SUSTAINABILITY OF RESOURCES AND READINESS TO FOLLOW CIRCULAR ECONOMY - AN EXISTENTIAL TASK OF TC STARTING BY FIBRES

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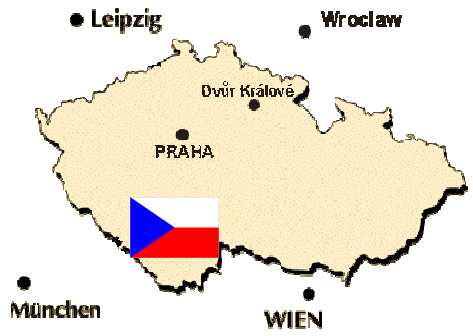

COMPANY PROFILE

inoTEX®

INNOVATION FROM THE SOURCE

72 years experience in innovation for textile wet processing

R&D – Technology Transfer –
Special small-lot productions – Services

Key strategy:

Implementation of tailored R&D into the practice by use of own speciality TAA production:

- textile chemistry and biotechnology, colouristic
- textile testing and analytical lab (EN ISO 17025)
- via cleaner production towards sustainability of resources
- eco-services and consultancy

WE OPERATE IN THE HEART OF EUROPE

CIRCULAR ECONOMY

MOTTO: „LEARNING TO MAKE MORE WITH LESS“
TC as a manufacturing industry based on the TRANSFORMATION OF RESOURCES – materials, water, energy, chemicals TO THE FINAL PRODUCTS WITH ADDED VALUE (for B2C-fashion and B2B-TT)

Why we need savings:
1. resources cost increase
2. strict legislation: energy consumption, C foot print, emissions, water and waste water pollution, coming landfill restriction (Green Deal)
3. rising customers orientation to the envi friendly products – promoted by „brands“ and ecolabels

!! THREAT:
Rising population + growing single use consumption + limited fossil resources

RAW MATERIAL SCARCITY = COLLAPSE OF INNOVATION & MARKETS

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WAY FORWARD: THROUGH RADICAL INNOVATION TO INNOVATION

from linear to the circular economy

Cleaner production using the minimized resources

products eco-design based on sustainable resources with possible recycling

systematic orientation to the sustainable, renewable resources

EU: reduction of strong dependence on the imported resources (fibres, dyes, chemicals)

ETP Fibres Textiles Clothing
EUROPEAN TECHNOLOGY PLATFORM

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WAY TOWARDS CIRCULAR ECONOMY

from the linear: gain – produce – throw away

to a complex circular economy model

jointly from raw material producers and textile manufacturers

via consumers (B2C i B2B)

to the waste processors

New dimension: New legislation

New ways: Bio-economy resp. circular bioeconomy (CBI – KET)

New approach: producer + market aim for waste management

WAY TOWARDS CIRCULAR ECONOMY

New technologies for repeated use and also dematerialization:

-„slow fashion“
- second-hand significant increase
- production + maintenance complex strategy
- service life & reactivation of functionality in laundry
- massive support by emerging technologies
- product marking / tagging to the recycling differentiation

