

From bioeconomy research towards sustainable innovations

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Pia Qvintus

Technology manager
VTT Technical Research Centre of Finland Ltd
pia.qvintus@vtt.fi



One of the leading research and technology organisations in Europe for 75 years already

VTT Technical Research Centre of Finland Ltd



75 years' experience in supporting our clients' growth with top-level research and science-based results.

- VTT is one of the leading research and technology organisations in Europe.
- We use our scientific and technological excellence to provide innovation services for our domestic and international customers and partners.



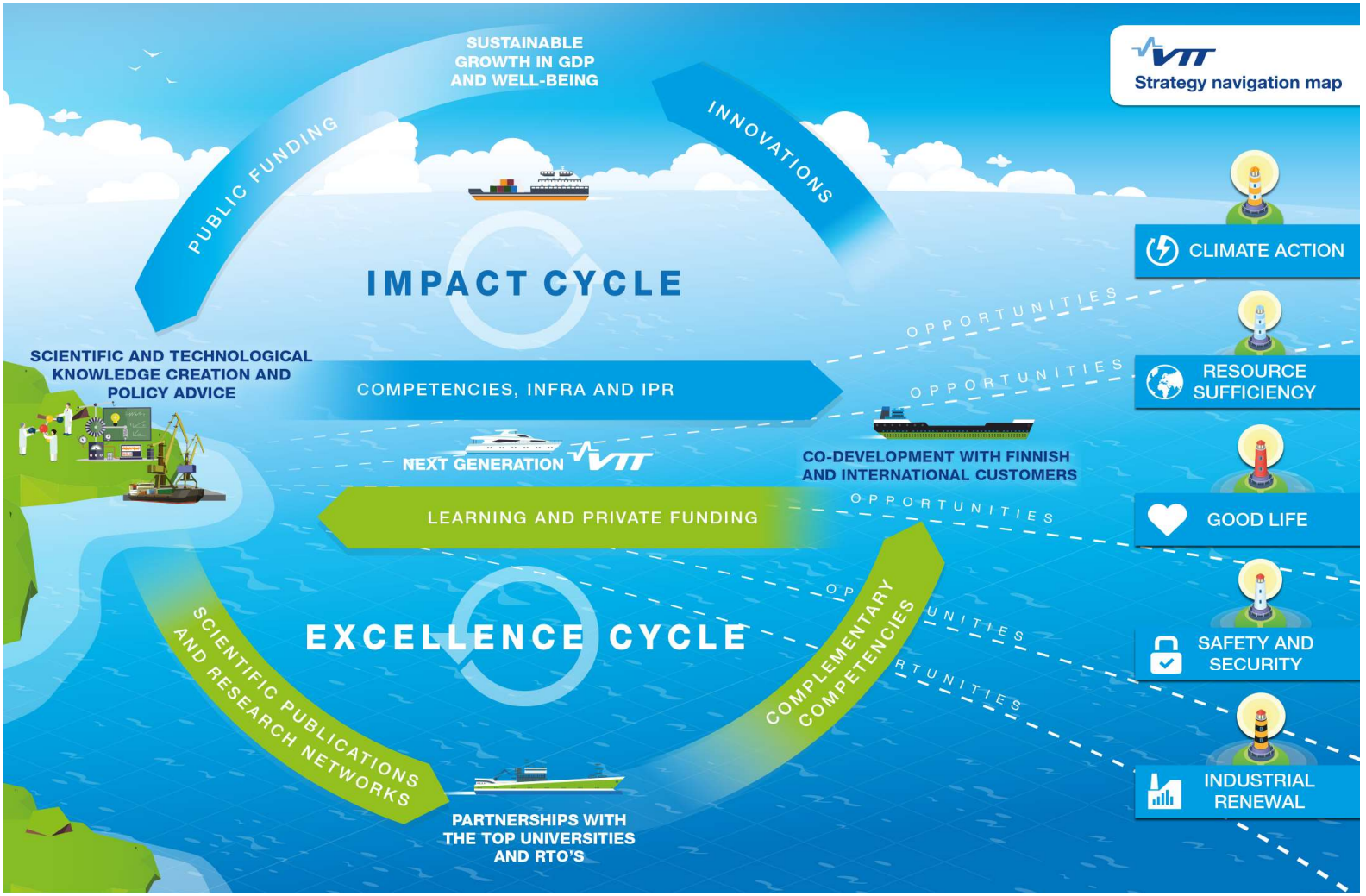
* Loikkanen, T. et al. Roles, effectiveness, and impact of VTT. Towards broad-based impact monitoring of a research and technology organisation. 2013. VTT, Espoo. VTT Technology 113. 106 p. + app. 5 p.

