

Model economic cooperation and partnerships in waste management – case of Scandinavian countries

**Hans Björk,
Swedish Center for Resource Recovery,
University of Borås
Sweden**



UNIVERSITY OF BORÅS

Sweden

- Population: 9,4 million
- Area: 450 000 km²
- Member of European Union

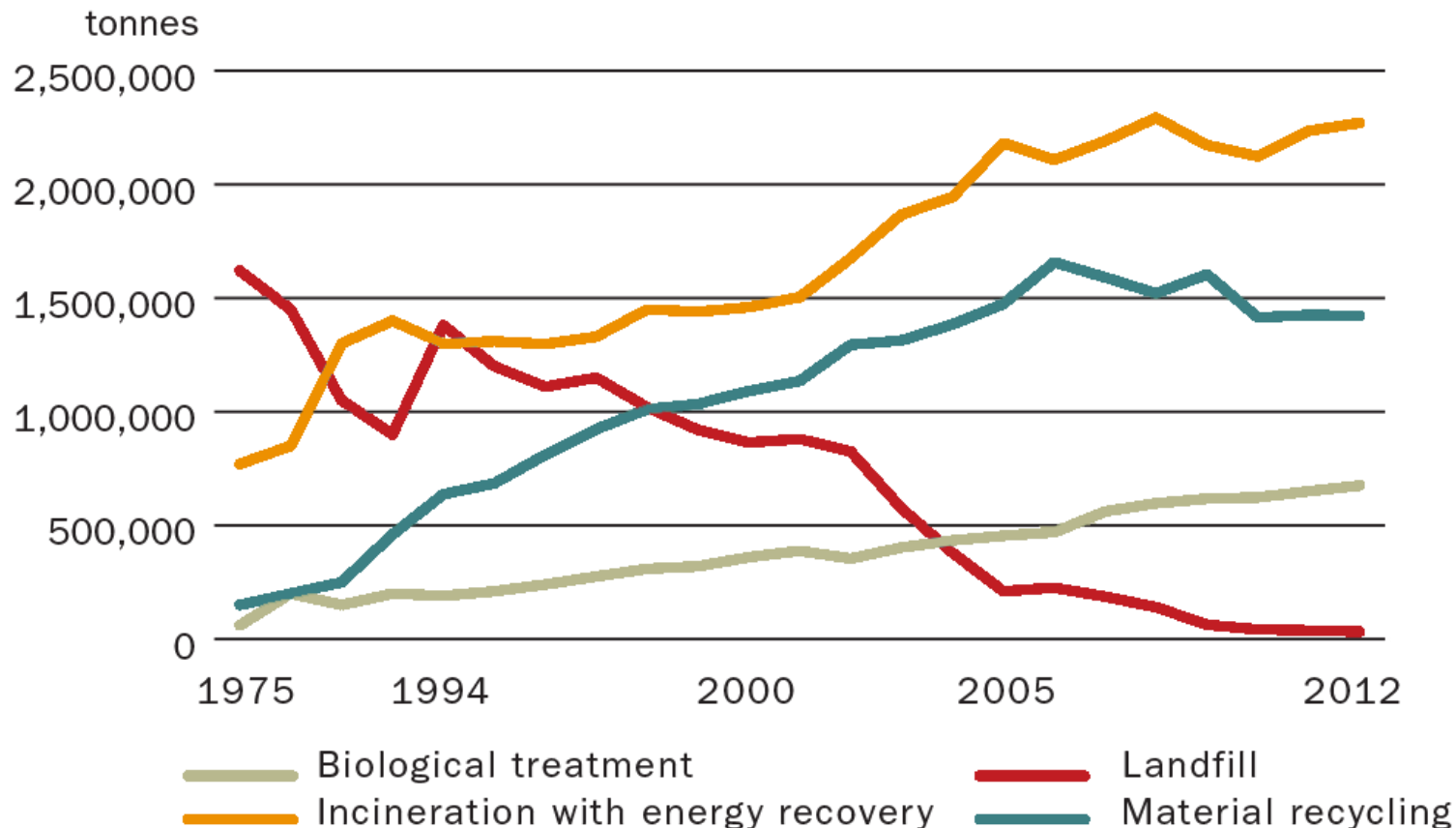


