

# 'Sustainable Clothing Roadmap'

## Industry Initiative Update- Part 2

### Reducing the Environmental Impacts of Clothes Cleaning

Defra commissioned this project because existing evidence shows that the impacts of the clothes cleaning stage of the clothing lifecycle has high environmental impacts and there is further potential for improvement beyond existing interventions. The project aim was to identify and analyse the options to reduce the energy, water and chemicals intensity of clothes cleaning. Information on current cleaning methods was collected and the environmental impacts of these methods (including potential trade-offs) assessed. The following six aspects of clothes cleaning were considered:-

- Fibre and fabric characteristics e.g. anti-crease or anti-bacterial coatings
- Washing and drying appliances
- Low/non-solvent dry cleaning
- Detergents and their packaging
- Sustainable building design
- Final assembly of garments & durability.

### Key Findings

The best options to reduce the impacts of clothes cleaning, in consideration of consumer behaviour and societal trends, were identified and recommendations made for consumer facing instruments, awareness campaigns and regulatory/legislative interventions.

The environmental impacts of clothes cleaning are significant with energy consumption and associated GHG emissions from the heating of water (washer) and air (dryer) often quoted as approximately 80% of the clothing lifecycle energy impacts. Eutrophication and other toxicity impacts due to washing detergents is the other key impact. The figure below highlights the key impacts and on a relative scale, where the big contributions are, it uses the example of cotton jeans.

	% impact of clothing life cycle	% impact during use phase			
		Washing	Drying	Detergent	Ironing
<b>Primary energy consumption</b>	<b>over 60</b>	13,1	<b>66,6</b>	7,2	12,9
<b>Emissions to air, water and soil present risk to humans</b>	<b>over 60</b>	10,9	<b>55,5</b>	22,2	10,7
<b>Climate changing greenhouse gases</b>	35 to 59	9,7	<b>49,1</b>	30,5	9,5
<b>Water eutrophication</b>	35 to 59	6,2	31,3	<b>54,3</b>	6,0
<b>Ozone layer depletion</b>	10 to 34	7,3	36,9	<b>44,7</b>	7,1

*BIO Intelligence Service (2006) for ADEME – Life cycle analysis of a pair of jeans*

As expected, this project confirms that for energy consumption, drying is the biggest contributor. At present more interventions focus on washing (e.g. Wash at 30) than drying.

## Recommendations

Key recommendations for going forward include:-

### Tumble drying

If all UK consumers externally line dried clothing for 6 months of the year (given UK weather anymore time is not feasible), 1.9 TWh energy per annum would be saved in the UK. Indoor drying in non ventilated areas (as specified in line with the Building regulations) is not recommended due to the heat replacement effect. However, indoor drying designed with suitable ventilation and as per the Code for Sustainable Homes (new stock only) requirements is an intervention for the future.

In the shorter term, a unified consumer awareness campaign to include point of sale information for appliances and detergents with a key focus on cost savings from:-

- Wash at 30
- Wash on full load
- Dose correctly
- Spin full at highest speed
- Line Dry

## Low temperature washing

Washing at 30°C has a 17% uptake in the UK (any detergent)[IPSOS Habits and Practices Studies 2002 and 2007] and 27% (leading consumer brand) [Source: Leading consumer products manufacturers] as of 2007. Average UK washing temperature is 40.2°C consuming 4.4TWh energy/annum in the UK (assuming 274 washes/annum). Based on one proprietary study, (Proctor and Gamble [2001] Comparative Life Cycle Assessment [LCA] of Ariel "Actif à froid" [2006], a laundry detergent that allows washing at colder wash temperatures) low temperature detergents perform well at 30°C (and lower) across a range of environmental indicators and for washing performance. While only one study, it does not show any evidence of eco or human toxicity trade-offs of detergents enabling low temperature washing when compared to traditional detergents.

Shifting from 40°C – 30°C would give 0.5 TWh energy saving / annum in the UK. In terms of lower temperatures, poor bleaching due to oxygen based bleaching agents requiring warmth for activation may impact wash performance at < 30°C. Hence, continuing to enable the uptake of washing at 30°C for normal (non-hygienically challenged) situations through the following measures was recommended:-

- Minimum standard requirement that appliances have low temperature or low impact wash choices e.g. Wash at 30°C built in and clearly displayed. From July 2010, the Ecodesign of EuP Implementing Measure for Washing Machines (Lot14) and EU Energy Label review will require "A" class machines as a minimum standard for the EU market. If all washing machines in the UK had the A rating this would achieve a 0.2 TWh energy saving / annum.
- Building on Wash at 30°C consumer campaigns to increase uptake utilising the association with cost savings as a consumer behaviour change lever.

The trade off of Washing at 30°C and lower can be that biofilms form in the washer if a higher temperature (60°C) wash is not done approximately every month. Washing at 30°C and using a monthly 60°C wash still enables a 10% energy saving compared to 40°C.

