Separate Collection and Biological Treatment of Food and Biowaste in a Circular Economy

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Waste Agency of Catalonia, Spain
Index

• The Waste Agency of Catalonia
• Geographic information
• MSW Management in Catalonia
• What is Biowaste?
• Objectives and Targets
• Biowaste Prevention
• Biowaste Collection
• Biowaste Treatment
• Project REVOLTA
• Project DECISIVE
The Waste Agency of Catalonia

ARC is a public enterprise within the Planning & Sustainability Department of the Government of Catalonia.

ARC has own competences on waste generated in Catalonia and also on all waste which are managed within Catalonia.

- Competences
  - Municipal waste
  - Industrial waste
  - Construction waste and debris
  - Manure & Livestock (jointly with Agriculture Department)
  - Sanitary waste and
  - Soil recovery

@ www.arc-cat.net  Info ++34/900 900 408
Geographical information
MSW Management in Catalonia: Competent authorities

948 Municipalities

Authorities responsible for MSW collection

May delegate obligations to

- Consortia
- Consells Comarcals (County Councils)
- Associations of municipalities
- Etc.
MSW Management in Catalonia:
Generation, composition, management

2016
Total MSW 3,73 mio tons

MSW Composition Analysis 2013

- Separate Collection 39%
- MBT 38%
- Landfill 17%
- Inciner. 7%

Organic Matter 37.3%
Glass 7.7%
Light Packaging 9.4%
Other 34.4% (Bulky waste, textile, WEEE, medicines, batteries, etc.)

29.6% OFMSW
7.7% Garden & Park Waste
MSW Management in Catalonia: Separate Collection 2016

Total MSW amount 2016: 3,727,886 t

<table>
<thead>
<tr>
<th>Separately collected</th>
<th>Residual waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>378,150 t</td>
<td>2,291,342 t</td>
</tr>
<tr>
<td>50,3 kg/inh./y</td>
<td>496 kg/inh./y</td>
</tr>
<tr>
<td>263,648 t</td>
<td></td>
</tr>
<tr>
<td>35,0 kg/inh./y</td>
<td></td>
</tr>
<tr>
<td>166,136 t</td>
<td></td>
</tr>
<tr>
<td>22,1 kg/inh./y</td>
<td></td>
</tr>
<tr>
<td>139,242 t</td>
<td></td>
</tr>
<tr>
<td>18,5 kg/inh./y</td>
<td></td>
</tr>
<tr>
<td>2,291,342 t</td>
<td></td>
</tr>
<tr>
<td>304,6 kg/inh./y</td>
<td></td>
</tr>
</tbody>
</table>

New target [PRECAT20] in 2020
What is Biowaste?
EU Definition

Waste Framework Directive (2008/98/EC) defines biowaste as:
“biodegradable

• garden and park waste,

• food and kitchen waste from households, restaurants, caterers and retail premises

• comparable waste from food processing plants”.
What is Biowaste?
Catalan Definition

<table>
<thead>
<tr>
<th>The Organic Fraction of the Municipal Solid Waste: OFMSW</th>
<th>Garden and Park Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>peel and rejected parts of fruit and vegetables</td>
<td>garden and park waste</td>
</tr>
<tr>
<td>fish bones and waste, shellfish and mollusc shells</td>
<td></td>
</tr>
<tr>
<td>leftover bread</td>
<td></td>
</tr>
<tr>
<td>coffee grounds and tea waste</td>
<td></td>
</tr>
<tr>
<td>dry flowers and leaves</td>
<td></td>
</tr>
<tr>
<td>bones and fish bones</td>
<td></td>
</tr>
<tr>
<td>dirty kitchen paper, dirty paper napkins</td>
<td></td>
</tr>
</tbody>
</table>

Garden and Park Waste

- Garden waste
- Park waste
Objectives and Targets

EU Circular Economy Package

PRECAT 20
General Program for Waste Prevention and Management and Resources in Catalonia 2020:

Strategic objectives:
- Consider waste a resource
- Waste prevention
- Increment material recovery with view to circular economy
- Abandon gradually landfilling and incineration of recoverable waste
- ...

Quantitative targets:
- Reduction of 50% food waste production, 2010 reference in retail, catering and households
- Material recycling: 60% in weight of biowaste

Qualitative targets:
- Biowaste: impurities < 10% by weight
- Packaging: impurities < 25% by weight
Biowaste prevention: Food waste

What is the impact of food wastage?

Social and ethical impact
Nearly one billion people suffer from hunger worldwide

Economic impact
Total economic loss: 841 M€ in Catalonia (2010)

Environmental impact
Greenhouse gas emissions: 520,700 tonnes of CO2 eq in 2010 in Catalonia (equivalent of emissions from 20,300 motor vehicles throughout their working life)
Food-waste prevention in Catalonia

The Diagnosis of Food Waste in Catalonia (2010)*

<table>
<thead>
<tr>
<th>FOOD WASTAGE FIGURES FOR CATALONIA (2010)</th>
<th>Total waste (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Markets</td>
<td>3,671 1%</td>
</tr>
<tr>
<td>Supermarkets and grocery stores</td>
<td>42,987 16%</td>
</tr>
<tr>
<td>Other food shops</td>
<td>23,391 9%</td>
</tr>
<tr>
<td>Restaurant and catering sector</td>
<td>30,976 12%</td>
</tr>
<tr>
<td>Institutions</td>
<td>9,574 4%</td>
</tr>
<tr>
<td>Households</td>
<td>151,872 58%!!</td>
</tr>
</tbody>
</table>

