Potentials in the waste sector in Croatia

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Transfer of waste management concepts and technologies
IFAT 2018, München, 15/05/2018
Energy Institute Hrvoje Požar (est.1994)

- National energy institute
- Development of modern and sustainable energy markets by integrating RES and EE, new technologies and know-how exchange
- ~90 employees (80% highly educated)
- 6+1 Departments:
  - Renewable Energy Sources, Energy Efficiency and Environmental Protection (26): multidisciplinary team (7 different professions + profiling)
- Market orientated
References

- Intelligent Energy Europe
- FP6 – Sixth Framework Programme
- FP7 – Framework Programme 7
- South East Europe Programme (IPA)
- Interreg
- Smart MED Parks
- INOGATE
- LIFE
- Horizon 2020
- ...

>70 European projects
> 100 regional projects
Waste management status in Croatia

- Total reported quantities of produced waste: 3.7 million tonnes (municipal and production waste) in 2014
  - 10.5 % increase compared to 2012
  - 97 % non-hazardous waste
  - 3 % hazardous waste

- Total of around 3.4 million tonnes of waste has been treated (production and municipal waste)
  - 3.1 million waste from within Croatia,
  - 315,000 tonnes imported waste
Management of produced waste

Percentage of recovery/disposal of total waste (production and municipal) in the Croatia in 2014 according to the reports by waste treatment facilities (Croatian Agency for the Environment and Nature, 2016)


- The public service of collecting municipal waste in 2015 was utilized by 99% of the population (not collected in 1 municipality)
Separately collected municipal waste

- Primarily paper, glass, plastic, metal

- Collecting from households, from containers on public surfaces, smaller collection centres, recycling yards and by established national schemes for special categories of waste

- Separate collection of useful types of waste from municipal waste organised by the local self-government units

- Increase in number of built recycling yards (17 (2010) → 84 (2016)), introduction of 46 mobile units until 2016
  - Total quantities collected in recycling yards did not increase significantly!

- 207 municipal waste public collection companies
Biodegradable municipal waste

- Biologically degradable types of waste originating from households and waste which is in its nature and composition similar to household waste, such as waste paper, biodegradable textile, green waste from the upkeep of public surfaces and etc., except production waste and waste from agriculture and forestry.

Produced and landfilled biodegradable municipal waste in the period from 1997-2015, in relation to prescribed goals (Croatian Agency for the Environment and Nature, 2016)
Transboundary movement of waste

The data on exported/imported non-hazardous waste in 2012 were not processed

Regulations on waste management in Croatia

- Act on Sustainable Waste Management (OG No. 94/13, 73/17)
- Waste Management Strategy of the Republic of Croatia (OG No. 130/05)
- Ordinance on management of wastewater treatment sludge when used in agriculture (OG No. 38/08)
- Ordinance on waste management (OG No. 117/17)
- Ordinance on by-products and end-of-waste status (OG No. 117/14)
- Ordinance on the waste catalogue (OG No. 90/15)
Waste management concept in Croatia

Strategy of waste management in the Republic of Croatia (OG No. 178/04)
Facilities and systems for waste management

- Recycling yards
- Facilities for biological waste treatment (11 composting plants, 11 biogas facilities)
- Other facilities for material recovery of waste
- Facilities for energy recovery and waste incineration (23 facilities)
- Waste management centers (13 planned – currently: Kaštijun, Marišćina)
- Landfills (148 landfills)
Current waste management system (1)

- Bio-waste – only 17% of separate waste collection
- Textile and footwear waste – relatively small (around 8,000 t/year)
- Packaging waste – subsidies for waste recovery
- Waste tyres – enough capacities for material and energy recovery
- Waste oils – 33% collected
- Waste batteries and accumulators (sufficient)
- End-of-life vehicles (sufficient)
Current waste management system (2)

- Waste electrical and electronic equipment – 4 kg of collected EE per capita (2012)
- Waste ships and marine waste – not established
- Construction and demolition waste (sufficient)
- Residual sludge from WWTPs – not established
- Waste polychlorinated biphenyls and terphenyls – not established
- Asbestos waste – within the frame of 17 landfills
- Medical waste (sufficient)
The total remaining capacity of landfills at the end of 2015 was 17,301,717 tonnes.

Gradual redirection of waste to regulated landfills or landfills that can become regulated on short notice necessary.

Waste management center systems concept with mechanical-biological treatment technology has been contributing to the achievement of goals regarding the decrease of biodegradable waste landfiling and total quantities of landfilled waste.

Not sufficient in regards to achieving the municipal waste recycling goals!
Position and capacity of planned waste management centers according to the Waste Management Plan of Croatia for the period 2007-2015

- WMC Kaštijun: 90,000 t/year capacity (County of Istria)
- WMC Marišćina: 100,000 t/year capacity (County of Primorje-Gorski Kotar),
- projects are being conducted for:
  - WMC Bikarac: 38,000 t/year capacity (County of Šibenik-Knin)
  - WMC Biljane Donje: 80,000 t/year capacity (County of Zadar),
- MBT facility in the City of Varaždin (95,000 t/year).
Municipal waste management scheme

Waste Management Plan of Croatia for the period 2017-2022
Good examples in Croatia

- Island of Krk
  - Population: 19,286
  - Area: 406.78 km²

- Ludbreg (Varaždin county)
  - Population: 8,435
  - Area: 68.26 km²
Conclusions

- According to Strategy of waste management in Croatia:
  - The separation of resource use and economic growth has not yet been achieved fully
  - The separation of waste production and economic growth has not been achieved
- Conduction of measures for waste prevention defined by the Waste Prevention Plan
- Establishing re-use centres and securing necessary equipment for home composting
- Establishing a system for separate collection of municipal waste
  - through securing the necessary infrastructure for the separation of municipal waste

- Mixed municipal waste (waste remains) to be collected through the public service of mixed municipal waste collection, and the collected waste will be taken to WMCs directly or through transfer stations.

<table>
<thead>
<tr>
<th>Total produced municipal waste</th>
<th>Separately collected municipal waste</th>
<th>Mixed municipal waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1.571.222 t</td>
<td>≥ 942.733 t</td>
<td>≤ 628.489 t</td>
</tr>
<tr>
<td>Separately collected municipal waste (paper, glass, plastic and others)</td>
<td>Separately collected bio-waste</td>
<td></td>
</tr>
<tr>
<td>≥ 741.617 t</td>
<td>≥ 201.116 t</td>
<td></td>
</tr>
</tbody>
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An overview of target values in 2022

Waste Management Plan of Croatia for the period 2017-2022
Next steps...

- Main potentials for further development:
  - Energy & material recovery
  - Potential utilization of waste on landfills

- Main challenges:
  - Public opinion
  - Regulations and legal framework

- Great potential for cooperation with EU countries (in form of technology and knowledge transfer)

- Need for education through best practices
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