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SIRCLES

GUIDELINE OF BEST PRACTICES FOR SUCCESSFUL BIOWASTE RECYCLING

Italian Composting and Biogas Association + project partners

Spain | Greece | Palestine | Jordan | Lebanon | Tunisia | Italy

GUIDELINE OF BEST PRACTICES FOR SUCCESSFUL BIOWASTE RECYCLING

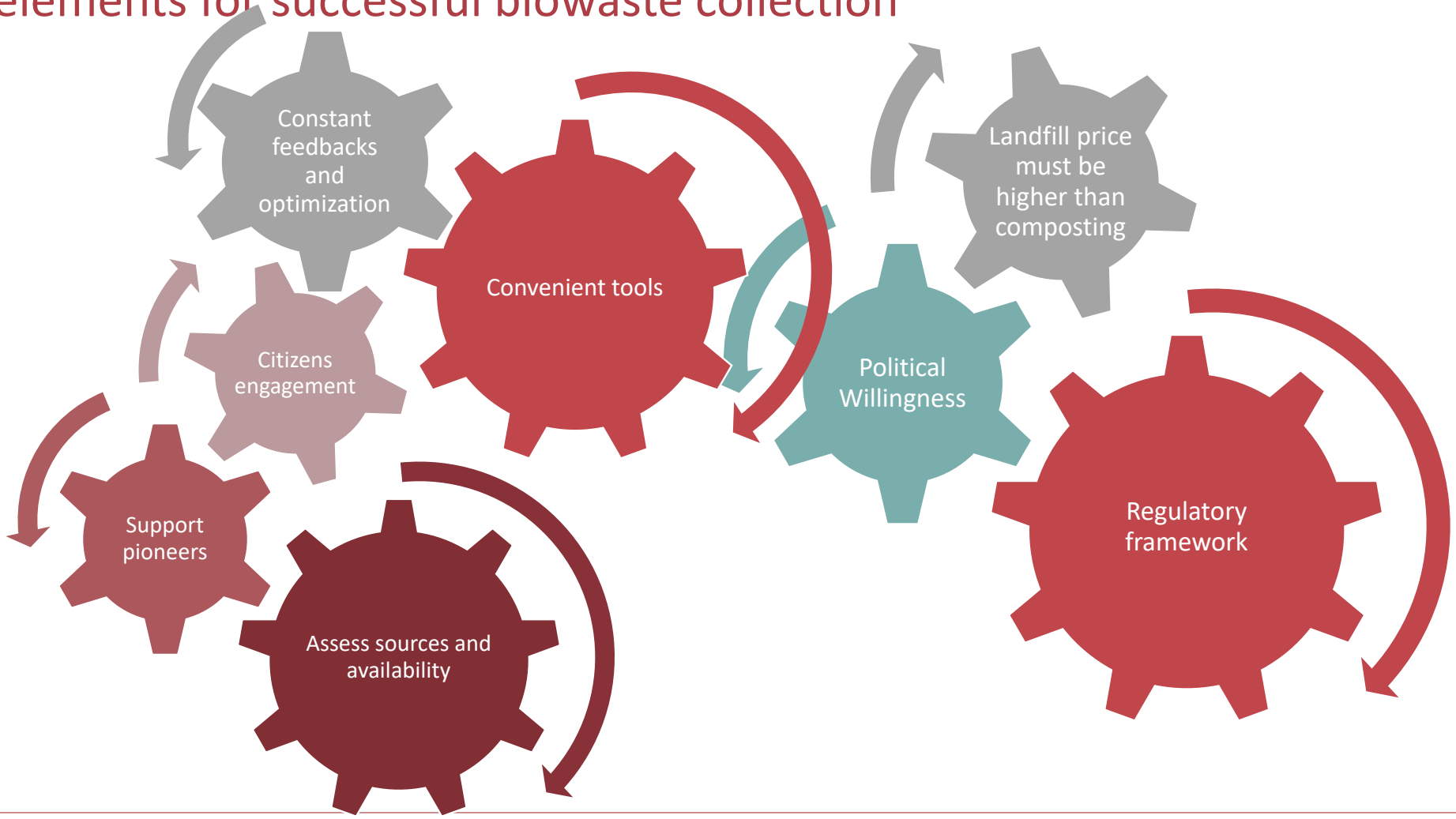
- This document lists **best practices** linked to the separate collection and management of organic waste.
- It refers to activity 5.1.1 and has been prepared by CIC with the support of all PPs in order to define innovative management plans and NEETs and women engagement in biowaste collection and treatment.

