

PROFESSIONAL TEXTILE CLEANING

2 times more sustainable compared to household washing and drying

TKT

TKT is the Dutch technical knowledge centre for the textile care industry, for both the dry cleaning industry and the laundry industry. TKT initiates and coordinates technical and sustainable innovation projects for the Dutch and the International textile care industry. TKT is imbedded in international and networks and has extensive expertise about technological aspects of cleaning and washing such as (amongst others) sustainability of cleaning, alternative cleaning processes, energy saving, hygiene of cleaning and washing, life cycle assessments, environmental legislation for dry cleaners & laundries, textile functionalities and their relationship to washing processes. There are many ongoing projects about these aspects. Additionally, practical knowledge is transferred to the companies in the form of online educational material, both on a national and on an international level. TKT is closely affiliated to the Dutch national associations FTN (laundry) and Netex (dry cleaning), as well as the umbrella association CINET (the international committee of professional textile care).

Introduction

For many years, the textile cleaning sector continuously discussed the sustainability of professional textile cleaning compared to the sustainability of household washing. The sustainability of the textile cleaning process can be considered an increasingly more important aspect in the (Dutch) market; taking into account for example the sustainable purchase policy of the Dutch government. For this reason, the need has been expressed within Netex to establish an independent study that determines to which extent the professional cleaning process distinguishes itself, compared to household washing, in the area of sustainability.

Such an analysis is far from easy to make. All processes of course consume energy, which, in the end, can be expressed as primary energy per kg laundry. However, the energy is generated and applied in very different ways. We can also observe large differences in the processes, resulting in different emissions into soil, water and air. When cleaning with solvents is applied according to the state of technology, the only emission into the environment is a small amount of solvent. On the other hand, wet cleaning and household washing result in discharge of waste water into the environment. The detergents are very different in chemical composition. Not only the environmental impact of the emission into the environment is weighed, also the environmental friendliness of the production plays a part. Overall, there are many different aspects that are not directly comparable with one another.

To be able to draw a truthful comparison anyway, TNO has been requested to aid. TNO has made available special software, that calculates the costs to 'undo' all changes that are caused in the environment (emission of PERC or HCS, discharge of waste water with surplus detergent, generation of energy, etc...). Also the production of the materials that are used, like cleaning amplifier, detergent, etc. are included in the calculation. This results in an extended analysis, in which the following aspects are represented: energy consumption, exhaustion of materials, climate change, damage of the ozone layer, human toxicity, aquatic and marine eco-toxicity, photochemical oxidant development, acidification and eutrophication.

This issue of Knowledge in Practice is based on the report by TNO (1).

Sustainability of household washing

In 2007, Faberi executed a study regarding household washing behavior of consumers(1). Parameters like energy consumption, washing temperatures and degree of loading, as they occur in practice, have been investigated in this report. To determine the consumer behaviour regarding household dryers, a report of MilieuCentraal (Environment Central) from 2008 has been used(2). This report states which percentage of the households possesses a dryer, how frequently this dryer is used and what this entails with regard to energy consumption. On basis of these two sources, it is possible to determine the energy consumption per kg laundry for washing and drying in a household situation.

Sustainability of professional cleaning

TNO determined the sustainability of professional cleaning with PERC, HCS and wet cleaning as applied in practice, by means of calculations and existing information originating from suppliers and cleaners. The following parameters, which are representative for the current state of technology, are presumed:

- Solvent use: 10 gram per kg laundry
- Cooling water of the solvent machines is used for wet cleaning
- The steam boiler works efficiently
- Degree of loading with regard to the machines is 80%
- Accurate discharge of waste containing solvents

Basis of assessment

A clothing package is used that can be washed/cleaned professionally as well as at home. Note that this is a fictive package, that as such has not been distinctly examined. In a household washing situation, this clothing package will be divided in laundry washed at 30°C and laundry washed at 40°C. From the report by Faberi it becomes clear which percentage of the clothing is washed at 30°C. With regard to laundry washed at 30°C, we presumed it is not dried in the dryer.

Results

First, the greenhouse effect of the processes is compared. The greenhouse effect is based on CO² emission and thus on energy consumption. This comparison naturally includes the energy consumption of the laundry- and drying processes, but it also includes the energy consumption relating to, for example, the production of the cleaning amplifier, the production of clean drinking water and the purification of waste water.

