COLLABORATIVE STUDY ON CHEMICALS IN RECYCLED TEXTILES

October 2021

H&M Group

IKEA

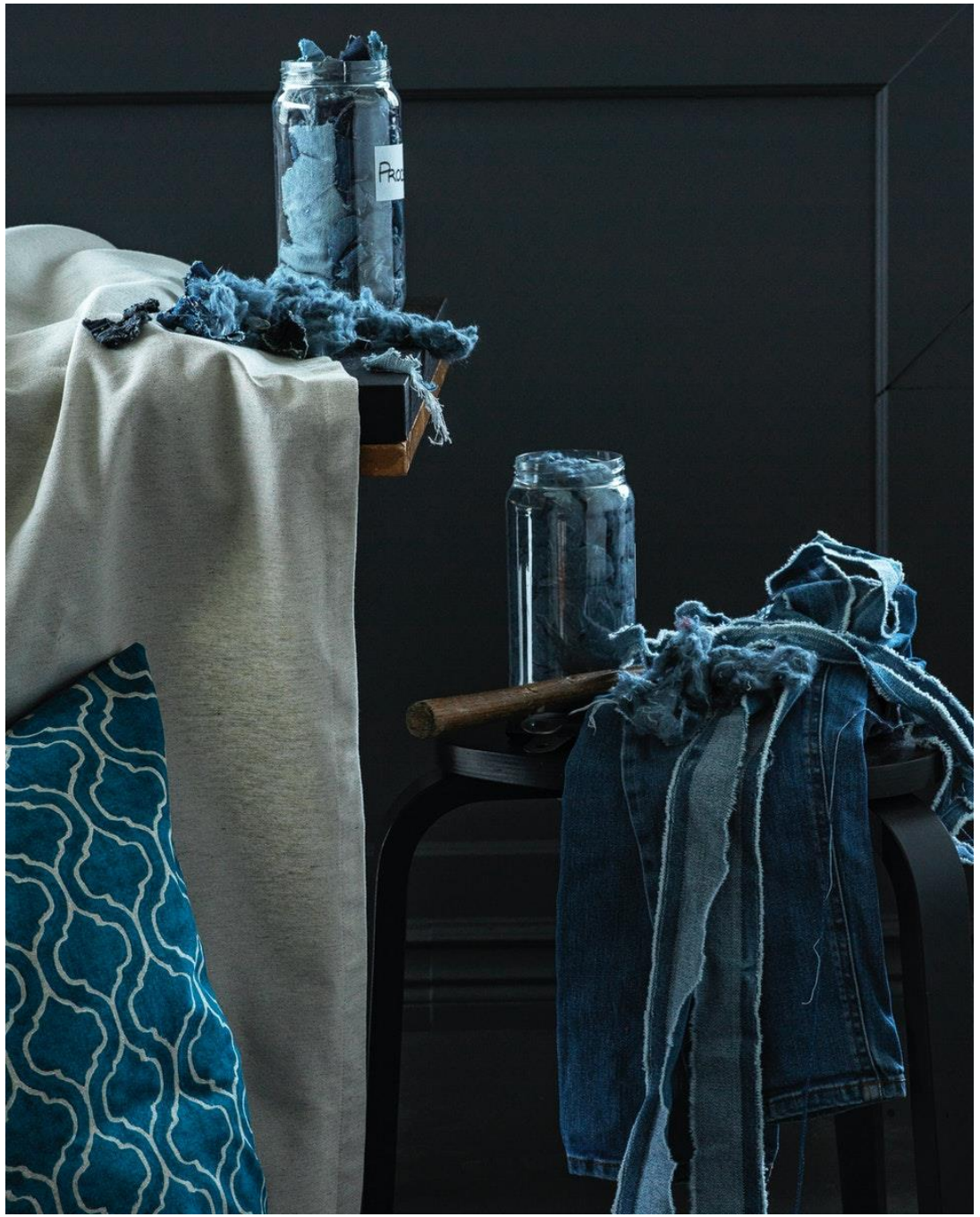
adidas

PVH

BESTSELLER

Gap Inc.

Kingfisher



WELCOME

Presenters :

Linn Farhadi – H&M Group

Mirjam Luc – Inter IKEA Group

Theresa Kjell – Chemsec

The presentation will be shared after the webinar

AGENDA

- Introduction
- Background to study
- How the study was conducted
- Results
- Learnings
- Key take aways
- Reflections from an NGO perspective
- Next steps
- Q&A

Today, collected textiles are often regarded as waste; this is a large barrier from a circular resource perspective.

We therefore call for that collected textiles shall be defined as a resource, given the large positive climate and environmental impact of extending product life and recover material from collected textiles.

TEXTILE WASTE SHOULD BE REGARDED AS RESOURCE

CIRCULAR BUSINESS MODELS

Need of transforming into circular businesses

,

Closing the recycling loop in a circular business model for materials like textiles presents many challenges

,

Tackling the presence of legacy chemicals and hazardous chemicals in recycled materials, will be a key part of realising circularity.

,

Collaboration is key

BACKGROUND

H&M and IKEA initiated the study in 2019

,

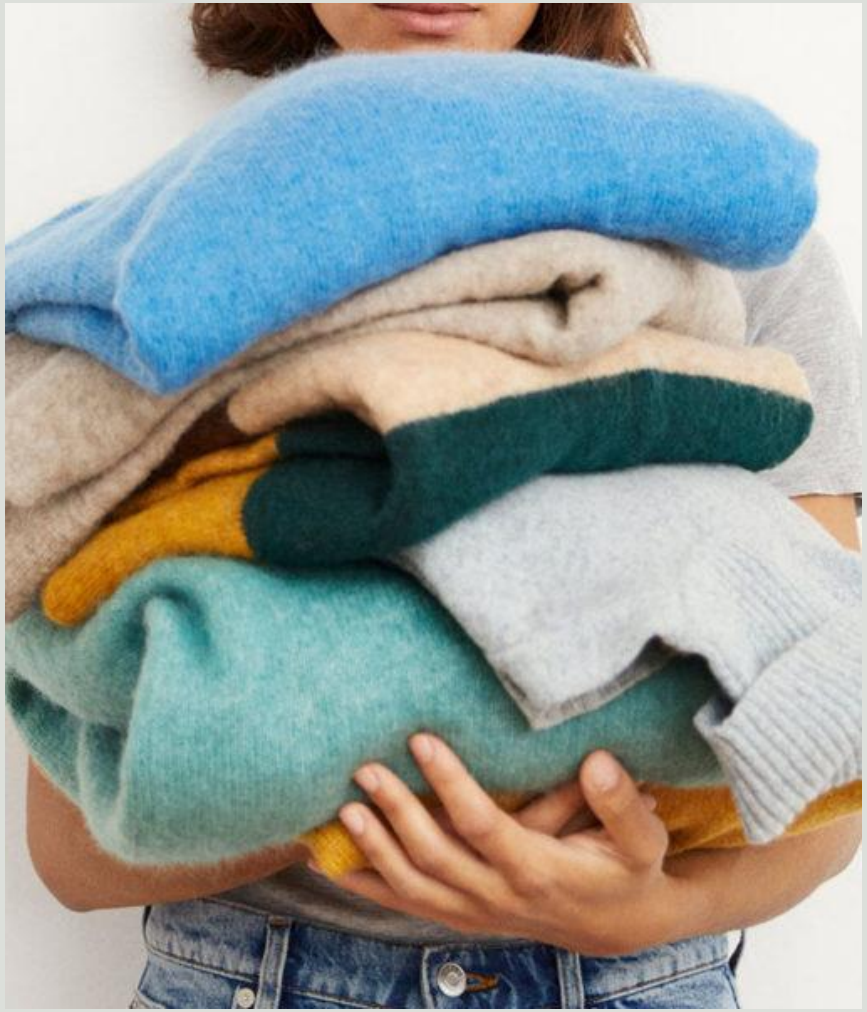
Limited data available on chemical content in recycled textiles

