

Session: Using post-consumer waste for new materials  
Presentation by: Hanneke Agterhuis, *Renewi*

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Title: **Clean cellulose from diapers**

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Curriculum:

Hanneke Agterhuis works as a project manager Business Development at Renewi, the waste to product company that was created in 2017 by the merger of Shanks Group plc and Van Gansewinkel Groep B.V. In this role, Hanneke is responsible for leading and executing projects that enable Renewi's vision; to be the leading waste-to product company in the world's most advanced circular economies. She works on innovation and research projects aimed at extracting value from waste and supplying high-quality secondary raw materials. Hanneke has over 10 years of experience in recycling and waste to product technologies and has a background in resource engineering.

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Abstract:

Every year the Netherlands generates around 400.000 tonnes of waste from diapers and incontinence materials. Currently the only solution for this is incineration with energy recovery, which means that high quality plastics and cellulose are only used once and then destroyed. Renewi sees alternatives for this in the form of recycling. One option for the cellulose is chemical recycling into dissolving cellulose. Hanneke will discuss the recycling process that Renewi has developed for this together with Wageningen Food & Biobased Research. In addition, she will address some of the challenges that this- and other circular projects- run into, such as practical, legislative and commercial issues.

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## Clean cellulose from diapers

Hanneke Agterhuis, Project Manager Business  
Development

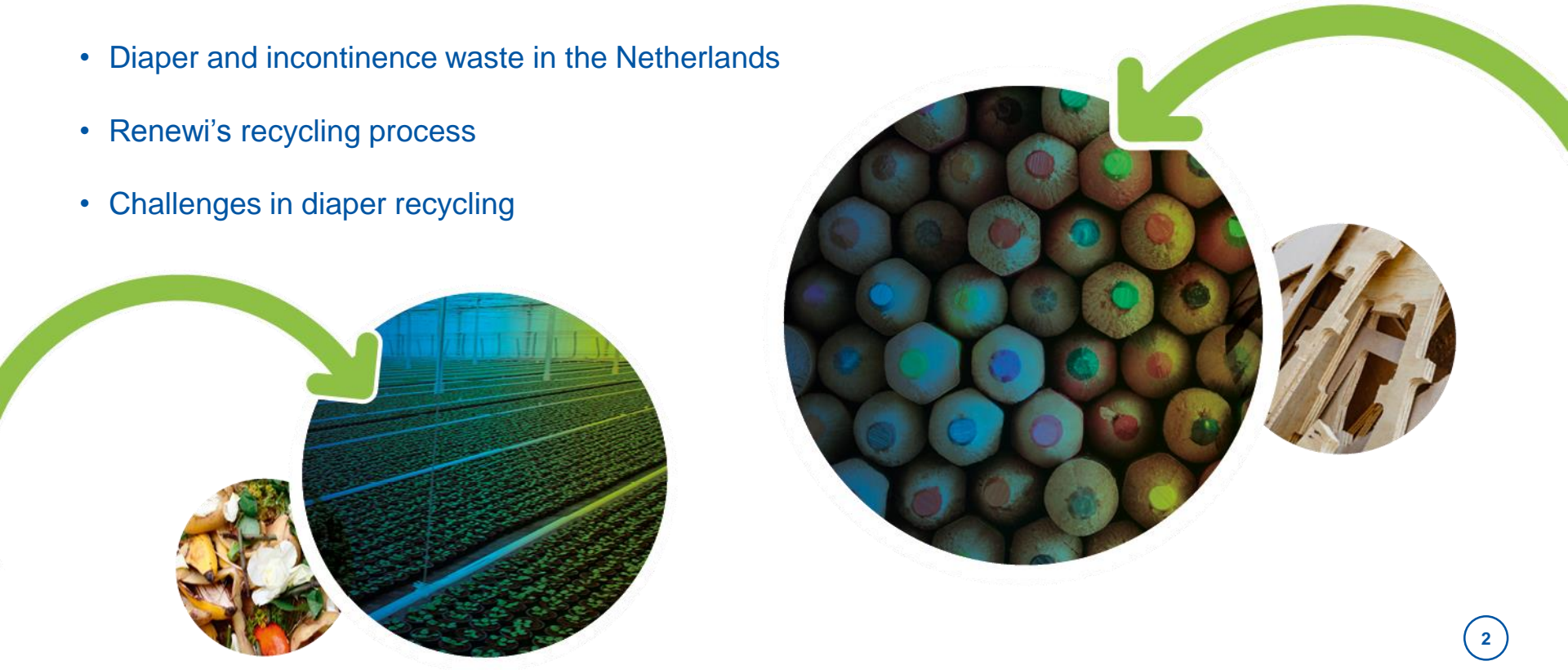
Symposium Circular Biobased Performance  
Materials

