Reuse and recycling of industrial waste
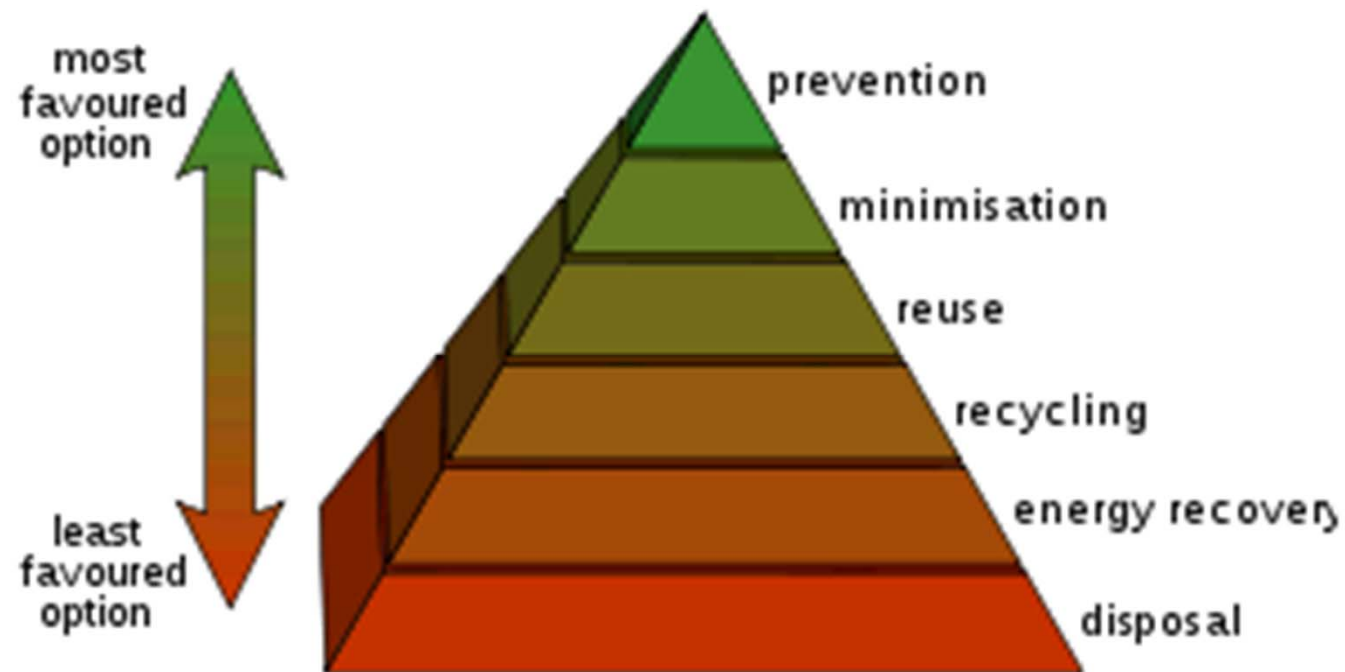
Dr. Kees Baldé - Statistics Netherlands
UNECE/Eurostat/EEA workshop on waste statsitics

Statistics Netherlands

Content

- Waste treatment
- Approaches measure waste treatment
- Case study
- Waste to energy in the Netherlands

Waste treatment hierarchy

most favoured option

least favoured option

prevention

minimisation

reuse

recycling

energy recovery

disposal

Classifications of waste treatment R/D codes

- Waste Framework Directive (2008/98/EC)
- 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**

