Commission Working Document on possible Ecodesign and EU Energy Label measures for Domestic Coffee Machines

Brussels, 18.11.2011

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Subject matter

This working document pursuant to Directive 2009/125/EC and Directive 2010/30/EU esxamines possible ecodesign and labelling requirements related to domestic coffee machines. The Lot 25 preparatory study shows that energy, coffee and filter/pad, capsule consumption in the use phase are the significant environmental aspects.

Coffee makers are about coffee. Europeans are large coffee drinkers, consuming 2,4 Mt of coffee beans and representing over 31% of world coffee consumption. On average, 2,2 daily cups per capita (1 cup = 125ml, 6 g of coffee) are consumed, totalling 400 billion cups per year. Per average household this comes to 2000 cups per year and a daily consumption of 5,2 cups.

Regional differences in coffee drinking behaviour are large. Coffee consumption is high in Northern and Western Europe, except UK and Ireland, at on average 3-4 cups per capita (8 per hh) of which a significant part is consumed at work, in bars and restaurants. In Southern Europe (2 cups/capita) and Eastern Europe (1,5 cups/capita) coffe consumption is significantly lower, but rising. Whereas in Western and Northern Europe coffee consumption is stable or even in a slight decline, Italian coffee consumption, although rarely involving filter coffee-makers in the scope of this possible measure, has been rising by 6%. For Eastern Europe there is anecdotal evidence that high-end coffee makers are becoming a status symbol. The UK reports almost doubling of coffee maker unit sales between 2001 and 2007, with a 2007 sales volume of 1 million units.

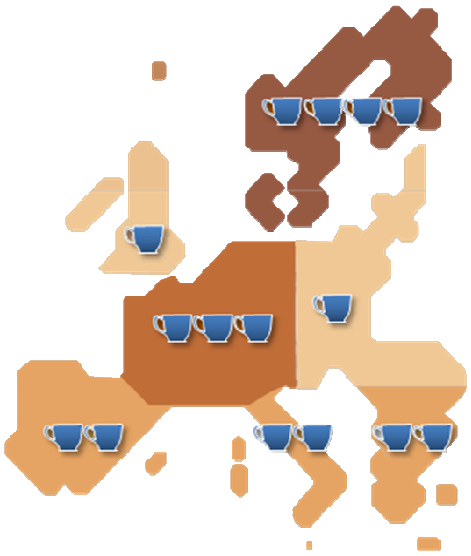


Figure . Daily coffee consumption per capita in the EU-27

According to the preparatory study[1], the expenditure related to domestic coffee machine usage is estimated around € 62 billion/year, costs related to the machine (3%), energy use (6%) and maintenance (1%) are negligible compared to coffee (including filters) which makes up 90% of the expenditure. Per household the annual costs are on average € 310.

[1] Bio Intelligence Service in association with ARTS, Preparatory Study Lot 25 Non-tertiary Coffee Machines. July, 2011.

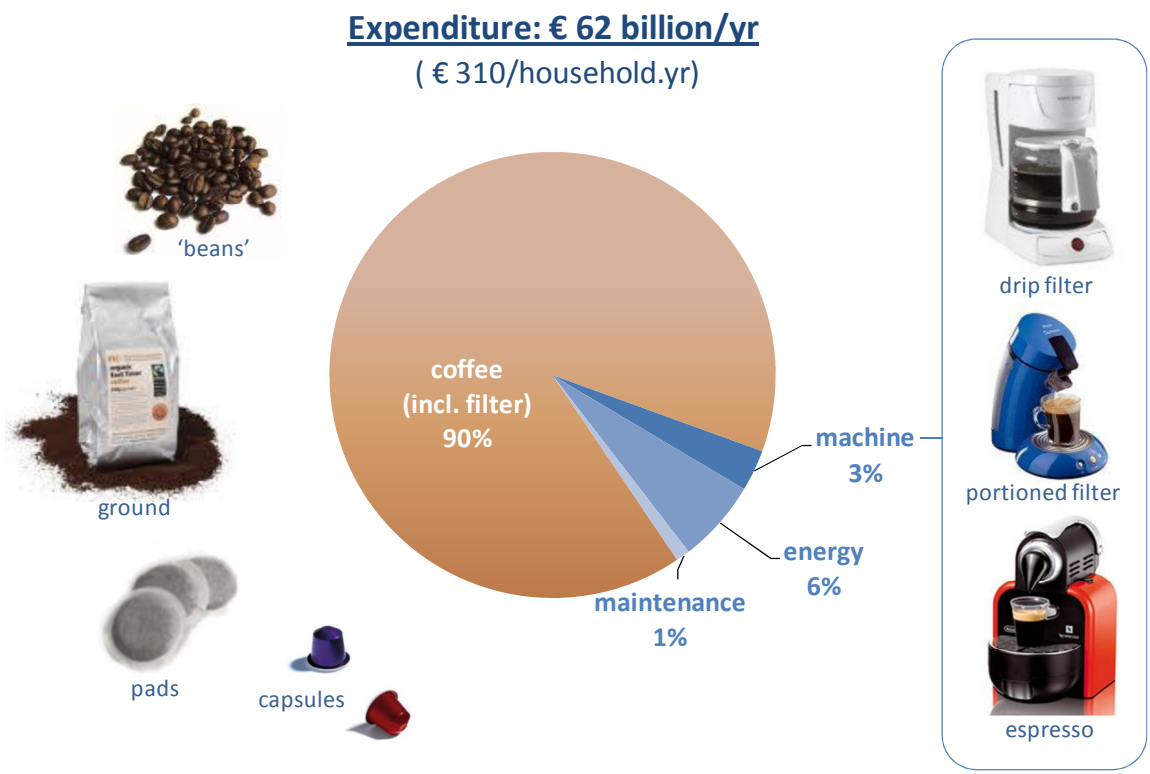


Figure . Annual consumer expenditure domestic electric coffee makers in EU-27

Coffee machines, although their expense is negligible compared to the coffee, are still economically significant constituting a market of € 2 billion in consumer prices. Market data in general is very poor for this sector, but it can be estimated that the market in msp (manufacturer selling prices) is around € 800 million. Employment in the trade, physical distribution and production is estimated to be significant and at the common ratios for wages against turnover will be in the order of 15-20 000 jobs, of which at least two-thirds will be in the EU.

In terms of energy, coffee makers are not just about electricity use but probably more about the (indirect) energy of waste streams caused by the machine. Reportedly, up to one-third of the drip filter coffee is thrown away after evaporating and deteriorating for more than half an hour on a keep-warm plate and also the filters/pads/capsules contribute to the impact.

An energy analysis of the production and procurement of roasted coffee beans is added as a separate document, providing background information on how the indirect energy values for coffee and auxiliaries used in the draft measure for proposal 2 are calculated. This analysis shows that coffee beans contribute more to energy use than the electricity consumption of the coffee maker.

Around 70% of installed domestic coffee machines are drip filter machines, 20% are portioned filter machines and 10% are espresso machines. Unit sales are estimated around 20-22 million machines per year at a value in consumer prices of € 2 billion per year. On average the price of a drip filter machine is € 35, portioned filter machines cost about € 81 and espresso machines can be acquired at the expense of € 225 (weighted average over all types).

Market structure and trends of the products covered by this working document

Over the last decade there has been a strong trend away from drip filter machines and towards portioned filter coffee machines and espresso machines with hard capsules. The latter two are now believed to constitute more than 50% of the market values.

Within drip filter machines, standard machines with a glass jug make up 70% of the market (€ 15-100), standard machines with a thermos account for 20% of the market (€ 25-100), finally electronic drip filter machines have a market share of 10% (€ 100-200).

Portioned filter machines were introduced in 2002 and now they have a 20% market share. These machines can be bought for on average € 81 according to the preparatory study.

The market for espresso machines is divided between hard cap machines with 51% market share (€ 156), semi-automatic machines with 30% market share (€ 103) and fully automatic machines with 19% market share (€ 595).

Measurement standard

For espresso machines there is standard IEC 60661: 1999, which was amended in 2005 but is now being redesigned to fit the policy measures and e.g. include also drip filter coffee machines. Unfortunately, a final version is not expected for some time but it has been a source of inspiration for the test and calculation method presented in this draft Working Document, albeit the drip filter section is still quite immature.

Other test and measurement methods for domestic coffee makers have been developed by the Swiss Topten and largely followed by the German Blue Angel. But again the scope is on espresso machines, taking into account also extra functionality such as the energy for frothing the milk.

In the US there is an AHAM standard AHAM CM-1-2007 for coffee machines, which has a focus on certain quality features but no focus on energy. The legacy voluntary minimum requirement in Russia, discussed hereafter, also features a measurement standard. The same goes for the Korean eco-label, which contains a prescription on how to establish efficiency.

Worldwide standards and labelling activities

Energy policy measures for coffee makers are scarce. In the EU there is a Blue Angel label RAL-UZ 136 for espresso machines and apparently a Nordic Swan label. In Switzerland Topten is very active in the field of espresso machines.

In Russia there appears to have been (or perhaps still is) a voluntary minimum energy performance for coffee pots GOST 20888-81, introduced in 1981 and updated last in 1991.

There is a Korean Eco-label EL408. for Electric Kettles and Electric Coffee Makers, introduced in 2005, which requires amongst others that the efficiency for brewing 1 litre of coffee should be at least 72% and the keep-warm consumption should be lower than on average 45 W.

Impact on other EU legislation

No impact on other EU legislation has been identified.

Impact from other EU legislation

Currently, domestic coffee machines are subject to Commission Regulation (EC) No. 1275/2008 on standby as well as directives on WEEE, RoHS, Packaging Directive, ELV and possibly, if they contain electronics, the EMC directive. Espresso machines will be subject, depending on type and pressure, the Pressure Equipment Directive ("PED"). Various health-related EU and national legislation on materials that come into contact with foodstuffs will apply.

Voluntary agreements

No voluntary agreements have been identified. The European Committee of Domestic Equipment Manufacturers (CECED) uses only the energy efficiency class of the Swiss Association of Manufacturers (FEA) voluntary energy label on product on the EU market based upon a voluntary agreement.

Alternative proposals

This Working Documents contains 3 proposals for measures, to be discussed at the Consultation Forum:

1. Label A-G rating based on test cycle and calculated annual electricity consumption. Minimum requirements for stand-by and off-mode power, maximum auto power down time (‘electricity only proposal’);
2. Label and minimum requirement single A-G rating based on test cycle and calculated annual energy consumption for electricity consumption and indirect energy requirement for production of coffee and filters/pads/capsules (‘electricity and consumables proposal’);
3. No action

Proposal 1 is based on the latest proposition by industry and the draft industry standard IEC 60661. Proposal 2 is developed using the findings of the preparatory study as a possible response to some stakeholders' request for a holistic approach reflecting on consumables usage, but still in the realm of energy. Proposal 3 is an option for non-action.

The proposals are elaborated hereafter. Finally, the differences are compared.

PROPOSAL 1

'Electricity only' proposal: Energy label A-G rating based on test cycle and calculated annual electricity consumption. Ecodesign requirements for stand-by and off-mode power, maximum auto power down time.

PROPOSAL 1

Following the finalisation of the preparatory study, the industry made the following proposal.

