AGENDA:

- Short intro to Lifestyle & Design Cluster
- Background for the mapping of textile plants
- Presenting all 18 European textile plants briefly
- Going deeper with some chosen plants
- Presenting textile plants across the globe
- Thank you

Lifestyle & Design Cluster

A **national innovation cluster** under the Danish Ministry of Higher Education and Science with the task of promoting **sustainable growth** and innovation in the furniture, lifestyle and clothing industry as well as in creative businesses.

Focus areas are **circular economy, new materials, digitalization** for SME's and startups.

How do we work?

Lifestyle & Design Cluster:

Sustainable growth
Innovation
Circular Economy
Digitalization
Entrepreneurship
National projects
International projects

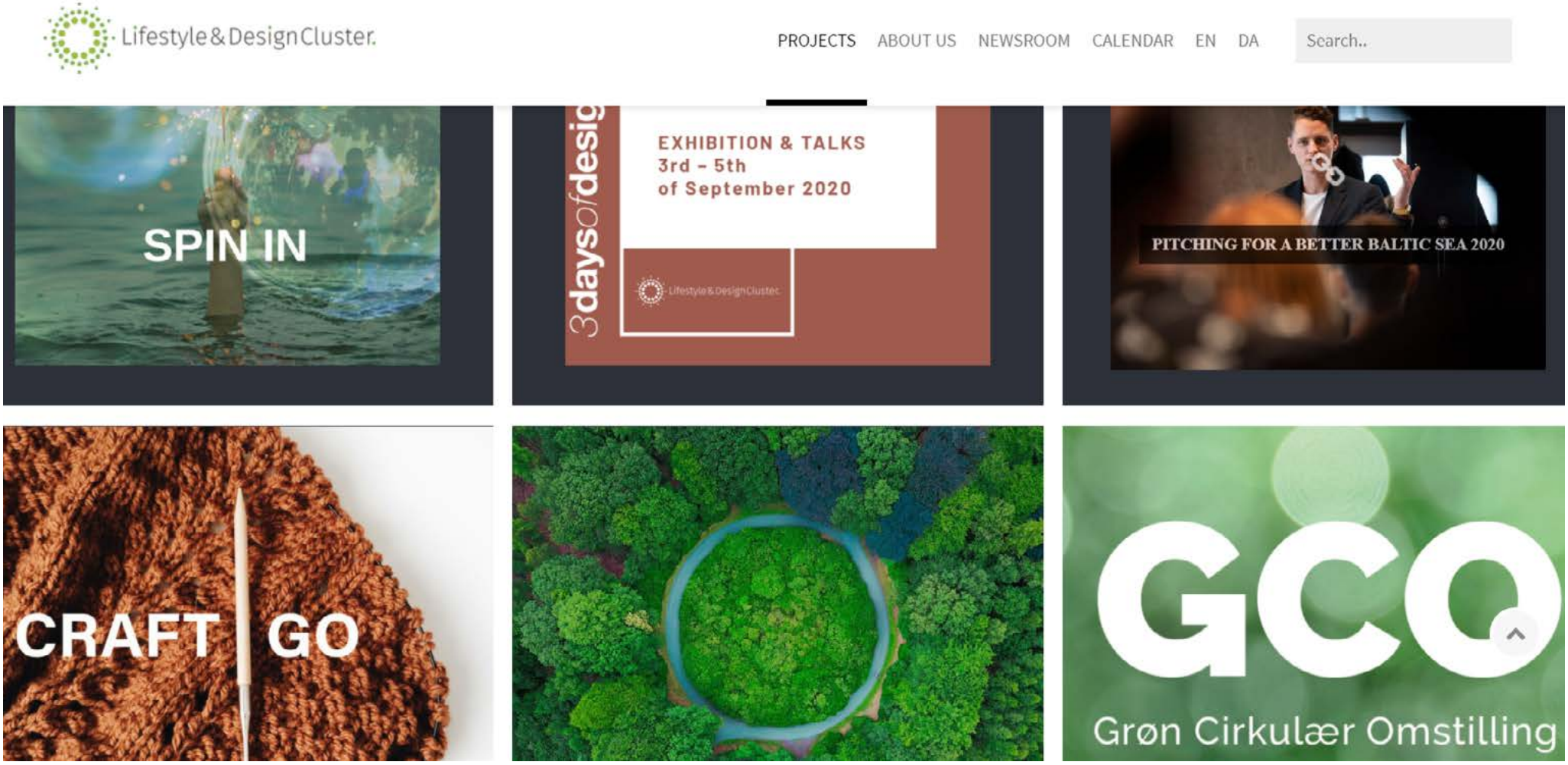
Research through our consortium partners:

Universities
Design Schools
Technological Institutes

Lifestyle Industry:

Textile
Fashion
Furniture
Interior
Creative Businesses

Projects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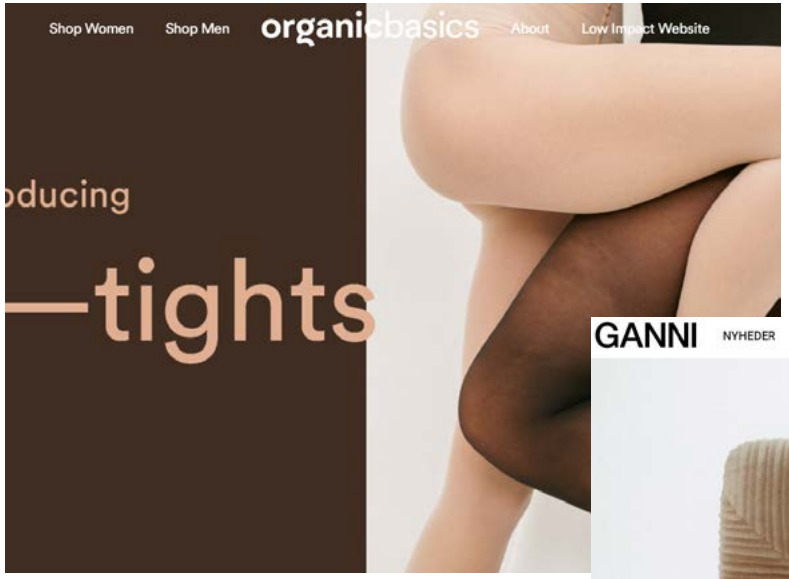
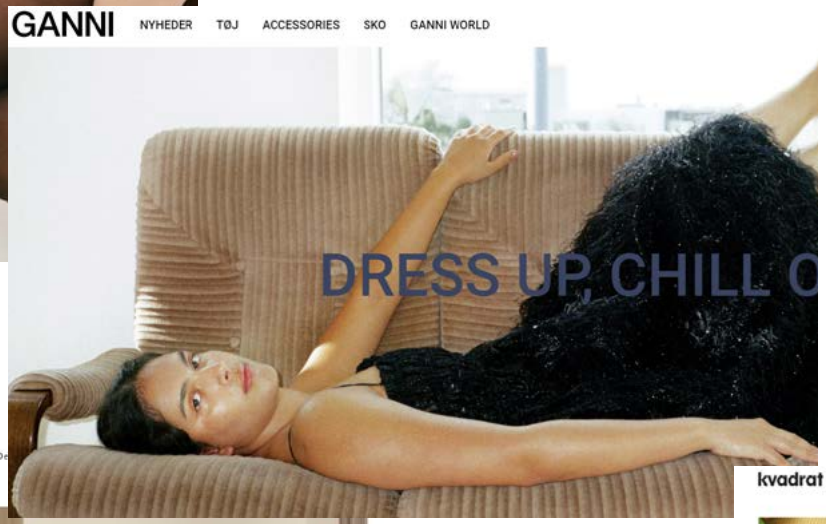
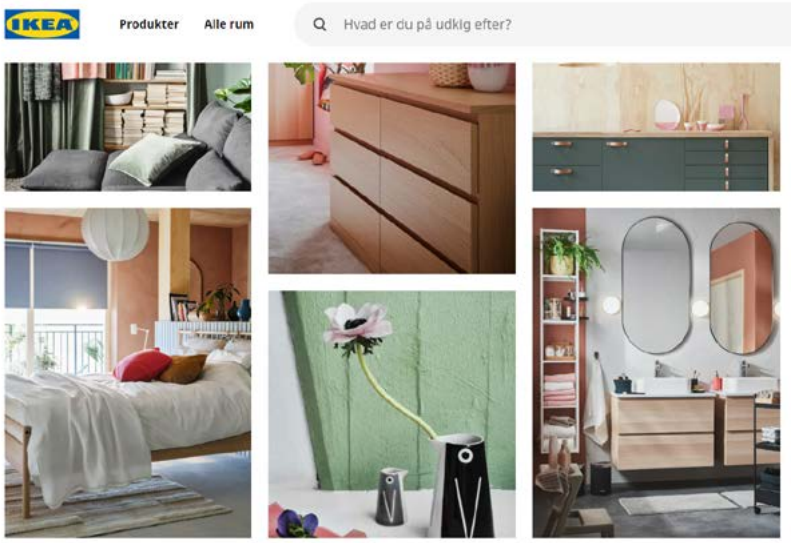
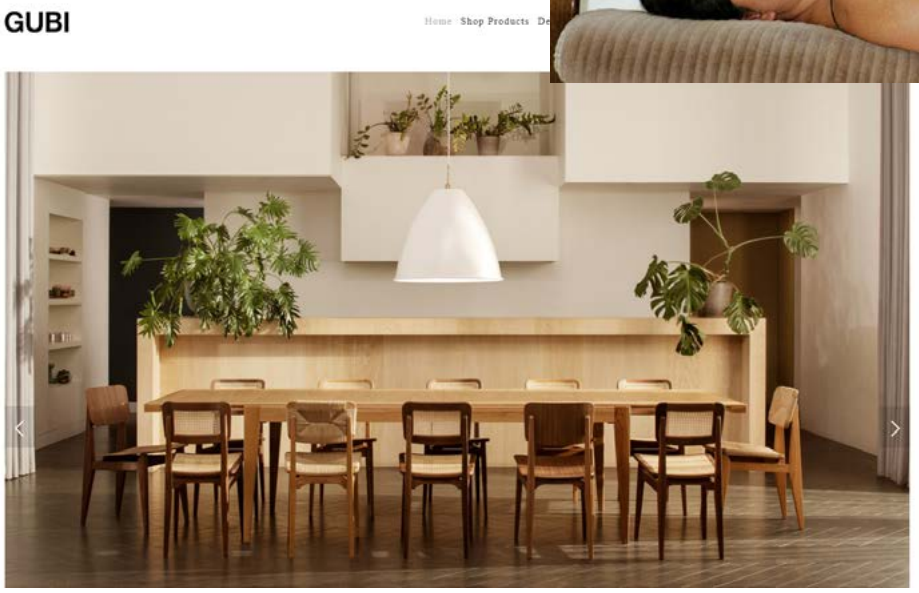
EXHIBITION & TALKS
3rd – 5th
of September 2020
Lifestyle & Design Cluster.
PITCHING FOR A BETTER BALTIC SEA 2020
CRAFT
GO
GCO
Grøn Cirkulær Omstilling

