Potential for Recovery of Recyclables from the Mixed MSW of the Municipality of Lesvos, Greece


Design of Environmental Plants Lab,
School of Environmental Engineering,
Technical University of Crete, Greece
 Population: 86,436 inhabitants

 MSW production (mixed plus recyclables): 38,431 tons/year

 Recyclables: 1,285 tons/year (blue bin)

 Recyclables are just 3.3% of total MSW
To analyze the exact composition of the MSW generated in the island of Lesvos

So as to identify the possibilities for a better utilization of the recyclable materials

The study took place in Lesvos and Chania
Methodology

- 40 tons of MSW from the landfill of Lesvos were transported to Chania, Crete

- MSW was sorted in the modern solid waste management facility of DEDISA (Chania), which is equipped with sensor-based sorting technology

- The loading and unloading of the waste was made under strict conditions, so as to eliminate interference of other materials

- The sample was analyzed for recyclable materials: paper, board, films, FE, NE, PET Bottles, HDPE, PP

- The remaining organic fraction and residual materials were also quantified
Transportation-unloading-shorting-packing
MSW composition in the green bin

- Organic: 50.3%
- Others: 34.8%
- Paper: 4.0%
- Board: 1.4%
- Beverage carton: 0.1%
- PET: 0.9%
- PS: 0.2%
- PP: 0.4%
- HDPE: 4.5%
- Color Film: 0.5%
- Clear film: 1.1%
- FE: 0.4%
- NE: 1.4%

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Recyclables from green bin: tons per year

Recyclables (tons/year)
Total: 5.527 tons/year

- HDPE; 197
- PET; 341
- PS; 56
- board; 503
- FE; 521
- NE; 163
- clear film; 397
- color Film; 1.669
- paper; 1.484
- beverage carton; 36

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Recyclables: Green vs blue bin

Recyclables (tons/year)
Total: 6527 tons/year

Recyclables in green bin: 5527 tons/year
Recyclables in blue bin: 1285 tons/year
Recyclables recovered 902 tn/y

Current system

Blue bin collection

Green bin collection

Input of recyclables (1285 tn/year)

Sorting plant (manual sorting)

Landfill 37.530 tn/y

Recyclables recovered 902 tn/y

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Scenario 1: Semi-automatic sorting plant

- **Blue bin collection**
  - Packaging waste
  - Sorting plant (first shift)

- **Green bin collection**
  - Landfill: 33.147 tn/y (organic plus residue)
  - Sorting plant (second shift)

- **Recyclables**: 5.284 tn/y

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Scenario 2: Semi-automatic sorting plant with composting of 100% organic

Landfill 14.311 tn/ y (residue)

Recyclables 5.396 tn/ y
Recyclables recovery: Efficiency

- Current system: 14%
- Scenario 1: 80%
- Scenario 2: 81%
CAPEX requirements

<table>
<thead>
<tr>
<th></th>
<th>Current System</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
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<tbody>
<tr>
<td>Euros</td>
<td>1,580,000 €</td>
<td>4,590,000 €</td>
<td>7,600,000 €</td>
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</table>

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Annualized total cost

Composting 100% of the organic fraction

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Net Cost</th>
<th>Recyclables Revenue</th>
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<tbody>
<tr>
<td>Current System</td>
<td>88,789 €</td>
<td>1,011,029 €</td>
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<tr>
<td>Scenario 1</td>
<td>578,027 €</td>
<td>761,489 €</td>
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<tr>
<td>Scenario 2</td>
<td>600,422 €</td>
<td>618,956 €</td>
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Annualized total cost

Composting 50% of the organic fraction

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<tr>
<td>scenario 2</td>
<td>853,011 €</td>
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</tbody>
</table>

Net cost
Recyclables revenue

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Comparison with the current model

Cost reduction 32.8%

Cost reduction 15.2%

Recyclables revenue 84.6%

Recyclables revenue 85.2%

Scenario 1

Scenario 2 (50% composting)

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Conclusions

- For Lesvos Island: **Separation at source is not enough so as to reach the high targets set by the EU**

- **5527 tons of recyclables** are being landfilled annually (about 4 times more than the materials in the blue bin)

- The recyclables found in green bin **must be recovered**

- Alternative Solutions: **semi-automatic sorting plant (scenario 1)** and **semi-automatic plant with composting (scenario 2)**

- Both scenarios indicates potential for **recovery of about 80% of recyclable materials** while currently only 14% is being recovered

- The **net annualized cost** for each proposed scenario is lower than the current cost
Thank you for your attention!

Correspondence:
petros.gikas@enveng.tuc.gr