Agenda 2030 and Product Development

2019-04-02

Dr. Sandra Roos, RISE IVF

Participates in Produktdesign, Produktion & Teknik

Research Institutes of Sweden
Material och Produktion

Sweden 2018: collapsing glaciers, forest fires, drought and emergency slaughter

Fashion for Global Climate Action

The recent Intergovernmental Panel on Climate Change Special Report on Global Warming of 1.5°C highlights the urgency and scale of action required to keep the planet safe. On the brink of dangerous climate change,

RELEVANT INFORMATION

SDG – the UN Sustainable Development Goals

Global Warming Potential

the case, it must have occurred several centuries ago, as leprosy became increasingly scarce in the British Isles after the 17th century (3). It is also conceivable that humans may have been infected through contact with red squirrels bearing *M. leprae*, as these animals were prized for their fur and meat in former times (30). Our findings show that further surveys of animal reservoirs of leprosy bacilli are warranted, because zoonotic infection from such reservoirs may contribute to the inexplicably stubborn plateau in the incidence of the human leprosy epidemic despite effective and widespread treatment with multidrug therapy (1).

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ACKNOWLEDGMENTS

We thank E. Sheehy, E. Goldstein, M. Flaherty, A. Zintl, the National Trust, Forestry Commission Scotland, and Saving Scotland's Red Squirrels for samples, help, and advice. We thank the Genomic Technologies Facility at the University of Lausanne for Illumina sequencing and technical support. Raw sequence read files have been deposited in the Sequence Read Archive of the National Center for Biotechnology Information under accession numbers SRR3672737 to SRR3672758 (NCBI BioProject PRJNA325727), SRR3674396 to SRR3674450 (NCBI BioProject PRJNA325827), SRR3674451 to SRR3674453 (NCBI BioProject PRJNA325856), and SRR3673933; representative TLR1 sequences have been deposited in GenBank under accession numbers KX388139, KX388140, and KX388141. Phylogenetic trees and SNP alignments have been deposited at Treebase under Study Accession URL http://purl.org/phylo/treebase/phylows/study/TB2:S19692. Supported by the Fondation Raoul Follereau and Swiss National Science Foundation grant IZRJZ3_164174 (S.T.C.), the Scottish Government Rural and Environment Science and Analytical Services Division (K.S.), and the Thomas O'Hanlon Memorial Award in Veterinary Medicine (F.McD.).

SUPPLEMENTARY MATERIALS

www.sciencemag.org/content/354/6313/744/suppl/DC1
Materials and Methods
Figs. S1 to S5
Tables S1 to S14
References (31–51)

21 June 2016; accepted 27 September 2016
10.1126/science.aah3783

ARCTIC SEA ICE

Observed Arctic sea-ice loss directly follows anthropogenic CO_2 emission

Dirk Notz[1*] and Julienne Stroeve[2,3]

Arctic sea ice is retreating rapidly, raising prospects of a future ice-free Arctic Ocean during summer. Because climate-model simulations of the sea-ice loss differ substantially, we used a robust linear relationship between monthly-mean September sea-ice area and cumulative carbon dioxide (CO_2) emissions to infer the future evolution of Arctic summer sea ice directly from the observational record. The observed linear relationship implies a sustained loss of 3 ± 0.3 square meters of September sea-ice area per metric ton of CO_2 emission. On the basis of this sensitivity, Arctic sea ice will be lost throughout September for an additional 1000 gigatons of CO_2 emissions. Most models show a lower sensitivity, which is possibly linked to an underestimation of the modeled increase in incoming longwave radiation and of the modeled transient climate response.

The ongoing rapid loss of Arctic sea ice has far-reaching consequences for climate, ecology, and human activities alike. These include amplified warming of the Arctic (1), possible linkages of sea-ice loss to mid-latitude weather patterns (2), changing habitat for flora and fauna (3), and changing prospects for human activities in the high north (3). To understand and manage these consequences and their possible future manifestation, we need to understand the sensitivity of Arctic sea-ice evolution to changes in the prevailing climate conditions. However, assessing this sensitivity has been challenging. For example, climate-model simulations differ widely in their timing of the loss of Arctic sea ice for a given trajectory of anthropogenic CO_2 emissions: Although in the most recent Climate Model Intercomparison Project 5 (CMIP5) (4), some models project a near ice-free Arctic during the summer minimum already toward the beginning of this century, other models keep a substantial amount of ice well into the next century even for an external forcing based on largely undamped anthropogenic CO_2 emissions as described by the Representative Concentration Pathway scenario RCP8.5 (4, 5).

To robustly estimate the sensitivity of Arctic sea ice to changes in the external forcing, we identify and examine a fundamental relationship in which the CMIP5 models agree with the observational record: During the transition to a seasonally ice-free Arctic Ocean, the 30-year running mean of monthly mean September Arctic sea-ice area is almost linearly related to cumulative anthropogenic CO_2 emissions (Fig. 1). In the model simulations, the linear relationship holds until the 30-year running mean, which we analyze to reduce internal variability, samples more and more years of a seasonally ice-free Arctic Ocean, at which point the relationship levels off toward zero. For the first few decades of the simulations, a few models simulate a near-constant sea-ice cover despite slightly rising cumulative CO_2 emissions. This suggests that in these all-forcing simulations, greenhouse-gas emissions were initially not the dominant driver of sea-ice evolution. This notion is confirmed by the CMIP5 1% CO_2 simulations, where the initial near-constant sea-ice cover does not occur (fig. S3A). With rising greenhouse-gas emissions, the impact of CO_2 becomes dominating also in all all-forcing simulations, as evidenced by the robust linear trend that holds in all simulations throughout the transition period to seasonally ice-free conditions. We define this transition period as starting when the 30-year mean September Arctic sea-ice area in a particular simulation decreases for the first time to an area that is 10% or more below the simulation's minimum sea-ice cover during the period 1850 to 1900, and

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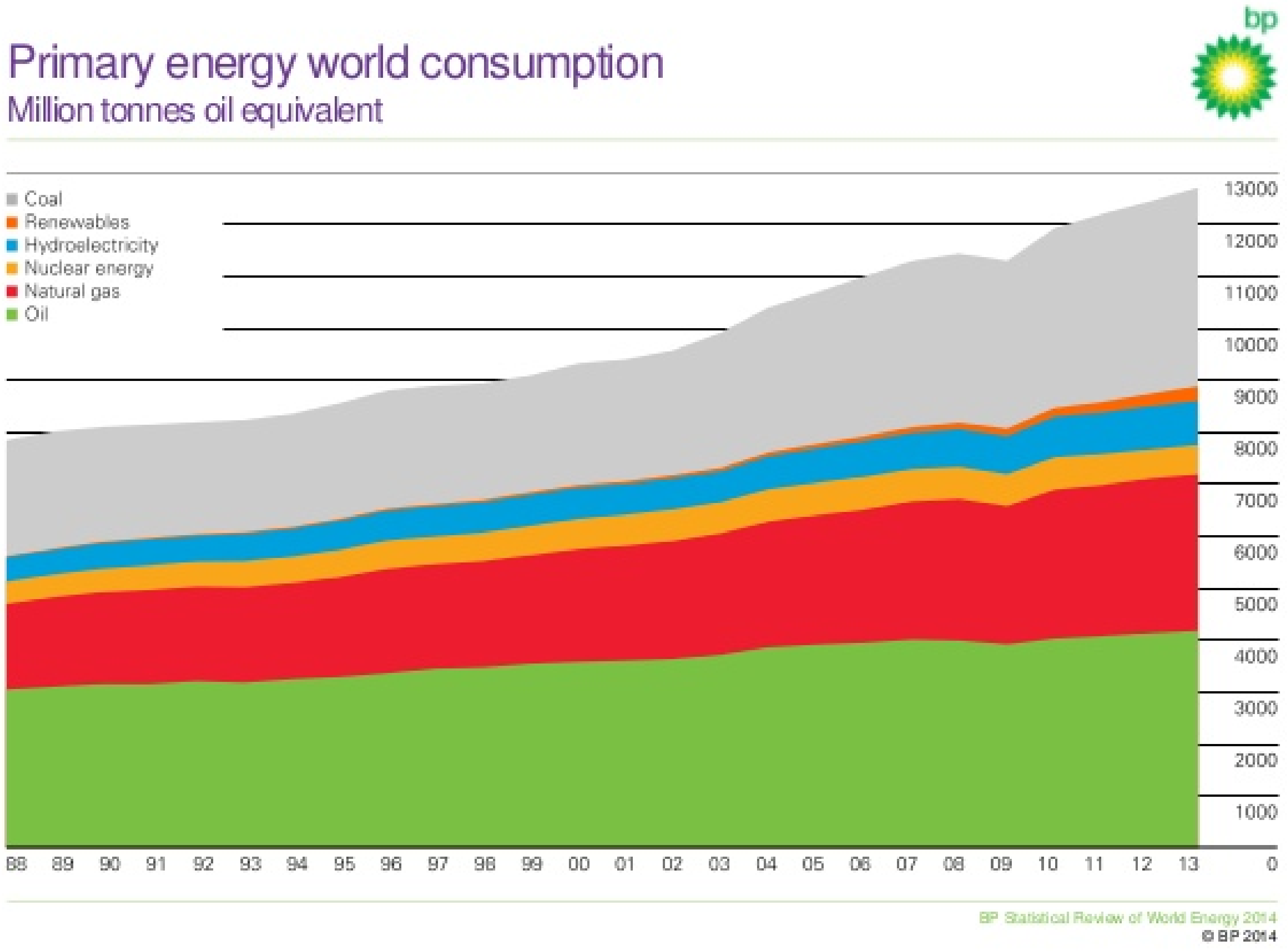
[2]National Snow and Ice Data Center, Boulder, CO, USA.
[3]University College, London, UK.
*Corresponding author. Email: dirk.notz@mpimet.mpg.de

We need to get climate neutral

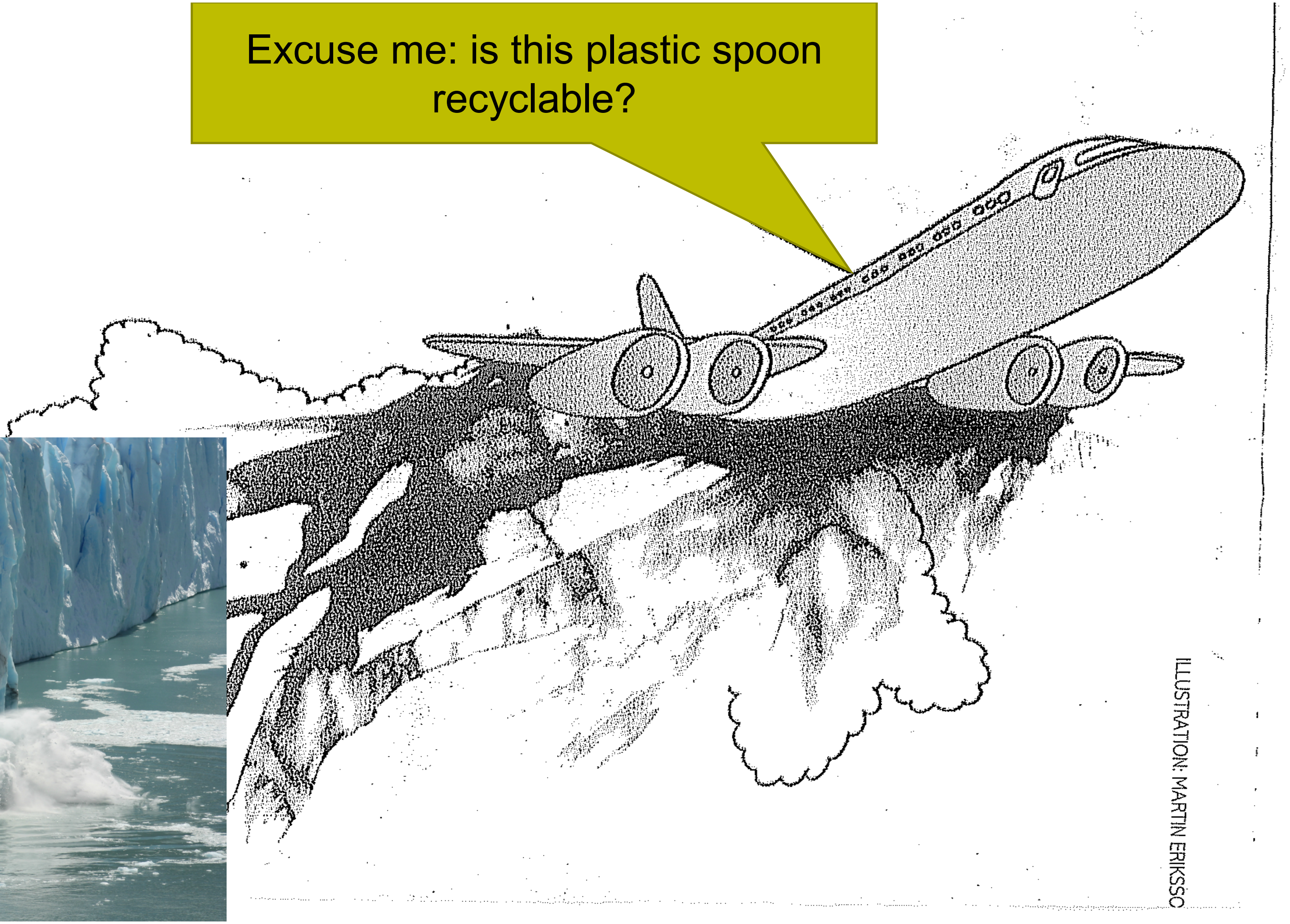
- and ~90% of climate impact is caused by fossil fuels…



350 million tonnes oil & gas to materials (textiles ~50 million tonnes)