June 19<sup>th</sup> 2019



# Content

- Introduction to Renewi
- Diaper and incontinence waste in the Netherlands
- Renewi's recycling process
- Challenges in diaper recycling





# Introduction to Renewi



# Introduction to Renewi





8,65 million tonnes



84,4%



44,9 MWh



950.000 t



## Diaper waste

One of the biggest remaining recycling challenges



# Waste from diapers and incontinence material

- Every year the Netherlands generates:
  - 200.000 tonnes of waste from baby diapers
  - 200.000 tonnes of waste from incontinence products
- Currently this is incinerated, with energy recovery

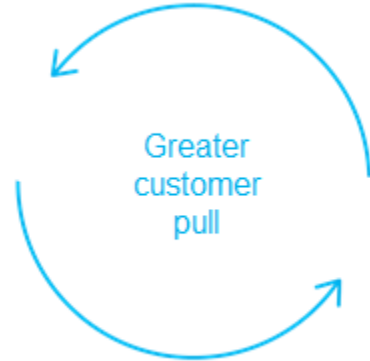
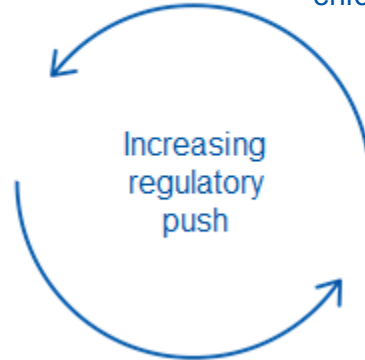




# Drivers for diaper recycling



Dutch government is considering legal methods to enforce recycling



40.000 tonnes of high quality cellulose are incinerated per year

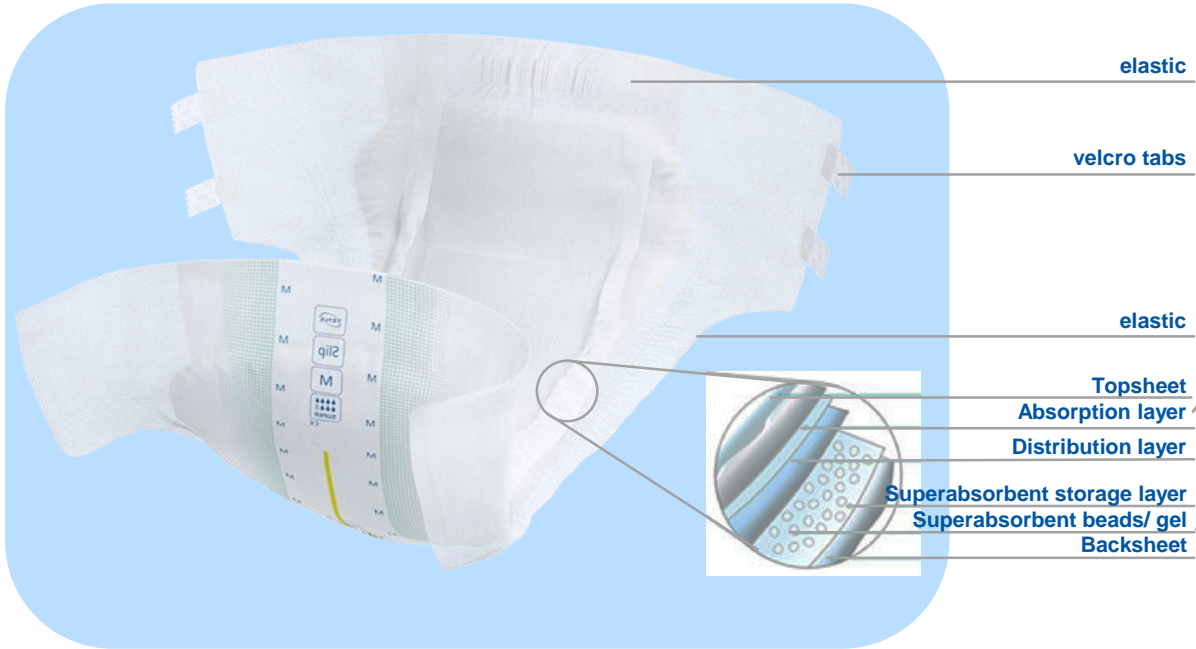
Municipalities, childcare centres and nursing homes are asking for a recycling solution