Net turnover and other operating income 269 M€ (VTT Group 2016)

Unique research and testing infrastructure

Personnel 2,414 (VTT Group 2016)

Wide national and international cooperation network


VTT
Strategy navigation map
SUSTAINABLE GROWTH IN GDP AND WELL-BEING
PUBLIC FUNDING
INNOVATIONS
IMPACT CYCLE
SCIENTIFIC AND TECHNOLOGICAL KNOWLEDGE CREATION AND POLICY ADVICE
COMPETENCIES, INFRA AND IPR
NEXT GENERATION VTT
CO-DEVELOPMENT WITH FINNISH AND INTERNATIONAL CUSTOMERS
LEARNING AND PRIVATE FUNDING
EXCELLENCE CYCLE
SCIENTIFIC PUBLICATIONS AND RESEARCH NETWORKS
COMPLEMENTARY COMPETENCIES
PARTNERSHIPS WITH THE TOP UNIVERSITIES AND RTO'S
OPPORTUNITIES
CLIMATE ACTION
RESOURCE SUFFICIENCY
GOOD LIFE
SAFETY AND SECURITY
INDUSTRIAL RENEWAL

Evolution of bioeconomy activities at VTT

VTT scientific & technological strengths


Industrial biotechnology


Biomass enzymology


Fibre and composite technologies

