WASTE MANAGEMENT PILOT STUDIES AND CHALLENGES FOR MUNICIPALITIES

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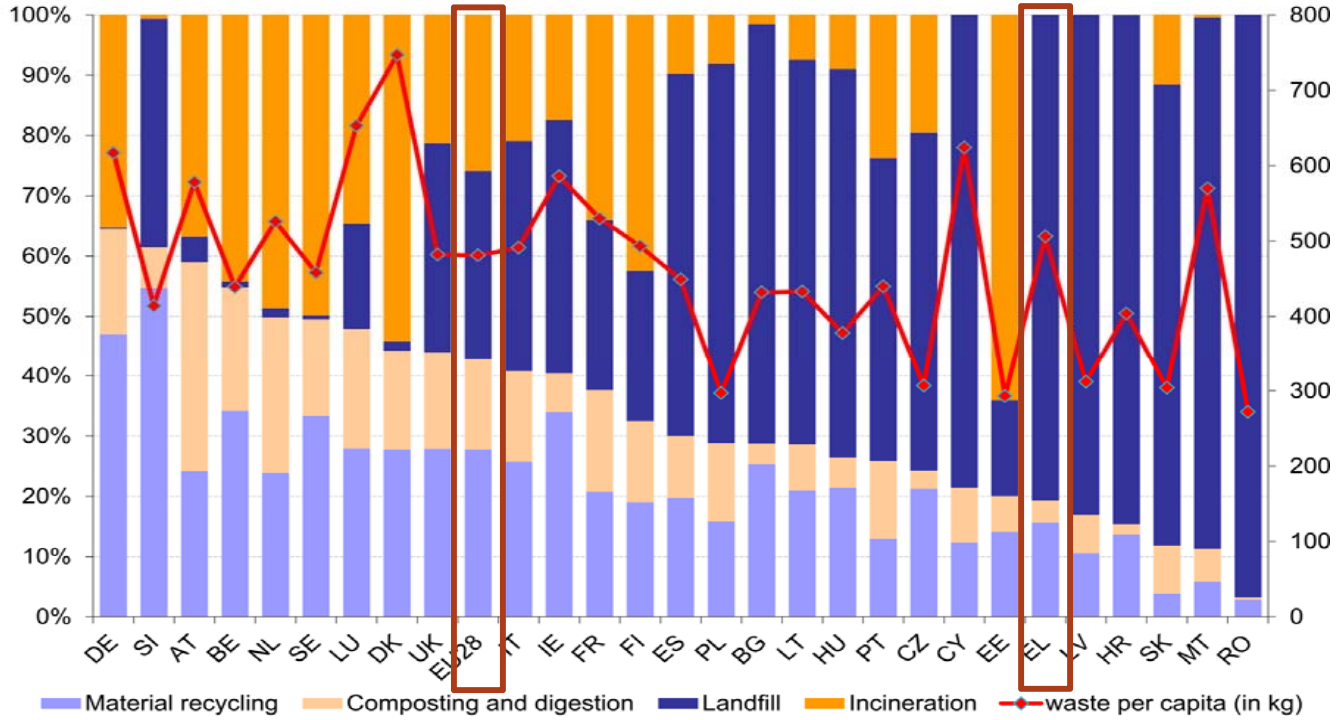
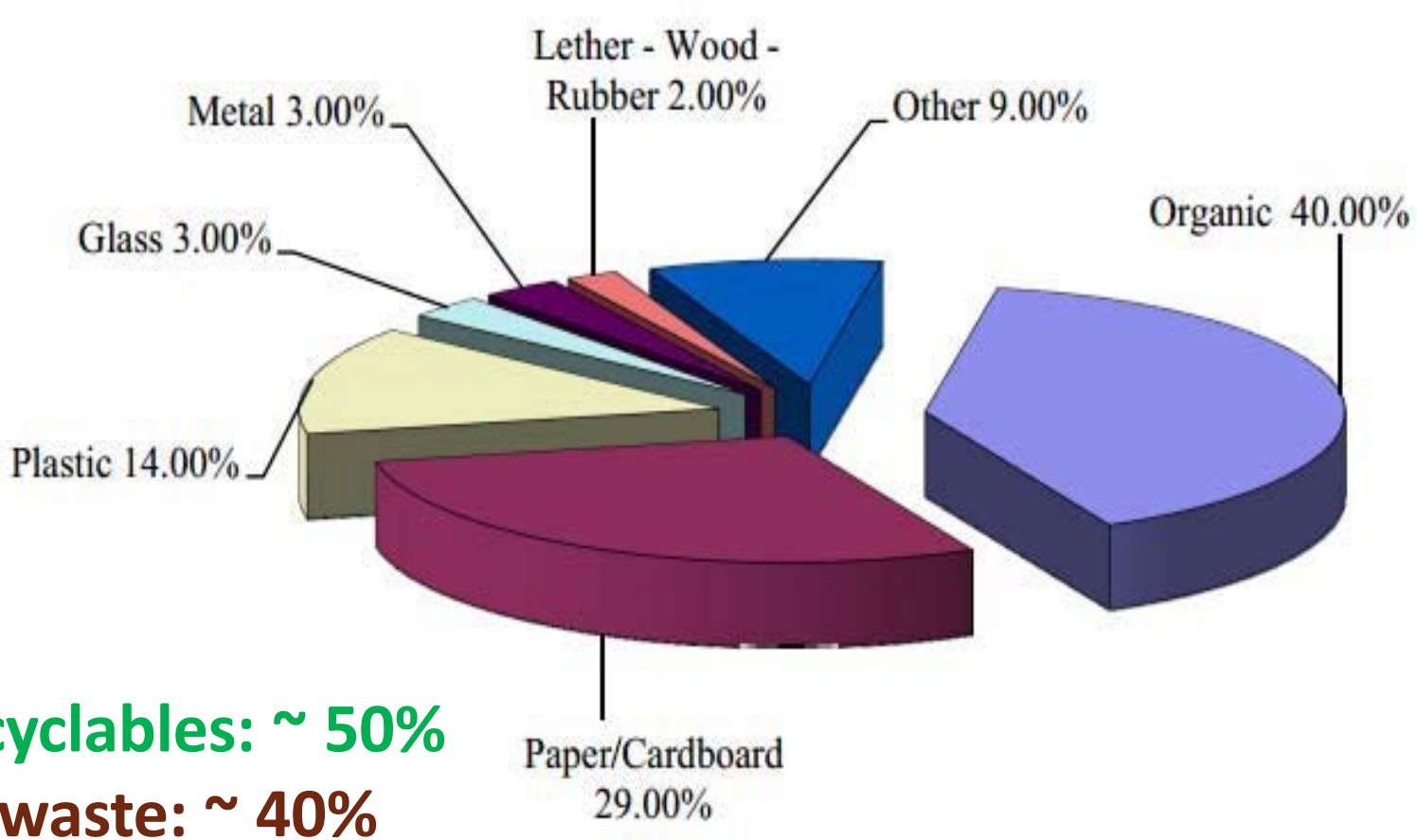
MSW PRODUCTION & MANAGEMENT IN EU