ETP Fibres Textiles Clothing
EUROPEAN TECHNOLOGY PLATFORM

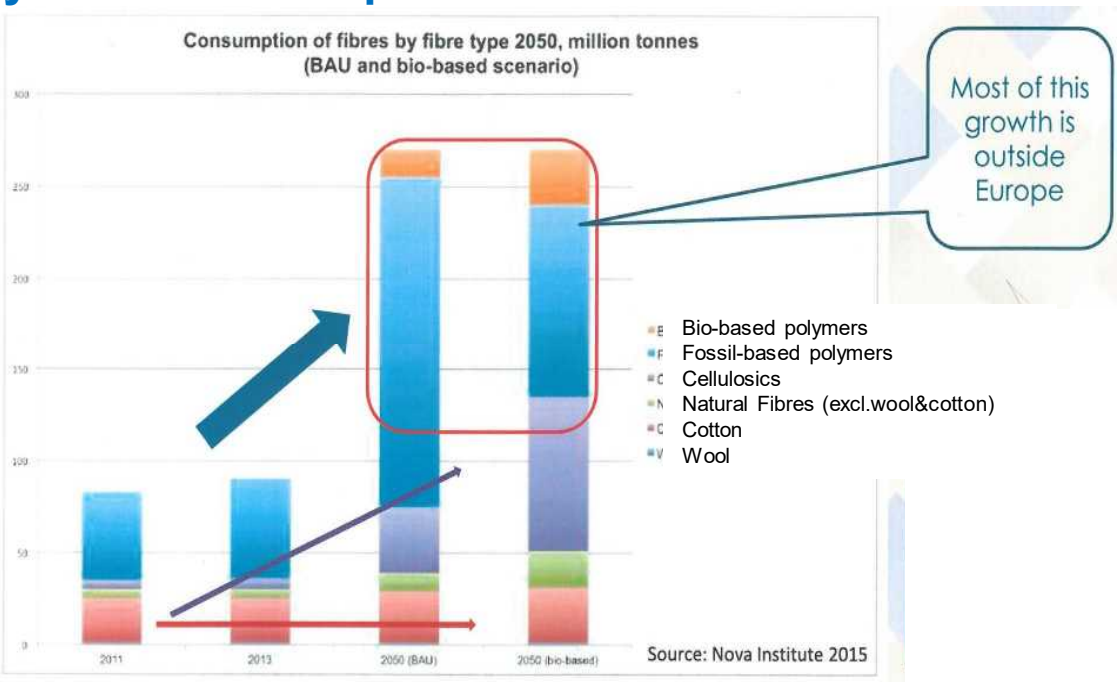
ETP FTC – Theme III Circular Economy and Resources Efficiency

SIRA – 10/2016 www.textile-platform.eu

STARTING TOOL - FIBRES

actual consumption about 100 mil.t/year 2017
steady growth +3%/year since 80th of 20.century
stable consumption increase for future years
non manageable: fibre demand 240 mil.t in 2050

diversification of actual consumption around 70% synthetic and man made fibres mostly based on fossil resources
about 30 % natural fibres - limitation
Actually 80% of textile products end at landfill or incineration



COTTON

consumption in 2018/2019 = 27,5 mil.t – slight decrease of consumption
production 26,3 mil.t/2018-19 against 27 mil.t/2017-18
compensation – cotton stocks: (about 19 mil.t/2018 against 23 mil.t/2015)
large stock in PRC (over 8,2 mil.t)

Source: ICAC 11/2018

Ecologically un-friendly, expensive crop
Reduction of cultivation area
Decreasing of cultivation area
(irreversible climate changes, soil damage – Aral Sea)

- new competitive biomass-production
- almost full dependence outside EU
- changing governmental policy in production countries (massive growth of textile production to cover local demand of rising population e.g. „Make in India“)

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GLOBAL FIBRE – MARKET – consumption 2017