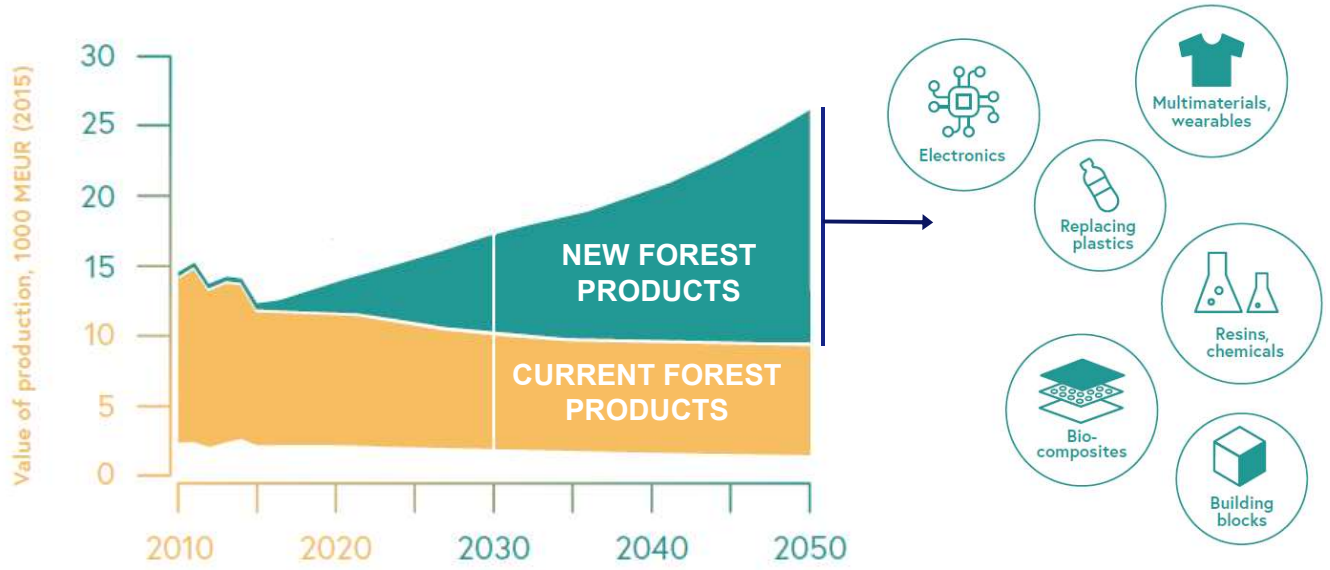

Biomass processing


Cereal technology

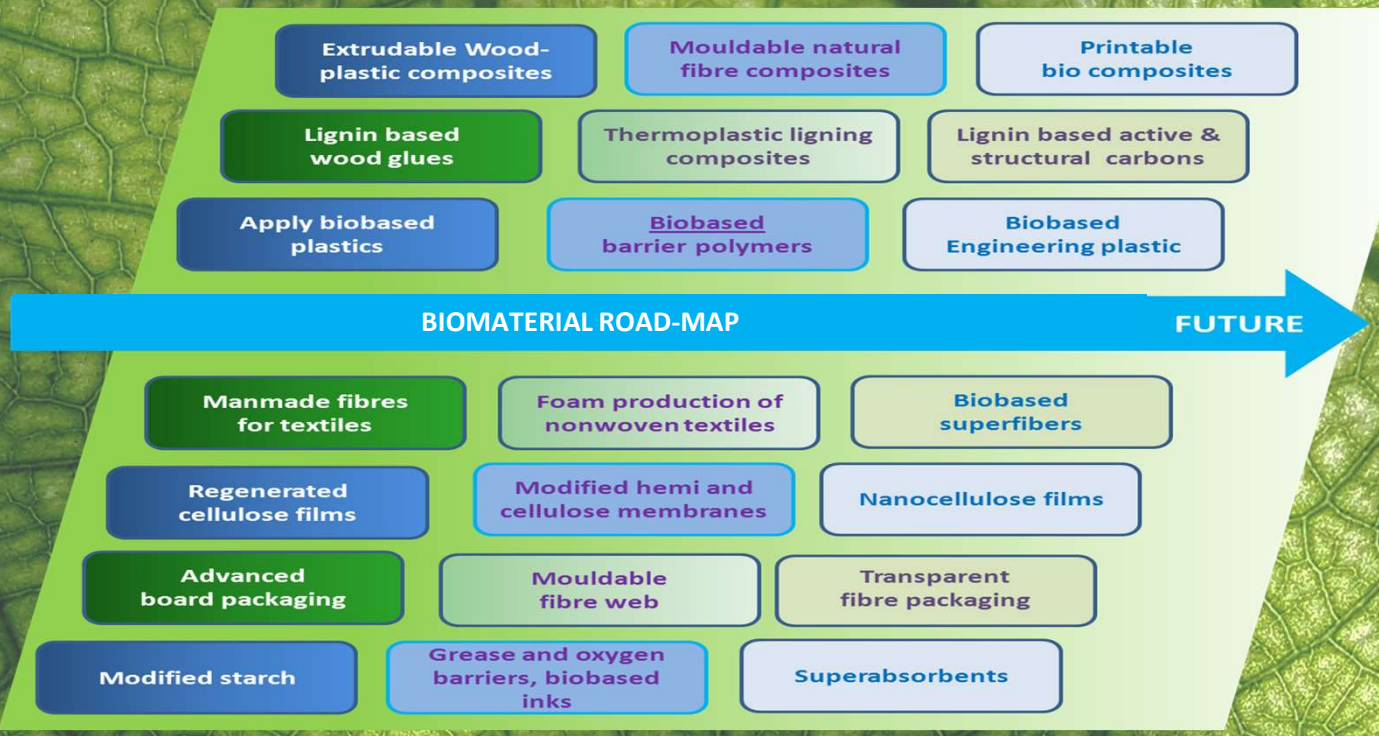

Thermochemical conversions

1993 - 1996	Chemical Reaction Mechanisms	Catalysis, Enzymes and fibres, Catalytic antibodies, Syngas cleaning, Methane activation
2002 - 2006	Clean World Technology Theme	Green technologies, Internal networking & building cross-lab entities
2006 - 2008	Biorefinery Technology Theme	Renewal of forest sector, Advanced biofuels, Native bio-polymers, Bark concepts, White biotechnology
2009 - 2012	Industrial Biomaterials	Beyond biofuels, Bio-materials for packaging, Appliances and building
2010 - 2013	Green Soln.s for Water &Waste	Water technology, Smart environmental technologies, Value from waste
2013 - ….	**Bioeconomy Transformation**	Plant based foods, Novel web-based fibre products, Bio-based performance chemicals, Packaging materials and products, Biofuels and energy

