



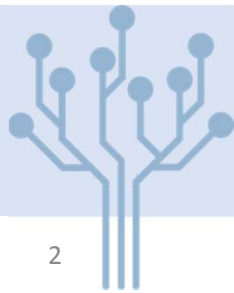
Impacts of policy decision on municipal solid waste composition in Croatia

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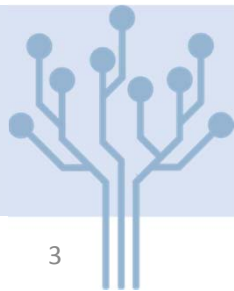
- Assess the impacts of waste legislation on waste management system and MSW composition in Croatia during period from 1990 to 2014
 - % of certain waste types in MSW
- Integrated management of municipal solid waste (MSW) is a necessity
- Implementation of EU regulations since 2004
- Collection coverage 100 %

Introduction



- 13th century → The Statute of the city of Dubrovnik
 - Formed waste disposal system
 - Proscribed penalties for disrespecting of orders
- 15th century → The Statute of the city of Gradec (a part of Zagreb city today)
 - Clean streets are necessity
- 20th century → poor waste management solutions
 - 1904 first waste incineration in Rijeka
 - 1980's involvement of relevant state institution
 - 1990's formation of the Republic of Croatia → first waste legislations

Overview of policy decision making in Croatia



- **1st Waste Act (OG No. 34/1995)**

- EU regulations **NO**
- Separate collection of packaging waste (glass, metal and plastic)

- **2nd Waste Act (OG No. 151/2003)**

- EU regulations **YES**
- Additional separate collection of construction waste, WEEE, end-of-life vehicles and waste tires

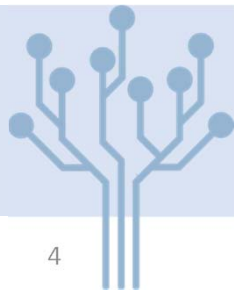
- **3rd Waste Act (OG No. 178/2004)**

- EU regulations **YES**
- special waste categories
 - packing waste, WEEE, end-of-life vehicles, waste batteries and accumulators, waste tires, medical waste, coal and mineral waste and waste oils

- **4th Act on Sustainable Waste Management (OG No 94/2013)**

- EU regulations **YES**
- Separate collection of

1. bio-waste,
2. textile and footwear waste,
3. packaging waste,
4. waste tires,
5. waste oils,
6. waste batteries and accumulators,
7. end-of-life vehicles,
8. asbestos-containing waste,
9. medical waste,
10. WEEE,
11. end-of-life ships,
12. marine waste,
13. C&D waste
14. WWT sludge,
15. wastes from TiO₂ production,
16. PCB and polychlorinated terphenyls



- Data

- Obtained from authorized company
- Determined by direct sampling
- Collected during two time periods

- Statistical analysis – *waste categories*

- | | |
|-------------------------|------------------|
| 1. bio-waste | 6. waste plastic |
| 2. waste skin and bones | 7. waste glass |
| 3. waste wood | 8. waste metal |
| 4. waste textile | 9. waste rubber |
| 5. waste paper | 10. other waste |

- Results

- Presented in percentage by weight (%)

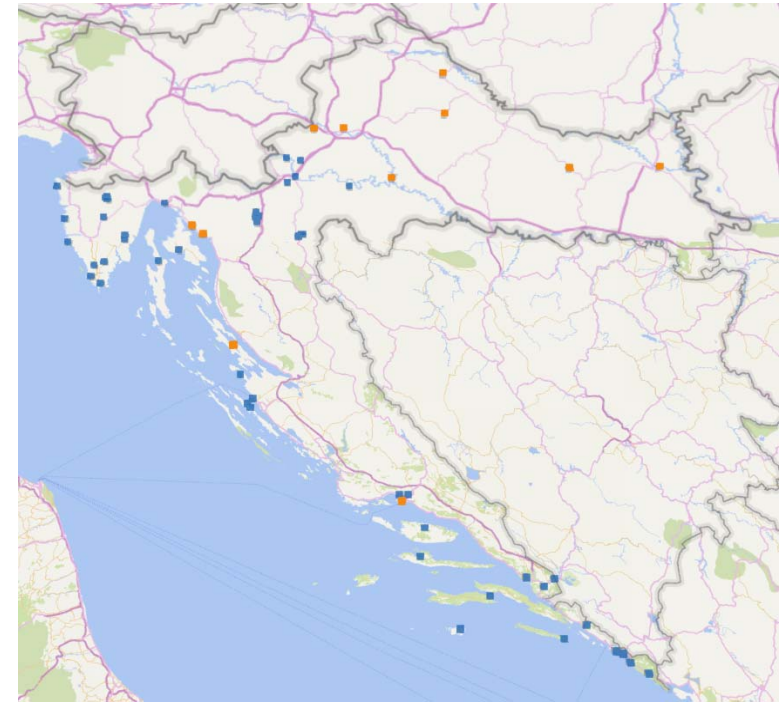
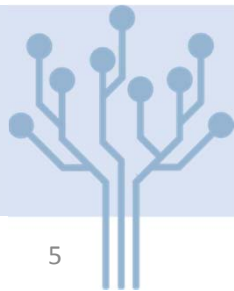


