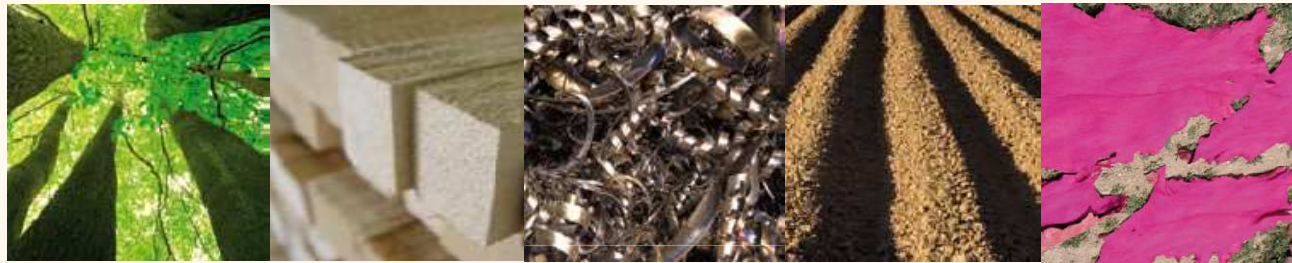




# Textiles4Textiles



Contribution to  
Nationaler Infotag "CIP Ecoinnovation - Förderung und  
Finanzierung von Umweltinnovationen,,  
by Ellen van den Adel, Work on Progress B.V.  
the Netherlands and partner of the T4T consortium

11 May 2011 Mühlheim an der Ruhr



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# Textiles4Textiles partners

**KICI**  
kledinginzameling

**m.u.t**  
efficient photonic solutions

work  
on  
progress

**enviu**  
innovators in sustainability

**LH**

**WIELAND TEXTILES**  
BEST IN SECTOR/CLUSTER

• MORE THAN 100 YEARS  
• **sfz**  
• SINCE 1814  
• BEST OF SATISFACTION

**ALCON**  
**Alcon Advies BV**  
De Aa 31 • 7602 HA, Vianen

**GROENENDIJK**  
BEDRIJFSCHOENEN EN KLEEDING



## Some facts

- In NL about 5 kg of textile waste per inhabitant is collected for re-use/recycling and another 5 kg is recyclable but ends up in the landfill/incinerator (in UK similar numbers)



- For Europe this means:  $\pm$  7000 ktons of second hand textiles which can be put to value by re-use/recycling



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# Value of second hand textiles

Crème	10%	Profitable	→
Rewearable textiles	40%		→
Recyclable textiles	40%	→	
Waste	10%	→	



