Reuse and recycling of industrial waste

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UNECE/Eurostat/EEA workshop on waste statistics
Content

• Waste treatment
• Approaches measure waste treatment
• Case study
• Waste to energy in the Netherlands
Waste treatment hierarchy
Classifications of waste treatment R/D codes

- Waste treatment related activities are classed as recovery (R) or disposal (D)
R and D codes (recovery operations)

- *R1 Use principally as a fuel or other means to generate energy*
- R2 Solvent reclamation/regeneration
- **R3 Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)**
- **R4 Recycling/reclamation of metals and metal compounds**
- **R5 Recycling/reclamation of other inorganic materials**
- ....etc
Disposal operations

• D1 Deposit into or onto land, e.g. landfill
• ... 
• D10 Incineration on land
• Etc etc
Measure treatment of other waste flows

- National monitoring: Measure the waste treatment from a sector according to a minimum standard
- Very detailed, combination of type of waste and origin of waste
- Where to measure? In NL: Hybrid

![Diagram showing the process of waste generation, collection, and treatment.](image)
Measure at generation

- Industry
- Enquire first step of treatment (recycling, sorting, or recovery, landfill, etc)
- Type of waste (Eural code)
- Amount of waste
Treatment of waste – Statistics Netherlands

Waste from industry

- Landfill
- Incineration
- Recycling
- Collection
- Traders
- Waste transfer points

Waste from other sources + imports

Challenging to link generation to waste treatment for industrial waste
Measure at generation (2)

- Need good knowledge of waste management and constitution of mixed waste
- Make assumptions → Separate collected waste is recycled (for the Netherlands)
- Mass balances for pre-treatment
Scope issues and specific issues for industrial waste

• Include by-products (waste from an industrial activity that is directly usable in industry)
  • For instance: Sulphur from desulferization in petrochemical industry
  • Beetroot pulp and treacle
  • Account for 50 % of total industrial waste
  • Including those boost recycling percentage
• Specifically include internal treated waste
  • Example: On site waste incineration / landfill
  • On-site recycling in EU is not waste
Generation to treatment: conclusion

- Large survey
- Link to final treatment sometimes difficult (but do-able with assumptions)
  - Mass balances might be needed
- Imports need to be monitored
Case study – Waste to energy

Many

Generation → Collection → Treatment

Few
Renewables & Waste: classification for understanding energy statistics

Renewables and Waste

Non-combustible renewable sources electricity-only
- Hydro
- Wind
- Tide, Wave, Ocean
- Solar photovoltaic

Non-combustible renewable sources electricity and heat
- Geothermal
- Solar thermal

Combustible renewable sources with stock changes
- Industrial Wastes
- Municipal Solid Wastes
- Solid biomass
- Biogas
- Liquid biofuels

Treatment of waste – Statistics Netherlands
Solid municipal waste

- 12 plants
- Direct survey of waste input (mass and caloric value!) and electricity and heat output
- Collaboration with industry and statistics
- Renewable fraction determined at national level from waste statistics
- Waste statistics have an annual sample survey on the composition of household waste
Landfill

• ~ 50 landfill sites with production of biogas that is used
• Mostly electricity production, sometimes also production of heat or natural gas
• Type of waste and amounts that are disposed
• Origin of waste is unknown…
And relations between waste and renewable energy

- Sewage sludge: ~ 90 sewage sludge purification plants
- Generate waste, but also generate biogas
- Data collection via cooperation with waste water statistics of Statistics Netherlands

- Co-digestion of Manure
- Waste treatment, but also electricity production
- About 80 sites
- Produce electricity
- Receive data on the electricity production from administrative files used for the subsidies

- Co-firing in electricity production (wood chips)
Conclusions

• Choose point of view (from generation or from treatment)

• Generation:
  • Generation, type of waste and first treatment
  • Mass balances for some pre-treatment steps
  • Construct final treatment

• Final treatment (few companies)
  • Origin; type of waste; amounts
  • Capacities
  • Includes imports
  • No idea of waste losses (exports, illegal dumping, etc)

• Best option: Both. Link together!