,

Established a successful way of working for data sharing to increase knowledge around chemical content in recycled textiles

,

GAP Inc., adidas, PVH Corp., Bestseller and Kingfisher joined in 2020



GOALS

I Develop smarter chemical testing strategies for recycled textiles – based on data

II Protecting textile resources by enabling an increased utilization of recycled textiles while meeting strict safety standards

III Stimulate collaboration, chemical transparency and address chemical challenges across the industry

SAMPLING PROCESS

Collection of
Post-consumer textile sources of municipal waste, from recyclers etc.

Sorting
- By composition and/or colors
- Manually or with NIR machine

Removing accessories
Manually or by machine

Shredding
Material cut in small pieces before shredding

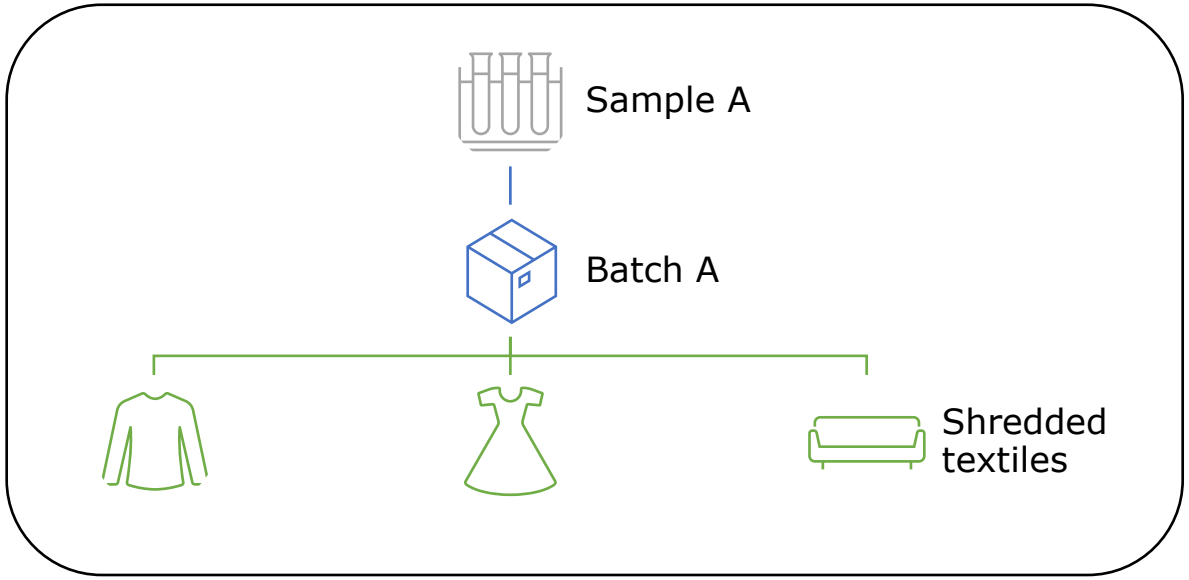
Spinning

Sampling

Chemical testing

SAMPLES

Mechanically shredded post-consumer textiles



Geographical origin of samples

- Cotton fiber content > 90 %
- Polyester fiber content > 90 %
- Wool fiber content > 80%

- Western- Southern- and Northern Europe
- East- and South Asia
- North America
- United Kingdom

RESTRICTED SUBSTANCES

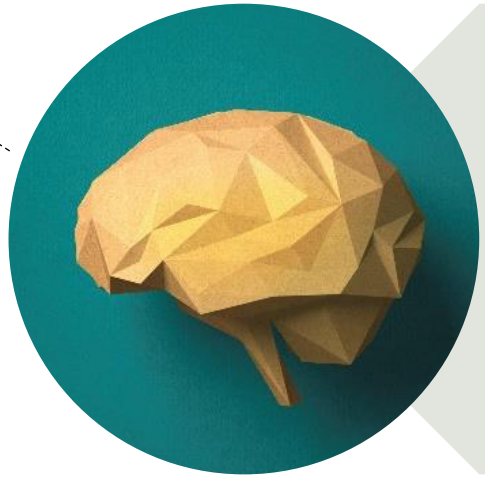
Alkylphenol (AP)
Alkylphenol Ethoxylates (APEOs)
Azo-amines and Aryl Amine salts
Bisphenols
Chlorinated Benzenes and Toluene
Chlorophenols
Dyes Forbidden and Disperse
Flame Retardants
Formaldehyde
Heavy Metals, Extractable
Heavy Metals, Total
Organotin Compounds
Perfluorinated and Polyfluorinated Chemicals (PFCs)
Phthalates
Polycyclic Aromatic Hydrocarbons (PAHs)
Quinoline

Full list of substances + methods and limits according to AFIRM Restricted Substances List

SUBSTANCE INFORMATION EXCHANGE

Sharing Data

- Anonymized Data Transparency
- Harmonized testing process
- Data Aggregation
- BI Analytics
- High Accuracy of information (the labs report the data)



AI for Smarter Analysis

- Target problematic recycled materials based on presence of hazardous chemicals and source (geographic region)
- Smarter testing programs
- Strategic sourcing

RESULTS

Post-consumer textiles

Definitions

- No Detection
- Detection (below RSL limit)

} Pass

- Fail (above RSL limit)