MSW (kg cap^{-1} yr^{-1})	2004	2012
GR	436	506
EU (28)	512	486

GREECE = 82% landfill & 16% Recycled & 2% Composted (Eurostat, 2016)

MSW COMPOSITION IN GREECE



Recyclables: ~ 50%

Biowaste: ~ 40%

LEGAL FRAMEWORK RELATED TO WASTE POLICY IN EU

- WFD on waste (2008/98/EC)
- Directives on waste management
  - Landfill Directive (1999/31/EC)
  - Incineration of waste (2000/76/EC)
  - Shipment of waste (2000/59/EC)
- Directives on specific waste streams
  - packaging and packaging waste (94/62/EC)
  - sewage sludge (86/278/EEC)
  - end-of life vehicles (2000/53/EC)
  - waste electrical and electronic equipment (2002/96/EC)
  - batteries and accumulators: (91/157/EEC)
  - waste oils (75/439/EEC)

CIRCULAR ECONOMY

12.4
tonnes of materials per capita were **extracted** in the EU.

3.2
tonnes of materials per capita were **imported** to the EU.

1.3
tonnes of material per capita were **exported** from the EU.

CIRCULAR ECONOMY PACKAGE ON WASTE

- The Circular Economy Package consists of an EU Action Plan for the Circular Economy with measures covering the whole cycle (production - consumption, - waste management - market for secondary raw materials)
- The proposed actions will contribute to "closing the loop" of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy
- Priority areas
  1. **Plastics:** The use of plastics in the EU has grown steadily, but less than 25% of collected plastic waste is recycled and about 50% goes to landfill.
  2. **Food waste:** Food waste takes place all along the value chain: during production and distribution, in shops, restaurants, catering facilities, and at home.
  3. **Critical raw materials** (i.e. rare earth elements in electronic waste): constitute a high economic importance to the EU with a high risk associated with their supply.
  4. **Construction and demolition:** Among the biggest sources of waste in Europe.
  5. **Biomass and bio-based products:** Bio-based materials can be used for a wide range of products and energy uses (e.g. biofuels).

REVISED LEGISLATIVE PROPOSALS ON WASTE

- A common EU **target for recycling 65% of municipal waste** by 2030;
- A common EU **target for recycling 75% of packaging waste** by 2030;
- A binding landfill target to **reduce landfill to maximum of 10% of municipal waste** by 2030;
- A ban on landfilling of separately collected waste;
- Promotion of economic instruments to discourage landfilling;
- Concrete measures **to promote re-use and stimulate industrial symbiosis**;
- Economic incentives for producers to put **greener products on the market** and support recovery and recycling schemes.