SP Technical Research Institute of Sweden



Treatment of household waste in Sweden

OVERVIEW 1975-2012



2,6 million tonnes

SP Technical Research Institute of Sweden

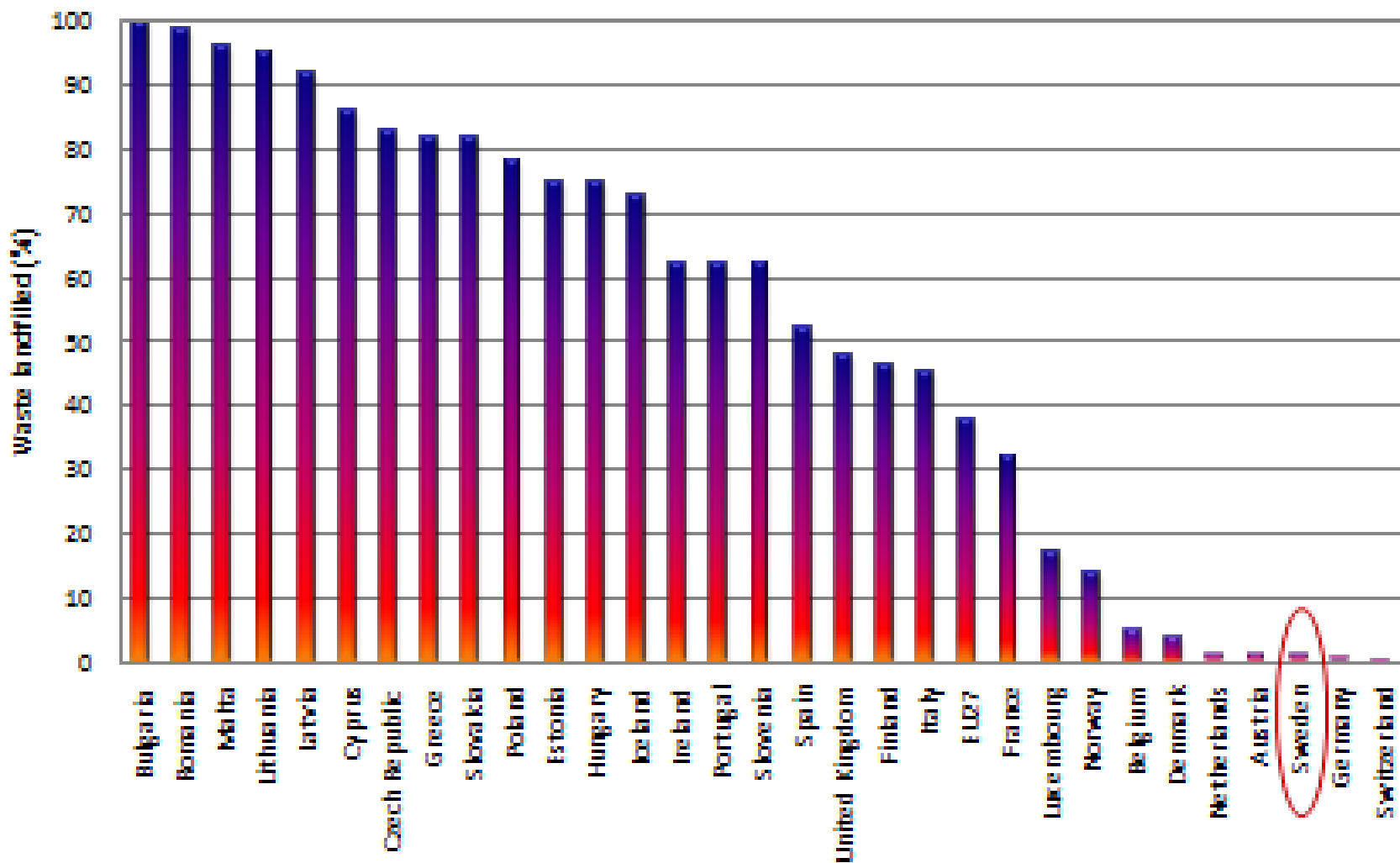


4,4 million tonnes

BORÅS ENERGY AND ENVIRONMENT

A subsidiary of Borås Stadshus AB

Municipal waste landfilling in Europe (2010)