Data Points = Number of test analysis of substances

COTTON

Post-consumer

TEST SUMMARY

TOTAL NUMBER OF SAMPLES **172**

24 700
Data Points

99,97 % Pass

0,03 % Fail

98,23 %
No Detection

1,74 %
Detection

TEST RESULTS

Spread of detections over samples

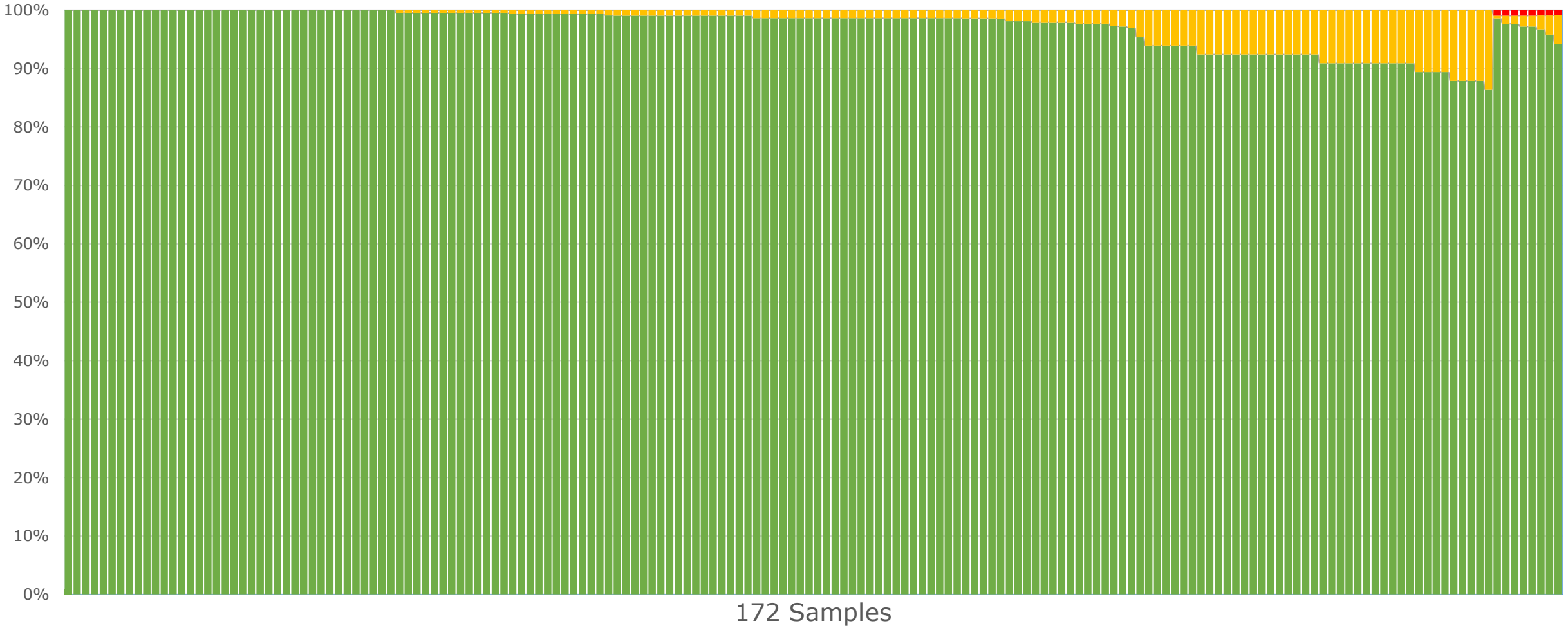
COTTON

Post-consumer

38 Samples with no detection

126 Samples with one or more detection

8 Samples with only one fail



TEST RESULTS
Substances without failure

COTTON
Post-consumer

218 Substances with no detection

21 Substances with one or more detection

Most substance groups were not detected in any of the samples

- Alkylphenols
- Chlorophenols
- Dyes (forbidden and disperse)
- Flame Retardants
- Perfluorinated and Polyfluorinated Chemicals (PFCs)

- Azo-amines and arylamine salts
- Chlorinated benzenes and toluene
- Polycyclic Aromatic Hydrocarbons

Minimal detection

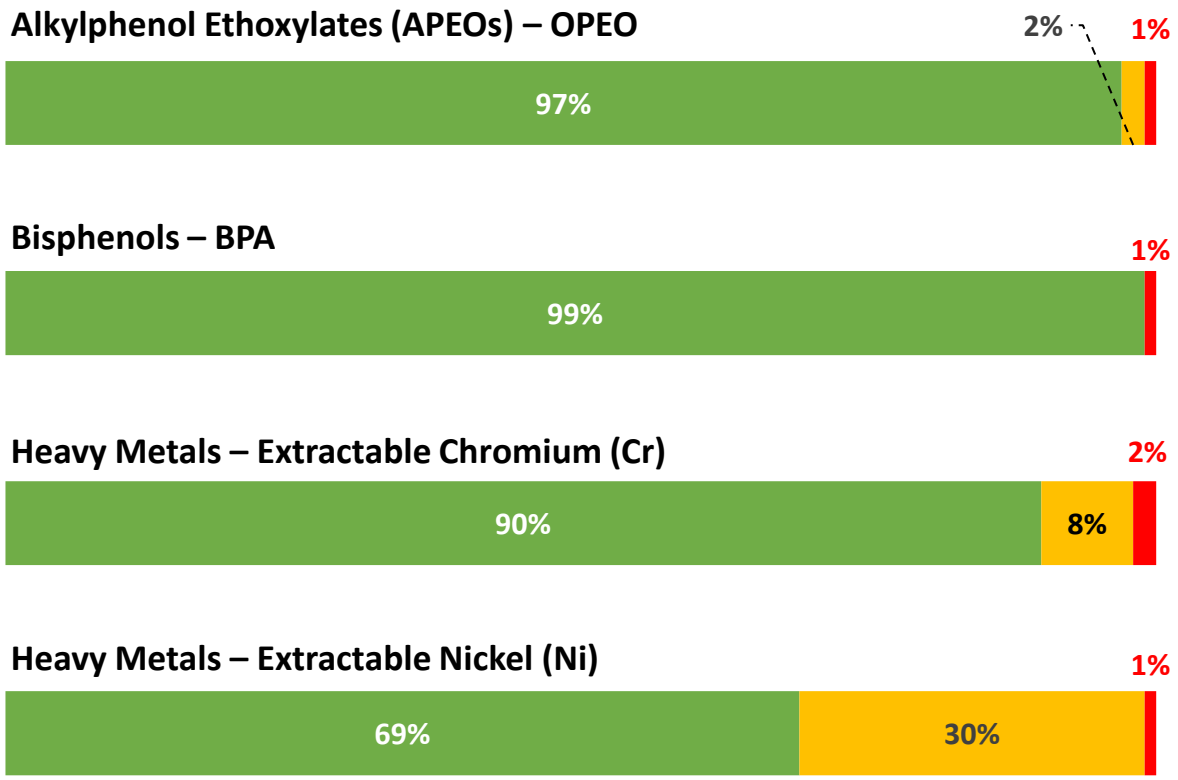
Top 5 most frequently detected substances with results below the RSL limits

	Detection rate
NPEO (Alkylphenol Ethoxylate)	62%
Barium (Extractable)	37%
DEHP (Phthalate)	29%
MBT (Organotin)	27%
Copper (Extractable)	27%

TEST RESULTS
Substances detected above RSL limit

COTTON
Post-consumer

4 Substances with one or more fail



Substances detected above RSL limit

- OPEO failed in 2 samples
- BPA failed in 1 sample
- Extractable Chromium failed in 3 samples
- Extractable Nickel failed in 2 samples

