To deliver on this it is our **MISSION** to deliver practical and scalable circular economy solutions to the world.

It is our **VISION** to contribute to a prosperous world of finite resources by accelerating the transition to a circular economy.

CIRCLE
ECONOMY

We work to accelerate the transition to a circular economy. As an impact organisation, we identify opportunities to turn circular economy principles into practical reality.
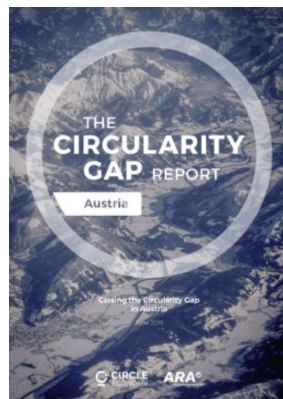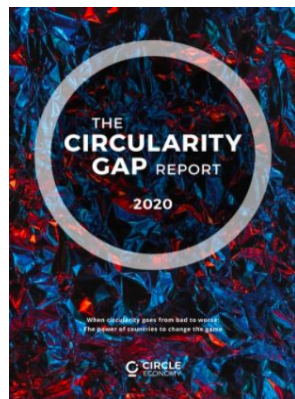
"

With nature as our mentor, we combine **practical insights with scalable responses** to humanity's greatest challenges.

ABOUT **CIRCLE ECONOMY**

Circle Economy has experience working with **circular economy leaders** - from startups to multinationals, and municipalities to governments.

Building on the Netherlands' front-running position on circularity, we have expanded our **global reach** and completed projects in Western Europe, Brazil, Indonesia and the United States.

WITH SPECIAL THANKS TO:

CIRCLE ECONOMY PROGRAMMES

CITIES

FINANCE

TEXTILES

THE CIRCULARITY GAP REPORT
Norway

JOBS & SKILLS

DESIGN & BRANDS

CIRCLE ECONOMY

MISSION
To achieve a zero waste
textiles industry

REDUCE the mountain

Build the data, technology and
infrastructure needed to
valorize textile waste at
end-of-use.

PREVENT the mountain

Increase the capacity of
industry and education
to assess and adopt
circular strategies.

TAKE

MAKE

WASTE

CIRCLE ECONOMY

Recycle   Refurbish   Reuse   Maintain

Source   Refine   Produce   Sell   Use   Incinerate / Landfill
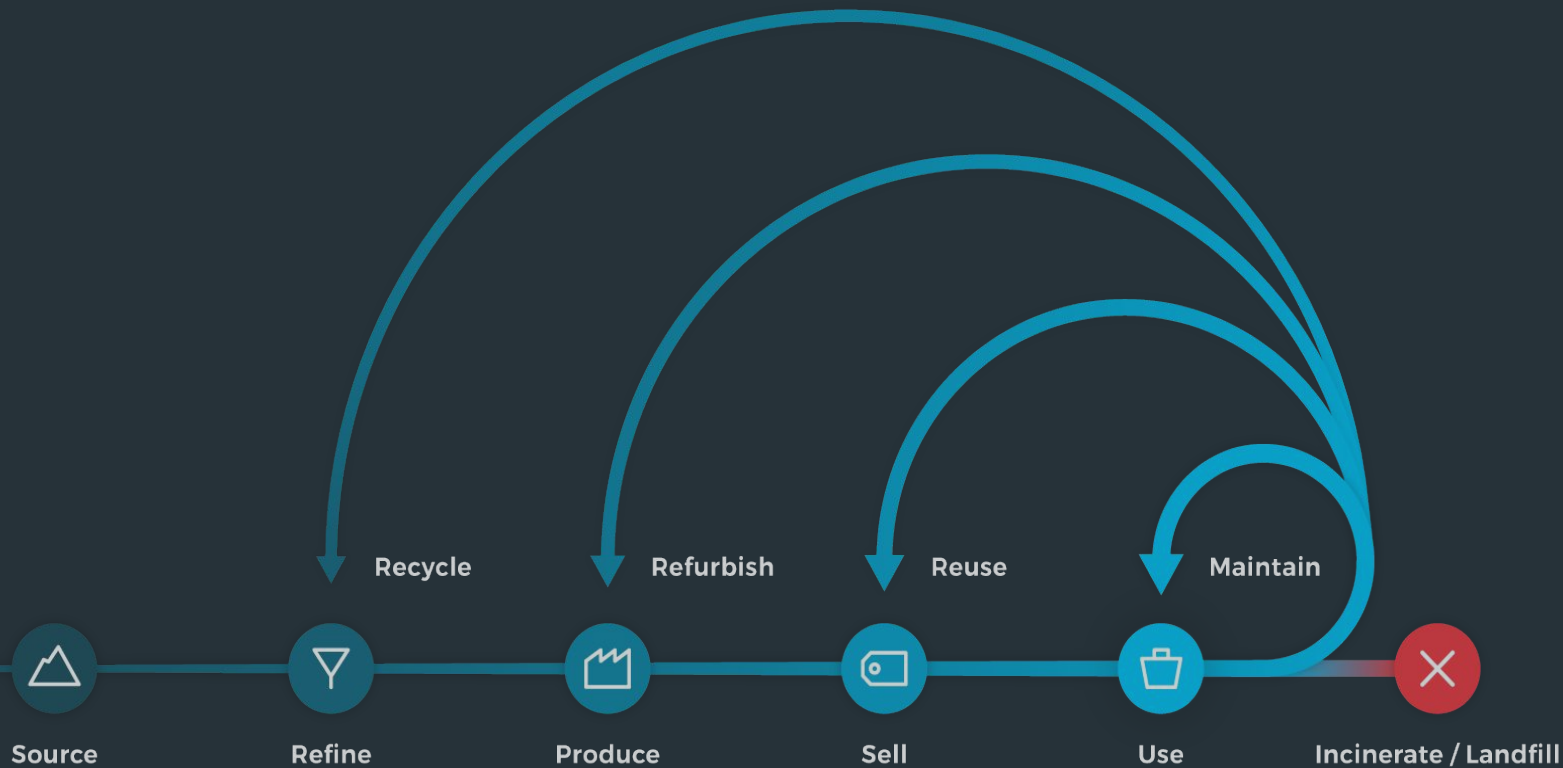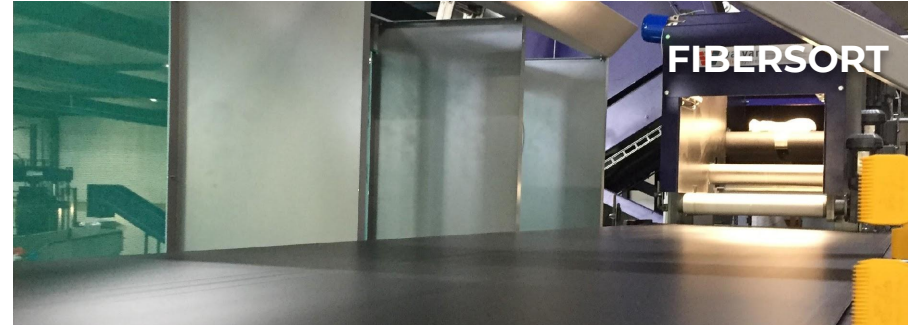
PREVENT