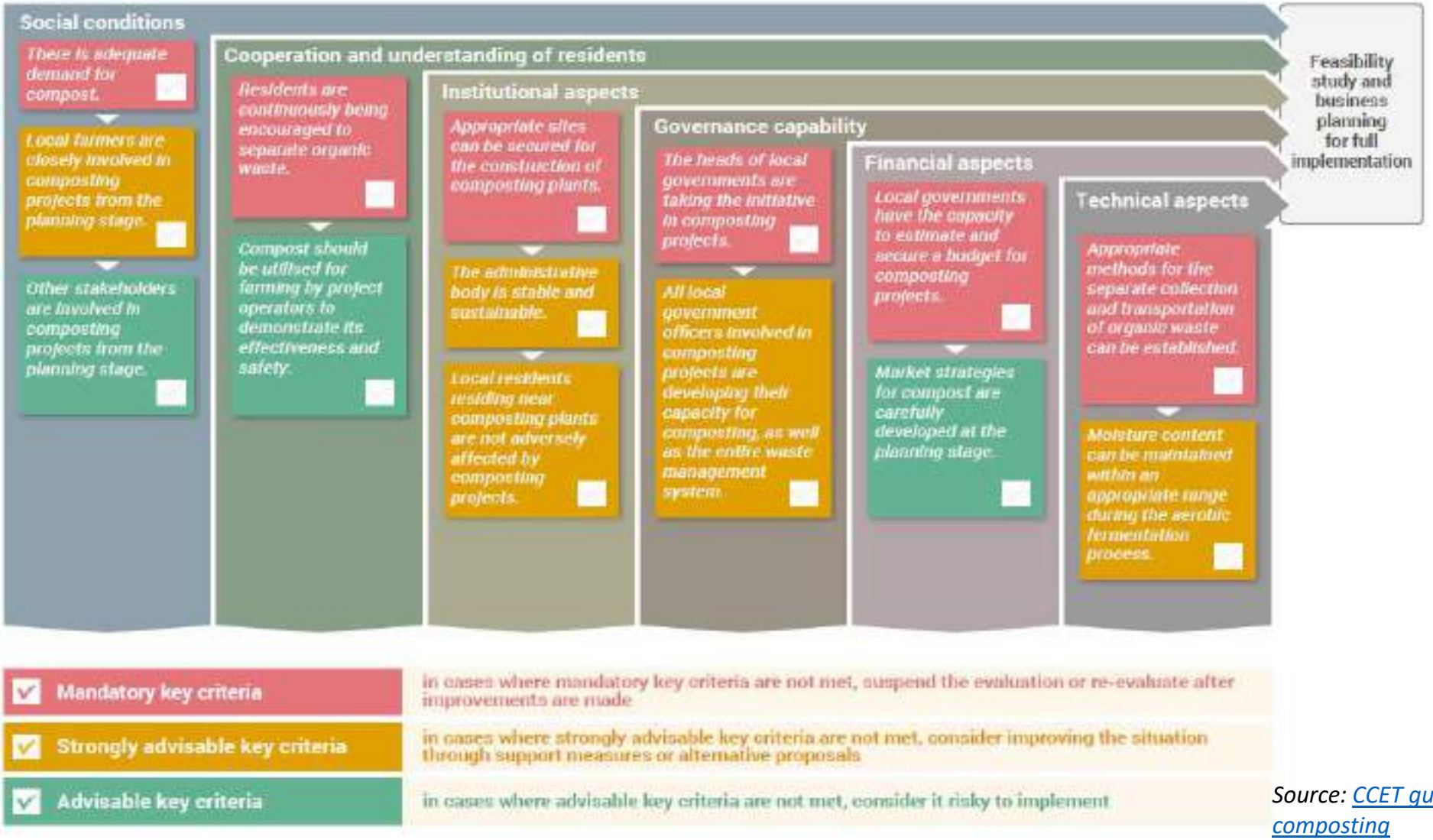
Activity title Measures to separate collection and high-quality recycling of biowaste in the targeted areas	Starting Month 6	Ending Month 9
Activity description Good practices in separate collection & high-quality recycling of BW will be discussed in order to define innovative management plans & key sensibiliation actions involving NEET & women in the targeted areas. Socioeconomic specificities & technical constraints discussed with policy actors & other stakeholders will be taken into consideration to implement a suitable model for the involved regions. PPs will deliver a simple Guideline of Best practices for a successful biowaste recycling.		

Guideline preparation

- Format: long PPT with additional downloadable references
- Draft canvas presented on September monthly meeting by CIC
- Sept – Oct: Suggestion of other of local good practices by PPs in an excel sheet with links
- Webinar to present the PPT with a full list of good practices by CIC to PPs in **mid October**
- Final adjustments requested by PPT with more case studies related to all SIRCLES countries and delivery of the final PPT **end October**

Key elements for successful biowaste collection



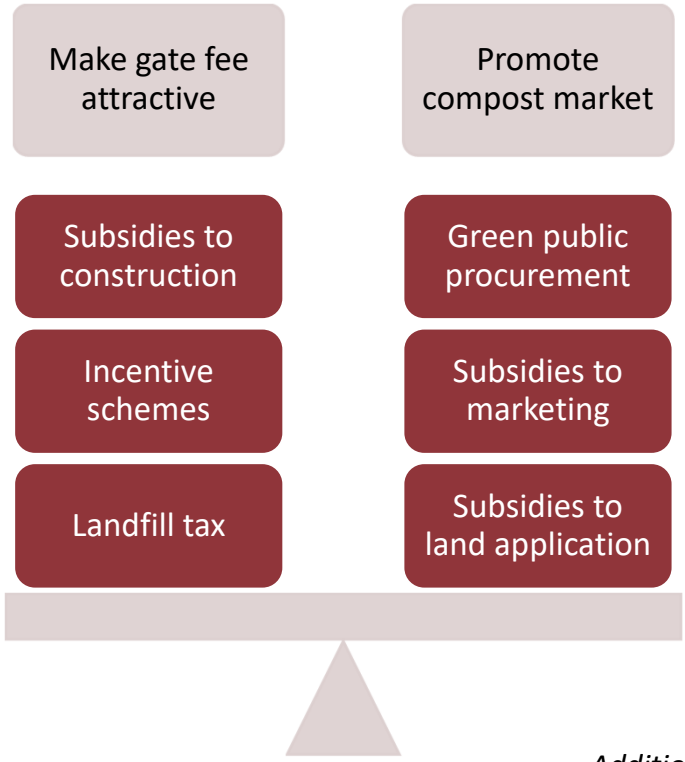


Source: [CCET guideline series - composting]

