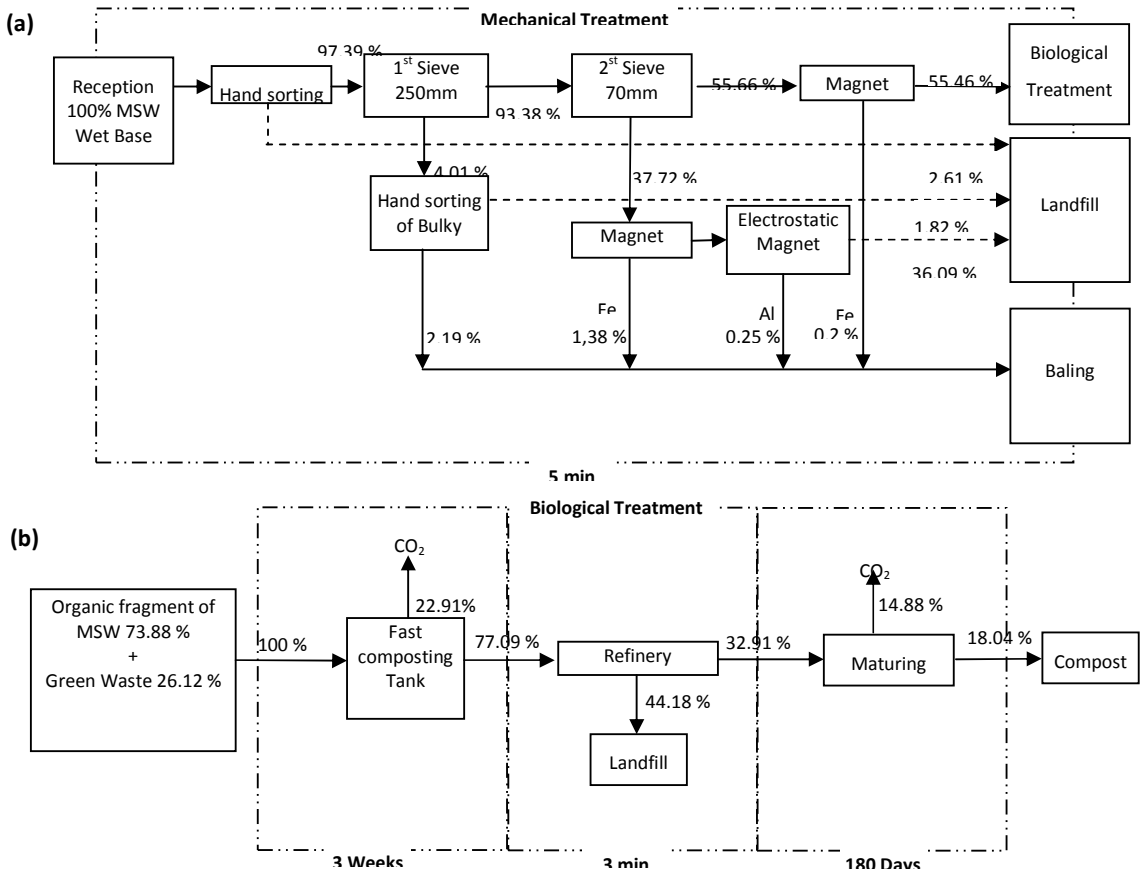


Figure 1: Flow chart and mass balance of the MBT plant at Chania

2 Reference Case

2.1 Waste quantity and composition used in the Tool

2.1.1 Waste Quantity and Composition, future projections

Data for waste quantity were collected from the weigh-bridge data logger of the IWM facility and have been presented in Section 2.2, above.

The expected average annual population growth in the Region of Crete is about 0.5%, while the production of waste per capita for Greece shows trends that approach those of European Cities. Therefore, in Crete, an annual increase of waste production by 1% to 2% is expected. Whereas it is likely that growth may slow down to some extent in certain areas, it seems that during the 10 -year period of 2009-2019, the annual expected increase will be 1.5%, while the next decade (2019-2029) the annual growth rate is expected to fall to about 1.2% due to prevention programs.

The same assumptions are applied for Chania, therefore waste production in 2019 equals to 109,469 tons and in 2029 equals to 123,338 tons.

The composition of waste that has been used for the 1st period has also been presented in Section 2.2/Table 2. Due to the fact that the change in waste composition is rather difficult to foresee, an assumption was made that for the rest of the 5-year periods (totally the Tool requests data for periods of five years each), the composition remains constant.

2.1.2 Rest of data

The Reference Case scenario includes:

- Production of waste in year 2010: 93.000 tons
- The MBT receives 13.000 tons of recyclables (mainly packaging waste) from the “blue bin” system. The operational cost for the processing of these 13,000 tons equals to 95 €/ton
- The MBT also receives 25,000 tons of mixed waste that are processed (mechanical treatment and composting). The investment cost is 22,000,000 €
- The MBT has a maximum capacity of 70,000 tpa
- 200 tons of glass are temporary stored within the IWM facility. The temporary storage facility 9within the same premises) has an investment cost of 100,000 € and an operational cost of 3 €/ton of glass
- 55,000 tons of mixed MSW enter the Sanitary Landfill. The investment cost for the SL is 3,900,000 €. Operational cost of the landfill is the weighted average between the price of 20 €/ton of mixed wastes and 7 €/ton of MBT residues.
- No transfer Stations are in operation

In this Reference case, the Tool is "free" to decide whether the MBT capacity will be fully exploited and even whether this capacity should be increased. Also the tool is free to increase the capacity for processing the recyclables or to add a new MRF. However, the technology for mixed wastes (MBT with aerobic composting) cannot be changed (all other MBT types are excluded).

2.1.3 Results

The model has resulted into 11 solutions for this "reference case" scenario, that are presented in the "Pareto front", below. Solution 1, is the least costly but results in the highest emissions. When one moves from solution 1 to solution 11, fewer emissions are produced but the cost increases as a result for adding capacity for sorting of recyclables and processing of mixed wastes at the MBT plant.