

# Telaketju Business from Circular Economy of Textiles

Pirjo Heikkilä VTT

16.3.2020 VTT – beyond the obvious

VTT

## VTT in brief: We create sustainable growth by tackling global challenges

VTT is a visionary research, development and innovation partner. We help society and businesses grow through technological innovations – we think beyond the obvious. VTT



# We make an impact through science and technology

#### **Our vision**

A brighter future is created through science-based innovations.

#### **Our mission**

We help our customers and society to grow and renew through applied research.

#### **Our strategy**

We make an impact through scientific and technological excellence.



VTT brings businesses and the public sector together with cutting-edge international research VTT

cooperation creates
solutions that go
beyond the obvious.



# We turn science into practical innovations through applied research





# VTT research infrastructures support piloting in basic research



**Bioruukki** 

piloting centre



**Biotechnology & food** 

research piloting



MIKES

**Centre for Metrology** 

and Accreditation



Micronova

clean room



SMACC Machinery and vehicle research facilities



PrintoCent Printed intelligence research environment



ROViR Remote control and virtual technology centre



New fibre products piloting environment



Centre for Nuclear Safety

# VTT

## **VTT today**





employees

36%

of Finnish innovations have links with VTT's competences

#### VTT

is under the state ownership steering of the Ministry of Economic Affairs and Employment

\*VTT Group 2018

44%

of turnover from

patent families

abroad\*

# Innovations emerge from collaboration

- Tailored partnership
- Joint projects
- Innovation ecosystems

VTT



# First phase

2017-2019

16.3.2020

## **Telaketju action & network**



Focus of the first phase was mainly on textile recycling and business related to that – building circular ecosystem



## **Telaketju action & network**



#### First phase composed of multiple projects and funding tools

#### **Telaketju Action**



Ympäristöministeriö Miljöministeriet Ministry of the Environment Telaketju YM 2017-2018

Jointly funded project, total budget 205 k€

Topics: Collecting, sorting and pre-processing

Coordinator Lounais-Suomen Jätehuolto (municipal waste management organization in Southwest Finland)

Participants: Municipalities, recycling organizations, public participants, as well as charities.

Ministry of Economic Affairs and Employment of Finland





Telaketju Tekes, 2017-2019

Jointly funded project, total budget 2.67 M€ Topics: R&D for processes, products, services aiming for business and export markets

Coordinator VTT

Participants: Turku and Lahti Universities of Applied Sciences and Companies

Varsinais-Suomen liitto Egentliga Finlands förbund Regional Council of Southwest Finland

Telaketju TEM & AIKO 2018-2019

Topics: Investments and markets & business planning

Beneficiary: Lounais-Suomen Jätehuolto



### Telaketju YM and Tekes projects







Heikkilä P. et al., Telaketju - Towards Circularity of Textiles, VTT Reseach Report, VTT-R-00062-19







Risk (potential)	Severity of consequencies			
Likelihood	minor	harmful	severe	unknown
unlikely	2	3	4	(4)
possible	3	4	5	(5)
likely	4	5	6	(6)
unknown	(4)	(5)	(6)	(6)



Sorting and property requirements of textile waste materials for different recycling processes

Heikkilä P. et al., Telaketju - Towards Circularity of Textiles, VTT Reseach Report, VTT-R-00062-19



Heikkilä P. et al., Telaketju - Towards Circularity of Textiles, VTT Reseach Report, VTT-R-00062-19



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## Telaketju YM and Tekes projects



- Focused on building ecosystem for textile recycling and circular economy
- Results summarized in <u>https://cris.vtt.fi/en/publications/telaketju-towards-circularity-of-textiles</u>
- More information about projects <u>www.telaketju.fi</u>



# Second phase

2019-2021

Public **Telaketju 2 B**usiness **F**inland project Coordinated by VTT Activities related to **Refinement plant** Lounais-Suomen Jätehuolto Oy (LSJH)

16.3.2020

### Title: Business from circular economy of textiles"

- Coordinator: VTT Pirjo Heikkilä (pirjo.heikkila@vtt.fi, +358 40 6891443)
- Co-Innovation project of Business Finland (BF)
- Duration two years: 1.5.2019 31.4.2021

Targets to build business from circular economy of textiles

Scope of the project includes:

- novel circular economy business models aiming for better material efficiency and increase material and product life
- business related to textile recycling



Projects including total budgets (k€) and share (%)













Research work packages are focused on circular economy





#### WP1 Management and networking

We aim to build and strengthen circular ecosystem of textiles by networking both nationally and internationally.