2<sup>nd</sup> hands shops Eastern-Europe



trade in Africa



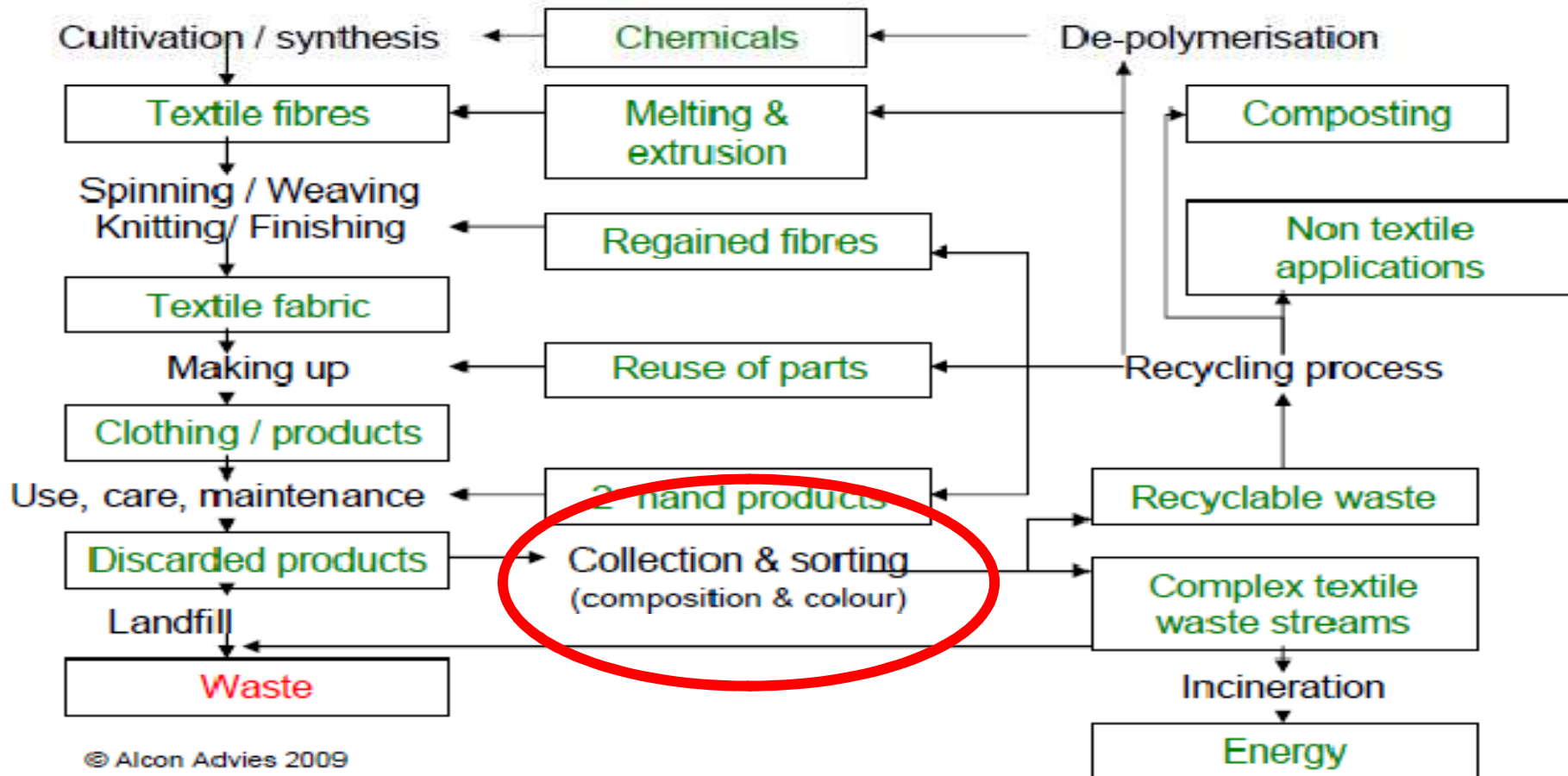
Recycling: cleaning-rags, fibres for re-use in carpets, blankets, etc.



incineration



## Textile recycling options



© Alcon Advies 2009



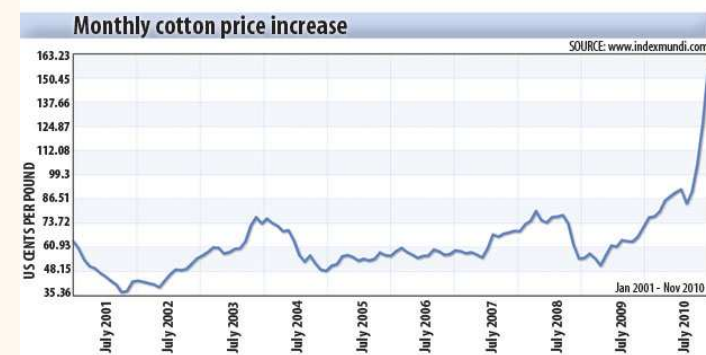
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# Why automated sorting

- Textile waste has a value, esp. with higher prices of raw materials
- The value increases when composition of sorted fraction is known (fibres and colours)
- Post-consumer non wearable textiles often have unknown composition of multiple fibre sorts
- Cost of sorting in Europe/USA is higher than sales value of sorted fraction with limited and low value recycling options
- Handsorting in Asia/Africa is possible, but implies logistics



