Super Efficient Coffee Machines – Best Available Technology (BAT) and Market Transformation

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Abstract

The stock of coffee machines in the European Union is estimated to be 100 million units, consuming 17'000 million kWh per year and causing electricity costs of about 2'500 Mio Euro (according to estimations by Topten). Roughly 20 million coffee machines are annually sold in Europe. For comfort and quality reasons, the trend goes towards espresso machines (fully automatic machines, portioned machines with high pressure) and filter pad machines; by now those machines account for about 45% of total sales, while the rest are mainly traditional drip-filter machines.

On account of the high energy saving potentials, manufacturers have implemented various efforts to increase the energy efficiency of coffee machines in the past few years. Energy efficiency particularly was enhanced with measures such as auto-power-down, better insulation of hot parts and low or zero standby consumption.

One striking development towards super efficient coffee machines is the application of flow-type heaters. Owing to the introduction of this technology by some innovative manufacturers these types of coffee machines represent the current best available technology (BAT).

This paper discusses the energy saving technology of flow-type heater for coffee machines, it gives an overview of the current state of the IEC 60661 standard (update in progress) and the EU Eco-design process (Lot 25) and it presents policy measures on European Minimum Energy Performance Standards MEPS and a labelling directive.

Introduction

For many people drinking coffee is part of their lifestyle. The range of the different coffee beverages is broad: in Europe well known are filter-coffee, espresso, cappuccino and latte macchiato.

The coffee beverages and the consumer preferences of coffee drinking habits are various and so are the preparation methods. Among the coffee machines with electricity supply, drip-filter coffee machines are still widespread in Europe. But for comfort and quality reasons, the trend clearly goes towards fully automatic machines and portioned capsule machines.

Conventional machines among these comfort products however account for large energy losses in particular in the ready mode to keep the temperature in the boiler or thermo-block permanently on 85°C to 90°C. Their keeping warm function may consume up to 170 kWh per year, depending on user's switching off practice. Never switching off would double this value. 170 kWh exceeds the annual energy consumption of a small A++-refrigerator, 75 kWh equals the consumption of an A-class oven used twice a week. The key parameters that strongly enhance the energy efficiency of coffee machines thus are auto-power-down, better insulation of hot parts, reduction of the thermal capacity of the heating unit, "energy saving mode", reduced or zero standby consumption and low amount of water to be heated for hygienic and quality purposes.

In the framework of the Eco-design Directive, the preparatory study on "non-tertiary" (i.e. for household use) coffee machines DG TREN Lot 25 is being carried out by BIO Intelligence Service (Paris) for the European Commission. It is attended by various stakeholders e.g. the European Committee of Domestic Equipment Manufacturers CECED, manufacturers, Topten (an international online search tool which presents the most energy efficient products such as household appliances,

office equipment, consumer electronics, building components, lamps and cars, for more information see [1], [2]), the Swiss Agency for Efficient Energy Use S.A.F.E., the European Environmental Citizens Organisation for Standardisation ECOS and Oeko-Institute.

Leading initiatives to push the market introduction of high efficient coffee machines since many years are taken by Topten and S.A.F.E..

Types of Coffee Machines

Coffee machines with electricity supply can be categorized according to their pressure: machines with high pressure (> 8 bar), low pressure (< 8 bar) and no pressure (see Table 1 and Figure 1). For the preparation of a real “espresso” 15 bar are optimal. Therefore, machines with more than 8 bar are synonymously called “espresso machines”. Coffee prepared with low or no pressure tastes more like drip-filter-coffee.

Table 1. Types of coffee machines.

Type	Pressure	Quality of Coffee	Synonym
Fully automatic machines	High	Espresso	Espresso machine
Portioned machines: Capsule machines	High	Espresso	Espresso machine
	Low (e.g. Tassimo)	Drip-filter-like	----
Portioned machines: Pad machines	Low	Drip-filter-like	----
Machines with piston lever	High	Espresso	Espresso machine
Drip-filter machines	No pressure	Drip-filter-like	----
Combi machines (Piston lever/Drip-filter)	High/Low	Espresso/Drip-filter-like	----

Figure 1. Types of coffee machines.

Stock, Sales and Market Trends of Coffee Machines

The stock of coffee machines in Europe is estimated at 100 million units (according to Topten). As shown in Table 2, annually more than 18 million coffee machines are sold in Europe [3].