RENTING & LEASING BUSINESS MODELS:
SWITCHING GEAR

EDUCATIONAL TRAININGS:
ON COURSE

SOCIO_ECONOMIC EFFECTS OF CIRCULAR
DENIM

EMPLOYMENT EFFECTS CIRCULAR TEXTILES

CIRCLE ECONOMY

FIBERSORT

LABELS ACCURACY & POLLUTION

M 134
%70cotton
%30pclly

MADE IN TURKEY

REDUCE

THE FIBERSORT PROJECT

RESOURCE AND MATERIALS EFFICIENCY

Interreg
North-West Europe
Fibersort
European Regional Development Fund

TIMELINE
2016 - 2020

TOTAL BUDGET FROM INTERREG NWE
€2 million of ERDF

TOTAL PROJECT BUDGET
€3.5 million

HIGH VALUE RECYCLERS   BRANDS   CONSUMER

70% LOST

30%

FIBERSORT

24% POTENTIAL

64% REWEARABLES

NON-REWEARABLES

DOWNCYCLED LANDFILLED INCINERATED

COLLECTOR & SORTER

smart fiber sorting

CIRCLE ECONOMY

Leger des Heils RESHARE TEXTIELHERGEBRUIK

procotex SA CORPORATION NV

valvan baling systems

worn again technologies
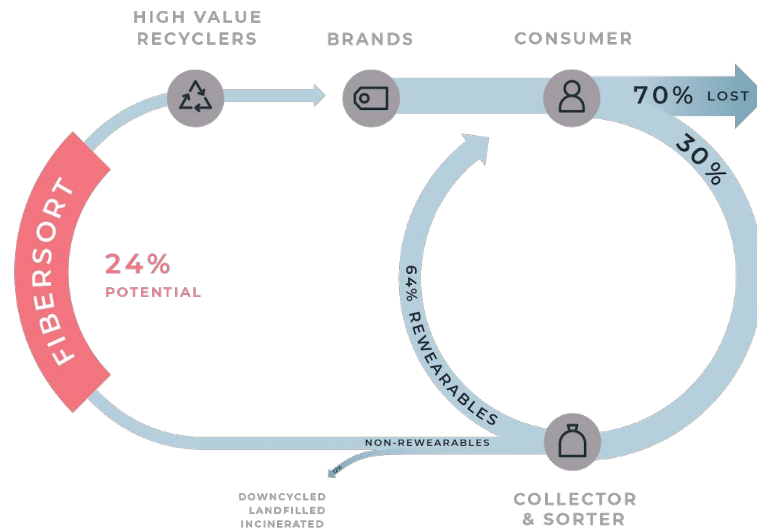
CLOTHING LABELS: ACCURATE OR NOT?

PURE NEW WOOL

CIRCLE ECONOMY

CIRCLE ECONOMY

THE TRUTH BEHIND THE LABEL

✓ **34**% claimed the right cotton content

> **31**% claimed the product contained >95% cotton while content was less than 75%

✗ **24**% claimed the product contained slightly more or slightly less cotton

< **11**% claimed the product contained <35% cotton while actual content was more than 50%