➔ Solution is automated sorting



# Creating value in the chain

- Identification and automated sorting increases the quality of regained fibres
  - Chemical composition: wool, cotton, polyester, acrylic, ..
  - Colour: can prevent necessity to re-dyeing the textiles saving cost and environmental impact
- ➔ This creates opportunity to make new textiles from post consumer textile waste = Textiles4Textiles

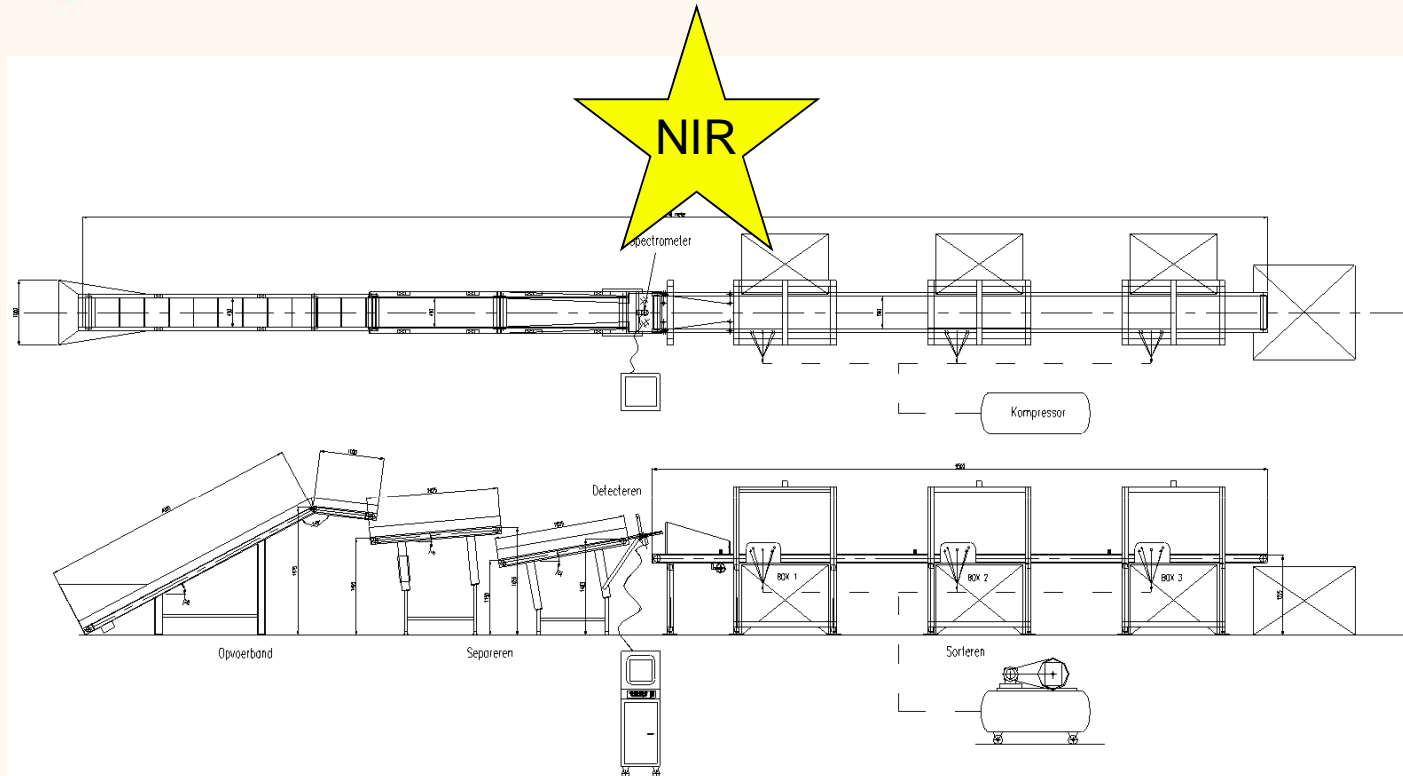




# Goal Textiles4Textiles

- Development of an industrial scale automated sorting machine for textiles based on NIR technology (building upon the Craft-project Identitex of 2001)
- Identifying market opportunities of sorted fractions and do small scale pilot projects (clothing and non-clothing)