Traditional drip-filter machines still have the highest market share (approx. 55%), followed by the portioned machines for pads (approx. 20%).

Espresso machines together with portioned machines for pads have a market share of 43% and an actual growth of 6.9%.

There is a considerable trend towards fully automatic machines (+5.5%) and an extremely strong trend towards espresso portioned machines (+43.1%), while low-comfort machines are losing market

share (machines with piston lever, machines with filter-coffee quality such as portioned machines for pads, and the rare combi machines).

Table 2. Sales of coffee machines in 2006 and 2007.

Sales of Coffee Machines (in 1'000)	2006	2007	Increase
Fully automatic machines (Espresso machines)	824	870	5.5%
Portioned machines for capsules (Espresso machines)	1'647	2'356	43.1%
Portioned machines for pads	3'546	3'410	-3.8%
Machines with piston lever (Espresso machines)	1'358	1'246	-8.2%
Drip-filter machines	10'076	10'072	0.0%
Combi machines	312	284	-8.9%
All coffee machines	17'763	18'238	2.7%
All espresso machines and portioned machines for pads	**7'375**	**7'882**	**6.9%**

Source: GfK Group data of 18 European countries [3]:
AT, BE, CH, DE, FR, GB, ES, IT, NL, PT, SE, DK, FI, GR, PL, HU, CR, SR.

Energy Using Functions of Coffee Machines

The most energy using function of coffee machines is the permanently keeping hot of the water at 85°C to 90°C and strongly depends on the heating unit. Further energy using functions are the production of a cup of coffee, standby and electric motors, pumps and magnet valves (see also [4]).

Heating units: Boilers, Thermo-blocks and Flow-type Heaters

Due to high power rating (about 1'000 to 1'500 W) and considerable active time the heating unit claims the largest share of coffee machines' energy consumption. Most heating units do not only heat up cold water, but also keep it hot or keep a jug hot (drip-filter machines) as long as they are supplied with electricity.

Three types of heating units are common in coffee machines (see Figure 2): boilers (containing several hundred ml of water), thermo-blocks (containing 10 to 20 ml of water, but several hundred grams of aluminium) and flow-type heaters (containing about 10 ml of water). Their material contents and resulting thermal capacity at a temperature difference of 70°C (ambient 20°C, coffee production 90°C) are shown in Table 3.

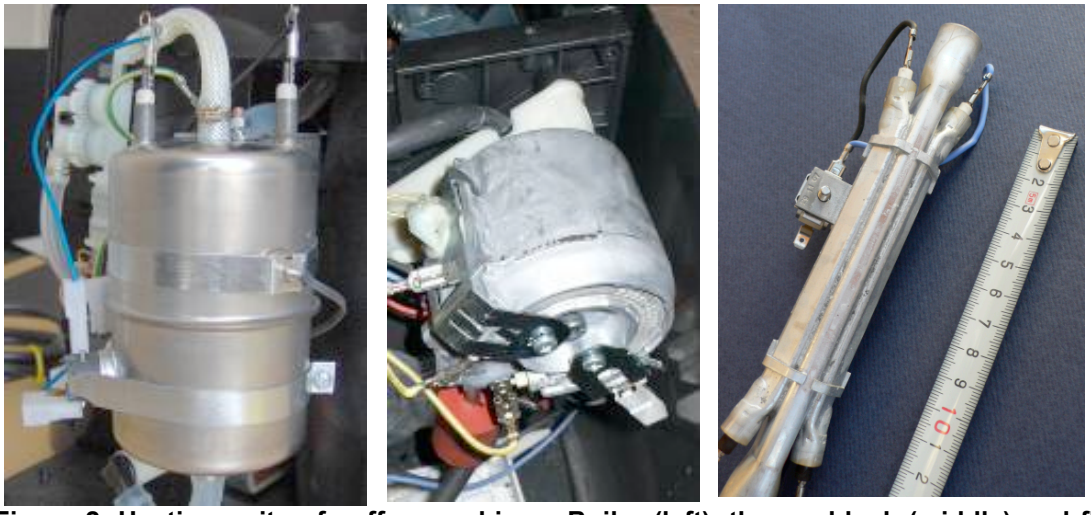

Figure 2. Heating units of coffee machines: Boiler (left), thermo-block (middle) and flow-type heater (right). Source: Topten

Table 3. Properties of heating units for coffee machines.