MAIN CHALLENGES TO MSW MANAGEMENT IN GREECE

- Collection, transport, treatment / recycling and disposal of MSW, have become a relatively difficult and costly problem to be solved by the competent authorities in a sustainable way.
- High quantities of waste being landfilled, low rates of recycling and separation at source, are the main reasons for non-sustainable MSW management.
- EU and National legislation sets demanding targets.
- Limited financial resources, as a result of the economic recession of the country.
- The solution should be sought through **the decentralized solid waste management at municipality level** while the central facilities should receive smaller quantities for treatment and final disposal

KEY POINTS & BENEFITS OF DECENTRALIZED MSW MANAGEMENT

- **Separation at source!**
  - Recyclables (constitutes ~50% of MSW)
  - Biowaste (constitutes ~40% of MSW)

- **Local-decentralized treatment of separated wastes**: Minimization of transfer costs (MSW collection and transportation, is considered to be the most fuel- intensive step in waste management)

- **Growth of local economy:** The decentralization of waste management enables the population to be actively involved in organizing and financing waste management services.

- **Higher recycling rates & better quality of end products**

  Higher prices → Less management costs

LIFE+ ATHENS-BIOWASTE

- **ATHENS-BIOWASTE** aims to establish and promote sustainable **biowaste management in Greece** using the municipalities of Athens and Kifissia as case study areas.
  - Separate collection systems in the Municipalities of Athens & Kifissia
  - Collection & composting of biowaste at the MBT facility of EDSNA
  - Developing appropriate bio-waste management software tool
  - Drafting recommendations for the amendment of the current technical specifications included in Greek legislation
  - Raising environmental awareness and knowledge in citizens and other stakeholders regarding management of bio-waste

