



Greensettle

GREEN CITIES AND SETTLEMENTS

Strategic waste management planning

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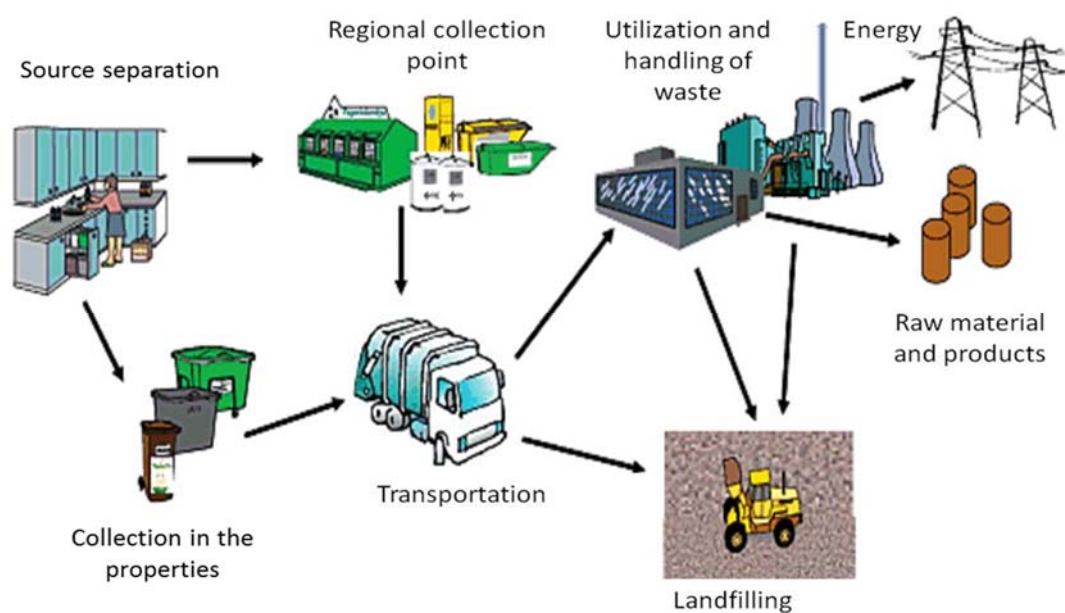
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Organization of Municipal waste management in Finland



Kuntaliitto



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Example case for MSWM planning

- The hypothetical city with population of 60 000 persons in 2014.
 - The number of inhabitants has been quite stable
- The amount of MSW produced is estimated to be one kilo (1000 grams) per person per day
- 21 900 tonnes annually for the whole city (365kg/person)



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Estimate of MSW fractions

Amount of MSW per inhabitant	Percentage	kg/year
Paper and cardboard	20 %	73
Bio-waste (food)	18 %	65,7
Plastic	12 %	43,8
Ferrous metals	4 %	14,6
Non-ferrous metals	1 %	3,65
Glass	10 %	36,5
Stones, bones, ceramics	9 %	32,85
Leather, rubber	1 %	3,65
Wood	4 %	14,6
Textile	5 %	18,25
Garden waste	1 %	3,65
Waste from treatment	10 %	36,5
Other	5 %	18,25
Total	100 %	365



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Estimating the amounts of MSW in 2019

- Population (no change after 2014) 60 000
- Service coverage 80 %
- Amount of MSW $1000 * 1,02^5 = 1104g$
(2% annual increase in five years)
- Total amount
 $(60\ 000 * 0,8 * 1104g/10^6) = 53$ tonnes/day



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Weekly amounts of recoverables and Collection points

- The weekly *amounts* of recoverables would be:
 - paper and cardboard 74,2 tonnes, plastic 44,6 tonnes, metals 18,6 tonnes, glass 37,2 tonnes and bio-waste 66,8 tonnes
- The weekly *volumes* of recoverables in 2019 would be:
 - paper and cardboard 1855 m³, plastic 1272 m³, metals 92,8 m³, glass 123,6 m³ and bio-waste 222 m³
- The *volumes of containers* for dry recoverables in the regional collection point:
 - two containers for paper and cardboard 2 * 8 m³, two containers for plastic 2 * 5 m³, one container for metal 3 m³ and one for glass 3 m³
- Kerbside collection for bio-waste (volume of containers 0,24 m³)