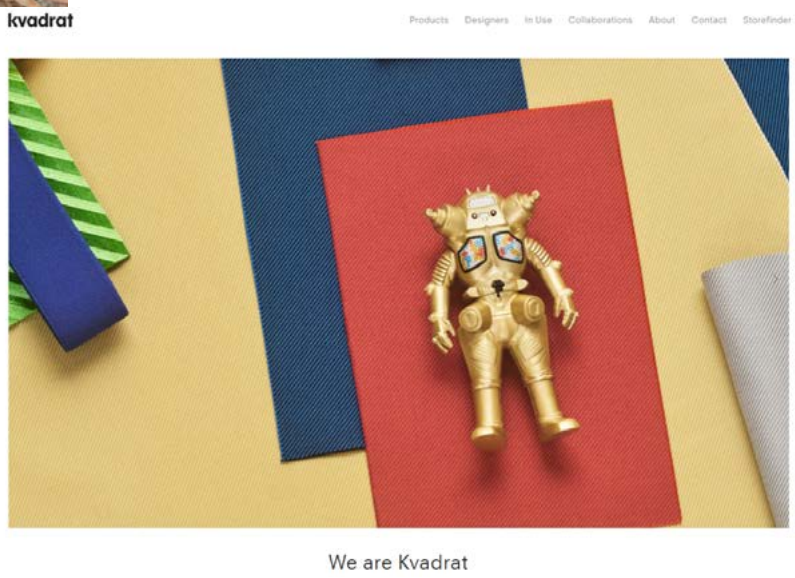
Our members
+220 Danish brands











Research and identification of textile plants in the Nordic countries & Europe - focusing on fiber - to - fiber recycling for the fashion & textile industry

Lifestyle & Design Cluster.

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Challenges to closing the textile loop

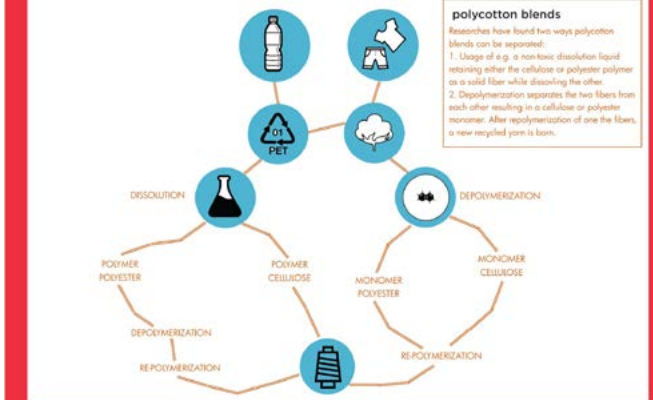
Redesign, remaking and recycling fiber-to-fiber have for centuries been a part of our life. E.g. in the eighteenth century the Napoleonic War caused virgin wool shortages which required that wool fibers be garneted into new yarns. However, recycling became less attractive and unnecessary in the late nineteenth century and beginning of 20th when man-made fibers were born. Suddenly the technical progress created no need for recycling anymore.

Nowadays non-organic raw materials are infused with a high variety of chemicals requiring different treatments under a recycling process. Today cotton-polyester blends, nylon PA6 and 100% polyester can be chemically recycled due to years of lab research and experimentation. On the other hand, fibers such as wool, cotton, camel, cashmere fibers can be mechanically recycled with the addition of a percentage of virgin fibers.

Using recycled materials is generally considered environmentally better but there are both advantages and disadvantages. In general, a recycling process is demanding and not many technological features are implemented yet as for instance material composition I.D. making it still a challenging field. During both the mechanical and chemical process many steps are needed e.g. characterization of materials/blends, separation of non-wanted components, materials, zippers, buttons, dyes and chemicals. Blends of e.g. cotton-pes or elastane can be highly time consuming to recycle due to the separation steps. While mechanically processed fibers are challenged in achieving an equal quality as a virgin material without adding any virgin fibers. 100% is typically not possible but the Italian textile plant Rifo adds 0% virgin fibers.