* 262,471 tonnes of food wastage
* 34.9 kg per person per year

<table>
<thead>
<tr>
<th>proposed actions for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
</tr>
<tr>
<td>Production and manufacture</td>
</tr>
<tr>
<td>Distribution</td>
</tr>
<tr>
<td>Restaurants and catering</td>
</tr>
<tr>
<td>Households</td>
</tr>
</tbody>
</table>

*Waste from wholesale distribution, the agrifood industry or the primary sector not considered in the study

Published in 2012
Available at: [http://residus.gencat.cat/web/content/home/lagencia/publicaciones/centre_catala_del_reciclatge_ccr/guia_consum_responsable_en.pdf](http://residus.gencat.cat/web/content/home/lagencia/publicaciones/centre_catala_del_reciclatge_ccr/guia_consum_responsable_en.pdf)
Food-waste prevention in Catalonia

Action: Communication campaign

- TRAVELLING EXHIBITION
- TV PROGRAMME
- WE ARE FOOD WISE
- VIDEO CLIP
- WEB somgentdeprofit.cat
- APP
- INSTAGRAM (15” animations)
Food-waste prevention in Catalonia

Action: Education and capacity building

- Publication of education material for schools and retail and catering sector

- Conferences and seminars
Food-waste prevention in Catalonia

Action: Awareness raising

6th European Week for Waste Reduction (LIFE Project)
- 11,995 actions in 34 European regions
- 871 actions in Catalonia

Action: Support for local projects

750,000 € in economic subsidies and technical support (2015):
- Catalan Food Bank Foundations (since 2007)
- Local bodies and non-for-profit organisations (since 2010)

Collaboration with other institutional initiatives
Biowaste Prevention / Biowaste Recovery


Waste Prevention → Highest Priority

However...

Mediterranean conditions:
• Poor soils
• Erosion
• Desertification

Life-cycle-Thinking

sustainable option:
• Separate collection
• Biological treatment
• Application to soil of Bio-waste

Biowaste collection in Catalonia: External factors

- Topography
- Type of Settlement
- Housing and Urban Structure
- Climate
Biolwaste collection in Catalonia: Separate collection systems

Bring Systems: Kerbside Containers

Collection frequency: daily to avoid odors

Collection schedule: at night to avoid traffic disturbance
Biowaste collection in Catalonia: Separate collection systems

Fetch System: **Door-to-Door Collection**

Citizens deposit separated wastes at their door step

134 municipalities ≈325,000 inh.
Biowaste collection in Catalonia: Separate collection systems
Biomass treatment in Catalonia:
Centralised biowaste treatment: Anaerobic Digestion + Composting

PROs
- Requires less area
- Allows better management of emissions / odors
- Allows recovery of energy (biogas)
- Fuel for vehicles

CONs
- High costs (investment /management)
- More sophisticated and sensitive technology
- Requires high input quantities
- Requires homogeneous input
- More feasible on the industrial scale

4 Facilities
Centralised biowaste treatment
Composting

20 Facilities

**PROs**
- Simple, robust technology
- Flexibility (capacity/modules)
- Biological process less complicated
- Process allows and requires input of woody materials (green waste)
- Lower costs (investment/management) than AD

**CONs**
- Slower process
Decentralised biowaste treatment: Composting

Diversity of Settlements and topography

Diversified approach to biological treatment

Home and Community Composting

- 2016: 439 Municipalities - 6,453 t of Biowaste treated
- Investment and operational cost very low
- Proximity - less waste transport
- High identification of the citizens
Decentralised biowaste treatment: Composting

Diversity of Settlements and topography

- **Diversified approach to biological treatment**

Small decentralised facilities, of simple and robust technology for high quality bio-waste

- Adequate for smaller waste amounts (<2,000 t)
- Lower investment and operational costs
- Relatively high surface demand
- High quality bio-waste required
New approaches to decentralised biowaste management:

- Distribution and nearby consumption
- Generation and separation in origin
- Pre-treatment in origin
- Fertilization and ecological production
- Composting
New approaches to decentralised biowaste management:
New approaches to decentralised biowaste management:

https://www.youtube.com/playlist?list=PLWQMeO43vsucX8Kpv2fBVppvyyoortnfz
New approaches to decentralised biowaste management:
Project DECISIVE
Horizon 2020

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#DECISIVE2020
Project DECISIVE
Horizon 2020

Partnership
Project DECISIVE
Horizon 2020

Current situation

- Increasing demand of food and energy in urban centres
- Increasing production of (bio-)waste
- Much bio-waste sent to disposal
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Objective

Paradigm shift from End-of-pipe thinking…
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Horizon 2020

Objective

...to a circular thinking
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Horizon 2020

Approach

Concept and tools consolidation
- Definition of concepts and impact indicators
- Micro-AD and SSF processes
- Decision-making tool

Innovative demonstration
- 2 pilot sites

Implementation of processes
- Waste
- Impacts
- Business outlooks
Outcomes

- Micro-anaerobic digestion units
- Solid state fermentation process
- Decision-making tool
- Training and communication material
More information

Separate Collection of MSW in Catalonia

MSW Statistics in Catalonia
http://estadistiques.arc.cat/ARC/

Door-to-Door Collection
ASSOCIATION OF CATALAN MUNICIPALITIES FOR DOOR-TO-DOOR COLLECTION

Biological treatment and separate collection of Biowaste

Waste disposal tax
THANKS FOR YOUR ATTENTION!

and

special thanks to the colleagues of the Circular Economy Area of ARC

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