

ADEME



An Environmental Product Declaration of Jeans

What to do to reduce the environmental impacts of one's pair of jeans.

The following document is an Environmental Product Declaration, that means a collection of environmental information on a given product, based on a life cycle analysis conducted according to international ISO 14040 standards.

This document presents the environmental assessment of a pair of jeans, and the possible improvements that can be provided thanks to consumers' sustainable purchasing and use behaviours.

This evaluation was conducted by Bio Intelligence Service in 2006 for the Department for Eco-Design and Sustainable Development of the French Environment Agency ADEME.

What is a Life Cycle Assessment?

A Life Cycle Assessment (LCA) is a global analysis of the environmental impacts resulting from a product during its whole life cycle, that is from the moment of the extraction of raw materials to manufacturing, transportation and use and finally to the disposal of waste.

The consumptions and emissions of materials and energy for each step of the life cycle are quantified.

These data are then used to proceed to the assessment of a cluster of environmental impacts (energy consumption, greenhouse effect, exhaustion of natural resources, acidification, quantity of waste produced, etc...).

So as to facilitate the comparison of different designs of jeans and different uses that can be made of it, a common reference was introduced to express the materials and energy balance of the system life cycle. This is the **functional unit** of the environmental assessment.

The Functional Unit (FU) that has been chosen for this study is the following: « **Wear jeans for one day** ».

Thanks to this unit of reference, the potential impacts which are generated all through the jeans life cycle can be assessed for its use for one day, thus taking its lifetime in consideration.

The life cycle assessment of jeans trousers was conducted in accordance with ISO 14040 standards and was peer reviewed. The following environmental product declaration is compliant with ISO 14025 standards (environmental labelling of type III).

The jeans under study

The pair of jeans which was considered in our study consists in trousers of blue denim material which have been slightly washed out. It weighs 666 grams (g), including 600g of denim material, 37.5g of lining fabric, 10.4g of double yarn, 3.6g of rivets (for a total of 6 rivets) et 14g of buttons (for a total of 4 buttons). The jeans are worn 1 day per week during 4 years, and are washed in a washing machine of class C at 40°C after they have been worn 3 times. When they are worn off, jeans are thrown away with household waste half the time, or are given or sold to a second user who will use them for another 4 years.

- The data related to the cultivation of cotton are representative of the production of cotton in the United States (which is the 2nd world producer).

- The chosen locations of cultivation of cotton, as well as the transportation of raw cotton and the finalized jeans trousers are representative of jeans sold in France that are produced from cotton produced in India, Uzbekistan and Egypt.

- The given data relative to the treatment proceedings of cotton were extracted from the document on Best Available Techniques (BAT) in the field of textiles and are therefore representative of the European situation.

- The given data relative to the production and treatment of jeans were provided by a company based in Tunisia that produces jeans trousers for a French brand.

- The given data relative to the use and the end of life of products are representative of the French situation.

