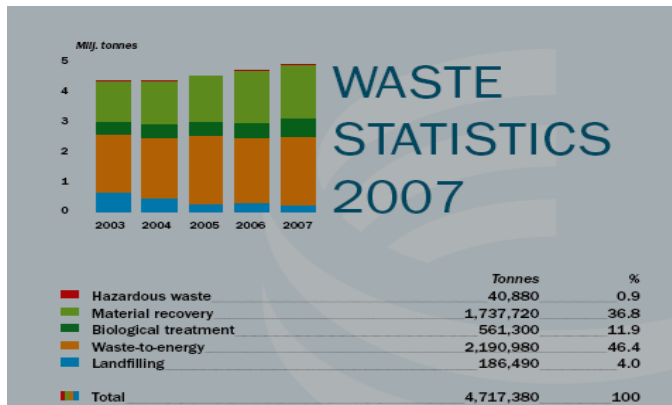


Nordic solid waste treatment - Sweden as an example

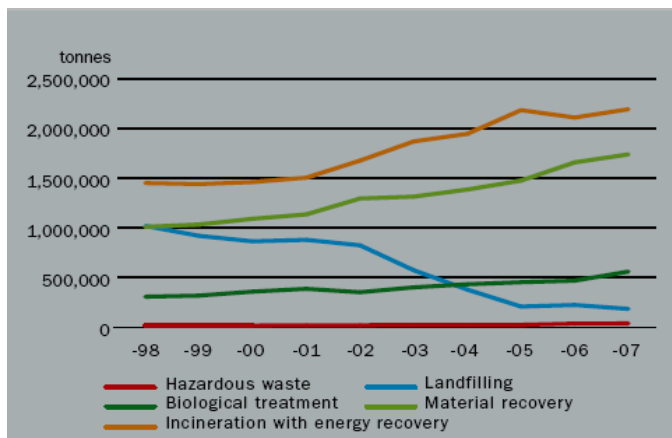
WASTE QUANTITIES

The quantity of treated household waste in Sweden in 2007 amounted to 4,717,380 tonnes, an increase of 4.8% compared with the previous year. 48.7% went to material recovery including biological treatment and 46.4% to waste-to-energy. Landfill continues to decline and is now down to 4.0%. This means that 96.0% of household waste is recycled.



Waste treatment quantities in Sweden (Source Avfall Sverige)

40,880 tonnes of hazardous waste, including impregnated wood, and 160,100 tonnes of electric and electronic equipment was collected during 2007. The proportion of material recycling that includes packaging, waste paper, electric waste and the bulky waste that is collected as metal parts at the municipal recycling centers was 1,737,720 tonnes. 561,300 tonnes was treated biologically.



Waste treatment quantity trends (Source Avfall Sverige)

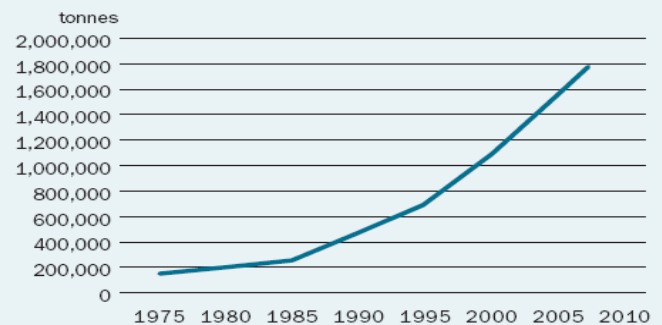
Great changes have taken place in Sweden within waste management in the last ten years. Landfill has decreased considerably, whereas material recycling has increased, respectively. The Swedish system of using deposits on aluminium drink cans and plastic bottles achieves high returns. According to Returpack, who are responsible for the deposit system, 85% of all cans and bottles are recycled.

PAY-AS-YOU THROW

Weight-based billing in household waste collection had been implemented in 26 of the municipalities, which corresponds to 9% of the Swedish population, i.e., 812,000 citizens.

During 2007 a national information campaign about material recycling under Avfall Sverige's direction was undertaken. The objectives was partly increase material recycling, and partly to increase knowledge about and faith in material recycling.

RECYCLING OF HOUSEHOLD WASTE



(Source Avfall Sverige)

WASTE-TO-ENERGY

Sweden has incinerated waste since the beginning of the 20th century. In 1986, the Swedish government issued a new recommendation on the stringent requirements concerning the emissions and operations of existing plants. Open incineration of waste at the refuse dumps, landfills or in simple furnaces do not take place in Sweden.

Currently there are 31 municipal waste incineration plants in Sweden with a total energy production of 13.6 TWh per year (2007). These plants produced 12.2 TWh district heating and 1.5 TWh electricity with waste as fuel.

There is a trend to co-incinerate sorted waste such as e.g. certain rubber and plastic fractions with conventional solid fuels in ordinary combustion plants.

Waste that is not suitable for incineration should not be incinerated. The combustible waste is sorted also at source in order to obtain a higher quality "fuel". Preventative measures have been to reduce the amounts of pollution in the waste provide a higher outcome with respect to the environment than measures to reduce the emissions. A good example would be dioxins. The dioxins emissions from waste incineration in Sweden have been significantly reduced from approx 100 gram per year to 0.45 gram year 2008 (entire country), the amount of emissions at all plants is below EU limit of 0.1 nanogram dioxins per cubic meter in outgoing flue-gas, which is valid for all existing plants from Dec. 2005.