#WHATSINMYCLOTHES

THE BARRIERS FOR CIRCULAR TEXTILES

Interreg
North-West Europe
Fibersort
European Regional Development Fund
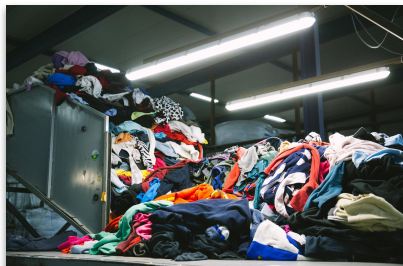
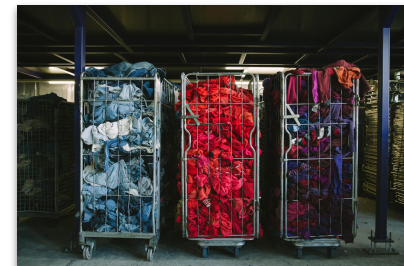A growing mountain of non-rewearable textiles

Negative perception on recycled content

Lack of urgency for textile waste

The changing composition of post-consumer textiles

The unknown origin of post-consumer textiles

Higher prices for recycled content
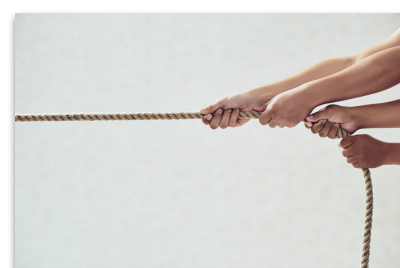
No demand for non-rewearable textiles

THE FIBERSORT PROJECT DELIVERABLES.

1 Composition of used textiles in NWE

2 Barriers for scaling the technology

3 End markets for Fibersort outputs

4 Policy recommendations

5 Case studies

LET'S SCAN!

CIRCLE ECONOMY

ORIGIN

INPUTS

MANUFACTURE

USE

OUTPUTS
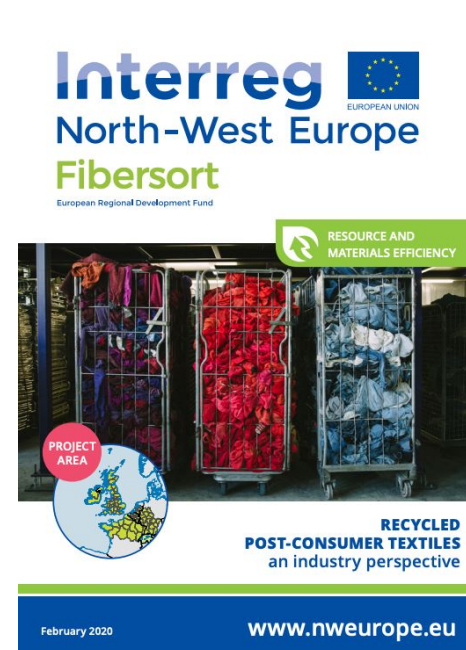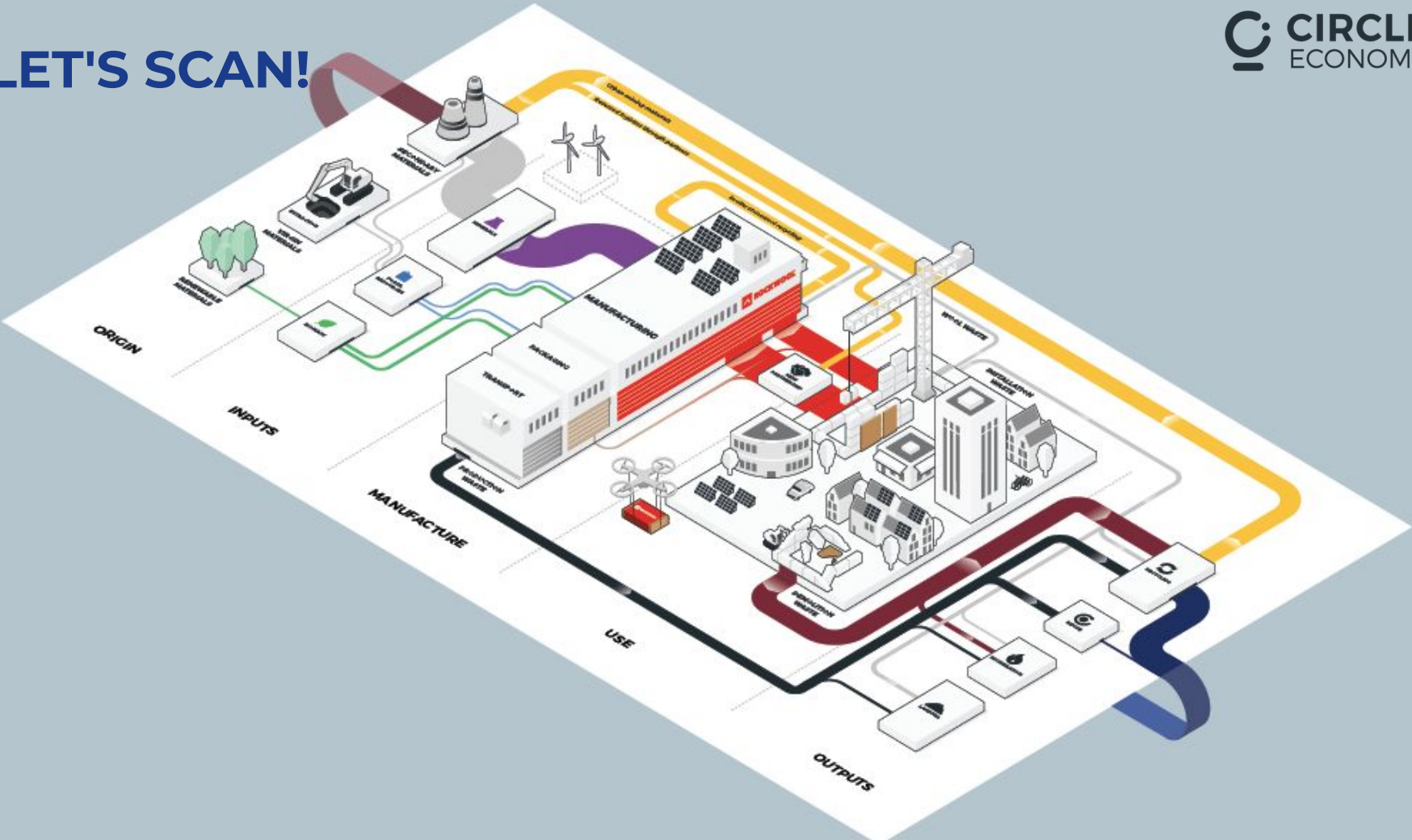
THE CIRCLE SCAN 3-STEP APPROACH