POLYESTER

Post-consumer

TEST SUMMARY

TOTAL NUMBER OF SAMPLES **169**

31 000
Data Points

99,3 % Pass

0,7 % Fail

96,9 %
No Detection

2,4 %
Detection

TEST RESULTS

Spread of detections over samples

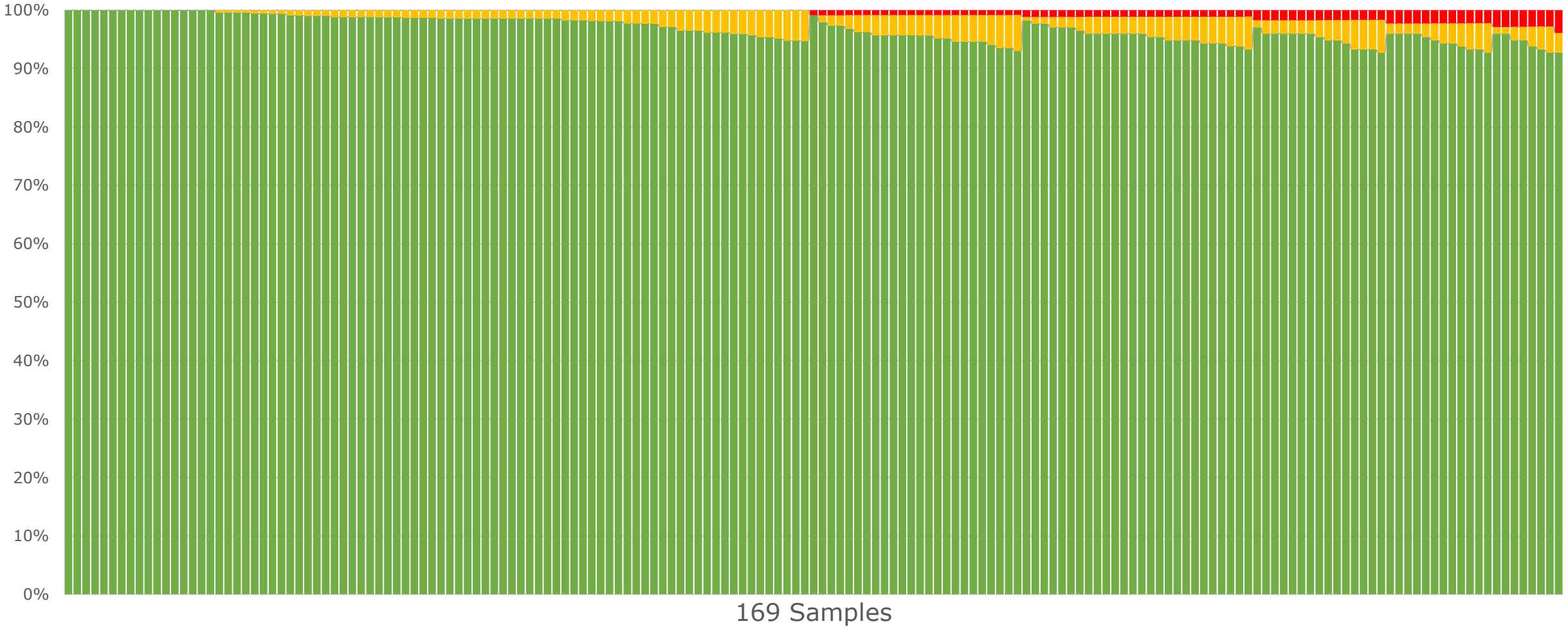
POLYESTER

Post-consumer

17 Samples with no detection

67 Samples with one or more detection

85 Samples with one or more fail



TEST RESULTS
Substances without failure

POLYESTER
Post-consumer

209 Substances with no detection

37 Substances with one or more detection

Most substance groups were not detected in any of the samples

- Chlorophenols
- Quinoline

- Azo-amines and Arylamine Salts
- Alkylphenols (APs)
- Formaldehyde
- Perfluorinated and Polyfluorinated Chemicals (PFCs)

Minimal detection

Top 5 most frequently detected substances with results below the RSL limits

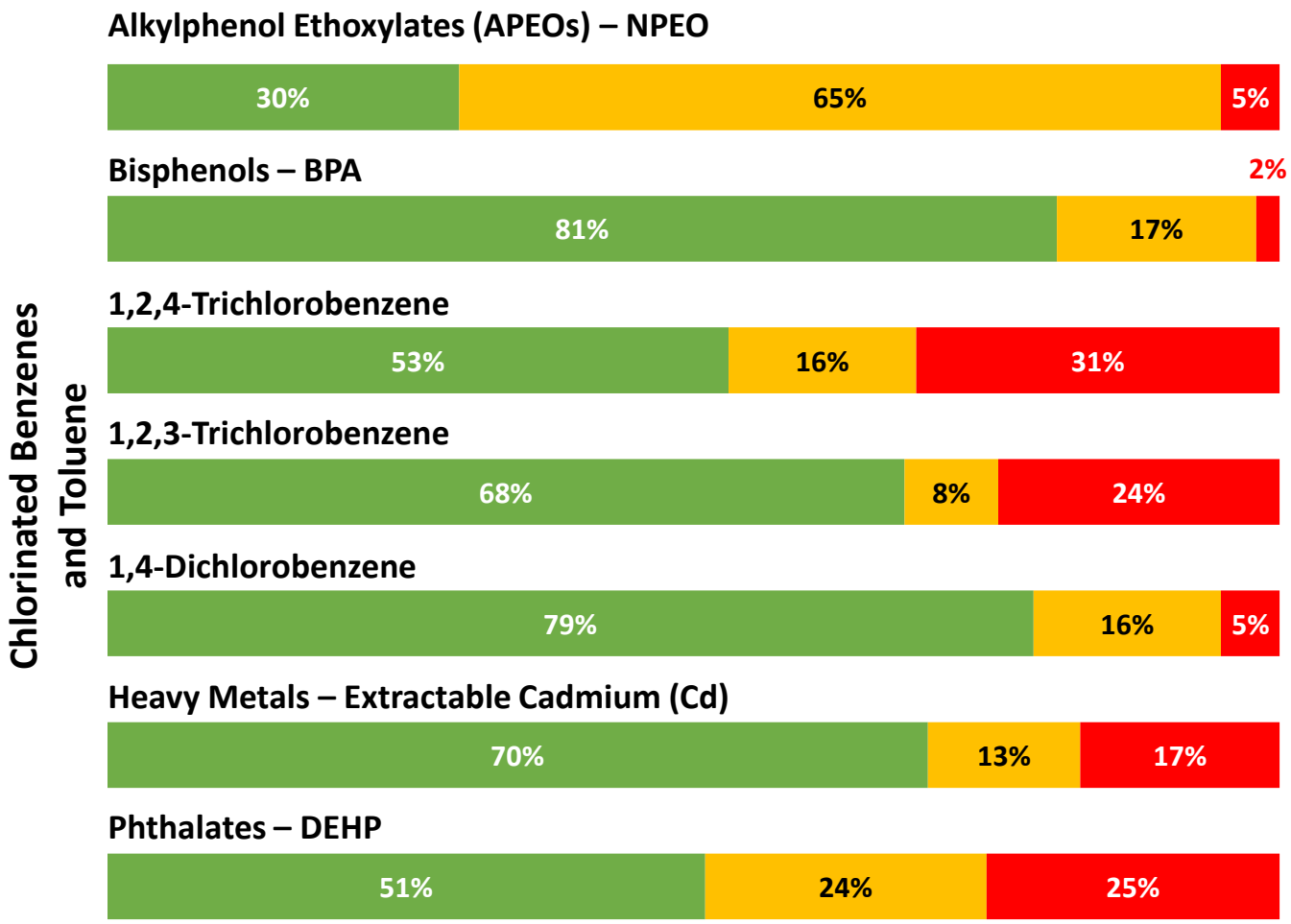
	Detection rate
Pyrene (PAH)	45%
Nickel (Extractable)	39%
Fluorene (PAH)	35%
Acenaphtene (PAH)	19%
Fluoranthene (PAH)	14%

