



DI.A.A.MA.TH. S.A.

**Waste Management Authority of Eastern
Macedonia & Thrace**

**Pilot monitoring of three (3) waste streams
of municipal solid waste (MSW) produced
at household level in Northern Greece**

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Overview

- Introduction - Background on Household Waste
- Objectives
- Materials and Methods
- Results
- Conclusions - Future Work

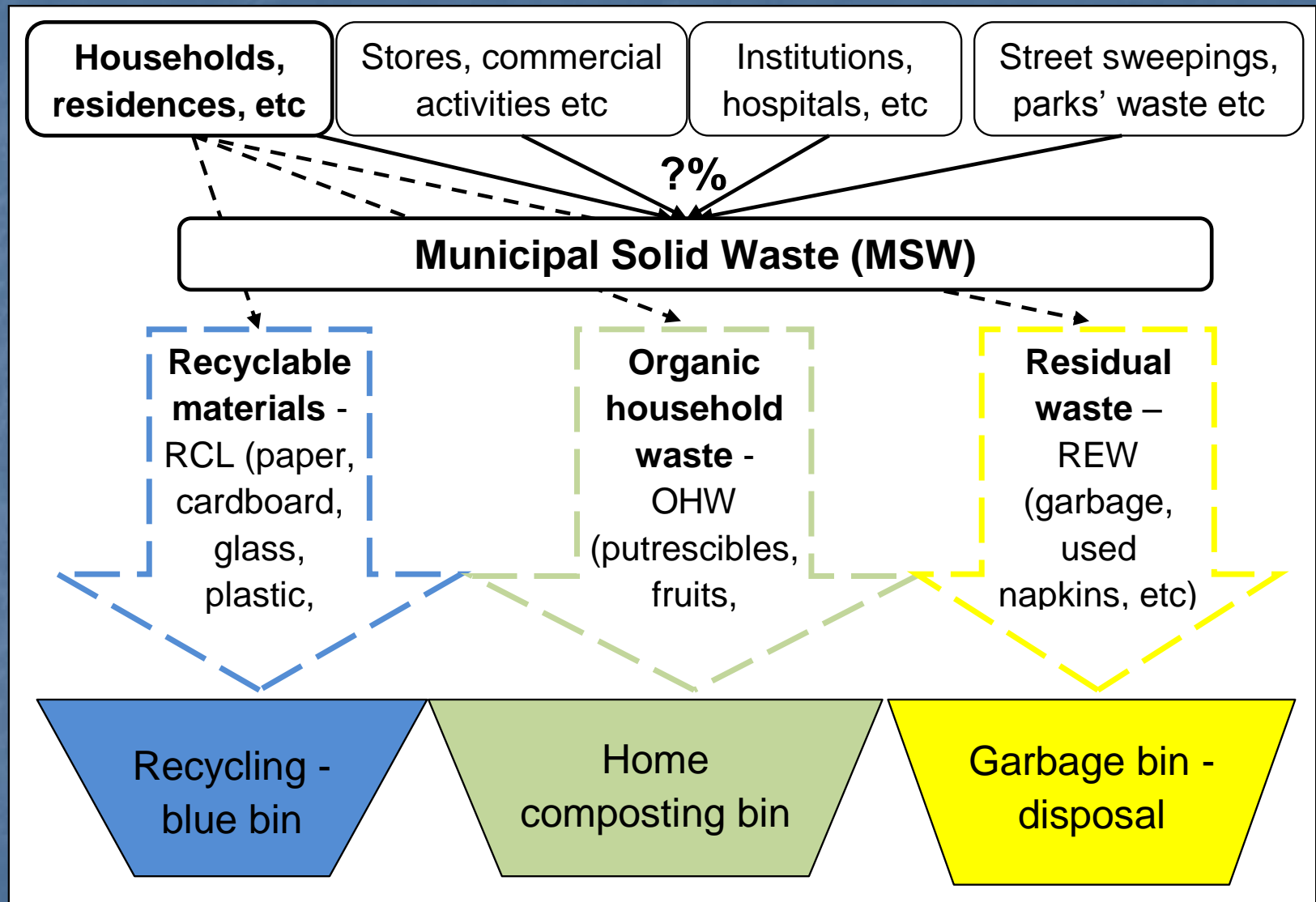
Introduction

- Sustainable management of Municipal Solid Waste (MSW) remains a problem in Greece
- Majority of MSW is being landfilled
- Various sources and activities generate MSW: **household activities**, commercial activities, street sweepings, institutes, etc