Added value of the forest sector in Finland can be doubled by 2030



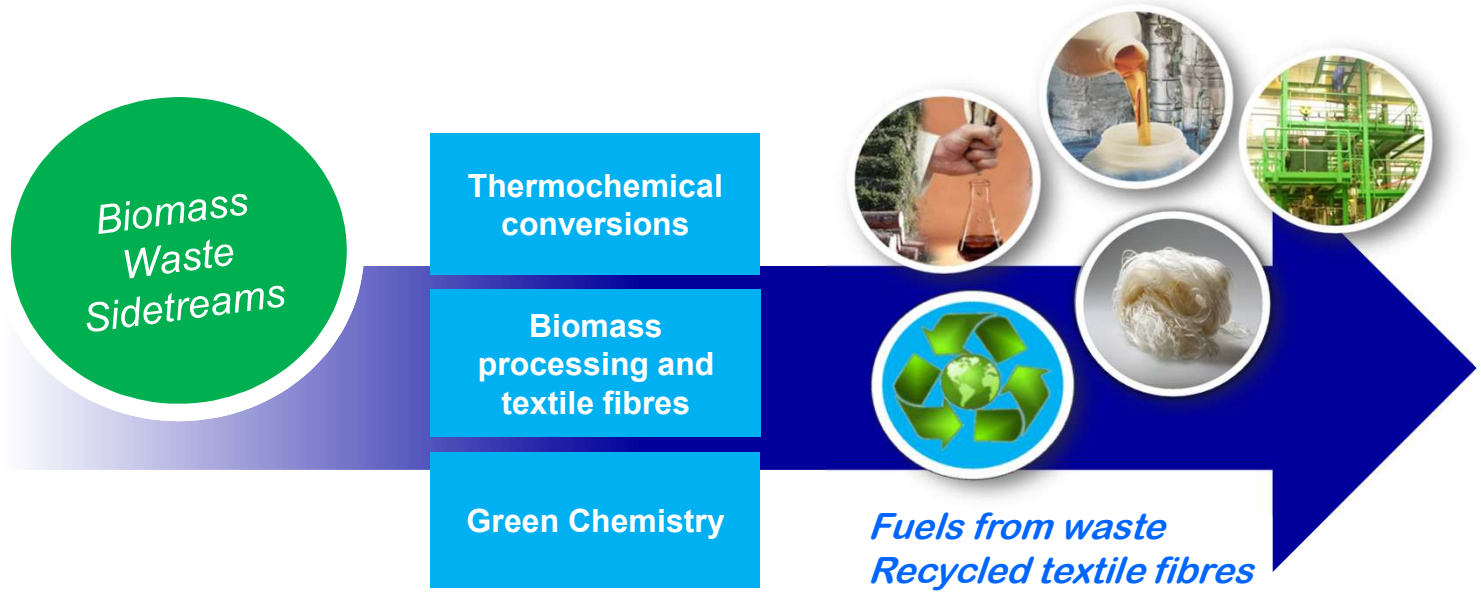
New biomaterials are waiting for a breakthrough



NANOCELLULOSE
APPLICATIONS AT VARIOUS TRL LEVELS



Unique pilot infrastructures - Bioruukki Pilot Centre



- Critical infrastructure demonstrator for bio and circular economy innovations
- Total investment ~25 M€

Fuels from waste
Recycled textile fibres
Chemicals from cellulose
Bio-oil from forest residues
Solar energy stored as liquid fuel
Design of new sustainable processes

Bioruukki thermochemical platform started 2015



Gasification pilot plants

- DFB steam gasification pilot
- Bench-scale CFB gasifier
- Pressurized Fixed Bed gasifier



Opening ceremony 13.3.2015

Biofuels, biochemicals, recycling concepts



Pyrolysis pilot plants

- Fast Pyrolysis CFB Pilot
- Fast Pyrolysis BFB Bench-Scale
- Slow Pyrolysis batch unit