Type	Boiler	Thermo-block	Flow-type Heater
Water	200 g	10 g	10 g
Metal	400 g	650 g	120 g
Thermal capacity at $\Delta T = 70°C$	22 Wh	12 Wh	3 Wh

Production of a Cup of Coffee

The amount of energy physically needed to heat up water for an average cup (80 g) is 6.5 Wh (at a temperature difference of $\Delta T = 70°C$). Measured values according to Topten-measurements and FEA/CECED-forms range from 8.1 to 14.7 Wh (see Figure 3). They comprise also the energy for pump and grinder, if existing (in the range of 1 Wh each). These values are significantly lower than the heating up energy of typical boilers. Values below 10 Wh signify good efficiency.

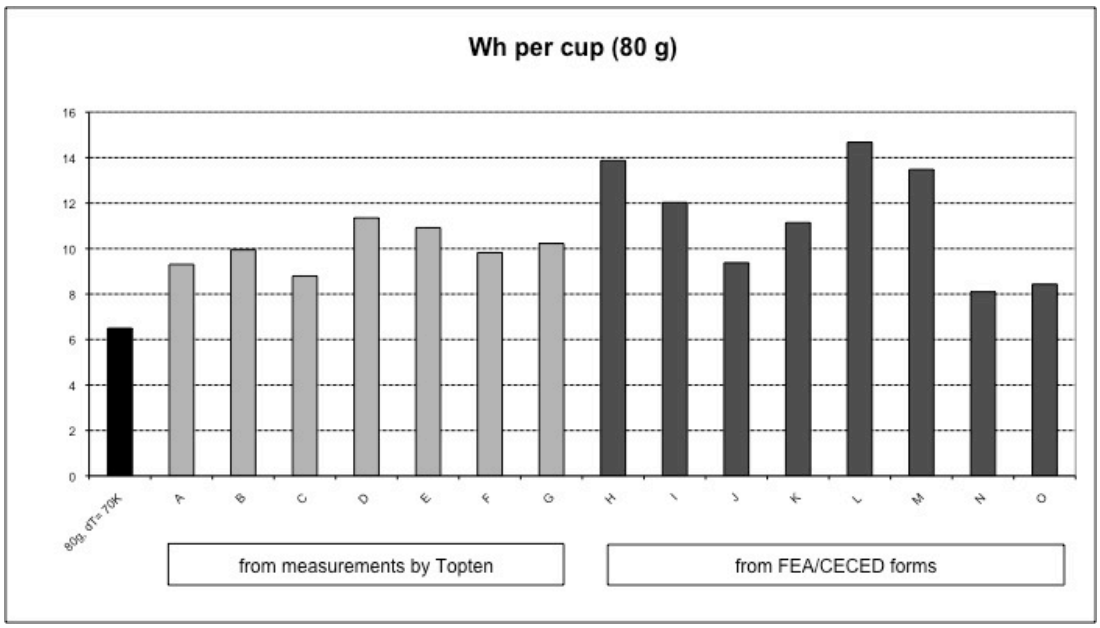

Figure 3. Energy needed for the production of a cup of coffee (80 g, in Wh).
Source: Topten

Standby

Appliances with automatic functions such as a coffee brewing process, a timer to switch on at pre-set times or an auto-power-down function need a power supply unit to generate the low DC-voltages for the electronics. Power consumption of older electronic power supplies was up to 5 W, while efficient new ones consume less than 1 W, e.g. 0.3 W. Standby duration depends on the active state duration, typically it is about 7'000 hrs per year, resulting in 2 to 7 kWh per year. For high efficient coffee machines, this is a small but not quite negligible value. For coffee machines, zero standby is possible (see below).

Electric Motors, Pumps and Magnet Valves

Motors are used for grinding and automatic brewing units, pumps for all coffee machines except drip-filter machines, and electric valves for special process steps. These units may have considerable power ratings of e.g. 20 to 100 W, but their switched-on time is normally very short, e.g. some seconds to one minute. Therefore, their consumption share is very low and no specific efficiency measures are taken.

Measures to Reduce the Energy Consumption of Coffee Machines

The importance of the energy consumption during the use phase for life cycle eco-balance is shown by several studies (e.g. [5], [6]).

Conventional fully automatic and portioned machines account for large energy losses in particular in the ready mode to keep the temperature of the water permanently on 85°C to 90°C.

