

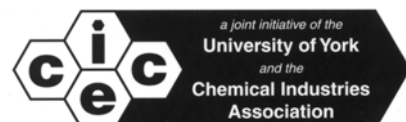
Understanding Sustainability

Is natural always better than synthetic?

Comparing the life cycles of cotton and polyester.



The Institute of Materials, Minerals & Mining



Is natural always better than synthetic?

Cotton v Synthetic

Students examine the information on cotton and polyester life cycles given on the www.sustainability-ed.org web site.

Activity **Cotton v polyester life cycle analysis**

45 minutes data analysis and interpretation exercise.

Suitable for more able key stage 4 students and key stage 5 students.

After using the www.sustainability-ed.org web site, students answer questions and produce two 'footprints' for the production and use of the fabrics.

Students decide on which they feel is the most sustainable and give reasons for their choice. This will vary according to the emphasis placed on the different factors.

Resources Access to www.sustainability-ed.org web site.

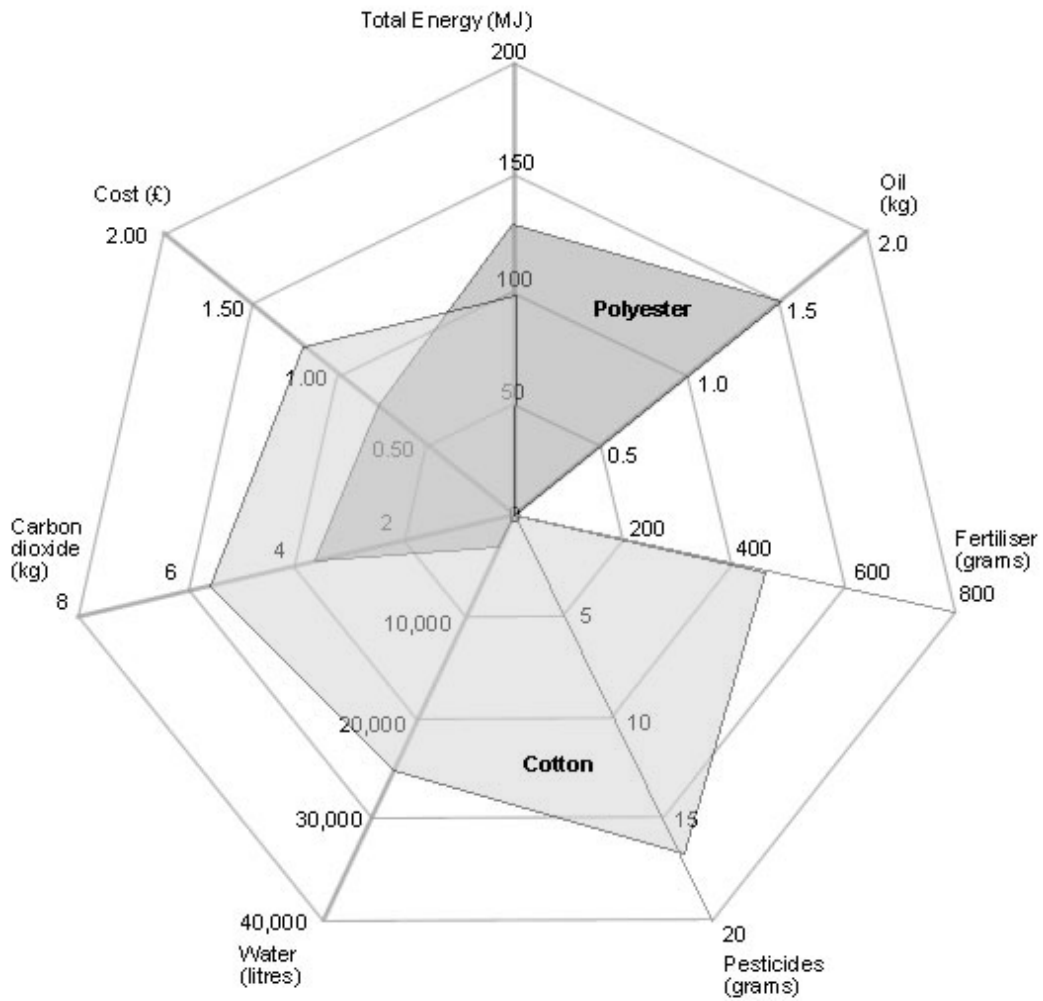
Worksheet referenced *LCA 1* sets out the question and task for the students.

Axes for the graphs are provided in sheets *LCA 2* and *LCA 3*.

LCA data Students should find the following data on the sustainability-ed web site for the production and weaving of 1kg of fabric.

	Polyester per kg	Cotton per kg
Total energy use (MJ)	130	100
Oil (kg)	1.5	0
Fertilisers (g)	0	457
Pesticides (g)	0	16
Water (litres)	1308	26100
Carbon dioxide (kg)	3.8	5.3
Approx cost (£)	0.78	1.13

Radar graph is shown overleaf.



Data for the use and disposal should include some or all of the following.

	Polyester per kg	Cotton per kg
Energy wash (MJ)	3.4	3.4
Energy tumble dry (MJ)	-	12.6
Energy recovery from incineration (MJ)	33	7
Water per wash (litres)	49	49
Shrinkage (% per 100 washes)	4	7
Loss of strength (% per 100 washes)	8	17

Sustainability - cotton v polyester life cycle analysis

Cotton and polyester can both be made into fabrics. Cotton is a natural fibre that comes from the cotton plant. Polyester is a synthetic fibre that is made from oil or gas.