PILOT AREAS SELECTED IN KIFISSIA

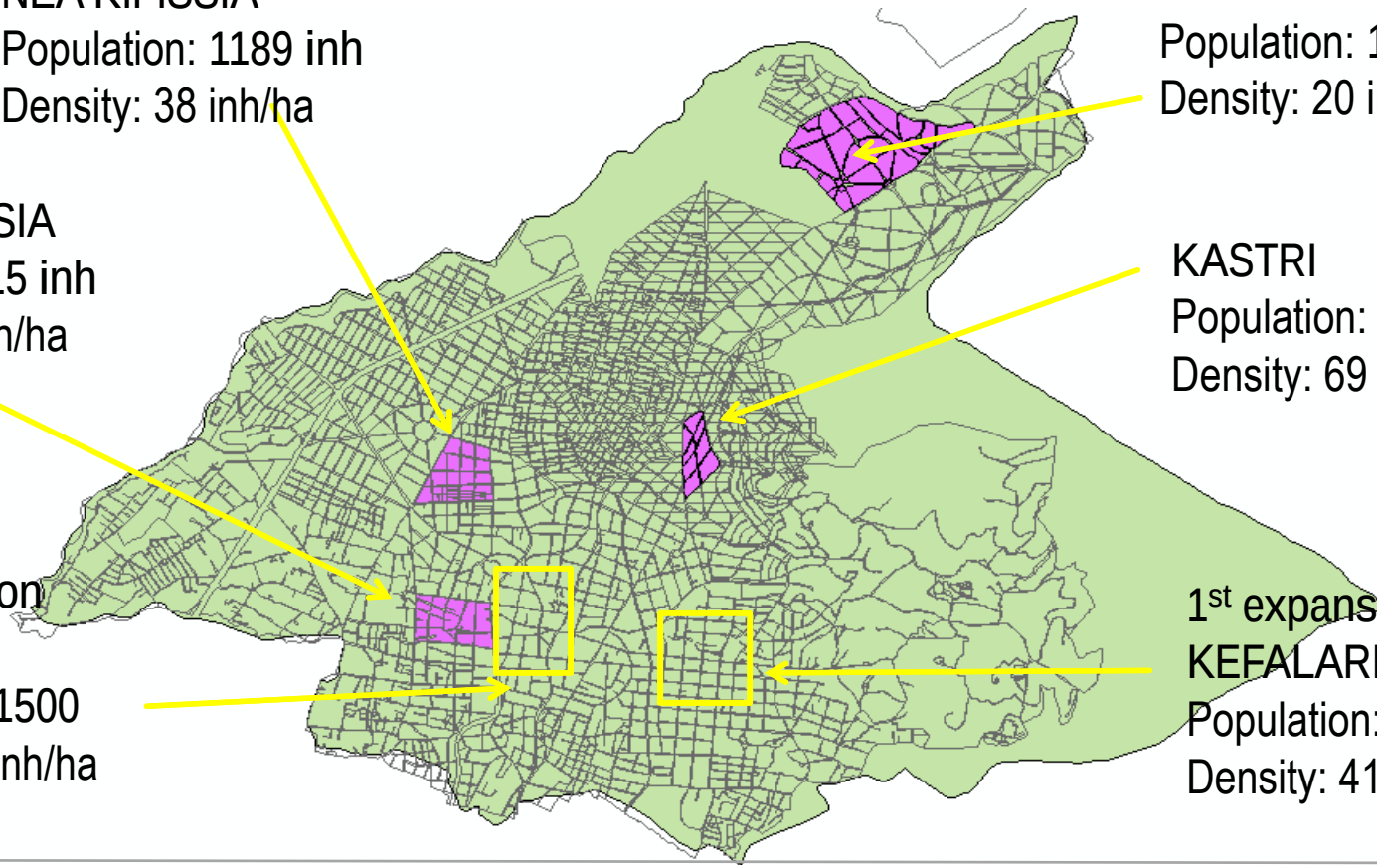
Targeting about 1700 households

NEA KIFISSIA
Population: 1189 inh
Density: 38 inh/ha

EKALI
Population: 1108 inh
Density: 20 inh/ha

KATO KHFISSIA
Population: 815 inh
Density: 48 inh/ha

KASTRI
Population: 409
Density: 69 inh/ha



2nd expansion
STROFILI
Population: 1500
Density: 30 inh/ha

1st expansion
KEFALARI
Population: 705
Density: 41 inh/ha

PILOT AREAS SELECTED IN ATHENS

Targeting about 2000 households

1st area KYPRIADOU

Population: 2.707

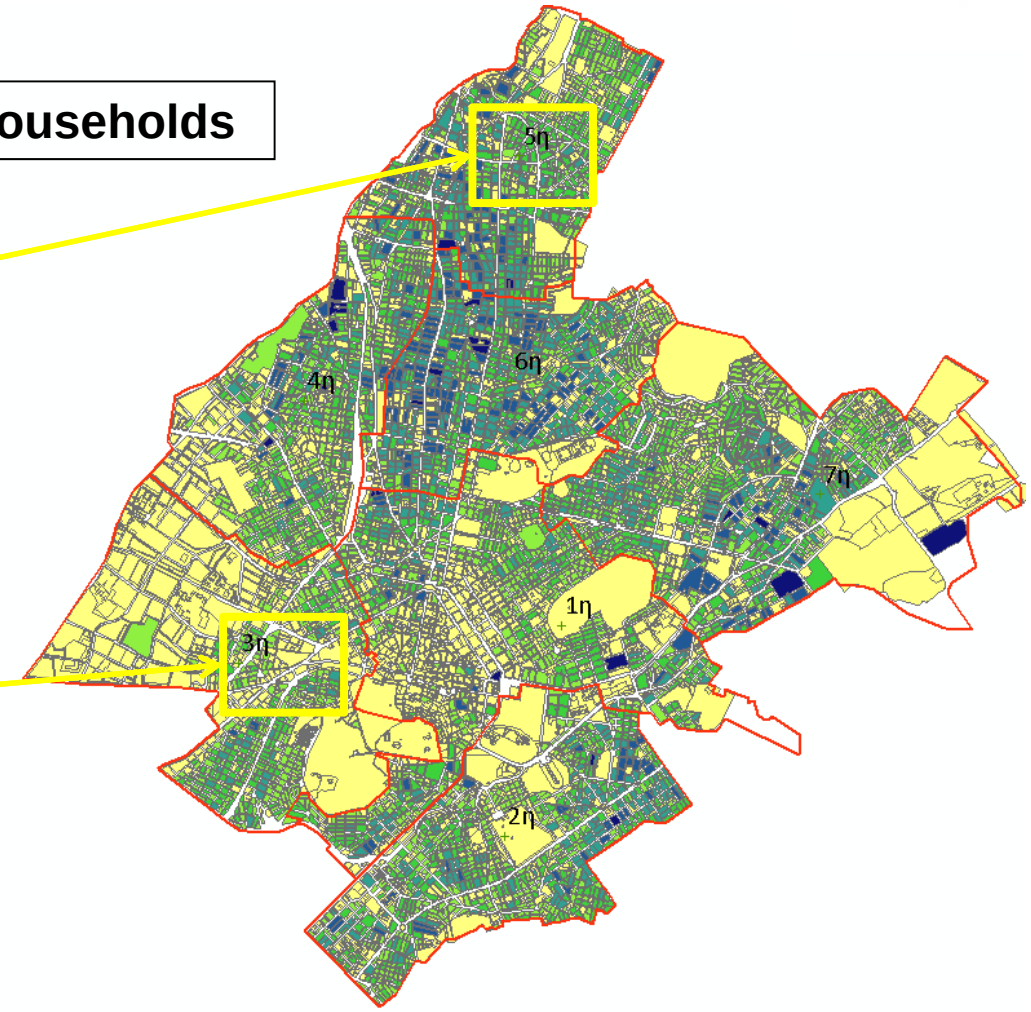
Density: 208 inh/ha

2nd area GAZI

Population: 1.447

Density : 54 inh/ha

≈ 80 restaurant, bars etc



KIFISSIA: DOOR TO DOOR COLLECTION

120-360L bin for apartment blocks

10L bin per household (including biobags)