Measures that strongly enhance the energy efficiency of coffee machines are the availability of an auto-power-down and a short delay time, insulation of hot parts, reduction of the thermal capacity of the heating unit; “energy saving mode”, reduced or zero standby consumption and low amount of water to be heated for hygienic and quality purposes (see also [4]).

Availability of an Auto-Power-Down and Short Delay Time

An auto-power-down function is the first and simplest measure to abbreviate the duration of the keeping hot state and thus to reduce the high energy consumption of the ready mode (keeping hot of the water). However, the duration of the delay time, or in other words, the time until the coffee machine switches from the ready mode into standby mode is important: the shorter the delay time the greater the impact of this feature.

New water heater units that are designed as flow-type heaters do not need auto-power-down, as they are activated only for coffee brewing and switched off immediately when the coffee production is finished (see below).

Insulation of Hot Parts

Thermal losses of heaters are substantially lowered by (even thin) insulation of the hot parts of coffee machines such as thermo-blocks and water heaters of any kind. The insulation prevents the cooling effect of air ventilating the hot parts immediately. Even with flow-type heaters a small efficiency gain by insulation is to be expected.

A very efficient type of insulation can be implemented for drip-filter machines: if the coffee is stored in a thermos jug (with vacuum insulation), no energy in form of electricity is needed to keep the coffee at the right temperature. This reduces strongly the energy consumption during the coffee period, but its value depends on the definition of the coffee period (see below).

Reduction of the Thermal Capacity of the Heating Unit

Reducing the thermal capacity of parts to be heated up is a further effective measure to reduce energy consumption. The smaller the thermal capacity the less “heating up”-energy has to be supplied.

A striking development towards super efficient coffee machines is the application of flow-type heaters. They have the lowest thermal capacity (due to their very small thermal mass) and thus are the most efficient water heaters for coffee machines. Coffee machines with flow-type heaters do not need auto-power-down and have no ready mode losses, as they are activated only for coffee brewing and switched off immediately when the coffee production is finished. Heat losses during the brewing process are also low because of their little water content and thermal capacity. Problems of the first brew being of minor quality because of too low water temperature can be solved by discarding the first few millilitres leaving the heater. Flow-type heaters need a sophisticated control of heating energy and pump to reach the desired water temperature very quickly but avoid overheating.

The flow-type heater shows a small non-insulated surface (see Figure 2). The huge energy saving potential compared to boilers and thermo-blocks is mainly due to the fact that it is heated only for 1 to 2 minutes whenever a cup of coffee is produced.

"Energy Saving Mode"

Some coffee machines have an "energy saving mode" or "eco-mode" which is factory set or can be programmed in the menu. This mode lowers the temperature of the heating element after a certain time (e.g. 5 minutes), from standard 90°C to about 60°C (e.g.). The coffee machine then is no longer in a real ready mode, but requires some heating time before dispensing coffee. It takes less time however than heating up from the cold state. This type of "energy saving mode" allows good energy efficiency figures also with somewhat longer auto-power-down delay times. A question of technical terms may arise: the "low-temperature eco-mode" is nor a standby mode nor a real ready mode. This should be adequately treated by a measuring method.

Reduced or Zero Standby Consumption

The shorter the delay time of the auto-power-down the longer the machine remains in standby. The allowed energy consumption in standby is regulated by the Eco-design Regulation for standby and off mode consumption [7]. As the use of a coffee machine requires pressing a button or another manipulation anyway, there is no need for a standby function as e.g. for TV sets, which are to be activated by a remote control. Therefore zero standby does not cause any technical problems for coffee machines and can be easily implemented. As most coffee machines afford an electronic control and soft switches, the extra costs of zero standby are small.

Low Amount of Water to be Heated for Hygienic and Quality Purposes

Most coffee machines heat up certain quantities of water for rinsing purposes when switched on or off, or they discard a small amount of coffee at the beginning of the brewing process, which might be not hot enough or not of sufficient quality. Decalcification and (automatic) cleaning also is an energy (and resources including chemicals) consuming aspect in the life cycle of coffee machines. There might be an additional saving potential, e.g. by using lower water temperatures and volumes for these processes.

Best Available Technology of Coffee Machines (BAT)

Highly efficient coffee machines feature the above discussed efficiency technologies in an optimal combination. Presently, comparable measurement results of a broad selection of coffee machines are not available because measurement methods are not yet harmonised (see below). The analysis of many results (FEA/CECED-forms) and own (Topten) measurements suggest that several coffee machines – portioned as well as fully automatics – are very nearby the theoretical "Best Available Technology".