TEST RESULTS
Substances detected above RSL limit

POLYESTER
Post-consumer

23 Substances with one or more Fail

Most frequently failed substances



Substances detected above RSL limit

- NPEO failed in 9 samples
- BPA failed in 4 samples
- 1,2,4-Trichlorobenzene failed in 52 samples
- 1,2,3-Trichlorobenzene failed in 41 samples
- 1,4-Dichlorobenzene failed in 9 samples
- Extractable Cadmium failed in 29 samples
- DEHP failed in 42 samples

WOOL

Post-consumer

TEST SUMMARY

TOTAL NUMBER OF SAMPLES **154**

14 400

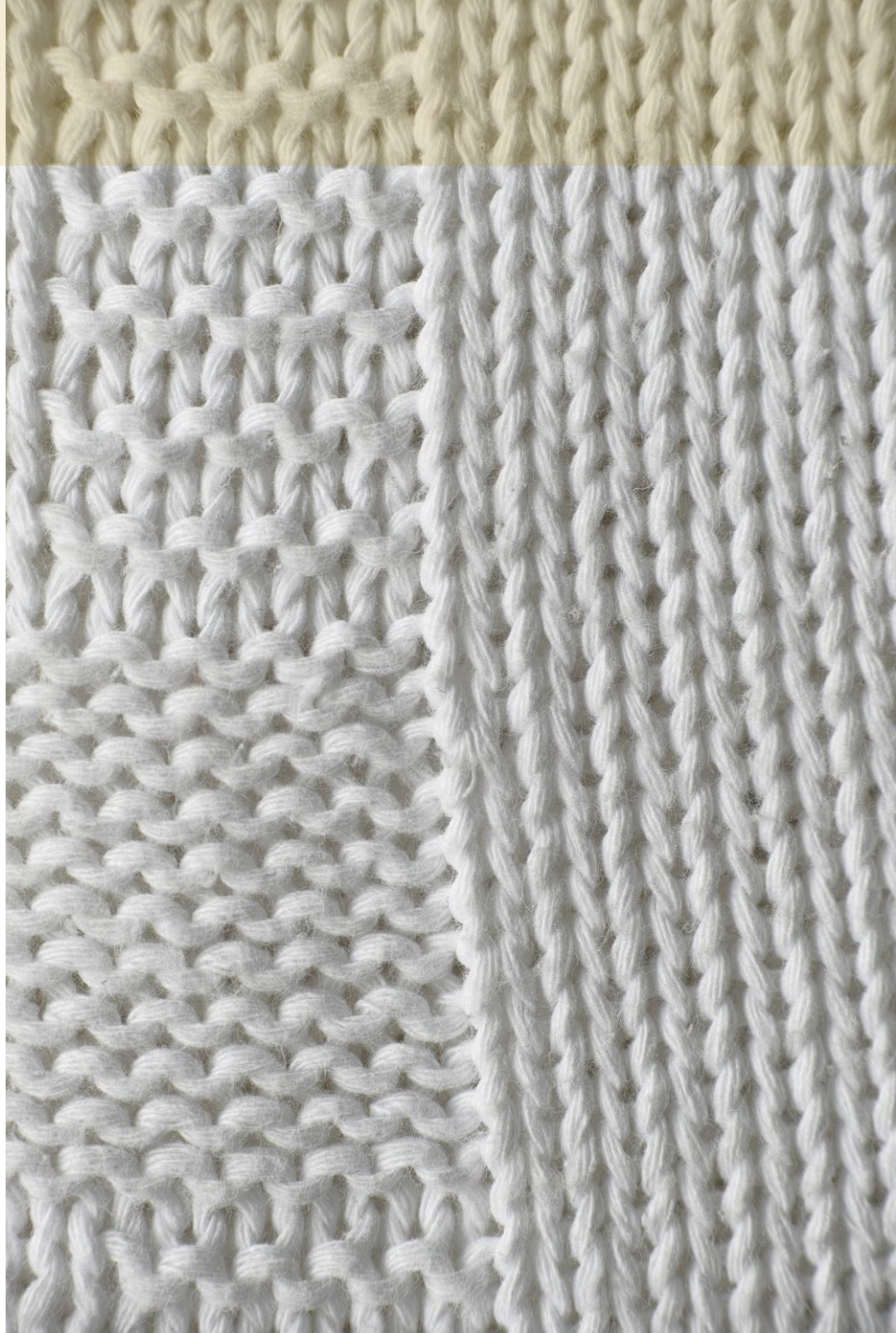
Data Points

98,5 % Pass

1,5 % Fail

94,7 %
No Detection

3,8 %
Detection



TEST RESULTS

Spread of detections over samples

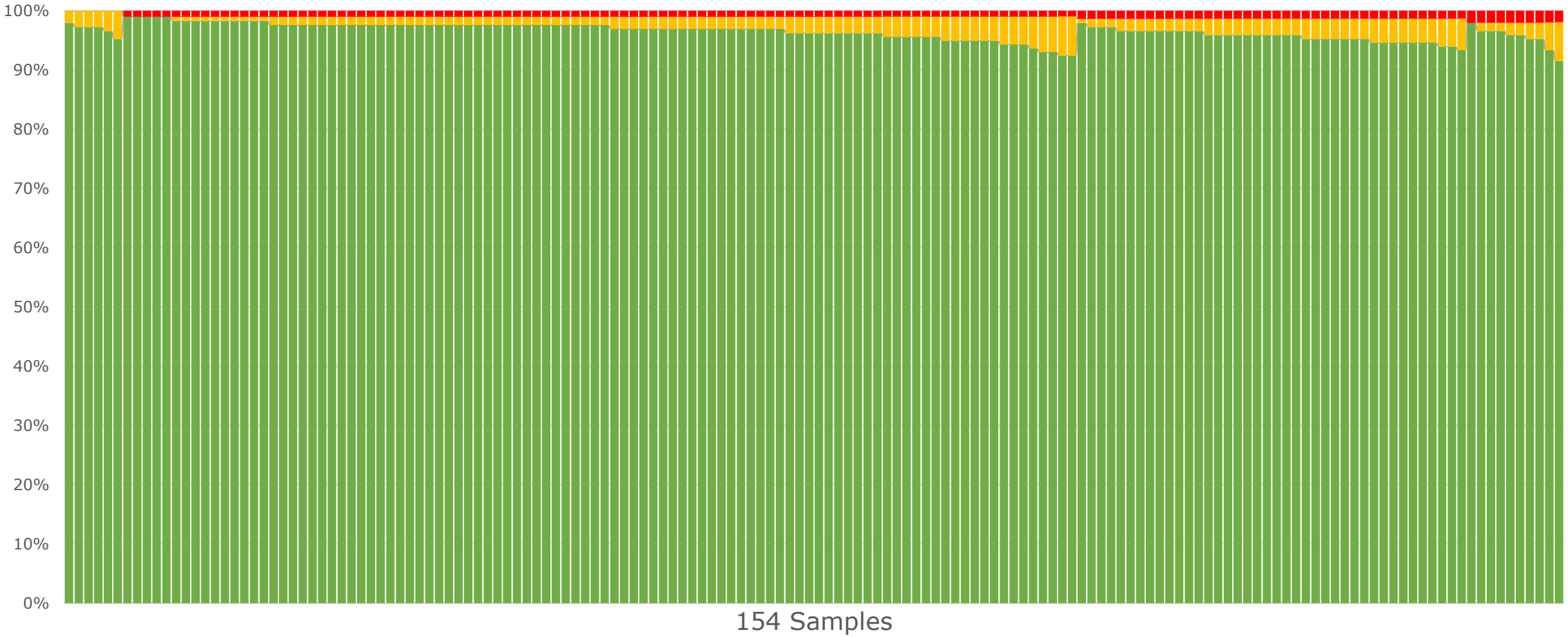
WOOL

Post-consumer

0 Samples with no detection

6 Samples with one or more detection

148 Samples with one or more fail



TEST RESULTS
Substances without failure

WOOL
Post-consumer

134 Substances with no detection

26 Substances with one or more detection

Most substance groups were not detected in any of the samples

- Dyes (forbidden and disperse)
- Perfluorinated and Polyfluorinated Chemicals (PFCs)

- Organotin Compounds
- Phthalates
- Alkylphenols (APs)

} Minimal detection

Top 5 most frequently detected substances with results below the RSL limits

