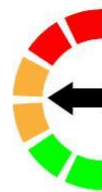# Measuring the Environmental Impacts of Textiles

The world of fashion and textiles is a complicated place and the emergence of eco-textiles have made it even more confusing.

How can an industry that seemingly encourages uncontrolled consumerism be environmentally sustainable?

Are 'environmentally friendly' fabrics going to save the planet from global warming or do we need to change our buying behaviour as well as the product we buy?

Which eco-textile products are significantly better than 'normal' production and which are high profile gimmicks?

These are just a few of the many questions that are being asked by those trying to reduce the impact of textiles on the environment but the single most common question is 'How do you measure the environmental impacts of textiles?'

What is EcoMetrics and who is it aimed at?

EcoMetrics is a simple on-line calculator that enables you to compare the environmental impacts of different textile products and processes.

If you are pro-environment then EcoMetrics is for you.

If you are massively cynical of the green movement then EcoMetrics is for you.

And if you are simply confused and want to learn some facts then EcoMetrics is for you.

Information on the environmental impact of textiles is generally available in two forms – scientific studies and subjective marketing information.

There are many superb scientific studies on the environmental impacts of textiles but they generally only look at a small sub-section of the industry (maybe a single fibre, or a single process) and they tend to be written by real scientific experts and therefore only fully understood by fellow scientific experts. Also since they are almost always stand alone pieces of work it is almost impossible to compare one study with another.

Marketing information is rarely reliable. It presents a skewed view by using hype, exaggeration and distortions of the truth.

Even when information is reasonably well presented a common problem with marketing is that it often only delivers the good news by presenting an exaggerated view of the good news whilst completely ignoring some of the negative aspects of a product or process.

There is also information from those with a cause (and a product to sell). This information is often hard hitting but sometimes over-exaggerates a problem and over-exaggerates the benefits of their proposed replacement.

Taking something 'bad' and making it 'less bad' is commendable but doesn't necessarily make it 'good'.

What is the core concept of EcoMetrics?

All textiles have a negative impact on the environment. Introducing a new eco-brand only has a direct benefit if it replaces 'normal' products - every additional textile item manufactures makes the global situation WORSE. If you can replace normal products with lower impact products then the situation will improve.

Textile EcoMetrics has been developed by Colour Connections in order to make objective assessments of products and processes possible by everyone involved in textiles – the web-based interface and simple presentation of results makes it very accessible.

Its core concept is that there are four key environmental impacts associated with textiles

- Water
- Energy
- Pollution
- Use of non-renewable resources

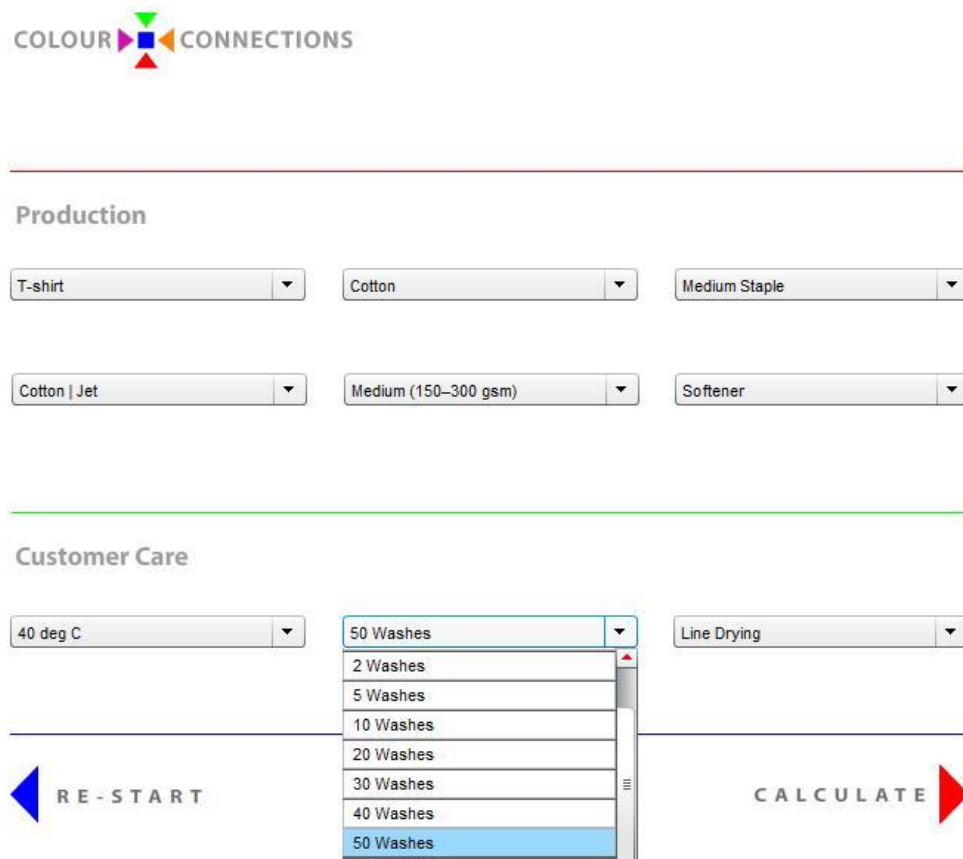......and it considers the whole production process too – not just the most marketable bit!