*Sources: ICAC, CIRFS, TFY, FEB, Lenzing estimates

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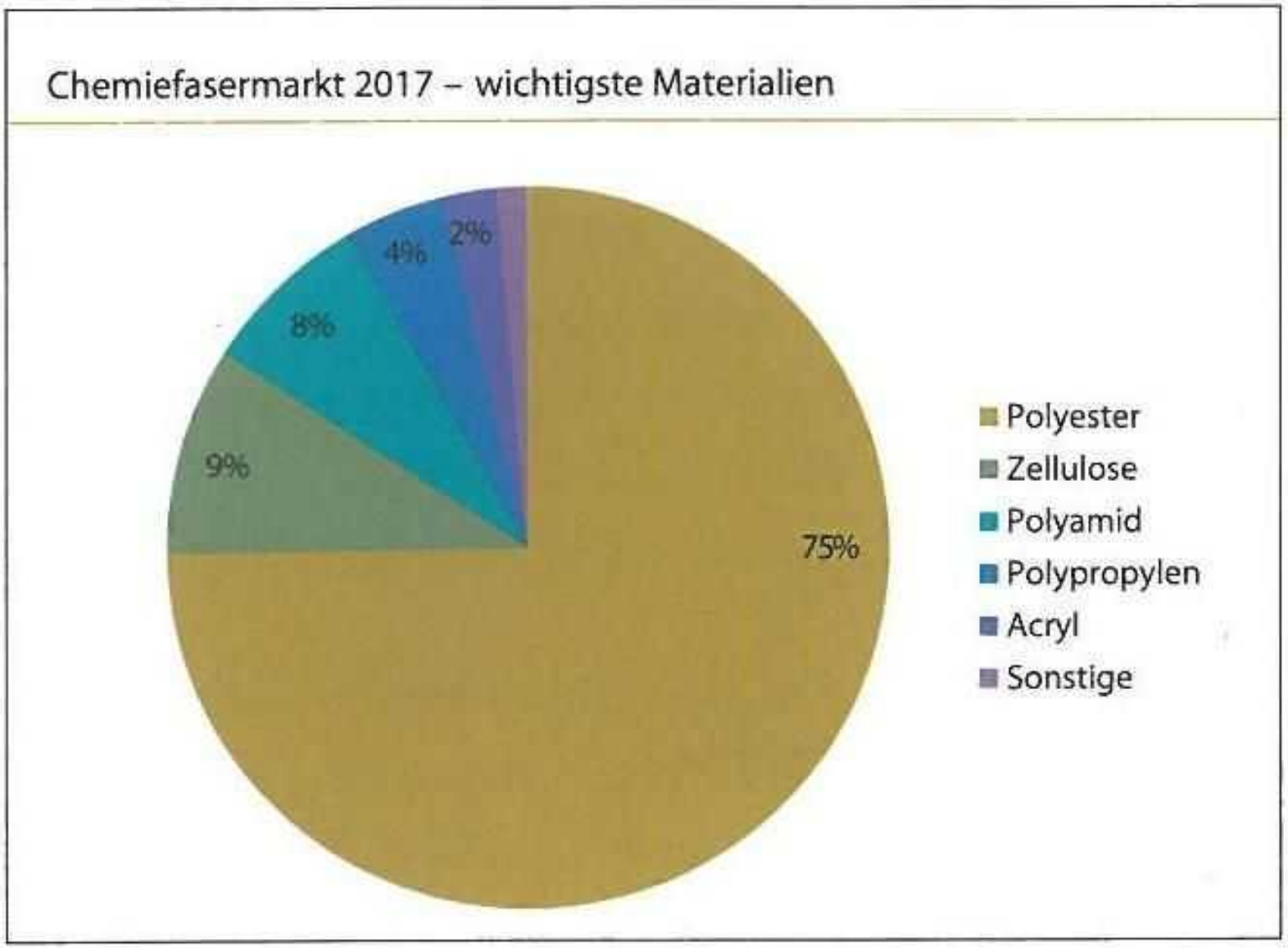
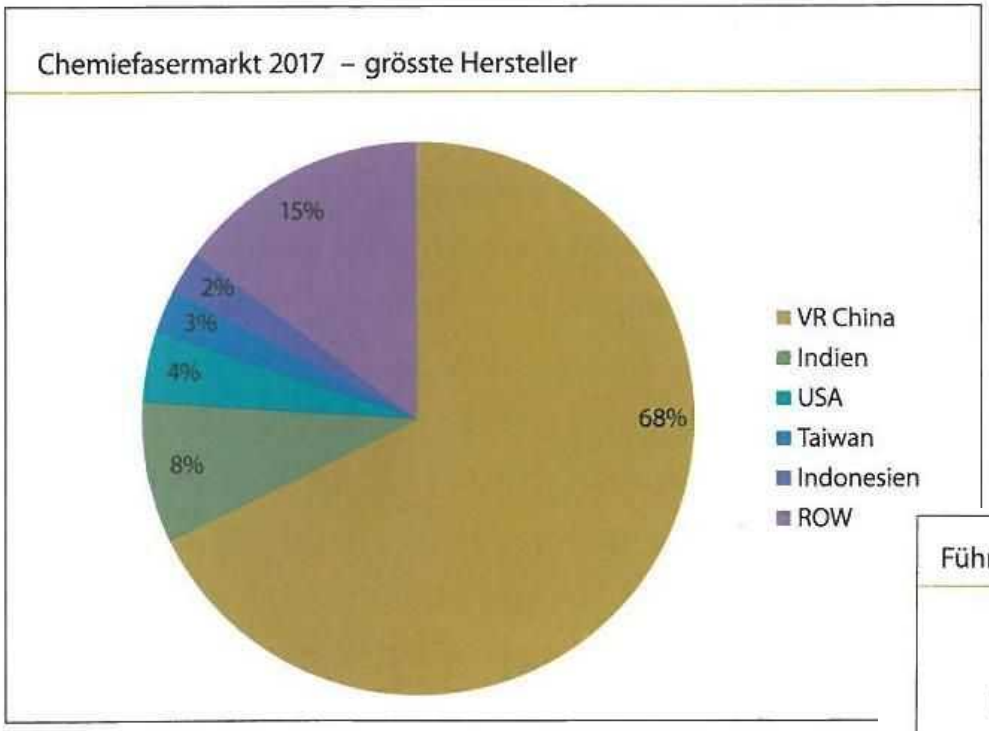
CHEMICAL FIBRES MARKET DIVERSIFICATION