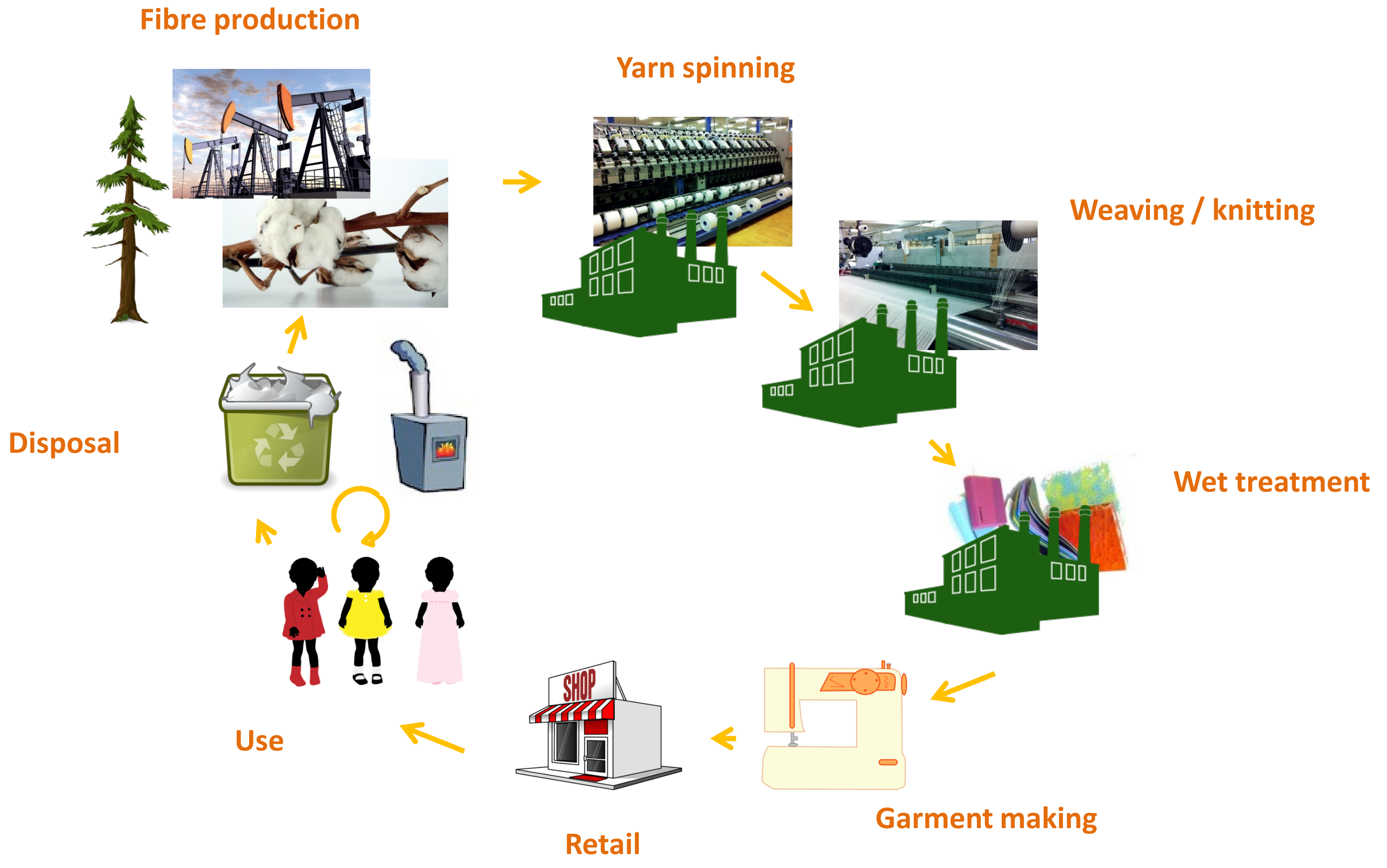
References: BP, Plastics Europe and Oerlikon

LCA differentiates between BIG and small issues…

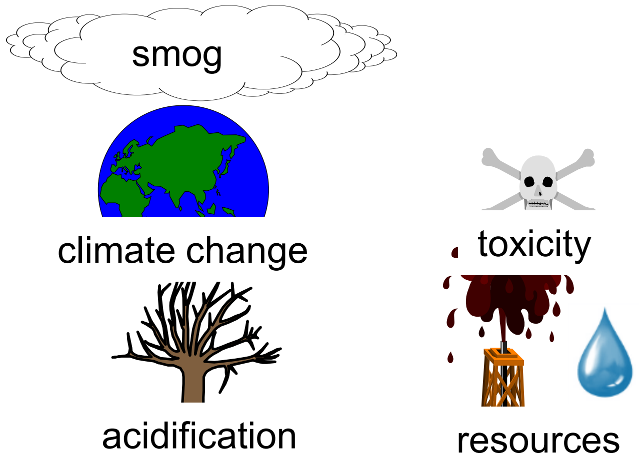


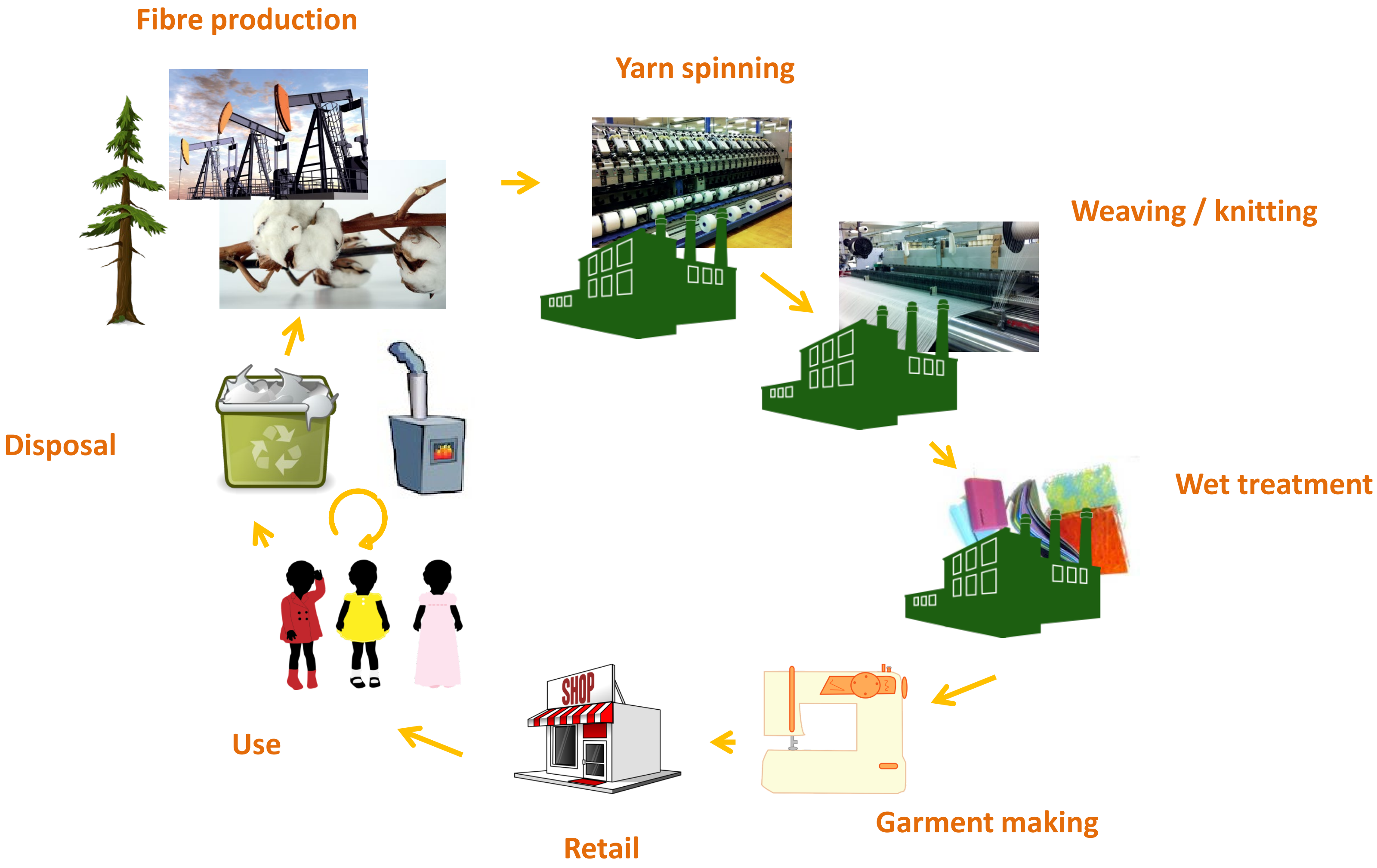
- 2011-2019
- ~11 million euros
- Multi-disciplinary team for multi-disciplinary solutions

Life cycle assessment (LCA)
Environmental impact from textiles in a life cycle perspective



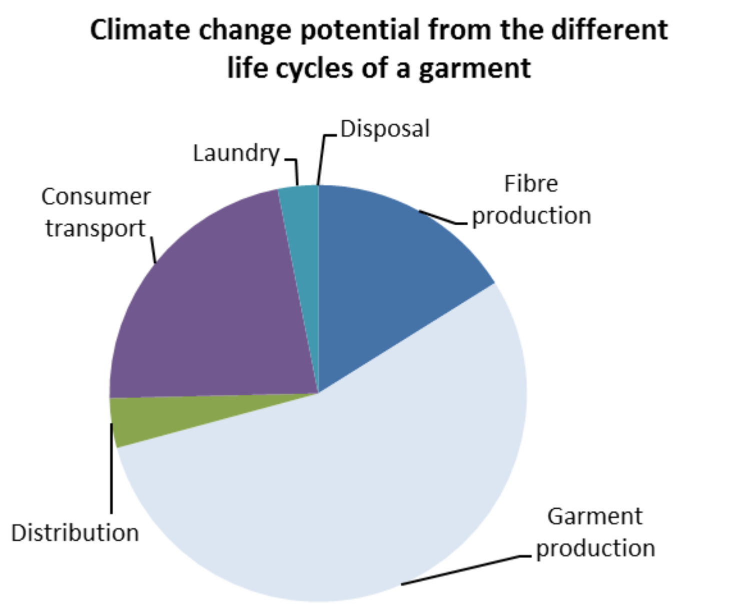
Environmental impact from textiles in a life cycle perspective – catching all the relevant environmental aspects

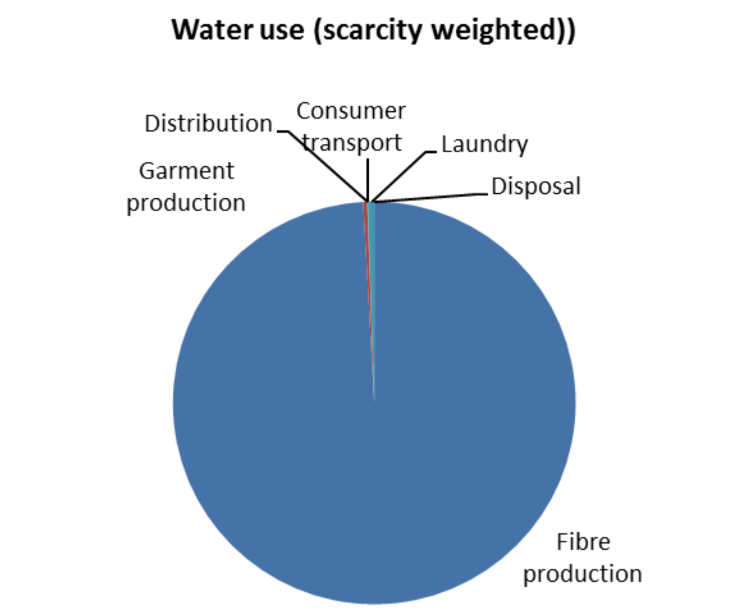


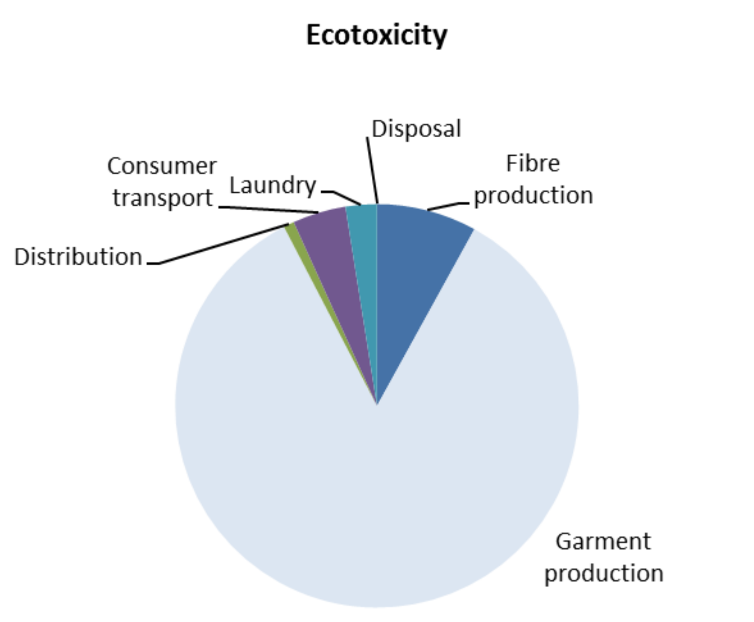


Environmental impact of the Swedish yearly fashion consumption

(from 2015 - updated version will be released in April)