Definitions

Domestic coffee machines are considered as energy-related products ("ErPs") within the meaning of Article 2.1 of Directive 2009/125/EC. Definitions remain as suggested by industry but the term "non-tertiary coffee machines" is changed to "domestic coffee machine" for a better understanding.

For the purposes of this working document the following definitions shall apply:

(1) "Domestic coffee machine" means a non-commercial appliance to be used to brew coffee when connected to the mains. Commercial Coffee machines are excluded.

(2) "Drip filter domestic coffee machine" means a domestic coffee machine with separate containers for water and for brewed coffee and with a filter to be placed on top of the brewed coffee container. Coffee is brewed by heated water passing once through the ground coffee and the filter into the brewed coffee container.

(3) "Low pressure portioned coffee machine" means a domestic coffee machine where coffee is brewed by heated water, forced through ground coffee contained in a capsule or pad by a mechanical pump with a pressure lower than 19 bar.

(4) "High pressure portioned espresso machine" means a domestic coffee machine where coffee is brewed by heated water, forced through ground coffee contained in a capsule or pad by a mechanical pump with a pressure equal or higher than 19 bar.

(5) "Manual espresso coffee machine" means a domestic coffee machine where coffee is brewed by heated water, forced through manually pressed ground coffee and a filter by steam pressure, manual piston drive or mechanical pump. The mechanical pump pressure is equal or higher than 9 bar.

(6) "Semi-automatic espresso machine" means a domestic coffee machine where coffee is brewed by heated water, forced through automatically pressed ground coffee and a filter by steam pressure, automatic piston drive or mechanical pump.

(7) "Standby mode" means a condition where the equipment is connected to the mains power source, depends on energy input from the mains power source to work as intended and provides only the following functions, which may persist for an indefinite time:

- reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or
- information or status display;

(8) "off mode" means a condition in which the equipment is connected to the mains power source and is not providing any function; the following shall also be considered as off mode:

- conditions providing only an indication of off-mode condition;

- conditions providing only functionalities intended to ensure electromagnetic compatibility pursuant to Directive 2004/108/EC of the European Parliament and of the Council

(9) 'reactivation function' means a function facilitating the activation of other modes, including on-mode, by remote switch including remote control, internal sensor, timer to a condition providing additional functions, including on-mode;

(10) 'information or status display' means a continuous function providing information or indicating the status of the equipment on a display, including clocks;

(11) "Beverage production mode" means a condition where the domestic coffee machine is brewing the coffee beverage.

(12) "Ready-to-use mode" means a mode were the heating element of the domestic coffee machine is kept hot.

(13) "Cup preheating function" means a mode by which the surface dedicated for the storage of cups in the domestic coffee machine is kept warm in order to maintain the temperature of the stored cups at the appropriate temperature for a better coffee taste.

(14) "Steam function" means a function where the domestic coffee machine produces water steam and delivers it through a pipe in order to heat up milk or drinking water.

(15) "Grinding function" means a function where the domestic coffee machine mechanically grinds coffee beans into ground coffee.

(16) "Rinsing function" means a function where the domestic coffee machine produces water steam and delivers it through the conducts by which the brewed coffee is delivered, in order to rinse these conducts.

(17) "Coffee brewing period" means a modelled pattern of use of the domestic coffee machine (excepting drip filter coffee machines) lasting 100 minutes and including the brewing of 4 coffees.

Eco-design requirements

Products falling under the definition domestic coffee machines of paragraph "Definitions" above in this document shall meet the ecodesign requirements set out in Annex I.

Energy labelling requirements

Products falling under the definitions of paragraph "Definitions" above in this document shall meet the labelling requirements set out in Annex II.

Measurement method

In the absence of an appropriate test standard, the Commission proposes to publish a Communication on a transitory measurement method in the Official Journal, as described at the end of this section.

Information requirements for domestic coffee machines

Suppliers shall ensure that:

(1) each domestic coffee machine is supplied with a label, stating, as applicable:

(a) Supplier's name or trade mark;

(b) Supplier's model identifier which means the code, usually alphanumeric, which distinguishes a domestic coffee machine model from other models with the same trade mark or supplier's name;

(d) the Energy Efficiency Class, as defined in Annex VI, Table 1;

(e) the weighted Annual Energy Consumption (AE_C), in kWh/year, as indicated in Annex VII.1(i);

(2) the format of the labels for the domestic coffee machine is set out in Annex I and shall be applied according to the following timetable:

(a) for the domestic coffee machine placed on the market from [*date to be inserted: 12 months after entry into force of the delegated Regulation*], labels for the domestic coffee machine with energy efficiency classes A, B, C, D, E, F, G shall be in accordance with Annex II;

(b) for domestic coffee machine placed on the market from [*date to be inserted: 2 years after entry into force of the delegated Regulation*] with energy efficiency classes A+, A, B, C, D, E, F, labels shall be in accordance with Annex II.

(3) a product fiche, is made available; as set out in Annex III;

(4) the technical documentation as set out in Annex IV is made available on request to the authorities of the Member States and to the Commission;

(5) from [*date to be inserted: 12 months after entry into force of the delegated Regulation*]:

(a) any advertisement for a specific model of domestic coffee machine contains the energy efficiency class, if the advertisement discloses energy-related or price information;

(b) any technical promotional material concerning a specific model of domestic coffee machine which describes its specific technical parameters includes the energy efficiency class of that model.

2. The energy efficiency classes shall be based on the Energy Efficiency value in accordance with Annex VIII.

3. The format of the label shall be as set out in Annex II.

Dealers shall ensure that:

(1) each domestic coffee machine, at the point of sale, bears the label provided by suppliers on the outside of the front of the domestic coffee machine, in such a way as to be clearly visible;

(2) from [*date to be inserted: 16 months after entry into force of the delegated Regulation*]:

(a) domestic coffee machine offered for sale, hire or hire-purchase where the end-user cannot be expected to see the product displayed, are marketed with the information provided by suppliers in the format specified in Annex VI;

(b) any advertisement for a specific model of domestic coffee machine contains a reference to the energy efficiency class, if the advertisement discloses energy-related or price information, and;

(c) any technical promotional material concerning a specific model of domestic coffee machine which describes its specific technical parameters includes a reference to the energy efficiency class of the model.

Conformity Assessment

A conformity assessment shall be carried out according to Article 8(2), and Annex IV (Internal design control) or Annex V (Management system for assessing conformity) of Directive 2009/125/EC. Member States shall apply the procedure laid down in Annex VI of Directive 2009/125/EC when assessing the conformity of the declared energy efficiency class, the weighted annual energy consumption, the power consumption in “off-mode”, “standby model” and “ready-to-use” mode.

Market surveillance

When performing the market surveillance checks referred to in Directive 2009/125/EC, Article 3 (2), Member State authorities shall apply the verification procedure set out in Annex II of this working document.

Benchmarks

Industry's preliminary assessment of where most of the products on the market are being estimated to be class "C". The benchmark for best product is not yet known as measurements will still have to be carried out.

Review

A review of the proposed requirements shall be presented to the Consultation Forum depending on technological progress and not later than 5 years after its entry into force.

Annex I: Ecodesign requirements

1. Specific ecodesign requirements

From January 1, 2014 onwards, domestic machines shall comply with the following requirements.

(a) Power consumption in 'off-mode':

Power consumption of televisions in any off-mode condition shall not exceed 1,00 Watt.

(b) Power consumption in 'standby-mode(s)':

The power consumption of coffee machines in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 1,00 Watt.

The power consumption of coffee machines in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 2,00 Watts.

(c) Availability of off-mode and/or standby-mode:

Coffee Machines shall have an off-mode and/or standby-mode, and/or another condition which does not exceed the applicable power consumption requirements for off-mode and/or standby-mode when the Coffee Machine is connected to the mains power source.

From January 1, 2015 onwards, domestic coffee machines shall comply with the following requirements.

(d) Power management:
Filter coffee machines storing the coffee in an insulated jug shall turn, not later than 15 minutes after the completion of the brewing cycle, into:

- standby-mode, or,
- off-mode, or,
- another condition which does not exceed the applicable power consumption requirements for off-mode

Coffe machines other than filter coffee machines shall turn into:

- standby-mode, or,
- off-mode, or,
- another condition which does not exceed the applicable power consumption requirements for off-mode

no later than 60 minutes after the activation of the machines

no later than 60 minutes after last beverage preparation

no later than 60 minutes after the activation of the ready-to-use mode

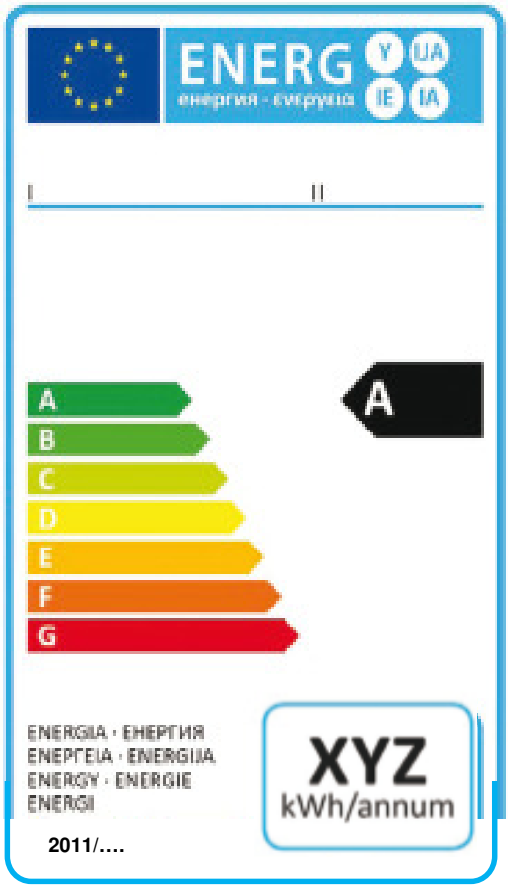
no later than 60 minutes after the activation of the cup preheating function

These should be the default time settings for placing the coffee machine on the market.