Source: The Fibre Year, 2018

CHEMICAL FIBRES PRODUCTION



Decisive production outside Europe

Key exporters of TC 2017

Source: The Fibre Year, 2018

SUSTAINABILITY OF FIBRE RESOURCES

FUTURE CONCEPT: CIRCULAR TEXTILES REPLACE THOSE MADE WITH NEW RESOURCES

- TO COVER EXPECTED FIBRE CONSUMPTION
- TO CUT DEPENDENCE ON LIMITED FOSSIL RESOURCE
- TO MOVE PRODUCTION OF FIBRES BACK TO EUROPE
- CLEAR „LECTURE“ OF SCARCITY SHOWN BY CORONA VIRUS PANDEMY – DIFFICULT AVAILABILITY OF TEXTILES, DISRUPTION OF LOGISTICS)
- TO CREATE A ROBUST TC INNOVATIVE BRANCH FILLING A GREEN DEAL WASTELESS STRATEGY

ALTERNATIVES: SLOW FASHION, INCREASE OF „SECOND HAND“ MARKET
RECYCLING – CLOSE LOOP (rPET-bottles), cellulosic wastes
UTILIZATION OF RENEWABLE BIO-BASED RESOURCES
REPLACEMENT OF FOSSIL BASED WITH BIO-BASED (Bio-PA, Bio-PBT, PHA)
BIOBASED BUILDING BLOCKS
LARGE GROUP OF CELLULOSE REGENERATES (FOREST BIOMASS-CSF, SECONDARY AGRI/FOOD WASTES, TEXTILE waste)

Ricinus communis

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NATURAL BAST FIBRES

FLAX – OILSEED FLAX – HEMP

RISING ATRACTIVENESS – WASTELESS UTILIZATION
OILSEED FLAX SEEDS – OMEGA 3 FA – NUTRIENT
+ WASTE STALK FIBRE EXTRACTION BOOSTED BY „BIORETTING“
(ENZYMATIC – TEXAZYM INOTEX)
INDUSTRIAL HEMP (*Canabis Sativa*)
– CONTENT OF NON HALUCINOGENIC CBD + FIBRE FROM STALK

„BIORETTING“ - spraying of stalk on the field (after harvest) TEXAZYM SER or
- bath processing (circulation loos fibre dyeing device) TEXAZYM BRF, DLG
Customized enzymes boost the natural field – retting process
Higher long fibre yield, less shives, shortening of retting time, elimination of (dry) climate changes

High-end garment textiles
Fibre reinforcement + (bio)resin = (bio)composites
Technical textiles – insulation felts (geo, agro, automotive, construction)