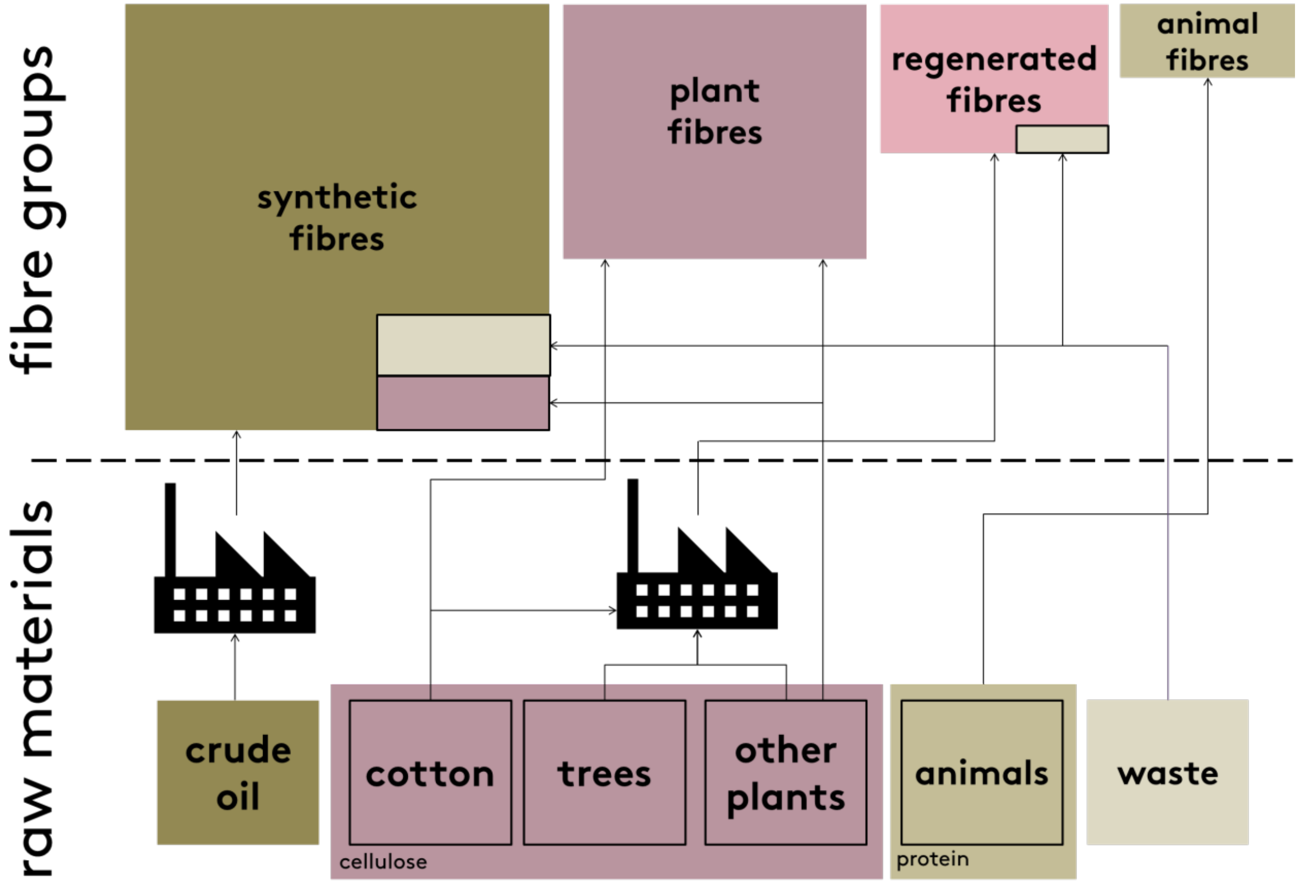






Roos, S., Sandin, G., Zamani, B., & Peters, G. M. (2015). “Environmental assessment of Swedish fashion consumption. Five garments - sustainable futures.” Stockholm, Sweden: Mistra Future Fashion. Retrieved from http://mistrafuturefashion.com/wp-content/uploads/2015/06/Environmental-assessment-of-Swedish-fashion-consumption-LCA.pdf

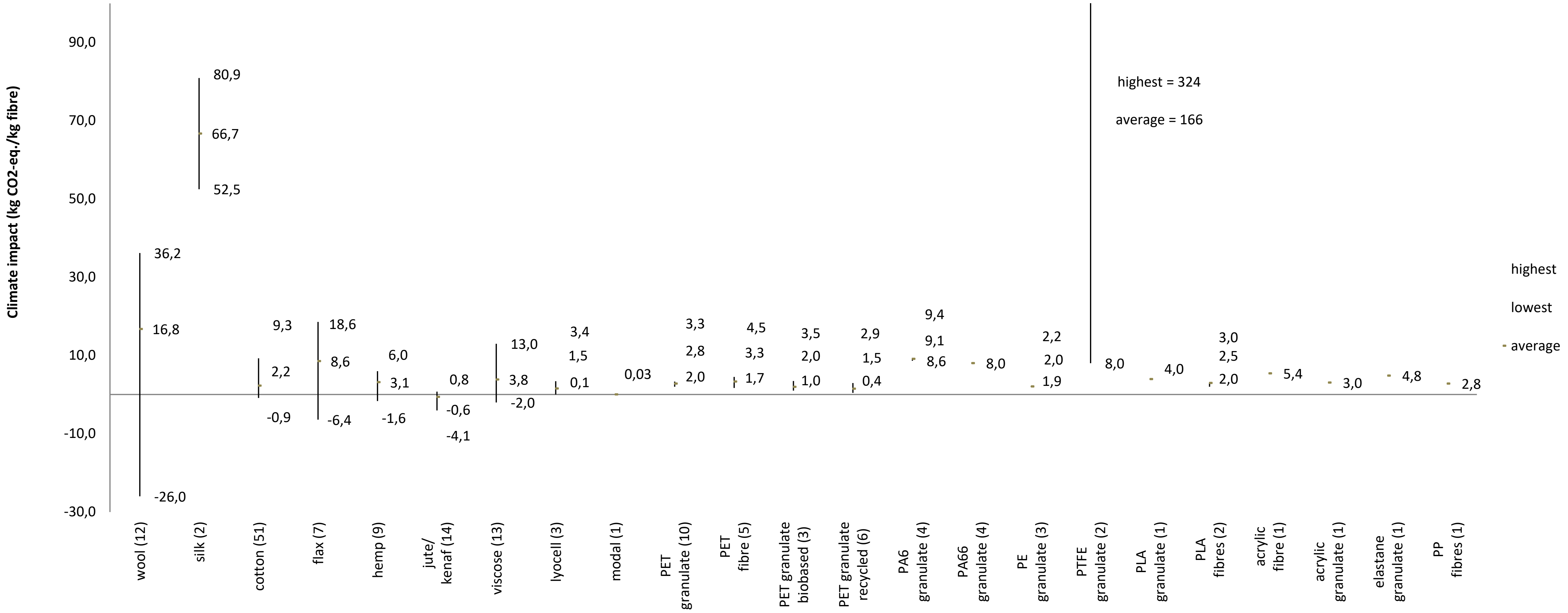
Fibres = fat, sugar and proteins!!!



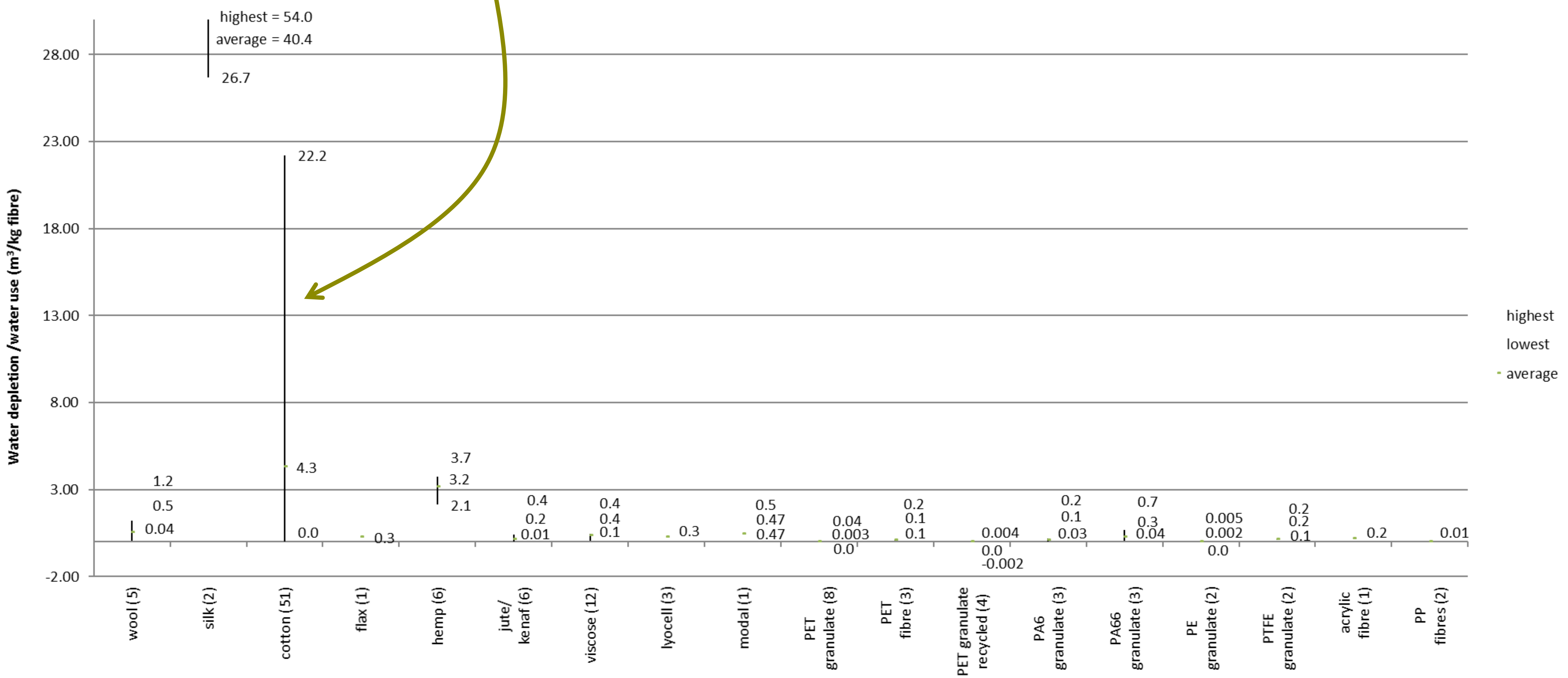
http://mistrafuturefashion.com/shifting-the-focus-from-fiber-to-process/

Conclusion from scientific facts:
There are no ”sustainable” or ”unsustainable” fibres!
It is the suppliers that differ!

supply 2

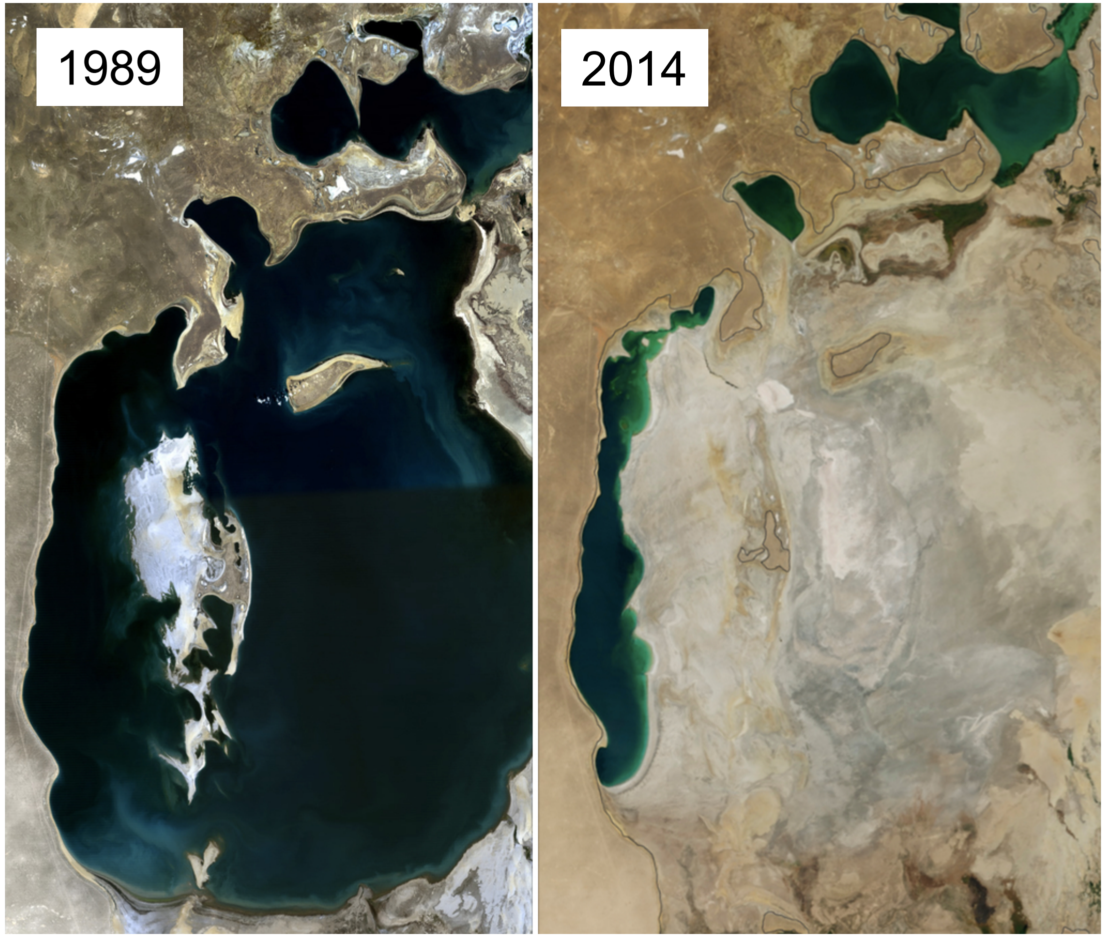


With one exception? In the future, what will conventional cotton cultivation look like?



The Aral sea disaster…

But, the sea's depth increased from 30 meters in 2003 to 42 meters in 2008.



The Kok-Aral Dam was built in 2005

https://www.su.se/forskning/profilomr%C3%A5den/ekonor

Stockholms universitet [SE]

Gift i kläder - Stockholms u...

McAfee

Lyssna | A-Ö | English Site | Tolkservice | Press | Gå vidare till: | Gå

Stockholms universitet

Start | Utbildning | Forskning | Samverkan | Institutioner | Bibliotek | Om oss | SÖK

Stockholms universitet > Forskning > Profilområden > Ekonomi & miljö > Många gifter kvar i dina kläder > *Gift i kläder*

Skriv ut

- Avhandlingar & publikationer
- Forskningsetik
- Forskningsinfrastruktur
- Forskningsnyheter
- **Profilområden**
- Utbildning på forskarnivå

Många gifter kvar i dina kläder

Tusentals kemikalier används vid klädtillverkning. Forskare vid Stockholms universitet har nu undersökt om kemikalier också finns kvar i kläderna vi köper. Flera hälsofarliga ämnen identifierades och inte ens ekologisk bomull är en garanterat giftfri textil.

