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# Assessing the informal recycling of aluminium beverage cans in Athens

*i-ALBEE (informal ALuminium Beverage Cans Eastern Europe)*


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# Contents

# Problem description

- **Informal diversion** of valuable **recyclables** not only in low-income countries, but **also in Europe**
- **Increasing quantities** diverted due to economic crisis and immigration
- **Informal recycling sector** (IRS) does not have the capacities or interest to record the quantities collected.

Athens

Vienna

*Fotos: ABF-BOKU, Konstantina Bpikou*

# Problem description

- **Formal systems** may "**lose**" **quantities** that are handled informally
- Sometimes only the collection is informal but the material ends up in the formal system
- Formal systems **invest in infrastructure** (e.g. bins) that are in the end empty or destroyed.
- When records are missing EPR and national targets cannot be fulfilled

# Goal of the study

- Develop a **methodology** to estimate the level of informal activities in UBC collection and recycling
- Develop **key performance indicators** of the informal recycling sector in selected EE cities focussing on UBC
- Estimate the share of **informal recycling sector diversion** of UBC in selected EE cities
- Map **material flows** in the informal recycling value chain, leading to information on the **final destination** of UBC

# Approach

- **Three pilot cities** selected for assessment: ***Athens (GR), Bucharest (RO), Miskolc (HU)***
- Challenge: different waste management systems (also related to formal and informal UBC collection) prevailing in the three cities.

# Methodological approaches

a. **Screening and mapping** the **locations of informal activities**: assessing the locations where the informal collectors are active. Where do informal collectors have access?

b. Using **Key Performance Indicators** (KPIs) on IRS in order to estimate UBCs collected in this manner: literature research and desktop work.

c. Developing **questionnaires** for different locations where IRS has access

d. Field work **surveys** carried out in three cities.

e. Data analysis and extrapolation for informal UBCs collection and recycling from field work surveys

f. Assessing **formal data** on UBCs put on market, quantities collected by EPR-schemes

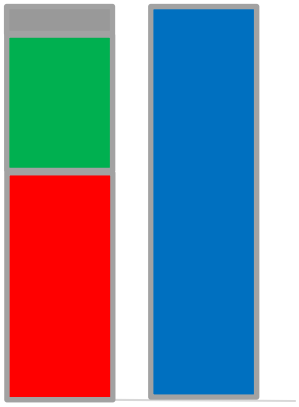
g. “Triangulation”: Comparison of outcomes of all relevant information

# Methodological approaches - Triangulation

Data available at country level => adjustment to city level?

↓

**UBCs put on market**

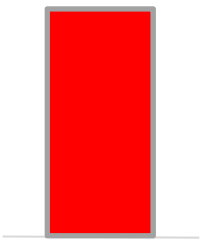


⇨

Data available

↓

**UBCs collected by formal system**



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Estimation with key performance indicators on informal sector

**Triangulation**

Estimation with surveys

↓

**UBCs informally collected**

+

Data partly available

↓

**UBCs in residual waste, landfills, littering, incineration slags, illegal activities**

**?**

**Upper limit of informal collection = UBCs put on market**

Remark: **Triangulation,** a concept used in social sciences, intends to facilitate the validation of data through cross verification from two or more sources. In this case this is done by calculating the amounts collected informally from different starting points and using different methods.

