Textile waste management in Finland

WAT-E2170 Circular Economy in Environmental Engineering

Alina Oksala, Jani Ruohola, Tuuli Teittinen, Susanna Vähäsarja
Global situation

• Textile production doubled from 2000 to 2015
• Use times per textile item decreased
• Production uses non-renewables:
  - oil
  - synthetic fertilizers
• Linear system: landfills or incineration
  - greenhouse gases
Global situation

Figure: Ellen MacArthur Foundation, 2017.
Current situation in Finland

• Most of the textile waste comes from individual consumers
• Currently no proper textile waste management system for the materials which cannot be recycled or reused
• No separate collection for textile waste organised by municipalities
• 72 million kg per year textile waste, 13 kg/person
• > 80 % to MSW/energy recovery
Textile waste collection

Clean, intact clothes
- Charity organisations
- Flea market

Dirty / broken clothes
- Shop chains
- MSW

Bring your unwanted clothes and textiles to your local H&M store.

The stained T-shirt, those mismatched socks, that t-shirt you never wear – even old sheets and towels. Nothing is too torn, worn or used to get a second life.
Ways to utilise discarded textiles

- Re-use
- Material recycling
- Mechanical recycling
- Chemical recycling
- Refining
- New product
- New material
- Energy utilisation
Textile waste utilisation in Finland

Material recycling
- Small ecodesign companies

Mechanical recycling
- Dafecor Oy
- PureWaste

Chemical recycling
- VTT Start-up
- Infinited Fibre
Value chain for textile waste

Suppliers

Firms

Channels

Buyers

HIGH VALUE

Consumers
Companies
Other industries

Second-hand businesses

Charities

Export

Sales

Consumers

RAW MATERIALS

16 t/a
< 1 t/a

< 1 t/a

< 1 t/a

4 t/a

55 t/a

59 t/a

59 t/a

Recycling

Manufacturing

MSW collection

Energy recovery

LOW VALUE

Textile manufacturing and sales

Aalto University
School of Engineering
Constraints in the value system

• Lack of information of flows
• Lack of organised collection of textiles unsuitable for reuse
• Lack of industrial-scale recycling plants
• Most of the collected textiles exported

Image: http://poistotekstiili.turkuamk.fi/12-000-kiloa-poistotekstiilia-lahti-hollantiin-kierratettavaksi/
Improvement suggestions

• Collection system for textile waste
  • EU obliges separate collection from 2025
• Need for new recycling plants for textile waste
• Recycling towards chemical treatment
• Techniques for material sorting
• Innovative applications for recycled textile fibers
• Replace the use of virgin materials by reuse and recycling
Conclusions

• Most of the textile waste from consumers
• Municipal collection systems needed
• Lack of information, lack of industry-scale technologies
• Most of the textile waste exported → loss of value
• Room for innovative chemical separation and fiber technologies