Three main waste streams in MSW

- 1. Recyclable Materials-RCL:** paper, plastic, metal, glass, etc → commingled bins (blue bins) → Material Recycling Facility (MRF)
- 2. Organic Household Waste-OHW:** fruits, vegetables, etc → home-composting bin → compost
- 3. Residual Waste-REW:** napkins, inert material, etc → garbage bins → Sanitary Landfill (SL)

MSW sources & waste streams



Household waste background

- Studies on monitoring household waste exist for many countries in the world
- Household waste generation rate (kg/capita/day) depends on living standards and city/country studied
- OHW ~40-60% in third world countries
- In Greece few household level monitoring studies
- Home-composting and recycling can contribute to reduction of GHG emissions, since less waste is disposed into landfills and natural resources are saved

Objectives

- Continuous weighing and monitoring of 3 waste streams generated at household level
- Estimation of household waste generation rates
- Investigation of household waste fraction in MSW
- The work was part of implementing Local Action Plan in the Region of Eastern Macedonia-Thrace of **Waste-C-Control** project (LIFE09 ENV/GR/000294)



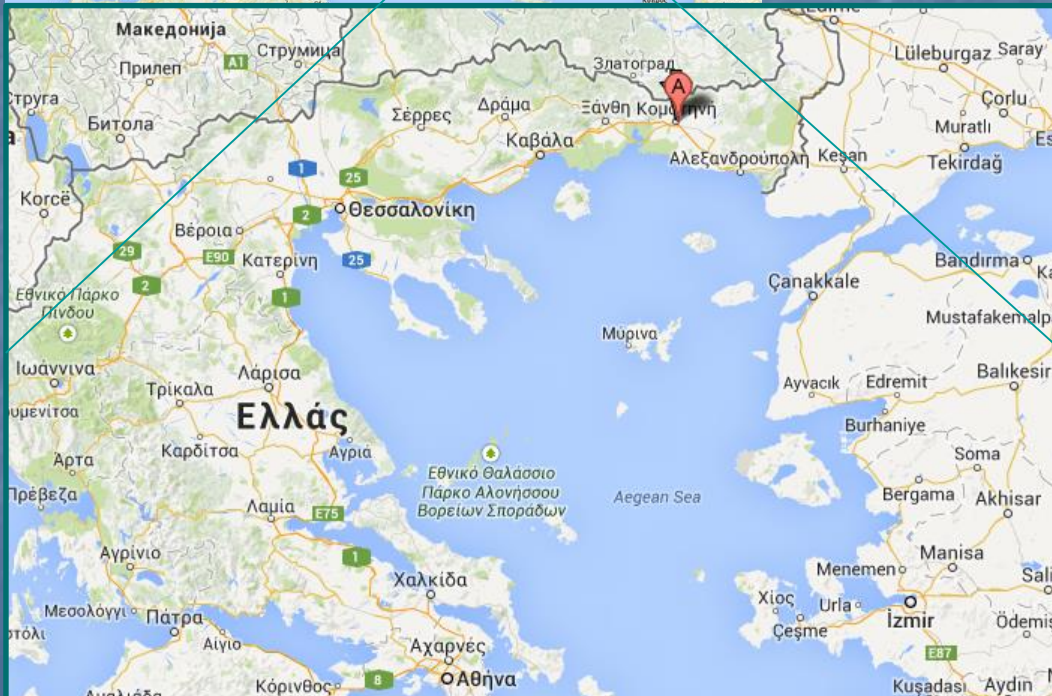
WASTE-C-CONTROL Project

LIFE09 ENV/GR/000294



- Coordinating beneficiary: EPEM SA
- Associated beneficiaries: DIAAMATH, DIADYMA & DEDISA - Waste Management (WM) Authorities
- Budget: 2.344.347 € , EC Co-funding: 49,50%
- Duration: 1/10/2010 –30/09/2013
- Main aims:
 - **Develop a software tool** that will help WM Authorities to reduce GHG emissions resulting from WM practices
 - Promote awareness and disseminate information on WM options and climate change mitigation
- More information: www.epem.gr/waste-c-control

Pilot action & location



- Production of 3 waste streams (RCL, OHW, REW) were weighed & recorded by 10 households.
- City of Komotini in Northern Greece.
- City's population ~50.000 inhabitants.