Political drivers concerning waste

1991 Municipal waste treatment plan

1994 Producers' responsibility

2000 Landfill tax (35 USD/tonne, today 60 USD/tonne)

2000 Landfill ban on combustible waste

2002 EU: Landfill directive

2002 EU: Waste incineration directive

2005 Landfill ban on all organic waste



SP Technical Research Institute of Sweden



Political drivers concerning waste

2006 Incineration tax on combustible waste

2008 Waste Framework Directive (incl waste hierarchy)

2008 EU: All landfills have to fulfill the landfill directive

2010 Incineration tax is removed

2010 50 % of household waste to material recycling (incl biol treatment)

2013 EU: Waste prevention programmes established

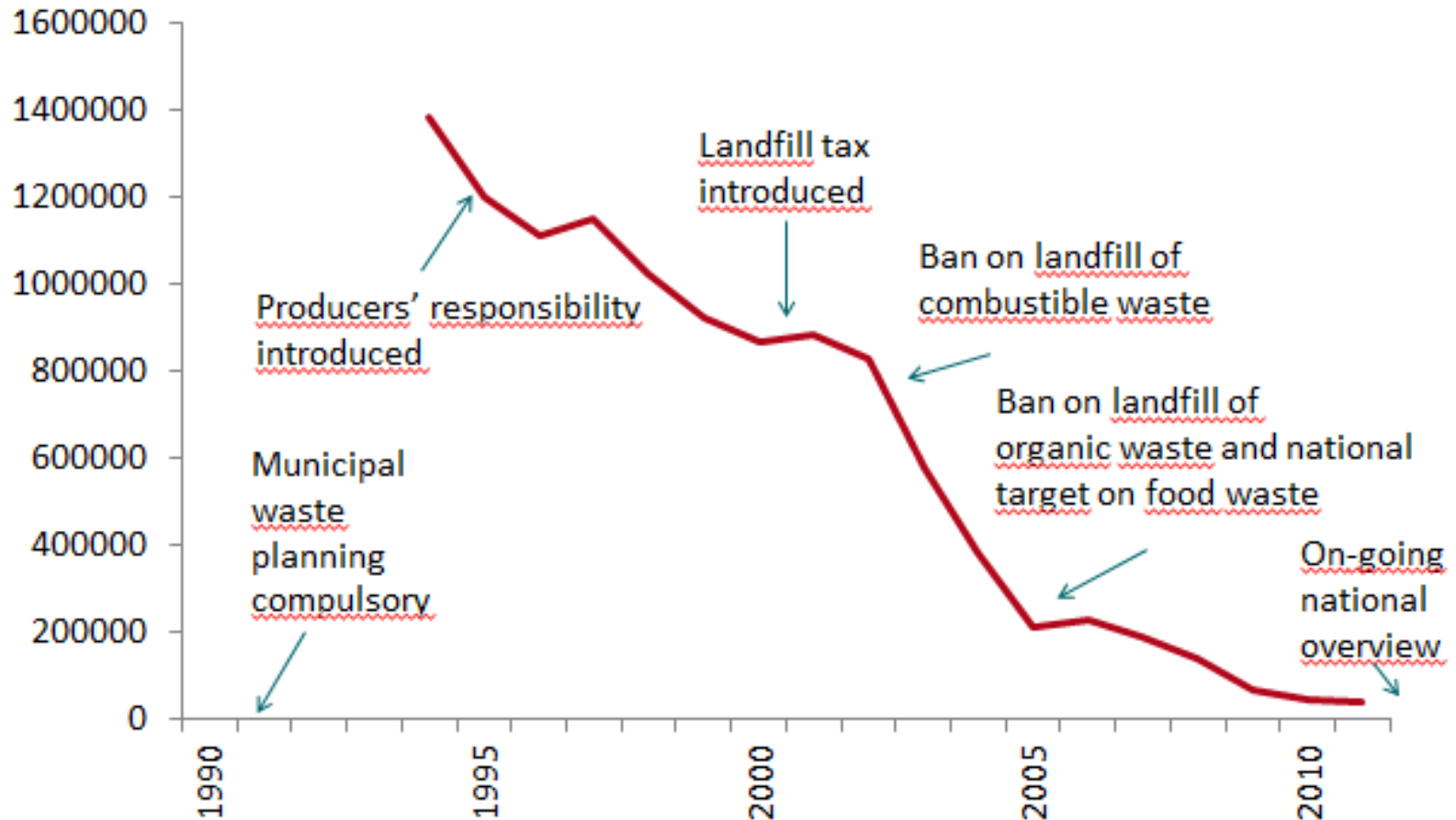
2018 50 % of food waste to biological treatment (40 % energy recovery)



