

Innovation goals household dishwashers

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1 Introduction

Topten is a consumer-oriented online search tool, which presents the most energy efficient appliances in Europe in various categories of products. Crucial precondition for the meaningful and well accepted Topten market surveys are appropriate selection criteria.

Obviously the market offers in European member States differ significantly in terms of price level, configuration, finishing as well as shares of energy classes and energy consumption corresponding to levels of purchasing power and behavioral aspects (mentality, customs, etc.). From the perspective of the enhancement of the European wide Topten project, however, the higher the level of congruency within the national websites the higher will be awareness (consideration) amongst manufacturers since supply side markets are rather focused on the entire EU market or even on the international market (especially for consumer electronics and ICT).

Within the context of the German EcoTopTen project, dialogues were held with manufacturers in recent years, in which criteria for future market surveys and thus also for possible product developments were discussed. In the case of some product groups, even formal innovation goals were characterised and substantiated, and were communicated to branch associations and manufacturers, with lead times of one to two years in order to give sufficient time for product developments. The targets could also refer to product features which support low-impact and low-cost behaviour on the part of consumers, such as consumption displays in cars, automatic dosage systems for detergents in dish washers etc..

In the herewith presented paper possible innovation targets for **household dishwashers** are discussed against the background of a dialogue with innovative manufacturers that took place in the forefront. After a short introduction in chapter 1, chapter 2 outlines the framework conditions concerning existing legislation, environmental labels and Topten / EcoTopTen criteria and according changes to be expected in the nearer future. In chapter 3 the possible innovation goals are presented and discussed against the background of the dialogue with the manufacturers. In chapter 4 conclusions are drawn.

2 Framework conditions dishwashers

2.1 Ecodesign and EU Energy Label – current discussions

The Ecodesign process on household dish washers is advanced but not completed yet. However draft versions of the implementing measure is available that most probably is close to the regulation that will be adopted. As this regulation naturally is of high importance for the product development undertaken by the manufacturers, its most important aspects are outlined in the following. The same is true for the EU energy label that is also outlined below.

The Ecodesign implementing measure likely to come according to the last draft available (May 2010, EU COM 2010a)

One year after entry into force

- for all household dishwashers, except household dishwashers with a rated capacity of 10 place settings and a width equal to or less than 45 cm, the Energy Efficiency Index (EEI) shall be less than 71; => *“A” and better*
- for household dishwashers with a rated capacity of 10 place settings and a width equal to or less than 45 cm, the Energy Efficiency Index (EEI) shall be less than 80; => *“B” and better*
- for all household dishwashers, the Cleaning Efficiency Index (IC) shall be greater than 1.12. => *“A” and better, no further differentiation*

Four years after entry into force

- for household dishwashers with a rated capacity equal to or higher than 11 place settings, the Energy Efficiency Index (EEI) shall be less than 63; => *“A+” and better*
- for household dishwashers with a rated capacity equal to or higher than 8 place settings, the Drying Efficiency Index (ID) shall be greater than 1.08; => *“A” and better*
- for household dishwashers with a rated capacity equal to or less than 7 place settings, the Drying Efficiency Index (ID) shall be greater than 0.86. => *“A” and better, no further differentiation*

Six years after entry into force

- for household dishwashers with a rated capacity of 8, 9 and 10 place settings, the Energy Efficiency Index (EEI) shall be less than 63. *“A+” and better*

EU Energy Label likely to come according to the last draft available (March 2010; EU COM 2010b)

- Energy Consumption: EEI is calculated on the bases of a standard programme;
- Annual energy consumption, annual water consumption;
- Drying efficiency index, noise, rated capacity (place settings).

Comment

The most important changes compared to the current approach of the EU energy label is that as well the Ecodesign implementing measure as the EU energy label will in the future refer to the annual energy consumption based on 280 cycles per year and include the energy

consumption due to stand-by (left-on after the end of the program) and off mode. In the current version the label refers to the electricity consumption of one cycle concerning the energy efficiency class. The new label will additionally include the classes for drying efficiency and inform consumers about annual water consumption – before: water consumption per cycle – as well as noise and number of place settings.

In both label approaches the number of place settings is considered in the calculation (the standard energy consumption is higher for a higher number for place settings).

2.2 Minimum criteria for Blue Angel, Topten and EcoTopTen

Besides the regulations outlined above also environmental labels – like the Blue Angel in Germany – and the Topten concept

Blue Angel criteria, RAL UZ 137 (RAL UZ 137 2019) => not yet adapted to new proposal for EU energy label / Ecodesign implementing measure.