Following the above mentioned method and basis of assessment, the results are presented in figure 1:

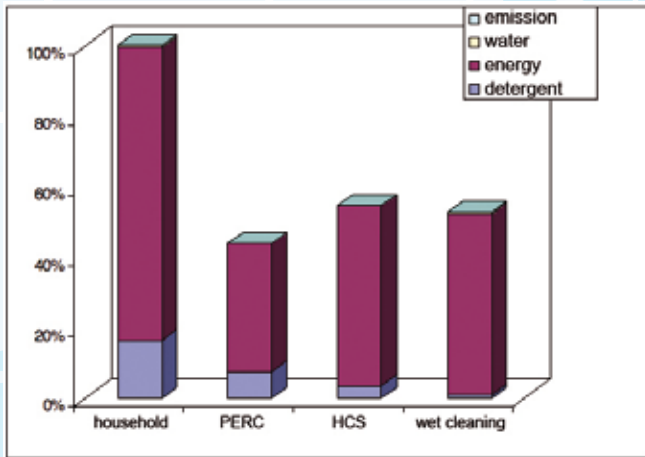


Figure 1 – Greenhouse effect per kg laundry as a result of the 4 compared cleaning- and drying processes. The numbers are relative, household washing is set on 100%. The values of PERC, HCS and professional wet cleaning are respectively 44%, 55% and 53%.

It is clearly shown that the contribution to the greenhouse effect is considerably lower where use is made of the professional cleaning methods based on PERC, HCS and/or wet cleaning.

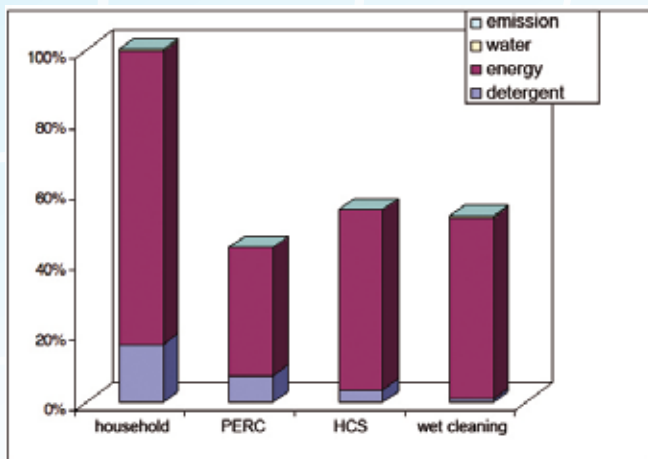


Figure 2 – Environmental impact of household washing and professional cleaning methods per kg laundry. The results are displayed relatively, household washing is scaled on 100%. The values for PERC, HCS and wet cleaning are respectively 43%, 66% and 41%.

Figure 2 clearly shows that overall, professional cleaning is less damaging to the environment than household washing. If we look at the separate numbers, we see that especially the solvents play a part with regard to emission. However, with a solvent use of 10 gram per kg, the contribution to the total environmental impact is relatively low. Water plays a minor part in wet cleaning and household washing; this mainly concerns the energy related to production of drinking water. Since in both cases the detergents are mostly biodegradable, the discharge of surplus detergent is not important.

The scores with regard to the detergent are mainly based on the production of the detergent. Also here, professional cleaning overall scores better.

Sensitivity analysis

TNO also determined which settings of cleaning processes are of a large influence on above mentioned results. This turned out to be the following parameters (in sequence of importance):

- Solvent emission per kg laundry
- Degree of loading of the machines
- Efficiency of steam generation
- Re-use of cooling water solvent machines
- Applying current working processes and state of technology to the machines that are used, sustainable values are reached for these parameters.

Conclusion

This study clearly shows that overall, professional cleaning is considerably more environmental friendly than household washing, when taking into account the current state of technology, the correct working processes and a careful discharge of waste containing solvents. That means this conclusion can once and for all wipe out the image of the cleaning sector as largest polluter. Using the online trainings of TCT and E-DryClean, these working methods can be implemented broadly into the sector, so that green growth can be made truly possible.

References

1. A.W. Wypkema, R.N. van Gijswijk, Duurzaam reinigen, Vergelijkende analyse van de milieubelasting van textielreiniging bij huishoudens thuis en bij professionele reinigers, TNO-rapport, 2011
2. Stefan Faberi, 2007, TREN/D1/40-2005, LOT 14
3. Groeneveld, P. Wasdrogers. Brondocument nr. 003 van Milieu Centraal, Utrecht, versie 3.0, 16 oktober 2008, pp. 1-23