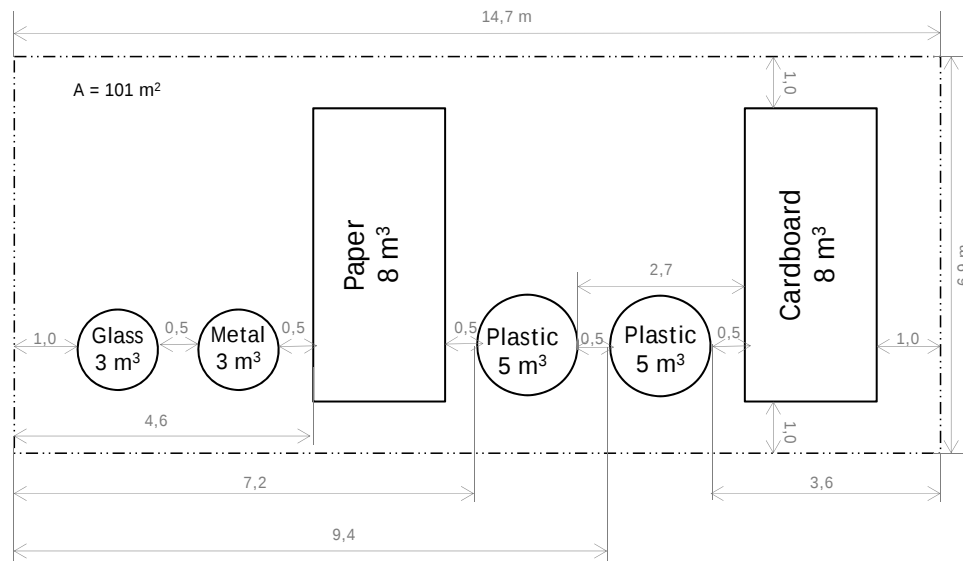
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Suggestion for the layout of regional collection point



There would be a need for 40 regional collection points if all the possible recoverables were collected separately.



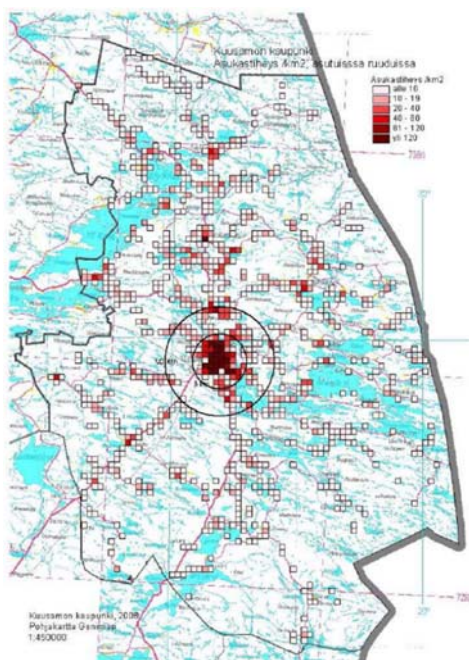
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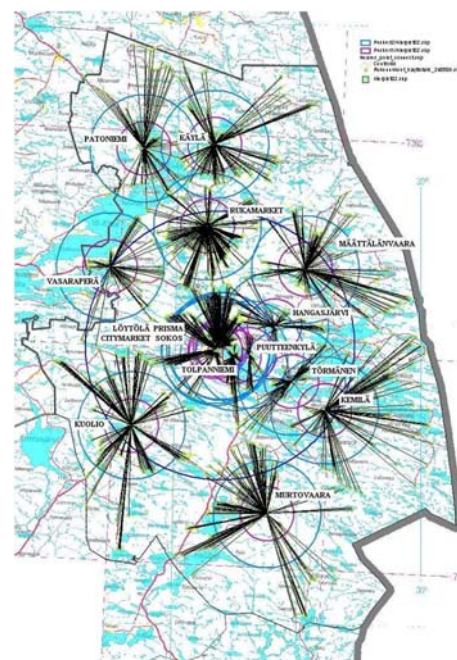
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Example from Finland: Kuusamo (inh. 16366)



Population density



Existing collection points



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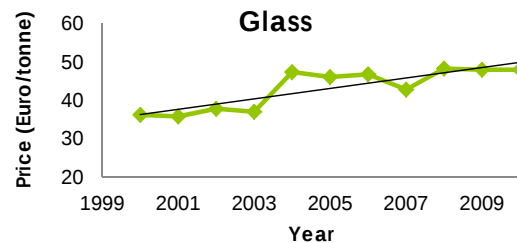
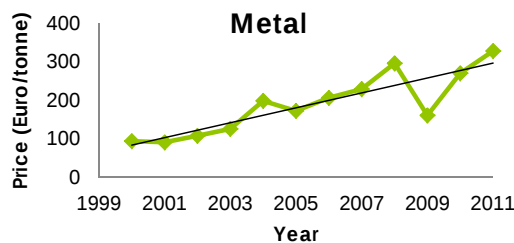
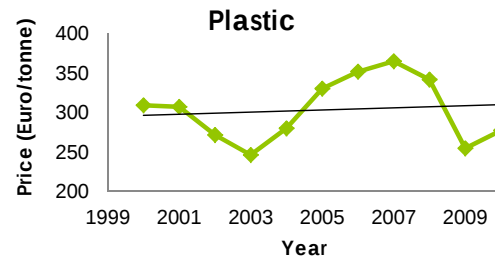
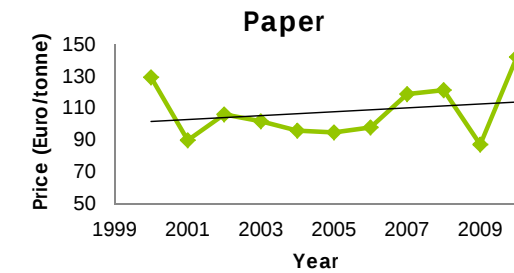
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The price of waste materials in Europe