Key elements for successful biowaste composting

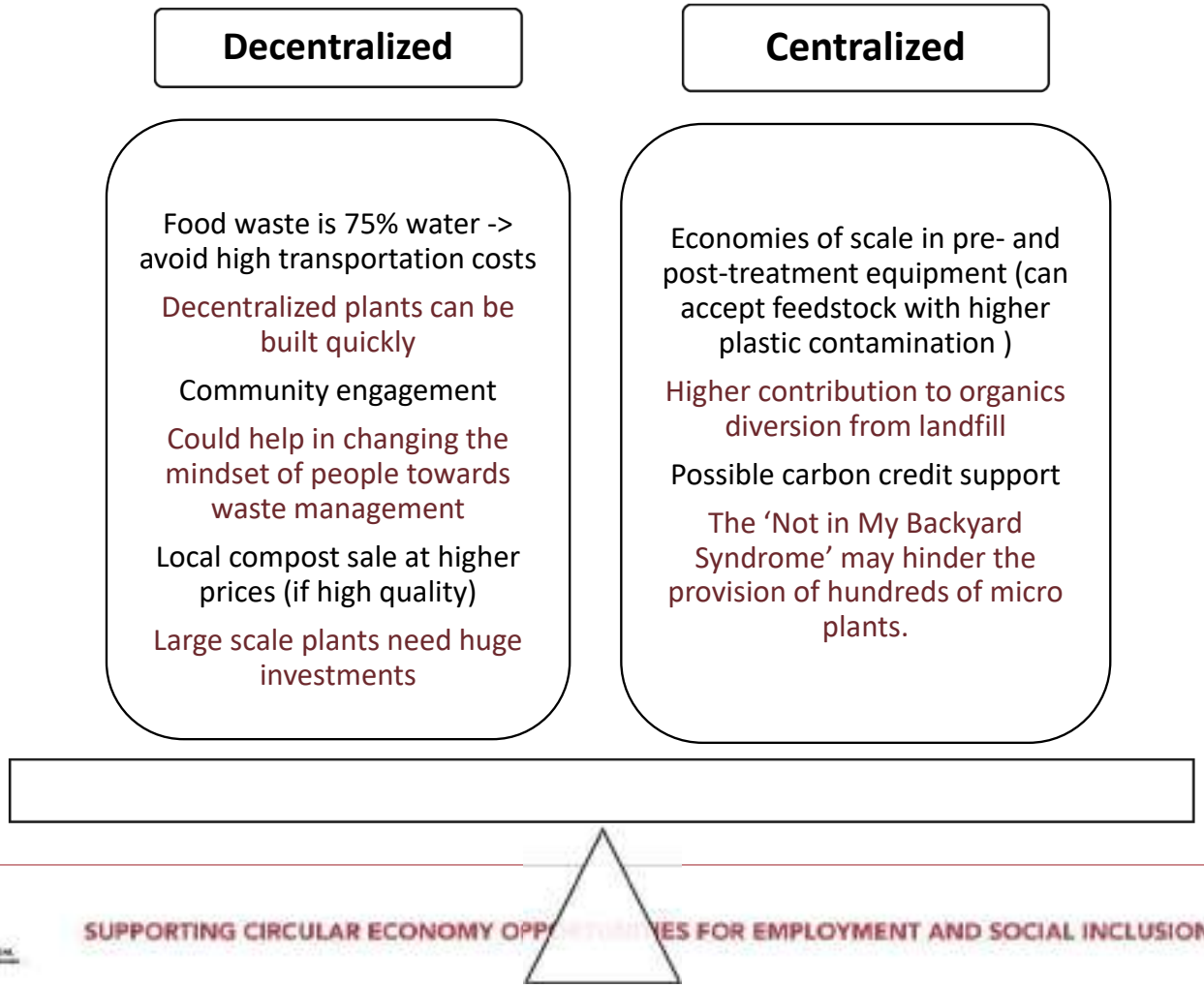
- Regulatory framework
- Visibility of compost as a valuable product
- In low income countries: low cost facilities
  - Second hand machinery, rental, network of facilities sharing equipment
- No impurities in biowaste collected

Key factors, an insight: gate fee, compost value



Additional information: EAWAG, marketing compost in low and middle income countries, [link]

Composting: the proximity conundrum



Reward and inform citizens

- Citizens must be **informed and sensitized**, even not economically, just about the final destination of their waste.
- Final treatment plants / areas must be visible and visited
- The misconception that an **end-of-pipe facility** can separate all fractions generating high quality end product is dangerous when it comes to explain citizens the role of their behaviour in **separating at home**

Compost give-out days in Italy

Community composting in Spain

Convenient tools

- Highest participation is ensured when citizens have the feeling that separate collection of food waste is, first of all,
  - Convenient
  - clean
  - easy
- E.g. door to door collection
- reduce collection frequency of residual waste, increasing frequencies for food waste

Promote separate collection at source

- Act on landfill gate fee, introducing a tax to be returned to municipalities with the specific purpose of supporting **source separation of organics.**
- **Set up incentive schemes to support pioneer experiences** keeping municipalities challenged
  - E.g. Catalonia, Sardinia
- Look for international funding only if there is a local governance support and willingness to increase landfill gate fee