Your task

1. Go to the sustainability-ed web site: www.sustainability-ed.org
2. Navigate to the Sustainable Development Case Studies and select the Cotton or Polyester case study.
3. Use the information in the Life Cycle Analysis section to **complete the table**.
4. Use the data in your table to draw a 'radar graph' to compare the **production** of 1kg of cotton and 1kg of polyester.
5. Compare the information for the **use and disposal** of cotton and polyester.

Life cycle analysis

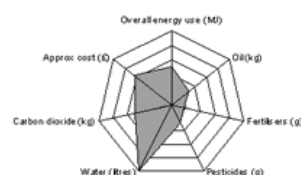
Fibre production and weaving	Polyester per kg	Cotton per kg
Overall energy use (MJ)		
Oil (kg)		
Fertilisers (g)		
Pesticides (g)		
Water (litres)		
Carbon dioxide (kg)		
Approx cost (£)		

Question

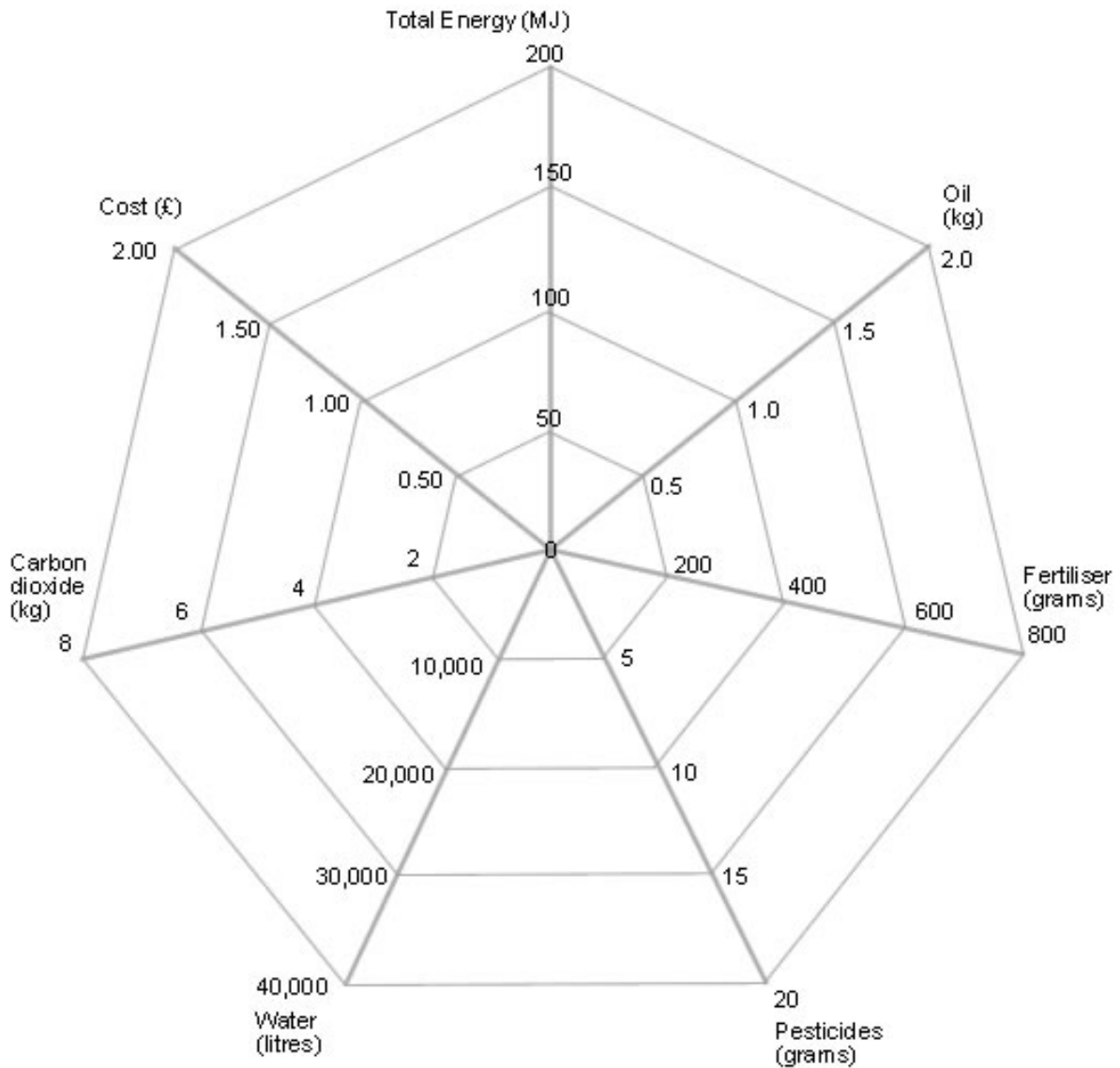
Which do you think is the more sustainable fabric?
Give reasons for your choice.

A radar graph allows you to see the 'footprint' of a product.

The scales can be different to take into account the amounts of each factor included.



Production and weaving of 1kg of cotton compared with 1kg of polyester



Use and disposal of 1kg of cotton compared with 1kg of polyester