Environmental indicators

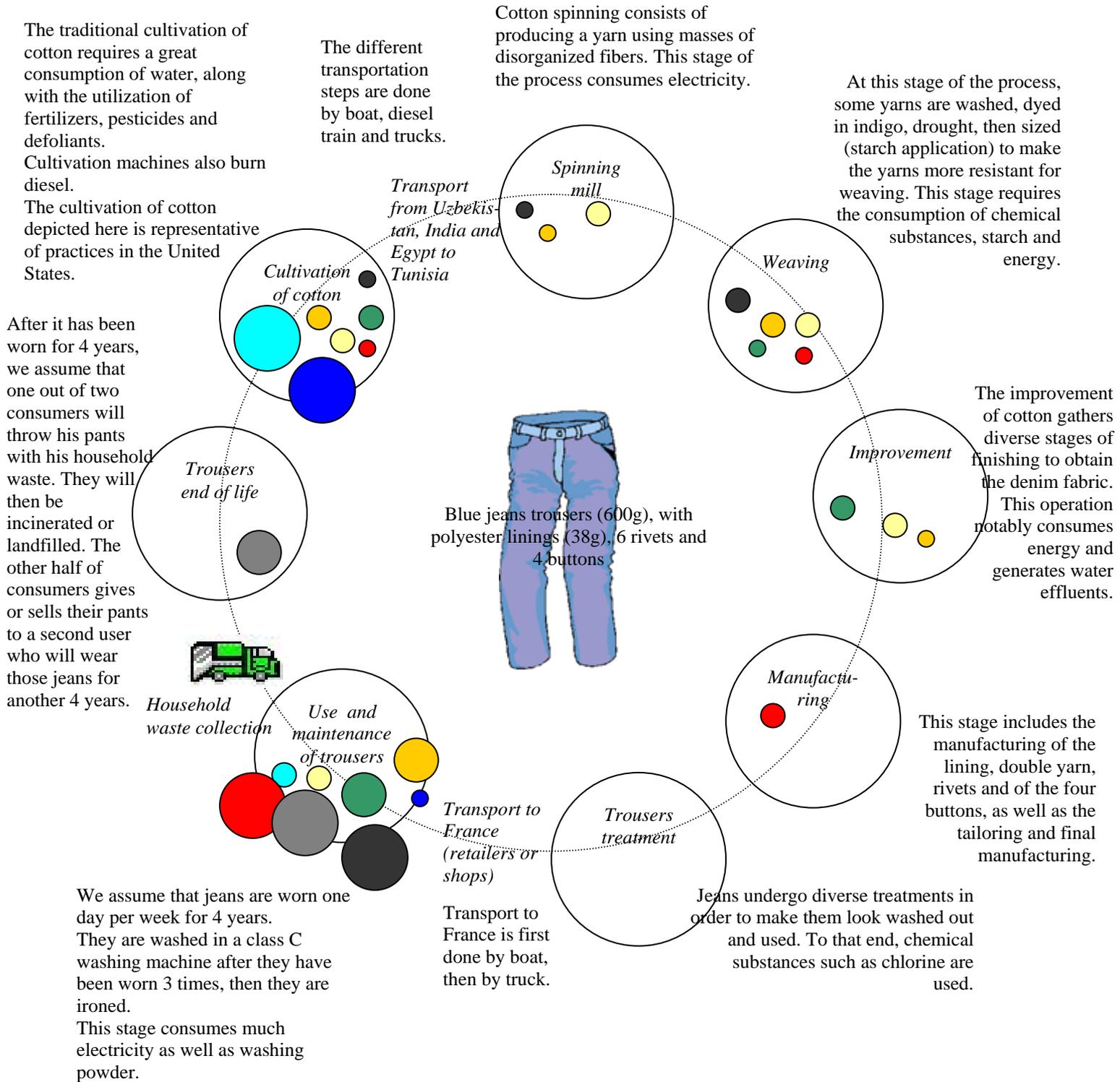
	Primary Energy Consumption This indicator expresses the consumption of natural energy resources.
	Climate Change This indicator reflects the emissions of greenhouse gases which are responsible for climate change.
	Ozone Layer Depletion This indicator reflects the damage done to the ozone layer.
	Human Toxicity This indicator reflects the emissions in the air, water and soils of toxic substances which present a potential risk for human beings.
	Aquatic Eco-Toxicity This indicator reflects the emissions in the air, water and soils of toxic substances which present a potential risk for aquatic fauna and flora.
	Water Eutrophication This indicator reflects the decrease in aquatic fauna and flora due to the excessive development of algae which consume oxygen, development which is facilitated by an excessive concentration of nutrients in water (especially nitrates and phosphates).
	Water Consumption This indicator reflects the water consumption that is directly linked to the trousers life cycle (irrigation of cotton fields, water consumption during the manufacturing and utilization of trousers).
	Production of Household Waste This indicator reflects the quantity of waste that is produced as a direct result of the trousers life cycle (loss of cotton, washing powder's packaging, waste trousers).