DTI Big Display 81.vr

Significance: 25.00% - 10.00% - 1.00% - 0.10% - 0.01%

Material Class: **100 % Wool**

Color Box: **White**

Now sample?  samples per second: 0 1 2 3 4 5 6 7 8 9 10

stop instruction

Material Class Names	# of samples	Colour Class Names	# of samples
100 % Cotton	0	White	2
100 % Wool	0	Red	0
100 % Polyester	0	Orange	0
100 % Viscose	0	Yellow	0
100 % Silk	0	Yellow-Green	0
100 % Acetate	0	Green	0
100 % Nylon	0	Turquoise	0
		Blue	0
		Violet	0
		Black	0
		White	0
		Grey	0

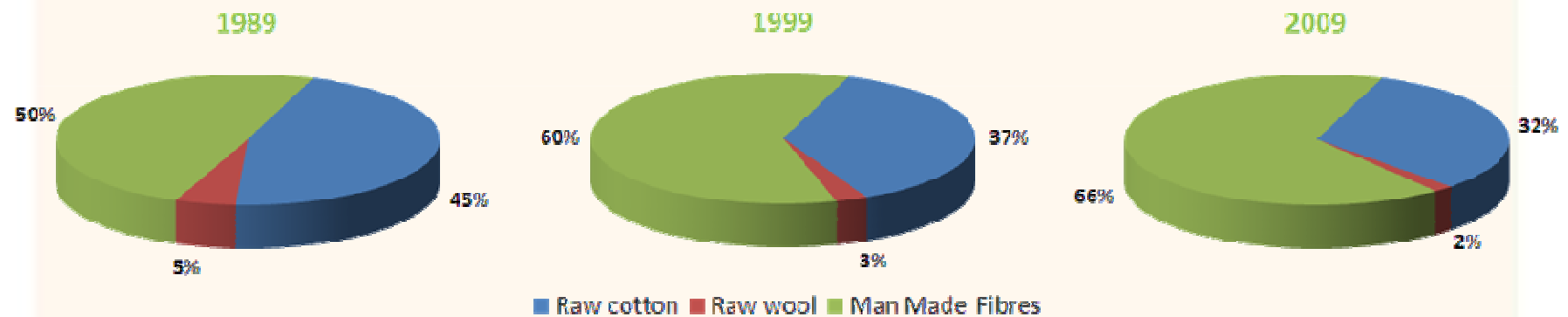
stop instruction

LZH LASER ZENTRUM HANNOVER E.V.





# World Production of Cotton, Wool & Man-Made Fibres



Source:





# Sorted fractions (to be expected)

2451 KG			BLUE	RED	GREEN	YELLOW	BLACK	WHITE	BROWN	SALMON	ORANGE	PURPLE	LILAC	BEIGE	PINK	GREY	L. BRAUWN	LIIGHT BLUE	LIGHT GREEN	FANCY
Fibre sort	KG	%	BLUE	RED	GREEN	YELLOW	BLACK	WHITE	BROWN	SALMON	ORANGE	PURPLE	LILAC	BEIGE	PINK	GREY	L. BRAUWN	LIIGHT BLUE	LIGHT GREEN	FANCY
100% COTTON	411,5	16,8%	31,0	19,0	6,0	3,0	33,5	85,0	17,0	7,0	8,5	5,5	5,0	28,0	15,0	23,5	6,0	35,0	18,0	65,5
100% WOOL	135,0	5,5%	15,5	7,5	5,0	0,0	10,5	8,0	6,5	2,5	0,5	2,0	0,5	5,5	0,0	13,5	2,0	31,0	11,5	13,0
100% POLYESTER	113,5	4,6%	13,0	9,5	1,0	0,0	13,5	10,0	11,5	0,0	0,5	3,0	2,5	6,5	2,0	8,5	1,5	5,0	1,0	24,5
100% VISCOSE	20,5	0,8%	0,0	1,0	1,5	0,0	8,0	5,5	0,5	1,0	0,0	0,0	0,0	0,0	1,0	0,5	0,0	0,0	0,0	1,5
100% ACRYLIC	441,0	18,0%	33,5	21,0	11,0	3,5	74,5	48,5	25,0	2,0	4,0	8,0	3,5	36,5	9,5	19,5	9,0	28,0	12,5	91,5
50% COTTON 50% ACRYLIC	188,0	7,7%	17,5	11,5	1,0	2,0	17,5	24,5	3,5	1,5	3,5	0,5	3,0	14,5	7,5	6,0	6,0	10,0	12,5	45,5
60% COTTON 40% ACRYLIC	41,0	1,7%	4,0	2,0	3,5	1,5	4,5	4,0	0,5	0,0	0,5	0,0	0,5	4,5	2,0	6,0	0,5	0,0	0,0	7,0
80% COTTON 20% NYLON	36,5	1,5%	2,0	3,5	0,0	0,0	7,0	2,0	1,0	0,0	0,0	0,0	0,0	2,5	4,0	3,5	0,0	4,5	1,5	5,0
50% COTTON 50% WOOL	10,0	0,4%	2,5	0,0	0,0	0,0	1,0	2,5	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,5	0,0	0,0	0,0	3,0
80% VISCOSE 20% NYLON	31,5	1,3%	1,5	2,5	1,0	0,0	8,0	4,0	0,5	0,0	0,0	3,0	0,0	0,5	2,5	1,5	0,0	2,5	2,0	2,0
100% NYLON	8,5	0,3%	1,0	0,5	0,0	0,0	2,5	1,0	0,0	0,0	0,0	0,0	0,0	1,5	0,5	1,0	0,0	0,0	0,0	0,5
80% WOOL 20% NYLON	81,5	3,3%	13,0	7,5	2,5	1,0	6,5	3,5	7,0	0,0	2,5	0,0	0,0	4,5	5,5	2,5	3,0	4,5	1,0	17,0
50% WOOL 50% ACRYLIC	119,5	4,9%	11,5	5,5	5,0	3,0	14,5	4,5	5,5	0,5	2,0	2,0	0,0	2,5	7,0	6,0	5,0	6,0	3,0	36,0
30% WOOL 70% ACRYLIC	125,0	5,1%	15,0	6,5	4,5	0,0	14,0	9,0	2,5	3,5	0,0	0,5	0,0	4,5	2,0	7,0	5,0	2,5	3,0	45,5
REST	688,0	28,1%	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
TOTAAL	2451,0	100,0%	161	97,5	42,0	14,0	216	212	81,0	18,0	22,0	24,5	15,0	112	58,5	99,5	38,0	129	66,0	358