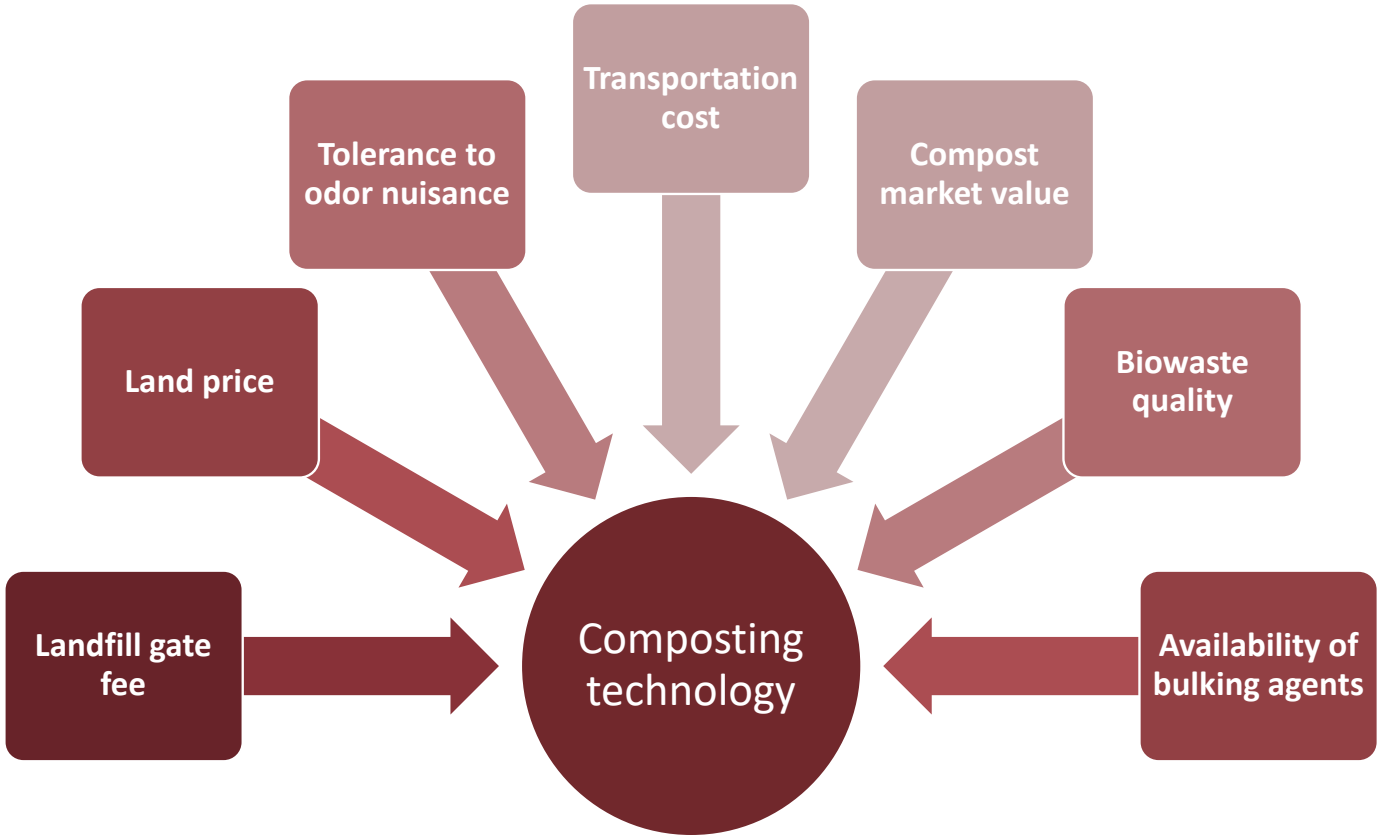
Composting plant Mabvepande

Annual operation costs (calc)

		Input	compost	residuals
amount	[t]	18.250	10.220	4.380
		unit costs	total costs	revenues
		[€/t]	[€]	[€]
O+M costs		11,69	216.928	
depreciation		7,12	129.920	
disposal of residuals		2,00	20.440	
gate fee		1,50		27.375
compost sales		33,26		339.913
			367.288	367.288

Source Florian Kolsch, CCAC meeting Berlin, 2021 , composting plant Dar Es Salaam, Tanzania

Composting technology: boundary conditions



Composting at different scales

Home composting 1

Home composting 2

Community based composting

Decentralized plants

Modular industrial plants

Centralized industrial plants

Case studies

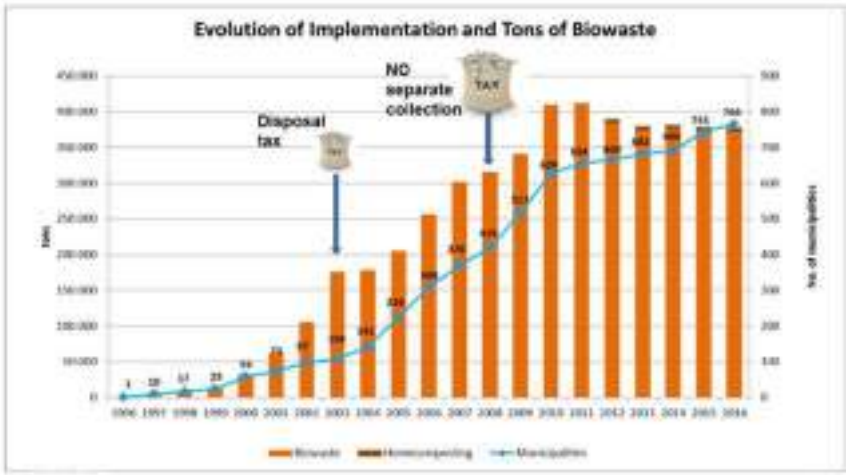
Case study: Catalonia government, Spain

- Landfill and incineration tax, steadily increasing over years. Refund system to municipalities to promote high quality biowaste collection
- Since the introduction of the tax, municipalities with biowaste collection increased from 17 to 766 in 13 years. More than 600M€ returned to local municipalities since its creation
- Compulsory food waste characterizations every trimester
- Incentives for continuous improvements in composting plant and innovation in biowaste separate collection
- A lot of promotional campaigns on biowaste