Annex II: Energy labelling requirements

Label

1. LABEL 1 FOR DOMESTIC COFFEE MACHINES



I, II

III

IV

[* Numbering of the Regulation to be added on the label before publication in the OJ]

(a) The following information shall be included in the label:

I. supplier's name or trade mark;

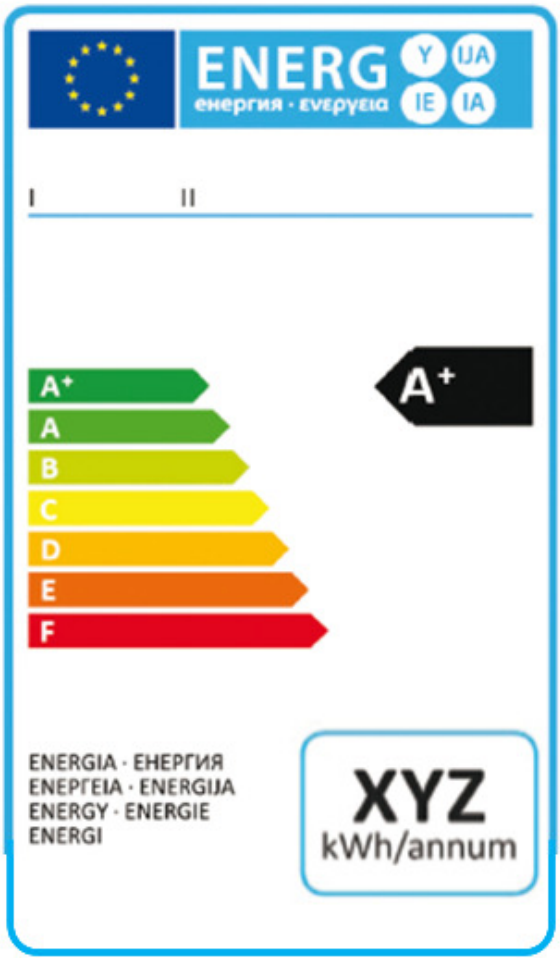
II. supplier's model identifier, meaning the code, usually alphanumeric, which distinguishes a specific domestic coffee machines model from other models with the same trade mark or supplier's name;

III. the energy efficiency class as defined in point 1 of Annex VI; the head of the arrow containing the energy efficiency class of the domestic coffee machines shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

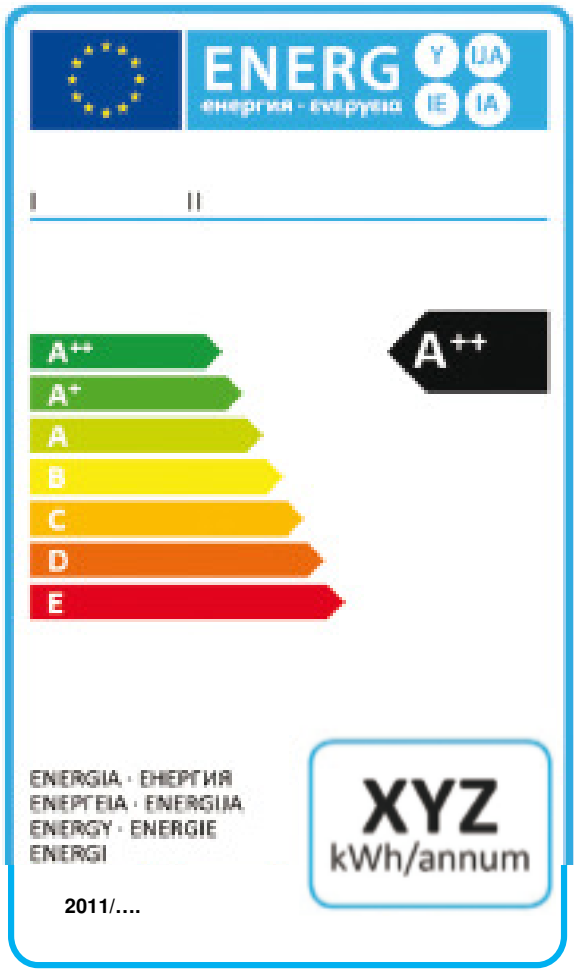
IV. weighted annual energy consumption (AE_C) in kWh/year, rounded up to the nearest integer and calculated in accordance with Annex VII.

(b) The design of the label shall be in accordance with point 5 of this Annex.

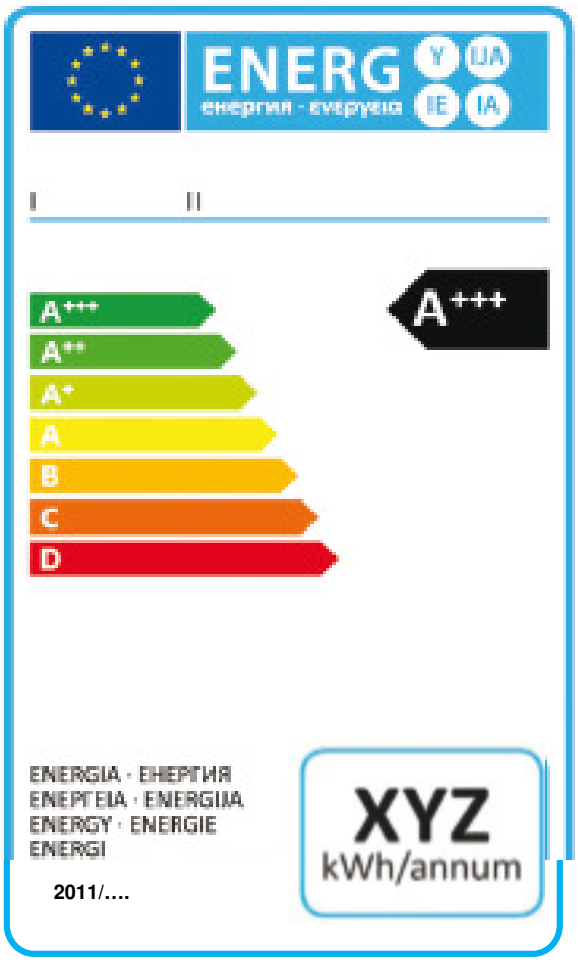
2. LABEL 2 FOR DOMESTIC COFFEE MACHINES



3. LABEL 3 FOR DOMESTIC COFFEE MACHINES



4. LABEL 4 FOR DOMESTIC COFFEE MACHINES



Annex III: Product fiche

1. The information in the product fiche of the domestic coffee machines shall be given in the following order and shall be included in the product brochure or other literature provided with the product:

   (a) supplier's name or trade mark;

   (b) supplier's model identifier which means the code, usually alphanumeric, which distinguishes a specific domestic coffee machines model from other models with the same trade mark or supplier's name;

   (c) whether the domestic coffee machines is an "automatic coffe machine" or "manual coffe machine";

   (d) energy efficiency class in accordance with point 1 of Annex VI;

   (e) the weighted Annual Energy Consumption (AE_C), in kWh/year rounded up the first decimal place; it shall be described as: "energy consumption 'X' kWh per year";

   (f) the power consumption of the off-mode (P_{off}) and of the standby mode ($P_{standby}$) in Watt and rounded to the first integer;

   (g) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.).

2. One fiche may cover a number of domestic coffee machines models supplied by the same supplier.

3. The information contained in the fiche may be given in the form of a copy of the label, either in colour or in black and white. Where this is the case, the information listed in point 1 not already displayed on the label shall also be provided.

Annex IV: Technical documentation

1. The technical documentation shall include:

(a) the name and address of the supplier;

(b) a general description of the coffee machine model, sufficient for it to be unequivocally and easily identified;

(c) where appropriate, the references of the harmonised standards applied;

(d) where appropriate, the other technical standards and specifications used;

(e) identification and signature of the person empowered to bind the supplier;

(f) technical parameters for measurements as follows:

i. the weighted Annual Energy Consumption (AE) rounded up to the first decimal place; it shall be described as: “energy consumption 'X' kWh per year”;

ii. the power consumption of the off-mode (P_{of}) and of the standby mode ($P_{standby}$)

iii. the average energy consumption of the following three functions, if available, the steam function (E_{steam}), the rinsing function (E_{rin}) and the grinding function (E_{gri}), in Wh and rounded to the first decimal place

iv. the average difference of the temperatures of the coffees brewed during the coffe period (T_{actual}), of the variation of tenperature of thewater in the tank and the steam water during the steam function (ΔT_{steam}),measured temperature of the water in the tank (T_{tank}) and the weight of the coffee during the coffee period (M_{coffee});

(g) the results of calculations performed in accordance with Annex VIII

information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.)

2. Where the information included in the technical documentation file for a particular domestic coffee machines model has been obtained by calculation on the basis of design, or extrapolation from other equivalent domestic coffee machines or both, the documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by suppliers to verify the accuracy of the calculations undertaken. The information shall also include a list of all other equivalent domestic coffee machines models where the information was obtained on the same basis.

Annex V: Information to be provided in the cases where end-users cannot be expected to see the product displayed

1. The information shall be provided in the following order:

   (a) the energy efficiency class as defined in point 1 of Annex VI;

   (b) whether the domestic coffee machines is an “automatic coffe machine” or “manual coffe machine”;

      i. the weighted Annual Energy Consumption (AE_C) rounded up to the first decimal place; it shall be described as: “energy consumption 'X' kWh per year”;

      ii. the power consumption of the off-mode (P_{off}) and of the standby mode ($P_{standby}$)

      iii. the average energy consumption of the three following function, if available: steam functions (E_{steam}), rinsing function (E_{rin}) and grinding function (E_{gri})

      iv. the average difference of the temperatures of the coffees brewed during the coffe brewing period (T_{actual}), average difference of the water temperature in the tank and the steam water during the steam function (ΔT_{steam}), the measured temperature of the water in the tank (T_{tank}) and the weight of the coffee during the coffee brewing period (M_{coffee});

   (c) if the domestic coffee machines is intended to be built-in, an indication to this effect.

   (d) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.).

2. Where other information contained in the product fiche is also provided, it shall be in the form and order specified in Annex III.

3. The size and font in which all the information referred in this Annex is printed or shown shall be legible.

Annex VI: Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Annex I, Member State authorities shall test a single domestic coffee machines. If the measured parameters do not meet the values declared by the supplier within the ranges set out in Table 1, the measurements shall be carried out on three more domestic coffee machines. The arithmetic mean of the measured values of these three domestic coffee machines shall meet the values declared by the supplier within the range defined in Table 1 (Ecodesign requirements) and –when appropriate—Table 2 (Labelling of non drip filter machines).

Otherwise, the model and all other equivalent domestic coffe machine models shall be considered not to comply with the requirements laid down in Annex I (Ecodesign requirements) and –where appropriate—Annex II (Labelling requirements).

Member States authorities shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state-of-the-art measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

Table 1. (Ecodesign requirements)

Measured parameter	Verification tolerances
The time for the activation of the power management system	The measured value shall not be greater than the rated value of T_{pms} by more than X %.
Power consumption in off-mode and standby mode	The measured value of power consumption in in off-mode and standby P_{off} and $P_{standby}$ shall not exceed the limit values by more than 10 %,

Table 1 (Labelling of non drip filter machines)

Measured parameter	Verification tolerances
Weighted Annual energy consumption	The measured value shall not be greater than the rated value* of AE_C by more than X %.
Weighted coffe brewing period energy consumption	The measured value shall not be greater than the rated value of E_t by more than X %.
Power consumption in off-mode and standby mode	The measured value of power consumption in in off-mode and standby P_{off} and $P_{standby}$ shall not exceed the rated values by more than 10 %,
Average mass of the brewed coffees during the coffee periods	The measured value shall not be greater than the rated value of M_{coffee} by more than X %.
Average temperature of the two first brewed coffees	The measured value shall not be greater than the rated value of T_{actual} by more than X %.
Temperature of the water in the tank	The measured value shall not be greater than the rated value of T_{tank} by more than X %.
Average of the temperature difference between the temperature of the water in the	The measured value shall not be greater than

tank and the steamed water	the rated value of ΔT_{steam} by more than X %.
Measured energy consumption for the coffee brewing period	The measured value shall not be greater than the rated value of E_{cbp} by more than X %.
Average measured energy consumption for the steam function	The measured value shall not be greater than the rated value of E_{cbp} by more than X %.
Average measured energy consumption for the steam function	The measured value shall not be greater than the rated value of E_{steam} by more than X %.
Measured energy consumption for the rinsing function	The measured value shall not be greater than the rated value of E_{rin} by more than X %.
Measured energy consumption for the coffee grinding function	The measured value shall not be greater than the rated value of E_{gri} by more than X %.

