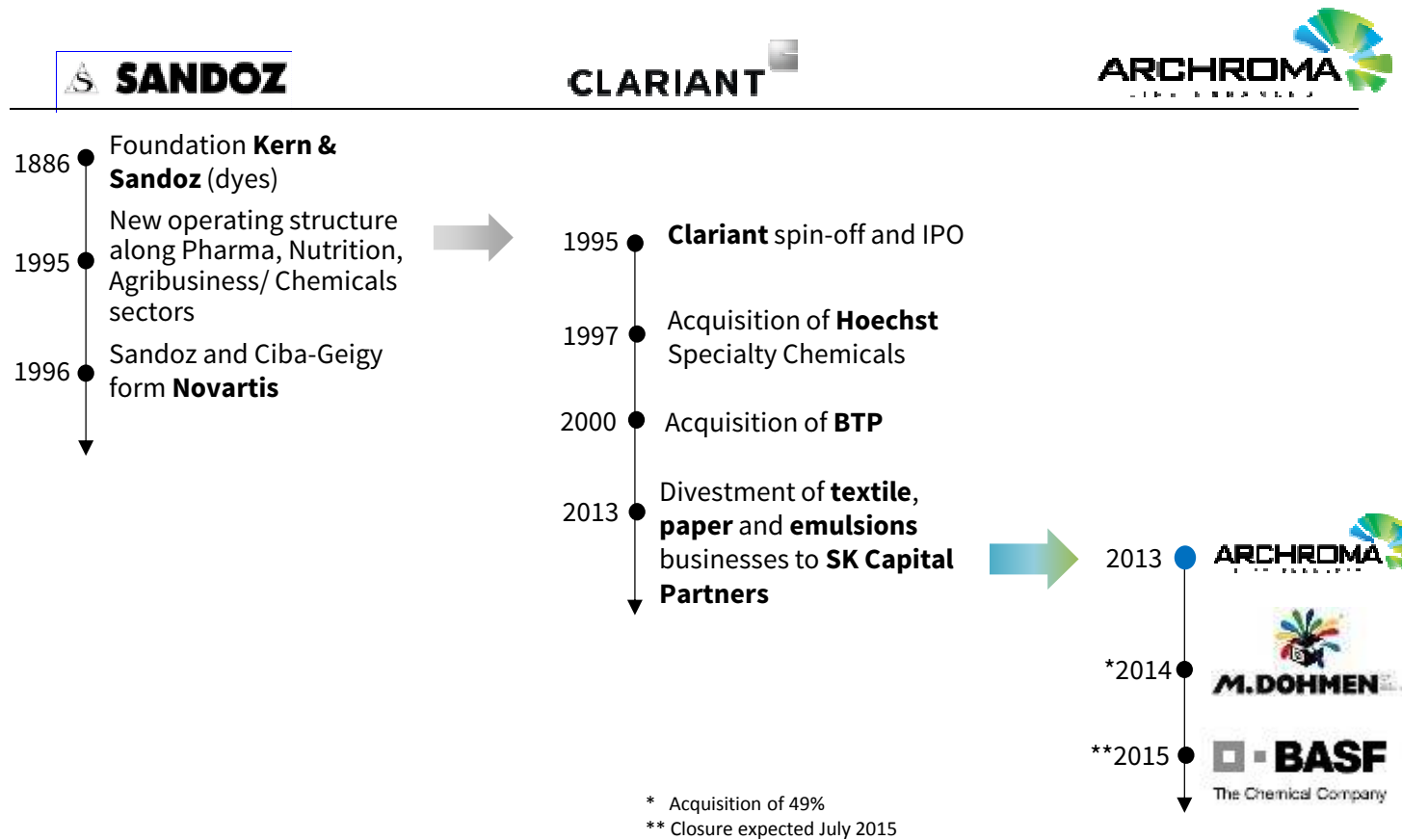


TOWARDS SUSTAINABLE TEXTILES

Sustainability in
Innovations



A trusted heritage





A global leader and trusted partner in textiles



127 years
of experience
in textile **chemicals** and
dyes(ex Clariant)

3 000
Archroma people

More than
20
global and local labs
and facilities

16
major production sites in
13 countries

Highly experienced
technical sales network in

100 +
countries

A global leader in specialty chemicals across the textile, paper and emulsions

/ Textile Specialties

Global leader in textile chemicals and dyes

/ Paper Solutions

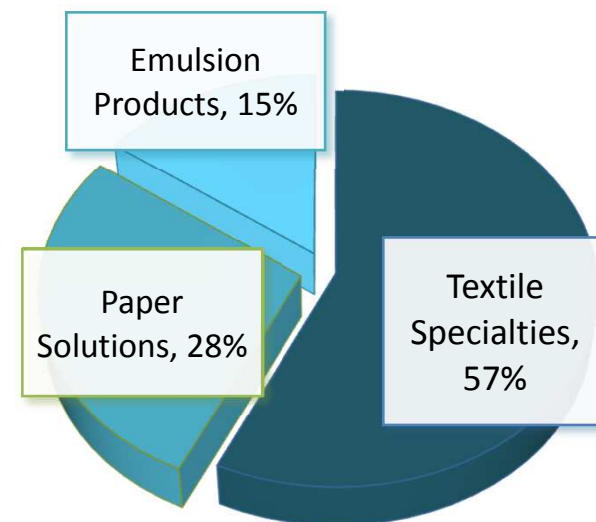
Leading provider of colorants, optical brightening agents, process and surface chemicals

/ Emulsion Products

Leading provider of specialty emulsions to paints, adhesives, construction and the textile, leather and paper sectors

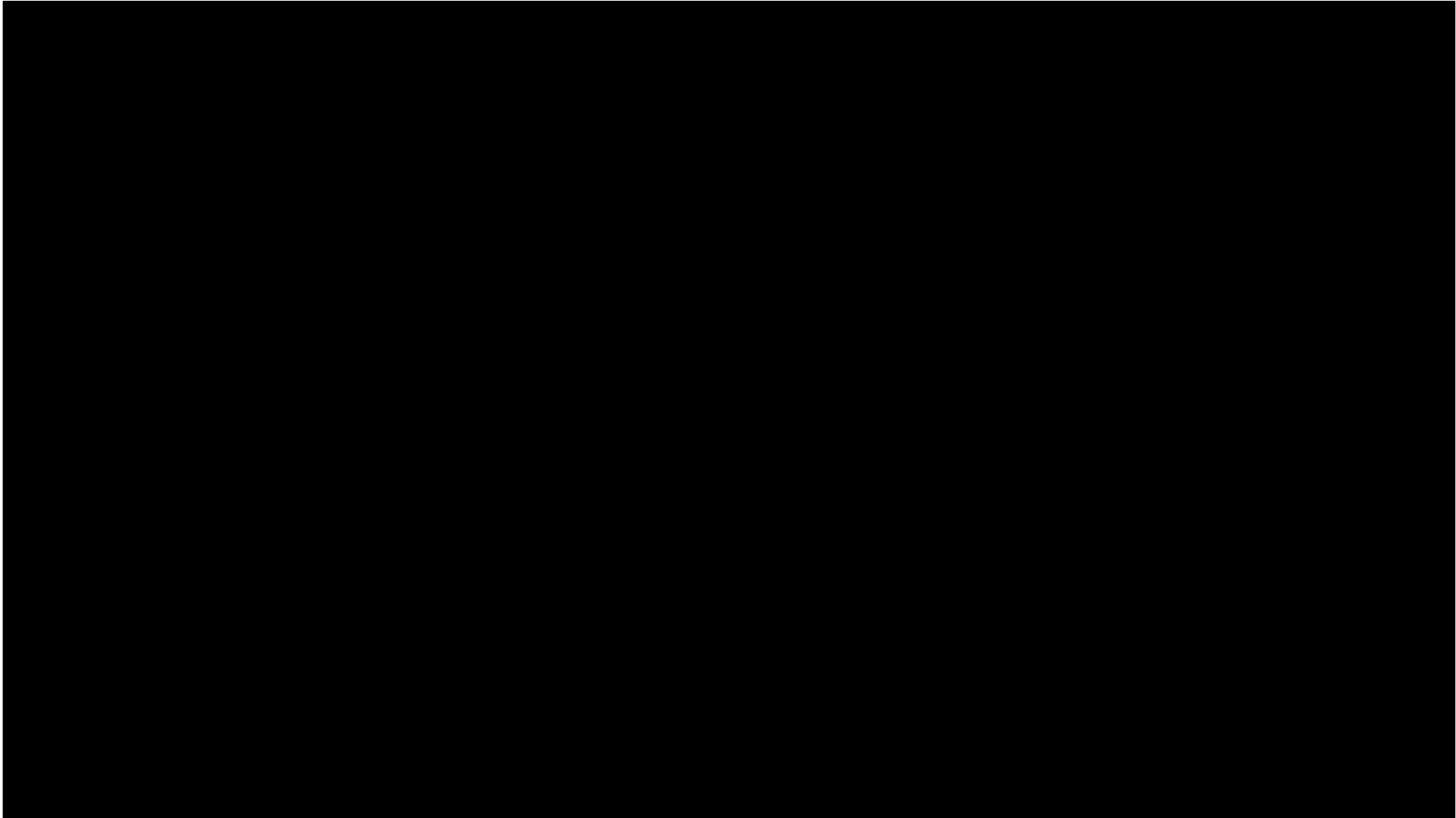
Products sales in 2014:

USD 1.432 billion in
(without BASF)



Sustainability in Innovations







Today, 1.1 billion people lack access to safe drinking water but by 2025 it is estimated that two-thirds of the world's population will face moderate or severe water shortages.

Source: United Nations report



Global environmental impact of textile processes

~6 million tons

of textile chemicals used each
year

**5% of all
landfill space**

occupied by textile waste

**20% of industrial
water pollution**

from textiles treatment and
dyeing

(Source: 2010 Global Market Report on
sustainable Textiles - Textile Exchange)

A changing environment.....



Banned Azos are the main problem

RSL's requested to protect the Brand Image with consumers

Confrontational customer discussions regarding cost/price

Water is "free" and energy unseen



External Pressures



Ø ZDHC
Zero Discharge of
Hazardous Chemicals



Minimizing hazard, risk and pollution

RSL, MRSL, audits and chemical management frameworks expected

Collaborative value chain discussions

True cost and impact of textile manufacturing measurable

Increasing Pressure for Transparency on different topics:

Toxic Threads: Polluting Paradise A story of big brands and water pollution in Indonesia

Publication - April 17, 2013



23 February 2014 Last updated at 20:05 GMT

The task of protecting India's child cotton pickers

By John Neal
Producer, You and Yours, BBC Radio 4



Working flat out - the child labour behind your Egyptian cotton sheets

They work 10-hour shifts in 40C heat for 20 pence a day. Their job? Picking the cotton that makes the world's finest bed linen. Dan McDougall reports on the scandal of Egypt's child labour

Dan McDougall
The Observer, Sunday 8 June 2008



26 April 2013 Last updated at 12:14 GMT

Bangladesh textile workers' deaths 'avoidable'

By Emily Young
BBC News



23 January 2013 Last updated at 00:24 GMT

Indian farmers and suicide: How big is the problem?

By Wesley Stephenson
BBC News

Retail group ramps up inspections of Bangladesh textile plants

BY HOWARD SCHNEIDER February 19 at 4:32 pm



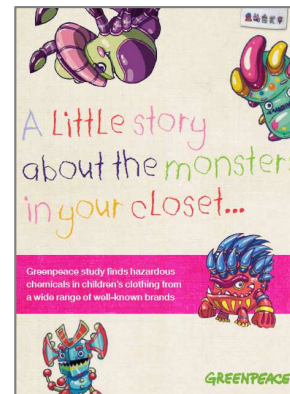
Pressure on Brands

- **NGO's highlight Toxicology and Social Responsibility**
- **International Brands placed under pressure to react**
- **Forcing a rethink regarding textile buying behavior**

e.g. Greenpeace's "Toxic Threads" campaign:



my clothes are filled
with little monsters!



Pictures courtesy of www.greenpeace.org

Key ecological market drivers



A low-angle, upward-looking photograph of a forest. The image shows numerous tree trunks of varying heights and thicknesses, all reaching towards a dense canopy of bright green leaves. Sunlight filters through the foliage, creating a bright, glowing effect in the center of the frame. The overall atmosphere is one of natural growth and vitality.

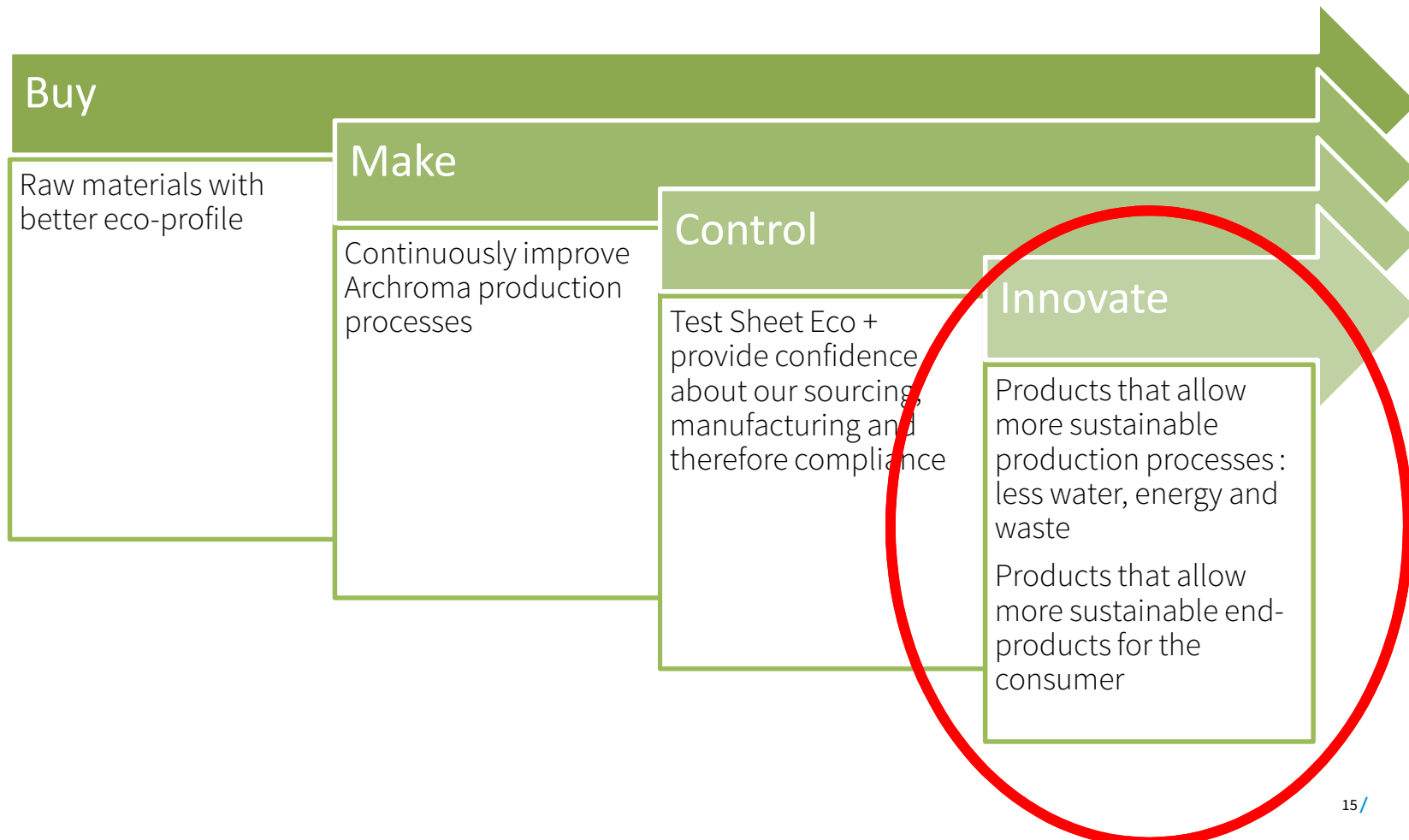
**We continuously challenge the status quo
in the deep belief that we can make our
industry sustainable.**