Fig. 1 Locations of MSW composition sampling
(blue mark - sampling in period 2005-2015;
orange mark - sampling in period 1990-2000)

Materials & methods



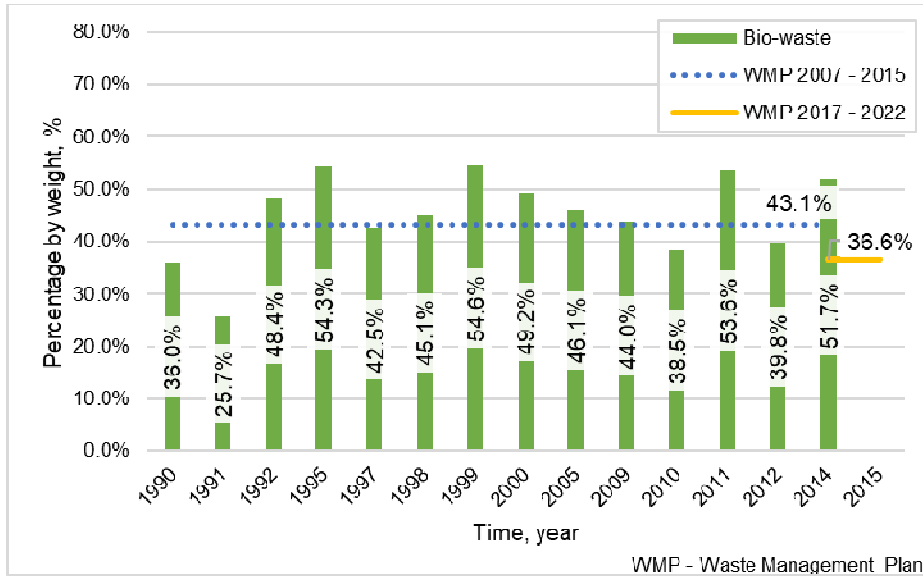


Fig. 2 Bio-waste in MSW

Ordinance on waste categories (OG No. 27/1996)
 Ordinance on waste treatment conditions (OG No. 123/1997)
 Ordinance on bio-waste management – *not yet issued*

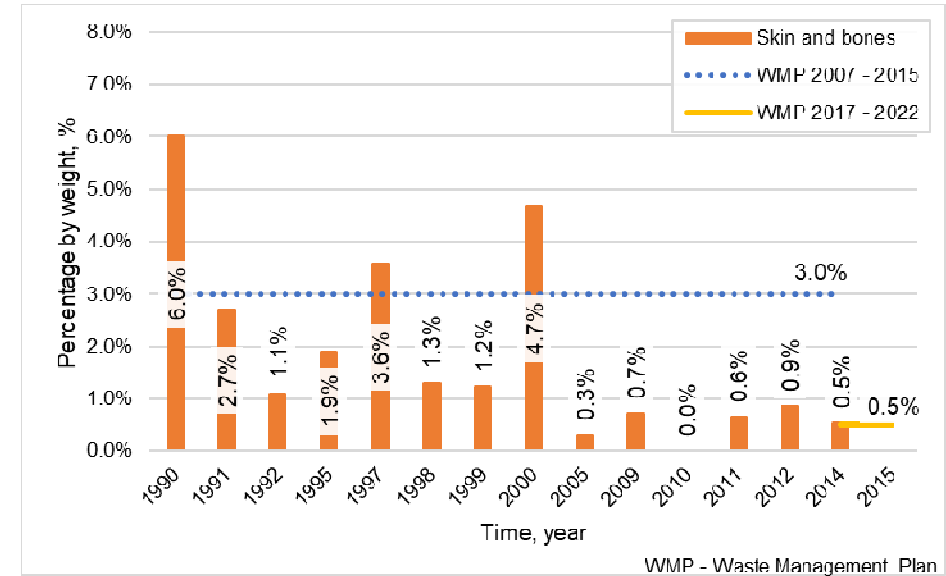
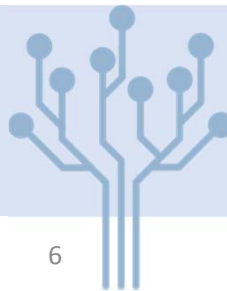