Biomass platform to Bioruukki in 2018



Upgrading biomass processing



Opening ceremony 25.4.2018



Cellulose fibre spinning platform



Next generation fractionation of biomass

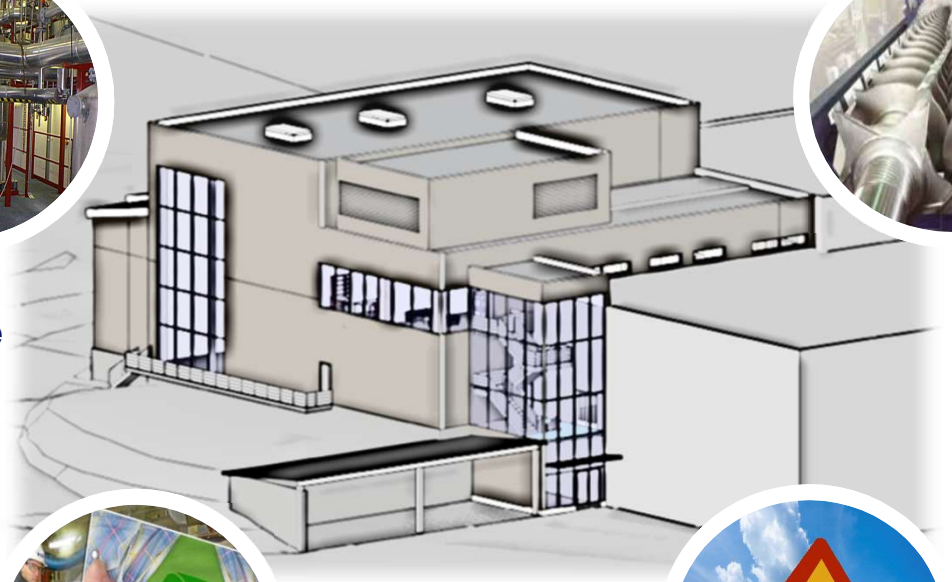


Fibrillated cellulose materials

Green Chemistry platform to Bioruukki in 2020



Modernised multi-purpose pilot plant.





New routes to biobased chemicals and materials



New process concepts for recycling



Carbon reuse economy and storage of CO_2

Bioeconomy in Circular Economy



Image: European Parliament

Business models of circular economy

- Product-life extension
- Product as a service
- Sharing platform
- Renewability
- Resource efficiency and recycling

Smart use of resources



Identification of raw material sources

Identification of potential end-uses

Evaluation of suitability in end-use applications

Chemical, structural and physical characterization

Development of process concepts

Techno-economical evaluation of the concept

Efficient use of side-streams

Wider product possibilities

Higher profit from raw materials

New raw material sources



Background

Links to various foresight and future oriented studies…



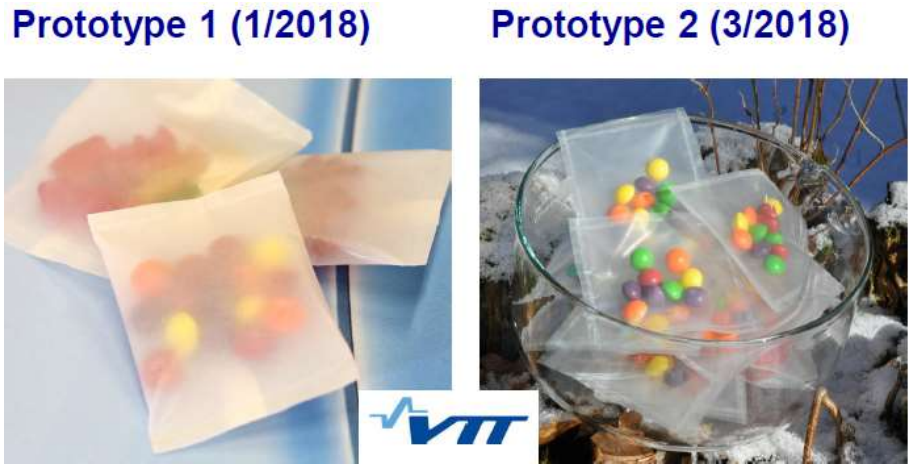


Towards Innovations

http://www.bioeconomyinfra.fi/
http://www.vttresearch.com/services/business-essentials/pilot-plants-and-r-d-infra

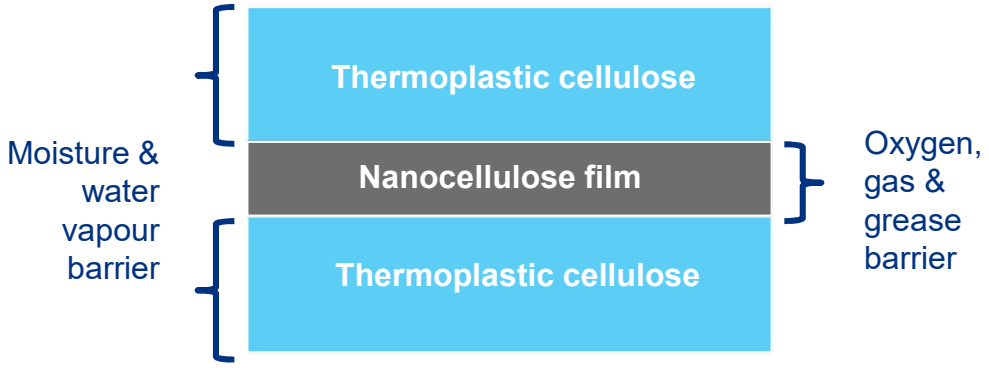
VTT is one of the winners of the New Plastic Economy Innovation Prize of Ellen MacArthur Foundation's Circular Materials Challenge