- Energy Consumption: “A”, more then 9 place settings: “A-10%”
off-mode: max. 0,5 Watt
left-on mode: max. 0,5 Watt (without display), 2 Watt (with display)
- Water Consumption: max. 9l/cycle for dish washers with 9 or less place settings;
10l/cycle for dish washers with 10 or more place settings
- Availability of automatic program that adapts water and energy demand to pollution degree of dishes
- Cleaning and Drying efficiency “A”
- Availability of (most important) spare parts for 10 years
- Materials: hazardous substances in plastic parts; insulation material; requirement for insulation material, exclusion of biocide silver;
- Noise: dish washers with 45 cm: $\leq 46\text{dB(A)}$; dish washers with 60 cm: $\leq 44\text{dB(A)}$
- Aqua Stop: guarantee for water safety for the whole product lifetime
- Instruction manual

Topten.ch => not yet adapted to new proposal for EU energy label / Ecodesign implementing measure.

- Energy Consumption: “A”
- Water Consumption: max. 11l/cycle for dish washers with 9 or less place settings;
12l/cycle for dish washers with 10 place settings; 14l/cycle for dish washers with more then 10 place settings
- Cleaning and Drying efficiency “A”

- Connection to warm water possible
- Aqua Stop: guarantee for water safety for the whole product lifetime
- Noise: integrated dish washers $\leq 46\text{dB(A)}$; stand alone dish washers $\leq 48\text{dB(A)}$

EcoTopTen criteria, January 2009 (ETT 2009) => not yet adapted to new proposal for EU energy label / Ecodesign implementing measure.

- Energy Consumption: "A"
- Water Consumption: max. 13l/cycle for dish washers with 60 cm; 12l/cycle for dish washers with 45 cm;
- Availability of a program for "light pollution"
- Dish washers with 60 cm must either have a quantity control (Beladungserkennung) or a program for light polluted dishes with reduces water and energy demand
- Cleaning and Drying efficiency "A"
- Noise: all dish washers $\leq 46\text{dB(A)}$;
- Aqua Stop: guarantee for water safety for the whole product lifetime
- Quality: If a testresult from Stiftung Warentest is available, it has to be at least "good".

2.3 Market

State of the Market (data from EcoTopTen / September 2009)

60 cm, 12-15 place settings (majority: 12)

Energy consumption: mostly 1,05 kWh/cycle, which corresponds to "A". Only few fulfil "A-10%" ("A+")

Water consumption: between 7 and 13 liters/cycle. Most often 12 liters

Noise: between 39dB(A) and 46dB(A), most 44dB(A)

As a rough estimate the values on the new label would be around 300 kWh/year ("A") and 3.400 litres per year for these machines.

45 cm, 9 place settings

Energy consumption: all 0,8 kWh/cycle, all fulfil "A-10%" ("A+")

Water consumption: between 9 and 12 liters/cycle. Most often 11 liters

Noise: between 45dB(A) and 46dB(A), most 45dB(A)

As a rough estimate the values on the new label would be around 230 kWh/year (“A”) and 3.100 litres per year for these machines.

3 Possible innovation goals for dishwashers

3.1 Energy efficiency

3.1.1 Innovation goal 1: Energy efficiency class “A++” according to the new labelling scheme

Concerning the criterion max. energy consumption the opinions of the manufacturers differed slightly between “A+” and “A++” (new label). One manufacturer expected that already two years from now one third to one half of his models would fulfil energy efficiency class “A++”. Others stated that the heat pump technology which helps to reduce energy demand needs a lot of space and therefore is difficult to integrate in the appliance. Still even then “A-15%” (corresponding to about A++” in the new label approach) seemed feasible for very efficient appliances.

One manufacturer added that a low energy consumption for dishwashing will result in longer program durations. According to his opinion a program duration of 2 hours is the maximum consumers are willing to bear. It can be added that another manufacturer mentioned that “A-30%” (current label approach which corresponds to “A+++” in the new label) can only be achieved with an extremely long program duration of 4 hours.

Against this background the proposed criterion seems reasonable.

3.1.2 Innovation goal 2: Power consumption in off-mode max. 0,5 Watt and in left-on mode max. 0,5 Watt (without display), 2 Watt (with display)

Most manufacturers stated that it is not necessary to set a separate criterion here because the new calculation formula already includes the energy consumption in off mode and in left-on mode. In contrary, double counting would occur which would not reflect correctly but rather overstress the relevance of these modes compared to the actual operation mode (dishwashing cycles). On the other hand some manufacturers argued that it could be counterproductive to set limits for left-on mode. Possible innovations that reduce overall energy consumption but need a higher input power in left-on mode could be prevented. At the moment the functions in left-on mode are merely contributing to comfort, safety and display but future innovations could also bring energy savings. One manufacturer proposed to set the same limit of 3 Watt as for washing machines in order to assure consistency.