* “rated value” means a value that is declared by the supplier

Annex VII: Energy efficiency classes

ENERGY EFFICIENCY CLASSES

The energy efficiency class of a domestic coffee machines shall be determined in accordance with its Energy Efficiency Index (*EEI*) as set out in Table 1.

The Energy Efficiency Index (*EEI*) of a domestic coffee machines shall be determined in accordance with point 1(a) of Annex VII.

Table 1: Energy efficiency classes

Energy efficiency class	Energy Efficiency Index
A+++	EEI < 48
A++	48 ≤ EEI < 56
A+	56 ≤ EEI < 68
A	68 ≤ EEI < 81
B	81 ≤ EEI < 97
C	97 ≤ EEI < 117
D	117≤ EEI < 140
E	140 ≤ EEI < 168
F	168 ≤ EEI < 202
G	202 ≤ EEI

Annex VIII: Method for calculating the Energy Efficiency Index, Weighted Standard Energy consumption and Weighted Annual Energy Consumption

CALCULATION OF THE ENERGY EFFICIENCY INDEX

For the calculation of the Energy Efficiency Index (*EEI*) of a non tertiary coffee machine, the weighted Annual Energy Consumption of a domestic coffee machine is compared to its weighted Standard Annual Energy Consumption.

(a) The Energy Efficiency Index (*EEI*) is calculated as follows and rounded to one decimal place:

$$EEI = \frac{AE_C}{SAE_C} \times 100$$

where

- AE_C = weighted Annual Energy Consumption of the domestic coffee machine, in kWh/year and rounded to one decimal place
- SAE_C= weighted Standard Annual Energy Consumption of the domestic coffee machine, in kWh/year and rounded to one decimal place.

CALCULATION OF THE WEIGHTED STANDARD ANNUAL ENERGY CONSUMPTION

(a) The weighted Standard Annual Energy Consumption (SAE_C) is calculated as a weighted benchmark, in kWh/year and rounded to one decimal place, as follows:

$$SAE_C = (WBE_{cbp} + WBE_{steam} + WBE_{standby} + WBE_{off} + WBE_{rin} + WBE_{gri}) \times 365$$

where

- WBE_{cbp} = weighted benchmark of the energy consumption for the coffee brewing period (in Wh and rounded to the first decimal place)
- WBE_{steam} = weighted benchmark of the energy consumption for the steam function (in Wh and rounded to the first decimal place)
- $WBE_{standby}$ = weighted benchmark of the energy consumption for the standby mode (in Wh and rounded to the first decimal place)
- WBE_{off} = weighted benchmark of the energy consumption for the off mode (in Wh and rounded to the first decimal place)
- WBE_{rin} = weighted benchmark of the energy consumption for the rinsing function (in Wh and rounded to the first decimal place)
- WBE_{gri} = weighted benchmark of the energy consumption for the grinding function (in Wh and rounded to the first decimal place)

(b) The weighted benchmark for the energy consumption for the coffee brewing periods (WBE_{cbp}) shall be calculated, in Wh and rounded to the first decimal place, as follows:

– If $T_{actual} < 76°C$

$$WBE_{cbp} = \left[3 \times \left(\frac{M_{coffee}}{80} \right) \times \left(\frac{T_{actual} - T_{tank}}{76 - 23} \right) \right] \times BE_{brew} + BE_{HU} + BE_{RTU}$$

– If $T_{actual} \geq 76°C$

$$WBE_{cbp} = \left[3 \times \left(\frac{M_{coffee}}{80} \right) \times \left(\frac{76 - T_{tank}}{76 - 23} \right) \right] \times BE_{brew} + BE_{HU} + BE_{RTU}$$

□ and

$$M_{coffee} = \frac{\sum_{n=1}^{3} M_{c,n}}{3}$$

$$T_{actual} = \frac{T_1 + T_2}{2}$$

where

□ BE_{brew} = benchmark energy consumption for the coffee brewing (in Wh, rounded to the first decimal places)

□ BE_{HU} = benchmark energy consumption for the heating up mode (in Wh, rounded to the first decimal place)

□ BE_{RTU} = benchmark energy consumption for the ready to use mode (in Wh, rounded to the first decimal place)

□ M_{coffee} = average weight of the coffees brewed in the three coffees brewing periods (in grams, rounded to the first decimal place)

□ $M_{c,n}$ = mass of one brewed coffee during each coffee brewing period (in grams, rounded to the first decimal place)

□ T_{actual} = average temperature of the two first brewed coffees in the coffee brewing period (in K, rounded to the first decimal place)

□ T_1 = temperature of the first brewed coffee in each coffee brewing period (in K, rounded to the first decimal place)

□ T_2 = temperature of the second brewed coffee in each coffee brewing period (in K, rounded to the first decimal place)

□ T_{tank} = measured temperature of the water in the tank (in ºC, rounded to the first decimal place)

□ 3 = number of coffee brewing periods per day

□ 80 = benchmark average weight of the three brewed coffees

□ 76 = benchmark average temperature of the brewed coffee

□ 23 = benchmark temperature of the water in the tank

(c) The weighted benchmark for the energy consumption for the steam function (WBE_{steam}) shall be calculated in Wh and rounded to the first decimal place, as follows:

$$WBE_{steam} = BE_{steam} \times \frac{\Delta T_{steam}}{40}$$

and

$$\Delta T_{steam} = \frac{\sum_{n=1}^{3} T_{F,n} - \sum_{n=1}^{3} T_{S,n}}{3}$$

where

- BE_{steam} = benchmark energy consumption for the steam function (in Wh, rounded to the first decimal place)
- ΔT_{steam} = temperature difference between the temperature of the water in the tank and the steamed water (in K, rounded to the first decimal place)
- $T_{F,n}$ = temperature of the water in the tank (in °C, rounded to the first decimal place)
- $T_{S,n}$ = temperature of the steamed water (in °C, rounded to the first decimal place)
- 40 = benchmark temperature variation between the temperature of the water in the tank and the steamed water.

(d) The weighted benchmark for the energy consumption for the standby mode ($WBE_{standby}$) shall be calculated, in Wh and rounded to the first decimal place, as follows:

$$WBE_{s\tan dby} = BP_{s\tan dby} \times 11$$

where

- $BP_{standby}$ = benchmark energy consumption for standby mode (in W and rounded to the first decimal place)
- 11 = number of hours in standby mode per day

(e) The weighted benchmark for the energy consumption for the off mode (WBE_{off}) shall be calculated in Wh and rounded to the first decimal place, as follows:

$$WBE_{off} = BP_{off} \times 8$$

where

- BP_{off} = benchmark power for off mode (in W and rounded to the first decimal place)
- 8 = number of hours in off mode per day.

(f) The weighted benchmark for the energy consumption for the rinsing function (WBE_{rin}) has the same value as the benchmark energy (BE_{rin}) consumption for the rinsing function as reported in Table 1.

(g) The weighted benchmark for the energy consumption for the grinding function (WBE_{grin}) has the same value as the benchmark energy consumption for the grinding function (BE_{grin}) as reported in Table 1.

Table 1: Benchmark energy consumption values

Function	**Symbol**	**Benchmark energy consumption values (Wh)**
Coffee brewing	BE_{cbp}	27,9
Heating up mode	BE_{HU}	20,0
Ready to use mode	BE_{RTU}	23,5
Steam function	BE_{steam}	15,0
Rinsing function	BE_{rin}	3,0
Grinding function	BE_{grin}	2,0
Mode	**Symbol**	**Benchmark power (W)**
Standby mode	*BPstandby*	2,0
Off mode	*BPoff*	1,0

CALCULATION OF THE WEIGHTED ANNUAL ENERGY CONSUMPTION

(a) The weighted Annual Energy Consumption (AE_C) is calculated, in kWh/year and rounded to one decimal place, as follows:

$$AE_C = \left[\left(3\times E_{cbp}\right)+\left(3\times E_{steam}\right)+\left(11\times P_{s\tan dby}\right)+\left(8\times P_{off}\right)+E_{rin}+E_{gri}\right]\times 365$$

and

$$E_{steam} = \frac{\sum_{n=1}^{3} E_{S,n}}{3}$$

where

- E_{cbp} = measured energy consumption for the coffee brewing period (in Wh and rounded to the first decimal place)
- E_{steam} = average measured energy consumption for the steam function (in Wh and rounded to the first decimal place)
- $E_{S,n}$ = measured energy consumption for the steam function for each of the three coffee brewing periods (in Wh and rounded to the first decimal place)
- $P_{standby}$ = measured power consumption for the standby mode (in W and rounded to the first decimal place)
- P_{off} = measured power consumption for the off mode (in W and rounded to the first decimal place)
- E_{rin} = measured energy consumption for the rinsing function (in Wh and rounded to the first decimal place)

- E_{gri} = measured energy consumption for the coffee grinding function (in Wh and rounded to the first decimal place)
- 3 = number of coffee brewing periods and number of steam function use per day
- 11 = number of hours in “standby mode” per day
- 8 = number of hours in ”off mode” per day.

ANNEX IX

Benchmarks

Industry has not yet proposed any benchmarks.

ANNEX X

List of energy-using products covered by Annex I, point 1 to Regulation (EC) No 1275/2008

1. Household appliances
Washing machines
Clothes dryers
Dish washing machines
Cooking:
Electric ovens
Electric hot plates
Microwave ovens
Toasters
Fryers
Grinders and equipment for opening or sealing containers or packages
Electric knives
Other appliances for cooking and other processing of food, cleaning, and maintenance of clothes
Appliances for hair cutting, hair drying, tooth brushing, shaving, massage and other body care appliances
Scales

Note: This proposal by industry eliminates coffee makers from the list of the Standby Regulation.

Transitional Measurement Method

[For publication as Communication in the OJ, based on the industry proposal and IEC 60661 Draft Nov. 2011]

Note: this method applies only to energy labelling of espresso machines.

Magnitudes

Power Consumption used to measure the of off-mode and standby consumption of P_{off} and $P_{standby}$ is measured over a moment in time and is expressed in Watt

Energy Consumption Is measured over a variable period of time and is expressed in Watt/hour

Measurements

Coffee Period: Measurements of Energy Consumption, Temperature and Coffee Mass

1. The appliance is switched on and the energy consumption measurement starts and continues for 100 minutes.

2. The first brewing cycle starts. A 40 g single coffee is brewed, this brewing cycle starts 60 seconds after the coffee maker is ready for brewing, and temperature (T_{C1}) and mass of coffee (M_{C1}) are measured and recorded.

3. The second brewing cycle is done 60 seconds after the coffee maker has finished the first brewing cycle. If needed the coffee maker is to be re-activated (in case the power management has turned the coffee machine to standby mode). This is a 120 g single coffee, and temperature (T_{C2}) and mass of the coffee produced (M_{C2}) are measured and denoted. After that, the energy measurement shall continue without any further interaction until minute 30 after the initial switch on of the machine.