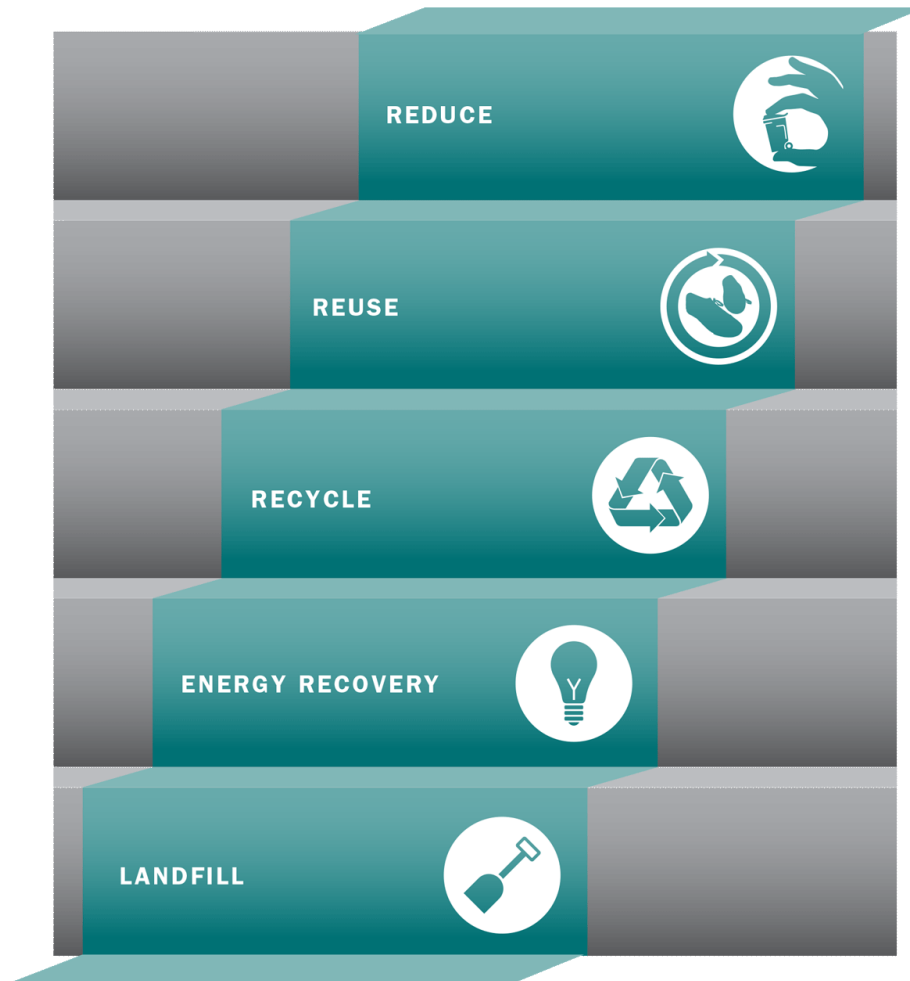
SP Technical Research Institute of Sweden



Amounts of waste to landfills (tonnes)



Waste hierarchy



SP Technical Research Institute of Sweden



Roles within waste management

Waste generator:
Households: Separation and leave/transport waste at indicated collection points
Companies/Industries: Management of own generated waste

**Parliament/Government
Authorities/Agencies**

Municipalities:
Collection and treatment of municipal waste
Information to households