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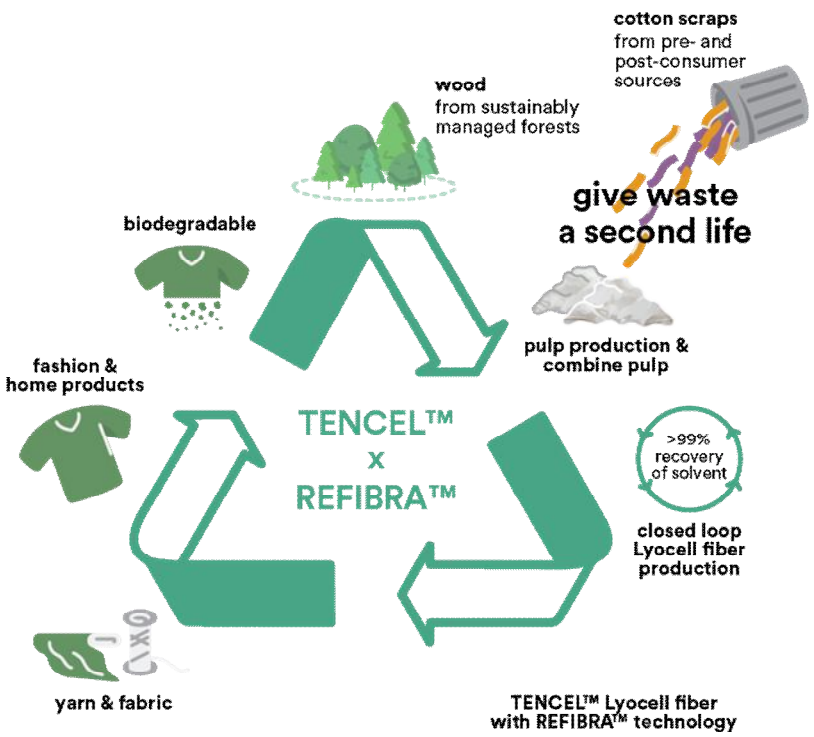
LARGE FAMILY OF CEL REGENERATES

LENZING – TENCEL, LYOCELL – CE NEW ALTERNATIVES



ECO VERO™
- eco-responsible viscose
- sustainable wood sourcing – CSF (certified sust.forestry)
- EU-ecolabel certified
- up to 50% lower emisions and water impact

REFIBRA™
- contains (up to 30%) cotton recyclate from garments „ECO DENIM“ – TECHTEXTIL 2019 innovation award

VEOCEL™
- new biodegradable from botanic origin Envi-responsible production processS

VEOCEL LYOCEL QUAT RELEASE – cleaning wet wipes / disinfectant

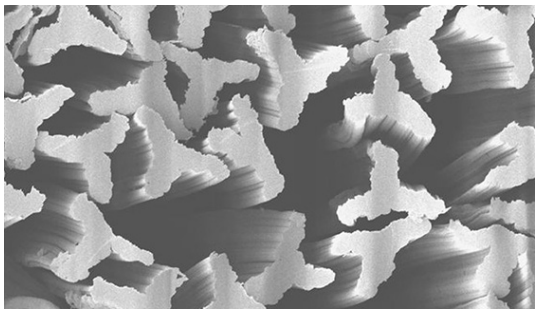
KELHEIM FIBERS – DANUFIL cellulose regenerate range from CSF wood
inherently modified – functionalised fibres
(DANUFIL DEEP DYE, FR, AMB, SA), Spun Dyed

IN ALL CASES CS_2 FREE, SOLVENT – REUSE

- FULLY BIODEGRADABLE – NO SEA WATER CONTAMINATION WITH MICROFIBERS
- READY FOR REPEATED UTILIZATION (CLOSE LOOP)

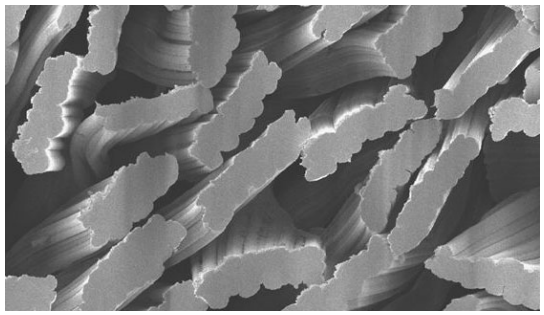
LARGE FAMILY OF CEL REGENERATES

KELHEIM FIBERS – DANUFIL cellulose regenerate range from CSF wood inherently modified – functionalised fibres (DANUFIL DEEP DYE, FR, AMB, SA), Spun Dyed…)