Fig. 3 Waste skin and bones in MSW

Ordinance on way of treatment with byproducts of animal origin that are not for human diet (OG No. 56/2006)

Results & discussion



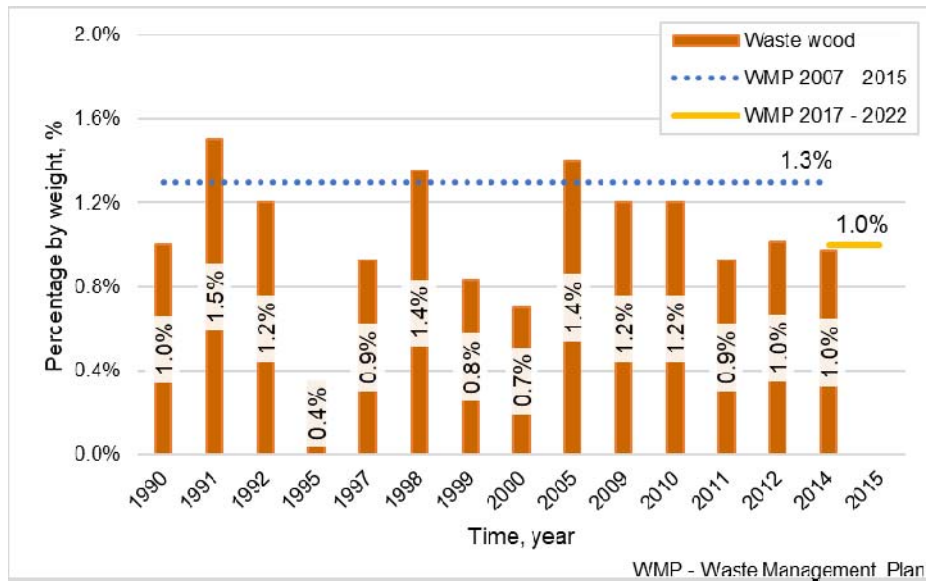


Fig. 4 Waste wood in MSW

Dependable on the area of sampling (rural/urban)

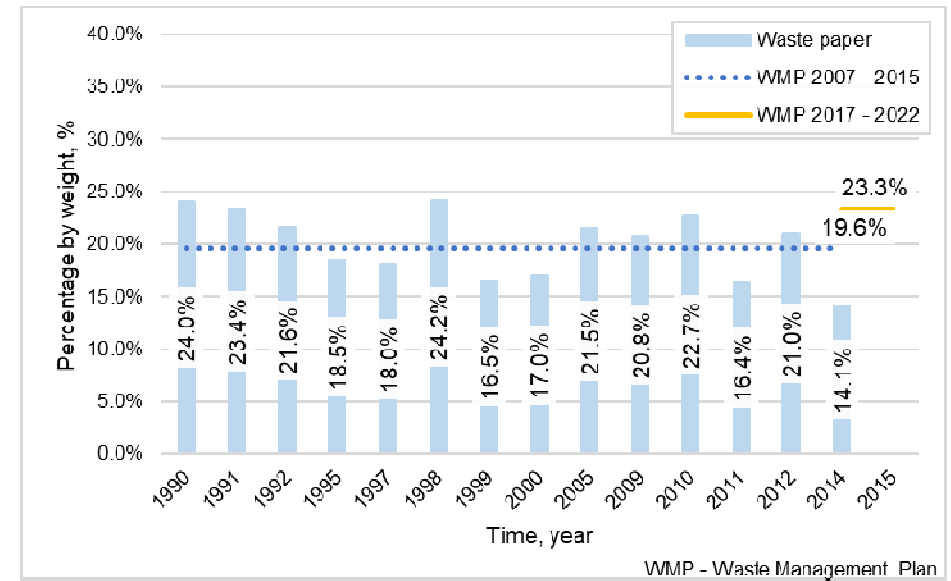
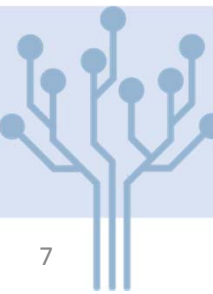