Real estate owners:
Space for waste separation

Producers:
Collection and treatment of waste within the Producers Responsibility

Contractors:
Transport and treatment of waste



The municipality's responsibility and organisation

The municipality is responsible for

- collection and treatment of household waste
- Including similar waste from restaurants, stores, offices, etc

Municipalities deal with their responsibility in different ways and design their own waste management organisation

Administration:

- Almost 50% have formed municipal waste management companies

Collection of municipal waste:

- 30% inhouse operation
- 70% contractors

Treatment of municipal waste:

- 35% inhouse operation
- 65% contractors, mainly municipally owned



SP Technical Research Institute of Sweden



Regional waste management companies



SP Technical Research Institute of Sweden



Packaging and newspaper collection



Coloured glass



Uncoloured glass



Metal



Paper/cardboard



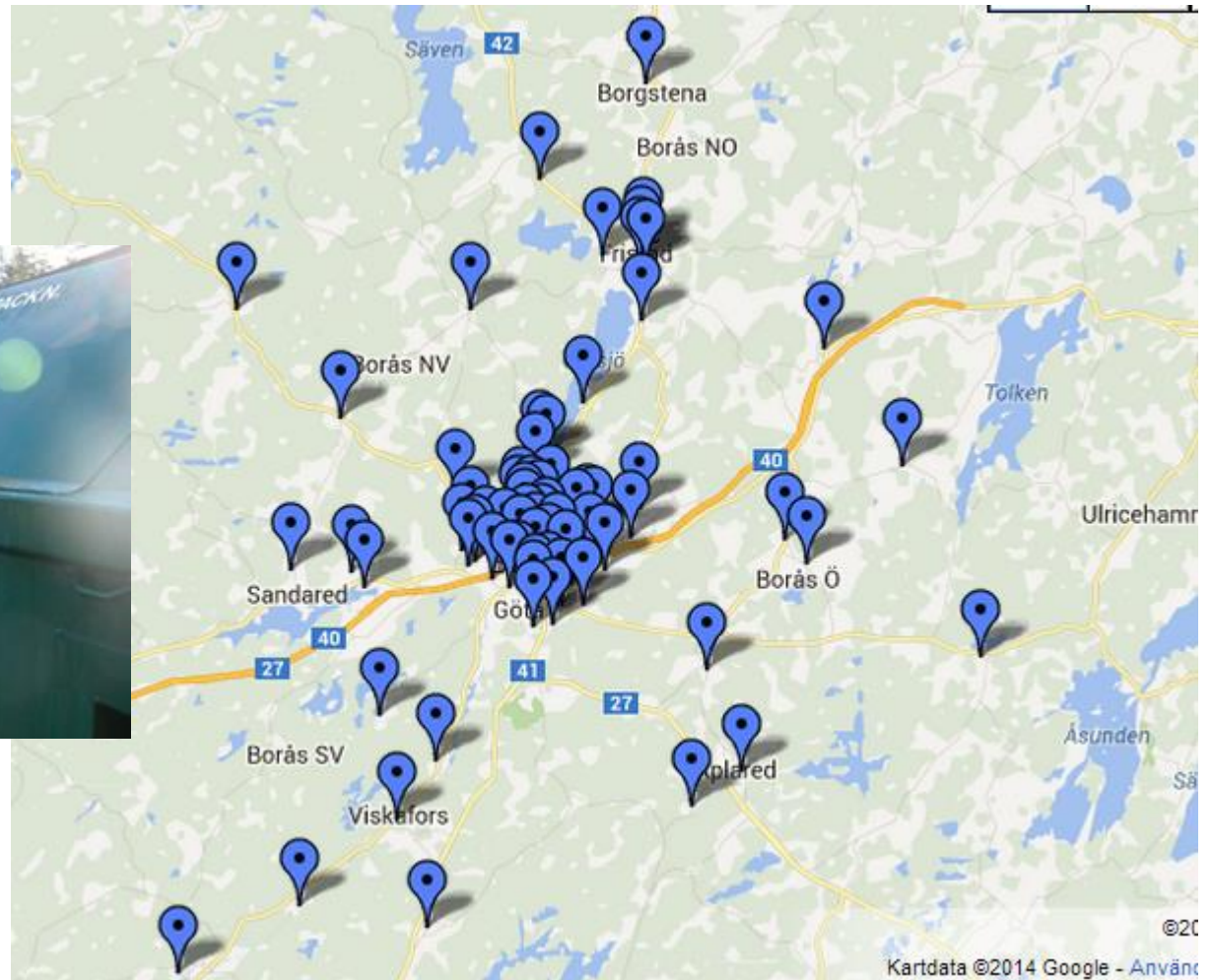
Plastic – soft/hard



Newspaper

Packaging and newspaper collection

77 stations in Borås



SP Technical Research Institute of Sweden



Material recycling

Plastics



26 % → Flower pots, parts to car industry, construction materials, plastic bags etc

Metal



68 % → Engine parts, tins etc

Cardboard



75 % → New cardboard boxes, coating on gypsum boards

Glass



92 % → Bottles and isolation material



Newspaper and toilet paper



SP Technical Research Institute of Sweden



Recycling centres



SP Technical Research Institute of Sweden



Recycling centers

- Reuse/Secondhand
- Bulky waste
- Garden waste
- Hazardous waste
- Electronic waste
- Inert waste