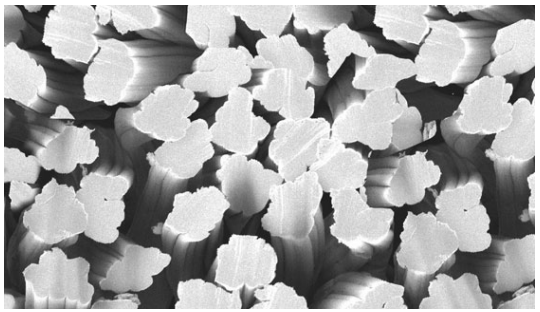
Viscosefibre **GALAXY®**

max absorbency-hygiene



Viscosefibres **VILOFT®**

fabric consists 70% of air



Viscosefibre **VISETA®**

cool, silk-like feel

IN ALL CASES CS_2 FREE, SOLVENT – REUSE

- **FULLY BIODEGRADABLE – NO SEA WATER CONTAMINATION WITH MICROFIBERS**
- **READY FOR REPEATED UTILIZATION (CLOSE LOOP)**

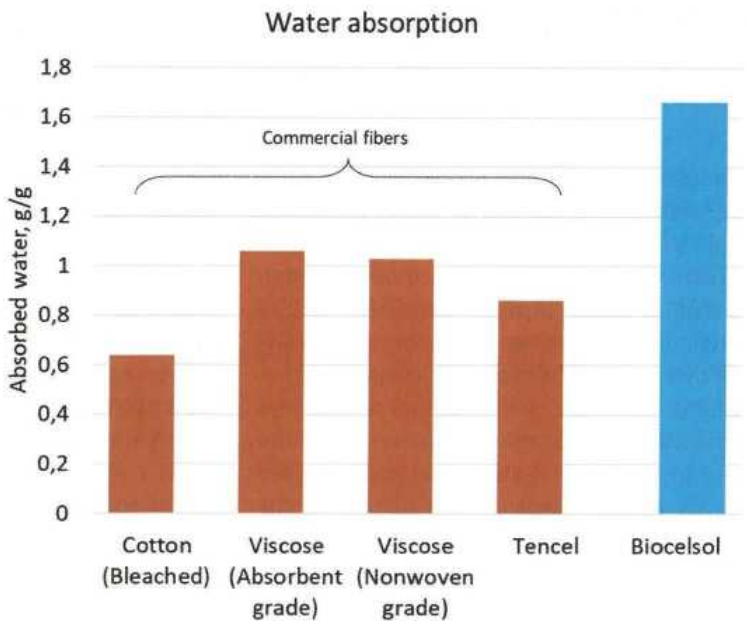
EMERGING RENENERATED CELLULOSICS

RESULTS OF BIOBASED INDUSTRIES (KET) MAINLY „BORN“ IN SCANDINAVIA

BIOCELSOL (TUT-FI) – combined chemical, machanical and enzymatic treatments

- Cellulose with high alkali stability and proper viscosity
- Novel biotech – converting cellulose into fibres
- Dissolving grade pulp modified to the alkali soluble form (ZnO/NaOH) by treating with enzymes
- Excellent water absorptivity – dyeability
- No bleaching needed

Water absorption of different fibers



Source: Chemical Fibers International 4/2020

inoTEX®

EMERGING REGENERATED CELLULOSICS

INFINITED FIBER (FI) – CELLULOSE RICH WASTE – OLD TEXTILES

(instead landfil or burning)