Distribution of environmental impacts during the trousers life cycle

Key :

	Contributes between 5 and 9% to the total life cycle
	Contributes between 10 and 34% to the total life cycle
	Contributes between 35 and 59% to the total life cycle
	Contributes for more than 60% to the total life cycle

The life cycle of jeans trousers and its related environmental impacts



Eco-friendly consumption and utilization alternatives

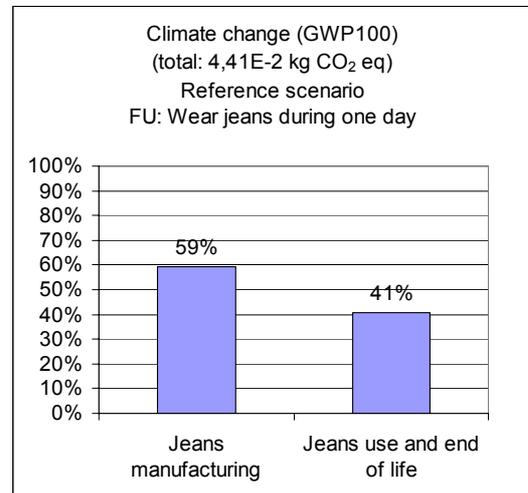
The life cycle of jeans can be divided into two main phases:

- the jeans manufacturing stage, that goes from the cultivation of cotton to the possible treatments of trousers (washing out)
- the use of jeans (cleaning, ironing) and their end of life

For some indicators of potential impact on the environment, such as for instance global warming (see opposite), each of these two main steps is responsible of about half of the environmental impacts caused by the jeans during their whole life cycle.

This means that :

- half the impacts is generated during the jeans manufacturing stages. Yet, the consumer can have an influence on this stage by his purchasing behaviour: he can choose to buy pants made of organic cotton, or pants made of unbleached fabric to avoid the use of chemicals for the washing up, etc....
- half the impacts is due to the utilization and the end of life of jeans, which are under the full responsibility of consumers. They can minimize those impacts by adopting a sustainable user's behaviour.



The life cycle assessment allowed us to determine the main parameters on which consumers can act (purchasing choice and utilization choice).

- **Purchasing choices**

The parameters that have a great influence on the environmental impacts generated during the jeans manufacturing are the way that cotton is cultivated and the location where the production of yarn, fabric and jeans takes place. This last parameter influences results in both ways: firstly, with regard to the transportation distances which are necessary to convey jeans to France. Secondly, the legislation in force in the countries where the different steps that lead to the final product take place determines the presence or not of water treatment units.

- **Utilization choices**

The way pants are cleaned and their utilization frequency are the parameters with the greatest influence on environmental impacts that are generated during the utilization stage of the jeans.

The influence of these parameters on each indicator of environmental impacts is presented in the table next page.

		Indicators of potential environmental impacts									Remarks
Reminder: reference scenario	Studied alternative	Resources		Emissions to the air		Emissions to water	Toxic risks		Production of solid waste		
		Primary energy consumption	Water consumption	Global warming	Ozone layer depletion	Water eutrophication	Human toxicity	Aquatic ecotoxicity			
Parameters of the jeans manufacturing	<i>Cotton produced using intensive cultivation</i>	Organic cotton	=	=	☺	=	☺	=	☺☺☺	=	Organic modes of cultivation forbids the utilization of chemicals (fertilizers, pesticides, defoliants), and therefore prevent toxic substances from being spread in waters and soils.
	<i>Water treatment after the manufacturing of yarn and fabric</i>	No water treatment after the manufacturing of thread and linen	=	=	=	=	☹☹☹	=	=	=	The presence of water treatment units in order to treat the aqueous effluents rejected by yarn and fabric manufacturing units depends on the legislation in force in countries where those treatments take place.
Parameters of the jeans utilization	<i>Jeans are washed after they have been worn 3 times</i>	Jeans are washed after they have been worn 5 times	☺	☺	☺	☺	☺	☺	=	☺	To reduce the frequency of washings allows a decrease in washing powder consumption and the utilization of washing machines and irons, which consumes much energy.
	<i>Class C washing machine used at 40°C</i>	Dry cleaning	☹☹☹	☹	☹☹☹	☹☹☹	☹☹	☹☹☹	=	=	When washing the same quantity of clothes, dry cleaning consumes more energy, more water (cooling circuit), and notably requires a solvent, named perchlorethylene, whose production and use generate polluting emissions in the air.
		Class A washing used at 0°C	☺	=	☺	=	=	☺	=	=	The more the washing machine belongs to a high energy class, and the higher the washing temperature, the more we consume electricity. The production of electricity generates greenhouse gases, which are responsible for global warming. It is also responsible for the emission of substances which present a toxic risk for humans.
		Class D washing used at 60°C	☹	=	☹	=	=	☹	=	=	
	<i>Ironing</i>	No ironing	☺	=	☺	=	=	☺	=	=	
	<i>No dryer</i>	Dryer	☹☹☹	=	☹☹	☹	☹	☹☹☹	=	=	Likewise, irons and dryers have an important electricity consumption: a dryer consumes about 5 times more energy than a washing machine!
	<i>50% are thrown away, 50% are reused</i>	100% is reused	☺	☺	☺	☺	☺	☺	☺	☺	☺
100% is thrown away with municipal waste		☹	☹☹	☹☹	☹☹	☹	☹	☹☹	☹		