SYSTEM MAPPING
*ANALYSE AND MAP OVERVIEW OF
THE CURRENT SYSTEM*

SCENARIO DEFINITION
*IDENTIFY SCENARIOS AND BUILD A
SHARED VISION*

ACTION ROADMAP
*ASSESS CIRCULAR INTERVENTIONS AND
PILOT PROJECTS*

THANK YOU

ola@circle-economy.com

CIRCLE ECONOMY

THE CIRCLE SCAN 3-STEP APPROACH

WASTE FLOW AND OPPORTUNITY MAPPING
MAP AND ANALYSE CURRENT TEXTILE WASTE FLOWS IN THE NORTH AMERICAN MARKET

SOLUTION PROVIDER IDENTIFICATION
REVISE WASTE HIERARCHY AND MATCH PRIORITY STRATEGIES WITH EXTERNAL SOLUTION PROVIDERS

CAPABILITY ASSESSMENT
EVALUATE COMPARATIVE CAPABILITIES TO INFORM RECOMMENDATIONS FOR EXTERNALIZATION

OBJECTIVE
Provide a detailed overview of the volumes, types, quality and fiber composition of Nike's unsellable and post-consumer textile waste products (NA), to identify key opportunities for recovery.
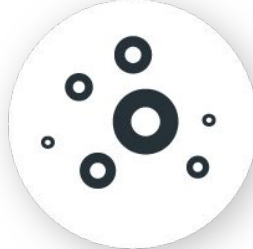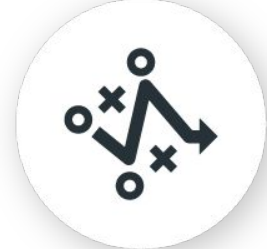
OUTCOME
A detailed and visual overview of the current waste flows as well as key opportunities for action.

OBJECTIVE
Update waste hierarchy to reflect the opportunity analysis. Conduct a geographical scan of relevant players and solution providers, and co-develop criteria for further assessment.

OUTCOME
A revised waste hierarchy, long-list of relevant external solution providers and criteria for shortlist selection and assessment.

OBJECTIVE
Assess capabilities of external solution providers according to predetermined criteria, conducting gap analysis to inform internal capacity needs.

OUTCOME
A final report including key results and recommendations for next steps.

STEP 1
WASTE FLOW AND OPPORTUNITY MAPPING

To understand the **potential of recommerce and other product recovery business models**, a detailed knowledge of the available volumes and specifications of secondary products is critical.

Information on the **volume, product type**, **quality**, **fibre composition and level of hardware contamination** of products is fundamental in selecting the appropriate strategy and partner(s).

OUR APPROACH

1. DATA COLLECTION

A. **Pre- & Post-consumer waste**
   a. Available waste data
   b. Manual sort (TBD based on availability)
   c. North-America sales data
   d. Literature review

2. DATA ANALYSIS

A. **Gap analysis**
   a. Data gaps
   b. Reverse supply chain gaps
   c. Value loss in current model

3. OPPORTUNITY MAPPING

A. **System mapping**
   a. Visual map of Nike's textile waste flows in North-America
B. **Opportunity definition workshop**
   a. Selection of opportunities based on waste volumes and profiles, value loss and strategic relevance

CIRCLE ECONOMY

A PROVEN TRACK RECORD

The 'Manual Sort' method was developed as part of the Fibersort project and has been applied with global apparel brands. It has **proven invaluable in generating an accurate representation** of volumes and specifications needed to **inform strategies for processing and recovery.**

Using material flow analysis (MFA), collected data and available statistics on textile waste management are **visualized** in a system map. Based on this we can show where gaps in the reverse supply chain exist.
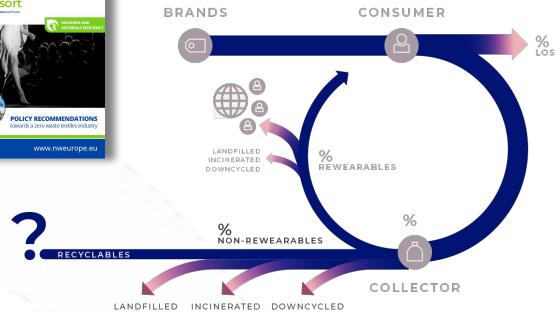
Analysis based on available statistics and literature

Mapping of recovery potential based on manual sort data

- **4.700 kt** GENERATED
- **2.026 kt** COLLECTED
- 486 kt
- 1216 kt
- 243 kt
- **2.674 kt**