Premium superfibres

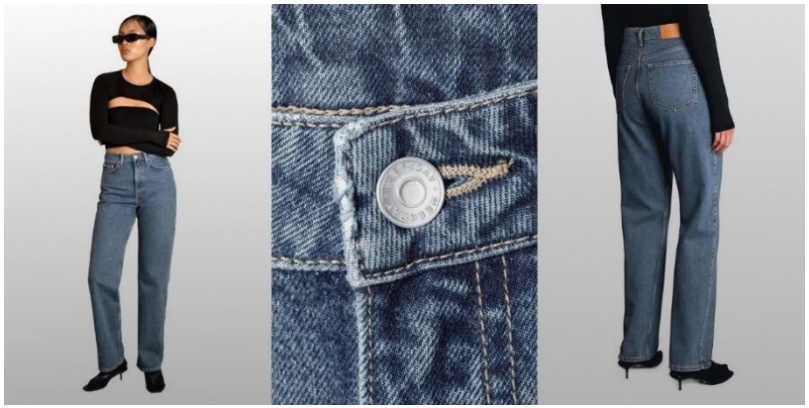
INFINNA™ – LOOKS AND FEEL LIKE COTTON – CARBAMATE F-

NON-CELLULOSIC PARTS (PET, ELASTANE, DYES) CLEANED OUT IN THE PROCESS

Based on UREA TREATMENT (NO CS_2) CONFORMS ZDHC, MRSL

Superior dye uptake, Inherently AMB

„NEW COTTON“ (+ AALTO UNI, H&M, Adidas)



H&M Weakday Jeans made with Infinna™ Sold Out in 24h!

EMERGING REGENERATED CELLULOSICS

IONCELL (FI) – AALTO UNI

IONCELL

DISSOLVING CELLULOSE OUT OF TEXTILES, CARDBOARD, PULP IN IONIC LIQUID (LYOCEL TYPE CEL. MAN MADE FIBER)