Fig. 5 Waste paper in MSW



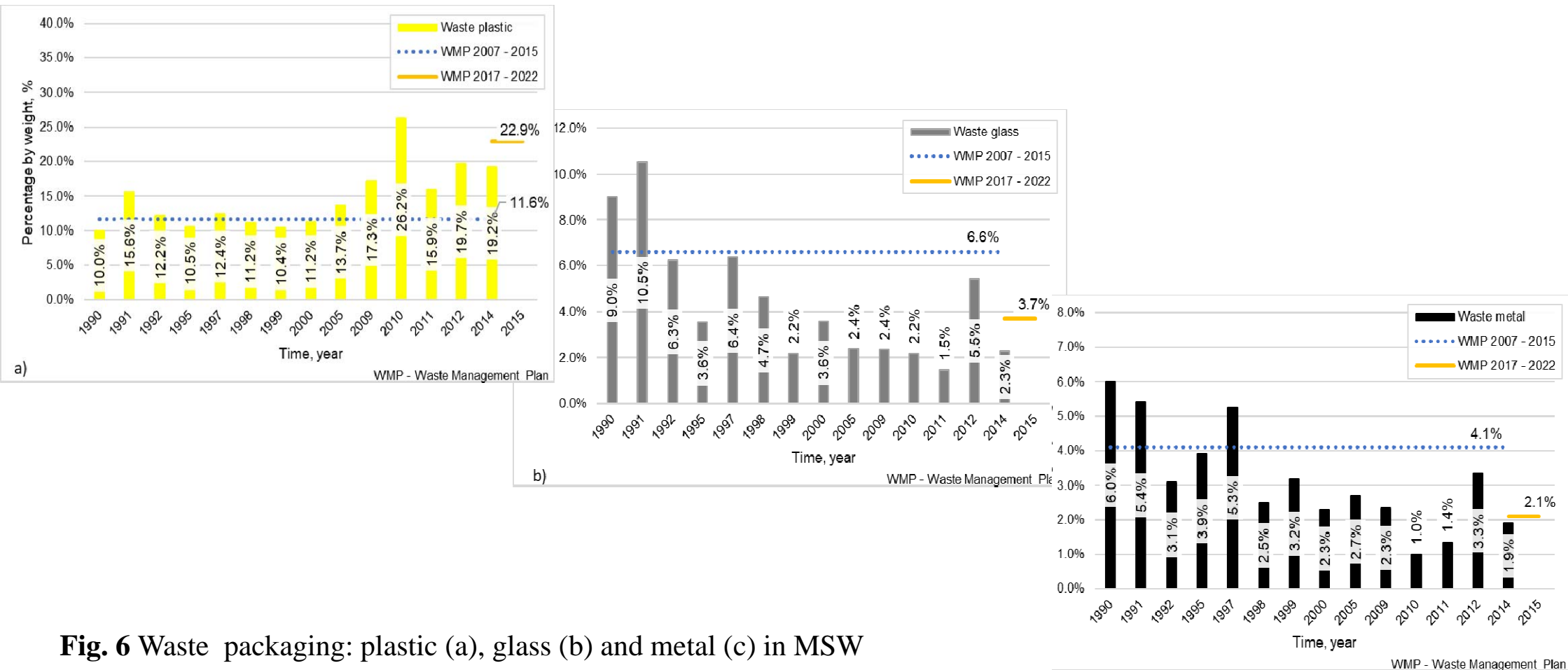
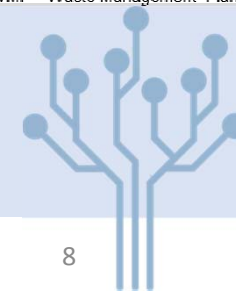