Commitment to sustainability



Archroma textile sustainability core values





An aerial photograph of a wastewater treatment plant. In the foreground, there are several rectangular aeration tanks with blue metal railings. To the right, there is a white control building with a blue base and two elevated cylindrical tanks. The background shows more of the facility, including large rectangular basins, surrounded by greenery and palm trees under a clear sky.

**2010
WASTE WATER**

142533
per day

Dedicated global product stewardship experts



- A team of experienced chemists fully dedicated to textile chemicals in Archroma's Product Stewardship departments
- An international network of specialized Product Safety labs with eco testing facilities : Mumbai (India), Karachi (Pakistan), Tianjin (China)

Eco-advanced innovation flow

INNOVATE 



Smart Repel Hydro®
Fluorine Free Durable
water repellency



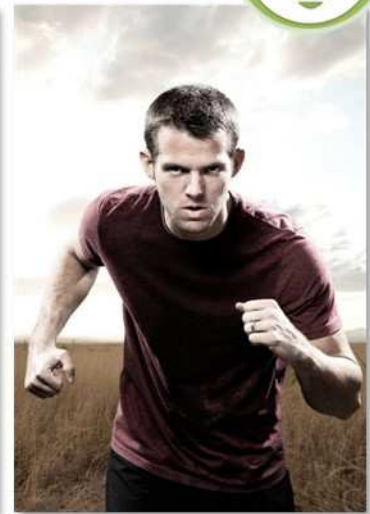
Blue Magic®
All-in-one solution for
discontinuous pretreatment



Advanced Denim®
Archroma redefines the world
of denim



Earthcolors®
Agricultural waste base
colors with traceability



Nylosan® S dyes
Metal Free acid dyes
Polyamide and Wool

A photograph of a man and a young child walking away from the camera on a railway track. The man is wearing a blue hoodie and tan shorts, and the child is wearing a blue jacket and yellow pants. They are holding hands. The track is surrounded by dense green trees, and the scene is lit with soft, natural light.

ONE WAY

Balancing
the **cost** of
compliance
with
sustainable
production

ONE WAY Objectives

Ecology & Environment

- Increase awareness at the mill level.
- Provide processes and products which can help to reduce carbon impact
- Provide products with higher biodegradability

Economy & Efficiency

- Generate sizable cost saving & improve profitability at the customer.
- Reduce gas, electricity, water consumption.
- Improve efficiency & and reduce processing time.

Measurable sustainability in action

ONE WAY three steps selection:





BLUE MAGIC

A **bleaching auxiliary** that provides
productivity gains with **dramatically reduced**
environmental impact in **water** and **energy**

Obtained critical base data from the mill

Base Data - Bangladesh_

Currency
Currency symbol:

Electricity
Price [TK/kWh]: Country (CO₂ from energy mix):

Water
Fresh water price [TK/m³]: Fresh water temperature [°C]:
Waste water price [TK/m³]:

Boiler house
Heating medium: Steam price (calc.) [TK/kg]:
Boiler efficiency [%]: Gas price [TK/m³]:
Oil price [TK/l]:
Brown coal price [TK/kg]:
Coal price [TK/kg]:
Wood price [TK/kg]:
Bargasse price [TK/kg]:
Rice husks price [TK/kg]:

Save As Template... OK Cancel

Material - 100% Cotton Knit

Number:

Blend:

Material type: Fabric Yam DenimYam

Material width [cm]: Weight [g/m]:
Weight [g/m²]:

Currency symbol: Material price [TK/kg]:

Save As Template... OK Cancel

General **Machine** Temperature Recipe

Name:

Number:

Description:

Operational / people cost [TK/h]:

Liquor carry over / Pick up [%]: * output water content of fabric

Liquor volume [l]:

Add loading time

Add unloading time

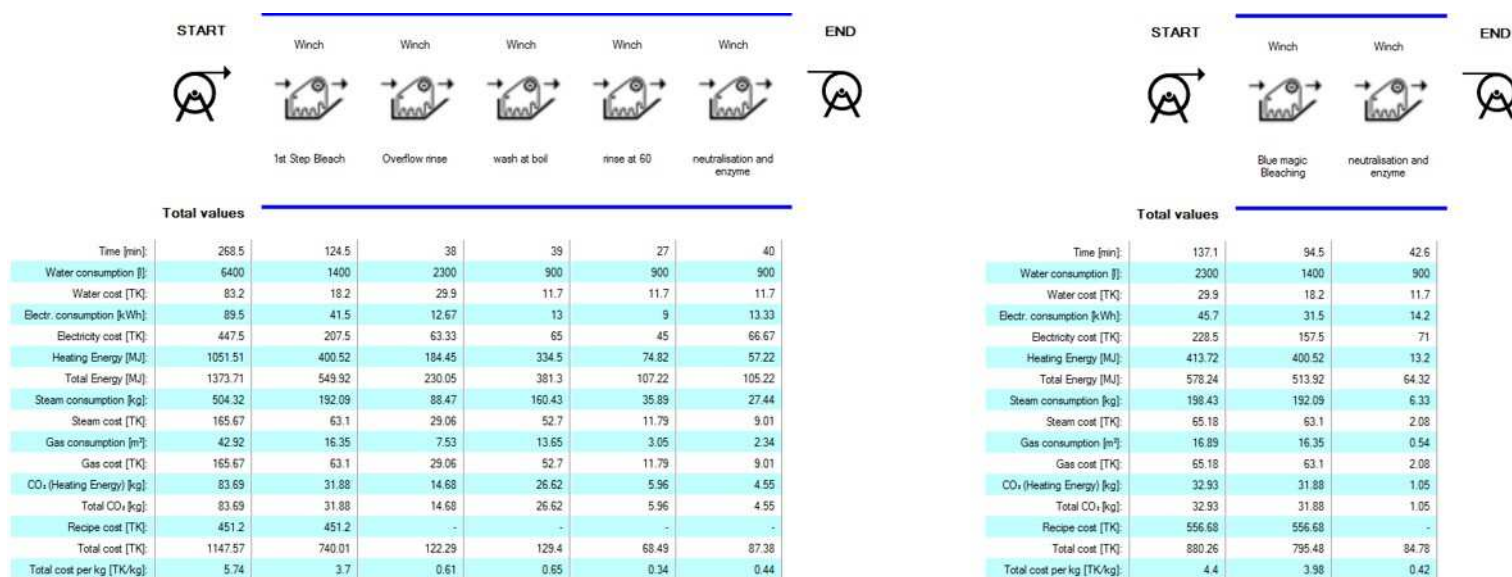
Overflow rinse

Rinse time [min]:

Rinse water feeding [l/h]:

Rinse water temperature [°C]:

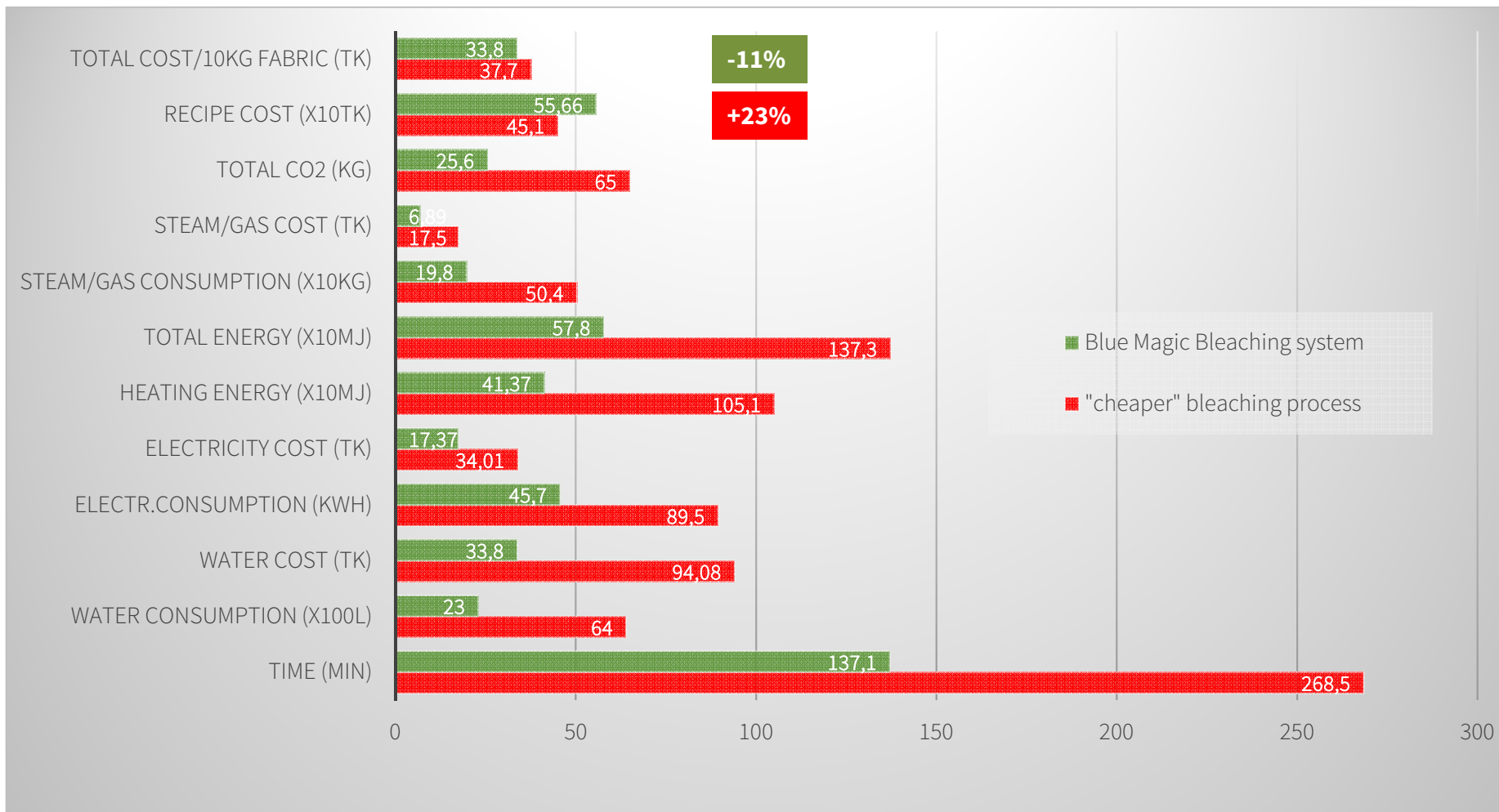
Digitized benchmark and optimized mill's bleaching process



- Large amounts of caustic, leading to :
 - Long rinse cycles required to remove
 - Increased TDS in the Waste Water
 - Potential for subsequent yellowing if not removed
- Longer process leads to more fibre damage and weight loss

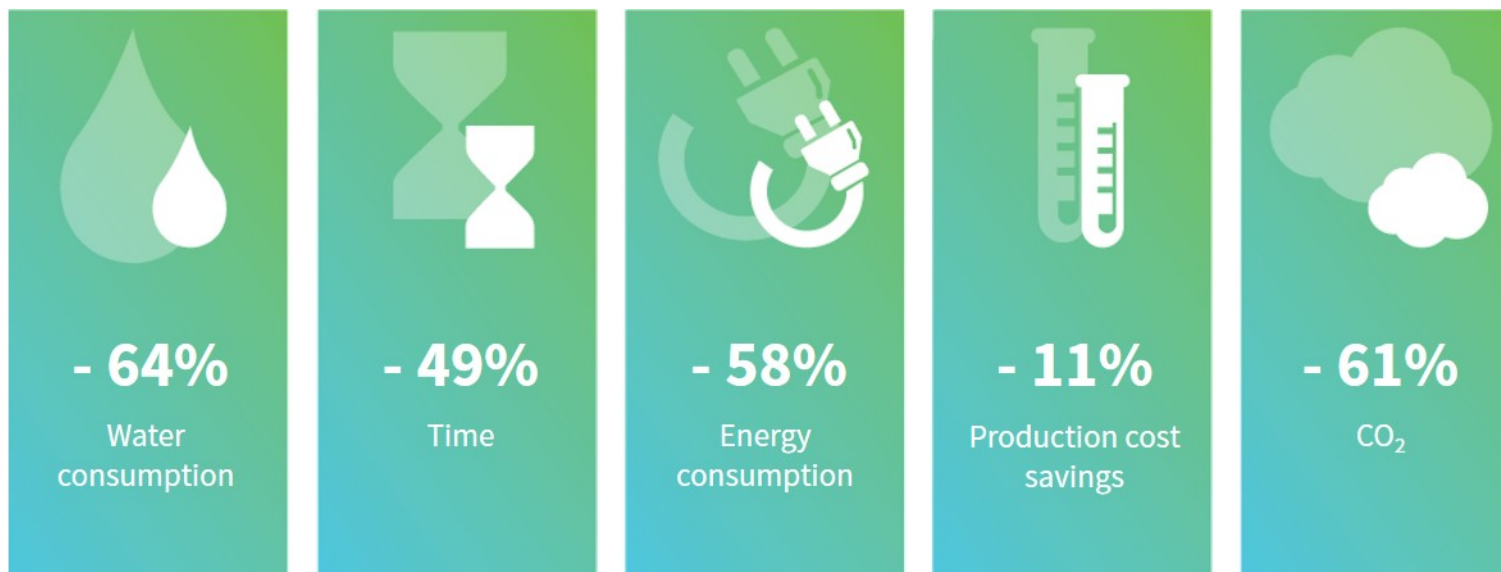
- Less resource utilisation (water, energy, time)
- Higher productivity
- Less fabric weight loss
- Reduced COD and BOD values compared to standard processing
- Maximal absorbency
- Higher degree of whiteness

Calculation output of results



Score card

*All without any additional investment in machinery



- Peace of mind that dyes are RSL/MRSL compliant
 - Free of APEO, reduced heavy metals and phosphonates
- Dramatically reduced water, energy and CO₂ emissions
- Actual overall cost savings (~11%)
- Increased capacity or opportunity time (~49%)
- Additional savings in volume of cotton loss (~2%)

What do those savings mean for a daily factory output ?