Source: ARC, ARC, Urbanwins

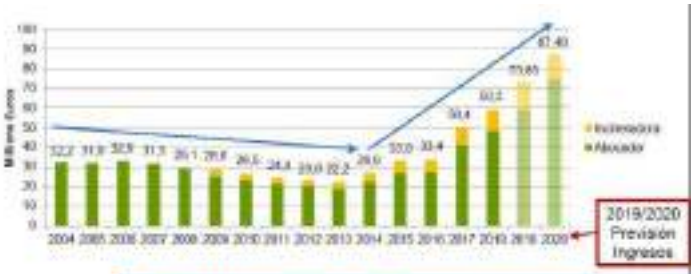
Case study: Catalonia government, Spain

Impact of the Waste Disposal Tax



SOMGENT DE PROFIT

WE ARE FOOD WISE



647 M€UR des de la seva creació (2004) !

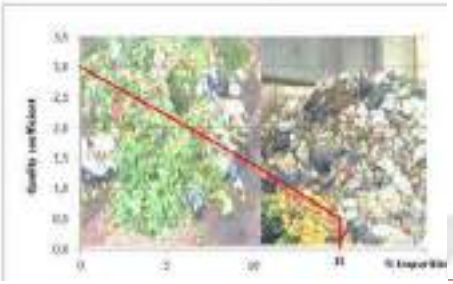
621 M€UR (96%) retorna als ens locals

Refund criteria

- **Separate Collection of Bio-waste** **10,- €/t**

Refunding is subject to a **quality coeffient** applied per ton, based on **periodical characterisations.**

At 15 % of impurities the refunding is 0.



Refund criteria

- **Biological Treatment of Net Biowaste**

Type of activity	Beneficiary	2004 €/t	2011 €/t	2015 €/t
Biowaste (Organic Fraction of MSW)	Local authority performing separate collection	32,50	33,50	34,00
Green Waste	Local authority performing separate collection			3,00
Home composting	Local authority that has installed composting units		20,- per unit	20,- per unit
Community composting			60,- per unit	60,- per unit

Case study: Pune, India

- India's ninth-most populous city - >4 million people
- Best practice of informal waste pickers organized in a cooperative (SwaCH): 2,200 workers-members, More than 80% are women. 80% of the city served.
- Door to door collection, sensitization, separation, income from selling recyclables, composting
- Users pay a fee to SWaCH
- Network of small scale composting plants

Source: UNESCAP , https://prizeforcities.org/project/swach-pune-seva-sahakari-sanstha , WIEGO, Down2earth, Youtube

Case study: Pune, India

Case study: Dhaka, Bangladesh

- 14 million people
- First case of a large scale composting facility in low income country
  - Financed partly with carbon credits
  - Primarily market waste
- Multilevel models, from small scale to large scale composting

Source: Waste Concern and others

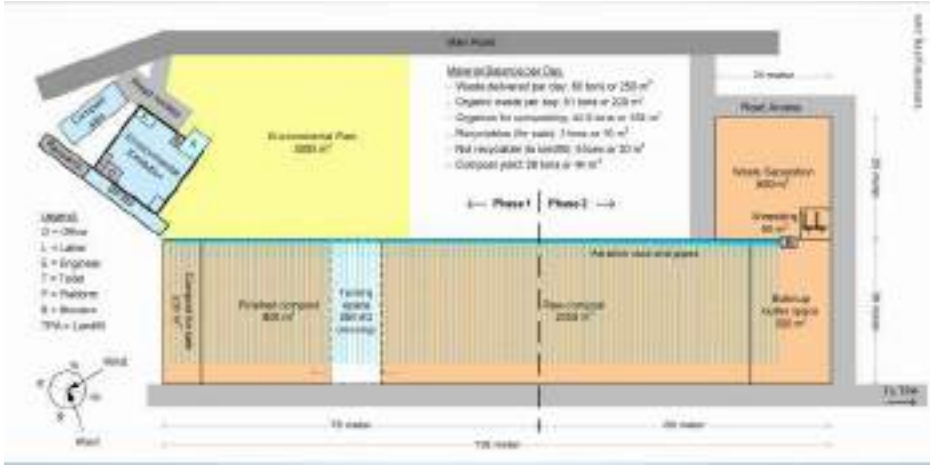
Case study: Dhaka, Bangladesh

Case study Temesi, Bali, Indonesia

- Large scale low cost composting facility (about 60 tons per day) operating since 2007
- Highlights:
  - Ownership transferred to village foundation
  - Employment opportunity for marginalized women
  - High importance given to quality control
  - Carbon credits for methane avoidance
  - Compost sold mainly to tourism industry
  - Extends landfill lifespan by factor 10
  - Environmental park

Source: EAWAG, course on MSW management in low income countries, and www.temesirecycling.com

Case study Temesi, Bali, Indonesia



Source: EAWAG, course on MSW management in low income countries, and www.temesirecycling.com

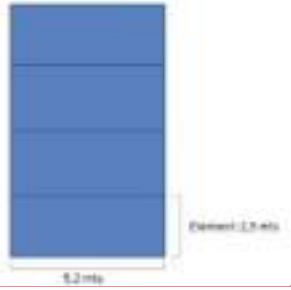
Low cost / small scale: Boadella i les Escaules, Spain

- Small scale 150 t/y plant
- Simple door to door collection
- Low cost equipment
- Small compost piles 2x1,5x1,5 m
- Overall collection and management cost 80 €/t
- Prime grade compost («A» quality)
- Very low contaminants in biowaste (0.32 %)
- Compost given back to citizens
- Pioneer Plant then improved with cement modules