## Detergent formulations and dosage

Current evidence indicates that:-

- compact powders and liquids perform at least as good as regular powder and in some cases have a lower impact over a range of environmental indicators as illustrated in the figure below largely due to use of reduced chemicals per wash <sup>1,2</sup> Unit-dose systems tend to perform worse than the

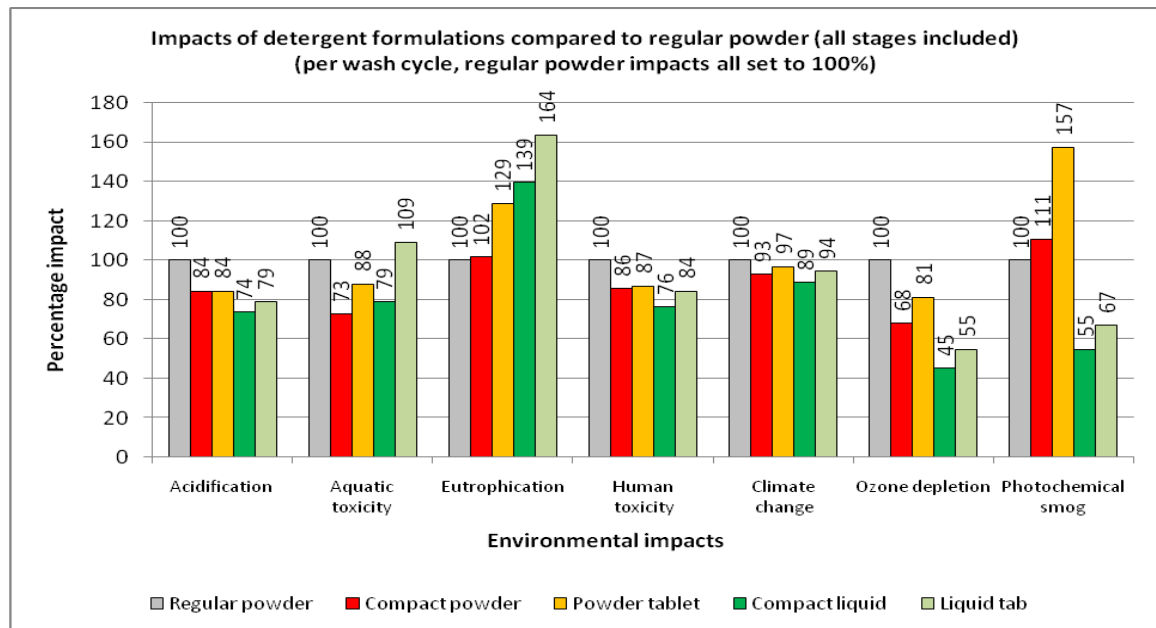
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<sup>1</sup> G. Van Hoof et al (2003), Comparative Life Cycle Assessment of Laundry Detergent Formulations in the UK. To note the impacts of temperature selection are not consider in this analysis

<sup>2</sup> Saouter E, et al (2002) The Effect of Compact Formulations on the Environmental Profile of Northern European Granular Laundry Detergents; International Journal of LCA (1) 27 – 38

compact version of the same physical form used at recommended amounts. Packaging is responsible for some of these.

- Liquids tend to perform better than powders across most indicators, apart from eutrophication, where liquid tablets and compact liquids perform worse (due to organic chemicals in their formulations) and on aquatic ecotoxicity (where liquid tabs tend to have higher potential impacts due to perfume contribution, as higher perfume levels are required to provide a similar level of fresh scent)



Compact detergents currently have a small market share in the UK with regular powders representing 40% and super concentrated liquids for example only 16% of sales, which limits enabling the environmental benefits.

Consumers over dosing is a problem as it increases the impacts while under dosing can have limescale and poor wash performance. Recommendations include:-

- Dosing methods should prevent over/under dosing
- Promotion of accurate dosing via simple information for consumers linked to cost savings
- Dosing common standard required to be agreed by detergent and appliance manufacturers.

### Washing appliance spin speed

Increasing washing appliance spin speed to 1600rpm would save approximately 0.7 TWh energy/annum in the UK if all stock rises from 1000 to 1600 rpm. A barrier to this is that the top end of range appliance with 1600 rpm are more expensive (EuP Lot 14 assessment study shows the actual cost at EUR€30/machines).

### **Appliance energy efficiencies**

If all appliances were increased by 1 energy rating upwards this would save, 0.2 TWh energy per annum in the UK. Benefits in the short term are small and depend on the impacts of early disposal of old appliances. Ecodesign of EuP implementing measures for washing machines and tumble driers are already focusing on these improvement levels.

### **Industry standards**

ISO3758 Clothes Care labelling should be revised to incorporate:-

- Mandatory wash temperature instructions

Provide guidance on compact powder, spin speed and line drying.

Publications and other industry information are available for the industry to use via:

[www.defra.gov.uk/environment/business/products/roadmaps/clothing/index.htm](http://www.defra.gov.uk/environment/business/products/roadmaps/clothing/index.htm)