From January 2013 on the standby regulation under Ecodesign will limit the input power to 0,5 Watt for left-on mode for appliances without display, which is the same as proposed

above, but stricter for appliances with display (max. 1 Watt). Anyway the limits will come into force in January 2013, which makes sure that manufacturers have to improve their models accordingly by and by.

3.1.3 Innovation goal 3: To be discussed: Availability of automatic program that adapts water and energy demand to pollution degree of dishes and/or load

In principle manufacturers welcomed the proposed criterion automatic program that adapts water and energy demand to pollution degree of dishes and load. They expect a high potential for energy savings especially as consumers – due to their observation – tend to use the automatic program most often (about 60%) and preferably. Consumers expect to have more convenience (e.g. optimized, eventually shorter program duration) and to get better results (e.g. clean and dry dishes). Some manufacturers criticized that at the moment automatic programs usually use higher temperatures than the standard labelling program which almost automatically leads to higher energy consumption compared to the standard labelling program.

Although the reaction was in principle positive there are severe practical obstacles that prevent the use of this criterion:

There does not exist a standardized measurement procedure to reflect half loading and/or light dirt on the dishes. Although Stiftung Warentest in Germany did quality tests that included a procedure with light dirt, this procedure is not recognized by manufacturers. The same is true for other procedures developed by different test laboratories. Standardization process is expected to take some more years.

As a consequence comparability of data could not be secured if such a criterion would be used by Topten. Therefore it is not recommended at the moment to set this criterion in Topten.

3.2 Water consumption

3.2.1 Innovation goal 4: Water Consumption: max. 9l/cycle for dish washers with 9 or less place settings; 10l/cycle for dish washers with 10 or more place settings

Concerning water consumption the manufacturers had different positions: part said, that the criterion is feasible, part said that they are not able to fulfil the criterion at the moment. It has to be differentiated between manufacturers that – at the time of discussion – had no appliances fulfilling the criterion and others that only had the 60cm dishwashers (10 or more place settings) fulfilling the criterion whereas the 45cm dishwashers (with typically 9 place settings) were not water efficient enough.

The affected manufacturer remarked that the smaller dishwasher models (45 cm) have a rectangular ground area that is per se disadvantageous concerning water consumption and noise. In contrast the quadratic ground area of the 60cm dishwashers leads to a higher efficiency concerning water consumption because the spray arms rotate and can cover a higher share of the ground area compared to the rectangular ground areas of the 45 cm dishwashers. Additionally it was stated that typically manufacturers optimise in the first place the 60cm dishwashers. In the smaller, 45cm models innovations will only be integrated 2-3 years later.

As a consequence it rather seems reasonable to harmonise the criteria for water consumption for the two different dishwasher sizes to 10 litres per cycle (corresponding to 2.800 litres per year according to the new label approach.

3.2.2 Innovation goal 5: To be discussed: Availability of automatic program that adapts water and energy demand to pollution degree of dishes

See 3.3.1 Innovation goal 3

3.3 Other criteria

3.3.1 Innovation goal 6: Noise: dish washers with 45 cm: $\leq 44\text{dB(A)}$; dish washers with 60 cm: $\leq 44\text{dB(A)}$

The reaction of manufactures showed that criterion 44 dB (A) is ambitious and more difficult to be achieved for the 45cm appliances than for the 60 cm dishwashers. Due to necessary insulation and at the same time the restricted space it is technically more difficult to realise a very silent dish washer with 45cm size. Some manufacturers argued to lower the limit for 45cm dishwashers to 45 dB(A). Still 44dB(A) seems to be feasible.

3.3.2 Innovation goal 7: Guarantee for water safety for the whole product lifetime

Basing on the existing criteria for EcoTopTen dishwashers and the Blue Angel criteria it was discussed with producers to expand the criterion AquaStop to other countries also.

The reaction was mostly negative: most manufacturers stated that only in a few countries, mainly Germany, Austria and the Netherlands, Water safety / Aqua stop is such an important issue to consumers that manufacturers offer accordant models. In the other countries consumers are not interested in this feature.

Against this background, it seems to be more to the point to leave the decision to include the parameter “guarantee for water safety” or not to the single countries. Depending on the attitude of the consumers and the market situation it should be included or not.

3.3.3 Innovation goal 8: Automatic dosage of dishwashing detergents

In order to prevent over dosage of detergents, which is current practise by consumers, it was proposed to set the innovation goal automatic dosage systems. That way the amount of chemicals released to the environment could be reduced. Concerning the criterion automatic dosage of dishwashing detergents manufacturers remarked that dishwashers with such a feature are not on the market and are even not planned by manufacturers.