How does it work?

We've developed clever units called Environmental Damage Units (EDU's) that allow you to calculate the total impact for a given product or process. We assign a high score to processes that have a massive impact (for example the water impact for cotton fibre or the use of non-renewable resources for polyester) and a low or zero score where there is low or no impact (such as use of water in yarn spinning).

So how do you compare spinning with dyeing, and fibre production with laundry?

For each stage of production we calculate the total EDU's using our database of information and then provide a total score.

Users simply select items from drop down menus to build a product or to assess an existing one (Garment type, fibre type, yarn type, fabric weight, dyeing method and finishing method) and press the 'calculate' button.

Results are displayed in a colour coded grid that shows the relative impacts of water, energy, use of non-renewables and pollution for a given process. It provides a visual snapshot of the impacts and highlights high impact areas that may require attention - it allows a user easily compare the impacts of different products and processes.

The following examples show some mainstream and popular eco-fibres. For ease of comparison for each fibre we've demonstrated a medium weight, weft knit fabric and dyed it in a jet dyeing machine (warm or hot dyeing) unless we've clearly indicated otherwise.

By accessing the interactive tool you can compare your silk socks with a wool coat and a bamboo shirt – in fact whatever combination you choose since there's over half a million product and process combinations in the eco-metrics tool

- Screen Shot for conventional cotton
- Screen shot for organic cotton
- Screen shot for lyocell
- Screen shot for wool
- Screen shot for polyester
- Screen shot for hemp
- Screen shot for cold-dyed cotton
- Screen shot for spun-dyed polyester

	Water	Energy	Non-renewables	Pollution		Water	Energy	Non-renewables	Pollution
Fibre	yellow	yellow	green	green	Fibre	red	green	yellow	red
Yarn	green	yellow	green	green	Yarn	green	yellow	green	green
Fabric Weight	green	yellow	green	green	Fabric Weight	green	yellow	green	green
Dye Method	yellow	red	yellow	yellow	Dye Method	red	red	yellow	yellow
Finish	green	yellow	green	green	Finish	green	yellow	green	green

Hidden behind each coloured box is a score calculated from the EcoMetrics database and we add these up and give you the overall score in EDU's.

These are presented as both EDU's per garment and EDU's per Kg to enable easy comparison between all products and processes.

Below is the EDU comparison table for the fibres we've illustrated above.

Insert EDU table

The impact of domestic laundry and drying

We also include a comparison between production impacts and domestic laundry impacts to show how foolish it is to make sweeping statements about 'laundry having a much greater impact that production' – laundry impacts vary massively depending on the durability of the merchandise........

www.colour-connections.com/EcoMectrics

The more a product is washed the more EDU's are used in washing that particular garment – however if a garment is poor quality and falls to pieces after 1 or two washes not very EDU's are used on that particular garment – BUT it will need to be replaced.