# Recycling options

## 1. INNOVATION Automated sorting

Fashion industry



Collecting



Transport



Sorting

## 2. INNOVATION Production with recycled fibres



Recycling



Recycling

Transport



Retail



## 3. INNOVATION Textile panels



Blankets



Recycling

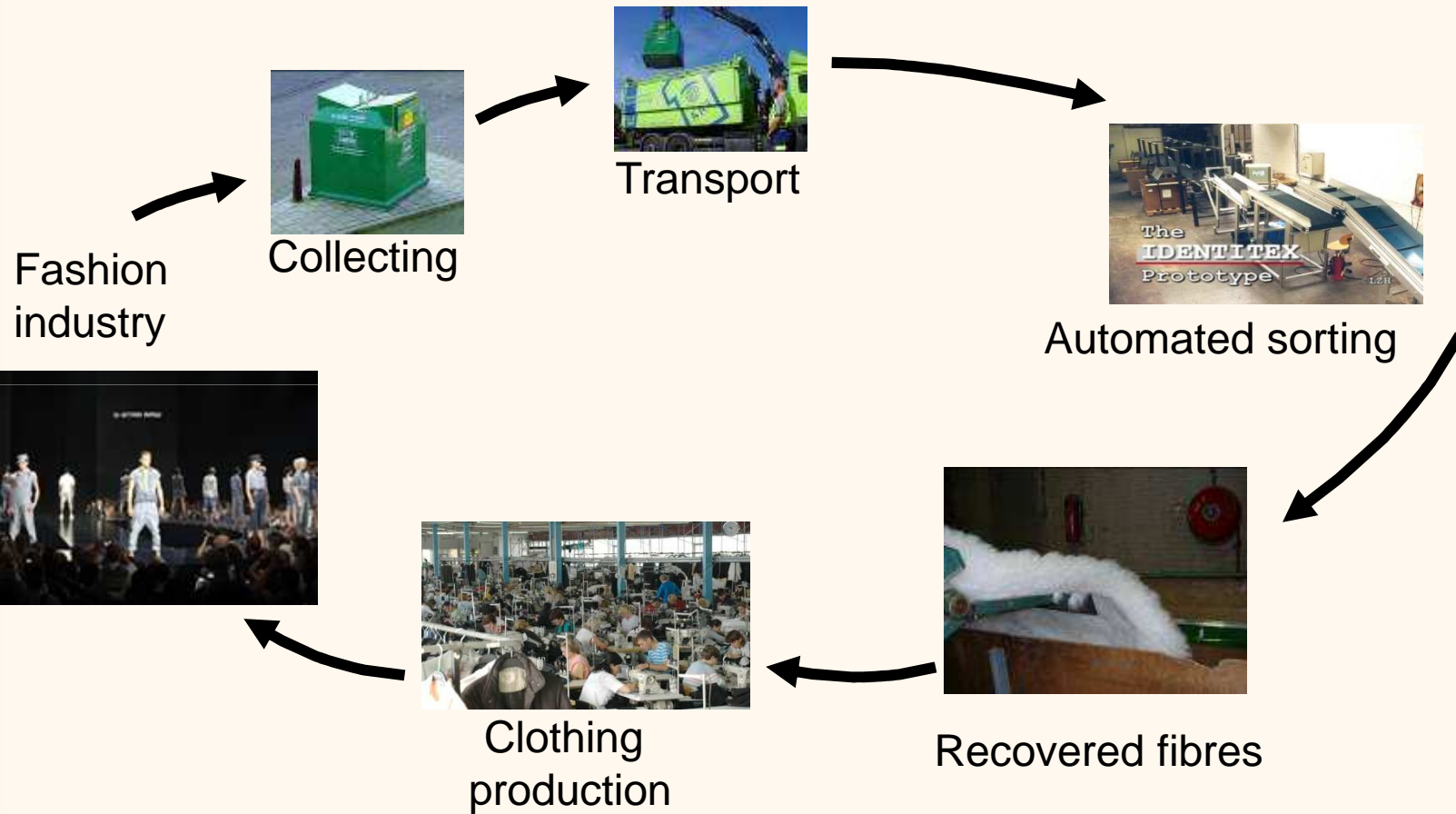


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# Closing the loop



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## e.g. Denim recycling project

- Cotton is sensitive to plagues and deceases
- Therefore a lot of chemicals are used
- Growing cotton requires a lot of water
- Cotton grows on valuable soil that is also fit for food
- Most of the cotton is used for making jeans

Therefore...