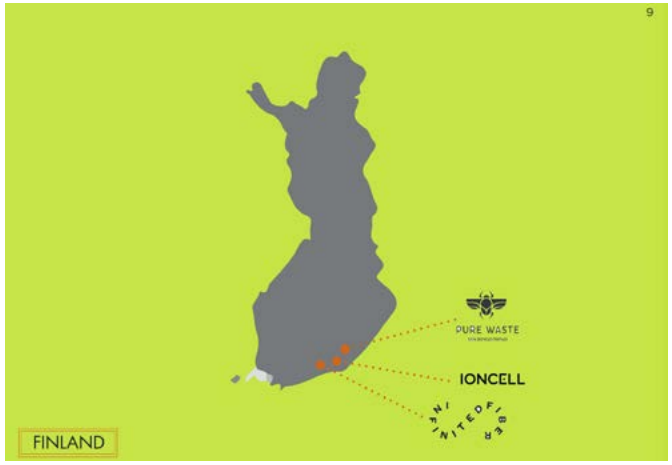
For these reasons recycled materials are today more expensive than virgin raw materials which continues to challenge the development of a circular textile industry.

chemical process at a glance



polycotton blends

Researches have found two ways polycotton blends can be separated:
1. Usage of e.g. a non-toxic dissolution liquid retaining either the cellulose or polyester polymer as a solid fiber while dissolving the other.
2. Depolymerization separates the two fibers from each other resulting in a cellulose or polyester monomer. After repolymerization of one the fibers, a new recycled yarn is born.



ReVerSo

since 2014 |
Prato, Italy
www.re-verso.com

what

© Re.Verso

Re.Verso is an identifying trademark standing for high-quality recycled wool materials "Made in Italy" with a well established textile system based in Italy. The trademark consists of several partners such as Green Line, Nuova Fratelli Boretti and several Italian manufatures for yarn, fabric and knitwear supply. Green Line responsibly sources pre-consumer cut offs from Italy and selected European countries. While Nuova Fratelli Boretti takes care of the mechanical process of transforming waste into fibers of various wool qualities such as cashmere and camel fibers. Re.Verso holds certificates such as Global Recycling Standard, ISO 9001 and SA8000.

Re.Verso™ re-engineered wool: 100% Made in Italy supply chain evolved and integrated for a circular economy based new production system

© Re.Verso

process & result

The process applied is mechanical and results in re-engineered wool, cashmere and camel fibers. These are then knitted or woven by Re.Versos Italian collaborators into fabrics for fashion and home textiles. Re.Verso sorts the textile waste by colour. Filippa K collaborates with Re.Verso by sending wool fabric cutting waste to one of their Italian fabric manufacturers in order for this to be reused and recycled.

© Stellioni Mapel

© Nuova Fratelli Boretti

collaborators: Filippa K FARRAH FLOYD

ReVerSo since 2014 | Prato, Italy www.re-verso.com

GREEN LINE
NFB NUOVA F.LLI BORETTI
C4 FILATURA
filpucci
A. Stellioni by Mapel
Filippa K

ReVerSo

Re.Verso has established a partnership between several textile manufactures in Italy that each have their role in textile recycling value chain.

The company Green Line responsibly sources pre-consumer cut-offs from Italy and selected European countries.

Nuova Fratelli Boretti takes care of the mechanical recycling process and transforming post-consumer waste collected and sorted by Green Line into fibers of various wool qualities such as cashmere and camel fibers.

In the production phase one of the fiber spinners is the Italian company Filpucci based in Tuscany. It is known for its superior knitwear yarns and has several plants in the area for twisting, dyeing and spinning yarns.

The other spinner company is Filatura C4 specializing in high-quality and performance yarns using recycled and eco-raw materials among others.

Stellioni Mapel is also an Italian fabric manufacturer producing knitted wool and mohair fabrics and fake furs for fashion clothing but also shoe lining and upholstery. Moreover they can produce more technical fabrics for e.g. paintrollers and cleaning usage.

In the end of a life cycle fashion brands have the possibility of sending their wool pre-industrial waste as f.x. Filippa K has tried out, in order for it to be used in the production of recycled yarns.