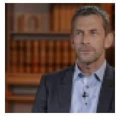
I den nya avhandlingen har 60 plagg från svenska och internationella klädkedjor testats. En första analys hittade tusentals kemikalier i kläderna och ett hundratal identifierades preliminärt. Flera av ämnena fanns inte med på tillverkarnas listor och misstänks vara biprodukter, restprodukter eller tillsatta under transport.

– Att exponeras för dessa kemikalier ökar risken för hudallergier, men de kan vara relaterade till mer allvarliga hälsoeffekter och miljörisker. Några av de identifierade kemikalierna är misstänkt eller bevisat cancerframkallande, samt giftiga för

KONTAKT

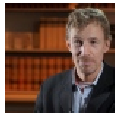
Ekonomi & miljö

Webbfilmer



Miljöregleringar måste anpassas till såväl lokala som globala förhållanden

Jonas Ebbesson, professor i miljörätt vid Juridiska institutionen.



Hållbar utveckling kräver ny syn på ekonomiska spelregler

Thomas Hahn, agronomie doktor vid Stockholms Resilienscentrum.

Sök i forskningsdatabasen

Photo by Greenpeace

ECOTEXTILE NEWS

The environmental magazine for the global textile supply chain

MAGAZINE | LATEST | RETAIL | STANDARDS | MATERIALS

Published on Tuesday, 09 August 2016

Most Bangladesh mills ignore effluent treatment

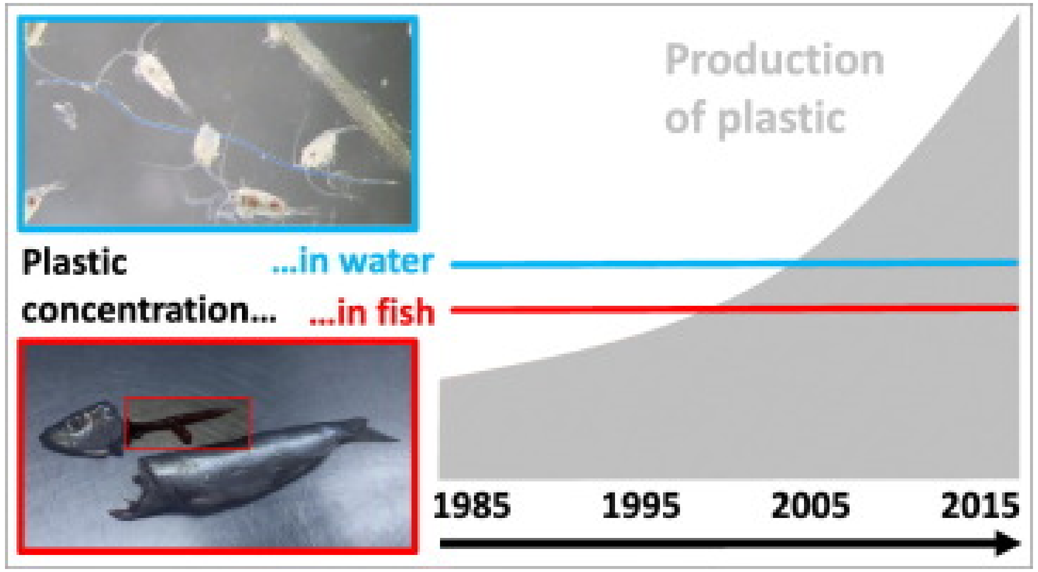
Written by Brett Mathews

Tweet | Like | Share 23 | G+1 2 | in Share 48

…Just 56 out of 466 Bangladesh textile factories that discharge potentially …
… environment were found to have effluent treatment plants in …
… which reveals the findings of Governmen…
… covering the past 12 months …
… Association …

108 out of 466 facilities had WWTP
Only 56 were being used…

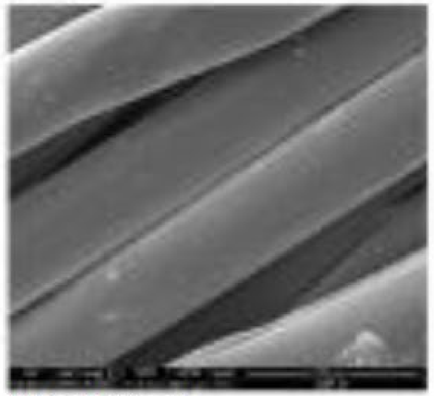
Beer et al. No increase in marine microplastic concentration over the last three decades – A case study from the Baltic Sea, 2018

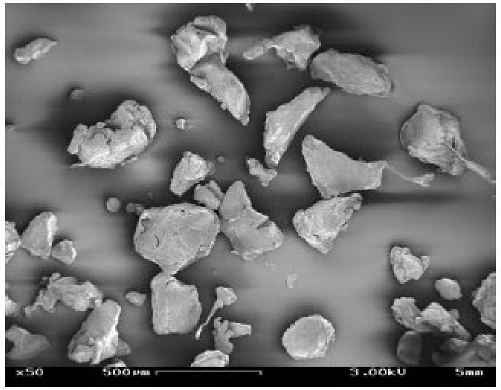


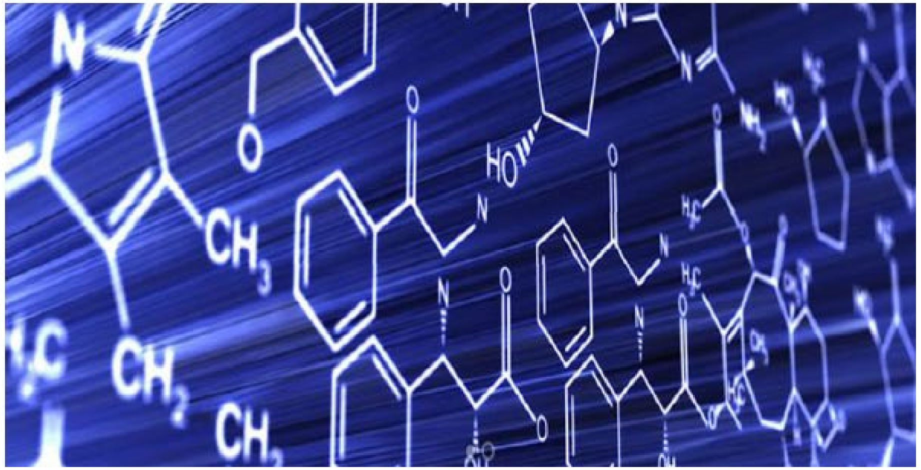
- **First** long term study (more are needed)
- Microplastics have been present in the Baltic environment and the digestive tracts of fishes **for decades**, the levels have **not changed** in this period.
- Microplastic pollution **may be more closely correlated to specific human activities in a region than to global plastic production and utilization as such**.

Effects?

- Particle effect
- Chemical effect


Life + Mermaids

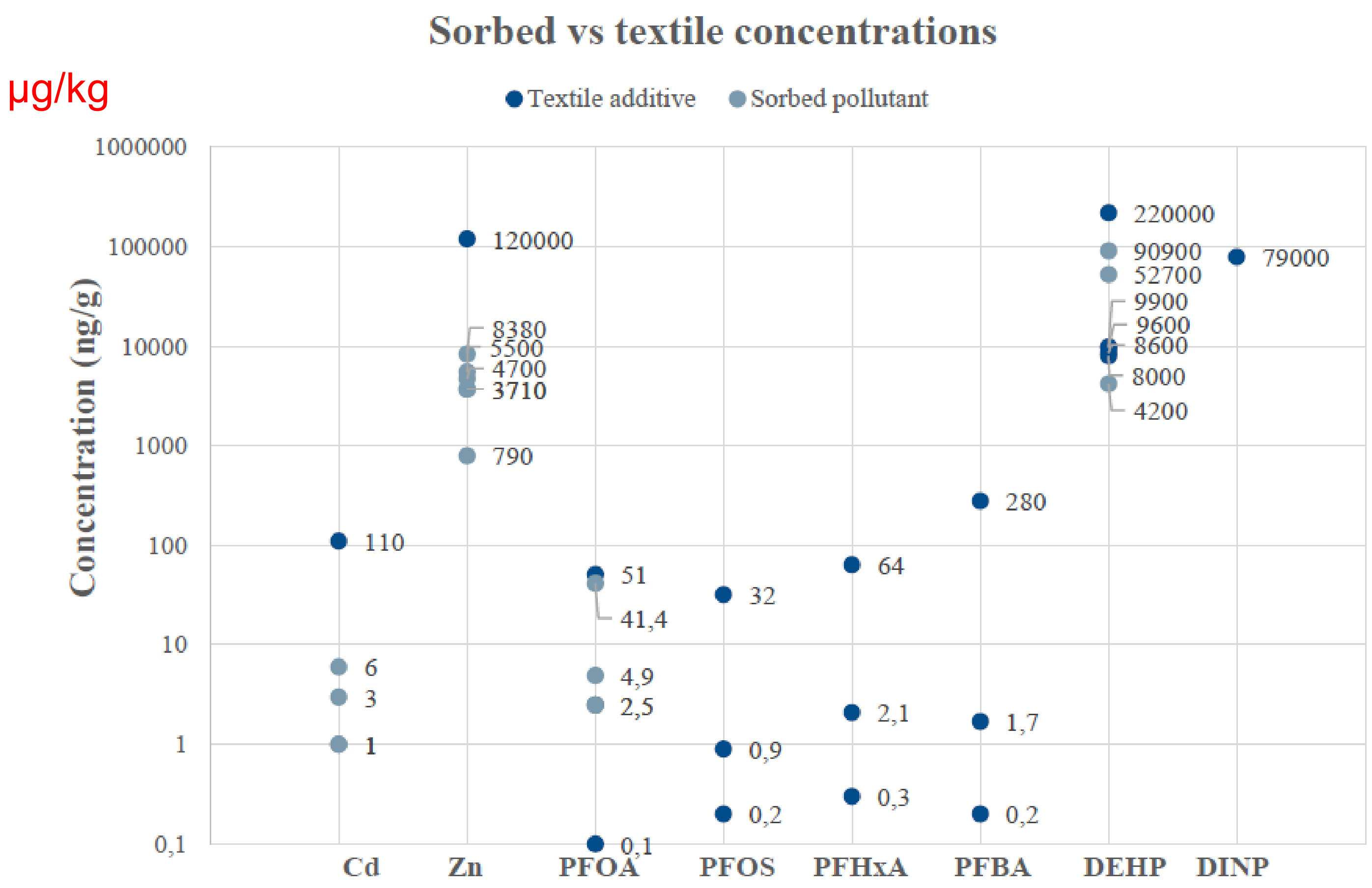

Giedre Asmonaite



Mikrostora plastpartiklar kan INTE gå genom cellväggar!!! (men nanostora kan)

RI. SE

Results from MinShed




UNIVERSITY OF GOTHENBURG

DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES

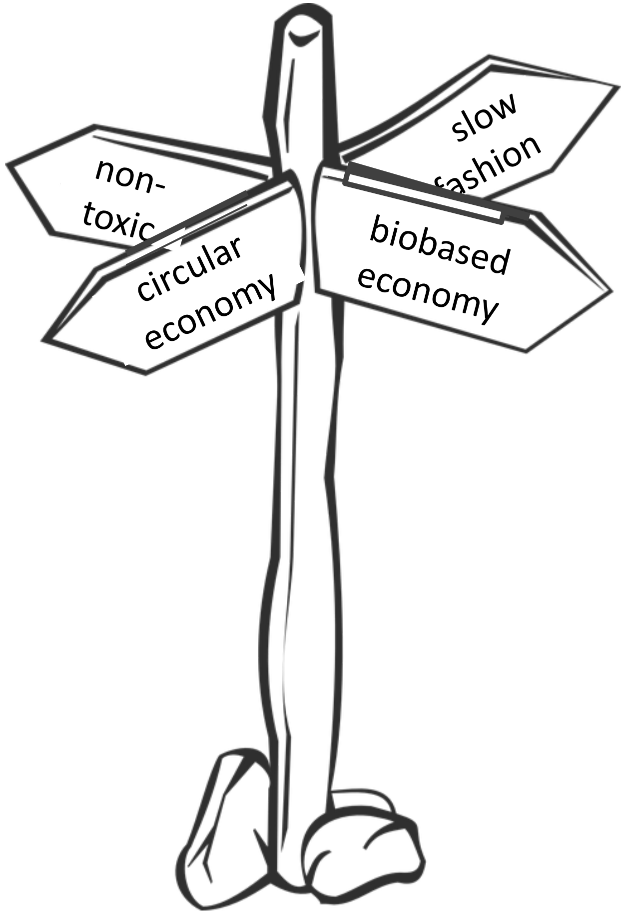
MICROPLASTIC POLYESTER FIBER AS A SOURCE AND VECTOR OF TOXIC SUBSTANCES:

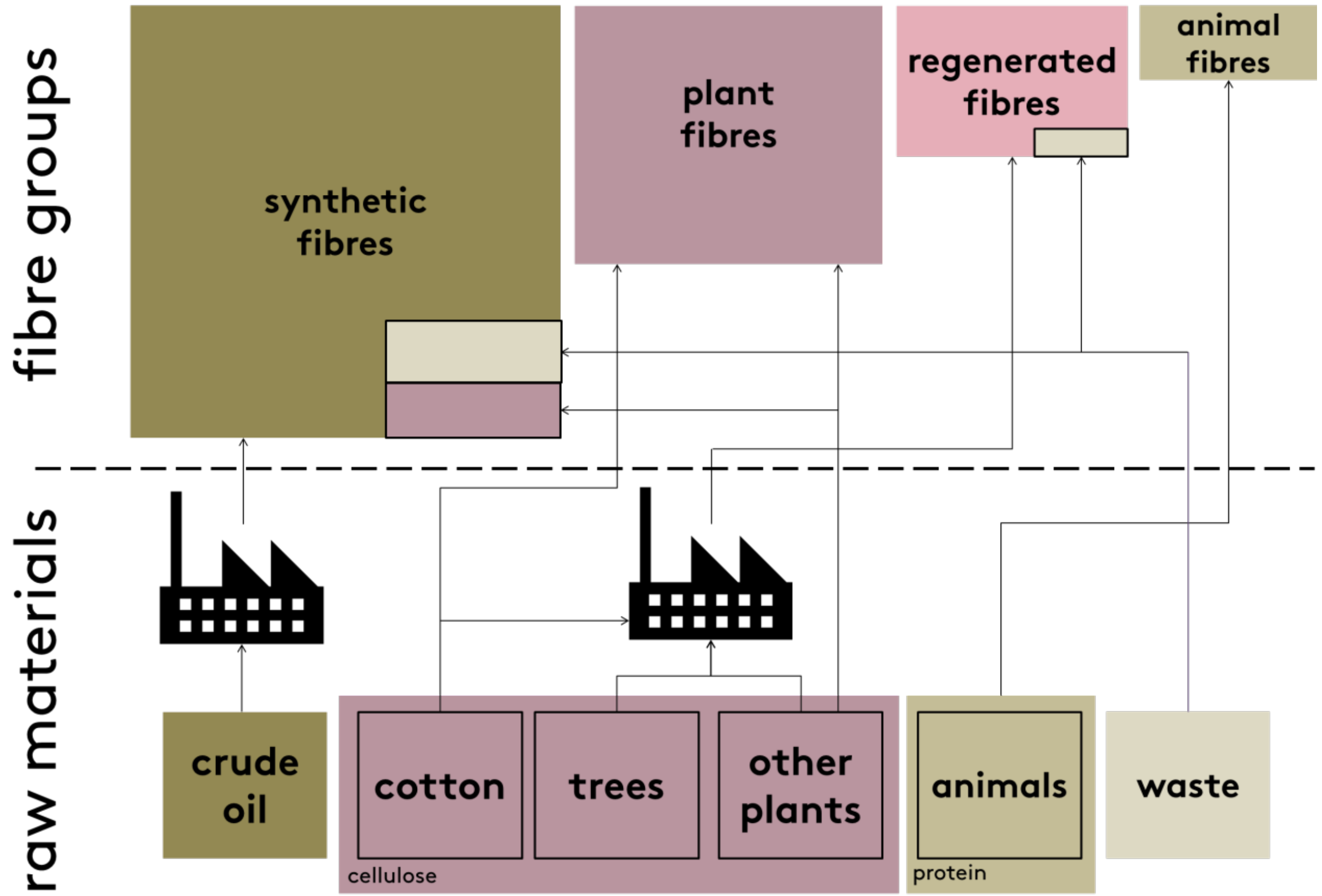
Risk assessment and evaluation of toxicity

Maria Eriksson Andin

Degree project for Bachelor of Science with a major in Environmental Science
ES1510, Examensarbete i miljövetenskap I, 15 credits
First cycle
Semester/year: Spring 2018
Supervisor: Bethanie Carney Almroth, Department of Biological and Environmental Sciences
Examiner: Dan Strömberg, Department of Biological and Environmental Sciences

Which fibre to select?

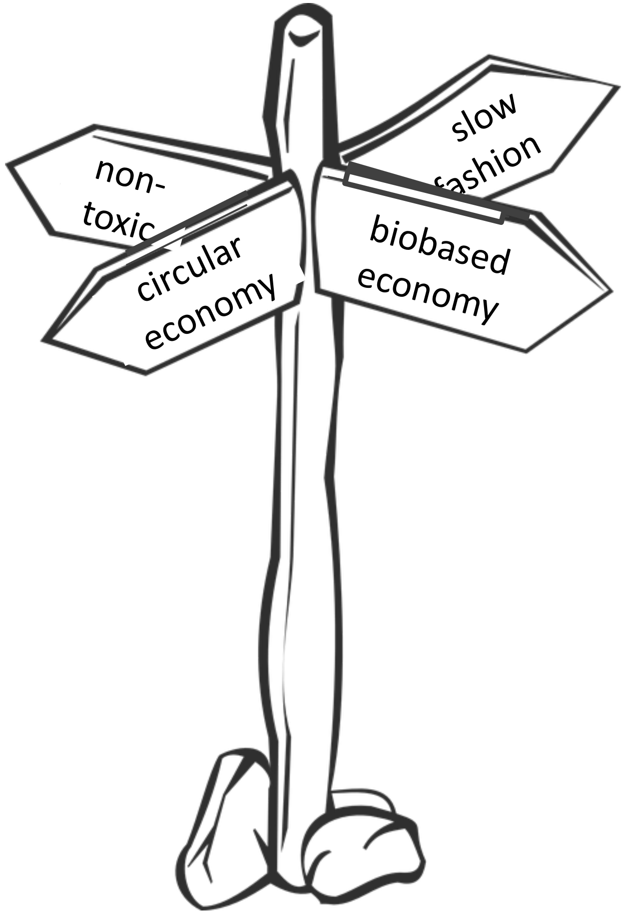


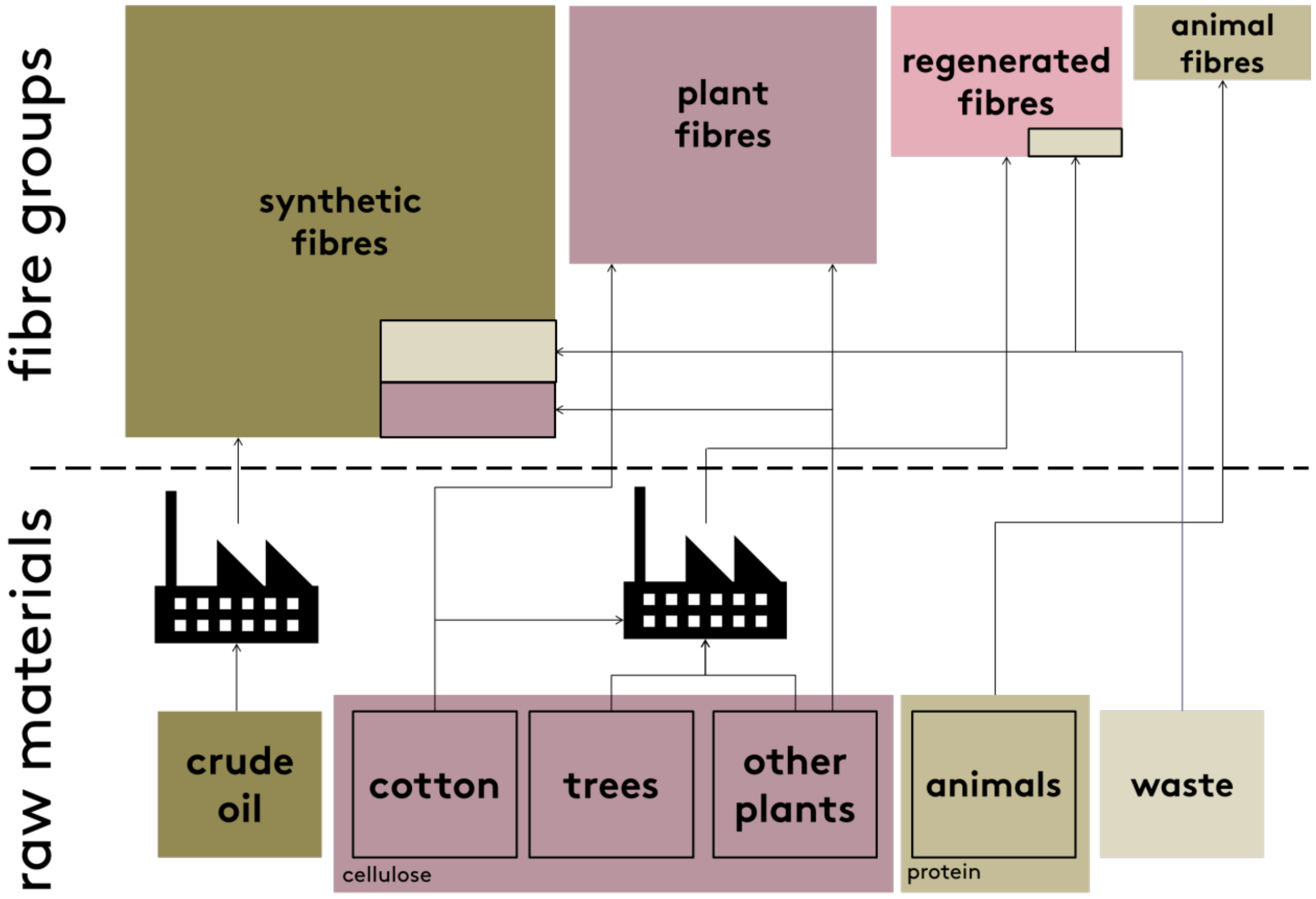


Biobased economy: ”skip the fossil ones” (but use also renewable fuels!)

Which fibre to select?

supply 2

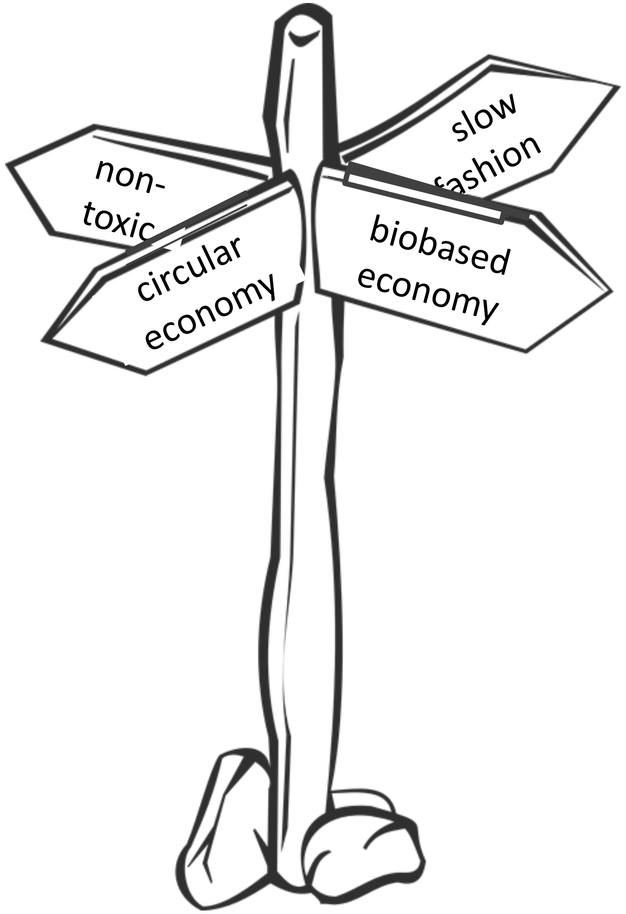


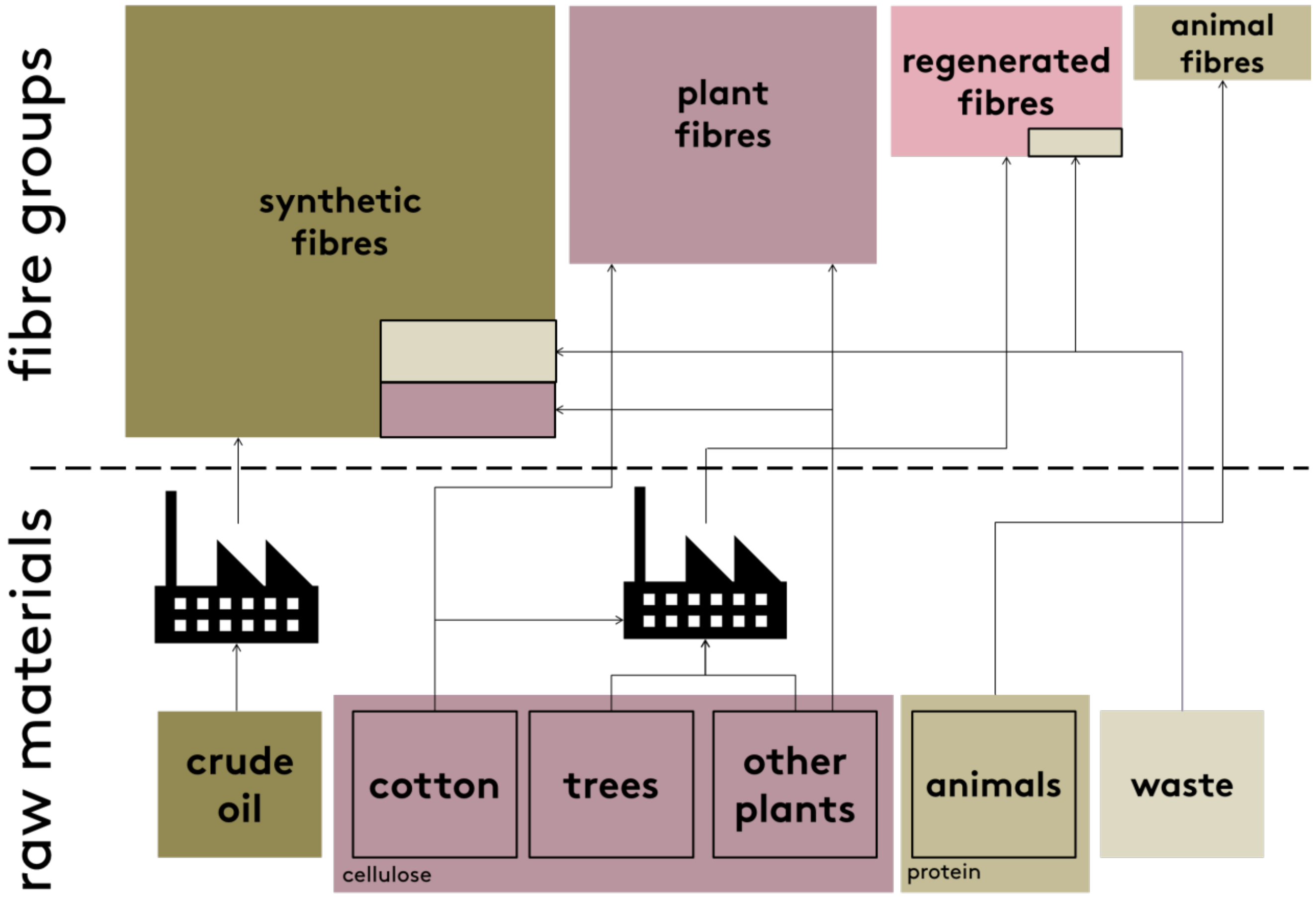


Slow fashion: ”use synthetics with long life span”

Which fibre to select?

