



Application of MFA as a decision support tool for waste management in small municipalities – case study of Serbia



Dr. Nemanja Stanisavljevic Assistant professor



Faculty of Technical Sciences Department of Environmental Engineering

Goal of the project?







Material Flow Approach?







Goal oriented decisions?

Available technology treatments

Legislation (EU Hierarhy)

- Protection of mankind and the environment
- Conservation of recourses
- Sustainable waste management

"Economic boundaries = Affordability of waste management"





Selection of municipalities?

Krupanj 20191 st. Region-Loznica

Aleksandrovac 23971 st. Region-Kruševac



Bela Crkva 20688 st. Region-Vršac

Svijalnac 33097 st. Region-Lapovo

> Kuršumlija 20688 st. Region-Niš





Application of MFA for model development







Waste generation measurements

Performed in 4 seasons

Waste Quantity





Perform in period of one week i.e. when whole municipality was covered by collection

Waste Composition

Samples collection (3 zones x 500kg)



Measuring of each category



Manual sorting (15 fractions)



Scenario development

Critical assesment of status quo

- Population under organized waste collection system
- Waste separation activities on a very low level
- No energy recovery from the waste
- Direct landfiling of biodegradable waste fractions without any pretreatment
- Unapropriate landfil practice (landfill gas, leachate)





Status quo







Scenario development

- Scenario 1 waste transportation to the Regional center
- Scenario 2 waste separation plant and transport into the Regional center
- Scenario 3 waste separation plant, and composting plant
- Scenario 4 separation plant, anaerobic digestion and composting plant

- Primary selection of recyclable materials -





Scenario I





Scenario II





Scenario III







Collection system - A

Waste category	Wet bin	Dry bin
Garden waste	95%	5%
Other biodegradable waste	85%	15%
Paper	30%	70%
Glass	30%	70%
Cardboard	30%	70%
Composite materials	30%	70%
Metals – packaging and other	30%	70%
Aluminum cans	30%	70%
Plastic packaging waste	30%	70%
Plastic bags	70%	30%
Other plastic	30%	70%
Textile	30%	70%
Leather	70%	30%
Diapers	98%	2%
Fine elements	98%	2%





Scenario IV







Collection system

Waste category	Bio bin	Rec. Mat	Other
Garden waste	85%	5%	10%
Other biodegradable waste	85%	5%	10%
Paper	3%	95%	2%
Glass	3%	85%	12%
Cardboard	3%	95%	2%
Composite materials	5%	70%	25%
Metals – packaging and other	3%	95%	2%
Aluminum cans	3%	95%	2%
Plastic packaging waste	3%	95%	2%
Plastic bags	5%	15%	80%
Other plastic	3%	95%	2%
Textile	5%	70%	25%
Leather	5%	5%	90%
Diapers	5%	5%	90%
Fine elements	5%	5%	90%





Criteria's for evaluation

- GHG emissions
- Energy consumption
- Energy production
- Recycling rate
- Landfill volume
- Mass of landfilled organic waste
- N Leachate to the hydrosphere
- <u>Economical feasibility costs</u>





Criteria's for evaluation - Results







- Data collection
- Scenario development
- Evaluation of developed scenarios and future perspectives

"SCENARIO ANALYSIS BEFORE MAKING ANY NEW DECISIONS IN WASTE MANAGEMENT"





THANK YOU!





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