- …

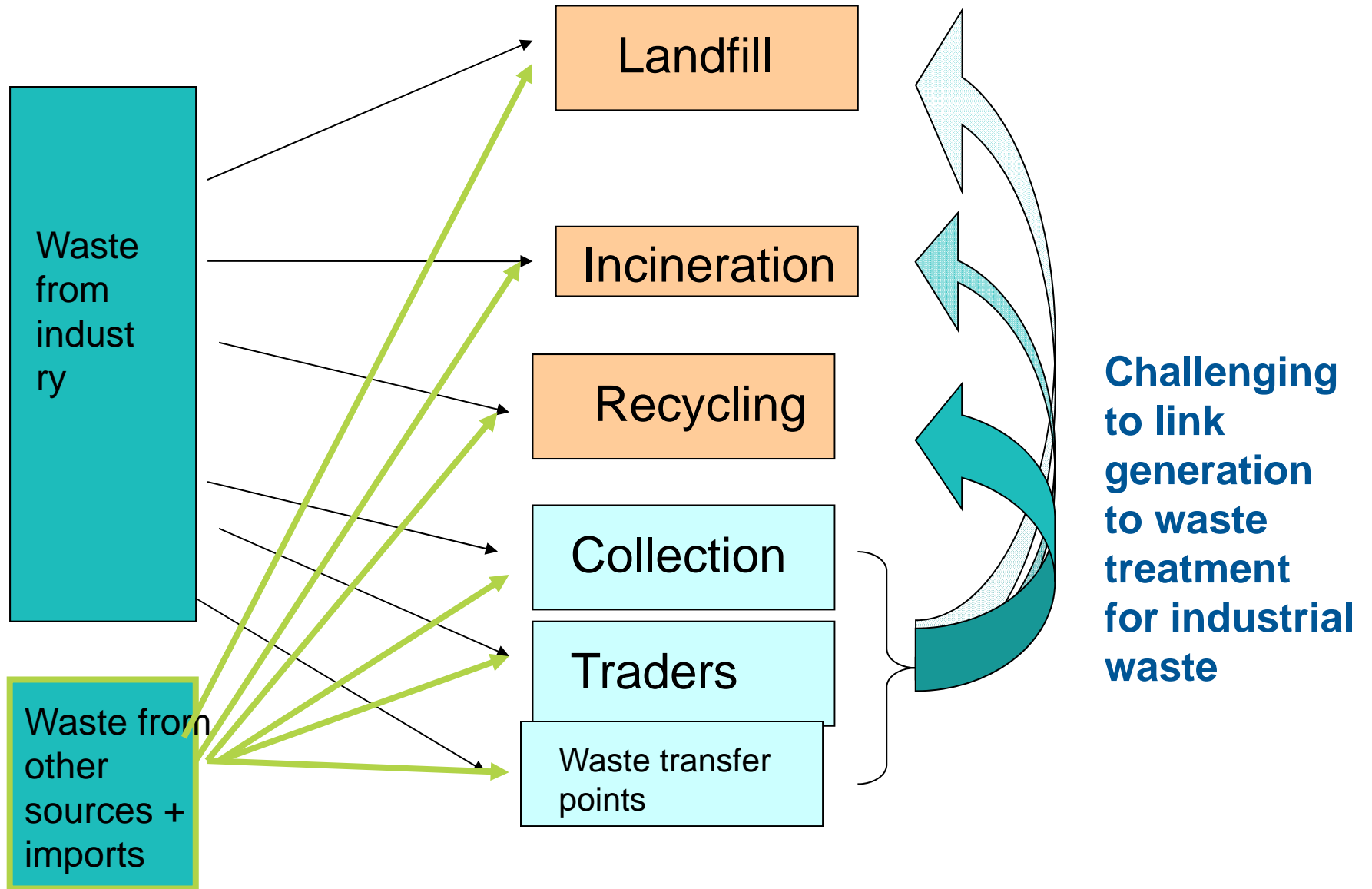- **D10 Incineration on land**

- 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

Many

Few

Generation

Collection

Treatment

Measure at generation

- Industry
- Enquire <u>first step of treatment</u> (recycling, sorting, or recovery, landfill, etc)
- Type of waste (Eural code)
- Amount of waste