Experience shows also that good efficiency can be achieved not only with flow-type heaters, but also with relatively small, well-insulated boilers/thermo-blocks and energy saving temperature control. Presently it seems that there are no really new "Best Not Available Technologies" (BNAT) to be expected for the types of coffee machines in the focus. The physical analysis of the functions and energy flows prompts this assumption.

A crucial issue considering energy efficiency is the possible affection of coffee quality by too restrictive efficiency measures. An example: optimal coffee with espresso quality requires all objects coming in contact with the brewing unit and brewed coffee to be hot. The challenge is to come near to that without the need of keeping all objects at high temperature. A possible solution is to discard a very small amount of coffee first leaving the brewing unit. The effect is similar to rinsing the machine before brewing.

Another development area for coffee machine efficiency is the consumption of energy and water for maintenance and hygiene purposes.

Flow-type heater technology might lead to higher electric power demand: actually, most coffee machines have a maximum power input of 1'000 to 1'500 W. To enable a machine to brew two cups

at once in a short time, power ratings of 2'000 W or more may be attractive. Problems may arise for household electrical installations.

Preparatory Study on Non-tertiary Coffee Machines Lot 25

Since mid of 2009, the preparatory study on non-tertiary coffee machines Lot 25 [6] is being carried out by BIO Intelligence Service (Paris) for the European Commission DG ENER in the context of the Eco-design Directive. The preparatory study follows the Methodology for Eco-design of Energy-using Products (MEEuP), which is mandatory for all Eco-design preparatory studies, comprising 8 tasks.

Methods to Measure the Energy Consumption of Coffee Machines

Presently Used Measuring Methods

The existing standard IEC 60661 [8] does not include a method for measuring the energy consumption of coffee machines. Therefore two initiatives have developed each a measuring method. Both methods are applied in Europe in parallel at present.

One method was developed by Euro-Topten and S.A.F.E. (year of implementation: 2007, last update May 2009 [9]) and was presented at EEDAL 2009 [10]. It is applied by Topten for "Best Products of Europe" (presented on www.topten.eu) and for national Topten-sites (e.g. www.topten.ch), by The Blue Angel (for RAL-UZ 136 [11]), by manufacturers to have their high efficient coffee machines presented on Topten websites and by Swiss electrical utilities and Swiss communities for rebate programmes based on Topten lists.

The other method was developed in 2008/2009 by the Swiss Association of the Domestic Electrical Appliances Industry FEA with the contribution of CECED. It is applied by manufacturers to get the voluntary Swiss energy label (class A to G, introduced in autumn 2009). The measuring method was adopted by CECED.

As shown in Table 4, both methods have benefits and drawbacks.

Table 4. Benefits and drawbacks of the Euro-Topten/S.A.F.E.- and the FEA/CECED-measuring methods for coffee machines.

	Euro-Topten/S.A.F.E.-Method	**FEA/CECED-Method**
Implementation	**2007**	**2009**
Benefits	• Measurement along a "coffee period" • Simple proceeding irrespective of "energy saving modes"	• Measurement of coffee preparation and steaming function
Drawbacks	• Presumed coffee preparation energy consumption: standard value of 20 kWh/year (Note: corresponds well to measurements, see Figure 3: 9 Wh for 80 g, 2'190 cups per year)	• Impact of auto-power-down delay and "energy saving modes" not adequately considered

Future Test Standard: Revised IEC 60661

As the existing standard IEC 60661 [8] does not include a method for measuring the energy consumption of coffee machines and because both presently used measuring methods have their benefits and drawbacks as described above, one revised European approach improving the existing methods validated by CENELEC is in development in a collaboration of CECED, manufacturers, Topten and S.A.F.E. (working group TC59X_WG15).

The revised IEC 60661 will contain two measuring procedures: one for coffee machines with pressure (high and low pressure) and one for drip-filter machines (no pressure).

Proposal for Pressurized Coffee Machines

The measurement follows along a reasonable usage cycle, the so called "coffee period": start of the coffee machine from cold, heating up, wait until ready, wait one minute, coffee preparation at defined points in time (1 minute after ready (1 x 40 g, 1 x 120 g) and at minute 30 (double coffees: 2 x 40 g), in total 240 g), measurement of the energy consumption at minute 40 and at minute 100 (end of the "coffee period"). During the measurement the behaviour of the machine will be as set by factory (e.g. auto-power-down, delay-time, "energy saving mode", rinsing etc.).