Fig. 6 Waste packaging: plastic (a), glass (b) and metal (c) in MSW

Continuous separate collection since 1995
 new WMP → doubled content of plastic packaging



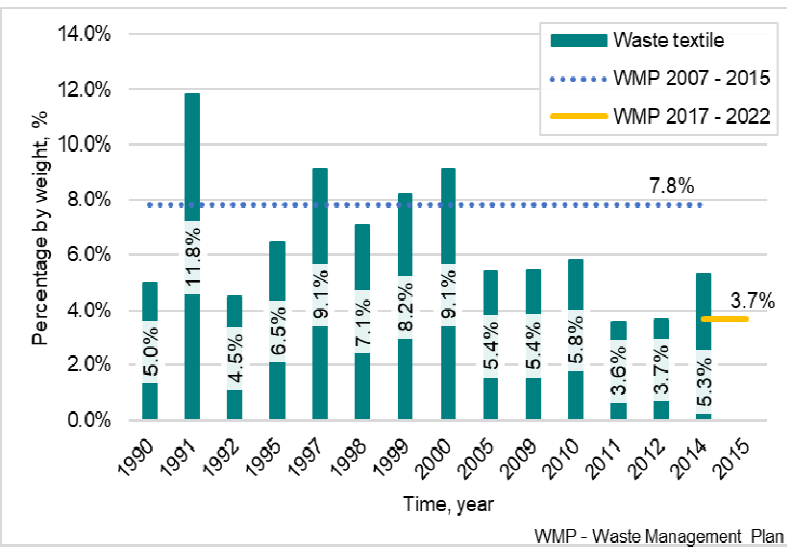


Fig. 7 Waste textile in MSW

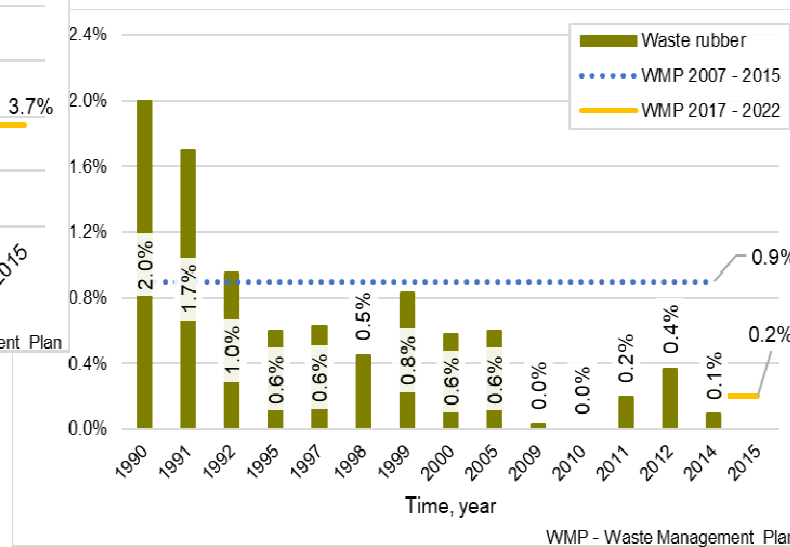


Fig. 8 Waste tyre in MSW

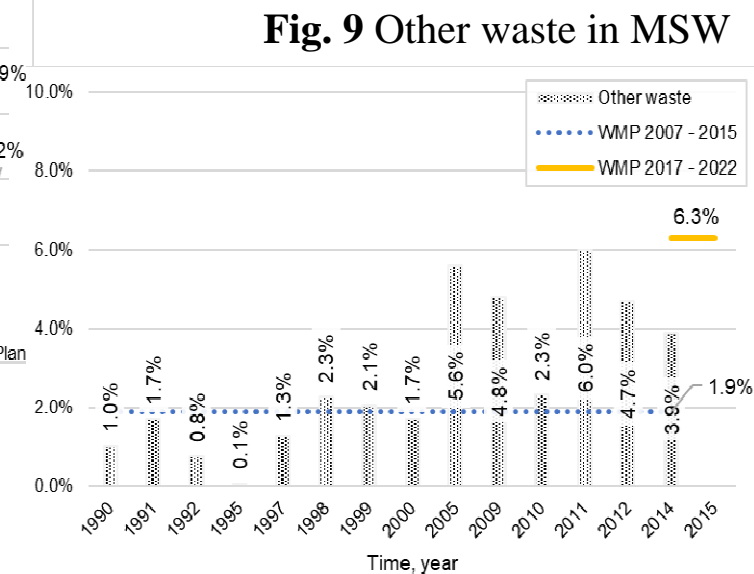
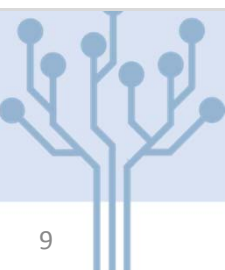


Fig. 9 Other waste in MSW

Fluctuations due to crisis in textile industry

Ordinance on waste tyre management (*OG No. 40/2006*)

Further analysis is needed to determine other SW categories (WEEE, medical waste, waste batteries)