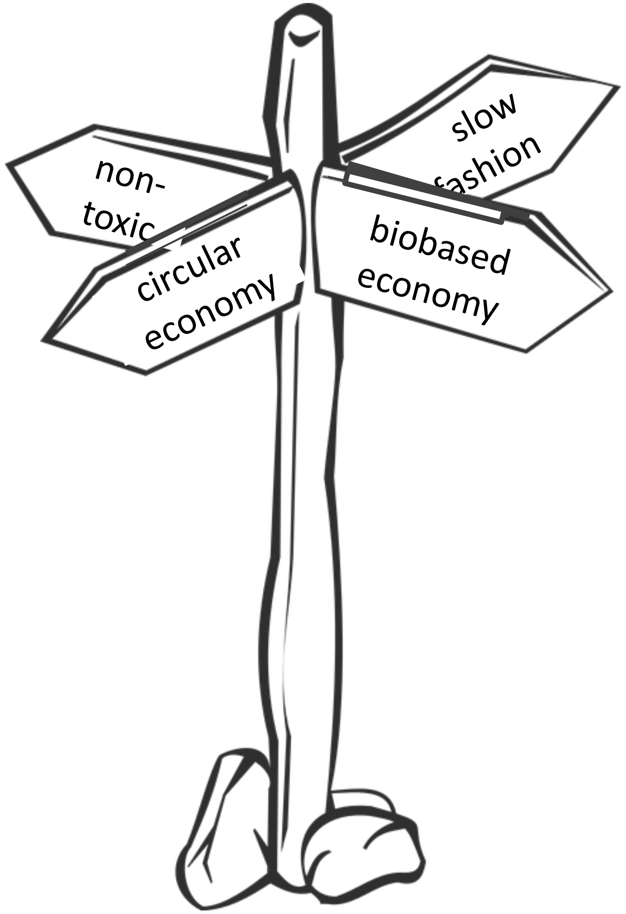
supply 2

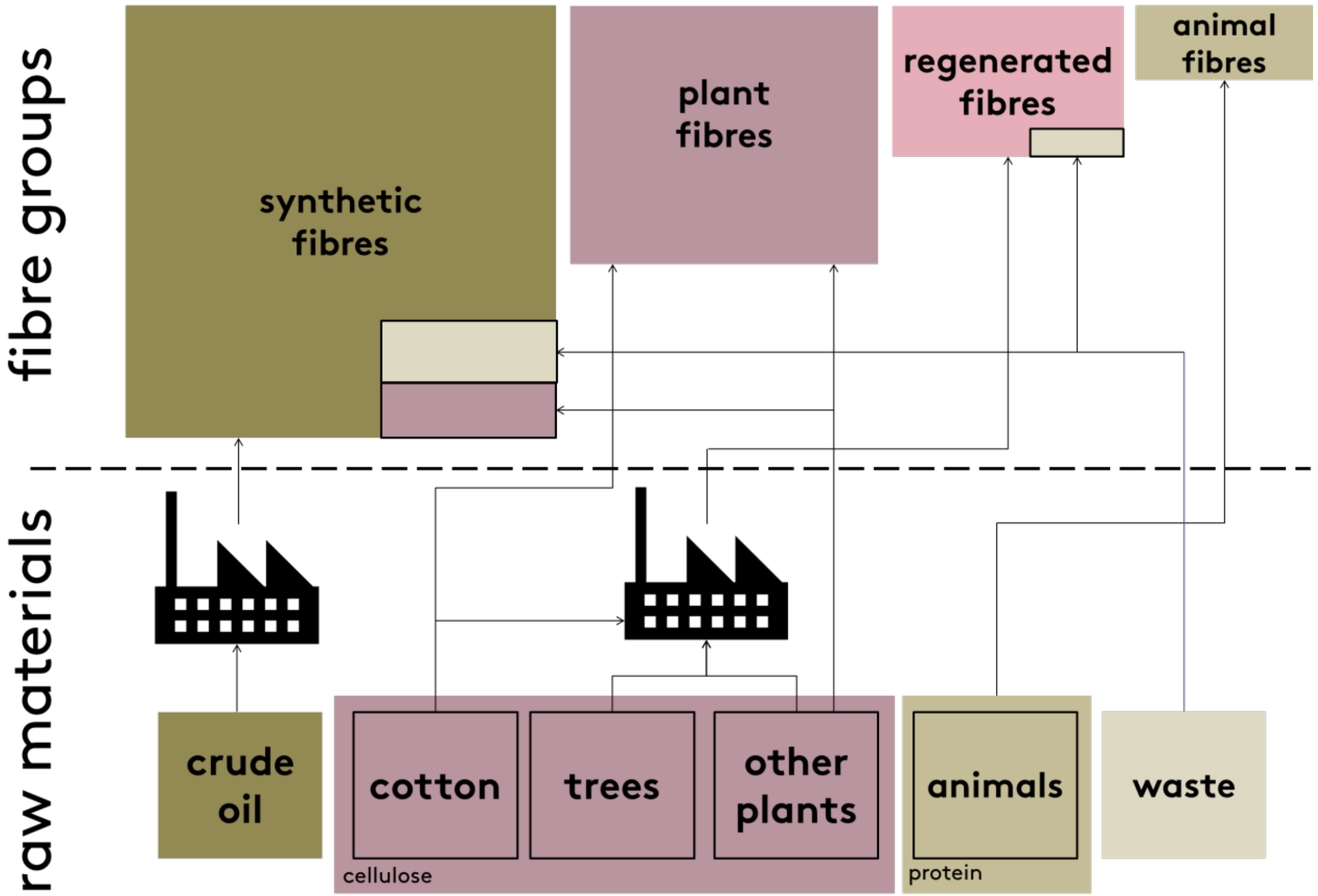




Non-toxic environment: ”skip the cotton”

Which fibre to select?

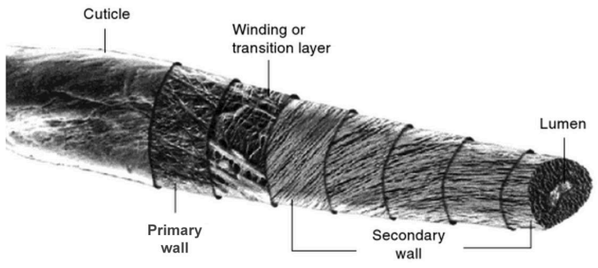




Circular economy: ”use recycled or bio-based”

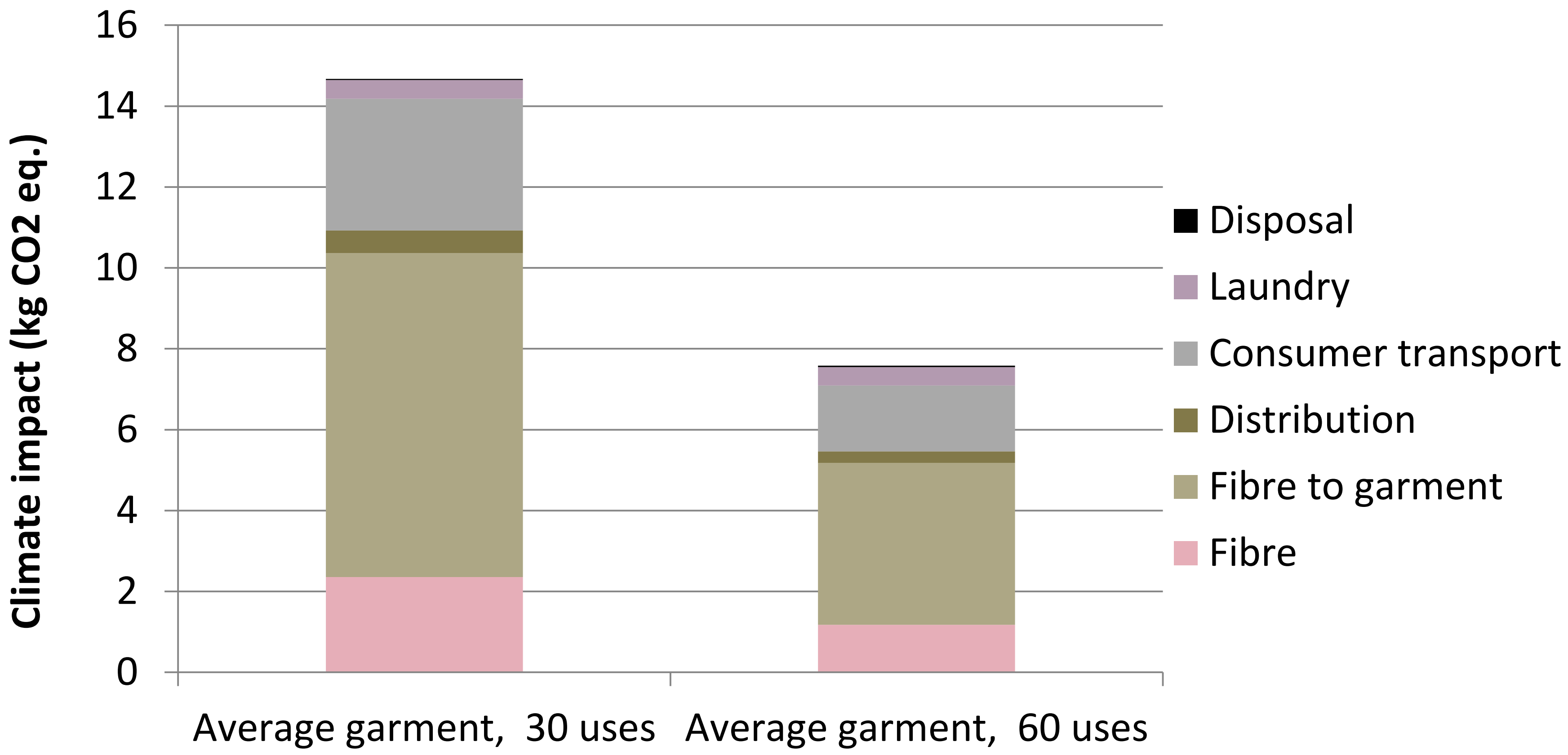
Differ between Market substitution vs. Technical substitution

supply 2



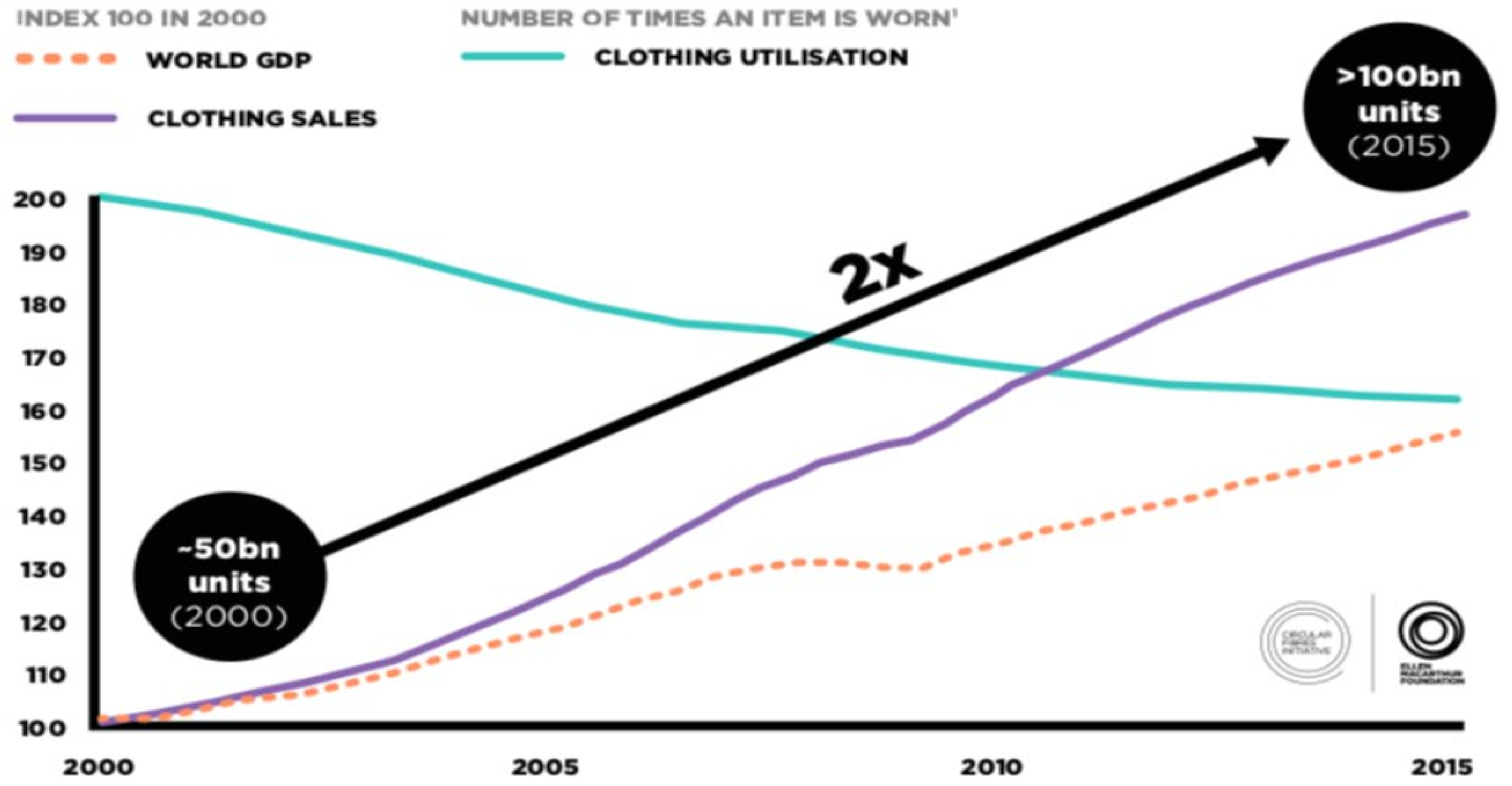
- Cotton
  - Only market substitution possible for the foreseeable future
  - There are LOTS of alternatives but look out for green-washing!
- Polyester
  - Technical substitution: bio-based or recycled ”drop-in” solutions have the same performance
  - Market substitution also an option

Most important recommendation: Optimise the life span!