Source: Spanish Ministry , and ARC - Mancomunitat La Plana

Low cost / small scale: Boadella i les Escaules, Catalonia, Spain

Pictures from Malla, MCP



Sort, Catalonia, Spain

- Result of the ENI CBC MED SCOW project
- Small scale – low cost facility for a rural area
- Some Machinery adapted from agricultural equipment
- High commitment from the County Council and managing technicians to promote and operate it

Source: SCOW ENI project

Sort, Catalonia, Spain

Pontevedra, Galicia, Spain

- Label and visibility (Plan Revitaliza)
- Comunity composting areas for 47 municipalities, even in urban areas.
- Unique EU experience in a training course for “master composters” supported by the Province. Job creation, continuous monitoring and citizens involvement
- Whole management cost kept at a minimum level, including the task of master composters
- High quality of feedstock
- Shredded wood is provided in big bags by the Province

Source: County Pontevedra and others

Pontevedra, Galicia, Spain

revitaliza
Apúntate á compostaxe

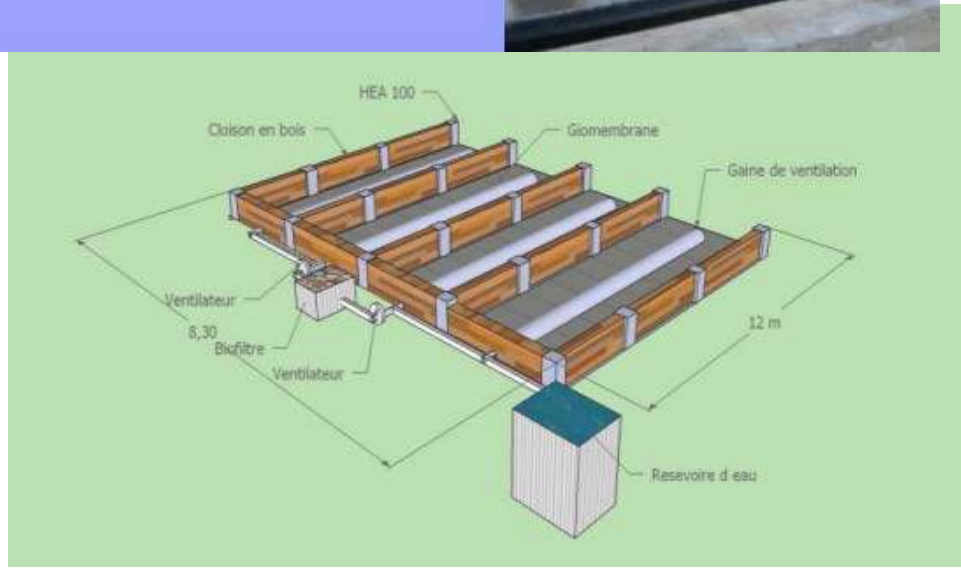
Houmt Souk and Grombalia, Djerba, Tunisia

- Implement a strategic approach to waste management
- Increase the environmental sustainability of Djerba
- Generate a quality touristic label for the hotels
- Quality compost can be applied easily to most eroded land to recover it
- Biowaste collection
  - first stage: 8 hotels
  - Second stage: 18,000 people
    - 3/week biowaste, 1/week residual
    - 45 L bucket for biowaste, Green bags for packaging waste, blue bags for residual waste
- Low cost composting plant operating since 2012

Source: https://www.youtube.com/watch?v=sRSYLZ5jPjE

Houmt Souk and Grombalia, Djerba, Tunisia

Case study: Djerba, Tunisia



Source: ISWA 2013, BEN ABDALLAH MONGI
Director of the Environment Municipality of Houmt Souk Djerba TUNISIA

Irbid, Jordan

- Funded by GIZ (German Cooperation Agency). 2019-ongoing
- The project is operated by Irbid municpality and it was able to employ 60 Jordanian and Syrian workers with appropriate salaries, and contributed to the employment of youth and the reduction of poverty and unemployment in Irbid governorate
- Aerobic composting, project's production capacity is up to 20 tons per day
- Leftovers of fruits and vegetables are collected from Irbid's central vegs and fruits market
- The organic fertilizer produced by this factory is one of the best types of fertilizers in the region according to laboratory analyzes issued by the National Center for Agricultural Research, stressing that it is the only product in the North Region that relies on raw materials of plant origin only without any chemical treatments in its manufacture
- The fertilizer is available to farmers and citizens at an acceptable price and high quality and it got approved to be exported to other municiplities

Source: Youtube, local news translated

Irbid, Jordan

Alkarak, Jordan

- Funded by MEDA – Global Affairs Canada. Enterprise Development for Women and Youth in the Jordan Valley
- 2019-ongoing
- Converting farm green waste into compost
- supported women entrepreneurs to pilot a green composting enterprise
- On-the-the-job training for green compost entrepreneurs
- Women members of the GNC started raising awareness among farmers in the area to persuade them to dump their green waste in the new composting facility. Following these efforts, a total of 100 tons of green waste was secured within two months
- a total of 25 tons of compost was generated in five months
- No gate fee: revenues from selling compost (20 JOD/ton) was enough to cover expenses related to transportation of green waste to the composting facility and the required manual labor.