Materials and Methods

- Equipment:
 - Digital weighing scales (max of 3kg)
 - Plastic bins (30 l & 3,2 l) for collection of RCL & OHW
 - Calendars and Questionnaires
- Period: 5 months (April 2013 - August 2013)
- Collaboration with Ecological Group of Rodopi (EGR): selection of participating households, distribution of equipment & guidelines, interviews with participants

Materials and Methods

- March 2013: information meeting with participants
- Distribution of equipment and guidelines
- During implementation 2 households did not weigh OHW fraction
- Results from 8 households



Implementation

- Data recording
- Home composting bin
- Communication and interviews



Results

Profile of participants

- Participants: 8 households - 24 persons
- 42% female - 58% male
- Household's average size: 3 members
- Main age group: 41-60 years (54%)
- 83% of respondents min secondary education

Results

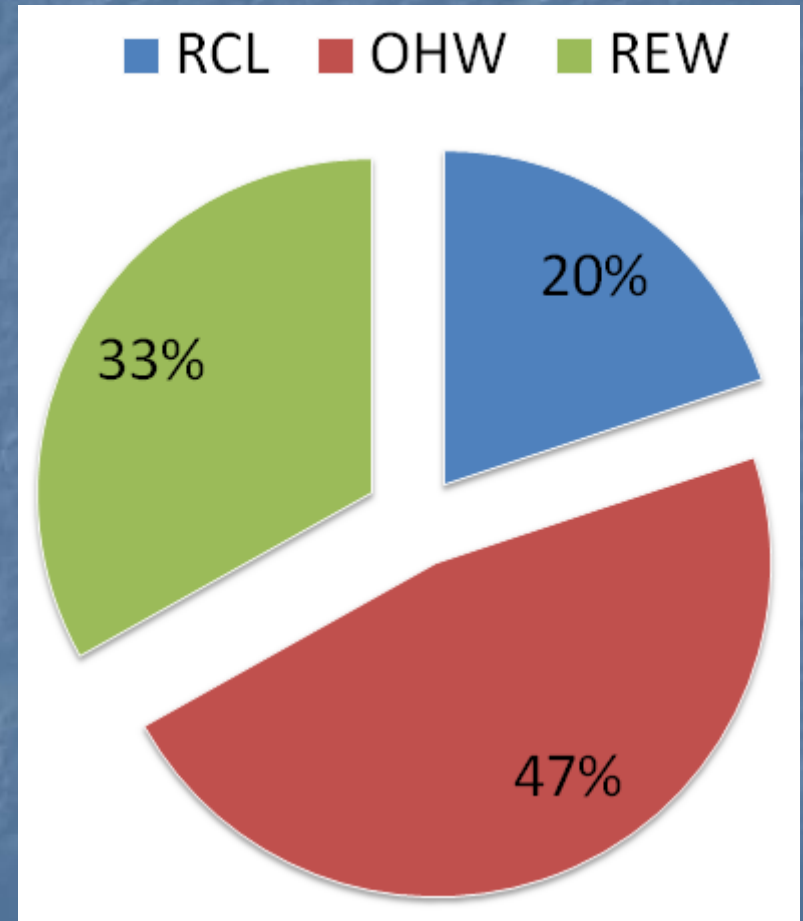
Waste generation rates

- Average production rate of household waste estimated: 425g/cap/day or 155kg/cap/year
- Average values of each waste stream:
 - RCL fraction: 31kg/capita/year
 - OHW fraction: 73kg/capita/year
 - REW fraction: 51kg/capita/year
- City's MSW estimation: 323kg/cap/year → HW ~48% of city's MSW → 52% of MSW generated by other activities (stores, supermarkets, restaurants-cafes, schools, institutions, etc)