Climate impact expressed as kg CO_2 equivalents and calculated for a hypothetical average garment of 0.5 kg. A doubled life length, from 30 uses of the garment (left) to 60 uses of the garment (right), decreases the climate impact by 48% - from 14.7 to 7.6 kg CO_2-eq. Modified from Roos et al. (2015).

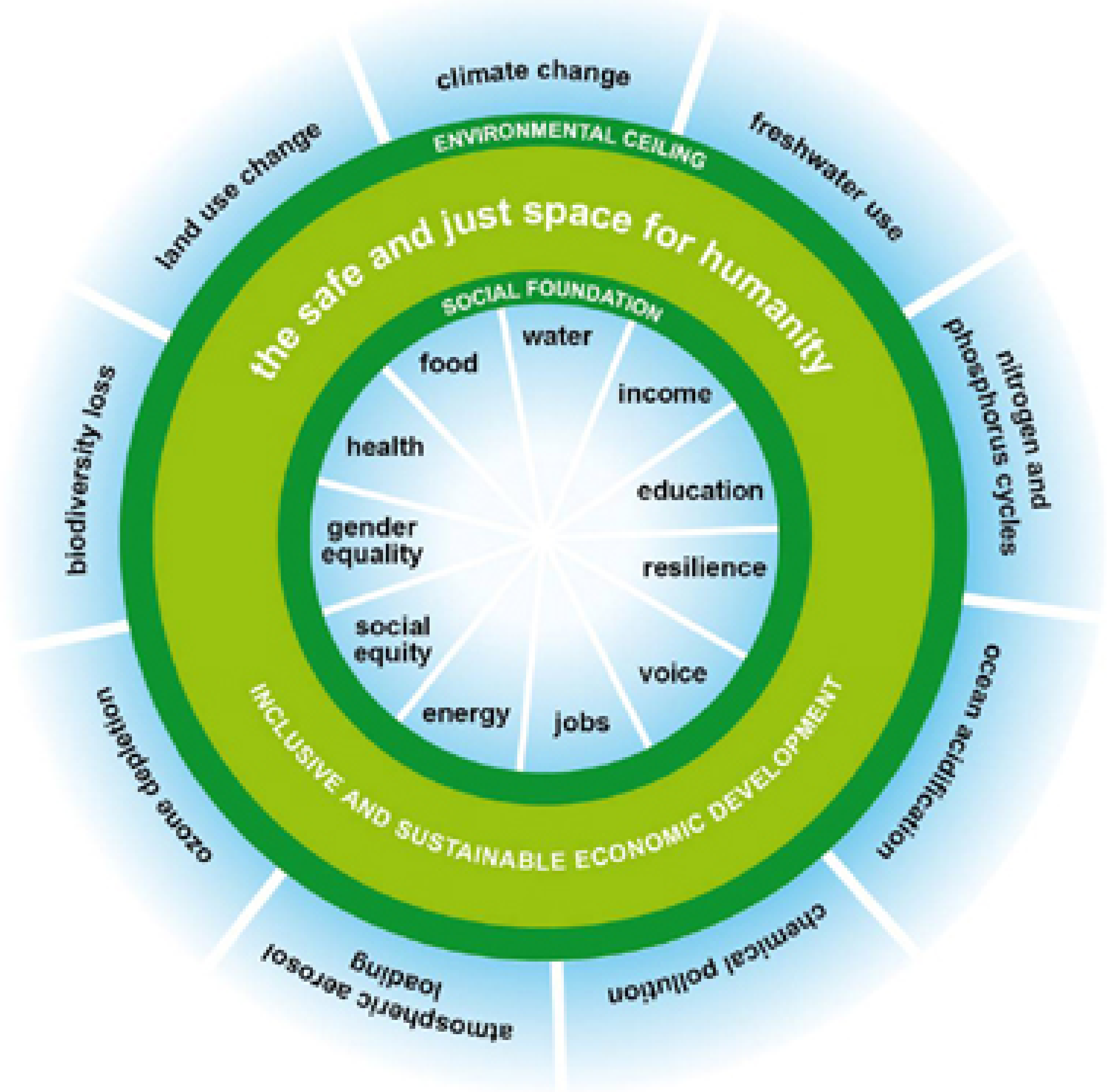
FIGURE 1: GROWTH OF CLOTHING SALES AND DECLINE IN CLOTHING UTILISATION SINCE 2000



1 Average number of times a garment is worn before it ceases to be used

Source: Euromonitor International Apparel & Footwear 2016 Edition (volume sales trends 2005–2015); World Bank, *World development indicators – GD* (2017)

Can we live within the Doughnut?



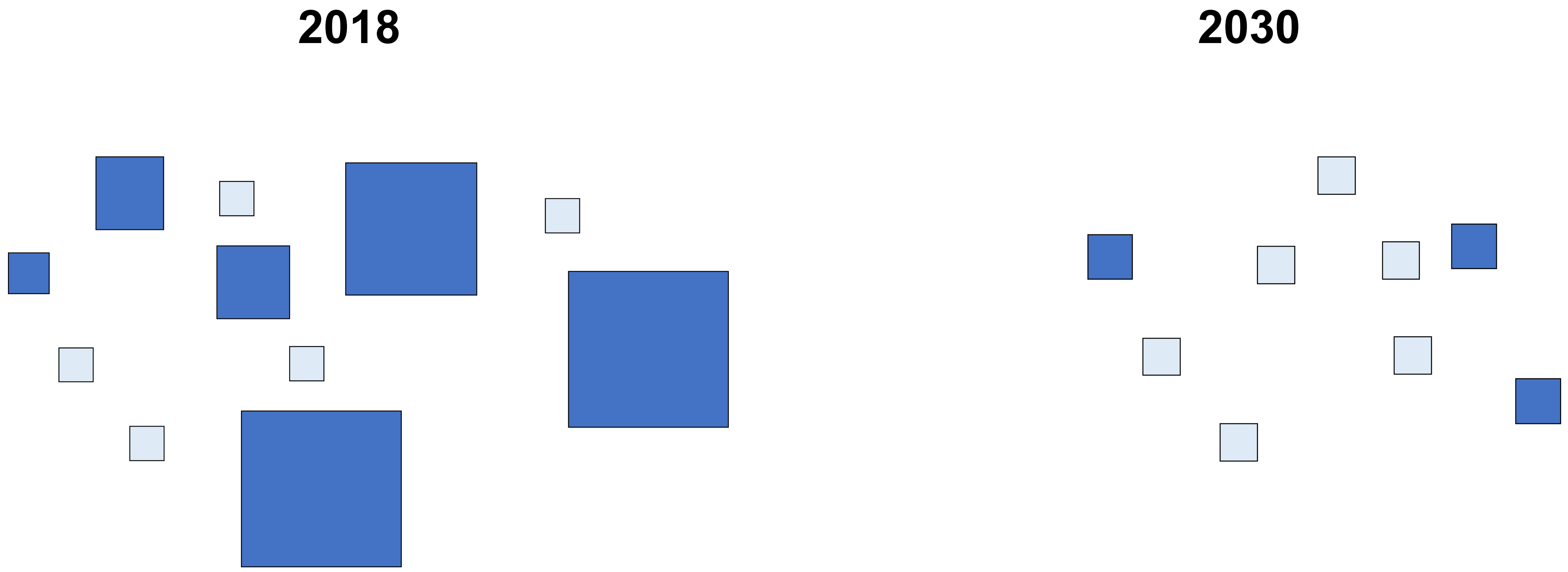
Raworth, K. (2012). A Safe and Just Space For Humanity: Can we live within the Doughnut? *Nature*, *461*, 1–26. doi:10.5822/978-1-61091-458-1

Solve the function more effectively!

Production focus | **Consumption focus**

$$\text{Total environmental impact} = \frac{\text{Environmental impact}}{\text{Product}} \times \frac{\text{Number of products}}{\text{Person}} \times \text{Amount of people}$$

(Commoner, 1972; Ehrlich and Holdren, 1972)



Vision:
In 2030, we foresee that there is less volumes of textiles produced per capita (9 boxes instead of 11).

$$\frac{\text{Number of products}}{\text{Person}}$$

But, those that are produced, are done so with much less impact per produced garment.

$$\frac{\text{Environmental impact}}{\text{Product}}$$

In addition, garments will have better quality, which prolongs the life length and increases the revenues at first, second and subsequent sale points.

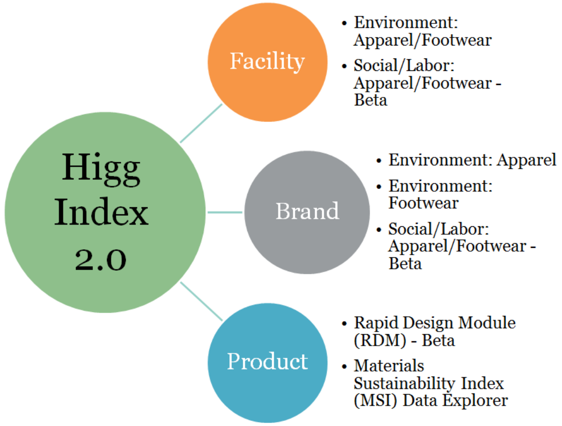
Outlook on on-going initiatives

United Nations Climate Change

European Commission

PEF

Sustainable Apparel Coalition



UNEP

Life Cycle Initiative

SETAC

EPD Environmental Product Declaration

ISO

The Swedish Textile Initiative for Climate Action

LCA

not LCA

AG AFIRM GROUP

BCI Better Cotton Initiative

CONFIDENCE IN TEXTILES
Tested for harmful substances
according to Oeko-Tex® Standard 100
00000000 Institute

OUTDOOR INDUSTRY ASSOCIATION

ZDHC

STWI SWEDEN TEXTILE WATER INITIATIVE

BSCI Business Social Compliance Initiative

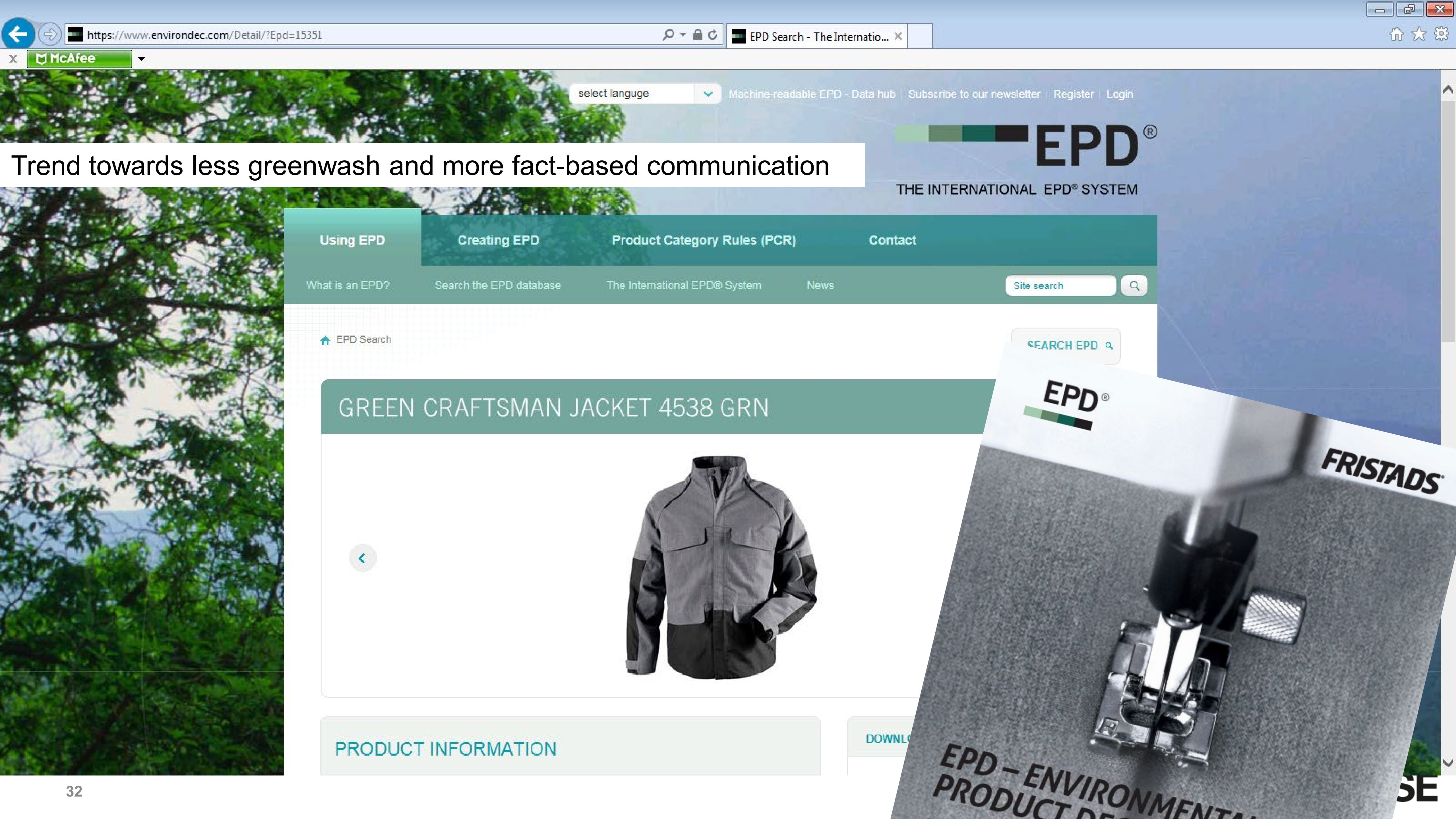
SWEDISH CHEMICALS GROUP SWEREA IVF

Global Reporting Initiative™

FAIR WEAR FOUNDATION

RI. SE

Trend towards less greenwash and more fact-based communication



Integrate with Higg Index

supply 2

"Mistra Future Fashion has proposed promising chemical assessment methodologies to the Sustainable Apparel Coalition. This work can lead to a better understanding of the apparel industry's toxicity impacts. While the complexities associated with textile chemistry are significant, we are hopeful that Mistra's methodology may further enhance the Higg Index in the future."