IONCELL

INFINITED FIBER

PURE WASTE

re:newcell

SÖDRA

TEXTILECHANGE

convert

I:CO

SAXCELL

Wolkat

worn again technologies

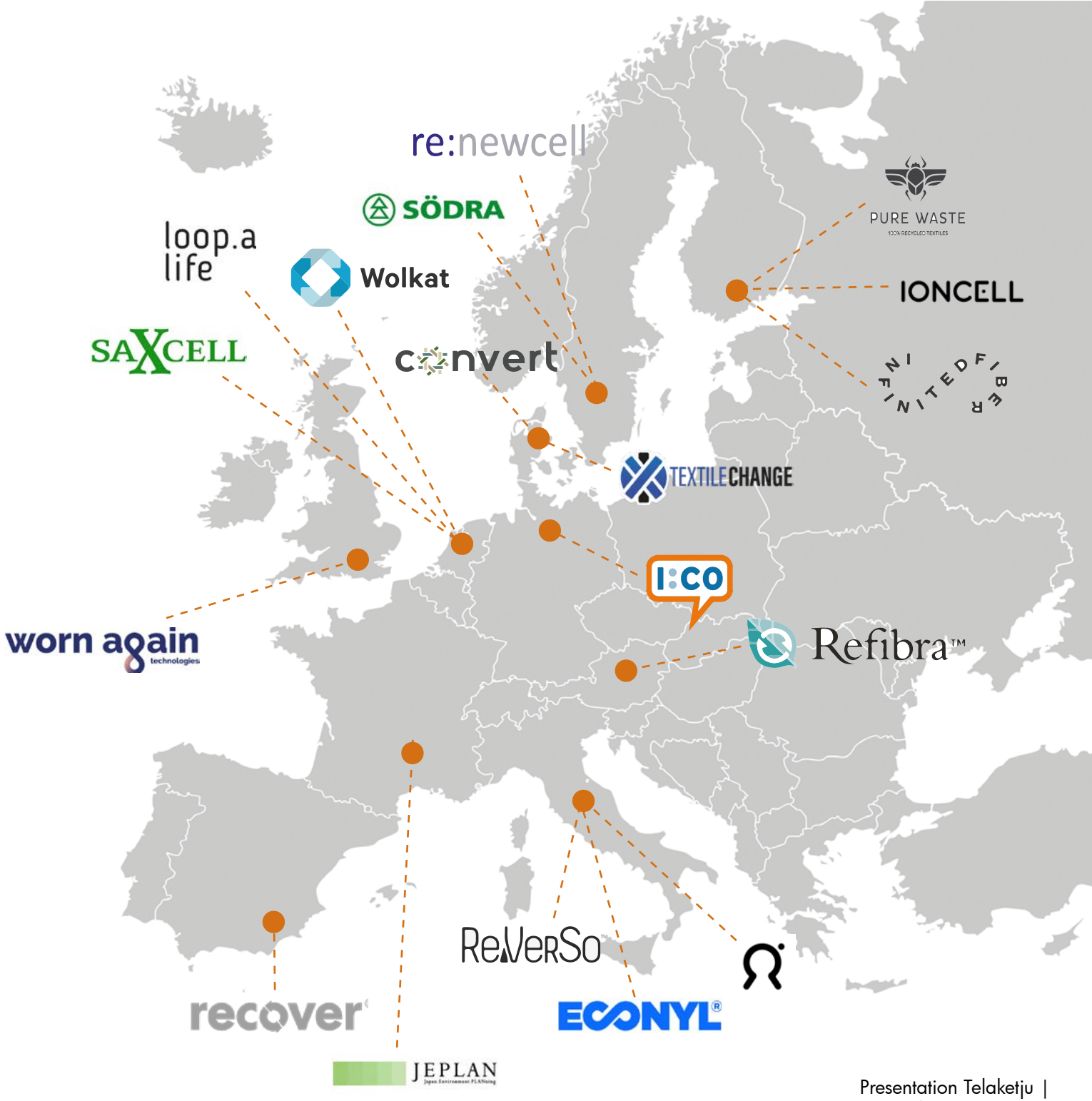
Refibra

ReVerSo

ECONYL®

recover

JEPLAN



Presentation Telaketju | November 2020

Mechanical process









RECOVER

PURE WASTE

recover®

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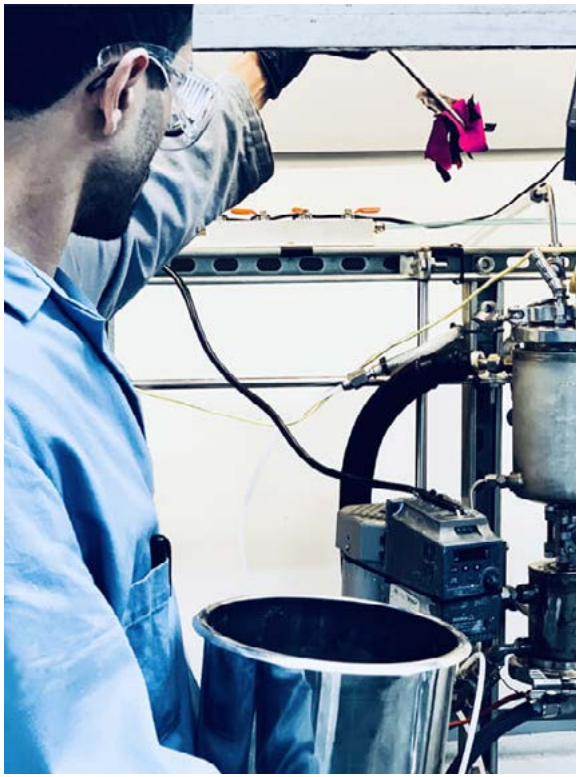
convert

I:CO

ReVerSo™

Chemical process



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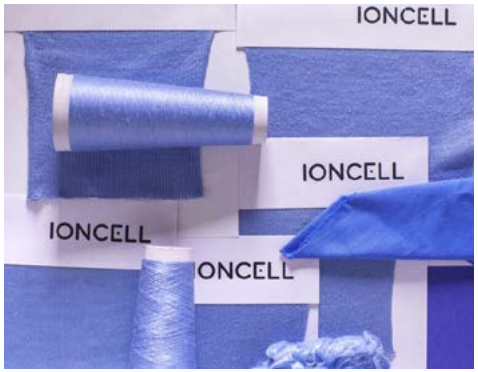


SAXCELL

re:newcell

INFINITED FIBER

The proce

The core of Infinited Fil
three key processes.