SP Technical Research Institute of Sweden



Household collection - curbside



SP Technical Research Institute of Sweden



2 household bins



Organic



Combustible

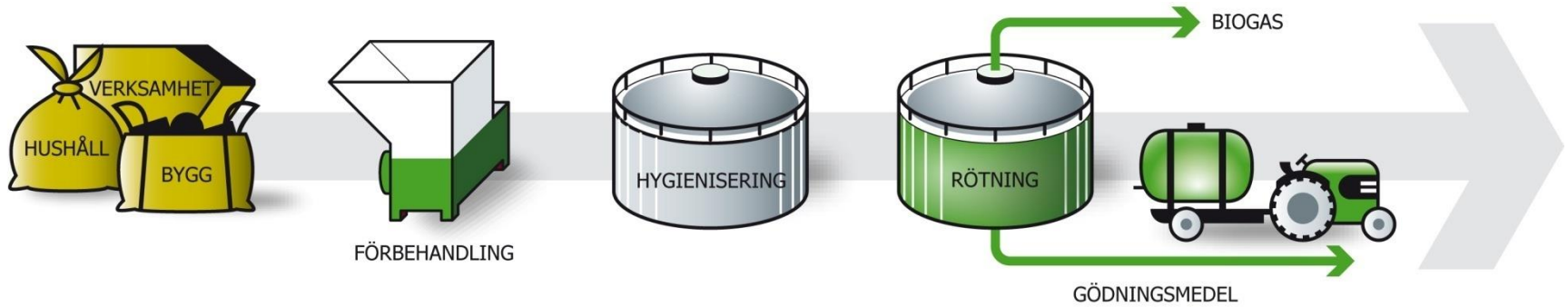


SP Technical Research Institute of Sweden

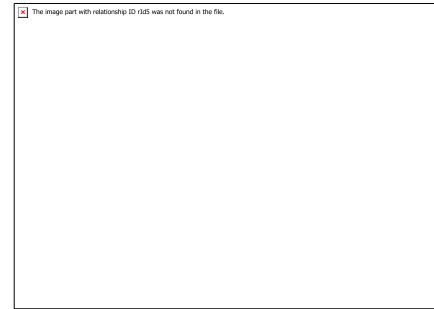


Biological treatment

Anaerobic digestion



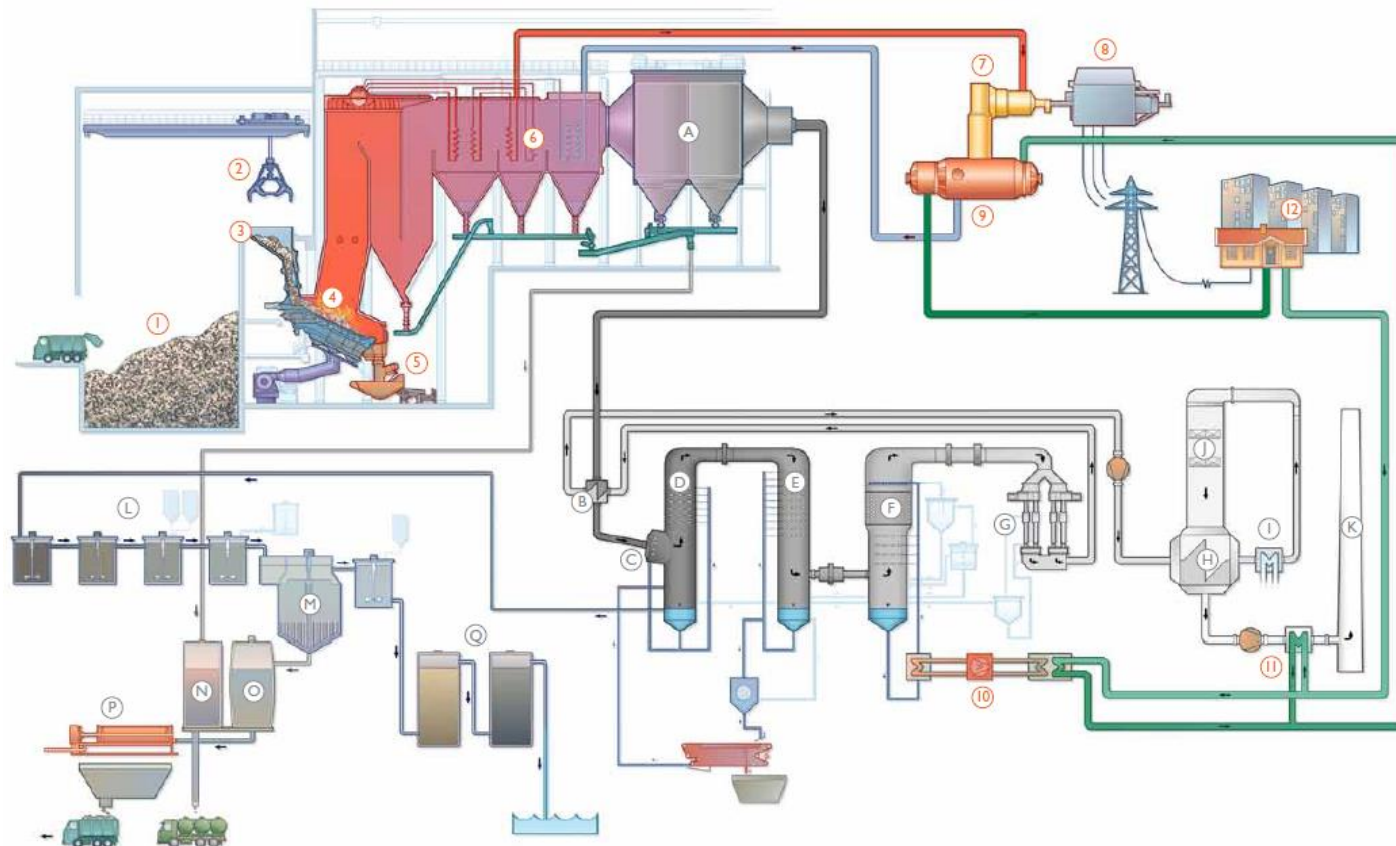
Composting



SP Technical Research Institute of Sweden



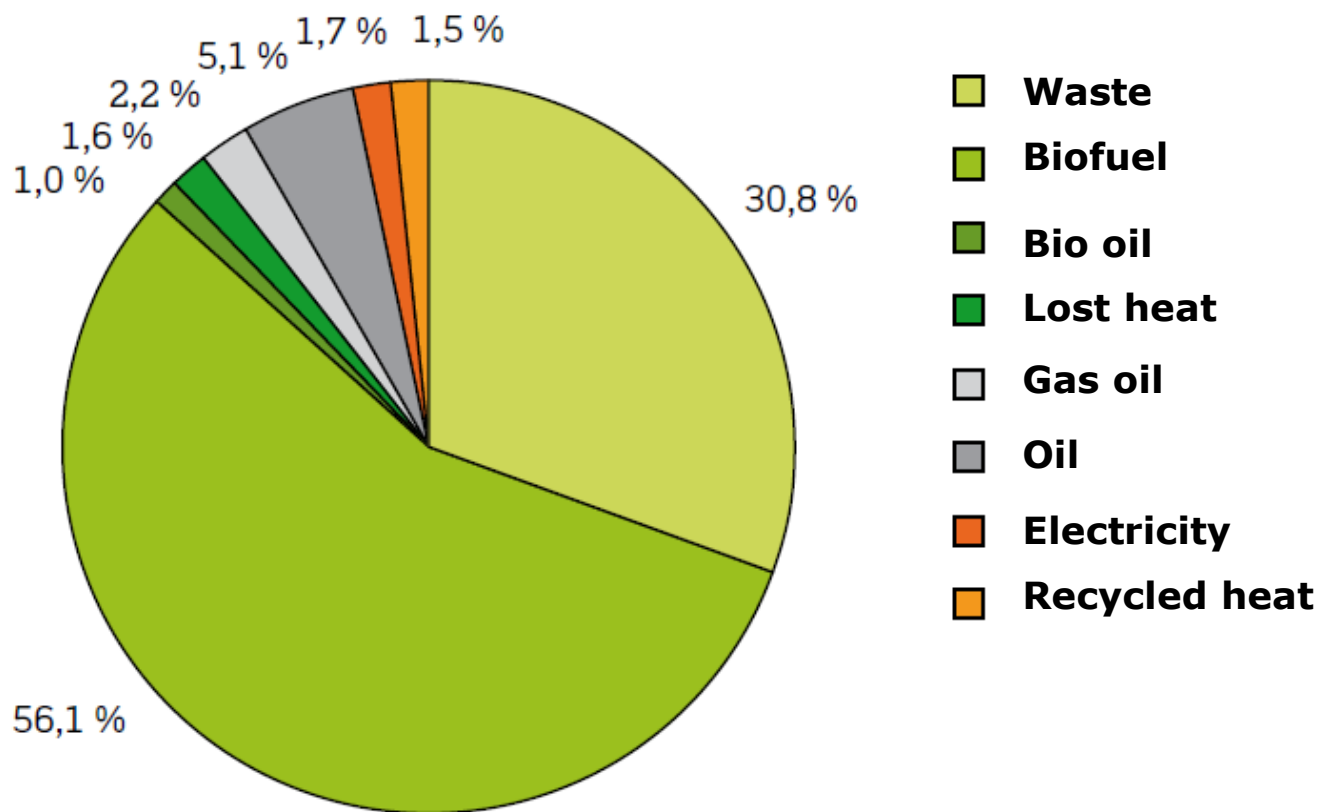
Waste-to-Energy plant



SP Technical Research Institute of Sweden



Mix of fuels



The plot shows the mix of fuels to the electricity and heat production. Fossil free fuels stands for 91%

Economy for Waste to Energy in Sweden