A factory bleaching 35 MT fabric/day



700,000L water/day savings

Based on 2L recommended intake of water

Would satisfy 350,000 people/day

What do those savings mean for a daily factory output ?

A factory bleaching 35 MT fabric/day

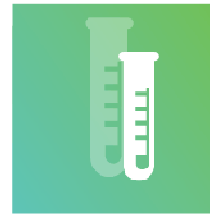


7 MT CO₂ less emissions/day

Daily emission of ~430,000 standard cars

What do those savings mean for a daily factory output ?

A factory bleaching 35 MT fabric/day



12 MT less NaOH/day

Dramatically less salt in the WWTP
(12MT NaOH also needs 12MT HCL)

What do those savings mean for a daily factory output ?

A factory bleaching 35 MT fabric/day



7,700 kWh electricity/day savings

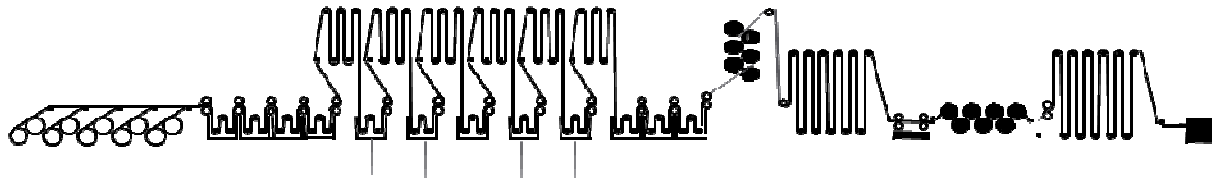
Enough electricity to power 300 homes/day in Dhaka



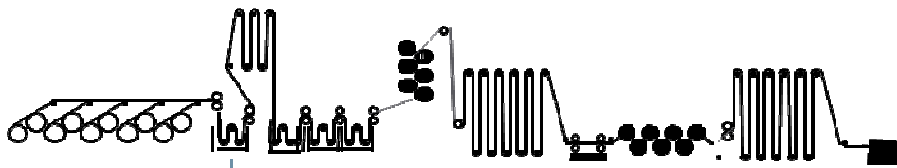
ARCHROMA
ADVANCED
DENIM

More sustainable denim production

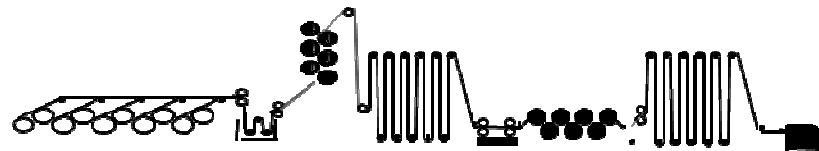
CONVENTIONAL DENIM (Indigo)



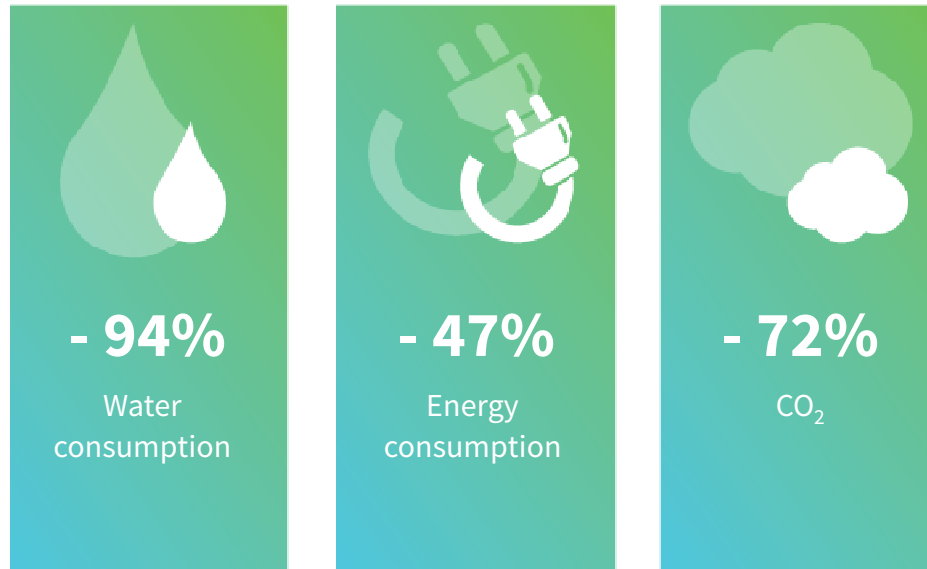
ADVANCED DENIM – DENIM OX PROCESS (Diresul® RDT liq dyes)



ADVANCED DENIM – PAD/SIZING OX PROCESS (Diresul® RDT liq dyes & Arkofil® DEN-FIX pw)



Score card



- Peace of mind that dyes are RSL/MRSL compliant
- Dramatically reduced water, energy & cotton waste
- Zero waste water possibility (zero volume, color, COD/BOD, effluent...)
- Increased flexibility for subsequent wash down styles
- More shades available for design inspiration
- Much Lower investment costs for new start up



In 2014 approximately 3.5 billion pairs of jeans were manufactured

For wet processing only:

Benchmark Indigo production uses ~ 14L/pair

Advanced denim Pad ox production uses ~1L/pair

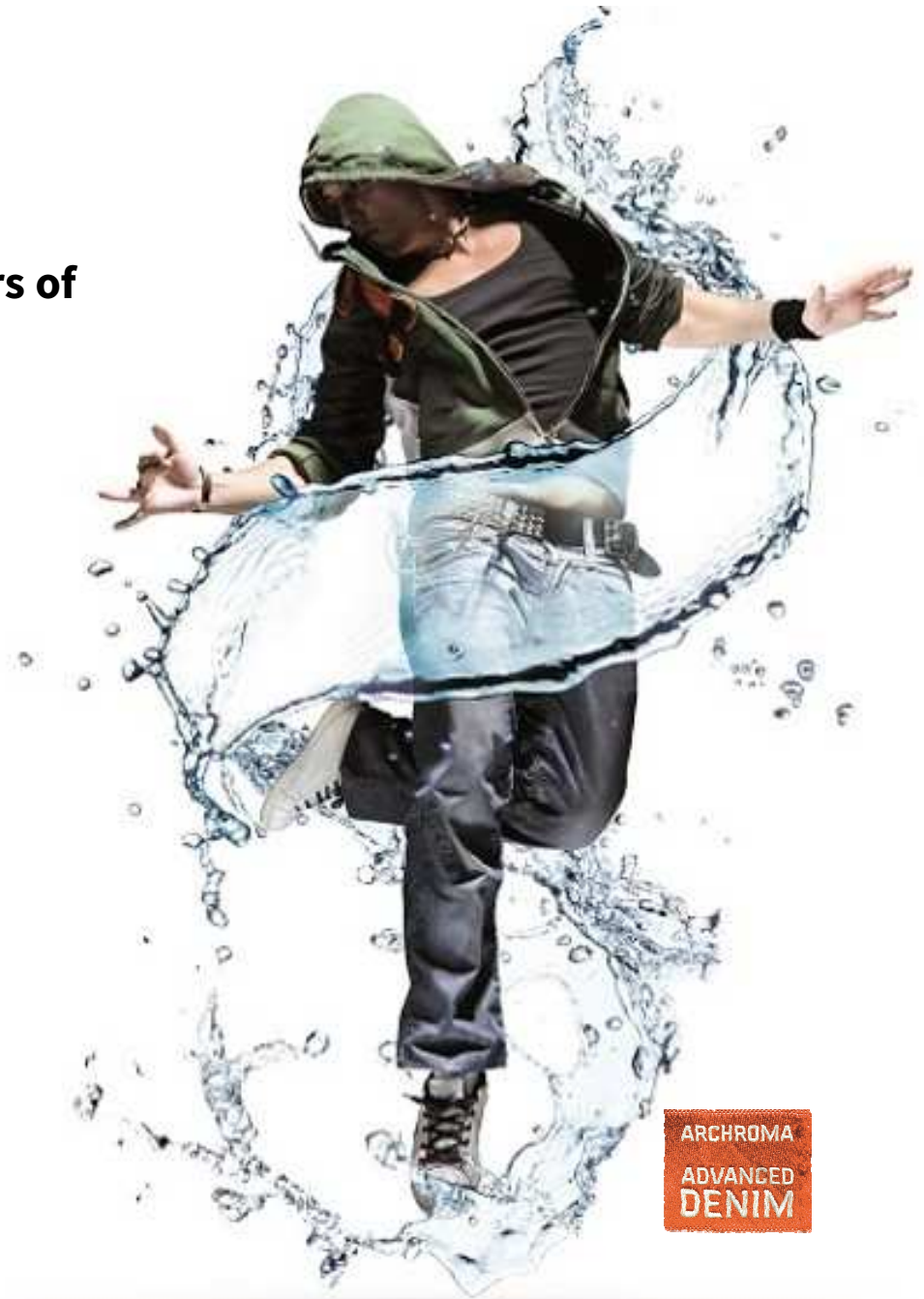
A saving of 13L water/pair jeans

If only 10% of the world denim switched to advanced denim there would be a saving of:

4,550,000,000L water/year



[Patagonia video](#)



Drimaren® HF reactive dyes for cellulose















- Full color range
- High degree of fixation to ensure minimal colour in effluent
- High productivity and process reliability
- Meets the fastness and ecological standards of leading brands

Foron® S-WF dyes for polyester and blends

- Full colour range
- meets the highest wet fastness requirements of leading brands
- Full Range of alkali clearable disperse dyes, where high wash fastness can be achieved in continuous dyeing without an intermediate reduction clearing process.

The traditional dyeing process for disperse/reactive dyeing of PES/CEL blends (Europe)

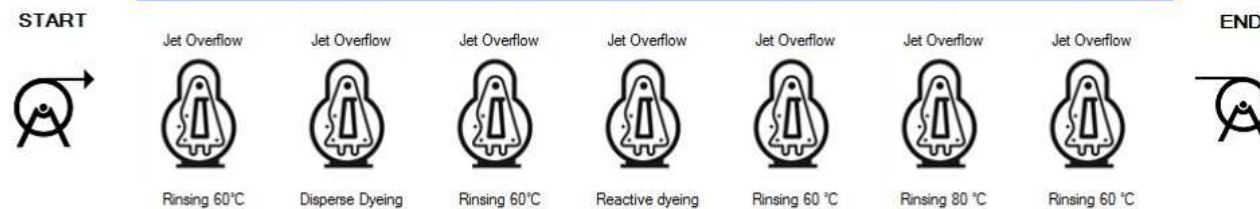
A **very long** and **costly dyeing process**, permitting a maximum of two dye lots per machine per day.

	START	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	Jet Overflow	END
														
		Prebleaching 110°C	Rinsing 60°C	Disperse Dyeing	Rinsing 60°C	Reduction clear	Rinsing 60°C	Reactive dyeing	Rinsing 60°C	Rinsing 80°C	Soaping 95°C	Rinsing 60°C	Fixation 40°C	
Total values														
Time [min]:	703	96	26.33	144	25.67	46.5	25.33	139	26.33	26.33	60.5	24	63	
Water consumption [l]:	29400	3000	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
Water cost [EUR]:	138.18	14.1	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28	11.28
Electr. consumption [kWh]:	182.78	24.96	6.85	37.44	6.67	12.09	6.59	36.14	6.85	6.85	15.73	6.24	16.38	
Electricity cost [EUR]:	27.42	3.74	1.03	5.62	1	1.81	0.99	5.42	1.03	1.03	2.36	0.94	2.46	
Heating Energy [MJ]:	5009.23	910.77	182.15	1118.95	182.15	403.34	169.14	780.66	208.18	208.18	663.56	182.15	-	
Total Energy [MJ]:	5667.24	1000.63	206.8	1253.73	206.18	446.86	192.86	910.76	232.82	232.82	720.19	204.62	58.97	
Steam consumption [kg]:	2402.51	436.82	87.36	536.66	87.36	193.45	81.12	374.42	99.84	99.84	318.25	87.36	-	
Steam cost [EUR]:	111.13	20.21	4.04	24.82	4.04	8.95	3.75	17.32	4.62	4.62	14.72	4.04	-	
Gas consumption [m³]:	168.38	30.61	6.12	37.61	6.12	13.56	5.69	26.24	7	7	22.3	6.12	-	
Gas cost [EUR]:	111.13	20.21	4.04	24.82	4.04	8.95	3.75	17.32	4.62	4.62	14.72	4.04	-	
Total cost [EUR]:	513.73	53.05	16.35	58.82	16.32	37.04	16.02	214.92	16.93	16.93	31.36	16.26	19.74	
Total cost per kg [EUR/kg]:	1.71	0.18	0.05	0.2	0.05	0.12	0.05	0.72	0.06	0.06	0.1	0.05	0.07	

For many years attempts were made to find ways to dye PES/CEL fibre faster, however

- Not all shades could be dyed by a given process,
- The processes proved to be unreliable, giving large batch to batch variations
- Off-shade batches couldn't be corrected easily

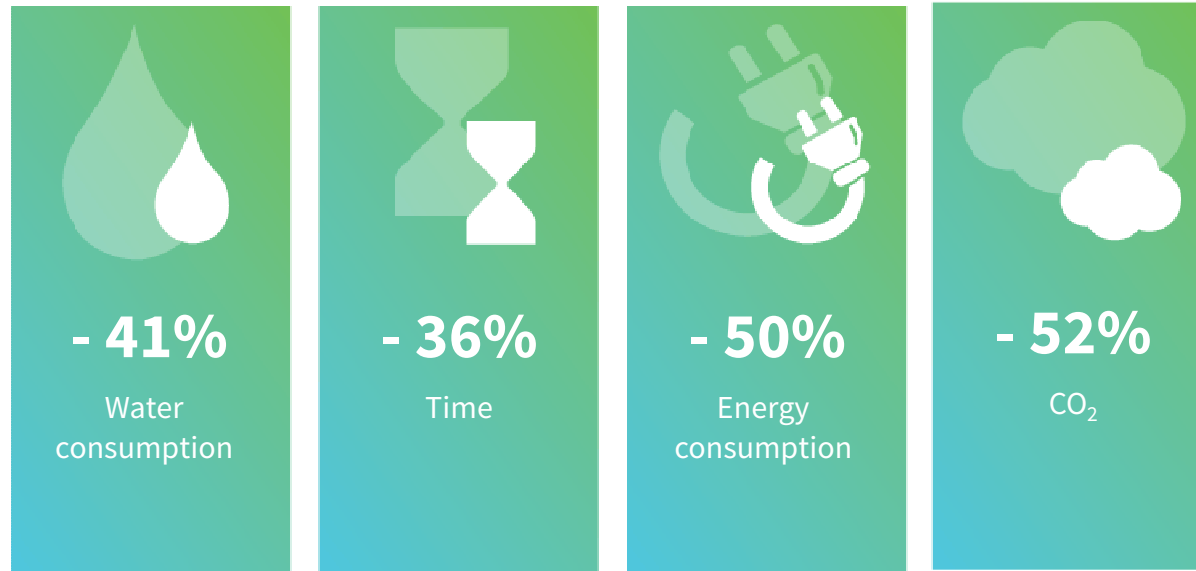
SWIFT + Process (Europe)