- ● POTENTIAL HIGH-VALUE RECYCLING / FIBERSORTING
- ● REUSE
- ● DOWNCYCLING
- ● LANDFILL / INCINERATION

CIRCLE ECONOMY
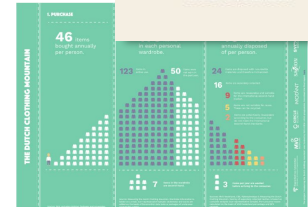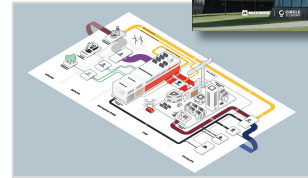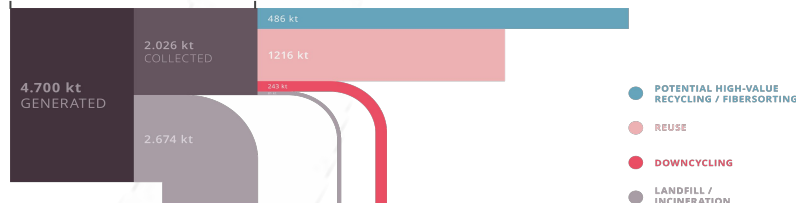
STEP 2
SOLUTION PROVIDER IDENTIFICATION

Step 2 in the Circle Scan shapes a **vision of the future reverse supply chain** based on insights gathered in step 1. This entails understanding how to best **retain value** in secondary products and defining a **hierarchy of product recovery options** such as resale, repair, reuse, donation or recycling.

Many **solution providers** exist to support this, however their offering and capabilities varies widely. In this step we also aim to support Nike in identifying a longlist of the most relevant partner(s).

OUR APPROACH

1. **WASTE HIERARCHY REVISION**

A. **Assessment of existing waste hierarchy**
   a. Validity of existing recovery options
   b. Level of detail in recovery options
B. **Revision of waste hierarchy**
   a. Alterations based on fit with insights on product waste data

2. **SOLUTION PROVIDER MAPPING**

A. **Solution provider mapping**
   a. Longlist of ±30 solution providers
   b. Matching of solution providers with waste hierarchy

3. **ASSESSMENT CRITERIA DEFINITION**

A. **Definition of assessment criteria**
   a. Operational capabilities to process Nike's secondary product volumes
   b. Systemic environmental benefits
   c. Systemic social benefits

CIRCLE ECONOMY

STEP 2
SOLUTION PROVIDER IDENTIFICATION

Across sectors, our projects focus on **retaining maximum product value** over a range of recovery options as illustrated in the value hill.

Through projects like Switching Gear, we have **aggregated an extensive database and active network of global solution providers**, including collectors, sorters, recyclers, repair, recommerce and rental partners.

A PROVEN TRACK RECORD

STEP 3
CAPABILITY ASSESSMENT

To support Nike's ambition for the circular management of pre and post-consumer waste the capabilities of solution providers need to be assessed on both **operational feasibility and impact on the socio-ecological system**.

Based on this assessment, we can then provide **recommendations** on which waste recovery strategies can responsibly be outsourced to external solution providers and which capabilities are better suited to be developed internally.

OUR APPROACH

1. SOLUTION PROVIDER ASSESSMENT

A. **Assessment of shortlisted solution providers using criteria from step 2**
   a. Interviews with industry experts
   b. Interviews with solution providers
   c. Desk research & Literature review

2. GAP ANALYSIS

A. **Identifying gaps in the reverse supply chain**
   a. Gaps in external solution providers' capabilities
   b. Gaps in internal capabilities

3. RECOMMENDATIONS

A. **Reverse supply chain configuration**
   a. Recommendations on recovery options that can be externalized responsibly
   b. Recommendations on recovery options that need internal capability development

A PROVEN TRACK RECORD

The method for assessing shortlisted providers will be informed by our previous experiences conducting **assessments and due-diligence on global (technology) providers.** Assessments to date have focussed on the **economic, environmental and social impact of the provider**, as well as their processing and technological capabilities.

The method may integrate the Circle Assessment tool; a unique self-assessment tool that allows companies to **evaluate their level of circularity,** using the 7 elements framework.

Multi-criteria scoring of solution providers
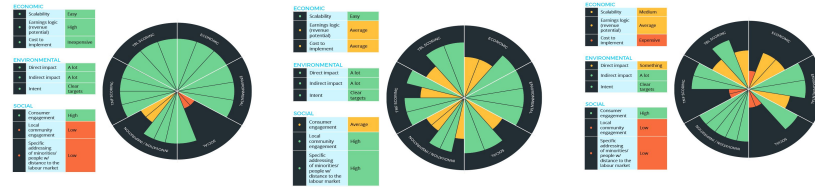
Reverse supply chain configurations, combining internal and external capabilities

ABOUT **THE TEXTILES PROGRAMME**

Since 2014 we have been dedicatedly working to develop the system innovations necessary to close the loop. Today, together with our project partners of fashion brands, recyclers, collectors and sorters, we aim to produce the critical data, tools, technology and business models that are building the new foundation for a circular textiles industry.

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Jade Wilting | Partnership & Community Manager
jade@circle-economy.com

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Ola Bakowska | Project Manager Circular Textiles
ola@circle-economy.com

Helene Smiths|
Project Manager Circular Textiles
helene@circle-economy.com

THE FIBERSORT TODAY.