Key:

=	variation in the impact < 5%	☺☺☺	decrease in the impact between 30 and 59%	☺☺☺☺☺	decrease in the impact > 60%
☺	decrease in the impact between 5 and 29%	☹☹☹	increase in the impact between 30 and 59%	☹☹☹☹☹	increase in the impact > 60%
☹	increase in the impact between 5 and 29%				

Now, I take action!

The table below recapitulates the different actions that you can take to reduce the environmental impacts of your jeans.

Tick the actions for which you commit, and work out the environmental gains that will be generated!

Resources		Emissions to air		Emissions to water	Toxic risks	
Primary energy consumption	Water consumption	Global warming	Ozone layer depletion	Water eutrophication	Human toxicity	Aquatic ecotoxicity
equivalent in hours of home heating	equivalent in days of water consumption for a daily use	equivalent in km run by a moped	equivalent in mg of CFC emitted to the air	equivalent in g of nitrates emitted to water	equivalent in g of arsenic emitted to water	equivalent in kg of mothproof emitted to water

The gain for this environmental indicator for 208 days during which jeans are worn

(that is once per week during 4 years) is the equivalent of:

Tick cases corresponding to the chosen actions

<input type="checkbox"/>	I choose jeans made of organic cottons			7 km		10 g		9 kg
<input type="checkbox"/>	I choose jeans manufactured in a country where water treatment is compulsory					149 g		
<input type="checkbox"/>	I do not dry clean my jeans	387 hours	3 days	159 km	105 mg	31 g	13 g	
<input type="checkbox"/>	I wash my jeans in a class A washing machine with a cold programme	23 hours		8 km			0.9g	
<input type="checkbox"/>	I do not iron my jeans	26 hours		10 km			1 g	
<input type="checkbox"/>	I do not use a dryer	137 hours		50 km	0.1 mg	17 g	5 g	

Thanks to these new behaviour patterns, I avoid:	the equivalent energy consumption of	the equivalent water consumption of	the greenhouse gases emissions which are equivalent to what is emitted by a moped for	a depletion of the ozone layer which would be equivalent to the emission of	the equivalent emissions to water of	the equivalent emissions to water of	the equivalent emissions to water of
	TOTAL						
<i>calculate the sum of environmental gains for each column</i>	hours of home heating	days of water consumption for a daily use	km	mg of CFCs in the air	g of nitrates	g of arsenic	kg mothproof

key: no variation
 variation superior to 5% of the total impact

The gains that have been calculated may seem modest, but once they have been multiplied by the number of pants you own, and by the number of French people who own a pair of jeans (a few millions), they become quite impressive!

You can try many more combinations by playing at the 'Eco-Jeans' game on the ADEME website at www.ademe.fr !

Find the complete results of this study on www.ademe.fr