Tumble drying also has a much bigger impact than lower wash temperatures

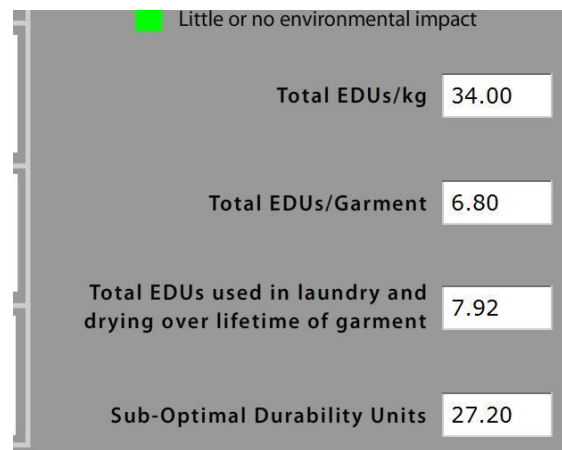Insert screen shot and figures for cotton t-shirt:-

Washed once at 40°C and line dried

Washed once at 40°C and tumble dried

Washed 50 times at 40°C and tumble dried

Washed 50 times at 30°C and tumble dried

Washed 50 times at 40°C and line dried

■ Little or no environmental impact	
Total EDUs/kg	34.00
Total EDUs/Garment	6.80
Total EDUs used in laundry and drying over lifetime of garment	7.92
Sub-Optimal Durability Units	27.20

What's best, green manufacture or durable products?

A durable polyester garment has much lower impact than a poor quality hemp, bamboo or organic cotton garment.

Why?

The longer it lasts, the less frequently it has to be replaced. A garment that is worn out after 2 washes has a 25th of the lifespan of one that lasts 50 washes meaning that 25 have to be manufactured in the same time frame.

However if you wash something 50 times there will be greater laundry impacts than if you wash it twice as we've shown above!

We salute the purveyors of low quality 'disposable fashion' by quantifying the massive impact of low durability merchandise with our SODU's (Sub-optimal durability units).

Of course if you can select high quality textiles made via low impact manufacturing from low impact fibres then you get even greater benefits.

www.colour-connections.com/EcoMectrics

Overall EcoMetrics is a very powerful tool for buyers, producers, educators and commentators – it highlights the benefits of the many good eco-initiatives, but also ensures people think about the all-round impacts throughout the entire production process.

This introductory explanation can't go through every one of the 700,000+ combinations available on the interactive tool but it shows that environmental impacts should be judged on facts and not on who has got the largest marketing budget!

How do you get access to the EcoMetrics tool?

Via www.colour-connections.com/EcoMetrics

We've partnered with Mowbray Communications limited to deliver the web-based interface so once you have subscribed you log on at www.ecotextile.com or www.textiledyer.com

How do consumers buy-in to low impact textiles?

There are two aspects to consider for consumers, the environmental impact associated with the products they choose to buy, and their purchasing behaviour - the biggest challenge for mainstream consumers is their long term behaviour.

Put simply, consumers would significantly reduce their impact if they significantly reduced their consumption of mainstream items. If they purchased textiles as normal and bought the occasional item of eco-textiles the benefits would be relatively small.

We've developed a simpler module for consumers and the textile supply chain to assess the overall impact of textile production, consumption and after-care.

The EcoMetrics household calculator calculates the total annual impact (in EDU's) of a household's textile purchases, the impact of their laundry behaviour and also the impact of their disposal.

This is available free to air at www.colour-connections/EcoMetrics

We've based the module on the same idea as food consumption and people calculate their total EDU's per year – see if they are fashionably obese, fashionably over-weight, under-weight or fashionably unfashionable.

Insert Screen Shots

Throwing things in the bin when you've finished with them adds to environmental impacts (and you lose points), but if you give unwanted textile products to friends, family, charity shops or re-cycling initiatives then you get points back. Even using old clothes as rags and cleaning cloths makes sense – and you get points back for this too.

So even if you are a mad shopper you can get points back by emptying your wardrobe into a charity shop – a bit like a crash diet!

Consumers will see that they are responsible for greater environmental impacts if they buy more items, wash at high temperatures, tumble dry and then throw things in the bin.

Conversely they will see that buying fewer items of greater quality and durability will dramatically reduce their impacts over a long period of time, reducing the frequency of washing has greater benefits than reducing the temperature of washing and that non-iron textiles made with all those nasty (said with irony) chemicals are actually great for reducing impacts.

Lastly it will get them to think about how to dispose of textiles.

What does EcoMetrics teach us?

There will be some surprising results.

- Polyester, the Devils' creation in some people's eyes, is rather good
- Some natural products are not so good
- Lowering wash temperatures by 10° can have less effect than doing less ironing
- Cutting down trees to make textiles can make sense!