# Methodological approaches - Triangulation

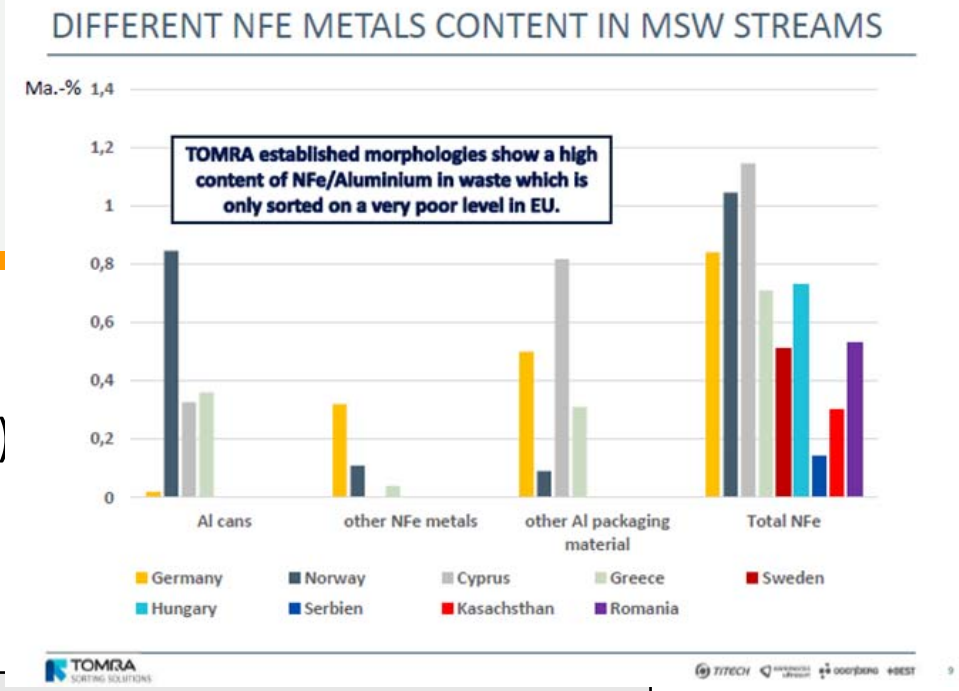
## Survey results

- Quantities collected informally per person and time unit ✓
- Size of IRS involved in UBC collection ≈
- Additional information on IRS "realities" (gender, age, income etc.) ✓
- Information on material flows ✓
- Picker survey vs. scrap yard survey ≈

# Questionnaires for field work surveys

- Quantities of aluminium cans collected per time unit
- Point / location of collection
- Zone / region covered by informal workers
- Working hours per day, Working days per week
- Equipment used for transport (means of transport)
- Daily distance walked / travelled
- Seasonal variation in the collected amounts (factor compared to average quantity)
- What happens to the collected cans (directly sold, processing of cans etc.)?
- What is the price one can achieve for the collected recyclables?

# UBCs in residual waste




- Based on TOMRA sorting analysis
- Based on consumption per capita (EAA)

| | Al cans consumed (Source: EAA 2012) | Al cans in residual waste (Source: Tomra 2014, Bucharest; GR 0.38% can; RO and HU 50% of NFe (RO: NFe = 0.55%; HU: NFe = 0.72% | |
|---|---|---|---|
| | (15g/can) kg/cap/yr. | max | based on max purchased |
| Greece | 1.2 | 1.881 | 157% |
| Hungary | 1.16 | 1.1448 | 99% |
| Romania | 0.33 | 0.84535 | 256% |

➢ **UBCs in residual waste not considered**

# Methodological Challenges

- No data is being collected on the informal recycling sector
- IRS does not have the capacities / needs / interest to keep records on its activities.
- High level of discrimination against ethnic minorities involved (e.g. Roma) and waste pickers in general.
- Employees and owners of scrap yards are often reluctant to provide information on quantities of materials received and sold, fearing fiscal or legal audits.
- Street waste pickers are either ashamed of sharing information about their work or fear that they may be persecuted for the information they provide.
- Data collection on IRS only possible at local level  while “formal” official data is reported at national level

# Methodological Challenges

- Language barriers between interviewers and interviewees
- Cases of threats; either from people that may be involved in illegal activities near the street pickers' area of work, or from some street pickers themselves who may have felt threatened.
- Inability on the part of the street pickers to determine the exact quantities of materials they collect.