THROUGHPUT ACCURACY

60%

Interreg
North-West Europe
Fibersort
European Regional Development Fund
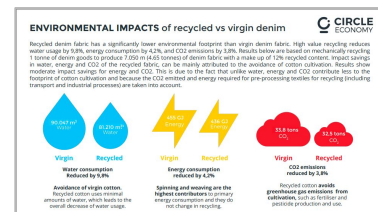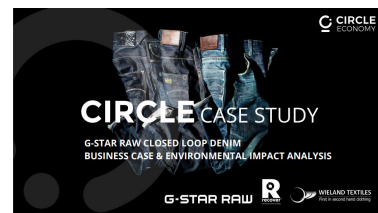
**NEW AUTOMATED FEED-IN
SYSTEM WITH 2 ROBOT ARMS**

Sorting by material composition
(Cotton, Wool, Acrylic, Polyester, Polyamide, Viscose)
Sorting by colour (15 tones, multi-colour recognition)

**NUMBER OF
SORTING CATEGORIES**

45

PRODUCTIVITY

1.5 sec/piece - Theoretical capacity: 3 sec/piece per
robot. Robots are modular and expandable up to 4 on
the same line.

OVERVIEW OF CURRENT & POTENTIAL END-MARKETS FOR FIBERSORTED MATERIALS - Textile to Textile Recycling