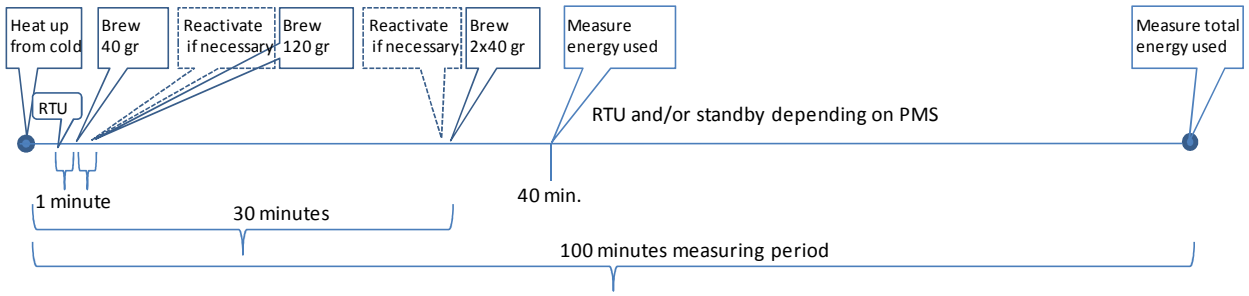
4. The third brewing is made 30 minutes from start. A double coffee is made (2 x 40 g). If needed, the maker is to be re-activated (in case the power management has turned the coffee machine to standby mode). Mass of coffee (M_{C3}) is measured and denoted. After that, the energy measurement shall continue without any further interaction until minute 100.

5. 40 minutes from start, the accumulated energy consumption is measured, and denoted (E_{40}).

6. 100 minutes from start, the accumulated energy consumption is measured, and denoted (E_{100}).

7.

Figure1 – Schematic representation of the coffee period



Steam Function: Measurements Energy Consumption, and Temperature

- 100 grams of water are heated up with the steam deployed though the dedicated pipe of the machine until a difference of temperature between the start and the end of the process of 40 K is reached.

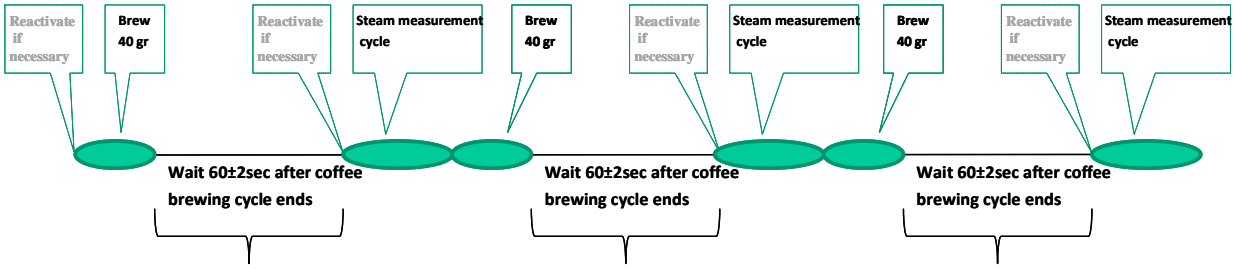
- The water temperature at the start in the beaker (T_S) has to be recorded for each cycle.

- The steam function is started 60 ±seconds after a coffee brewing cycle has ended and the coffee maker is ready to be used. The energy is measured from the moment the steam function is activated by pre-selection of steaming, opening the steam valve or pushing the steam button, until the moment the required water temperature in the beaker has been obtained.

- This cycle is repeated two additional times and the energy is measured ($E_{S1,}$ $E_{S2,}$ E_{S2}) for each cycle.

- The temperature in the beaker shall be monitored continuously until the difference of temperature between the initial and the final temperatures is 40 K temperature is reached. When the required temperature is reached, steaming is stopped and immediately the final temperature (T_F) is measured in the middle of the beaker, after a short stirring, and denoted.

Figure 2 – Schematic representation of the steam function measurements



Standby and Off modes: Measurements of Power Consumption

The power consumption in the standby and off modes is measured according to EN 50564/2011.

Grinding and Rinsing: Energy Consumption

The energy consumption of one Rinsing Cycle and one Grinding Cycle is measured

Method for filter coffee machines (from latest draft IEC 60661, Nov. 2011)

Note: The industry's proposal at this stage does not foresee labelling of coffee machines. However, the draft IEC 60661, although in early stages, considers filter coffee machines as the example shows below.

26.3 Filter coffee makers

All features [Note 1] are to be set in factory default mode.

Accessories, e.g. (thermos) jugs are to be used according to user manual.

Note 1 Features such as auto-power-down, heating systems, etc.

26.3.1 Coffee Period

26.3.1.1 Preparations

Measurements are performed without coffee powder and paper filter. In case of filter coffee makers with integrated coffee grinder, the grinder function shall not be part of the energy measurement procedure.

If the maker provides a plastic or metal filter, this filter shall not be used unless necessary for the function of the appliance.

The rated amount of water (check mark, "max", etc.) is filled into the reservoir [Note x1].

Water temperature (T_w) shall be 15 ± 1°C.

The mass of the jug is weighed and denoted.

Water temperature (T_w) is measured before start and denoted.

Note 1 Energy consumption will be corrected to a nominal amount of brewed coffee as described in clause 26.3.4.

26.3.1.2 Procedure

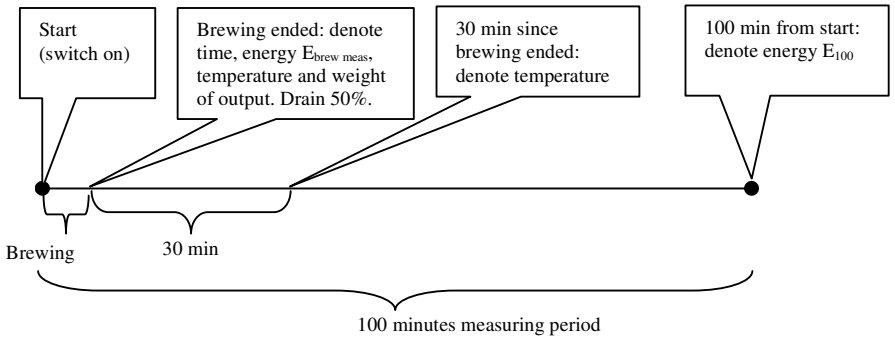


Figure 3 Coffee period, filter makers

The appliance is switched on and the energy consumption measurement starts and continues for 100 minutes ± 2 seconds.

Brewing ends when the power measurement show a drastic drop in used power. Ending time and energy consumption $E_{brew-meas}$ is denoted. The temperature of the processed (brewed) water T_{B1} is measured within 10 seconds, after stirring with a rod of negligible heat capacity, in the middle of the jug at approximately 1 cm from the bottom. Temperature T_{B1} is denoted.

The amount of brewed (processed) water M_{brew} is determined by weighing the jug and subtracting its empty weight. M_{brew} is denoted.

50% ± 1% of the processed water M_{brew} is drained. If there is a lid supplied with the appliance to replace the filter with the coffee residues, it is now placed. The jug is placed back into the appliance within 30 seconds since brewing ended.

30 minutes ± 10 seconds since brewing ended, temperature of the water in the jug (T_{B2}) is measured, after a short stirring with a rod of negligible heat capacity, in the middle of the jug and is denoted.

Ambient temperature (T_A) is measured and denoted.

Note 2 Benchmark temperature values of brewed coffee and after 30 minutes are 80°C and 76°C, respectively. If measured values (referred to T_W = 15°C) are below, a correction is made as described in clause 26.3.4.

Energy measurement is continued until 100 minutes ± 2 seconds from start and total energy consumption of the coffee period E_{100} is denoted.

26.3.2 Standby mode

The power or energy measurement is started immediately after the coffee period has ended, and according to EN 62301. The value of $P_{standby}$ over 1 hour is to be recorded as $E_{standby}$.

Note 3 If a maker does not have a power management system including automatically switching to **standby mode** or off mode, the average of the power consumption during keeping hot shall be used as **standby mode** energy consumption for 1 hour.

Note 4 If the maker has a power management system that switches the maker to off mode, the off mode power consumption will be taken as **standby** power.

26.3.3 Off mode

The power or energy consumption in the off mode is measured according to EN 62301. The value of P_{off} over 1 hour is to be recorded as E_{off}.

Note 5 If the maker does not have any off mode, the **standby mode** value will be used for this value.

26.3.4 Calculation of energy rating

The energy rating is calculated as a relation between the weighted sum of the measured values for functions as given in table 2 and the weighted sum of the benchmark energy values based on the current available technology. Weighting factors are set to represent the energy consumption during 24 hours.

26.3.4.1 Temperature correction of brewing energy

If after brewing the temperature difference ($T_{B1} - T_W$) is below 65°C, the brewing energy is corrected:

$E_{brew} = E_{brew\text{-}meas} * (80 - 15) / (T_{B1} - T_W)$ Note 6, 7

Note 6 80°C is judged to be the minimal coffee temperature of filter coffee to allow an optimal filtering process. The relevant temperature increase by brewing is 80°C – 15°C = 65°C. If the temperature difference after brewing ($T_{B1} - T_W$) is 65°C or higher, no correction is made, i.e. $E_{brew} = E_{brew\text{-}meas}$.

Note 7 Real filter coffee preparation (with coffee powder) will yield about 11% higher brewing energy consumption, according to the amount of hot moist coffee powder remaining in the filter.

26.3.4.2 Temperature correction of keeping hot energy

The measured energy consumption $E_{khot\ meas}$ to keep 50% of the brewed coffee (for test: of the processed water) hot is:

$E_{khot\text{-}meas} = E_{100} - E_{brew\text{-}meas}$

Note 8 Filter coffee makers with thermos jug do not need active heating energy for keeping hot. $E_{khot\ meas}$, will in that case represent the standby or off mode energy consumption of the rest of the coffee period after brewing. Penalization of too low keeping hot temperature of thermos jugs is based on brewing energy, see Note x10.

If the temperature difference of coffee (water) to ambient ($T_{B2} - T_A$) after 30 minutes is below 53°C, the keeping hot energy is corrected:

a) For makers with active heating to keep hot

$$E_{khot} = E_{khot-meas} \cdot \frac{76 - 23}{T_{B2} - T_A}$$ Note 9

b) For makers with thermos jug

$$E_{khot} = E_{brew} \cdot \left(\frac{76 - 23}{T_{B2} - T_A} - 1 \right)$$ Note 9, 10

Note 9 76°C is the minimal coffee temperature value, the same as used for the correction of pressure coffee makers. At 23°C nominal ambient temperature the difference is 53°C. If ($T_{B2} - T_A$) is 53°C or higher, no correction is made, i.e. $E_{khot} = E_{khot\text{-}meas}$.

Note 10 Thermos jug makers: Penalization by the relative temperature loss times the brewing energy instead of the actual energy content presumes a keeping hot efficiency below 100%. The energy necessary to cover the losses of common jugs by common heating elements is much greater.

If no correction is made for thermos jug makers, E_{khot} will be equal to the standby or off mode energy consumption since brewing ended.

26.3.4.3 Temperature corrected energy for coffee period

E_{cp} (Wh) = E_{brew} + E_{khot}

26.3.4.4 Benchmark energy for coffee period

Benchmark energy for the coffee period (B_{coffee}) is calculated from the basic value E_{cp900} which is the value for nominal capacity of 900 g of processed water and comprises also the energy consumption for active keeping hot.