- Model results indicate that waste incineration is expected to be an economically competitive alternative for district heating production during the studied period up to the year 2030. This provides that the national need for this waste treatment method will be met.



SP Technical Research Institute of Sweden



Sobacken Waste Management Facility

Biological Treatment

Hazardous waste

Weighing station

Contaminated Soils Treatment

Reception

Landfill

Preparation of Combustible Waste

Leachate Pond

Waste economy in Borås City

- Waste taxation in Borås , a non-profit system
 - >35% Transports (Collecting)
 - 20% Treatment
 - 20% Recycling Centres
 - 5% Sorting (Black/White bags)
 - Rest. Overhead costs
- **Fixed rate** and dynamic rate, Borås 2013:
 - $1309 + 921 - 1567 = 2230 - 2876$ SEK/year ($\sim 250 - 325$ €/year)
- Waste tax as a management control measure
 - Based on weight of waste
 - Mandatory or driven by cost



SP Technical Research Institute of Sweden



Economy and business in waste management

- Business is selling energy:
 - Biogas (busses, trucks, cars)
 - Heating (private persons, companies/industries)
 - Cooling (industries)
 - Electricity (Nordic electricity market – Nord Pool)



▪ Laws/ordinances



SP Technical Research Institute of Sweden



Waste Recovery International Partnership in Borås



Sustainable
cityplanning

Knowledge transfer
and research

Strategic
environmental
development

Training program
Capacity building