There are several reasons for that: at first consumers – at least in Germany – use mostly tabs (about 70%) whereas the others use detergent in powder form. That way most consumers have the impression to already use the right amount / the right dosage: one tab for one cycle. But according to the comments of the manufacturer tabs are disadvantageous compared to detergents in powder form because the relation of the different components is always the same and cannot be adapted (e.g. concerning water hardness): in most of the cases they are either over dosed or under dosed.

In general for an automatic dosage system one would need a liquid detergent because a detergent in powder form would agglutinate in the humid atmosphere of the dishwasher. For washing machines such liquid detergents exist but not for dishwashers. Dish washer detergents need to be composed of several components (e.g. salt, rinsing agent) that need to be entered in the dishwashing cycle at different times given the detergent is liquid.

3.3.4 Innovation goal 9: Feedback function on the energy and water demand of the chosen program

Consumers have a significant influence on the energy and water demand of their dish washer by choosing the temperature, putting more or less detergents and fill in more or less dishes. In contrast to washing machines at the time of discussion no manufacturer offered a model on the market that had such a feedback function on the energy and water demand of the chosen program. Neither was it planned to integrate such a function in the future.

Therefore it does not make sense to include innovation goal 9 in Topten criteria

3.4 Conclusions

In the following table the discussion of the innovation goals is summarized and conclusions are drawn concerning their suitability as future Topten criterion resp. what other option is possible.

Tabelle 3-1 Overview on the proposed innovation goals for dishwashers, their suitability as Topten criterion and other options

Possible innovation goal	Suitable as future Topten criterion?	Other options
Innovation goal 1: Energy efficiency class "A++" according to the new labelling scheme	According to the feedback of manufacturers "A++" seems to be absolutely reasonable as criterion for Topten	An eye should be kept on the program duration. Additionally due to the changed label approach it cannot exactly be predicted how fast the market will be positioned and how it will develop in the future.
Innovation goal 2: Power consumption in off-mode max. 0,5 Watt and in left-on mode max. 0,5 Watt (without display), 2 Watt (with display)	In principle yes	As power consumption in left-on-mode and in off-mode are already included in the EU energy label a separate criterion is not absolutely necessary, the display of the figures may be sufficient.
Innovation goal 3: To be discussed: Availability of automatic program that adapts water and energy demand to pollution degree of dishes and/or load	No, because no standardization method is available	In the future this criterion could become relevant if a standardization method is developed that defines measuring with half load and/or light dirt.
Innovation goal 4: Water Consumption: max. 9l/cycle for dish washers with 9 or less place settings; 10l/cycle for dish washers with 10 or more place settings	An harmonization of the criteria for both dishwasher sizes seems reasonable: 10 liters per cycle (corresponding to 2.800 liters per year according to the new label approach)	
Innovation goal 5: To be discussed: Availability of automatic program that adapts water and energy demand to pollution degree of dishes and/or load	No, because no standardization method is available	In the future this criterion could become relevant if a standardization method is developed that defines measuring with half load and/or light dirt.
Innovation goal 6: Noise: dish washers with 45 cm: ≤ 44dB(A); dish washers with 60 cm: ≤ 44dB(A)	Important criterion, a harmonized approach for both sizes of dishwashers (45cm and 60cm) makes sense and might even be expected by consumers.	Alternatively: Set less strict limits, e.g. 45dB(A) for 45cm dish washers
Innovation goal 7: Guarantee for water safety for the whole product lifetime	Country specific decision is necessary: If consumers ask for such feature and there is a reasonable number of efficient models on the market that offer this feature, yes. Otherwise not.	
Innovation goal 8: Automatic dosage of dish washing detergents	As no models are on the market and – as it seems – in the pipeline of manufacturers planning it makes no sense to use such a criterion in Topten.	
Innovation goal 9: Feedback function on the energy and water demand of the chosen program	No, there are no models on the market and – as it seems – in the pipeline of manufacturers' planning.	

3.5 References

- EU COM 2010a Draft COMMISSION REGULATION (EU) No .../..of [...] implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for household dishwashers. 12-05-2010
- EU COM 2010b Draft COMMISSION DELEGATED REGULATION (EU) No .../.. of [...] implementing Directive 2010/.../EU of the European Parliament and of the Council with regard to energy labelling of household dishwashers. 12-05-2010
- RAL UZ 152 2010 Vergabegrundlage für Umweltzeichen Geschirrspülmaschinen für den Hausgebrauch RAL-UZ 152. RAL GmbH. Juli 2010
- ETT 2009 EcoTopTen-Kriterien für Geschirrspülmaschinen. Öko-Institut e.V.. Juni 2009