Bin collection at common building area

Bin collection outside the resident

35-50L for single-family detached residents

ATHENS: KERBSIDE COLLECTION

10L bin per household
(including biobags)

30-50L bin per bar
restaurant etc.
(including biobags)

COMPOSTING OF THE SORTED BIOWASTE

Mechanical and Biological (Composting) Treatment plant in Attica Region

ATHENS-BIOWASTE RESULTS

- First implementation of biowaste source separation and composting scheme ın Greece of such scale
- Source separation:

		Athens	Kifissia
Households	Number of hh with bin	1653	1419
Participation	%	42.2	45.1
Collection rate	kg inh^{-1} yr^{-1}	37.4	27.1
Recovery rate (purity)	%	91.5%	97%

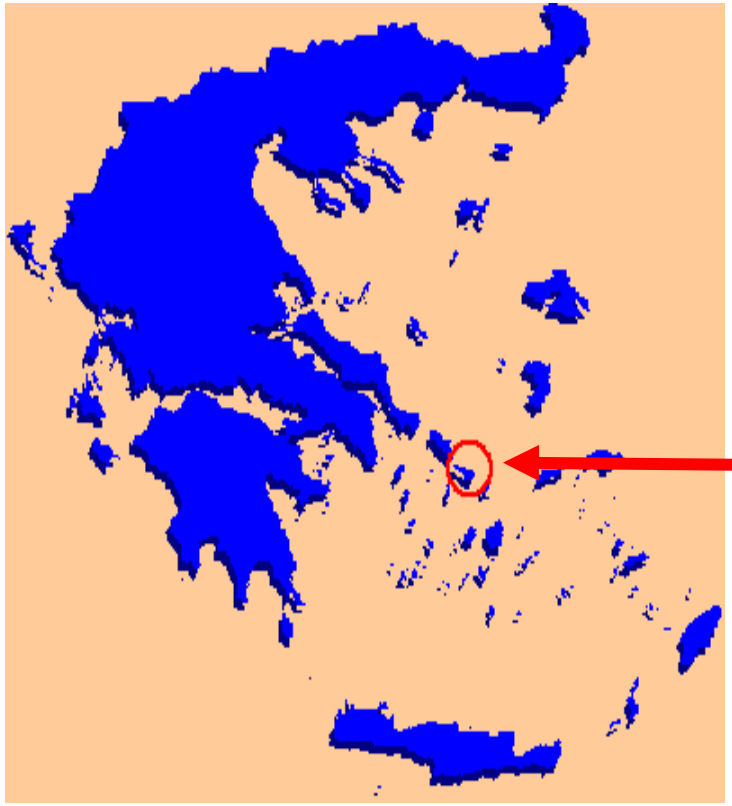
- **Composting quality:** Good quality source separated compost which satisfies the End of Waste Criteria for biowaste: Heavy metals (lower than mixed compost which is currently produced at the MBT), Pathogen free, Sufficient organic matter content
- **Decision support tool** for the selection & cost evaluation of source separation programs in Greek Municipalities
- **Biowaste management guide for Local Authorities** to Organize, Initiate, Operate, Monitor & Evaluate biowaste source separation schemes

LIFE ISWM TINOS

'**ISWM-TINOS' project** aimed to demonstrate an Integrated Solid Waste Management system to a **remote area of Tinos Municipality** for the sustainable management of MSW in line with the WFD 2008/98/EC

- Separate collection scheme for dry recyclables (paper/paperboard, glass, plastic & metal) and biowaste
- Treatment of sorted biowaste in a pilot prototype composting unit to produce good quality compost
- Evaluation of the ISWM system in Tinos and & suggestions for full scale implementation
- Raising public awareness and training on sustainable waste management