- With the Ellen MacArthur Foundation concept, VTT is also a part of Think Beyond Plastic's Accelerator Program
- VTT also won the Ecopack Challenge 2018 (Packaging Innovations in association with Marks&Spencer)



VTT Biobased Material Solution for Food Packaging

3 layer barrier film structure



- **COMPOSTABLE**
- **100 % RENEWABLE**
- **CUSTOMIZABLE**
- **HEAT SEALABLE**
- Accepts **MULTIPLE BIOBASED RAW MATERIALS** – use of local resources
- Processable with
- **EXISTING MACHINERY**



VTT Spin-off companies

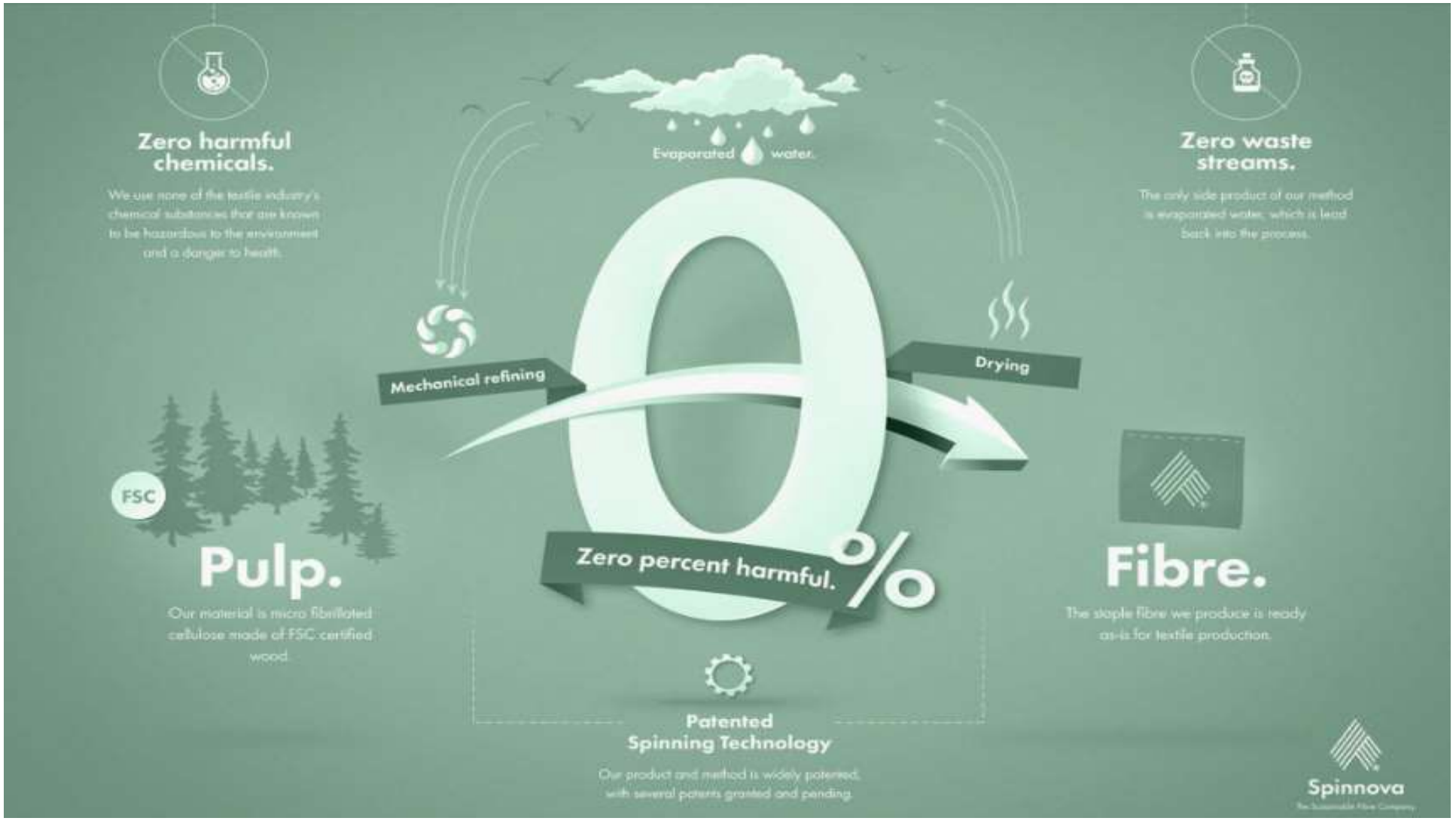
http://www.bioeconomyinfra.fi/
http://www.vttresearch.com/services/business-essentials/pilot-plants-and-r-d-infra