Total values

Time [min]:	453.33	37.67	164	25.67	139	26.33	26.33	34.33
Water consumption [l]:	17400	3000	2400	2400	2400	2400	2400	2400
Water cost [EUR]:	81.78	14.1	11.28	11.28	11.28	11.28	11.28	11.28
Electr. consumption [kWh]:	117.87	9.79	42.64	6.67	36.14	6.85	6.85	8.93
Electricity cost [EUR]:	17.68	1.47	6.4	1	5.42	1.03	1.03	1.34
Heating Energy [MJ]:	2394.02	260.22	1118.95	182.15	208.18	208.18	208.18	208.18
Total Energy [MJ]:	2818.34	295.48	1272.45	206.18	338.28	232.82	232.82	240.31
Steam consumption [kg]:	1148.21	124.81	536.66	87.36	99.84	99.84	99.84	99.84
Steam cost [EUR]:	53.11	5.77	24.82	4.04	4.62	4.62	4.62	4.62
Gas consumption [m ³]:	80.47	8.75	37.61	6.12	7	7	7	7
Gas cost [EUR]:	53.11	5.77	24.82	4.04	4.62	4.62	4.62	4.62
Total cost [EUR]:	364.07	21.34	73.1	16.32	202.22	16.93	16.93	17.24
Total cost per kg [EUR/kg]:	1.21	0.07	0.24	0.05	0.67	0.06	0.06	0.06

- Combined rinsing and pre-bleaching of the fabric after polyester dyeing
- Combined reduction clearing of the disperse dyes during the reactive dye fixation
- Suitable for all shades and all depths with easy corrective shading possible
- Optimum wet fastness level with the same handfeel for all shades



- Peace of mind that dyes are RSL/MRSL compliant
- Production time reduced more than 4 hours
- Large water savings :
 - Saves 40L/kg PES/Cotton fabric; in a 300kg batch = 12,000L/batch
- Dramatically reduced energy and CO₂ emissions
- Increased capacity or opportunity time

Arkofi NZF New- Wrinkle Free & formaldehyde Free finish for woven fabrics

- Formaldehyde free finishes have been available for many years, however limited with respect to a conventional “non iron” finish performance
- A new chemistry which allowed the crosslinking to be more flexible which led to an Increased performance in durable press and also abrasion resistance



Conventional resin finishing process for shirting

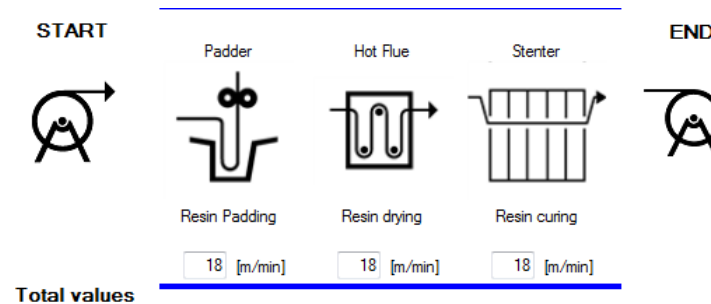
With a requirement of < 16ppm formaldehyde



Conventional processing is long due to ::

- Low formaldehyde systems which requires post washing and drying
- Subsequent application of handle modifiers which requires additional steps

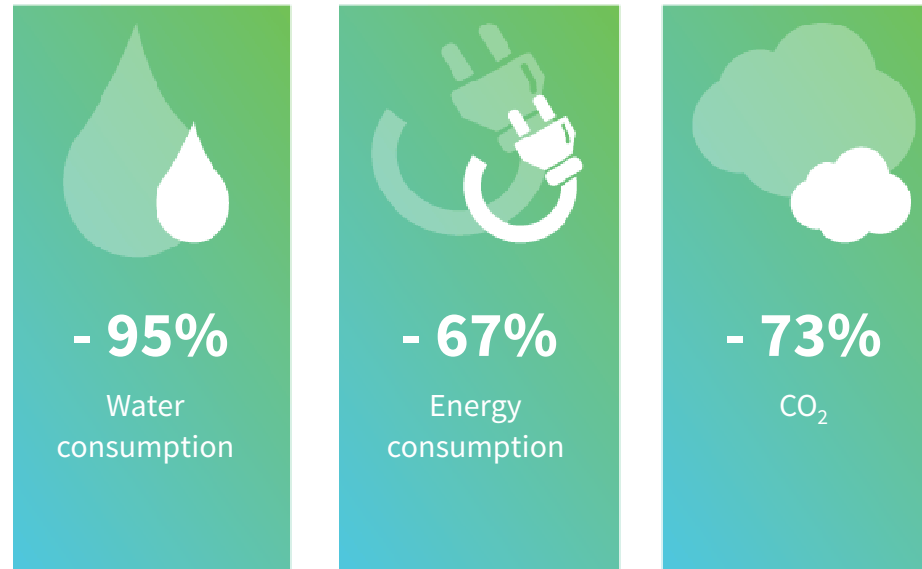
Arkofix NZF New process



Total values

Time [min]:	555.56	555.56	555.56	555.56
Water consumption [l]:	2600	2600	-	-
Water cost [USD]:	2.05	2.05	-	-
Electr. consumption [kWh]:	758.68	500	225.6	33.08
Electricity cost [USD]:	69.8	46	20.76	3.04
Heating Energy [MJ]:	7629.22	-	4742.14	2887.08
Total Energy [MJ]:	10360.47	1800	5554.3	3006.17
Steam consumption [kg]:	-	-	-	-
Steam cost [USD]:	-	-	-	-
Gas consumption [m ³]:	217.98	-	135.49	82.49
Gas cost [USD]:	115.53	-	71.81	43.72
CO ₂ (Electricity) [kg]:	5	3.3	1.49	0.22
CO ₂ (Heating Energy) [kg]:	425.06	-	264.2	160.85
Total CO ₂ [kg]:	430.06	3.3	265.69	161.07

- Due to the “formaldehyde free” chemistry no washing off is required
- Handle modifiers can be applied in the same step
- Dramatically reduced water and energy consumption