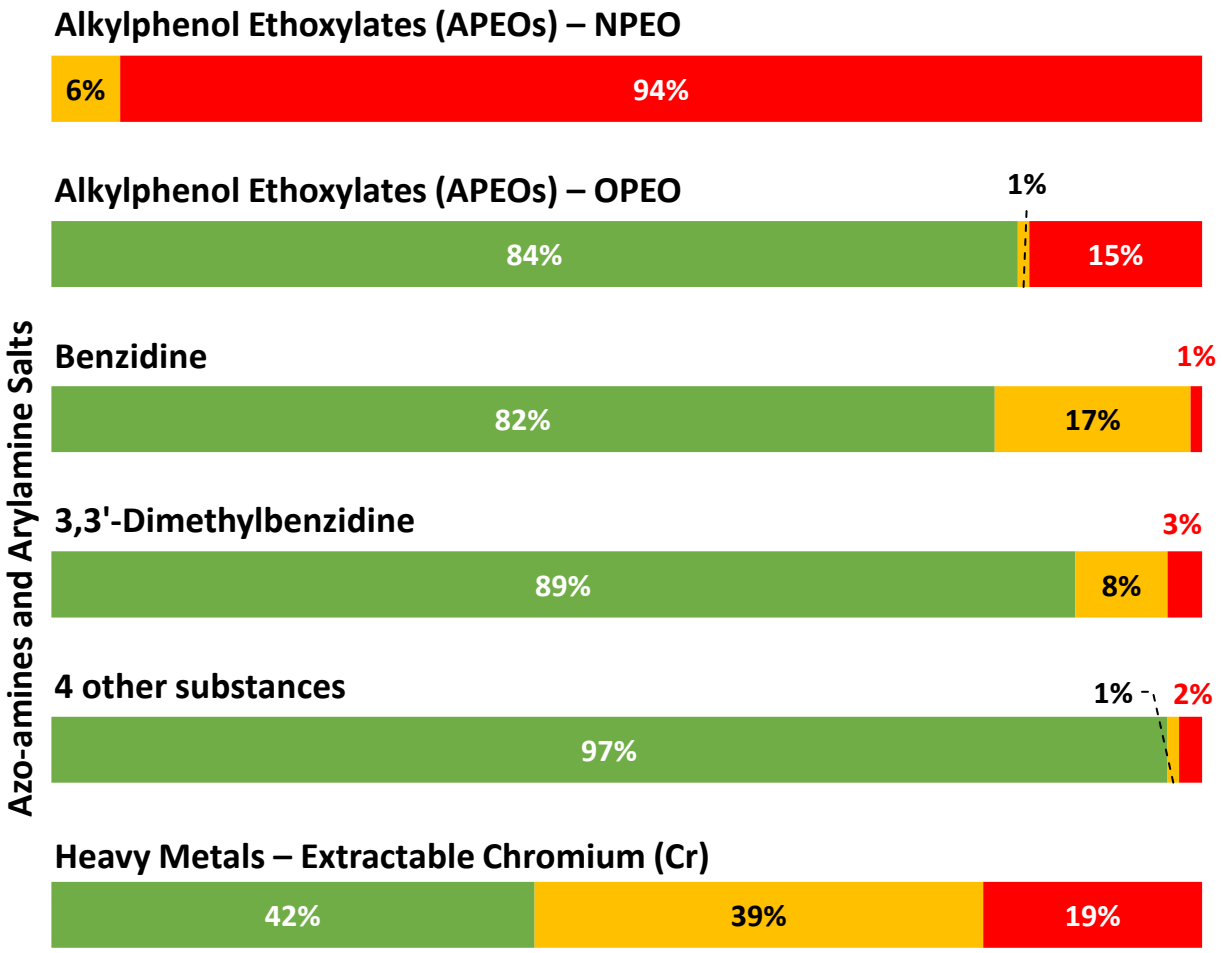
	Detection rate
• Formaldehyde	51 %
• Lead (Total content)	42 %
• Barium (Extractable)	38%
• Copper (Extractable)	32 %
• Cadmium (Extractable)	20 %

TEST RESULTS
Substances detected above RSL limit

WOOL
Post-consumer

10 Substances with one or more Fail

Most frequently failed substances



Substances detected above RSL limit

- NPEO failed in 145 samples
- OPEO failed in 23 samples
- Azo-amines and Arylamine Salts failed in 7 samples
- Extractable Chromium failed in 29 samples

TEST RESULTS
Geographical origin

COTTON
Post-consumer

- NPEOs detected in samples from almost all regions
- OPEOs only failed in samples from East Asia

POLYESTER
Post-consumer

- PFCs were only detected in samples from UK
- Flame retardants were only detected in samples from UK

WOOL
Post-consumer

- APEOs detected in samples from all regions
- Extractable Chromium mainly detected in samples from Northern Europe

Samples collected in Western- Southern- and Northern Europe, East- and South Asia, Northern America and United Kingdom

LEARNINGS

Most substances included in the test plan were not detected in any samples of any fiber type, and even fewer substances were detected above RSL limits.