PAPTIC IS THE NEXT GENERATION OF PAPER

RENEWABLE
RECYCLABLE
REUSABLE

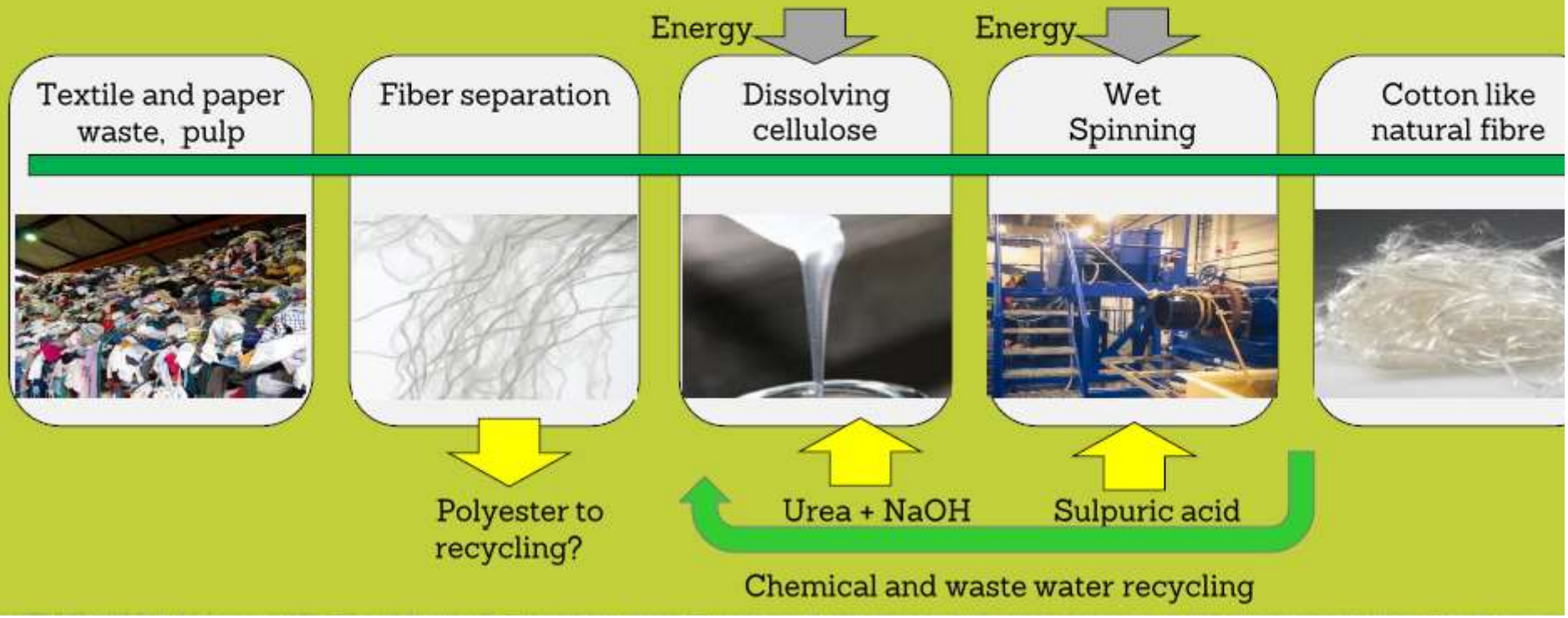



SPINNOVA


Zero harmful chemicals.
We use none of the textile industry's chemical substances that are known to be hazardous to the environment and a danger to health.
Evaporated water.
Zero waste streams.
The only side product of our method is evaporated water, which is feed back into the process.
Mechanical refining
Drying
FSC
Pulp.
Our material is micro fibrillated cellulose made of FSC certified wood.
Zero percent harmful.
%
Fibre.
The staple fibre we produce is ready as-is for textile production.
Patented Spinning Technology
Our product and method is widely patented, with several patents granted and pending.
Spinnova