Source: MEDA JVL report in English

Alkarak, Jordan

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Source: MEDA JVL report in English

Mafraq, Jordan

Kaslik, Lebanon

- Holy Spirit University of Kaslik (USEK) cafeteria waste composting
- 700 students, 2017- ongoing
- Cafeteria waste approximately 350 kgs per day
- Carbon material supplied from landscape waste of the university
- Students were involved and taught the composting techniques
- Technology used is Aerated SP inside wooden boxes: Air is supplied from 2 central blowers into 10 1x1x1m boxes

Source: Facebook, Compost Baladi

Kaslik, Lebanon

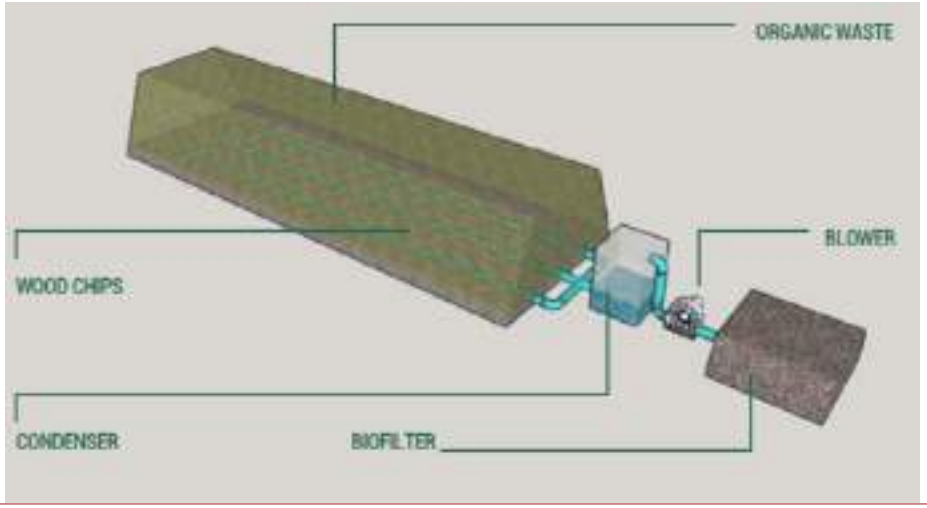
Other low cost modules promoted by Compost Baladi

Kawkaba, Lebanon

- Kawkaba Municipality organic waste + agricultural residues composting
- 1000 inhabitants + 100 farmers . 2021 – ongoing
- Source separated municipal organic waste 500kgs per day
- Carbon material supplied from olive trees pruning residues (Kawkaba is known for its olive farming)
- 2 wood chippers were supplied to the municipality to chip the residues on site to reduce transportation cost
- Technology used was the container composters, ASP inside shipping containers with leachate and odor management systems.
- Funded by Italian NGO CELIM
- NEETs and women involved

Source: Elnashra news, Facebook, Compost Baladi

Kawkaba, Lebanon



Manara, Lebanon

- Manara Municipality organic waste
- 4000 inhabitants. 2017 – ongoing
- Source separated municipal organic waste 2 tons per day
- Carbon material supplied from landscape and agriculture pruning waste
- The close follow up and constant monitoring from the municipality's officials were the key success factor in this case
- The end product is being sold in 25kgs bags for 4$ a bag
- The revenues are contributing to the sustainability of the WM facility
- NEETs and women involved. Supported by Dutch cooperation (VNG)
- The Manara-system achieved a reduction of untreated waste by 84% in two years after initial adoption. The system was introduced as part of the Local Government Resilience Programme (LOGOReP)

Source: Facebook, Facebook, Linkedin

Manara, Lebanon

Halandri, Greece

- Municipality of Halandri, close to Athens
- Almost 1000 citizens. 2016 – ongoing
- Supported by the H2020 project Waste4Think, coordination by NTUA
- Source separated Household Fermentable Waste collection from almost 1000 citizens followed by drying and shredding for the production of a biomass called FORBI(Food Residue Biomass) .
  - FORBI valorized for 8 different valorization alternatives (gaseous, liquid and solid biofuels).
  - Drying and shredding, aiming to evaluate the FORBI as a potential feedstock for the production of high TRL eco-products (biofuels, compost, alternative fuel for cement industry etc). FORBI is a high quality homogenized and dry biomass product with a weight approximately 25% of the original food waste, which may be stored for prolonged periods of time without deterioration. The FHW collection vehicles were equipped with a CNG system capable of running on both diesel and biogas generated from FORBI, for the evaluation and demonstration of a cyclic bioeconomy concept.
- % increase of food waste source separation and diversion from landfill (50% achieved within 6 months of operation for the the municipal sector where it was applied)
- % decrease in waste management costs (36% reduction in anticipated upon implementation for the whole city)
- % decrease in waste management environmental impact (up to 80% reduction in carbon dioxide emissions)

Source: H2020 Waste4Think,INCIRCLE, Municipality of Halandri

Halandri, Greece

FERMENTABLE HOUSEHOLD WASTE MANAGEMENT IN A CIRCULAR ECONOMY: THE MUNICIPALITY OF HALANDRI, GREECE CASE

WASTE 4think — Moving towards Life Cycle Thinking

Central Corfu and others, Greece

- Interreg E-HORECA WANET Efficient Hotel Restaurant & Catering Waste Network
- Collection of biowaste in the municipality of Central Corfu. 2020 – ongoing
  - Aims at identifying a network of local waste producers in Corfu and Saranda in order to identify the current waste management practices. 2. Having full knowledge of international best practices and of the current situation in waste management procedures new protocols will be prepared for the pre-separation stage for waste producers and waste collection stage from local authorities.
- New other pilots of separate collection starting in other places in Greece: Aigaleo , Peristeri (link), Vari – Voula, *Koropi city, Agia Marina, Skarpiza, Kitsi, Karellas,* and many others listed on GIZ Guide on biowaste and https://www.followgreen.gr/
- Other projects: IFE-F4F, Crete (Greece), Food for Feed: An Innovative Process for Transforming Hotels' Food Waste into Animal Feed to evaluate an innovative, simple technology and low emissions process that allows the safe transformation of source separated food wastes, mainly from hotels (and generally from the hospitality and food service sectors), into animal feed, utilising an altered solar drying process.