NOTE The basic benchmark energy (Wh) for coffee period represents the state of technology.

E_{cp900} = 125 Wh

Benchmark energy (Wh) for coffee period: $B_{coffee} = E_{cp900} \cdot \frac{M_{brew}}{900}$

26.3.4.4 **Relative energy consumption** value

W_i = Weighting factor based on use frequency for function i

B_i = Benchmark energy value for function i

P_i = Function i available (yes=1, no=0)

E_i = Measured energy for function i

index	Function	clause	W_i	B_i (Wh)	E_i
1	Coffee period	26.3.1	2	B_{coffee}	E_{cp}
2	Standby mode	26.3.2	12.67	0,5	$E_{standby}$
3	Off mode	26.3.3	8	1	E_{off}

Table 2 Energy rating values for functions of filter coffee makers

Note 11 Is measured as a part of the Coffee period

The energy rating value is given by: $E_{rating} = \frac{\sum_{i=1}^{3} W_i \cdot E_i}{\sum_{i=1}^{3} P_i \cdot W_i \cdot B_i} \cdot 100\ (\%)$

PROPOSAL 2

'Electricity and consumables' proposal: Ecodesign requirement and energy label, single A-G rating based on test cycle and calculated annual energy consumption for electricity consumption and indirect energy requirement for production of coffee and filters/pads/capsules

PROPOSAL 2

Following the finalisation of the preparatory study and building on the views of some stakeholders on the necessity to consider consumables such as coffee, filters, pads and capsules, this proposal considers the impact of consumables.

Note on Proposal 2

The inclusion of other significant environmental impacts besides energy in the EU energy label is foreseen in the labelling directive and has occurred in the past for e.g. the water consumption of washing machines and dishwashers. For other candidate products like imaging devices, there is no energy label, but options like double-sided printing (saving paper) and others would certainly be considered. Annex 1 contains an energy analysis of coffee production and procurement.

The guiding principles here are:
a) that the impact is significant, and
b) that the manufacturer can do something about it through the design of the machine.

The latter is important for manufacturers. For instance in the SAVE studies in the 1990s for washing machines the subject of automatic detergent dosage, to contain the overdosing by consumers, was considered but not implemented because there was proof from experience of low market-acceptance[1]. This is not the case for domestic coffee machines, where a significant part of machines on the market work with automatic water dosage and show various solutions to optimize coffee dosage (portioned solutions, automatic dosage).

What would be new in proposal 2 is the fact that coffee and filter efficiencies would not be given a separate A-G rating, but instead would be integrated in an overall A-G energy efficiency rating, taking into account direct and indirect energy requirement. It emphasizes, unlike with water usage in washing machines that investing in coffee machines that are coffee efficient is

- good for the household budget (coffee constitutes 90% of the LCC of a coffee maker and a part of that cost is in energy),
- is good for taste (overdose is detrimental for taste)
- and would constitute more than half of the energy use of the total energy considered.

Considering the significant impact of the consumables on energy consumption and consumer expenditure, this proposal would be based on the view that taking into account only electricity consumption on the label would not provide consumers with the full picture.

Definitions

Domestic coffee machines are considered as Energy-related products ErPs within the meaning of Article 2.1 of Directive 2009/125/EC.

For the purposes of this working document the following definitions shall apply:

[1] Compare e.g. the market failure of the Bosch ADS (Automatic Dosage System) for washing machines.

"Domestic coffee machine": any coffee machine that fits the definition of a drip filter machine, a portioned pad coffee machine or an espresso coffee machine as defined in Annex IX.

Eco-design requirements

Products falling under the definitions of paragraph "Definitions" above in this document shall meet the ecodesign requirements set out in Annex II.

Energy labelling requirements

Products falling under the definitions of paragraph "Definitions" above in this document shall meet the labelling requirements set out in Annex III.

Measurement method

In the absence of an appropriate test standard, the Commission proposes either (i) to publish a Communication on a transitory measurement method in the Official Journal or (ii) incorporate a test and calculation method in the legislation, as described in Annex IX.

Information requirements for domestic coffee machines

Suppliers shall ensure that:

(1) each domestic coffee machine is supplied with a label, stating, as applicable:

(a) Supplier's name or trade mark;

(b) Supplier's model identifier which means the code, usually alphanumeric, which distinguishes a domestic coffee machine model from other models with the same trade mark or supplier's name;

(d) the Energy Efficiency Class, as defined in Annex VIII, Table 1;

(e) the weighted Annual Energy Consumption (AE_C), in kWh/year, as indicated in Annex IX;

(2) the format of the labels for the domestic coffee machine is set out in Annex II and shall be applied according to the following timetable:

(a) for the domestic coffee machine placed on the market from [*date to be inserted: 12 months after entry into force of the delegated Regulation*], labels for the domestic coffee machine with energy efficiency classes A, B, C, D, E, F, G shall be in accordance with Annex III;

(b) for domestic coffee machine placed on the market from [*date to be inserted: 2 years after entry into force of the delegated Regulation*] with energy efficiency classes A+, A, B, C, D, E, F, labels shall be in accordance with Annex III.

(3) a product fiche, is made available; as set out in Annex IV;

(4) the technical documentation as set out in Annex V is made available on request to the authorities of the Member States and to the Commission;

(5) from [*date to be inserted: 12 months after entry into force of the delegated Regulation*]:

(a) any advertisement for a specific model of domestic coffee machine contains the energy efficiency class, if the advertisement discloses energy-related or price information;

(b) any technical promotional material concerning a specific model of domestic coffee machine which describes its specific technical parameters includes the energy efficiency class of that model.

2. The energy efficiency classes shall be based on the Energy Efficiency value in accordance with Annex IX.

3. The format of the label shall be as set out in Annex III.

Dealers shall ensure that:

(1) each domestic coffee machine, at the point of sale, bears the label provided by suppliers on the outside of the front of the domestic coffee machine, in such a way as to be clearly visible;

(2) from [*date to be inserted: 16 months after entry into force of the delegated Regulation*]:

(a) domestic coffee machine offered for sale, hire or hire-purchase where the end-user cannot be expected to see the product displayed, are marketed with the information provided by suppliers in the format specified in Annex VI;

(b) any advertisement for a specific model of domestic coffee machine contains a reference to the energy efficiency class, if the advertisement discloses energy-related or price information, and;

(c) any technical promotional material concerning a specific model of domestic coffee machine which describes its specific technical parameters includes a reference to the energy efficiency class of the model.

Conformity Assessment

A conformity assessment shall be carried out according to Article 8(2), and Annex IV (Internal design control) or Annex V (Management system for assessing conformity) of Directive 2009/125/EC. Member States shall apply the procedure laid down in Annex VI of Directive 2009/125/EC when assessing the conformity of the declared energy efficiency class, the weighted annual energy consumption, the power consumption in “off-mode”, “standby model” and “ready-to-use” mode.

Market surveillance

When performing the market surveillance checks referred to in Directive 2009/125/EC, Article 3 (2), Member State authorities shall apply the verification procedure set out in Annex VII of this working document.

Benchmarks

The benchmark for best product is an energy efficiency EE of 83%, defined as set out in Annex IX.

Review

A review of the proposed requirements shall be presented to the Consultation Forum depending on technological progress and not later than 10 years after its entry into force.

Annex I: Energy Analysis of Coffee

Introduction

The preparatory study found that consumables have a significant cost and environmental impact. Below is an exploration of one of these impacts, coffee, in more detail for the purposes of this proposal of the working document.

Energy analysis of coffee production

Coffee has been subject to several LCA studies, looking at energy, water, carbon emissions, pesticides, fertilizers, land use, etc. This document is only about energy consumption, i.e. the energy analysis of roasted coffee beans, from cultivation of the crop up to the point where they enter the household. End-of-life credits for the energy displacement by the use of composted coffee bean peelings as fertilizer and the energy credits of (a fraction of) coffee beans in municipal waste composting and heat recovery incineration have been considered.

Publications by Jungbluth (ESU-Services/ EcoInvent data) and Humbert (ecointhesis) were identified as being most reliable, known to follow proven energy analysis principles from IFIAS (later incorporated in ISO 14044-series). Also the industry viewpoint on LCA (Nespresso) and some LCA cases at the extremes (best case: organic farming; worst case: irrigation from pumped water at sea-level plantations) were taken in to account.

Generally speaking, several sources show a wide spread in GER values (Gross Energy Requirement) for the individual parts of the analysis, amongst others this reflects not only the difference in data quality but also the spread in climatic conditions and agricultural practices on which the LCAs are based. But, independent of the source there is a wide consensus that the non-renewable energy involved in production and procurement of the roasted coffee beans exceeds the energy for brewing in a domestic coffee maker. This has been, independently from the outcomes of individual LCA studies, a guiding principle in establishing the energy value of 6 kWh electricity equivalent per kg of roasted coffee (GER 65-70 MJ/kg). This value represents the lowest estimate from all sources and in the rest of this background document values will be found that are more than twice as high. This reflects the cautious approach in trying to avoid an overstatement of the importance.

Note that in the draft measures for coffee machines a primary energy factor (pef) for electricity generation and distribution from MEEuP was assumed at 10,5 MJ/kWh (pef=2.9). This could be in the future replaced by a MEErP pef based on 9 MJ/kWh (pef=2.5). However, it was taken into account that most LCA studies use pef values for the average EU mix that are 20-30% higher.

As a case in point, the following figure 1 was calculated from the analysis by Humbert 2007[2], which shows an overall GER value of 148 MJ/kg roasted and ground (R&G) coffee beans. As this study uses EcoInvent (UCTE) average EU mix the pef is 20-30% higher. However, taking that into account, the GER value is still twice the assumed 65-70 MJ/kg.

[2] S. Humbert et al., Life cycle assessment of spray dried soluble coffee and comparison with alternatives (drip filter and capsule espresso), Journal of Cleaner Production 17 (2009) 1351–1358.

At the other side of the spectrum, Jungbluth et al., although the study shows a lower level of detail in the publication than Humbert, generally assume values that are much lower (closer to 65-70 MJ/kg).[3] Both Jungbluth and Humbert studies result in a GER of coffee production higher than the GER for electricity of the coffee machine in brewing the coffee.

