

ANNEX 1

This annex attempts to illustrate with examples our concern that the new formula for the calculation of the annual energy consumption suggested by the Commission on 31 March 2022 might be making annual energy consumption of most vacuum cleaners lower than in regulation (EU) 666/2013, with undesirable consequences. In some cases, it could mean that previously banned products would be allowed to re-enter the EU single market.

A main assumption underlying the reasoning below is that the energy consumption during the debris pick up test is not significantly different from that of the dust pick up test, for a given vacuum cleaner model. We've checked this assumption with manufacturers, and the data available seems to validate our hypothesis. That would therefore mean that:

- For carpet vacuum cleaners, the only difference between the annual energy consumption in the old (regulation 666/2013) and the new formula is the $\left(\frac{1-0,20}{d_{puc}-0,20}\right)$ correction factor, which disappears in the Commission's new suggested formula. Getting rid of the correction factor reduces the annual energy consumption of all products with d_{puc} lower than 1 (all of them).
- For hard floor vacuum cleaners, the only difference between the annual energy consumption in the old and the new formula is the $\left(\frac{1-0,20}{d_{puhf}-0,20}\right)$ correction factor, which disappears in the Commission's new suggested formula. Getting rid of the correction factor reduces the annual energy consumption of all products with d_{puhf} lower than 1.
- For general purpose vacuum cleaners, and given that the energy consumption formula is a weighted average of the carpet energy consumption and the hard floor energy consumption, the vast majority of general purpose vacuum cleaners would also see their annual energy consumption reduced.

Below are some examples that illustrate these points¹:

¹ The examples below use 900W power but the same logic applies with lower power. This [interactive datasheet](#) allows to play with different hypotheses.

Example 1:

Type of vacuum cleaner = carpet

Power = 900W

$D_{puc} = 0,75$

Nozzle width = 0,20m

- The current 666/2013 regulation would yield:

$$\begin{aligned} AE_c &= 17,4 \times \left(\frac{P}{1800B} \right) \times \left(\frac{1 - 0,20}{d_{puc} - 0,20} \right) = \\ &= 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) \times \left(\frac{1 - 0,20}{0,75 - 0,20} \right) = \\ &= 17,4 \times 2,5 \times 1,45 = \\ &= \mathbf{63,27 \text{ kWh/year}} \end{aligned}$$

- The Commission proposal of 31 March 2022 would yield:

$$\begin{aligned} AE &= 17,4 \times \left(\frac{P}{1800B} \right) = \\ &= 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) = \\ &= 17,4 \times 2,5 = \\ &= \mathbf{43,5 \text{ kWh/year}} \end{aligned}$$

The energy consumption of this hypothetical vacuum cleaner would be 31,25% lower under the new formula.

Example 2

Type of vacuum cleaner = hard floor

Power = 900W

$D_{puhf} = 0,95$

Nozzle width = 0,20m

- The current 666/2013 regulation would yield:

$$\begin{aligned} AE_{hf} &= 17,4 \times \left(\frac{P}{1800B} \right) \times \left(\frac{1 - 0,20}{d_{puhf} - 0,20} \right) = \\ &= 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) \times \left(\frac{1 - 0,20}{0,95 - 0,20} \right) = \\ &= 17,4 \times 2,5 \times 1,07 = \\ &= \mathbf{46,40 \text{ kWh/year}} \end{aligned}$$

- The Commission proposal of 31 March 2022 would yield:

$$\begin{aligned} AE &= 17,4 \times \left(\frac{P}{1800B} \right) = \\ &= 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) = \\ &= 17,4 \times 2,5 = \\ &= \mathbf{43,5 \text{ kWh/year}} \end{aligned}$$

The energy consumption of this hypothetical vacuum cleaner would be 6,25% lower under the new formula.

Example 3:

Type of vacuum cleaner = general purpose

Power (carpet) = 900W

Power (hard floor) = 900W

$D_{puc} = 0,75$

$D_{puhf} = 0,95$

Nozzle width = 0,20m

- The current 666/2013 regulation would yield:

$$\begin{aligned} AE_{gp} &= 0,5 \times 17,4 \times \left(\frac{P_c}{1800B} \right) \times \left(\frac{1 - 0,20}{d_{puc} - 0,20} \right) + 0,5 \times 17,4 \times \left(\frac{P_{hf}}{1800B} \right) \times \left(\frac{1 - 0,20}{d_{puhf} - 0,20} \right) = \\ &= 0,5 \times 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) \times \left(\frac{1 - 0,20}{0,75 - 0,20} \right) + 0,5 \times 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) \times \left(\frac{1 - 0,20}{0,95 - 0,20} \right) = \\ &= 0,5 \times 17,4 \times 2,5 \times 1,45 + 0,5 \times 17,4 \times 2,5 \times 1,07 = \\ &= 0,5 \times 63,27 + 0,5 \times 46,40 = \\ &= \mathbf{54,84 \text{ kWh/year}} \end{aligned}$$

- The Commission proposal of 31 March 2022 would yield:

$$\begin{aligned} AE &= 0,25 \times 17,4 \times \left(\frac{P_c}{1800B} \right) + 0,75 \times 17,4 \times \left(\frac{P_{hf}}{1800B} \right) = \\ &= 0,25 \times 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) + 0,75 \times 17,4 \times \left(\frac{900}{1800 \times 0,2} \right) = \\ &= \mathbf{43,5 \text{ kWh/year}} \end{aligned}$$

The energy consumption of this hypothetical vacuum cleaner would be 21,67% lower under the new formula.

Suggested solutions

- **Maintain a simplified formula**, and:
 - a) **Lower the Ecodesign energy consumption threshold** by 31,25%, from 43,5 kWh/year **to 30 kWh/year**; or
 - b) Alternatively, you could slightly raise the **dpu_c Ecodesign threshold, and lower the annual** energy consumption by a smaller amount than 31,25%. Indeed, raising the dpu_c would lower the difference in annual energy consumption between the old and the proposed regulation. Different combinations of dpu_c and energy consumption limits can be explored in this [interactive datasheet](#).
- Note that these suggested changes would just bring the Ecodesign threshold to the same level as in the (EU) 666/2013 regulation. If we consider that technological progress has happened in the last 10 years, and it surely has, then the Ecodesign threshold would need to be further tightened.
- Finally, we acknowledge that, due to the changes in the standard (partially loaded receptacle, three double strokes, etc.), it will be more challenging for a vacuum cleaner to reach the same level of cleaning performance (dpu_c and dpu_{hf}) in the new regulation. While that may have a (limited) impact on the figures provided above, it doesn't change the overall rationale.