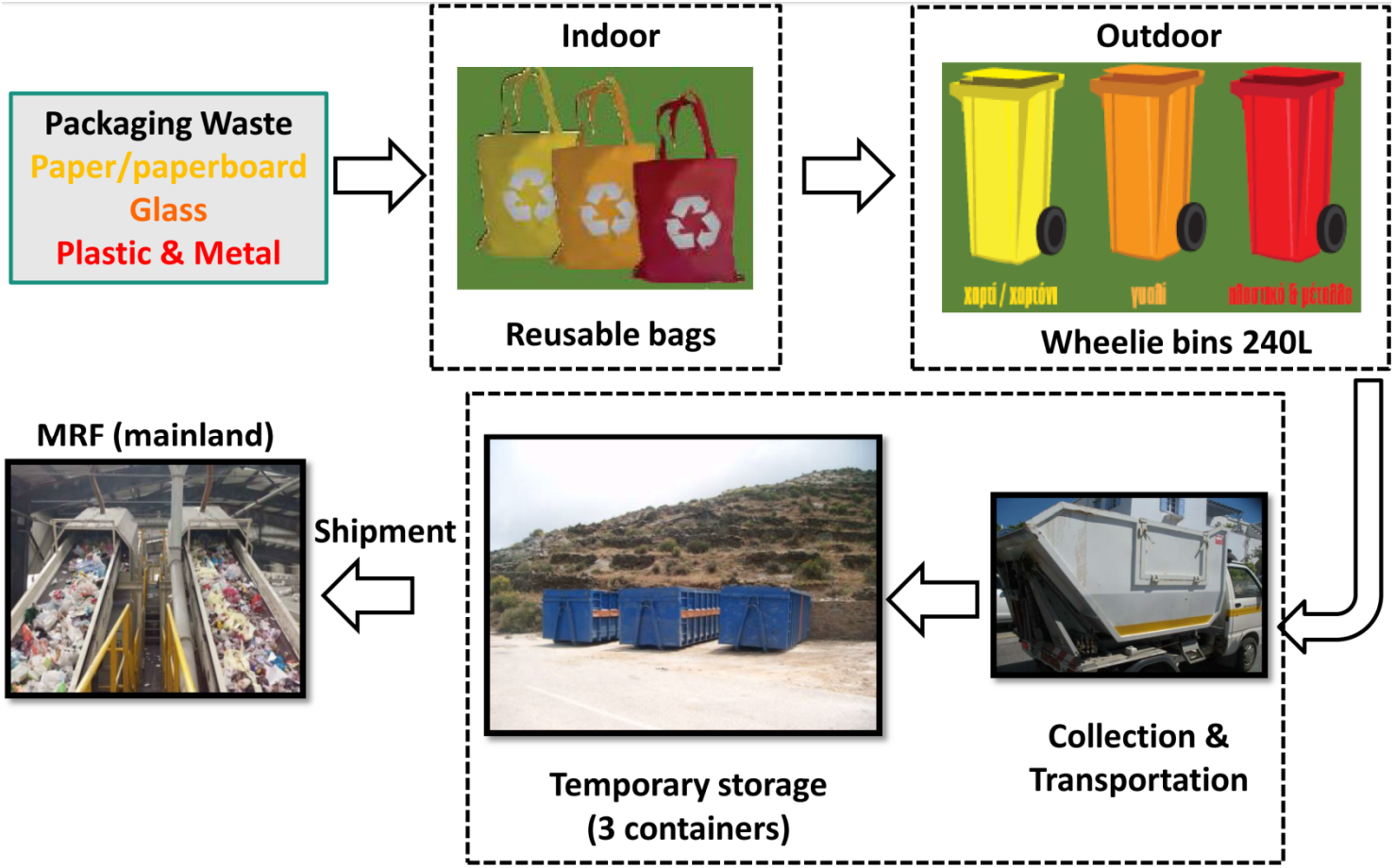
PILOT AREA IN TINOS ISLAND



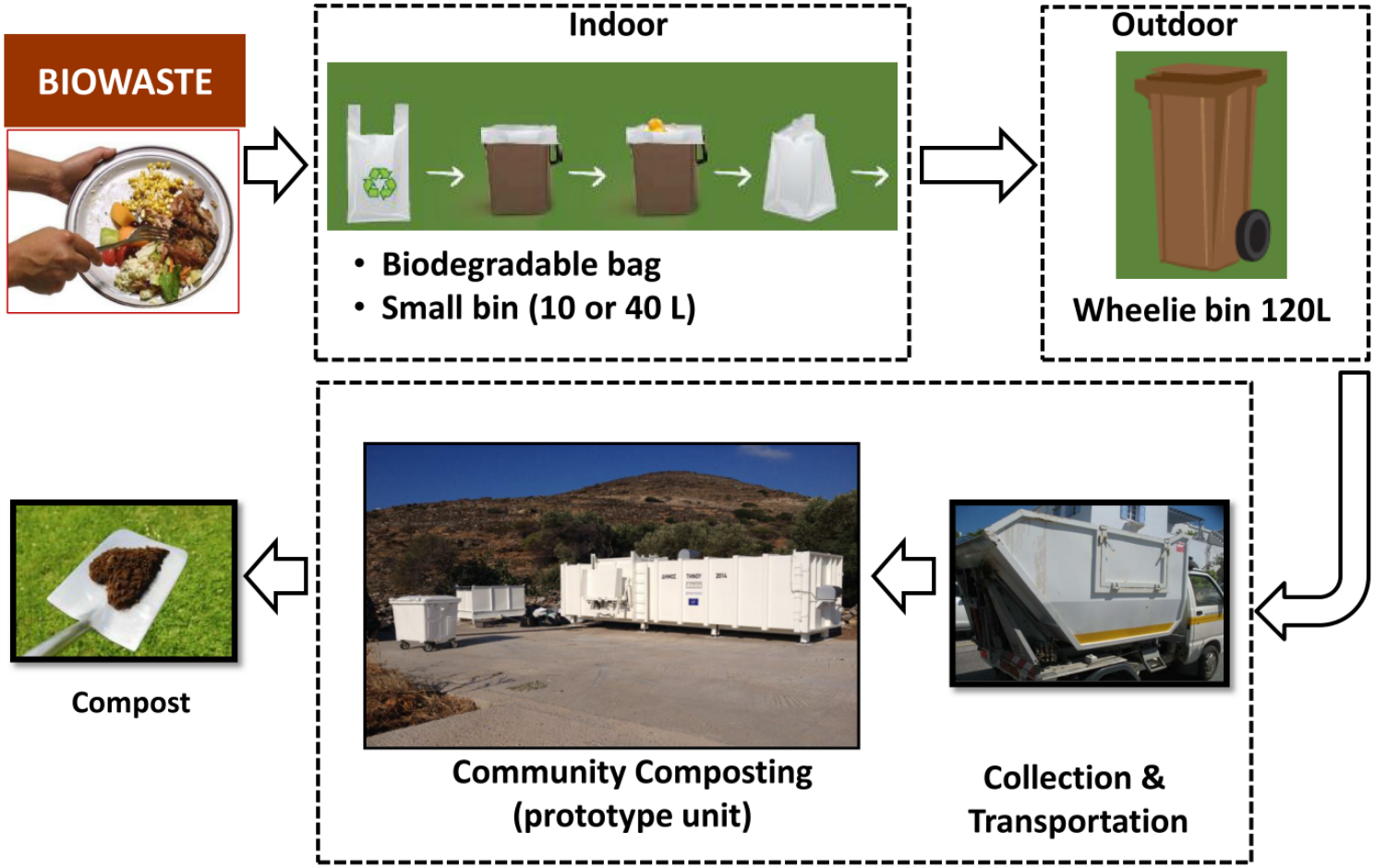
Tinos Island

Target population: 400 inhabitants

ISWM SCHEME FOR PACKAGING WASTE



ISWM SCHEME FOR BIOWASTE



EVALUATION OF ISWM TINOS MSW SCHEME

Waste type	Unit	Recycling Achievement
Paper/paperboard	kg cap^{-1} yr^{-1}	33.3
Glass	kg cap^{-1} yr^{-1}	11.4
Plastic & Metal (joint collection)	kg cap^{-1} yr^{-1}	21.1
Biowaste	kg cap^{-1} yr^{-1}	82.4
Total MSW	**kg cap^{-1} yr^{-1}**	**148.2**
	% of MSW	**34.2**

LIFE+ PAVE THE WAYSTE

- **LIFE+ Pave the Wayste** aims to Demonstrating resource efficiency through innovative, integrated waste recycling schemes for remote areas
  - Establishment of an flexible and replicable innovative system for **source separation and treatment of MSW in remote areas** in GR and EU;
  - **Recovering the maximum possible resources from MSW** to generate more than 5 streams of clean materials (target 15 streams);
  - Evaluate the quality &marketability of the final products in relation to the specifications of the market;