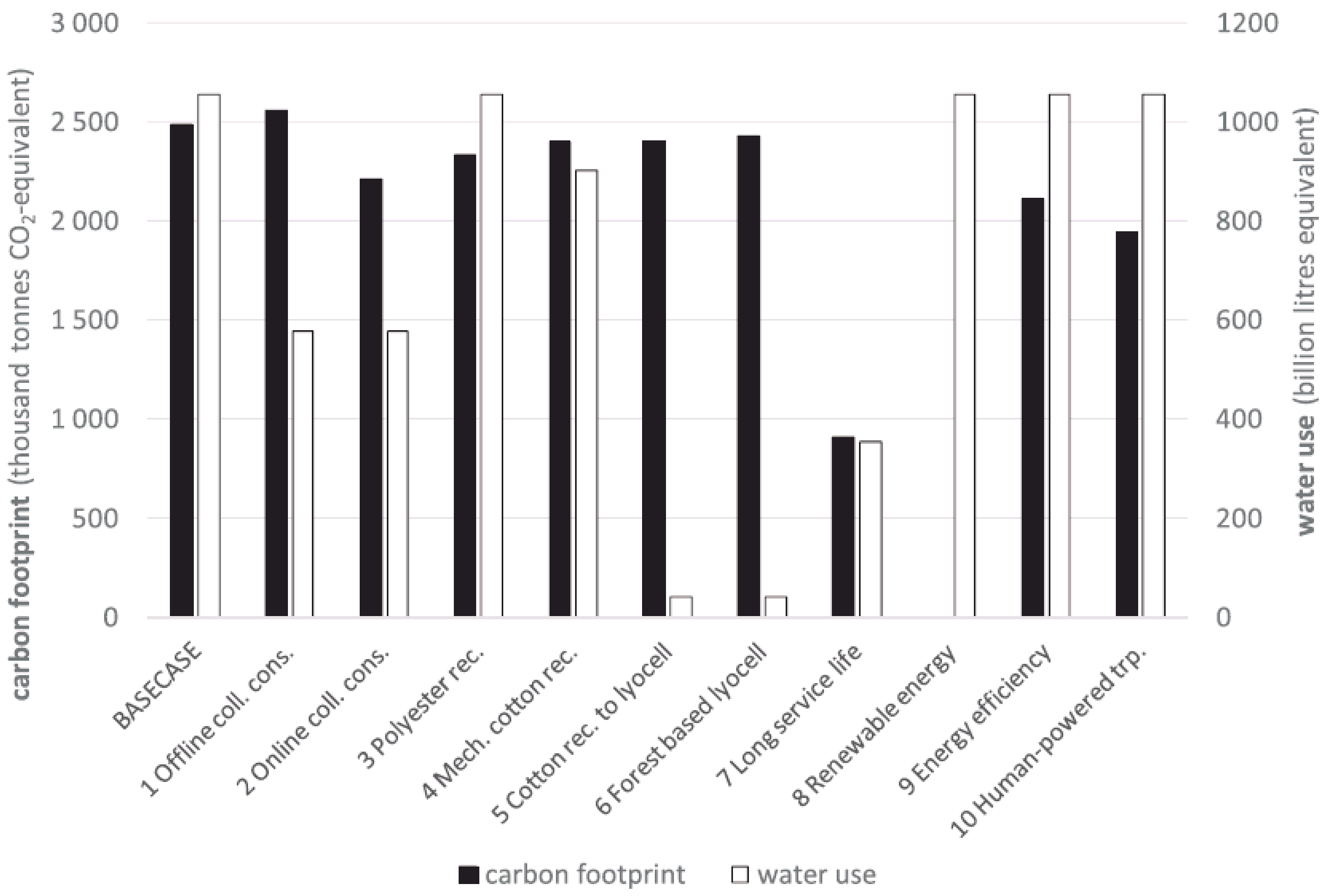
Julie Brown, SAC Director, Higg Index

Status:

The proposal to integrate chemicals data into Higg Index was approved by the SAC members at the May meeting in Vancouver

The project will be carried out during fall 2019.

Sustainable Apparel Coalition



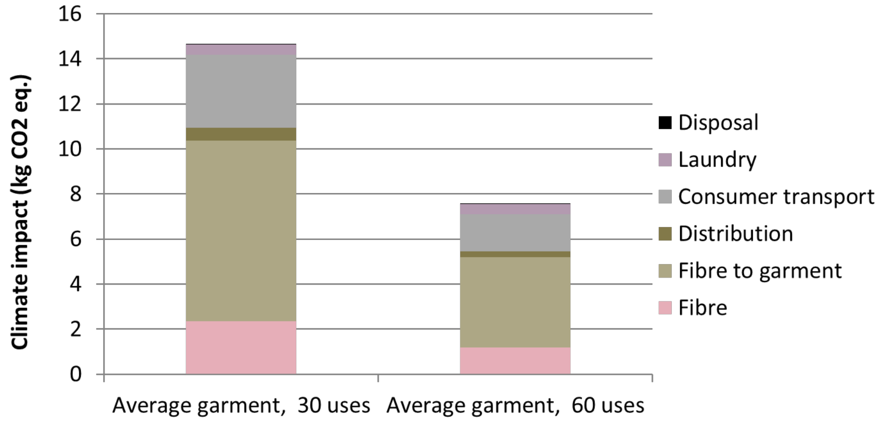
Roos, S., Zamani, B., Sandin, G., Peters, G.M., Svanström, M. (2016) A life cycle assessment (LCA)-based approach to guiding an industry sector towards sustainability: the case of the Swedish apparel sector, Journal of Cleaner Production, Volume 133, 1 October 2016, Pages 691–700, doi:10.1016/j.jclepro.2016.05.146

Garment ecodesign checklist

LARGE IMPACT and *small impact* indicated

Action	Climate	Water	Chemicals
1. Increase life span	$\frac{\textbf{IMPACT}}{\textbf{NUMBER OF USES}}$	$\frac{\textbf{IMPACT}}{\textbf{NUMBER OF USES}}$	$\frac{\textbf{IMPACT}}{\textbf{NUMBER OF USES}}$
2. Better production technology	**LESS ENERGY**	**LESS WATER USE**	**WASTE WATER TREATMENT**
3. Better energy sources	**LESS FOSSIL FUEL**	-	-
4. Better chemicals selection and reduction of chemicals' use	**LESS CLIMATE IMPACT**	**LESS POLLUTED WATER**	**LESS TOXICITY**
5. Better materials	-	**LESS WATER USE**	*less toxicity*
6. Avoid microplastics	-	*less polluted water*	*less toxicity*
7. Optimise transport and packaging	*less fossil fuel*	-	*less toxicity*

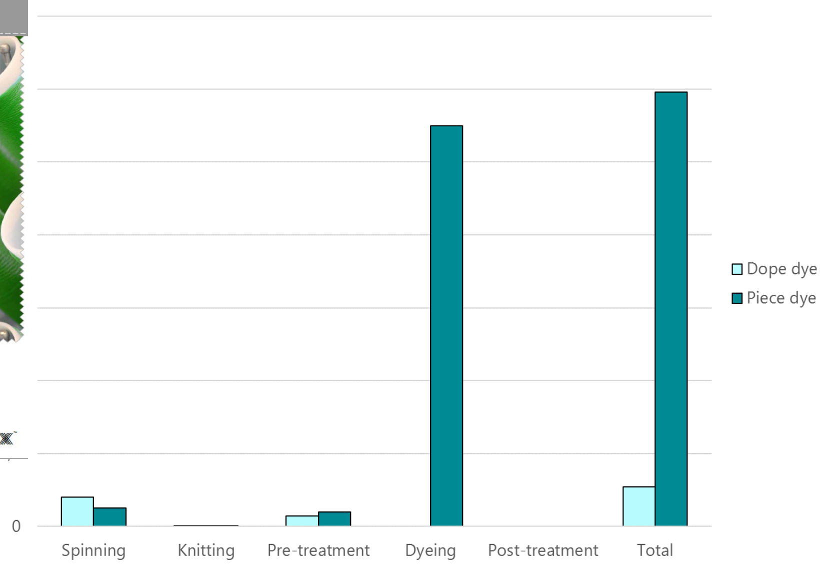
1. Increase the life span!



A. Analyze which factor(s) decides the life span:
- Do you know how many times does the average customer use the garment?
- Do you analyse return causes?
(both unused garments and claims made after use)

B. Improve by:
- Make the design more timeless/classic
- Guarantee the life length (minimum 10 years?)
- Use fibers with good durability
- Use dyestuff with good durability
- Select better options for parts that are likely to be worn out first:
    - Zippers
    - Reflecting tapes
    - Optimal colour for gussets, collars and other sensitive parts (shade/dyestuff)
    - Childrens' trousers (knee)
- Provide spare buttons and other trims (often simpler if trims are standardized/carry over)
- Offer mending services for customers
- Take back and resell garments second-hand

2. Better production technology



A. Improve efficiency:
- Reduce cutting rates
- Reduce rework

B. Improve by:
- Use solution dye / dope dye / spin dye / e.dye technology (no rework, colour match between batches)
- Automated dosing systems
- Waste water treatment plant (WWTP) with mechanical, chemical and biological treatment

C. Select suppliers that:
- Keep their waste water treatment plant (WWTP) turned on (also after audits…)
- Offer transparency regarding
  - Sub-suppliers
  - Energy use and sources
  - Social sustainability and labour conditions

3. Better energy sources

A. Drive change at your suppliers' facilities to more sustainable energy sources :
- Solar panels or wind turbine installation
- Use of biofuels
- Electric trucks at warehouses

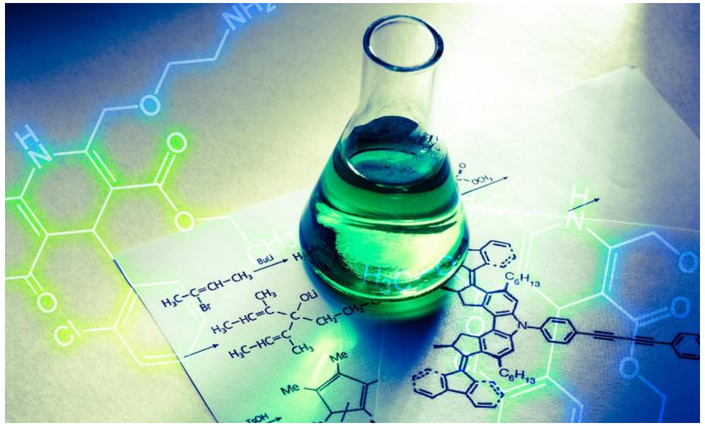
B. Select suppliers that are already using better energy sources:
- E.g. at Laos, high amount of water power

Global warming potential for different electricity sources (g CO_2-eq./kWh*)	
Coal power plant	1,057
Oil power plant	916
Natural gas power plant	600
Wind power plant	14
Solar panel	84

Global warming potential for state grid electricity in different countries (g CO_2-eq./kWh*)	
China	1,140
Korea	638
Laos	211
Lithuania	195
Sweden	11

*gram carbon dioxide equivalents per kWh

4. Better chemicals selection and reduction of chemicals' use



A. Phase out (unless essential use):

- Persistent organic pollutants (POP)
- Durable Water Repellent treatment – use fluorine/silicon free unless PPE* applies
- Antibacterial treatment – why?
- Transport fungicide – keep dry and cool instead

B. Improve by:

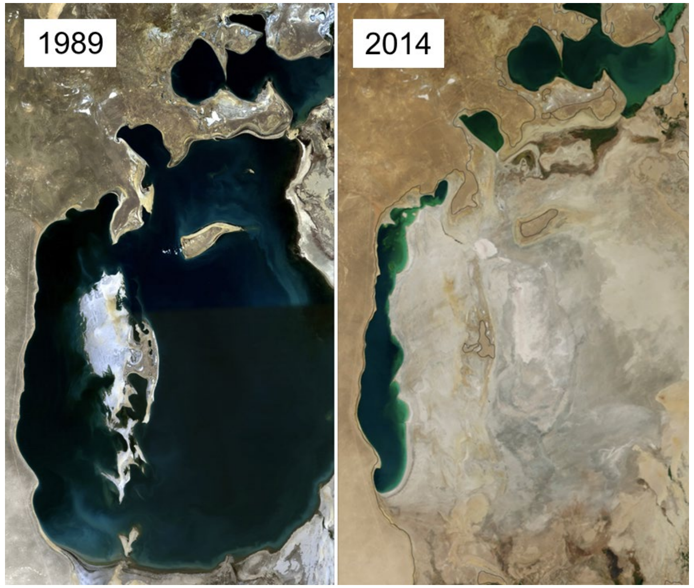
- Use solution dye / dope dye / spin dye / e.dye technology
- Reduce rework
- Automated dosing systems
- Are there any unnecessary effect chemicals in the garments? (softeners, "easy care" etc.)

C. Select suppliers that:

- Offer safety data sheets
- Offer transparency about what chemicals they use
- Have a good chemicals management work in place

*Personal Protective Equipment Regulation (EU) 2016/425

5. Better materials



A. Replace conventional cotton:

- Can you use e.g. 50/50 forest fibre and cotton fibre?
- Can you use polyester instead?

B. Select sustainable fibres:

- Set the fibres' life-cycle performance at centre stage – including their fit-for-purpose and effects on subsequent production, user behaviour and end-of-life options.
- Avoid GMO cotton
- Use fibres with good durability
- Use fibres that can be solution/dope dyed
- Watch out for green-wash!

C. Avoid unnecessary materials:

- Are there any unnecessary functions in the garments?

D. Standardize trims, attachments, hang tags etc.:

- Increase control for "high risk" materials
- Simplify exchange of buttons etc. in the use phase.

6. Avoid microplastics

A. Reduce microplastics generation in the production of the garment:
- Are there any unnecessary brushing operations?
- Use laser or ultrasound cutting if possible

B. Reduce the amount of microplastics being carried by the garment:
- Ensure good air quality in the facilities

7. Optimise transport and packaging

A. Reduce air freight:
- Can there be a total ban of air freight in the company?

A. Reduce anti-mould agents (fungicides):
- Pack and store in dry conditions
- Keep dry and cool
- Unpack as soon as goods arrive
(humidity, temperature and time drives mould growth)

B. Optimise packaging materials:
- Make sure the packaging does its work and protects the goods
- Reduce the size of the packaging
- Do not use hazardous chemicals

Thank you!!!

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