The price of waste material fluctuates strongly but it is steadily increasing

- Paper 142 euro/tonne, plastic 277 euro/tonne, metal 328 euro/tonne and glass 48 euro/tonne



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The value of recoverables with 80% service coverage (maximum recovery, all the recoverables are collected, European price values)

- The total selling price for the collected recoverables in 2019 would be 1 463 924 euros
 - The price of waste paper would be 410 948 euro
 - The price for waste plastic 642 640 euro
 - The price for metal 317 504 euro
 - The price for waste glass 92 832 euro
 - (The price for treated bio-waste (compost and biogas) 42 290 euro)
- It depends on price of the waste and original raw material, cost of collection systems, utilization facility, and transportation distances and costs, if the material or energy use of recovered MSW is reasonable



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Case Oulu

Oulu Waste Management is a public-service company of the city of Oulu

- responsible for waste treatment, coordination of waste transport and waste education and supplementary services for both to private customers and companies.
- private customers can use reception points and landfills, recycling center and consultation services.
- funded by the fees collected from the delivery of waste to the Rusko Waste Management Centre and funds received from the sale of methane gas produced in waste management centre and from other services



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The operation region of Oulu Waste Management includes 12 municipalities with over 290 000 residents.



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Extended Producer Responsibility (EPR) in Europe

- Some product groups are under producer responsibility
 - An approach where the producers' responsibility for a product is extended to the waste
 - Producers are manufacturers and importers of the products
- Producers are obligated to finance and organize the collection, preprocessing, recycling, utilization and waste management of their products removed from use
 - They can take care of this obligation themselves or transfer the recovery obligation to producer organizations



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Wastes that belong under EPR schemes

- Waste Electrical and Electronic Equipment (WEEE);
 - Batteries and accumulators;
 - Tires;
 - Cars;
 - Newspapers,
 - Magazines, copy paper, and
 - Packaging
- For these wastes, depending on where you live, you either have kerbside collection, or some defined collection points – e.g. "Ekopisteet"



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Reception points for recoverables ("Ekopiste")

- Over 70 Ekopiste reception points in Oulu Waste Management's operation region
- Every reception point has separate containers for paper, cardboard, glass and metal



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Rusko Waste Management Centre consists of 93 hectares of protected park area of which 5,5 hectares are in use for landfilling of mixed waste and construction waste

- operations like recycling stations, hazardous waste storing, composting and for office use.
- reusable and recyclable domestic waste and hazardous waste to the free reception station
- about 300-350 customers visit waste centre every day.



Oulun Jätehuolto



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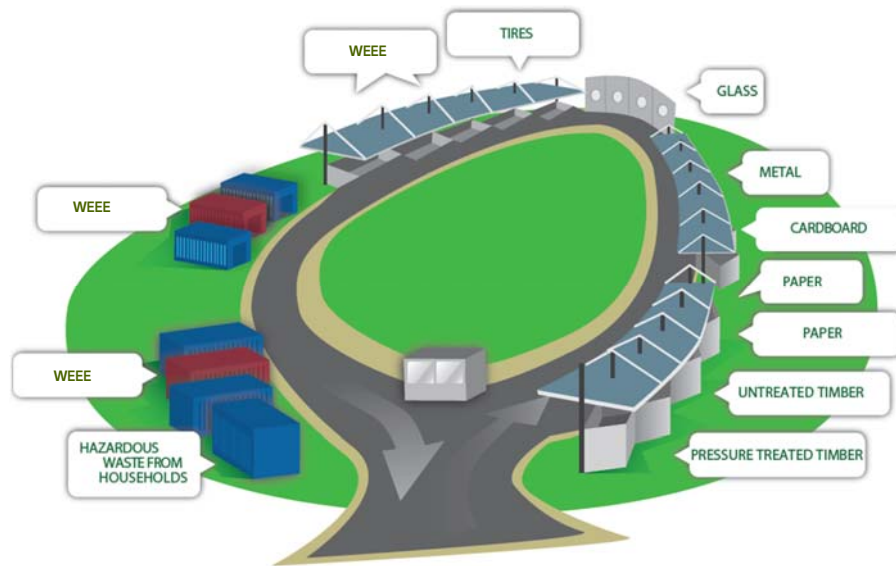