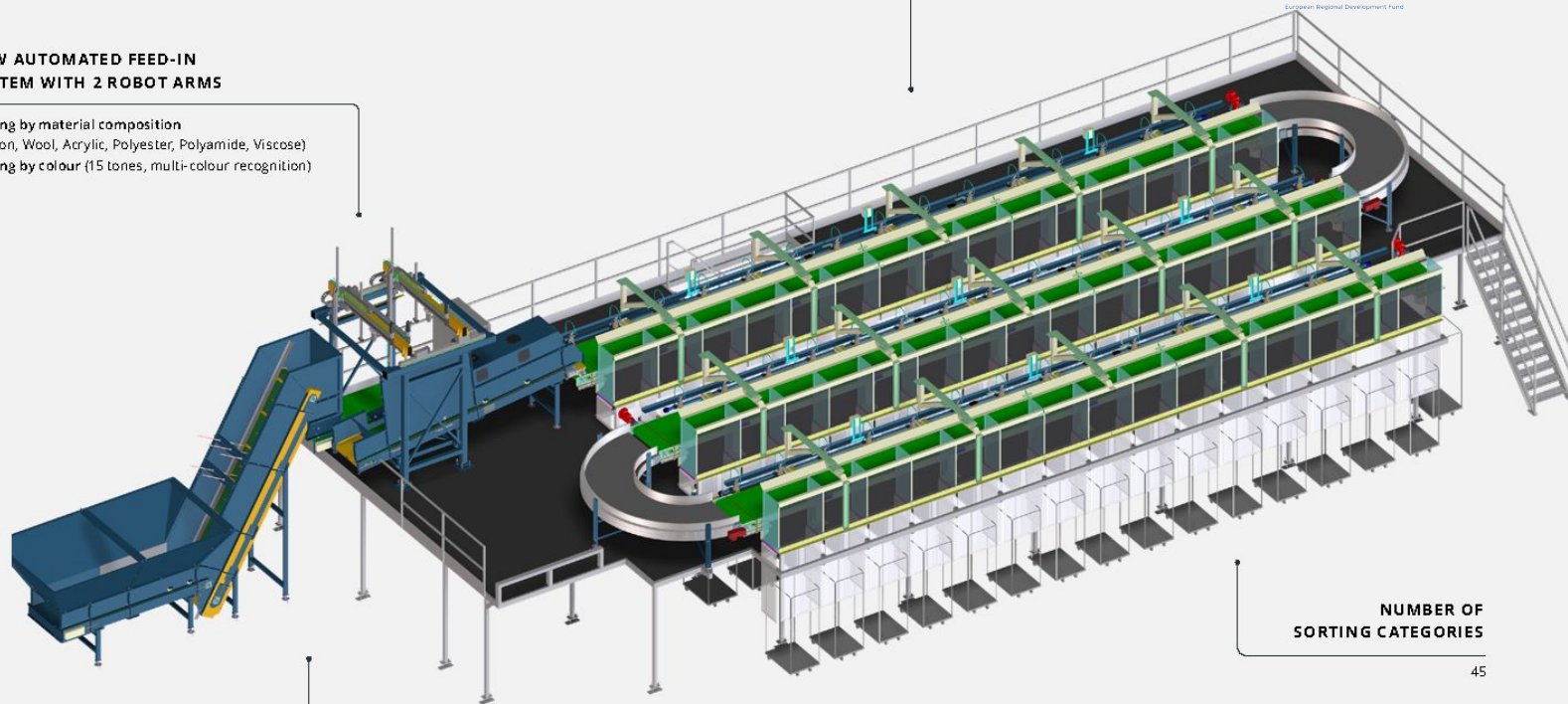| | | | | | | | | | | INPUTS | | | | | | | | | OUTPUTS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GENERAL INFORMATION | | | | | | | | | | | | | | | | | | | | | |
| Core Function | Organisation | Location | Pilot / Scale (Current Capacity) | Main Activities | Cotton | Wool | Polyester | Polyamide | Acrylic | Viscose | Other synthetics | Wool Blends | Poly cotton blends | Other naturals | Other blends | Input | HV/DC | Output | Uses | Certifications |
| Mechanical Recycling | A.S.T.R.I (Associazione Tessile Riciclato Italiana - 160 members) | Prato, Italy | Scale (22 000 tonnes since 2017 end) | Collection - recycling - weaving | | Wool | | | | | | | | | | PI; PC | HV | Yarn, Fabric | Clothing (Weaving, Knitting) | - |
| Mechanical Recycling | AKSA | Taşköprü Çiftlikköy-Yalova, Turkey | Scale. Post-industrial waste from their own production | Recycling - Spinning | | | | | Acrylic | | | | | | | PI | HV | Fiber | Clothing; Household Textiles; Outdoor; Industrial Uses. | OEKO-TEK 100 |
| Mechanical Recycling | Altex Textil Recycling | Gronau, Germany | Scale | Recycling to fibre | Cotton | Wool | Polyester | PA | | | PP | | | Bast | | PI | DC | Fibre | Insulation; Automotive; Geotextile; Drainage | ISO 9001 |
| Mechanical Recycling | Antex (EcoAntex) | Angles, Spain | Scale Post-Consumer: Pilot | Recycling - spinning | | | Polyester | | | | PP, PBT, PTT, PLA | | | | | PI | HV | Yarn | Clothing; Automotive; Decoration | - |
| Mechanical Recycling | Artistic Milliners - Fabric & Garment Industries | Karachi, Pakistan | Scale (60 million metres fabric and 25 million garments / year) Post-Industrial & Post-Consumer: 800 kg/hour shredding | Recycling - spinning - weaving | Cotton (Denim) | | | | | | | | | | | PI; PC | HV | Fabric | Clothing (Denim) | LEED Gold |
| Mechanical Recycling | Belda Lloréns (EcoLife) | Alicante, Spain | Scale (65 000 m2 production plant) | Recycling - spinning | Cotton | | | | | Viscose | | | | | | PI | HV | Yarn | Clothing | REMO, GRS, OEKO-TEX 100 |
| Mechanical Recycling | Bonded Logic | Arizona, United States | | Recycling to fibre; non-wovens | Cotton (Denim) | | | | | | | | | | | PC; PI | DC | Non-woven | Insulation, Acoustical Products | USGBC Member; Cotton from Blue to Green |
| Mechanical Recycling | Cardato (Recycled Brand - 6 producers) | Prato, Italy | Scale (eg. 3CRlati: 700 tonnes/yr) | Recycling - Spinning - (Weaving/Knitting) | | Wool | | | | | | Wool/polyester and Wool/Polyamide | | Cashmere | | PI; PC | HV | Yarn; Fabric | Clothing (Weaving, Knitting) | Cardato Recycled Brand |
| Mechanical Recycling | COM.I.STRA (Rigenius.it line) | Montemurlo (Prato), Italy | Scale | Recycling - Spinning - Weaving | | Wool | | | | | | Wool/polyester and Wool/Polyamide | | | | PI; PC | HV | Yarn; Fabric | Clothing (Weaving) | GRS; ICEA |
| Mechanical Recycling | Culp Contract | North Carolina, US | Scale | Recycling - Non-wovens | | | | | | | | | | Leather | | PI | HV | Fabric | Clothing; Upholstery | - |
| Mechanical Recycling | Dunya Tekstil | Catalca-Istanbul, Turkey | Scale (24 000 tonnes/yr) | Supply chain integration: sorting - recycling | Cotton (combers, linter) | Wool | | | | | | | | Jute | | PI | DC | Fibre | Open-End Yarn Manufacturing; Paper Pulp; Medical Bleached Cotton and Various Medical Products; Felt and Fabrics for furnishing; Automotive | - |
| Mechanical Recycling | ETS H. Moncorgé | Cours la Ville, France | Scale (5 000 - 10 000 tonnes/yr) | Shredding, opening, recycling | Cotton | Wool | Polyester | | Acrylic | | PP, PA | | | Silk, Linen, Hemp | | PI; PC | DC | Fibre | Automotive, Clothing, Construction, Furnishing, Geotextile | ISO 9001; Altertex Label; Certifiée Ecovadis |
| Mechanical Recycling | European Spinning Group (ESG Green) | Rekkem, Belgium | Scale | Recycling - Open-end Spinning | Cotton (Denim) | | Polyester | | | | | | | | | PC | HV | Yarn | Denim; Knitwear; Workwear; Towels; Tents | GRS; OEKO-TEX 100 |
| Mechanical Recycling | Fast Feet Grinded | Susteren, Netherlands | Pilot (39951 recycled shoes) | Collection, sorting, component separation, recycling | | | | | | | | | | Rubber | | PC | DC/ HV | Rubber; Foam; Fibre | Playground or other sports flooring, Footwear, Geotextiles | - |
| Mechanical Recycling | Filatures du Parc | Brassac, France | Scale (10 tonnes/day) | Recycling - spinning | Cotton | Wool | Polyester | | | | | | | | | PI | HV | Yarn | Knitting; Hoisery; Weaving; Upholstery; Carpeting; Handknitting yarns. | ECOCert |
| Mechanical Recycling | Flyleather - Nike | Hilversum, Netherlands (EU headquarters) | Scale | Recycling - end-products | | | | | | | | | | Leather | | 50% PI leather; 50% virgin leather | HV | Fabric | Shoes | - |
| Mechanical Recycling | Frankenhuis | Haaksbergen, Netherlands | Scale (7 000 tonnes/yr) | Fiberising | Cotton | | Polyester | | Acrylic | | | | | | | PI; PC; Confidential Destruction for Workwear; | DC | Fibre | Automotive; white goods; drainage; insulation; acoustic panels; office partitions; felt products. | - |