Source: Interreg-IPA CBC, Facebook, FollowGreen, food4feed

Central Corfu and others, Greece

Corfu, E-WANET project

«empty for full» collection in Peristeri, Youtube

Vari – Voula leaflet

Beitello, Palestine

- Sellective collection of the organic waste in tourist area (SCOW) in Ramallah city and the composting unit in Beitello village has been the main pilot of separate collection in Palestine
- 10 hotels from Ramallah city and one neighborhood from Betello village (50 household or 300 inhabitants) where the composting unit is located
- Started operation in 2015, irregular working, now to be renovates for SIRCLES
- Similar plant more focused on agricultural waste in Jericho

Source: SCOW ENI-CBC MED, local news, news

Beitello, Palestine

Asira, Palestine

- "Building a model for a society based on recycling": Waste Seperation project in Northern Asira, in the city of Nablus .
- The project is implemented by PARCIC foundation in cooperation with Northern Asira municipality.
- This project targets 150 families located in Asira in the first year
- 2019- still ongoing
- Biowaste seperation at household levels: waste is seperated using colorful bins in 4 categories; organic waste, papers, plastics and bags. / Collection of organic waste from households as well as from 10 different grocery stores regularly, and then sending it to the compost center where decentralized composting takes place using "piles" methodology.

Source: Progress of waste separation project in Asira | Palestine | PARC Interpeoples' Cooperation(PARCIC),
بلدية عصيرة الشماليةASIRA Municipality - Posts | Facebook
(1) بلدية عصيرة الشماليةASIRA Municipality - Posts | Facebook

Asira, Palestine

Anabta, Palestine

- Development and Implementation of the Waste Management System in Anabta Municipality in northern Tulkarm, Decost project
- 400 families of the residential area of Anabta, about 2000 inhabitants
- 2020- still ongoing
- Decost project is based on "Decentralized Composting in Small Towns" Concept. /
  - It aims to build a closed-loop system of organic waste valorization through integrating decentralized both home and community composting systems with urban agriculture.
  - As for home composting, approximately 2000 residents of Anabta will participate.
  - The target is 400 home composters. 90 units were distributed so far and the rest will also be distributed soon.
  - As for community composting, 2000 residents of Anabta will participate through seperation of organic wastes at their houses. The municipality will collect them along with organic waste twice a week from grocery stores and commercial shops. It is then transfered to a composting unit in town where compost is produced.

Source: Organic waste: DECOST project to implement community composting in the municipality of Anabta, Palestine | EU Neighbours ,
Kadoorie and Anabta Municipality Kick-off First Phase of DECOST Project - Palestine Technical University (ptuk.edu.ps)
DECOST involves influential women from Anabta, Palestine in waste reduction and recycling awarness campaign | EU Neighbours

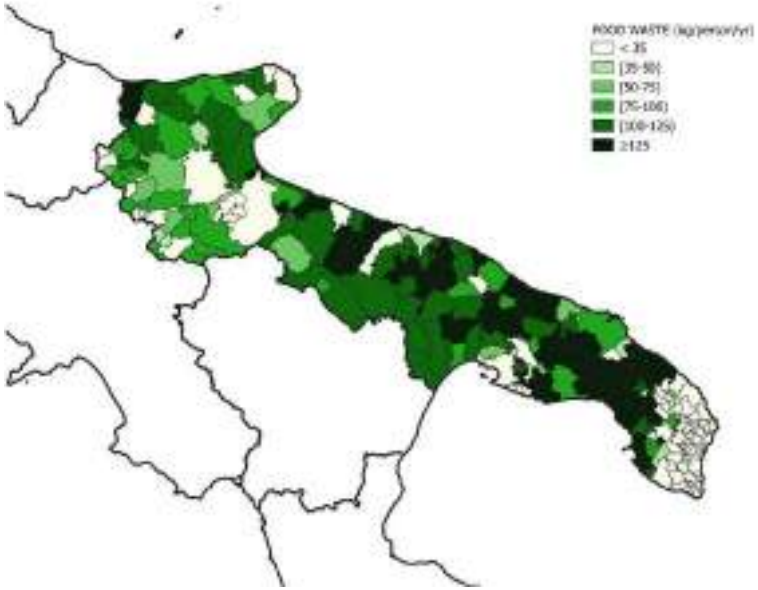
Anabta, Palestine

Puglia, Italy

- Italy has a long list of best practices in separate collection of biowaste, more than 5,000 municipalities have implemented it even in mediterranean southern regions
- Separate collection of biowaste in Puglia started around 2010 and now got to good results
- Three best practices:
  - Capture rate of biowaste in the area. 370,000 t/year on 4 million people means 93 kg/capita/year, which is about 80% participation rate, even in large cities (Bari, Lecce) data
  - Large scale composting facility of Progeva (associate partner SIRCLES), female entrepreneurship, also managing soil improver production, and gourmet vegetables for restaurants
  - Project "Compost Goal" to promote the use of compostable bags instead of polyethylene

Source: www.compost.it, www.compostgoal.net, www.progeva.it

Puglia, Italy



Compost Goal project

PROGEVA composting plant

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CIC – Italian Composting and Biogas Association

November 2021

Spain | Greece | Palestine | Jordan | Lebanon | Tunisia | Italy