- Environmental authorities aggregate data, mixing different types of metals and do not record composition data at the level of detail needed;

# KPI UBC collection

| | Daily collection rates of UBCs [kg/day/person] | | | |
|---|---|---|---|---|
| Country / Region | Landfill picking | Street picking | Source | Factor landfill / street |
| USA / Laredo (Texas) and Mexico / Nuevo Laredo | 24.60 | 2.8 – 3.8 | Medina (1998) | 8.8 – 6.5 |
| Philippines / Metro Manila | 2.50 | 0.76 | JICA (2008) | 3.3 |
| Philippines / Southern Mindanao | 1.79 | 0.40 | JICA (2008) | 4.5 |
| India / Delhi | ---- | 0.54 | Agarwal et al. (2005) | ---- |
| **Average** | **9.6** | **1.7** | ---- | **5.6** |

# Results: Key Performance Indicators

1. **Literature research** related to data on IRS and UBC collection.
   - Size of IRS **worldwide**: approx. **0.5 to 2.0%** of the urban population (based on 43 datasets);
   - **European** context: **0.15 – 0.25%** (3 datasets) of the urban population
   - Very sparse literature available, but <u>an average estimate</u> informal street pickers collect **1.7 kg/cap/day**, at landfills this amount can be higher (up to a factor 6 in developing countries).

Used **KPIs** for estimation:

0.2 % of urban population; collecting 1.7 kg UBC per day; 2 scenarios with 5 and 6 working days per week

# Results: Key Performance Indicators

| City | Inhabitants | Estimated size of IRS: 0.20 % of population | Estimated inf. collected amounts t/year Based on 0.56 kg/cap.day | Cans consumed [t/year] |
|---|---|---|---|---|
| Athens (Attica region) | 3,827,624 | 7,655 | 1.230,4 | 3.963 |
| Bucharest | 1,880,000 | 3,760 | 604,3 | 588 |
| Miskolc | 164,510 | 328 | 52,7 | 188 |

# UBC info in the pilot cities

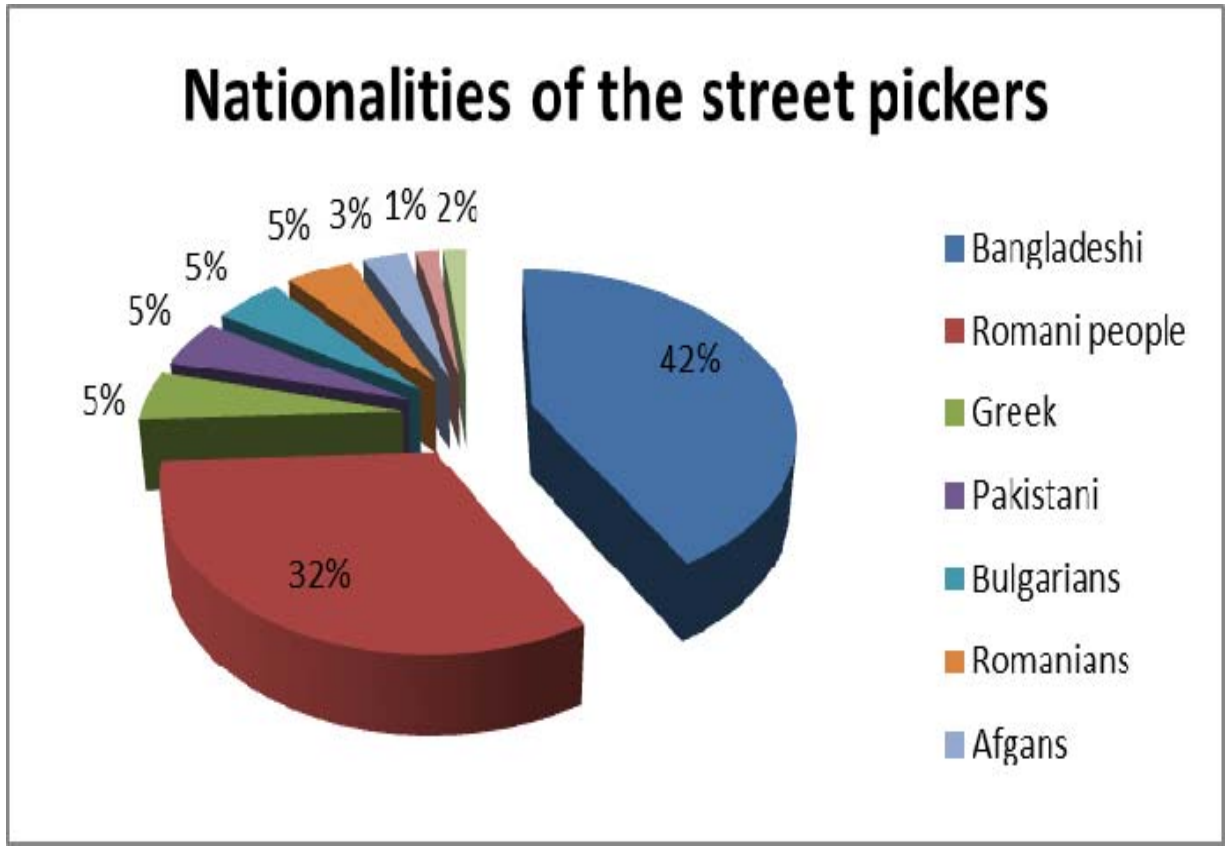
| City | Inhabitants | MSW generation [kg/cap.year] | Cans used [kg/cap.year] | waste composition: metal fraction [%] |
|---|---|---|---|---|
| Athens | 3,827,624 | 496 | 1.2 | 3.74 |
| Bucharest | 1,883,425 | 318 | 0.33 | 1.46 |
| Miskolc | 163,939 | 402 | 1.15 | 3.8 |
| Vienna | 1,797,337 | 520 | 1.6 | 4.6 |