1 FIBER SE

2 TURNING
LIQUID

3 TURNING

worn again technologies

ECONYL®

SÖDRA

JEPLAN

Refibra

P Pilot

O Operational

C Commercial

Lifestyle & Design Cluster


ECONYL®
ReVerSo™
ITALY

since 2017 |
Prato, Italy

www.rifo-lab.com

- Post-consumer waste

- Jeans & Cashmere knit

- Collected from fra Southern Europe og USA

- Sorted in colour families

- Mechanical process

- No need for re-dye

- 0% addition of virgin materials

- 3 hues of blue (jeans)

- Variety of cashmere yarns

- Take-back system so far established for end users in Italy

- Collecting system will expand to other European countries too

since 1965 + 2011 |
Aquafil Group
USA + Italy

www.aquafil.com
www.econyl.com

- Pre-consumer & post-consumer waste
- Fishing nets and old carpets
- Collecting points in oceans globally
- PA6 nylon

- Textile plant in Slovenia
- Chemical process
- Depolymerization process
- 0% addition of virgin fibers

- Econyl yarns are regenerative

- Econyl yarns used for fashion & interior products

DENMARK

since 2018 |
Kvadrat + Moellerup Estate
Roende, Denmark

www.convert.as
www.advancednonwoven.dk

- Post-consumer clothing waste, PET, used carpets or even wood and glass fibers

- Turned into non-woven composites

- Mats' height varies from 1 to 100mm

- Textile plant in Jetland

- 40% of the company is owned by Kvadrat

- Caft-former is a machine patented method the Danish company Advanced Nonwoven

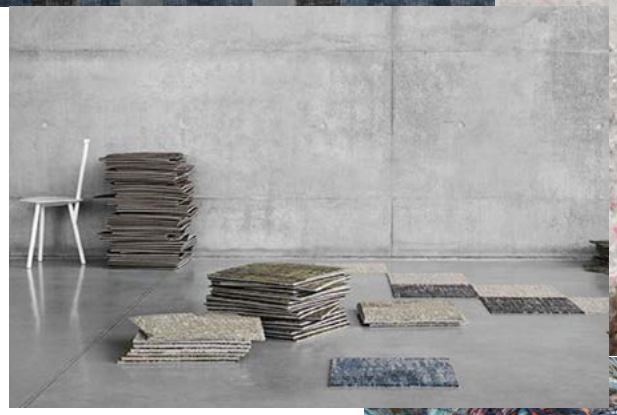
- No glue used for binding the materials

- Binding fibers are used and melt when they reach the right temperature

- **Really** is a company using hard panels to experiment with furniture products

- Products can vary from company to company

ege



convert

ECONYL®

- Up tp 200 components in a carpet
- Collaboration with Convert & Technological Institute looking into recycling possibilities. E.g. testing a backing made of Ege‘s own pre-consumer waste
- Circular design solutions are highly needed in order for making recycling easier and more effective in the future
- ‘ Ecotrust‘ backing produced of PET bottles at Fibertex
- Econyl yarns usage in production is 32%
- In 2030 increased to 75%
- Cradle to Cradle certified