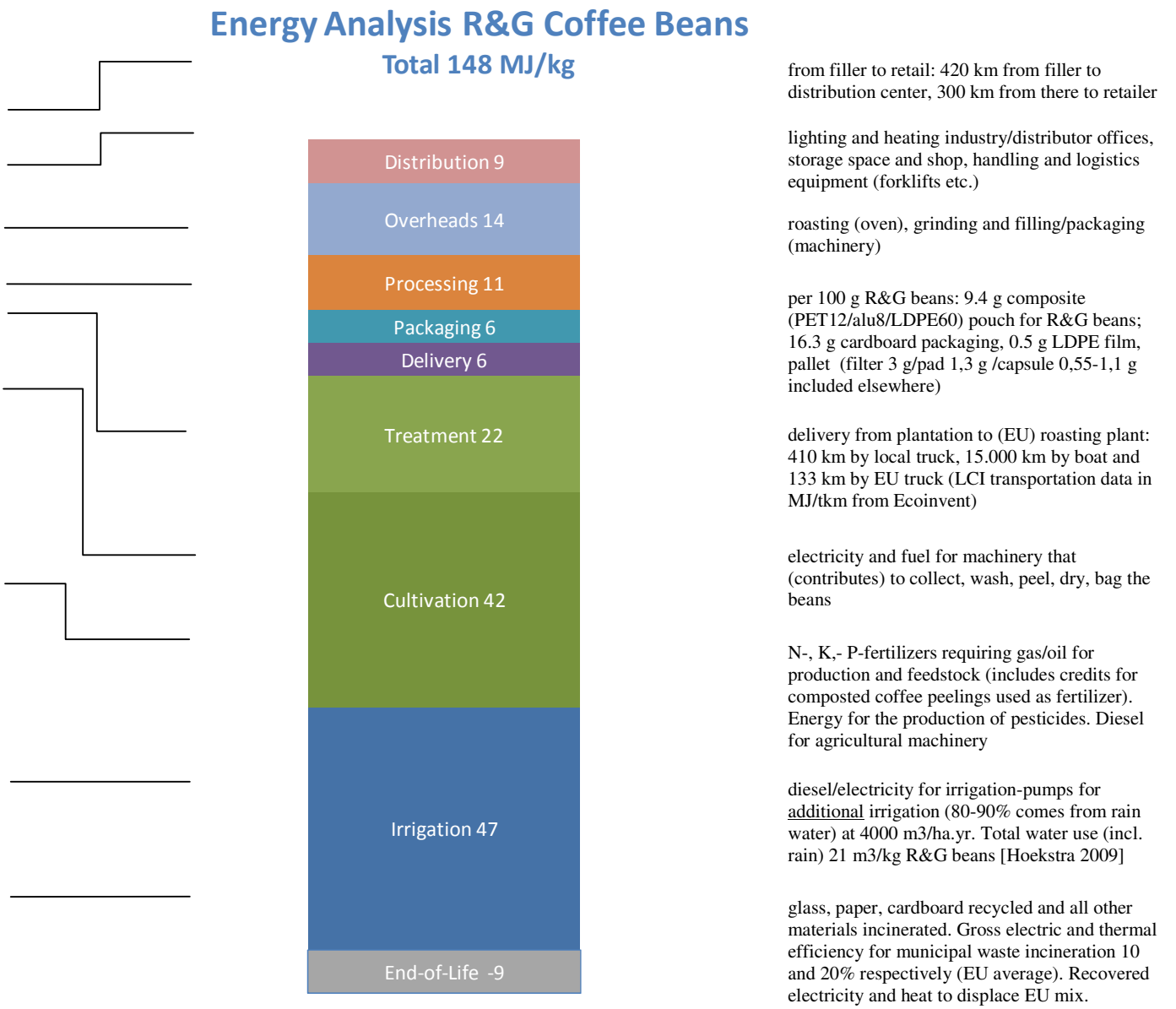


Figure 1. Energy analysis of roasted and ground coffee beans (source: calculated from Humbert et al., 2007)

[3] Busser, S., Steiner, R., Jungbluth, N., LCA of Packed Food Products , the function of flexible packaging , ESU-services Ltd. (CH) for Flexible Packaging Europe. (LCA of coffee therein)

Annex II: Ecodesign requirements

Domestic coffee machines shall meet the ecodesign requirements set out in this Annex.

a) Minimum energy efficiency requirement

From January 1, 2014 onwards, the minimum allowable energy efficiency of domestic coffee machines must meet or exceed an energy efficiency EE of 60% as defined in Annex IX.
In case of combination machines every type of domestic coffee maker that is in the same product (casing) shall meet this requirement.

b) Minimum energy efficiency requirement

From January 1, 2016 onwards, the minimum allowable energy efficiency of domestic coffee machines must meet or exceed an energy efficiency EE of 70% as defined in Annex IX.
In case of combination machines every type of domestic coffee maker that is in the same product (casing) shall meet this requirement.

c) Minimum energy efficiency requirement

Instead of a revision like in the past, it is proposed that a third minimum energy efficiency requirement is set at the level of BAT (rounded to the class limit 80%). This would provide a stable regulatory framework for industry over a longer period of time and avoid unnecessary administration work in form of frequent revisions. The following text is proposed:

From January 1, 2018 onwards, the minimum allowable energy efficiency of domestic coffee machines must meet or exceed an energy efficiency EE of 80% as defined in Annex IX.
In case of combination machines every type of domestic coffee maker that is in the same product (casing) shall meet this requirement.

d) Product information requirement

From January 1, 2014 onwards, the suppliers of domestic coffee machines shall provide the information in a product fiche, following Annex IV, and make available technical documentation, following Annex V.

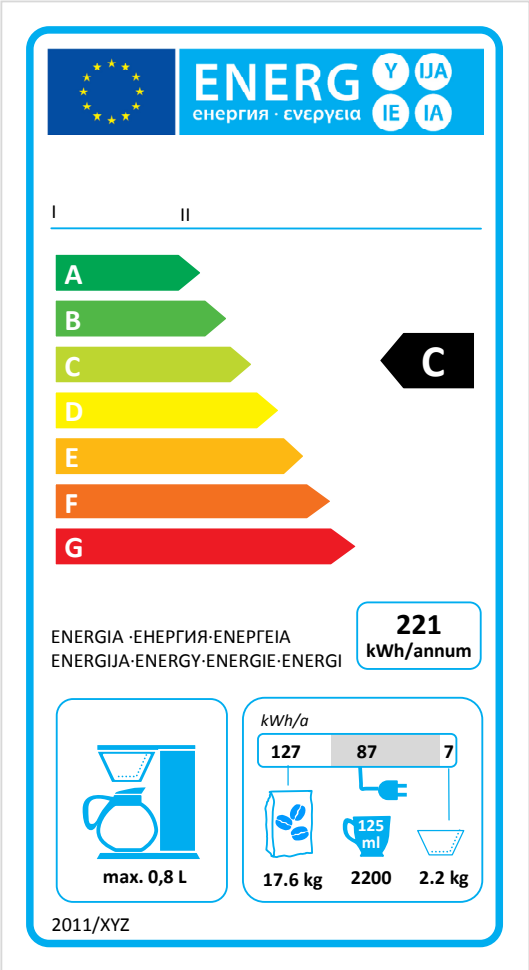
e) Appropriate power down time

For the purpose of the second tier of Commission Regulation (EC) No. 1275/2008 of 17 December 2008, the appropriate power down time is defined as 100 minutes after the end of the brewing cycle as defined in Annex IX.

Annex III: Energy labelling requirements

1. LABEL FOR DOMESTIC COFFEE MACHINES

[illustration drip filter coffee machine]



I, II

III

IV

V, VI

[XYZ: Numbering of the Regulation to be added on the label before publication in the OJ; Note that figures are fictituous and will be replaced with xx,x denominations in the final regulation]

(a) The following information shall be included in the label:

I. supplier's name or trade mark;

II. supplier's model identifier, meaning the code, usually alphanumeric, which distinguishes a specific domestic coffee machines model from other models with the same trade mark or supplier's name;

III. the energy efficiency class as defined in point 1 of Annex VIII; the head of the arrow containing the energy efficiency class of the domestic coffee machines shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

IV. calculated annual energy consumption *AE* in kWh per year, rounded up to the nearest integer and calculated in accordance with Annex IX.

V. a pictogram of the type of domestic coffee maker: drip filter coffee machine (as in label 1), portioned filter coffee machine (as in label 2) and espresso coffee machine (as in label 3) with –for drip filter coffee machines—the option to indicate the maximum capacity.

VI. a diagram with graphics (in cyan) as indicated, showing the split of the calculated annual energy consumption *AE* in kWh electricity equivalent per year in a rounded rectangle as follows

a) calculated annual electricity consumption *AEL* in kWh per year, rounded to the nearest integer and calculated in accordance with Annex VII, positioned in the center of a grey bar. The grey bar is placed in the rounded rectangle and has a width proportionate to the relative contribution to the total *AE* as indicated by the width of the rounded rectangle, a height fitting the inside frame of the rounded rectangle and is left-aligned to a position that is proportionate to the relative contribution of the indirect energy requirement for the ground coffee beans;

b) the calculated indirect energy requirement of the ground coffee beans *AEC* in kWh electricity equivalent per year, rounded up to the nearest integer and calculated in accordance with Annex IX positioned in the center of the space in the rounded rectangle to the left of the grey bar mentioned under a);

c) the calculated indirect energy requirement of the possible filter material *AEF* in kWh electricity equivalent per year, rounded up to the nearest integer and calculated in accordance with Annex IX positioned in the center of the space in the rounded rectangle to the right of the grey bar mentioned under a);

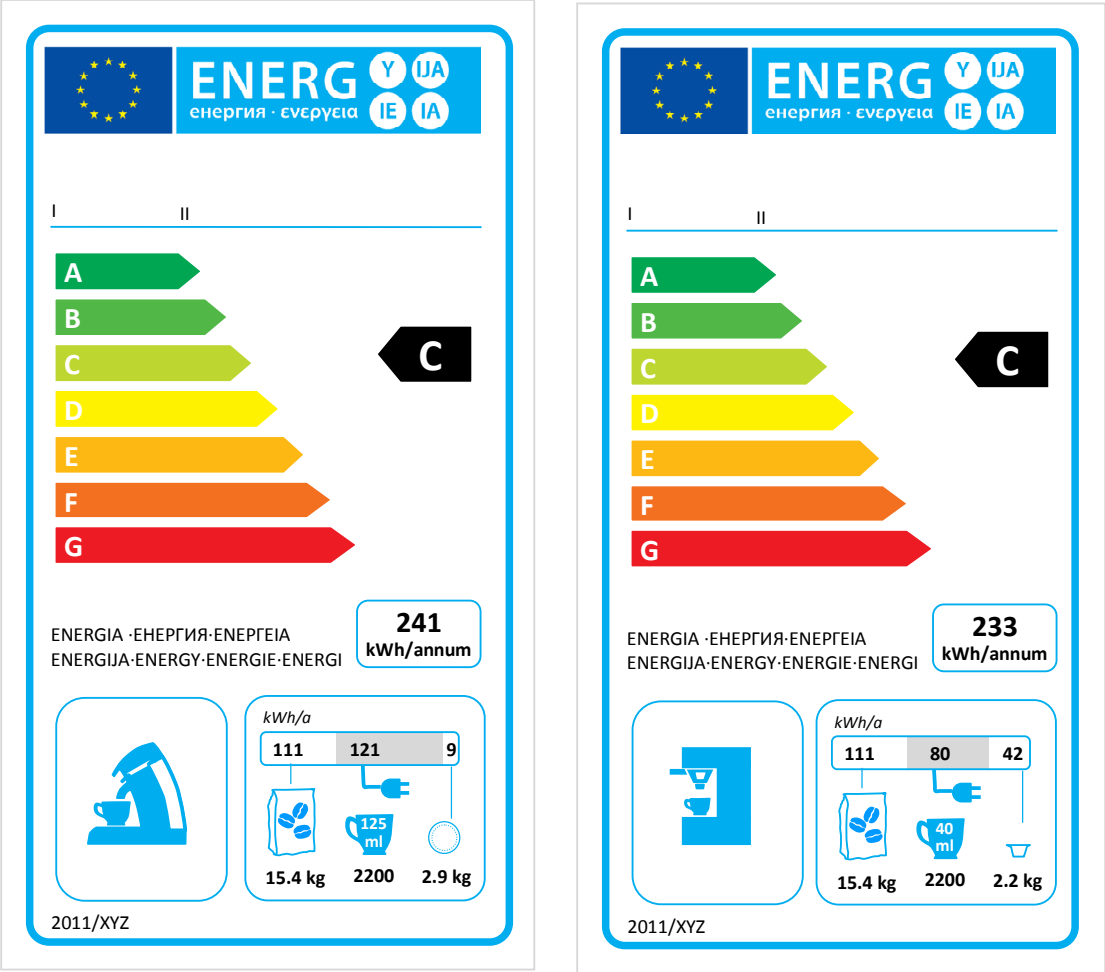
also showing pictograms (in cyan) with indications, in black and from left to right in the picture of:

d) the calculated annual coffee consumption in kg

e) the number of annually consumed coffee cups used in the calculation, with an indication in the pictogram of the cup size in g

f) the calculated annual consumption of possible filter material.