Results

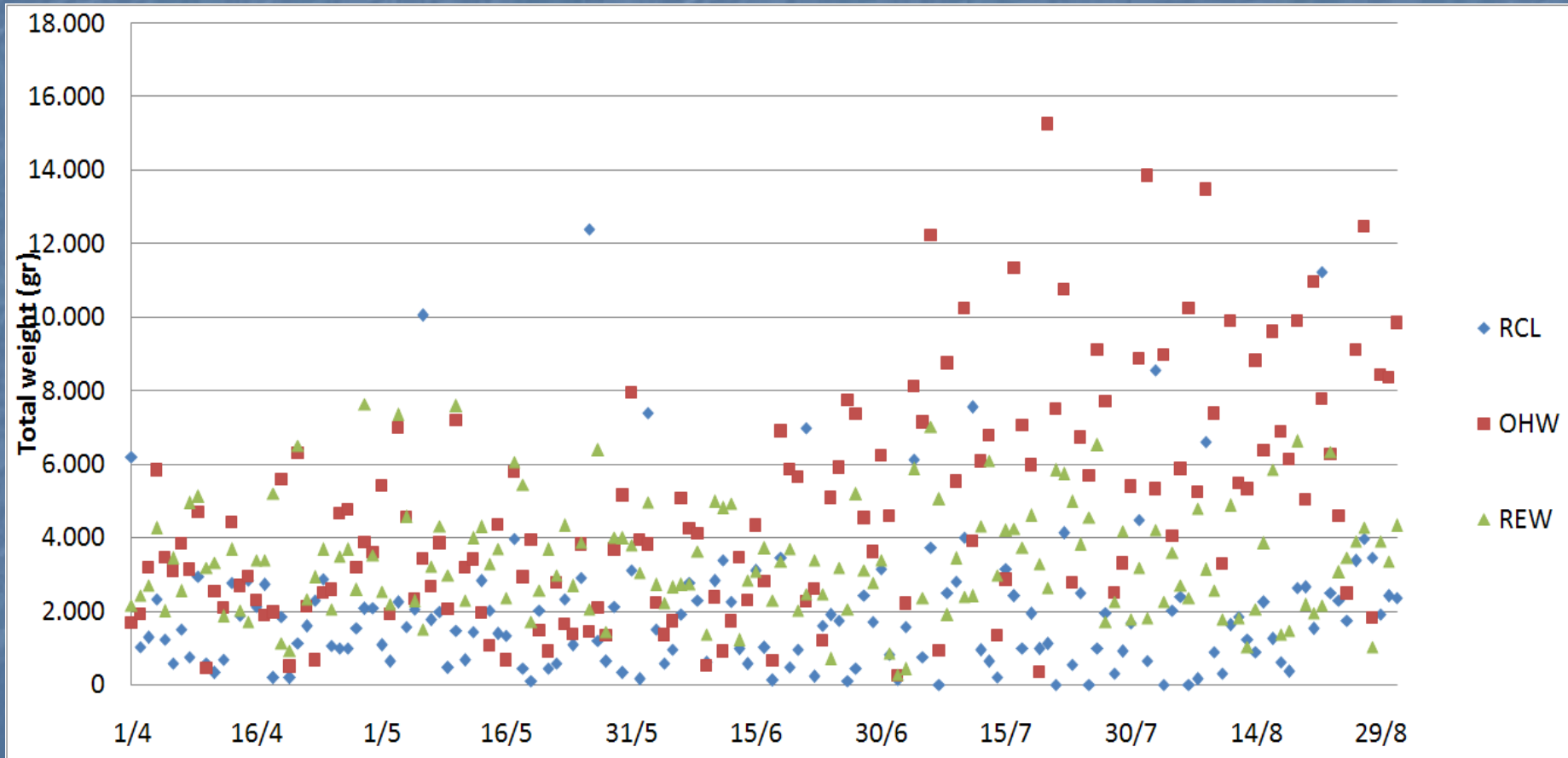
Percentage of 3 waste streams

- Recyclable materials
~20%
- Organic household
waste ~47%
- ~67% of household
waste can avoid
landfilling