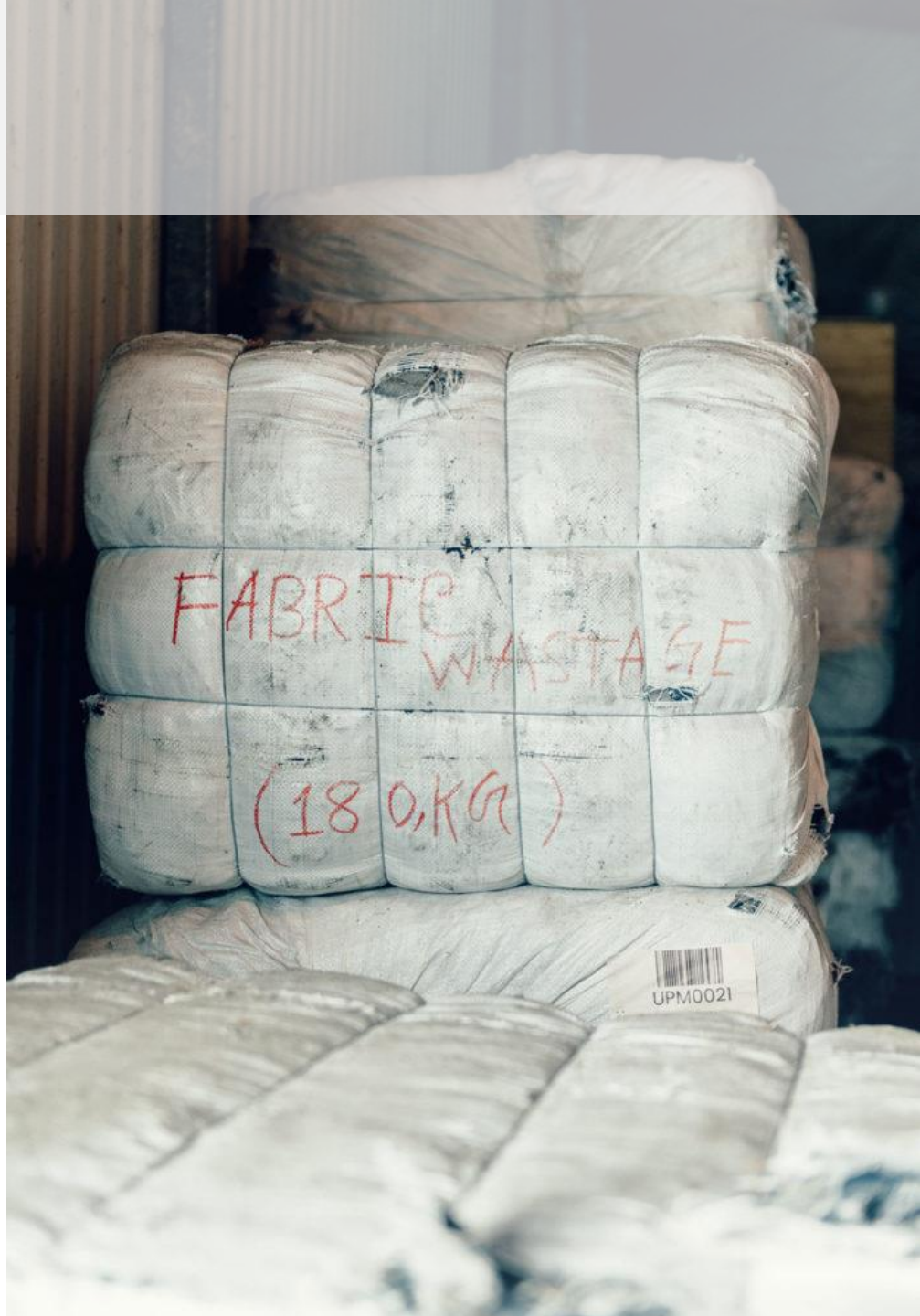
Although the overall detections were low, the distribution of the detections were widely spread among the tested samples.

Fewer substances were detected in cotton compared to polyester and wool. Polyester samples had the widest variety of substances detected. But, in wool almost all samples contained at least one substance that failed against AFIRM RSL limits.

APEO:s were detected in samples from all three tested fibres; cotton, wool and polyester.

In wool, NPEO was detected in every samples and failed in almost all.

The phthalates DBP, DINP and DEHP were detected in polyester (DEHP failed in 42 of the samples).