Coffee temperature – as one of the indicators for good coffee – is measured. In case the temperature does not reach 76°C, a correction of the consumed energy is made.

In case the actual coffee mass deviates from the nominal, a correction is made.

In case the machine can only make single coffees the double coffees are replaced by 2 singles of the same weight to be made immediately in sequence.

If a machine does not have a power management system including automatic switching to standby or off mode, the value of the energy consumption from minute 40 to minute 100 shall be used as hourly standby mode energy consumption.

If the machine has a power management system that switches the machine to off mode, the off mode power consumption will be taken as standby power.

Steam production is measured separately.

The consumption of energy and water for maintenance and hygiene purposes is not considered in measuring method.

Proposal for Drip-Filter Coffee Machines

A draft proposal was worked out by Topten and S.A.F.E.. It will be discussed at the next CENELEC-meeting held in mid of May 2011. This will be after the closing time for this paper and thus no further details can be provided in this section.

Energy Saving Potential of Coffee Machines

The electricity consumption of coffee machines and its saving potentials are of high relevance. However, the annual energy consumption of coffee machines depends on the applied measuring method and the assumptions made on the consumer behaviour. It is intended that the daily energy consumption of coffee machines will be calculated as followed:

- Pressurized coffee machines: 3 coffee periods per day (measured according to the upcoming revised IEC 60661 (drafted), 720 ml, 5 h), 8 hours in standby, 11 hours in off.
- Drip-filter machines: 2 coffee periods per day, energy consumption normalised to 900 ml.

First measurements according to the upcoming revised IEC 60661 (drafted) were undertaken by some manufacturers. However, there cannot be given estimations on the energy saving potential on that basis, because no broader data are available and the tasks of lot 25 are not yet finished at the present time.

According to estimations by Topten more than 10'000 million kWh or up to 2'000 million Euro electricity costs could be saved per year, if 100 million coffee machines in Europe were replaced by energy efficient models (old coffee machine: 170 kWh/a, new coffee machine: 50 kWh/a).

Market Transformation of Coffee Machines

Since 2005, the energy efficiency of coffee machines has been improved as follows (based on the expert knowledge of Topten and S.A.F.E., see also [4]):

Until 2005 most coffee machines had to be switched off manually after use. If consumers didn't do so, the coffee machines stayed in the ready mode, which resulted in a high energy consumption (heating unit at 85°C to 90°C).

When launching the www.topten.ch presentation of the most efficient coffee machines available on the Swiss market in 2007, the auto-power-down function was found only in the first few machines. However, the factory settings of the auto-power-down delay time were at 3 hours and more. Nowadays all (non-tertiary) coffee machines of the important manufacturers entering the market are equipped with an auto-power-down function. Factory settings of the auto-power-down delay have been shortened: for some models the factory setting is 2 hours (or more), for many models between 10 minutes and 1 hour and for some models 1 minute or even below.

The first coffee machines with an auto-power-down had a standby consumption of about 3 W. Since January 2010 the standby of coffee machines is regulated by the Eco-design Regulation for standby and off mode consumption [7] and max. 1.0 W (without display) and max. 2.0 W (with display, tier 1) are required. Nowadays, coffee machines typically have a standby of 0.5 to 0.9 W. However, more and more models switch even to zero power.

Coffee machines that are equipped with an "energy saving mode" that lowers the temperature of the heating element after a certain time entered the market in 2009.

In the past few years, thermal losses of heaters were also lowered by better insulation of the hot parts of coffee machines such as thermo-block and water heaters of any kind. Before 2005 certain models needed 30 W and more in ready mode (even without actively heated hot plate), today efficient models hardly exceed 10 W.

First (portioned) machines equipped with flow-type heaters entered the market in 2008.

Initiatives to Push Market Introduction of High Efficient Coffee Machines

The following initiatives have been undertaken in the last few years to push the market introduction of high efficient coffee machines:

Measurements of the Energy Consumption and Tests

Since 2003 many measurements and tests on coffee machines have been undertaken by Topten and S.A.F.E. according to their measurement method [9]. The results and the expert knowledge flew back to the manufactures. Many of them incorporated the input and enhanced the energy efficiency of their machines during the past few years.