Both the production and household modules show that more benefits can be gained from improving mainstream textiles and mainstream behaviour than the introduction of niche eco-initiatives.

However these small scale eco-initiatives are <u>very</u> important – they highlight the problems of mainstream production and highlight a lot of best practice that can be applied to mainstream.

The summary is to base decisions on facts and not emotion, and to apply the best practice learnt from eco-initiatives to the other 99% of the textile world.

How accurate are the figures?

Textile EcoMetrics is based on science and experience. It is easy to get concrete figures from the top end of the textiles industry, but impossible to get it from the foul, polluting, inefficient, irresponsible bottom end. We therefore combined hard facts with well founded estimates to populate our database with industry average results.

The figures it generates give very good indications of the relative impacts and allows you to highlight areas of concern - and it encourages all-round thinking.

Why is the impact of transport not included?

Transport is a factor in textiles – lots of fibres, yarns, fabrics, garments, chemicals and dyes are transported around the world to get clothing into shops at the prices consumers want to pay for it.

The total energy impact of transport of a garment has been estimated as being approximately a quarter of the energy impact of the manufacturing, so it is not inconsiderable but is not as high as many commentators would imply.

However since the EcoMetrics module looks at average processes the transport figure would not differentiate between any different fibres or processes. We will be building transport into future modules to highlight the benefits of improved logistics and reduced transport.
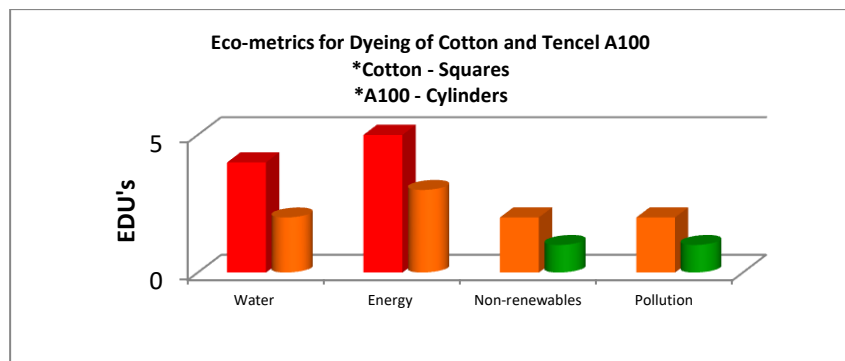
If you did want to include the impact of average transport required to get an item to a shop is likely to be in the region of an additional 3 EDU's per kg for every item.

How do you use the approach to assess specific products and processes?

If you want your ranges, products and processes assessing in more detail the consultancy based EcoMetrics Pro is for you.

This is not a web based tool but uses the same approach to enable clients to use their own data to compare their products and processes with the industry average - and generate results in a format that immediately demonstrate the benefits in a number of easy to understand formats

Eco-metrics for Dyeing of Cotton and Tencel A100
*Cotton - Squares
*A100 - Cylinders

(bar chart: vertical axis labelled EDU's, scale 0 to 5; horizontal axis categories: Water, Energy, Non-renewables, Pollution)

Simply send an e-mail to enquiries@colour-connections.com to ask for further details.

The benefits of using EcoMetrics to measure the impacts of textiles

- Objective
- Looks at entire life-cycle
- Simple enough to be universally understood
- Sophisticated enough to be very powerful
- Compares the previously incomparable
- Rewards low impact products, processes and behaviour
- Dispels myths and punishes poor products and behaviour
- Simple user interface
- Standard presentation for everyone in the supply chain

EcoMetrics doesn't have a specific agenda other than to use facts to highlights areas for improvement.

www.colour-connections.com/EcoMectrics

EcoMetrics will evolve – that's why we have it on-line to ensure everyone has access to the up to date version – and we'll add more products and features on an ongoing basis.

If anyone has any comments, questions or constructive criticism we'd love to hear from you.

Phil Patterson
Managing Director
+44 (0)7799 656786

www.colour-connections.com

Colour Connections Consultancy Ltd is a private limited company, registered in England & Wales 10th Sept 2007, no. 6366020, registered office 141-145 Dale Road, Matlock, Derbyshire, England.

www.colour-connections.com/EcoMectrics