With modern techniques for flue-gas cleaning, the extent of separation of contaminations is very high. The emissions of mercury (Hg) and other heavy metals from waste incineration plants into the air has, for example, been reduced by 98-99% from 1985 to 2002.

The Swedish waste incineration plants have become more and more highly sophisticated and technically advanced. They are comparable to process industries, steel and iron plants and other larger industrial plants concerning techniques and complexities.

BIOMASS, RDF AND SRF FUELS

In Sweden the use of biomass fuels amounts to roughly 125 TWh (2009). The meaning of biomass in this sense would be municipal waste, wood chips from forestry exploitation, black liquor and bark from the pulp and paper industry, by-products from saw mills like sawdust, straw, and other agriculture materials. The amount of biomass is expected to increase considerable in the future as a result of i.e., the Swedish energy policy to reduce CO₂ emissions.

According to the waste catalogues (1975/442 and 1994/3), and European Directives 1994/64/EU, 1999/31/EU, 2001/77/EU, and 2009/28/EU, these fuels are considered waste products.

Solid Recovered Fuel – SRF: Recovery of selected, non-hazardous, combustible waste as a specified fuel substitute for co-combustion in industrial installations is technically, economically and environmentally sound. The production requires a permit to deal with waste and shall follow good manufacturing practices and quality assurance standards (CEN/TC 343). Thus, recovered fuel shall meet specifications as required by the relevant combustion installation. A classification system needs to be developed. Substituting primary fuel by recovered fuel is sustainable and CO₂-neutral, provided that the environmental performance of the plant is maintained. This is proven in full scale demonstrations and current co-combustion operations in the EU.

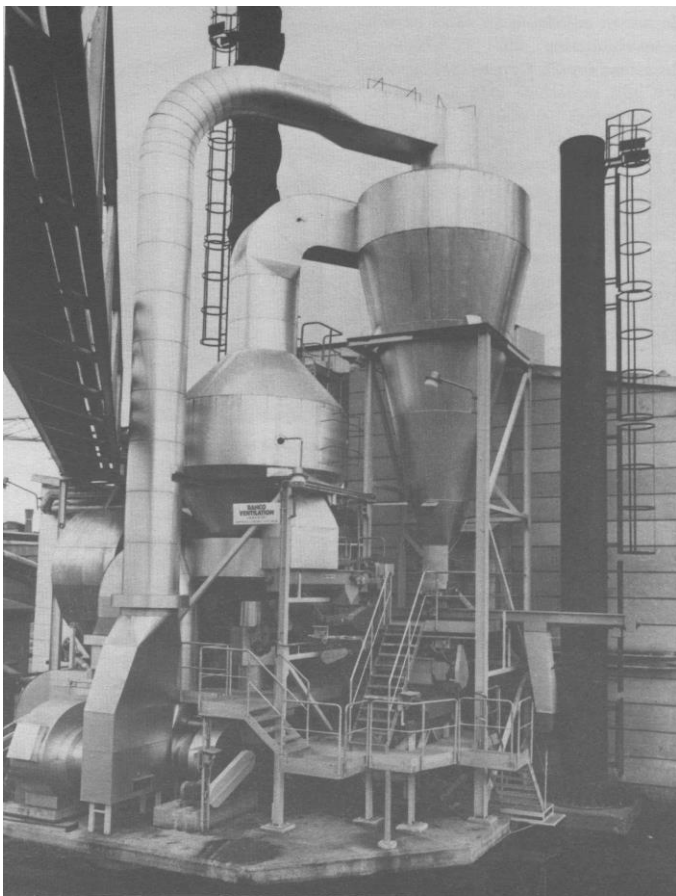
Refuse Derived Fuel – RDF: Recovered fuel as a product with specified fuel characteristics which is produced from selected, non-hazardous, combustible waste.

ENERGY AND WASTE IN GREECE

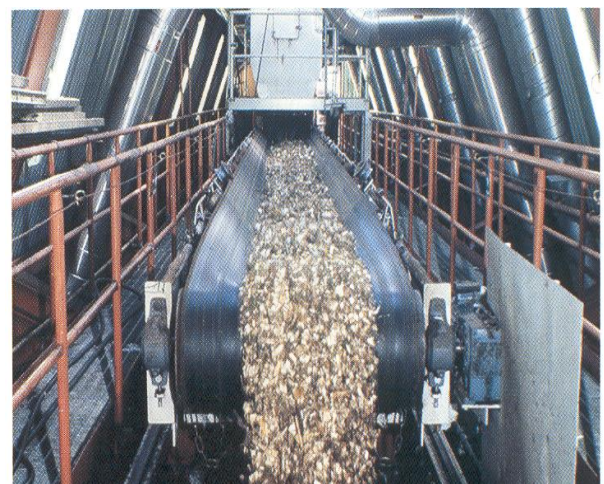
- Combustible waste shall be seen as an indigenous, renewable source of energy.
- Direct incineration with recovery of the heat is energy recovery and does require extensive source separation or separate collection or preparation of Municipal Solid Waste.
- Co-incineration in boilers, furnaces and kilns required feed preparation and can utilize both material and energy.



Processing of SRF fluff (Sweden)



Treatment of biomass with drying system (Sweden)



Processing of biomass/waste (Sweden)