Moisture absorbing

BIODEGRADABLE

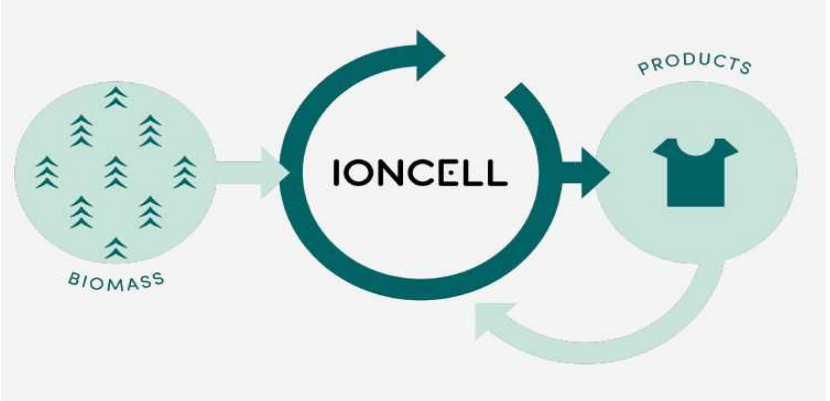
High mechanical strenght even when wet

Dyeable with Re,VAT dyes

- dyes retain in dissolution

Natural crimp

Shiny lustre



EMERGING REGENERATED CELLULOSICS

SPINNOVA (FI) – NO DISSOLVING, ONLY MECHANICAL REFINING THE PULP TRANSFORMING THAT INTO SPINNING READY FIBRE SUSPENSION

Spinnova®

„0“ HARMFULL CHEMICALS, „0“ DISSOLVING, „0“ REGENERATION

Can be upcycled again without dissolving – good/better quality

NO need to ad fresh fibres into recyclate

ANY CELLULOSIC BIOMASS (AGRI WASTE – WHEAT STRAW),

Co waste (= 30% of textile wastes) can be turned into new fibres

SPUN DYEING IN MASS – KEMIRA (FI) – AVOID ENVI EXPOSURE,

NO WATER/ENERGY CONSUMPTION BY SUBSEQUENT DYEING

0 CHEMISTRY

„BioBased Fibre of the year 2019“

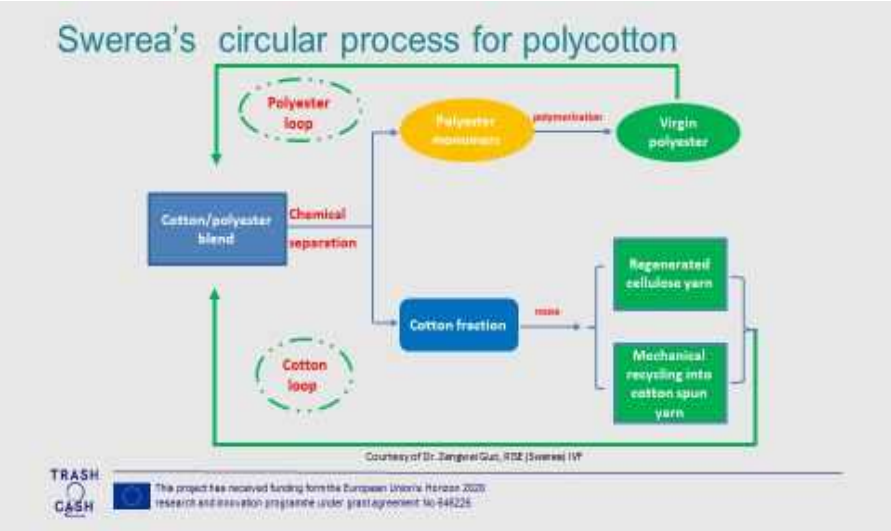
„ISPO 2020 Sustainability award“

Source: Spinnova.com (06/2020)

WASTE TEXTILES AS FIBRE RESOURCE

ACTUAL PROBLEMS TO BE SOLVED:

BLENDS of fibres: PES/Co – POLYCOTTON



RUNNING ACTIVITIES:

- SWEREA (TRASH 2 CASH)
- SAXCELL (NL) – r COTTON
- CARBION (FR) – enzymatic PET degradation (for plastics/foils at this moment)
- SEPARATION OF NON-CEL IN THE REGENERATION PROCESS

COATINGS – need to be separated before textile reprocessing

(swelling additives in the coating film – CENTEXBEL)

FROM LARGE VOLUME – DEFINED TEXTILES (HOSPITAL, ELDERLY SERVICES, HOTEL)

TO THE UNKNOWN MIXED WASTES

IDENTIFICATION OF FIBRE SORTS – by RFID fibres, by conti-analytical way (Near IR)

DEMATERIALIZATION – less input, REFUNCTIONALIZATION IN LAUNDRY

FROM OWNERSHIP TO SHAERING (AUTOMOTIVE, PPE-RENTAL)

CONCLUSIONS

TO AVOID RISK OF CONVENTIONAL FIBRES SCARCITY AND EFFECTIVE UTILIZATION OF TEXTILE WASTES:

- **MANIFOLD EMERGING RECYCLING – REUSE STRATEGIES ARE IN PROGRESS**
- **NEED OF RESTRUCTURALIZATION OF BOTH - TEXTILE INDUSTRY AND MARKET IS EVIDENT TO RETURN THE TEXTILE WASTE BACK INTO THE FIBRE PRODUCTION**
- **BIO-BASED INDUSTRY – ACTUALLY INTEGRATED WITH THE CIRCULAR ECONOMY (BBI TRANSFORMED IN CBI JRI FOR HORIZON EUROPE) PLAY A SIGNIFICANT ROLE IN THE RESTRUCTURALIZATION OF FIBRE ASSORTIMENT**
- **BIO-BASED FIBRES PLAY A SGNIFICANT ROLE IN THIS MOVEMENT**
- **CELLULOSE REGENERATES - A FUTURE ASSORTIMENT OF RENEWABLE/RECYCLABLE/BIODEGRDABLE FIBERS**

RETURNING THE TEXTILE AND ORGANIC WASTE BACK INTO THE EU TEXTILE CHAIN

LET´S LEARN TO MAKE GREEN DEAL MAX. EFFICIENT

Thank you for your attention!

ACKNOWLEDGEMENT:
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MINISTERSTVO PRŮMYSLU A OBCHODU

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