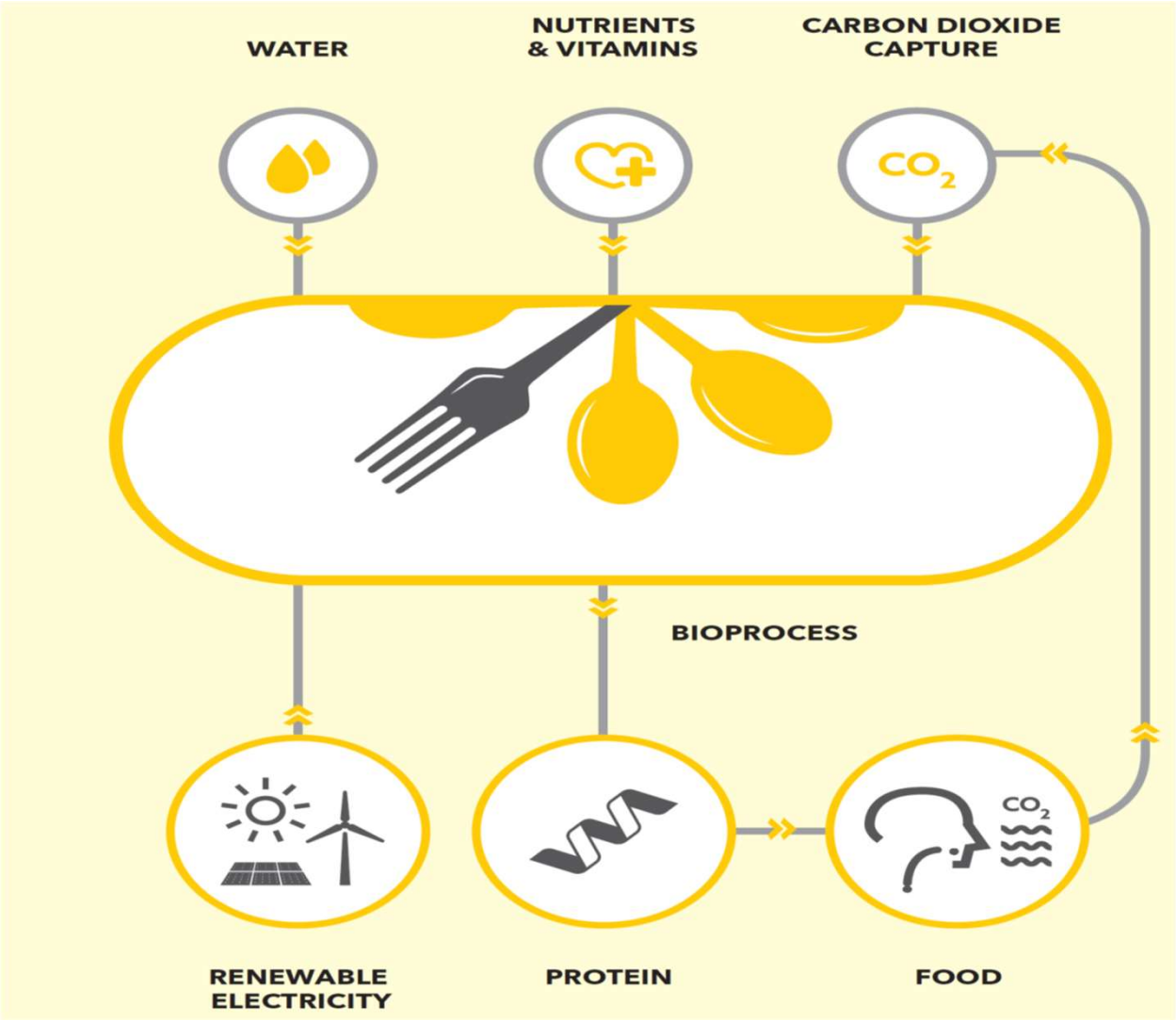

Infinited Fiber Company
New sustainable closed-loop textile fiber production technology
– no compromises for comfort and quality
The Infinited Fiber Company

We have developed sustainable technology producing cotton like textile fiber from waste materials and residue biomaterials



SOLAR FOODS

Food from air




Thank you for your attention!
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Centre of Finland Ltd.
BEYOND THE OBVIOUS
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