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Oivapiste in Rusko Waste Management Centre



Oulun Jätehuolto

Oivapiste of Rusko Waste Management Centre for reception of household waste



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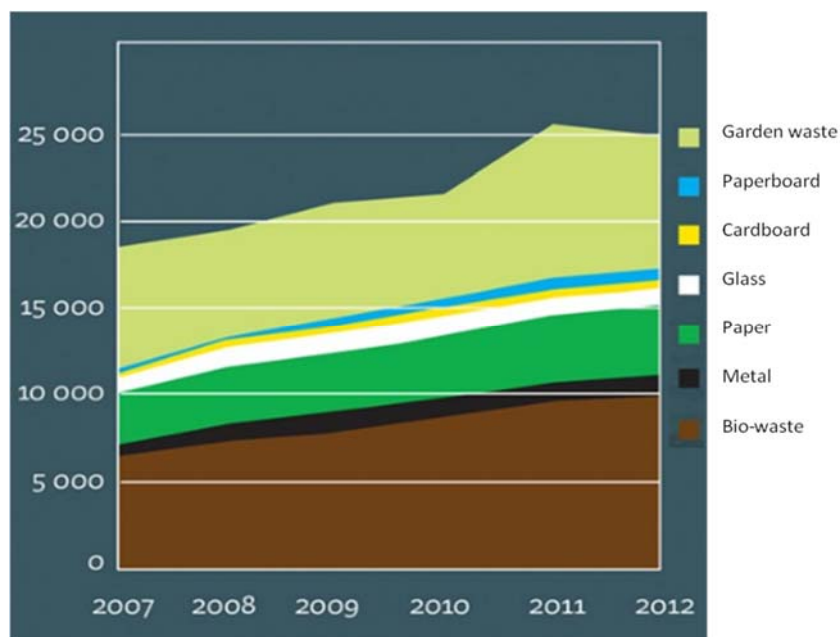


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Amounts of recoverables in Oulu area



Oulun Jätehuolto



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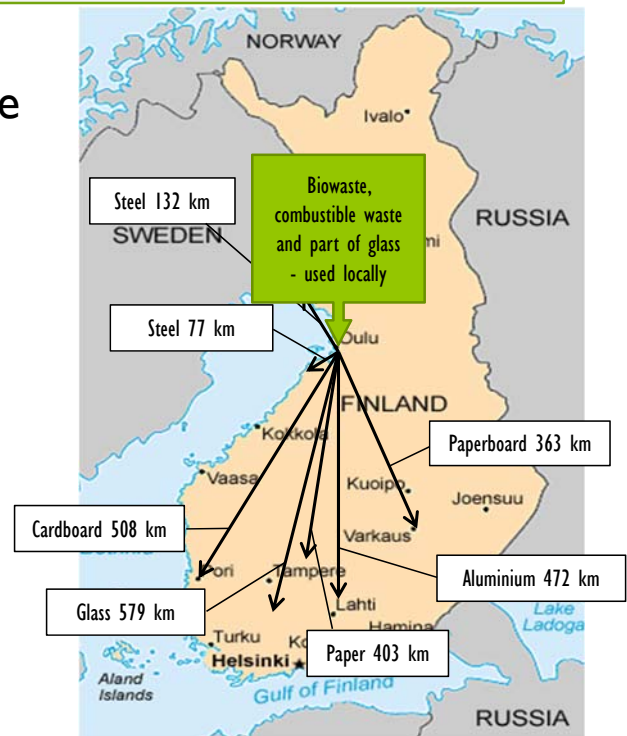


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Recovery of waste collected at Rusko Waste Management Centre

- o Separately collected bio-waste is handled and utilized locally
- o Part of waste glass is utilized locally for construction purposes
- o Paper, paperboard and cardboard, as well as metal is transported to recycling facilities
- o Combustible waste is incinerated with energy recovery in Power plant in Laanila, Oulu after source separation



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Conclusions

- o In Finland, legislation has been the key driver to facilitate recycling activity
- o Producer associations have been setting up a recovery networks that covers the whole Finland
 - The price of recycling is included in the product
- o Due to the size of Finland, recyclables are transported over large distances
- o The tendency for the future is that waste management will centralize further
 - There will fewer, larger-size facilities
 - This will also mean that transportation distances will further increase
- o Ultimately, the key issues to consider are
 - Calculating waste amounts, including future increases and the capacities needed
 - Considering the region as a whole
 - Within this, setting up fewer recovery centres to utilize the economics of scale
 - Establish a transfer station network across the region
 - Consider the financial implications – who pays for setting up and operating the network?
- o It only makes sense to collect waste separately, if there is a recipient recycling facility!



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Thank you!



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