ege

since 1938 |
Denmark

www.egecarpets.com

Collecting & Sorting

ECONYL®

Recycling process

convert

Belrey FIBRES

Fibertex NONWOVENS

TEKNOLOGISK INSTITUT

Production

Bentzon Carpets

carpetconcept

HAMMER CARPETS

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Life cycle

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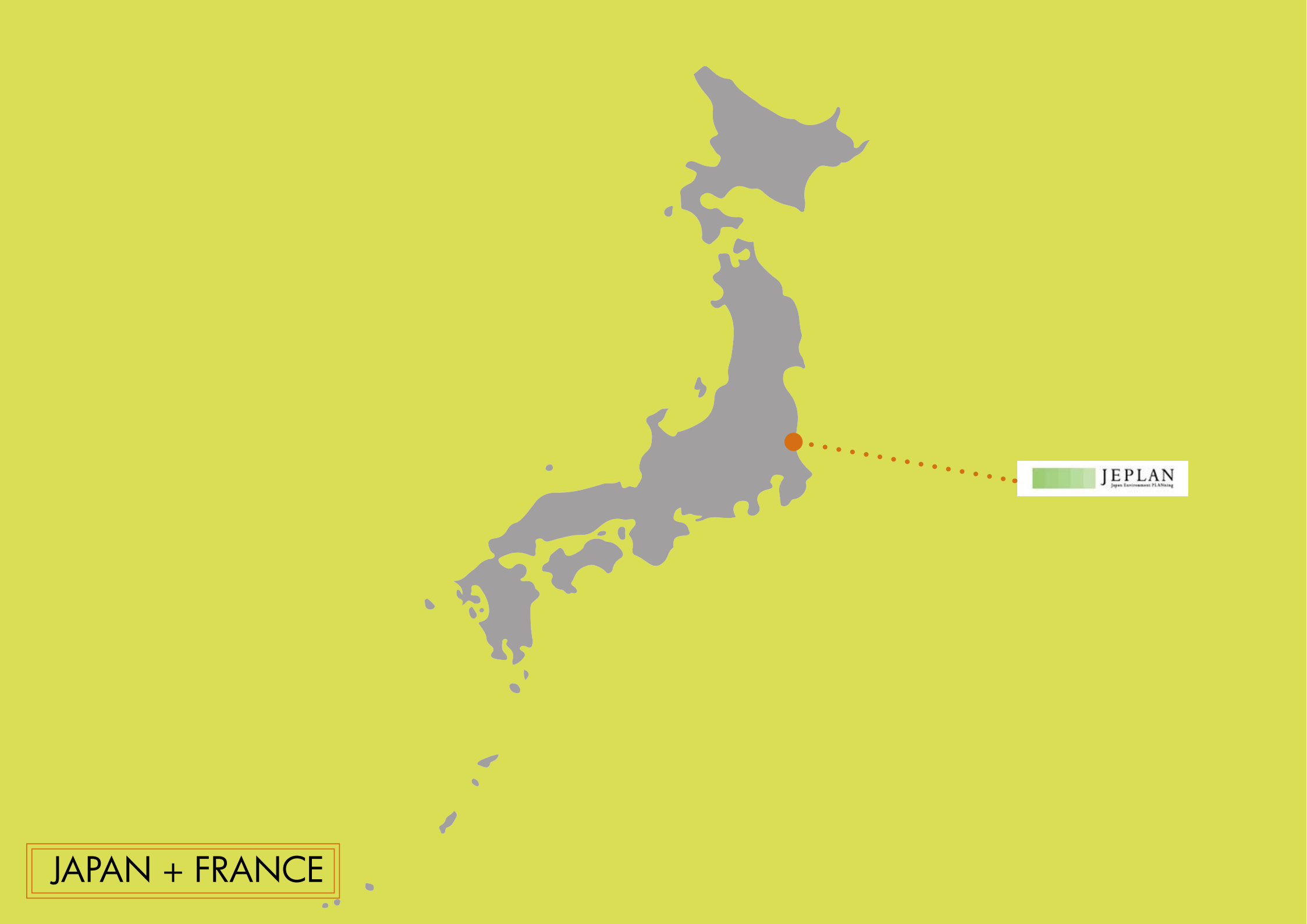

JEPLAN
Japan Environment PLANning
JAPAN + FRANCE

JEPLAN
Japan Environment PLANning

since 2007 |
Japan + Lyon 2022

www.jeplan.co.jp

- Post-consumer waste

- PES textiles

- **Bring** take-back system since 2010

- Collected in Japan

- Currenctly 2,800 collecting spots upscale to 10,000 spots

- Chemical process

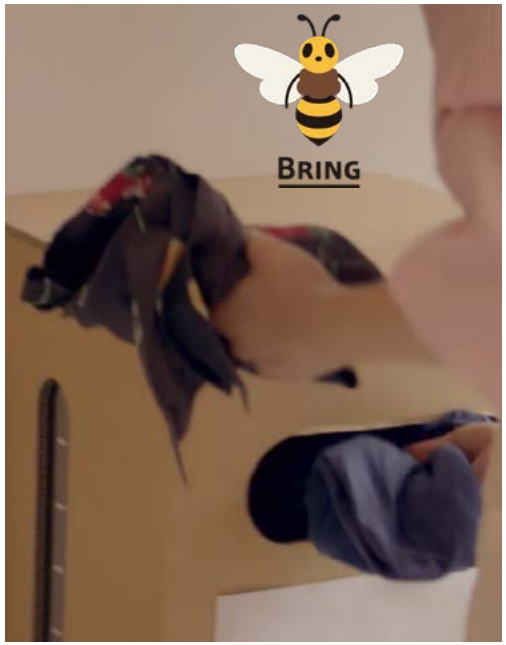
- Extract PES from clothing and not PET bottles