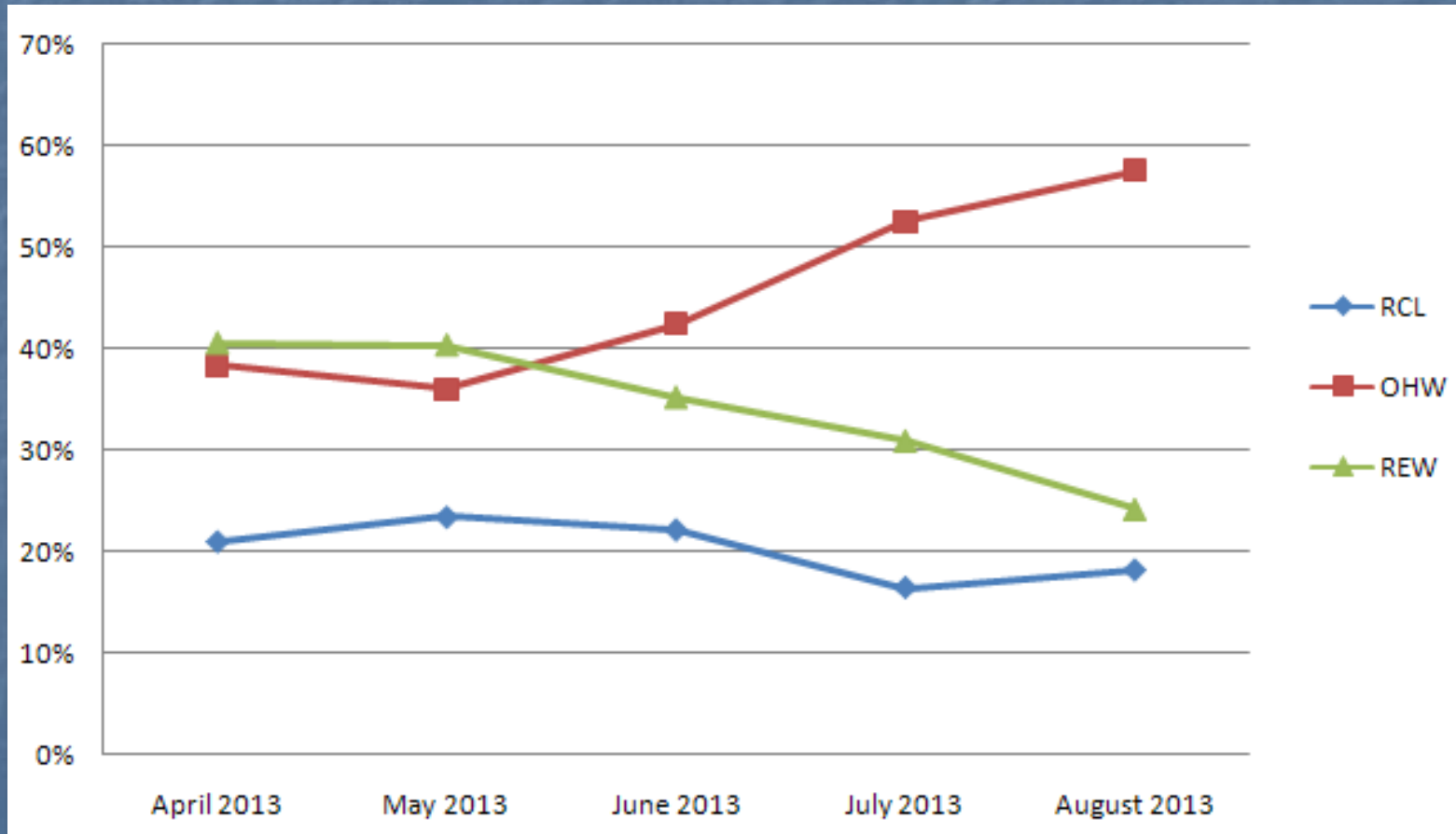
Results

Daily recordings of 3 waste streams



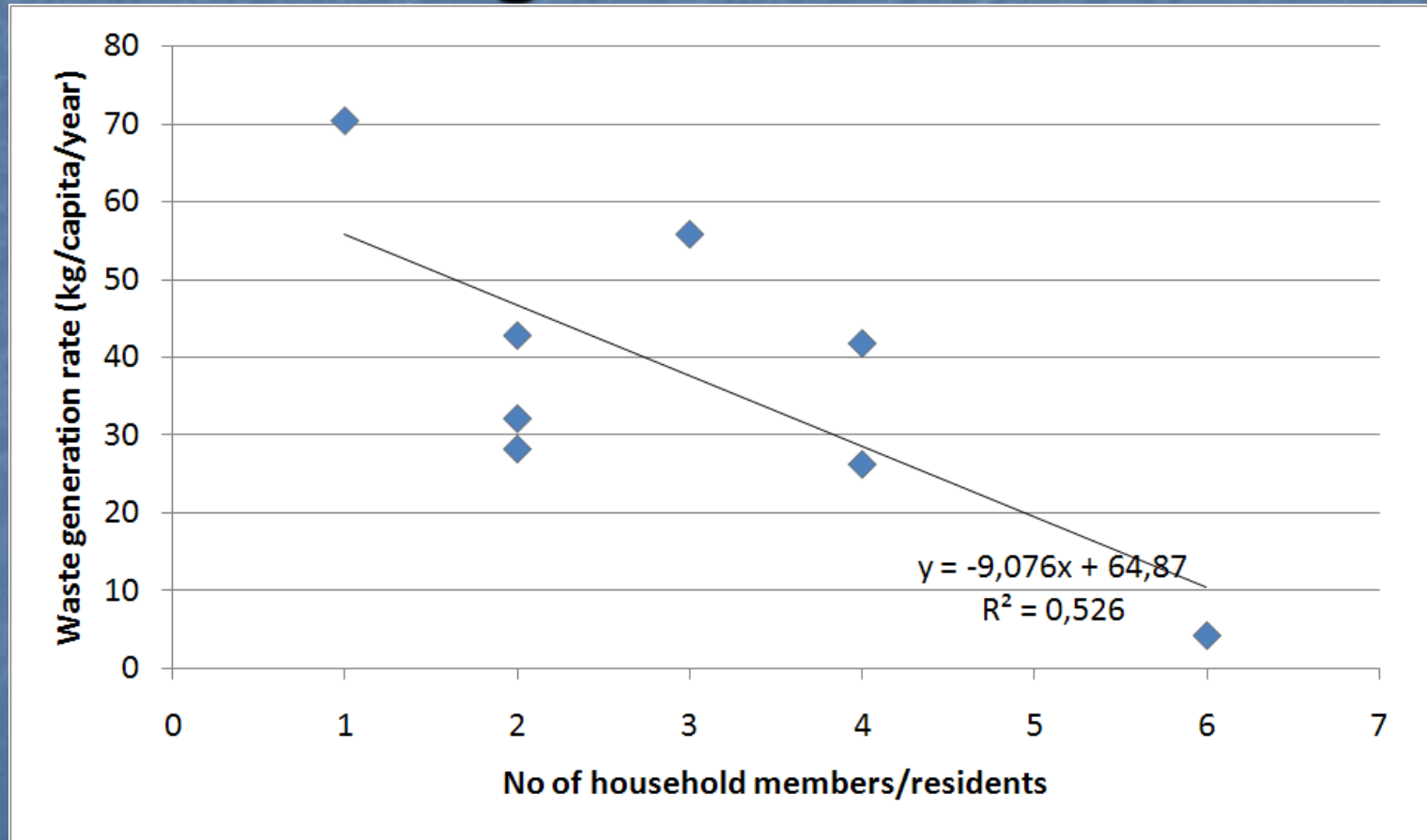
Results

Average monthly weight (%) of 3 waste streams of 8 households



Results

Effect of household size on per capita RCL generation rate



Conclusions

- Pilot monitoring of 3 household waste streams implemented for 5 months in a city in Northern Greece
- Home-composting and recycling can reduce household waste disposed to sanitary landfills & GHG emissions
- On average 67% w/w of household waste can avoid final disposal by recycling (20%) & home-composting (47%)
- Household waste estimated at 48% of MSW generated in Komotini → 52% of MSW by commercial and other activities (stores, supermarkets, restaurants, etc)

Conclusions & Future work

- Margins of improving recycling rates in Komotini
- Increase of OHW stream during summer months
- Conclusions can help better waste management systems
- Future work may include:
 - Greater period of study (whole year) and participation of more households
 - Inclusion of other household waste (WEEE, batteries, etc)

Acknowledgements

- The project was co-funded by DIAAMATH and LIFE+ Programme in the framework of “Waste Management Options for Greenhouse Gases Emissions Control” (WASTE-CONTROL) – LIFE09 ENV/GR/294
- Ecology Group of Rodopi
- Participating citizens in the city of Komotini



Thank you for your attention!