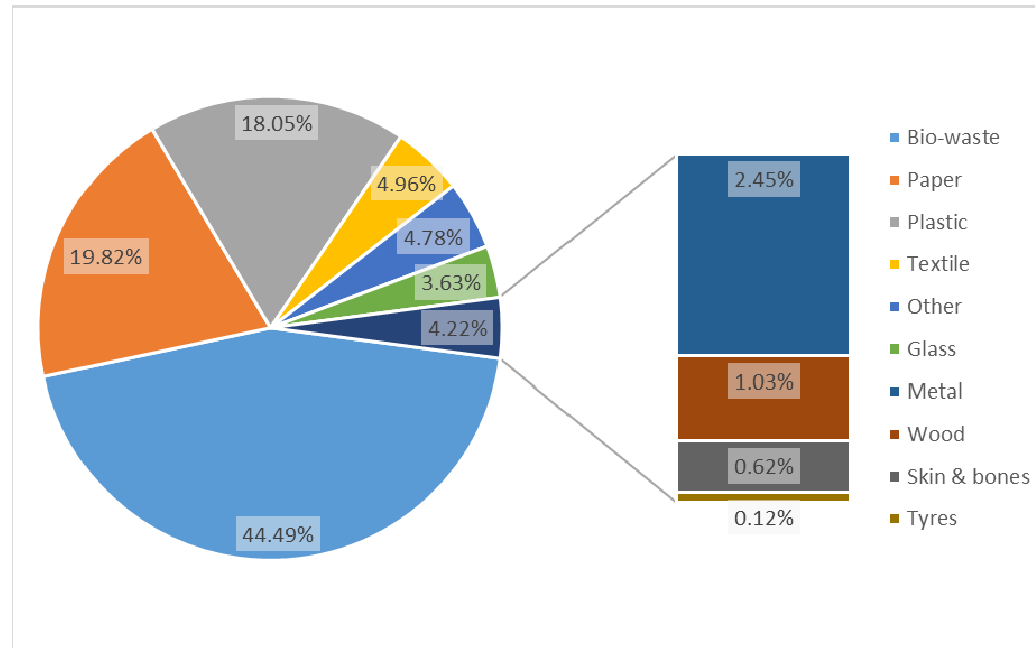
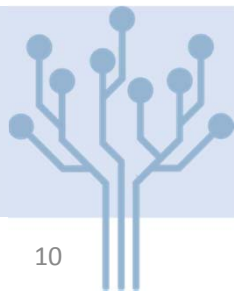


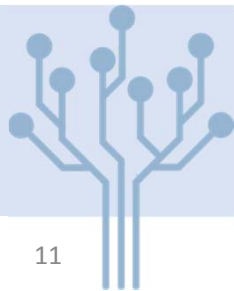
Fig. 10 MSW composition

Current MSW composition



- Impact of waste regulations is visible in special waste categories
 - Waste skin and bones
 - Waste tyres
- Other SWC can not be directly connected with regulations
 - Economic crisis?
- Waste management policy cannot compete with the economic advancement
 - plastic packaging

Conclusion



Thank You for Your Attention!

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