Waste from industry

Waste from other sources + imports

Landfill

Incineration

Recycling

Collection

Traders

Waste transfer points

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
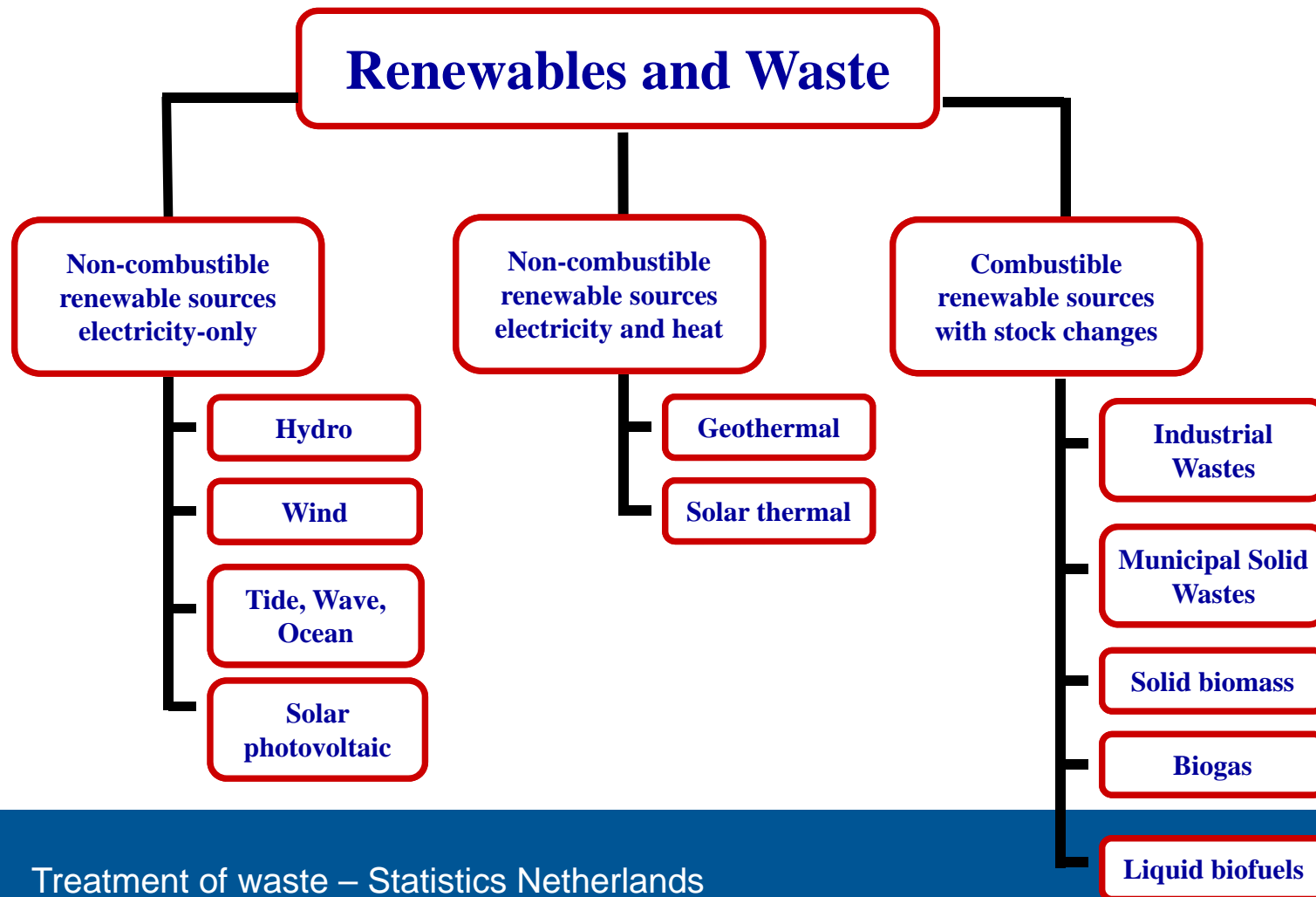 - On-site recycling in EU is not waste

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

Few

Generation

Collection

Treatment

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

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!**