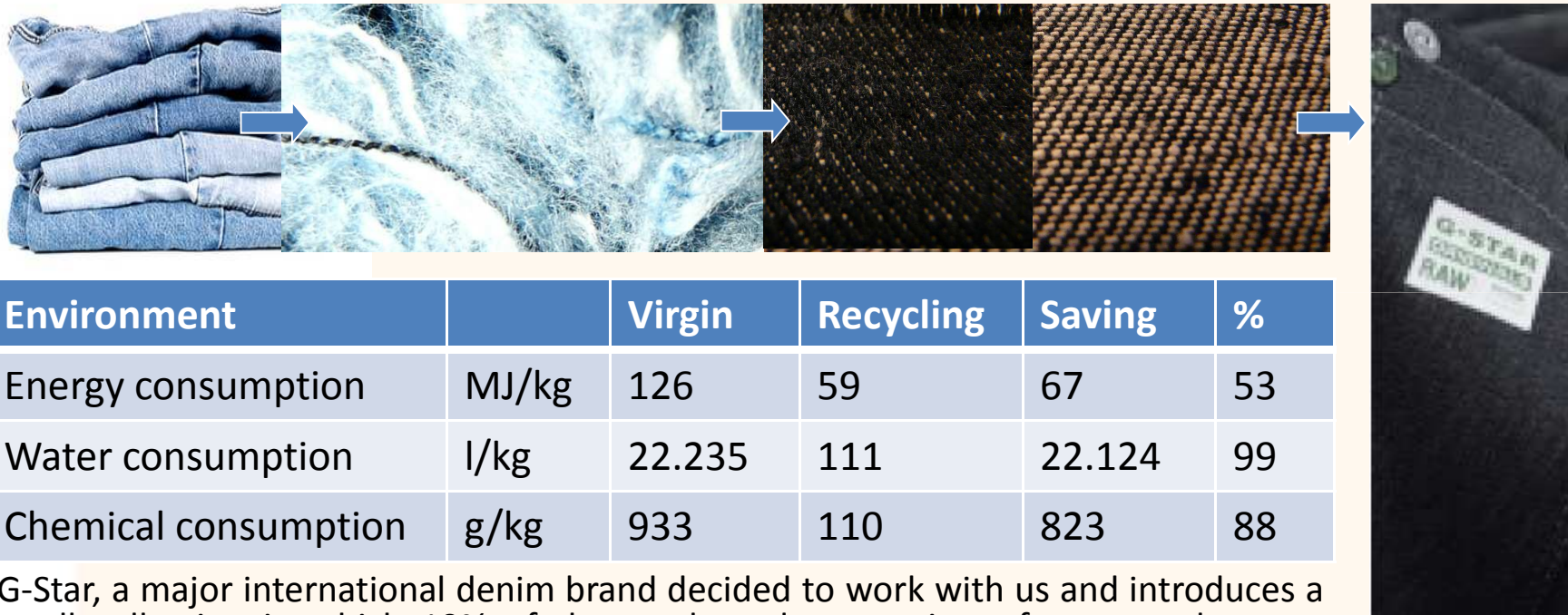




# Recycling denim project with G-Star

## Process

Collecting, recovering fibres, fabric production, garment production



Environment		Virgin	Recycling	Saving	%
Energy consumption	MJ/kg	126	59	67	53
Water consumption	l/kg	22.235	111	22.124	99
Chemical consumption	g/kg	933	110	823	88

G-Star, a major international denim brand decided to work with us and introduces a small collection in which 10% of the total product consists of recovered cotton fibres, thus creating 10% of the results mentioned above. Further development is now focussed on raising the percentage of recycled fibres by the production of a higher quality of fibres in the recycling process.



Source: TNO Institute, Netherlands



e.g. Textile panels



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# Thank you!

[www.textiles4textiles.eu](http://www.textiles4textiles.eu)

Presented to you by Ellen van den Adel

[ellen@workonprogress.nl](mailto:ellen@workonprogress.nl)

Tel. +31 6 203 92 805



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