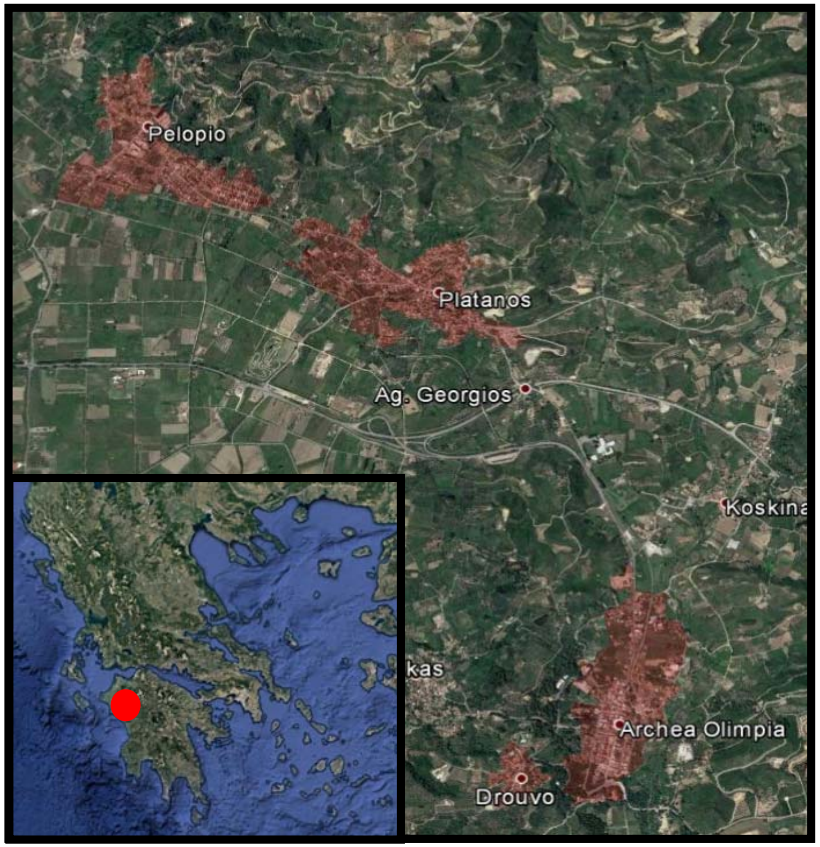
PILOT AREAS IN NAXOS MUNICIPALITY

Targeting about 1000 people

4 small Islands of Naxos Municipality

- Donousa
- Schinoussa
- Irakleia
- Koufonissi

PILOT AREAS IN ANCIENT OLYMPIA



Targeting about 3000 people

3 local communities in Ancient Olympia Municipality

- Ancient Olympia (and Drouva)
- Pelopio
- Platanos

MSW MANAGEMENT SCHEME

1. Source separation in 5 main streams

MSW production

MSW source separation

Drop off site

Paper/Paperboard

Plastics

Glass

Metals

Specific waste streams

Green Kiosk
(20' container)

MSW MANAGEMENT SCHEME

2. Further separation in substreams

Green Kiosk

1 employee

Participants

ID card for participants Rewarding System

- Printed Paper
- Paperboard
- Mixed paper
- PET non-coloured
- PET coloured
- HDPE
- LDPE
- PP/PS
- Glass non-coloured
- Glass coloured
- Ferrous metals
- Non-ferrous metals
- Waste oils
- WEEE
- Batteries
- Lamps

MSW MANAGEMENT SCHEME

- Printed Paper
- Paperboard
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- PET non-coloured
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- LDPE
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- Non-ferrous metals
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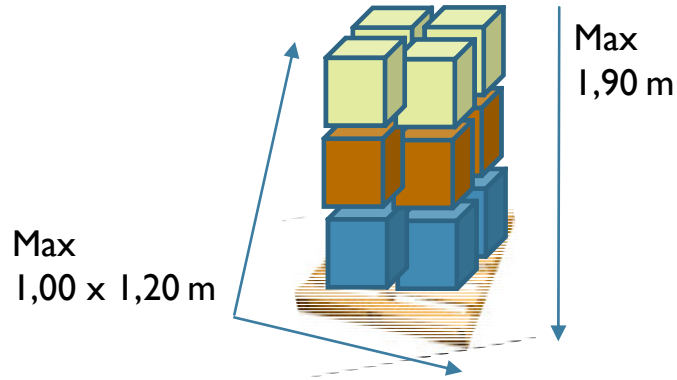
3. Temporal storage



4. Transportation to the market

- ✓ **Private Sector**
- ✓ **industries**

LIFE+ PAVETHEWAYSTE EXPECTED RESULTS

- Increase MSW recycling rate in pilot areas at:
  - 60% in Ancient Olympia
  - 50% in Naxos
- Installation and demonstration of nine (9) recycling systems in 2 Municipalities having at least 500 kg of MSW per day / system treatment capacity
- Recovering high quality recyclable materials (at least 1,600 tones)
- Environmental Awareness and Participation of >2,000 residents and tourists
- 2 replication and transfer studies of the project in other remote Municipalities of Spain and Greece

LIFE+ PAYT

LIFE+ PAYT aims to support local authorities in adopting PAYT ("Pay-as-you-throw") waste tariffs, which will encourage waste prevention & source segregation practices, fostering separate collection.

- Reduce unsorted waste from households and services
- Increase recycling rates for packaging waste
- Demonstrate to local authorities that PAYT (Pay-as-you-throw) waste tariffs can be implemented, resulting in environmental and economic benefits for the municipalities
- Promote the replication of PAYT tariffs in countries in the South of Europe

LIFE+ PAYT KEY ACTIONS

Aveiro

Condeixa

Lisboa

Larnaka

Vrilissia

- Transition to PAYT tariffs in 5 demonstration sites: changes in waste collection services; development of PAYT tariffs

LIFE+ PAYT KEY ACTIONS

- **Portal web (on-line):** powerful tool to monitor waste production at the study sites; calculate waste tariffs; monitor waste related costs.
- **Technical courses:** promote knowledge about PAYT tariffs and foster its acceptance
- **PAYT network:** to foster the adoption of PAYT tariffs in other municipalities

LIFE+ PAYT EXPECTED RESULTS

Reduction of **residual waste** by 30-40%

Increasing **separate collection** rates by 100%

Reduction of **carbon footprint** in 10-15%

THANK YOU FOR YOUR ATTENTION!

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