Led by VTT

#### WP2 Business models

Novel circular business models will be studied and developed, and companies are provided with tools communicating about circular solutions within their value chain.

Led by Turku UAS



#### **WP3 Products and materials**

We will review effect of product design on material and products life span and recyclability, integrated product information in circular economy, as well as biobased solutions for textiles.

Led by Lahti UAS

#### WP4 Recycling

We develop concept for textile collecting and pre-sorting, textile identifying and sorting systems, and draft a classification system of recycled textile materials.

Led by VTT



#### WP5 Sustainability

Environmental, social and economical sustainability are promoted in our project. We will review different tools for LCA and social costs calculation, make modeling of costs of textile recycling and study market potential of different solutions.

Led by Turku AMK

#### WP6 Quick trials and demonstrations

Participants of project represent various stakeholders in circular economy, which enables us to make fast experiments with novel business models, as well as demonstrate processes and products thus modelling future recycling value chains.

Led by VTT, company involvement strong



#### **WP7** Consumers

Consumers needs to be involved in circular economy of textiles and therefore we study consumer attitudes and direct our communication activities also to common public.

Led by Turku UAS

#### WP8 Ecosystem

We aim to increase business opportunities also by supporting ecosystem building, and review scalability and export potential of results as well as further development and research needs.

Led by VTT



# Refinement plant for end-oflife textiles

Lounais-Suomen Jätehuolto Oy (LSJH)



## Municipal waste management

- LSJH is responsible for household waste management in South-West Finland
  - Co-owned by 17 municipalities, approx 420.000 residents
  - Separate collection for textiles since 2016
- Collection in cooperation with other municipal waste management companies
  - First phase expansion started 2/2020  $\rightarrow$  5 companies covering 57 municipalities (2,3M residents)
- Aim to implement nationwide textile collection by 2023



# Added value through high quality recycling

- Mechanical recycling of fibers is the missing link in Nordic circularity of textiles
- Sorting systems developed to ensure added value
  - Strong emphasis on waste hierarchy
  - Sorting for structural recyclability
  - Fiber content and purity assured by NIR technology
- Refinement plant
  - Produces high quality recycled raw materils according to industy requirements
  - Enables varied partnerships (collection, sorting, utilisation)
  - Provides new business opportunities
  - Helps forming strong value chains across the textile industy



## Plant & Process

- Pilot plant to be located in Paimio
  - Shared facilities with Rester Dy
  - Construction during 2020
- Textiles are refined mechanically into fibers
  - Sorting by fiber composition prior to processing
  - Finished product pressed as fiber bales
- Process is developed according to needs and requirements from the textile industry
- Full scale refinement plant will include multiple recycling lines optimized for specified materials



## Schedule

- 2019 2020 (Preparation for Pilot phase)
  - Expansion of municipal collection area
  - KaMU-collection pilot 2020, including
    - Second hand markets
    - Clothing stores (Fashion Finland members)
  - Capacity 170 700 t/a
  - -> Buffer stock collected before recycling line start-up
- 2021 (Pilot facility)
  - Commissioning of the mechanical recycling line
  - Collection expansion to involve more municipalities
  - Value chain pilots, processing demos, PCT waste stream screenings within the Baltic area, financial evaluation for large scale refinement plant
  - Capacity 700 ► 5 000 t/a
- 2022 →
  - Preparations for facility expansion to be located at Topinpuisto Circular Economy Hub in Turku
  - Nationwide collection of end-of-life textiles by 2023
  - Recycling services offered for the Baltic sea region?
  - Capacity 5 000  $\blacktriangleright$  100 000 t/a ? (to be detemined during Pilot phase)



## Thank you! Questions!