Population, MSW generation and can consummation in pilot cities ([1]…ELSTAT, General population Census 2011; [2]…INSSE, 2013 Census 2011, [3]United Nations); MSW generation, national figures, Cans, EAA figures

# Formal Waste Collection - Athens

- Total quantity of waste collected has been dropping - 2010 to 2014, by about 25 %
  - 2,519,985 tons in 2010 to 1,897,502 tons in 2014
- Recyclables (packaging and printed paper) collected in blue bin (1 bin / 75 People)

# Informal UBC collection Athens

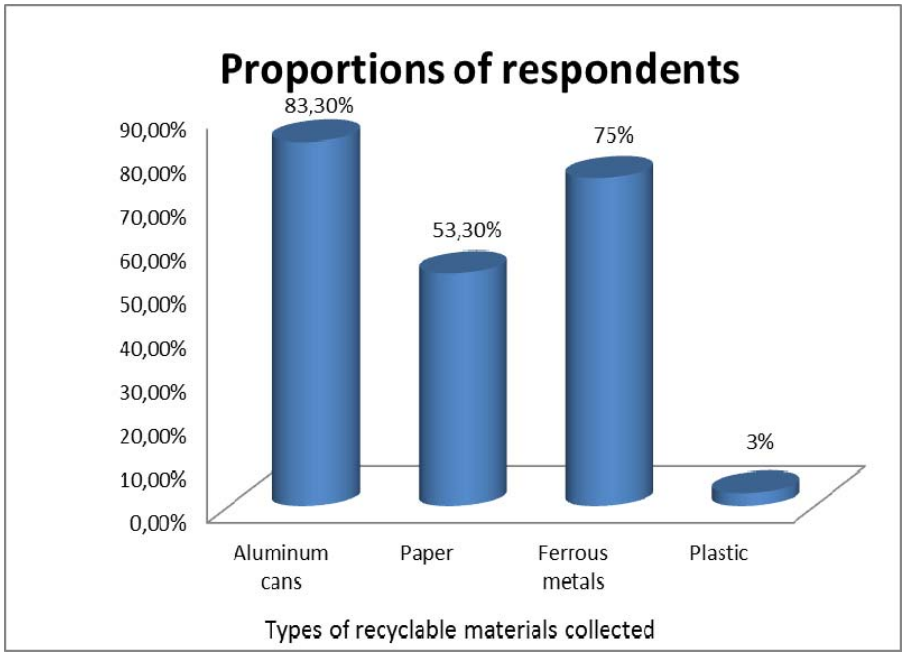


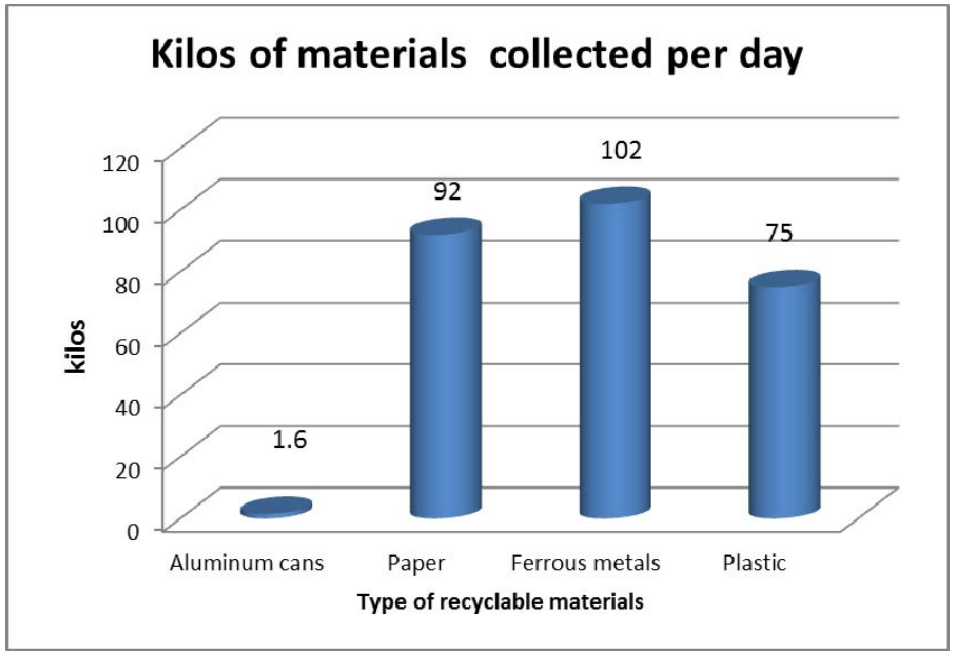

street pickers from Bangladesh (80%), Pakistan (100%) or Afghanistan (100%) are street pickers since the day they came to Greece (based to the questionnaire)

# Informal UBC collection in Athens

- 58% collect recyclable materials **6 to 7 days a week** for **8 to 10 hours per day** (70%).
- 43.3% **shopping trolleys**, on foot,
- 23.3% use tricycle motorbikes with small trailers
- 73% search for and collect materials both **from waste bins and EPR containers (blue bin)**