# Renewi's recycling process



# Anatomy of an incontinence product

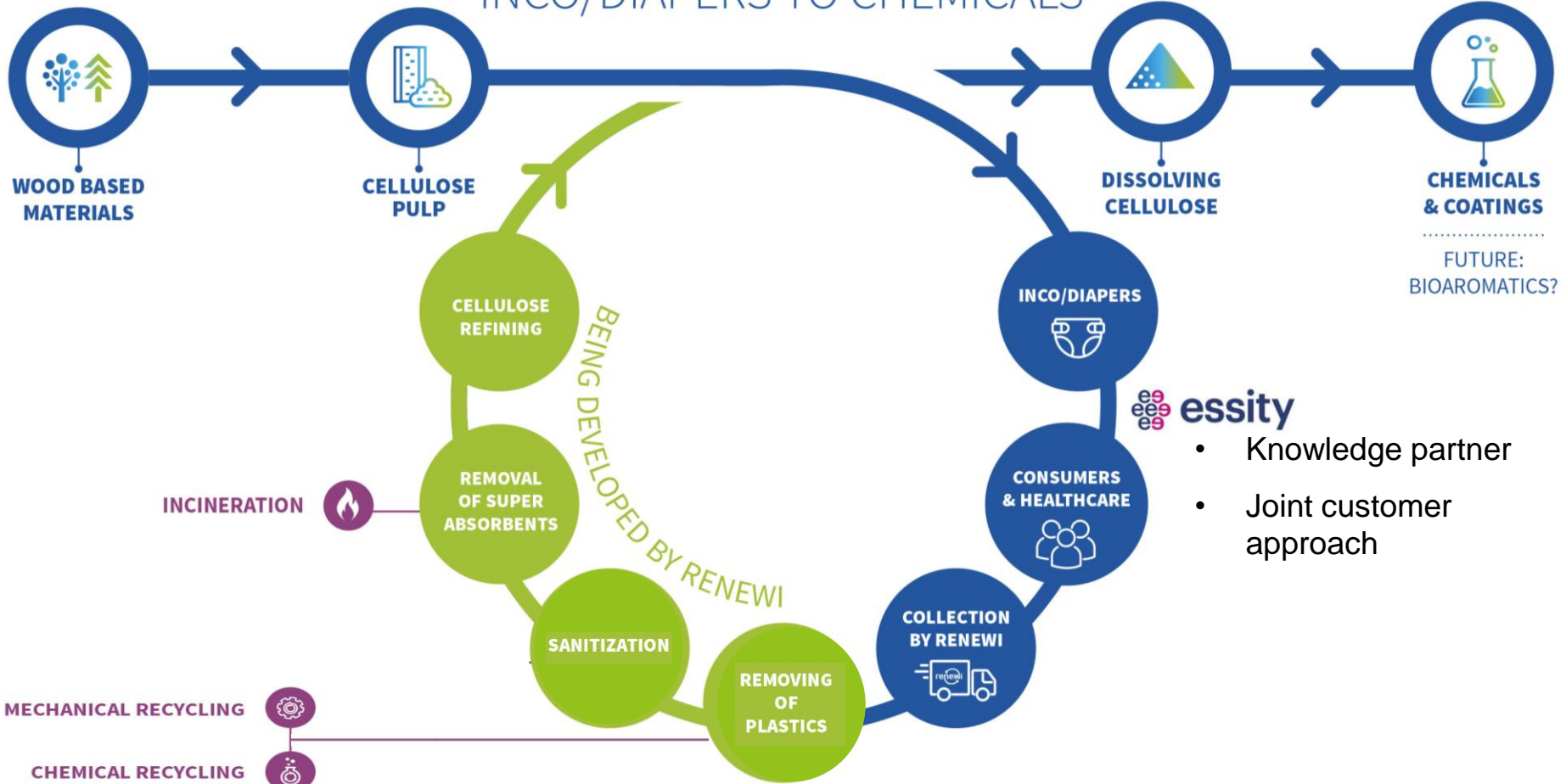


cellulose



# PROCESS:

## INCO/DIAPERS TO CHEMICALS



# Development of the recycling process

- Version 1: basic pretreatment + WUR patented refining process
  - For empty fruit bunches from palm oil industry
  - Not economically feasible
  - Conditions were unnecessarily harsh, leading to high costs for energy and chemicals
  
- Version 2: more pretreatment + mild refining process developed by WUR
  - Input material contained too much SAPs and plastics
  - These consumed process chemicals, interfered with reactions and polluted final product
  
- Version 3: improved pretreatment, followed by mild refining
  - Pretreatment to be tested this month.
  - Aimed at maximum SAP removal
  - Refining to be tested Q3





## Challenges in diaper recycling



# Commercial aspects: perception of product

- One of the reasons previous initiatives did not make it



# Commercial aspects: gatefees

- No legal obligation to recycle
- Alternative is incineration, which costs the municipality or client 80-120 €/tonne
- Process must be cheaper than this





# Potential medicine and pathogen issues

- No standard testing method exists to measure contamination levels
- No legal framework exists for dealing with these issues



# Technological challenges & innovations

- Diapers are a complex, engineered product
- Significant % of diaper waste is urine, trapped in SAPs





**Questions?**