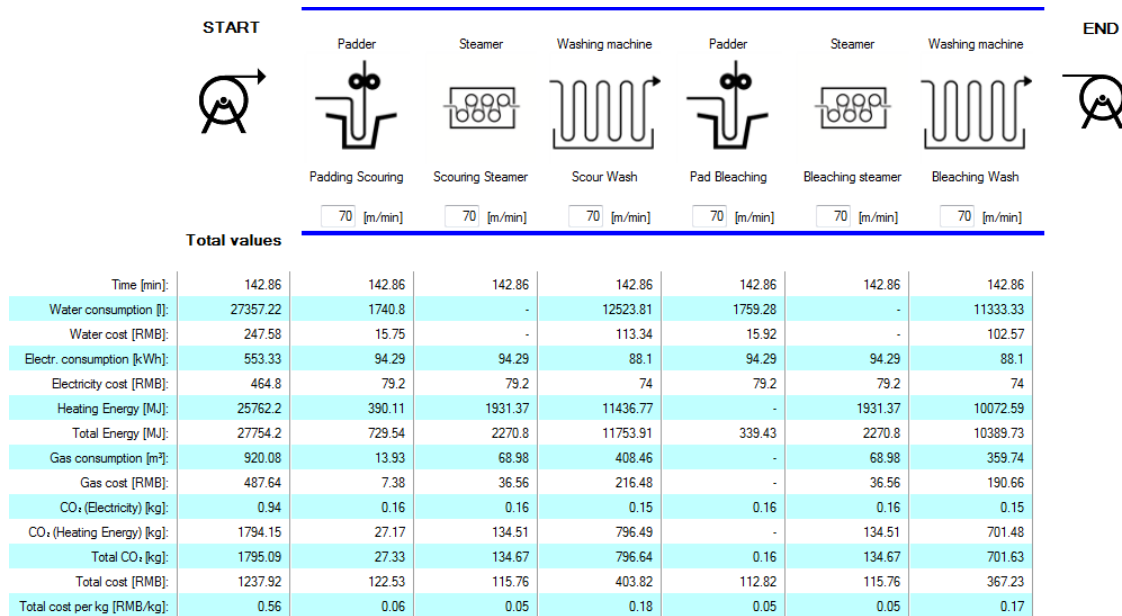
- Peace of mind that dyes and auxiliaries are RSL/MRSL and BSSL compliant
- Formaldehyde free fabric
- Dramatically reduced water & energy usage and CO₂ emission
- Conventional process = 4.6L water/M;
- Arkofix NZF process = 0.26L water/M
- Less damaged fabric – higher tensile strength

Optivator HPE – Continuous APT pre-treatment of woven cotton

- Innovative new chemistry for textile pretreatment which allows the improvement of fabric quality in terms of tear and tensile strength
- Dramatic chemical savings in caustic/hydrogen peroxide also leads to significant water and energy savings during the rinsing process



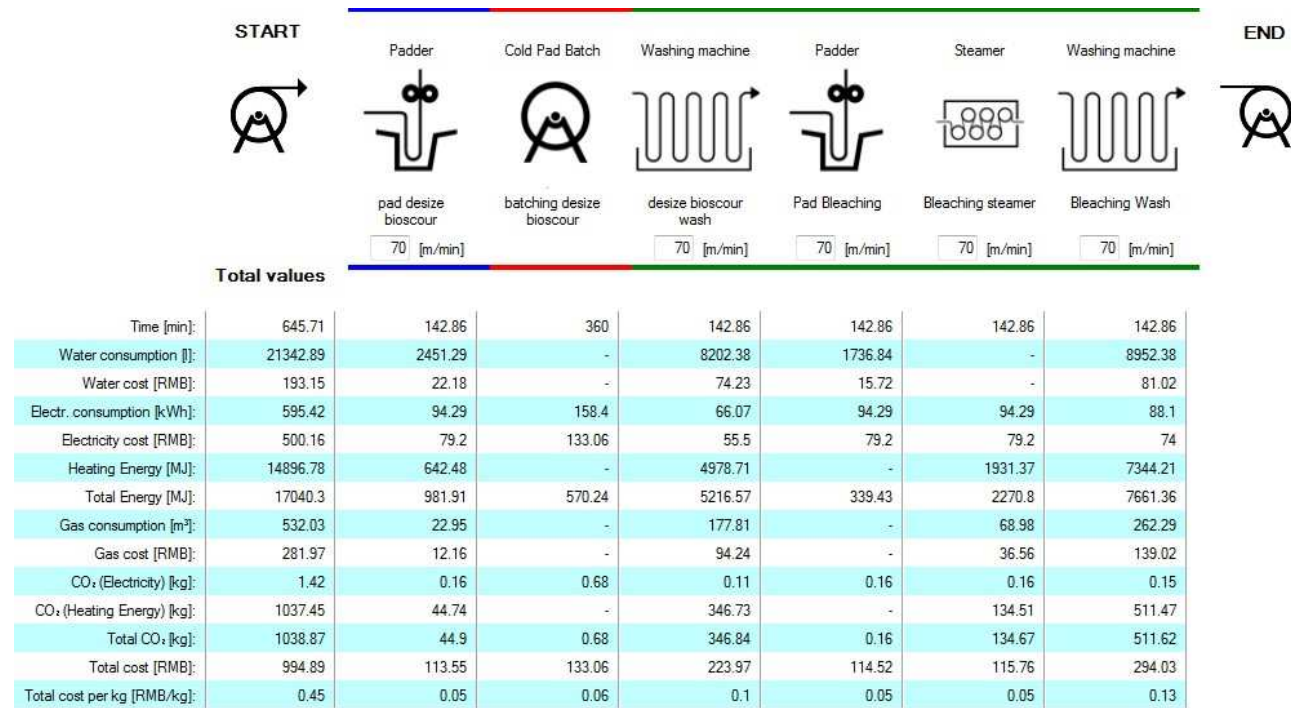
Conventional 2 step scouring and bleaching process



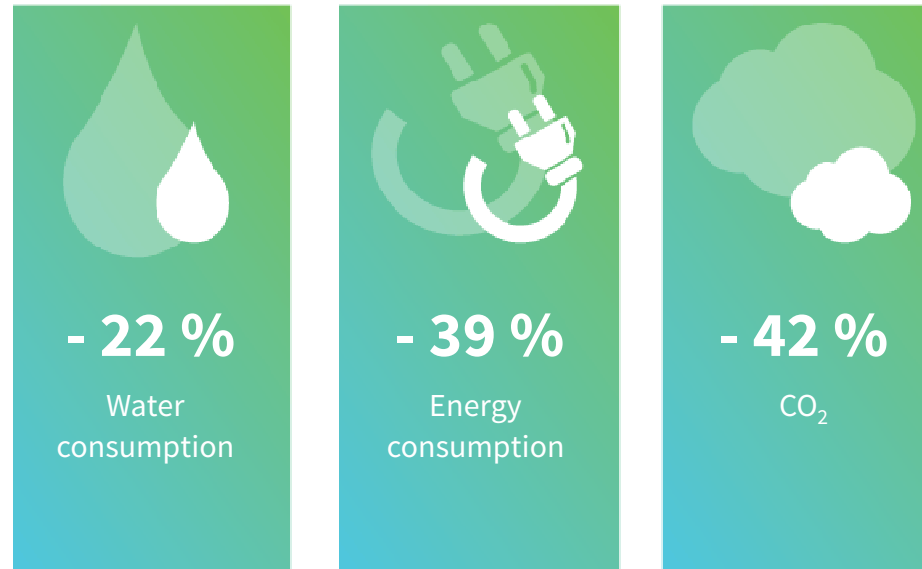
Conventional processing is long due to ::

- Conventional amounts of caustic need long rinse cycles
- Increased cycles and increased caustic lead to fibre degradation in terms of tear & tensile strength

Optivator HPE : Advanced polymer Technology



- Activated enzyme technology allows the reduction of caustic/peroxide
- Significantly reduced water and energy consumption



- Peace of mind that dyes and auxiliaries are RSL/MRSL compliant
- Significantly reduced water & energy usage and CO₂ emission
- Less damaged fabric – higher tensile strength

Sustainability means opportunities



In a nutshell



Cost efficiency



**Reduced water or
energy consumption**



**Nature-friendly
ingredient selection**

**Don't hesitate to approach me
or my colleagues if you have
any question**

**THANK YOU FOR YOUR
ATTENTION**





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