# Informal UBC collection in Athens



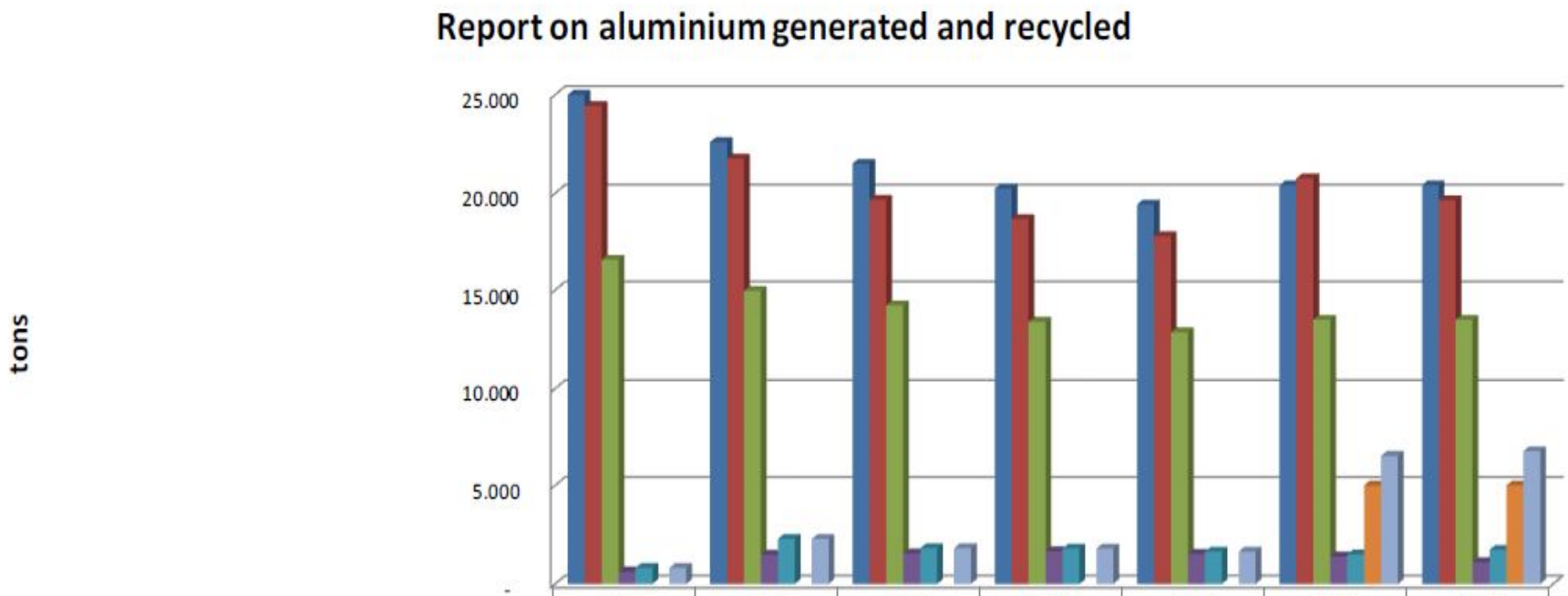



# Informal UBC collection in Athens

| Types of recyclable materials | Price (EUR/kg) |
|---|---|
| Aluminium cans | 0.70 |
| Paper | 0.06 |
| Ferrous Metals | 0.17 |
| Plastic | 0.10 |

average income for interviewed waste pickers: 16.05 EUR/day.

# Aluminium packaging and aluminium beverage cans generated and recycled in Greece




| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| Put on market, aluminum packaging total, Hellenic Recycling Agency (Ministry of Environment and Energy) 1 | 25.000 | 22.600 | 21.500 | 20.240 | 19.430 | 20.400 | 20.400 |
| Put on market, total aluminum packaging, HERRCO | 24.434 | 21.765 | 19.681 | 18.699 | 17.828 | 20.761 | 19.645 |
| Put on market, beverage cans 2 | 16.544 | 14.955 | 14.228 | 13.394 | 12.858 | 13.500 | 13.500 |
| Blue bin recycling, HERRCO | 631 | 1492 | 1550 | 1662 | 1527 | 1391 | 1115 |
| Traced recycling (blue bin + ELVAL), HERRCO 3 | 815 | 2.279 | 1.814 | 1.794 | 1.640 | 1.499 | 1.739 |
| Informal sector, non-traced, estimate 4 | | | | | | 5.000 | 5.000 |
| Total UBC recycling (traced and non-traced)5 | 815 | 2.279 | 1.814 | 1.794 | 1.640 | 6.499 | 6.739 |

# Official data on UBC generation and collection in Greece

| Greece | [t] | % |
|---|---|---|
| Put on market, beverage cans | 11,500 (estimated by EAA)<br>13,000-15,000 (estimated by HERRCO) | |
| Official sector recycling, HERRCO | 1,115 | 6.1 |
| Informal sector, recorded (ELVAL) | 624 | 3.4 |
| Informal sector, non-recorded, estimate | 5,000 | 27.2 |
| no information | 13,661 | 67.0 |