Criteria for High Efficient Coffee Machines by Topten and by The Blue Angel

In 2007, Topten developed selection criteria for high efficient coffee machines (fully automatic machines and portioned machines) and started to present the most efficient coffee machines in Switzerland on www.topten.ch (measured according to [9]).

The presentation of the most efficient coffee machines available on the European market followed in 2008 (www.topten.eu – Best Products of Europe). The criteria strengthened in parallel to the technical development of coffee machines.

The Blue Angel developed criteria for high efficient coffee machines in summer 2009 (RAL-UZ 136 [11]). The measuring method and energetic criteria are harmonized with Topten.

Topten and The Blue Angel will adopt the revised IEC 60661 standard as soon as possible.

Rebate Programmes

In Switzerland, the cradle of Topten, first rebate programmes for high efficient coffee machines were launched in 2007 by the Zurich Municipal Electric Utility (ewz). Selection criterion is Topten (being listed on www.topten.ch). Other Swiss electric utilities and Swiss communities soon followed the example of ewz.

Energy Label

In 2006, Topten and S.A.F.E. proposed the introduction of an energy label for coffee machines in a contribution at EEDAL 2006 [12]. In autumn 2009, a voluntary Swiss energy label was introduced in Switzerland ranging from class A to G, based on the FEA/CECED-measuring method.

Policy Recommendations

Policy measures are needed to realise the high electricity saving potential of coffee machines. The Eco-design Regulation for standby and off mode consumption is also relevant for coffee machines, but the delay-time for the auto-power-down is not yet defined. Furthermore, Minimum Energy Performance Standards MEPS and an EU energy label for coffee machines should be established. Also the production of capsules and pads should be taken into account and an ambitious timetable for the implementation should be set up.

Appropriate Implementation of the Standby and Off-Mode Regulation

Since January 2010 the “horizontal” (covering all products) Eco-design Regulation for standby and off mode consumption [8] is in force and requires also coffee machines to have a standby consumption of no more than 1.0 W (2 W with display). From 2013 the limits will be 0.5 W (1 W with display). As for non-tertiary coffee machines there is no need to display any information in standby mode, Topten recommends that only the lower values should apply (tier 1: 1.0 W; tier 2: 0.5 W). Nevertheless, zero standby represents BAT and helps manufacturers to get a better energy class.

Introduction of Minimum Energy Performance Standards MEPS

Effective Eco-design measures should include MEPS targeting the coffee machines’ energy consumption during the coffee period. Maximum limits should be guided by the most efficient products on the market. As the measuring method according to the revised IEC 60661 is not yet definite maximum thresholds cannot yet be proposed at the present time.

From January 2013 energy-using products must have a power management function switching to a standby or off mode "after the shortest possible period of time appropriate for the intended use of the equipment" (tier 2 of [7]). For non-tertiary coffee machines, auto-power-down will therefore be a need. For coffee machines the maximal delay from the last activity is not yet defined. Topten recommends a maximal delay time (factory setting) of 15 minutes for portioned machines (high and low pressure), 30 minutes for fully automatic machines and machines with piston lever and 60 minutes for drip-filter machines without thermos jug.

Introduction of an EU Energy Label for Coffee Machines

An energy label would be a very effective measure to help buyers to recognise the most efficient products on the market. As retailers like to offer products of best label classes the label would give incentives to industry and trade to develop and offer energy-efficient coffee machines. It further would be a useful tool for promotion programmes.

Topten recommends the introduction of an EU energy label for all types of coffee machines such as fully automatic machines, portioned machines (high and low pressure), machines with piston lever as well as drip-filter machines and combi machines. The measurements of the energy consumption shall follow the revised IEC 60661 (in work).

For the different types of coffee machines are different labelling schemes recommended (e.g. fully automatic machines have a more sophisticated brewing unit because coffee powder has to be processed, instead of capsules or pads).

The Production of Capsules and Pads Should Also Be Taken Into Account

With respect to the overall energy and resources consumption of coffee preparation the production of capsules and pads should also be taken into account. The capsule production is likely to (over-) compensate the somewhat lower energy consumption of portioned machines for a coffee period. As the energy and resources expenses of capsules cannot be influenced by the buyers, a declaration of the eco-balance of capsules and pads should be discussed.

Ambitious Timetable for Implementation

Manufacturers strongly improved their coffee machines over the past three years. No further big energy saving potential is expected (brewing of coffee: no substantial energy gain is possible, and flow-type heaters are introduced in the market). Manufacturers shall get incentives very soon!

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