PREVENT

RENTING & LEASING BUSINESS MODELS:
SWITCHING GEAR

EDUCATIONAL TRAININGS:
ON COURSE

REBOUND EFFECTS OF CIRCULAR DENIM

EMPLOYMENT EFFECTS CIRCULAR TEXTILES

FIBERSORT

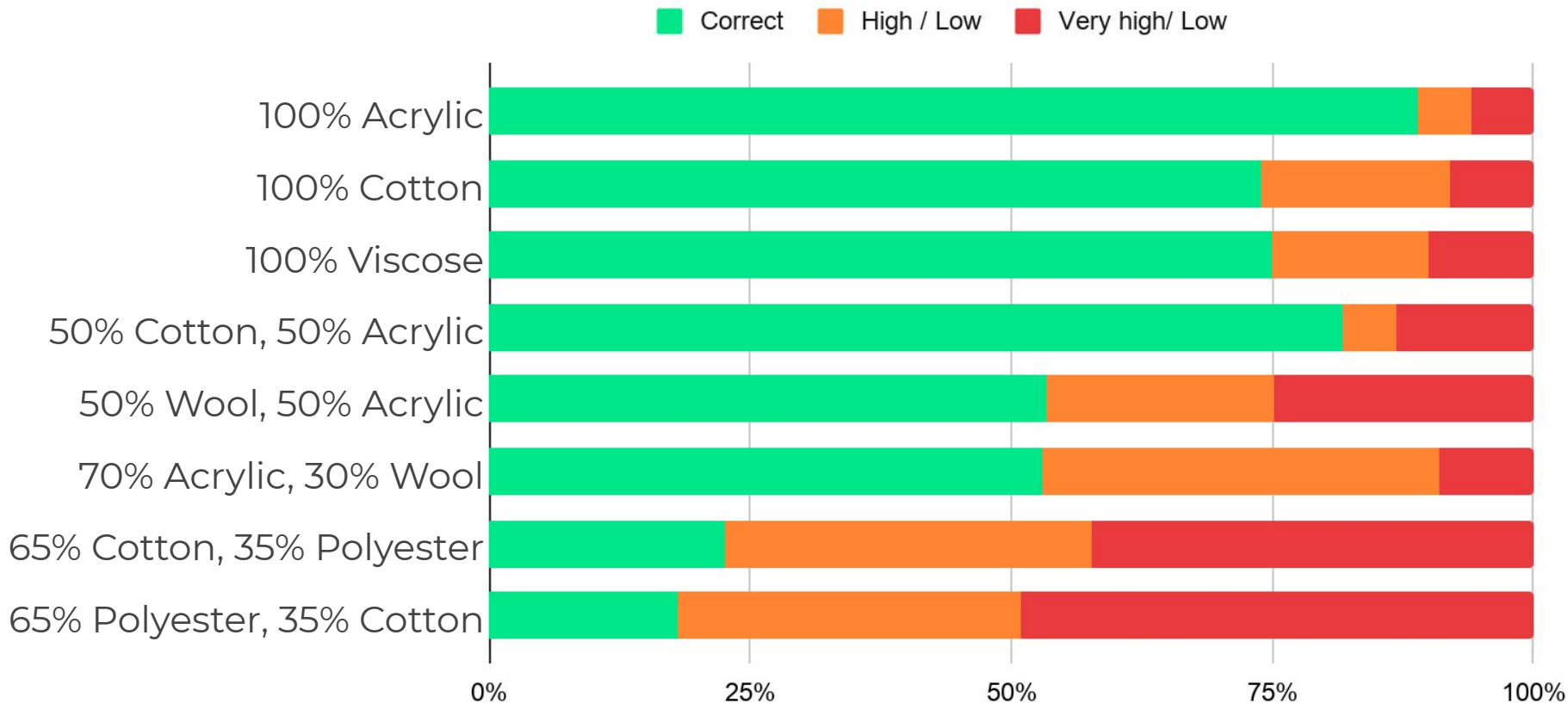LABELS ACCURACY & POLLUTION

REDUCE

10,901 garments
7,454 legible labels

CIRCLE
ECONOMY

41% of the labels were not accurate

Pure materials: **23%** of the labels were not accurate

Blends: **59%** of the labels were not accurate

CIRCLE
ECONOMY

ACCURACY OF LABELS PER MATERIAL TYPE

CIRCLE ECONOMY

Legend: ■ Correct ■ High / Low ■ Very high/ Low

- 100% Acrylic
- 100% Cotton
- 100% Viscose
- 50% Cotton, 50% Acrylic
- 50% Wool, 50% Acrylic
- 70% Acrylic, 30% Wool
- 65% Cotton, 35% Polyester
- 65% Polyester, 35% Cotton

0%   25%   50%   75%   100%

POTENTIAL CAUSES OF INACCURATE LABELS

CIRCLE ECONOMY

COTTON

POLYESTER

Chain of command

2

Independent audits don't happen

4

Washing can change the composition

5

1

Mass balance of fibres

3

Varying checks amongst brands