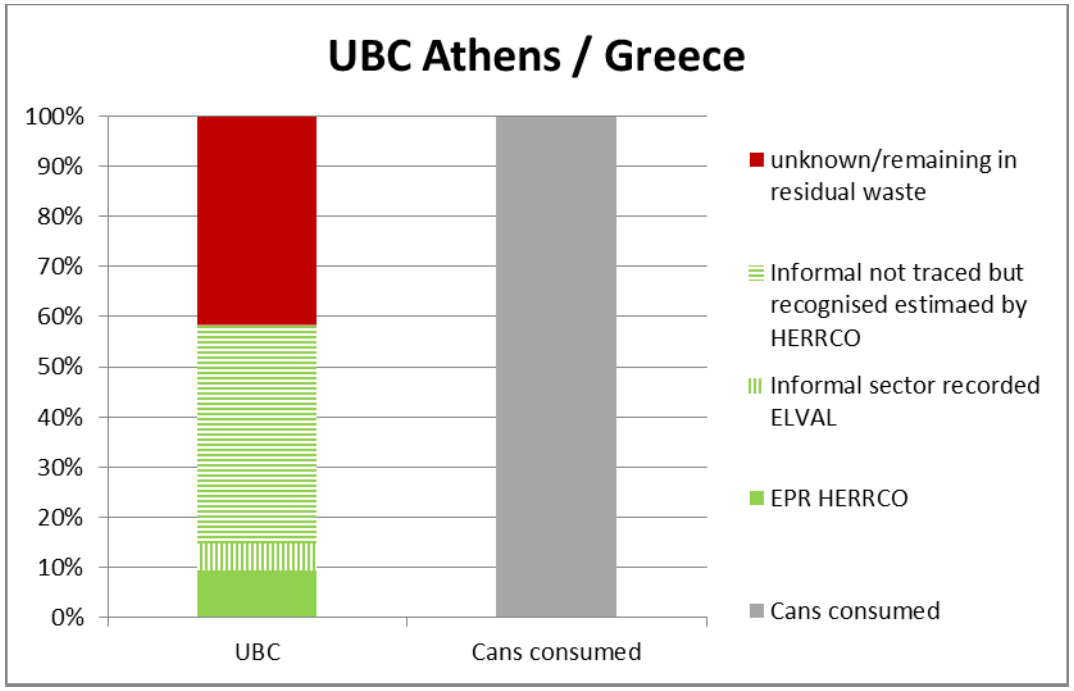
# Results informal sector

| | Bucharest | Miskolc | Athens |
|---|---|---|---|
| Informal collection kg/cap.day | 1.7 | 6 | 1.6 |
| Generalists | 70% | 25% | 100% |
| Total number of collectors | 936 | 110 | 3200 - 7655 |
| Collector: urban population | 0.05% | 0.07% | 0.08% - 0,2 % |
| Place of collection | cleaning personal, street, small bins | mainly big waste bins and public waste islands | 73% collection from bins and EPR containers |
| Place of selling | metal traders/scrap yards | up to 95 % of cans in VTBM from inf. Waste pickers | metal traders / scrap yards |

# Results informal sector

| | Bucharest | Miskolc | Athens |
|---|---|---|---|
| means of transportation | plastic bags, sacks | plastic bags, sacks | at least shopping trolley or pram, (53%), trailer on motorbike 23 % or cars, even trucks |
| collection days per week | 6 - 7 | 6 (81 %) | 6 - 7 |
| Nationality of collectors | Mainly Romanian | Mainly Hungarian | Mainly Bangladeshi also Romani, 5 % Greek |

# UBC Athens




Estimation of UBC recycling in Greece (based on 11,500 t/y cans consumed)

# Summary and Discussion

- Extremely different initial situation
  - consumed cans 0.3 – 1.5 kg/cap!
  - Collection system (separate collection more or less introduced)
  - Illegal re-melters existing or not
  - RVM's existing or not
  - UBC put on market: Data available at country level => adjustment to city level

# Summary and Discussion

- In all cities the informal sector contributes to the formally collected amounts.
  - 70% via RVMs about in Hungary or
  - 43 % via scrap dealers in Romania and
  - 35 % via scrap dealers in Athens.

*Thank you for your attention!*

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