KEY TAKE AWAYS

Collaboration is necessary

,

Data exchange is possible

,

Restricting chemicals through RSL's and MRSL's is not enough

,

Harmonised hazard assessment methodology for chemicals

,

Transparency of chemical formulations

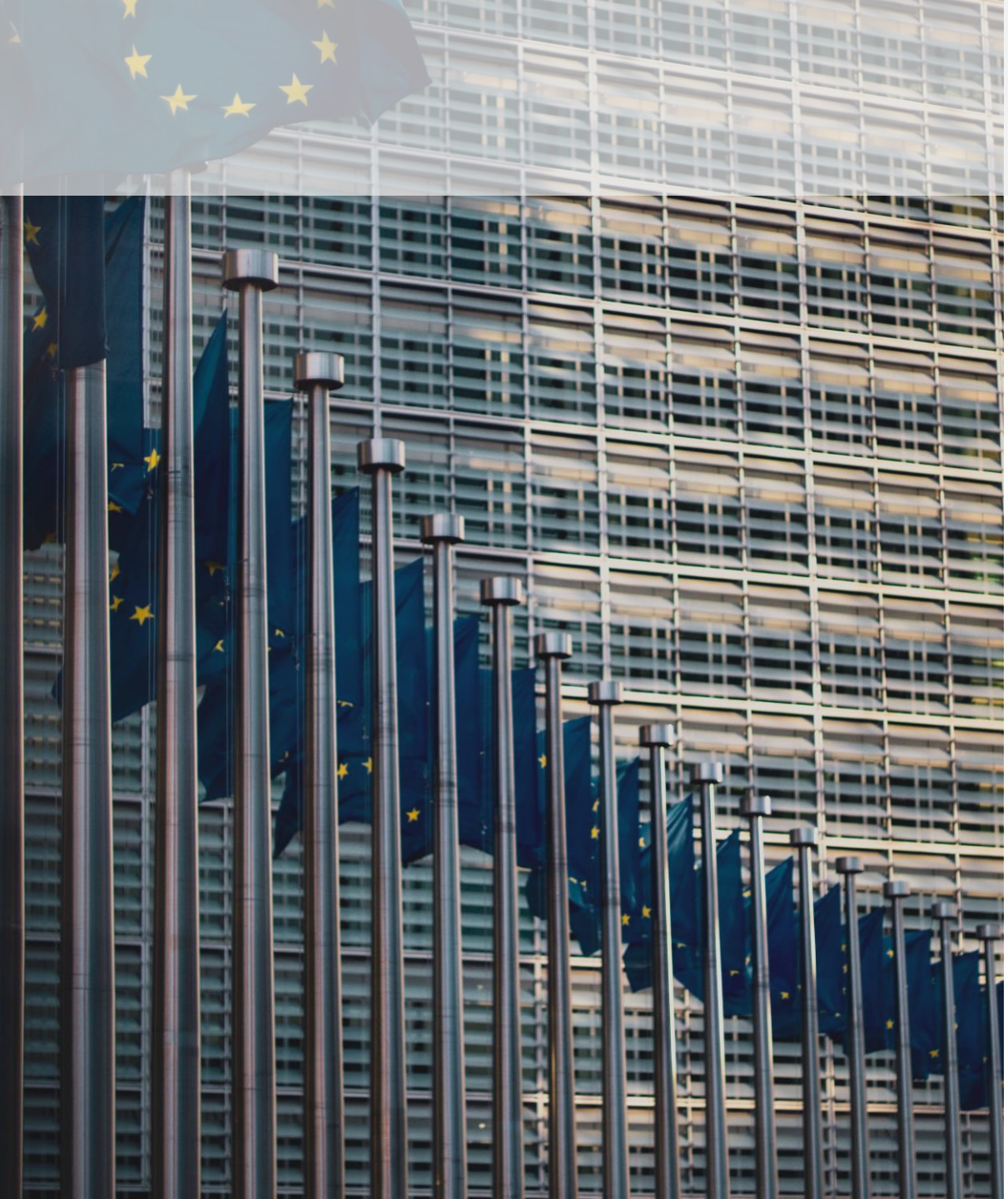
,

Chemicals hampering recycling and material recovery should be restricted (on group level) based on structural or functional similarities – **To avoid regrettable substitution and future legacy chemicals**

WHAT WE DO AT CHEMSEC

- Drive the political discussion on hazardous chemicals
- Challenge companies to improve their chemicals management
- Develop online tools to help companies switch to safer chemicals
- Inform investors about risks and opportunities in the chemical industry

chemsec



POLICY

- Green Deal and the Chemicals Strategy for Sustainability
- Reach Review
- Essential use
- Sustainable Product Policy Framework
- Non toxic material cycles

RECYCLED MATERIAL AND CHEMICALS

- Chemical content is a major roadblock
- Step one – non regrettable substitution
- Transparency and traceability
- Not all materials should be recycled
- Establish close collaborations
- Embrace real change

chemsec

NEXT STEPS

Continue developing the databank in collaborations

,

Build smarter testing strategies with AI

,

Use the data to understand need of innovation to further develop and scale recycling

,

Use the data to support Public Policy

,

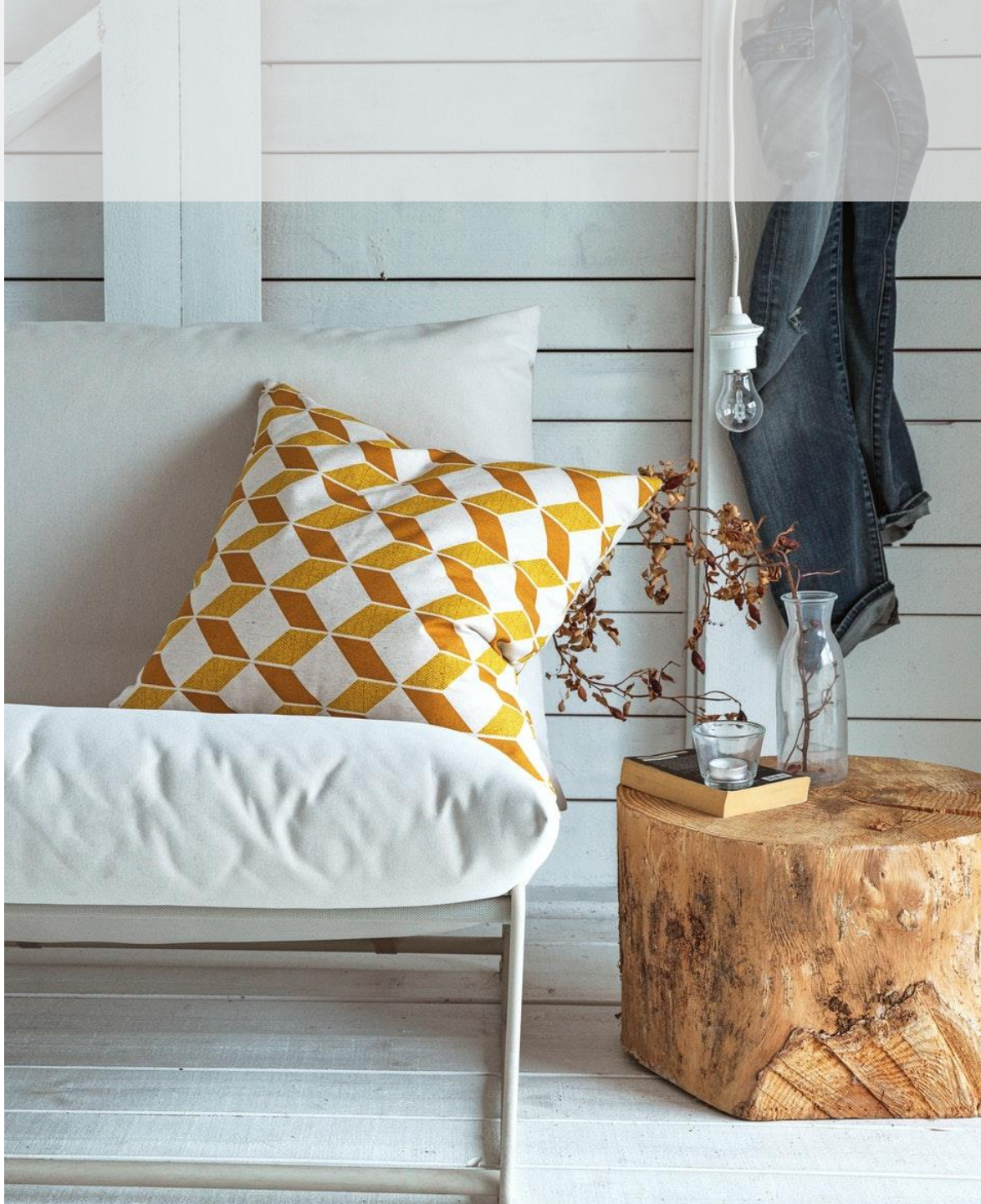
Strengthen strategic goals to increase utilization of recycled textiles

Q&A SESSION

recycledtextiles@hm.com

recycledtextiles@inter.ikea.com

circular@chemsec.org



THANK YOU!

H&M Group

IKEA

adidas

PVH

BESTSELLER

Gap Inc.

Kingfisher