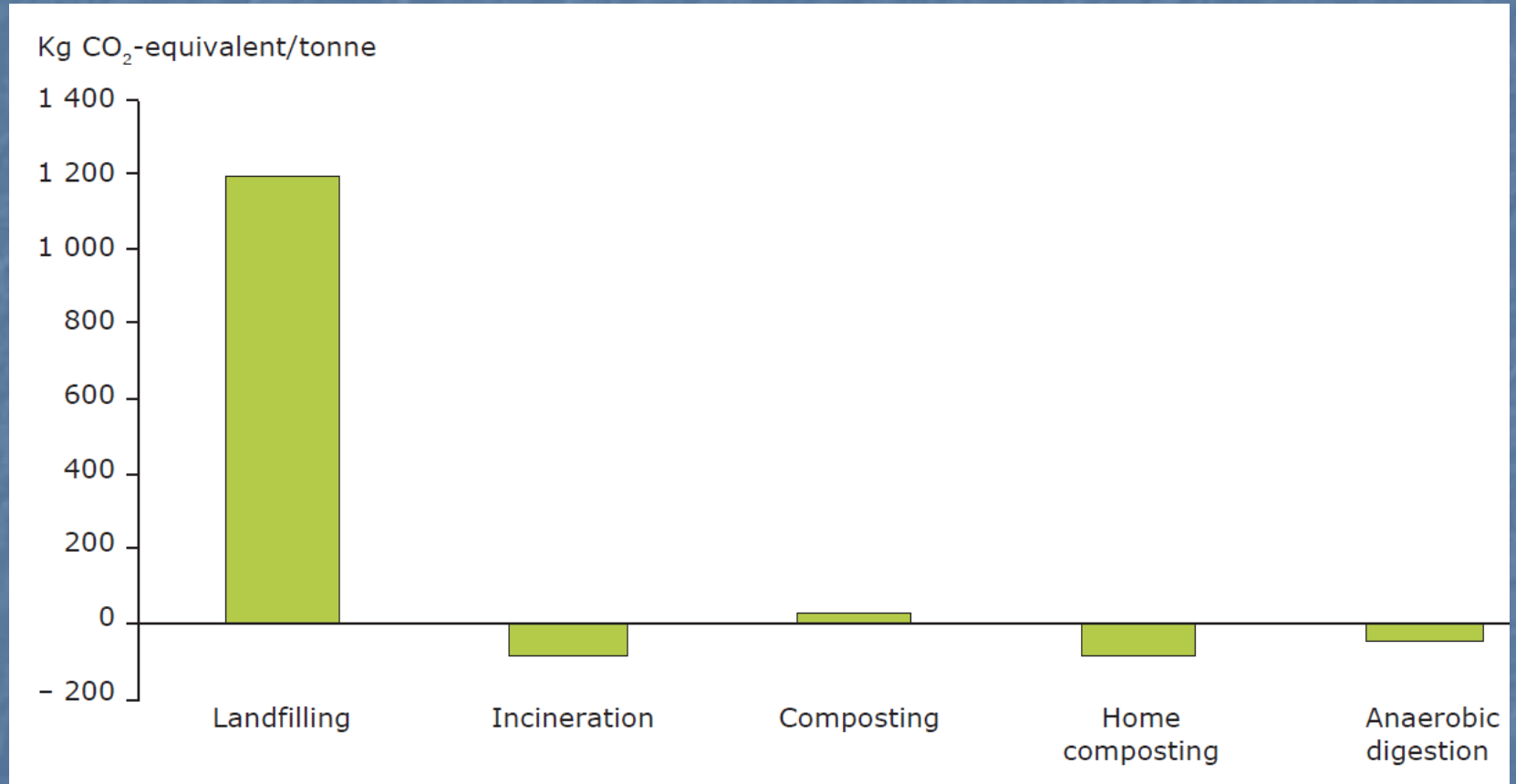
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Additional Photos



2014, Athens: 2nd International Conference on Sustainable Solid Waste Management

Net emissions (kg CO₂-equivalent) per treatment option for one tonne of kitchen and garden waste



Source: ETC/SCP 2011