- Zippers & buttons recycled too

- 0% addition of virgin fibers

- PET pellets

- Pilot textile plant in Lyon 2022 in collaboration with French Cluster Techtera



- **Bring** system utilised by both Japanese and international fashion brands

- **Bring** system will also begin in France in 2022

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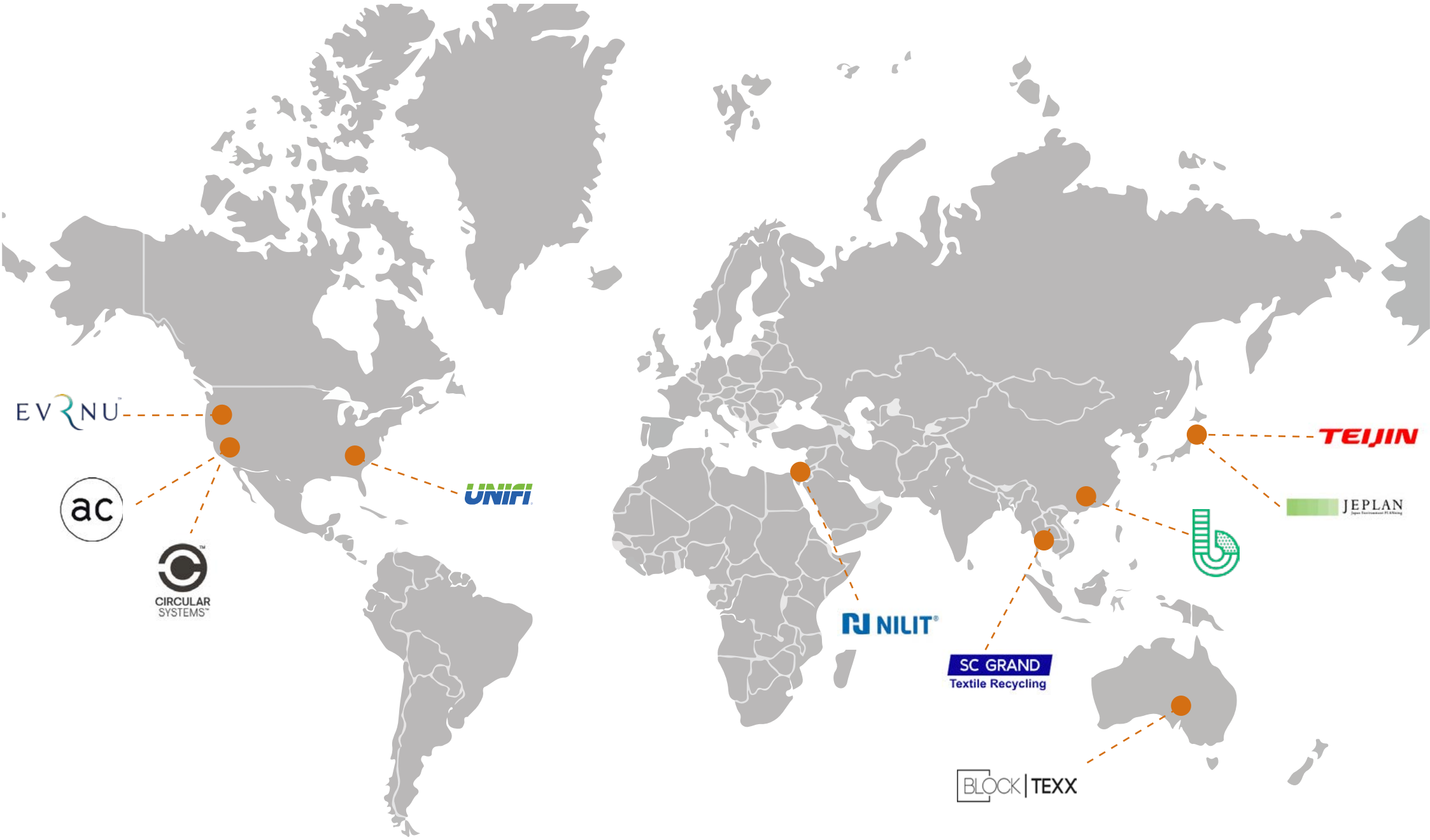
Textile plants outside EU



EVRNU

WHAT: Engineered fiber from post-consumer clothing waste

PROCESS Mechanical & NuCyl tech (extracting molecular)

RESULT: Yarn & Fabric

CUSTOMERS: Adidas, Stella McCartney

UNIFI

WHAT: PET waste

PROCESS: 4 REPREVE produkter. Nylon 6 from pre-consumer waste: tents, socks, backpacks

RESULT: Fashion & home textiles. Tops, socks, outwear, automotive, home (curtains to carpet)

CUSTOMERS: Lindex, Nike, Adidas, H&M

CIRCULAR SYSTEMS

WHAT:
1. Texloop (post-consumer waste)
2. Orbital Hybrid yarn
3. Agraloop biofiber (agriculture waste)

PROCESS: Texloop is created from post-consumer waste both natural & synthetic fibers (cot/poly, cot., poly., viscose) with some % of organic virgin cotton

RESULT: Fabric for fashion

AWARDS:H&M Global Change Award 2018

ac

WHAT: Post-consumer waste clothing & textiles

PROCESS: Chemical

RESULT: Yarn for fashion

AWARDS: H&M Global Change Award 2016

STATUS: Pilot or operational

WHAT: pre-consumer & post-consumer waste

PROCESS: mechanical, 0% water waste, 0% chemical waste, automated colour sorting system (9 colours) where machines can process up to 3 tonnes per day. Addition of virgin materials is needed to spin a strong and high-quality yarn.

RESULT: yarns for fashion

CUSTOMERS: Big players of the fashion industry

STATUS: Operational or commercial

BLOCK | TEXX

WHAT: BlockTexx is a clean technology company that recovers polyester and cellulose from textiles and clothing. Feedstock supply: Pre- and post-consumer (consumer, industrial, commercial)

PROCESS: Chemical. Feedstock: Polycotton, Polyester/MMC, Polyester, Cotton, MMC

CUSTOMERS: Work with Australian and International brands

STATUS: Pilot facility with a commercial scale plant due Q4 2020

TEIJIN

WHAT: TEJIN makes it possible to separate and eliminate additives and colorants not only from PET bottles but also from other polyester products. PET bottles, post-consumer, min. 80% pes, natural fibers too

PROCESS: chemical, no closed loop since feedstock isn't only textile waste

RESULT: ECO CIRCLE fibers, 10-20% more expensive than virgin, reduction 84% in energy consumption, Low environmental impact reduction effect of CO2 emissions

P **Pilot**

O **Operational**

C **Commercial**

THANK YOU FOR LISTENING!

ANY QUESTIONS?

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