(b) The design of the label shall be in accordance with the following specifications *[detailled design drawing and description to follow; examples below are for illustration of icons for icons of portioned filter coffee machines (left) and espresso machines (right)]*



(c) Combination coffee machines shall have a separate label for each type of domestic coffee machine.

Annex IV: Product fiche

1. The information in the product fiche of the domestic coffee machines shall be given in the following order and shall be included in the product brochure or other literature provided with the product:

(h) supplier's name or trade mark;

(i) supplier's model identifier which means the code, usually alphanumeric, which distinguishes a specific domestic coffee machines model from other models with the same trade mark or supplier's name;

(j) whether the domestic coffee machines is an "automatic coffee machine" or "manual coffee machine";

(k) energy efficiency class in accordance with point 1 of Annex VIII;

(l) the calculated Annual Energy Consumption (AE), in kWh/year rounded up the first decimal place; it shall be described as: "energy consumption 'X' kWh per year for brewing on average 6 cups per day in 2 shifts";

(m) the calculated Annual Electricity Consumption (AEL), in kWh/year rounded up the first decimal place; it shall be described as: "electricity consumption 'X' kWh per year";

(n) the calculated Annual Equivalent Electricity Consumption for Coffee Beans (AEC), in kWh/year rounded up the first decimal place and the calculated Annual Mass of Coffee Beans in kg/year rounded up the first decimal place ; it shall be described as: "calculated equivalent electricity consumption 'X' kWh for production and procurement of 'Y' kg of roasted and ground coffee beans per year";

(o) the calculated Annual Equivalent Electricity Consumption for Filter Material (AEF), in kWh/year rounded up the first decimal place and the calculated Annual Mass of Filter Material in kg/year rounded up the first decimal place; it shall be described as: "calculated equivalent electricity consumption 'X' kWh per year for production and procurement of 'Y' kg of filter material per year";

(p) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.).

2. One fiche may cover a number of domestic coffee machines models supplied by the same supplier.

3. The information contained in the fiche may be given in the form of a copy of the label, either in colour or in black and white. Where this is the case, the information listed in point 1 not already displayed on the label shall also be provided.

Annex V: Technical documentation

1. The technical documentation shall include:

(h) the name and address of the supplier;

(i) a general description of the coffee machine model, sufficient for it to be unequivocally and easily identified;

(j) where appropriate, the references of the harmonised standards applied;

(k) where appropriate, the other technical standards and specifications used;

(l) identification and signature of the person empowered to bind the supplier;

(m) technical parameters for measurements as follows:

(1) whether the domestic coffee machine is drip filter coffee machine, a portioned filter coffee machine or an espresso machine, whereby –if it is a drp filter coffee machine—it shall be reported if the product has a thermos jug, automatic water dosage, automatic coffee dosage or is fully automatic as defined in Annex IX;

(2) the accumulative electricity consumption for the test cycle until 100 minutes after finishing the brewing cycle E_{tst} is calculated, expressed in Wh with 1 decimal precision, as appropriate increased with the corrections under points 3), 4) and 5) to be reported separately;

(3) the average power consumption between 100 minutes after finishing the brewing cycle until the end of the test cycle PD_{tst} is calculated, expressed in W with 1 decimal precision;

(4) average temperature of the water leaving the filter before entering the cup or jug, expressed in degree Celsius with a 1 decimal precision;

(5) temperature of the coffee in the cup is measured immediately after the cup is filled by the machine or after filling from the jug, measured with a temperature sensor positioned in the center and middle of the cup, expressed in degrees Celsius with a 1 decimal precision;

(6) average mass of the coffee in the cups brewed per cycle, expressed in g rounded to the nearest integer;

(7) the dry mass of the ground coffee beans consumed during the test cycle expressed in g with 1 decimal precision;

(8) the dry mass of pads without ground coffee beans or the dry mass of the capsules used, expressed in g with a 1 decimal precision ;

(9) average ambient air temperature during the test, expressed in degrees Celsius with a 1 decimal precision;

(10) temperature, expressed in degrees Celsius with a 1 decimal precision, and water hardness of the cold water used in the test;

(11) for machines not equipped with automatic water dosage the mass of cold water supplied to the reservoir in g, rounded to the nearest integer;

(12) for machines not equipped with automatic coffee dosage or portioned coffee pads or –filters, the mass of coffee used during the test in g, with an accuracy of ±0,1 g;

(13) for drip filter coffee machines with a thermos jug, the temperature drop in of the water in the jug after 30 minutes when filled to half of its volume-capacity with water of a temperature between 77 °C and 97 °C and placed in an ambient with 20±1 °C air temperature not exposed to direct sunlight or other radiative heat sources, measured in the middle of the jug with an accuracy of ±0,1 K;

(14) for portioned domestic coffee machines: the material used for the pad or capsule;

(15) for machines with an automatic dosage device, the settings used for the coffee taste and/or composition.

(n) the results of calculations performed in accordance with Annex IX to arrive at the

- Annual Energy consumption AE in kWh/a
- the Annual Mass of Coffee AMC in kg/a,
- the Annual Energy requirement for Coffee AEC in kWh/a,
- the Annual Mass of Filter or capsule material AMF in kg/a,
- the Annual Energy requirement for Filter or capsule material AEF in kWh/a and
- the Energy Efficiency EE in %;

(o) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.)

2. Where the information included in the technical documentation file for a particular domestic coffee machines model has been obtained by calculation on the basis of design, or extrapolation from other equivalent domestic coffee machines or both, the documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by suppliers to verify the accuracy of the calculations undertaken. The information shall also include a list of all other equivalent domestic coffee machines models where the information was obtained on the same basis.

Annex VI: Information to be provided in the cases where end-users cannot be expected to see the product displayed

1. The information shall be provided in the following order:

(e) whether the domestic coffee machine is drip filter coffee machine, a portioned filter coffee machine or an espresso machine, whereby –if it is a drip filter coffee machine—it shall be reported if the product has a thermos jug, automatic water dosage, automatic coffee dosage or is fully automatic as defined in Annex VII;

(f) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.) and in case of a portioned preparation the material of the pad or capsule material;

(g) the energy efficiency class as defined in point 1 of Annex VIII;

(h) the following quantitative information:

v. the weighted Annual Energy Consumption (AE) rounded up to the first decimal place; it shall be described as: “energy consumption 'X' kWh per year, at 6 cups brewed per day”;

vi. the calculated Annual Electricity Consumption (AEL), in kWh/year rounded up the first decimal place; it shall be described as: “electricity consumption 'X' kWh per year”;

vii. the calculated Annual Equivalent Electricity Consumption for Coffee Beans (AEC), in kWh/year rounded up the first decimal place and the calculated Annual Mass of Coffee Beans in kg/year rounded up the first decimal place ; it shall be described as: “calculated equivalent electricity consumption 'X' kWh for production and procurement of ‘Y’ kg of roasted and ground coffee beans per year”;

viii. the calculated Annual Equivalent Electricity Consumption for Filter Material (AEF), in kWh/year rounded up the first decimal place and the calculated Annual Mass of Filter Material in kg/year rounded up the first decimal place; it shall be described as: “calculated equivalent electricity consumption 'X' kWh per year for production and procurement of ‘Y’ kg of filter material per year”;

(i) if the domestic coffee machines is intended to be built-in, an indication to this effect.

(j) information on the type of coffee preparation used by the machine (for example filter, capsule, pad, etc.).

2. Where other information contained in the product fiche is also provided, it shall be in the form and order specified in Annex III.

3. The size and font in which all the information referred in this Annex is printed or shown shall be legible.

Annex VII: Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Annexes II and III, Member State authorities shall test a single domestic coffee machine. If the aggregated value of Energy Efficiency is lower than the value declared by the supplier, the measurements shall be carried out on three more domestic coffee machines. The arithmetic mean of the Energy Efficiency value of these three domestic coffee machines shall meet or exceed the Energy Efficiency value declared by the supplier. Otherwise, the model and all other equivalent domestic coffee machine models shall be considered not to comply with the requirements in this Regulation.

Member States authorities shall use the measurement procedure as defined in Annex IX.

Annex VIII: Energy efficiency classes

ENERGY EFFICIENCY CLASSES

The energy efficiency class of a domestic coffee machines shall be determined in accordance with its Energy Efficiency Index (*EEI*) as set out in Table 1.

The Energy Efficiency Index (*EEI*) of a domestic coffee machines shall be determined in accordance with point 1(a) of Annex IX.

Table 1: Energy efficiency classes

Energy efficiency class	Energy Efficiency
A+	EEI ≥ 90%
A	80%≤ EE < 90%
B	70% ≤ EE < 80%
C	60% ≤ EE < 70%
D	50%≤ EE < 60%
E	40%≤ EE < 50%
F	30% ≤ EE < 40%
G	EE<30%

Annex IX: Testing and calculation methods

TECHNICAL DEFINITIONS

For the purpose of this Regulation the following technical definitions applies:

(18) "domestic coffee machine" means any machine for brewing coffee that fits the definition of a drip filter coffee machine, a portioned filter coffee machine or an espresso coffee machine hereafter;

(19) "drip filter coffee machine" means an appliance for producing and storing coffee, using a production method where heated water is dripping once through ground coffee beans in a filter at the force of gravity, equipped with provisions for heating the water and automatically dosing the heated water on the grinded coffee beans, with a coffee brewing capacity between 0,6 and 1,8 litres within 10 minutes after being activated, with a storage capacity of the recipient between 0,6 and 1,8 litres capable of storing the coffee at a temperature of 67°C or higher for at least 30 minutes after brewing.

(20) "portioned filter coffee machine" means an appliance for producing coffee from one or two portions of ground coffee beans contained in a filter envelope using heated water, at a pressure lower than 1 MPa (10 bar), equipped with means for heating the water and automatically administering the heated water on the ground coffee beans, with a minimum brewing capacity of 125 g of coffee in a recipient within 2 minutes after being activated and a maximum capacity of simultaneously producing 2 coffee portions of 125 g in two different recipients within 2 minutes after being activated;

(21) "espresso machine" means an appliance for producing coffee by supplying heated water at a pressure of 1 MPa (10 bar) or more to ground coffee beans in a filter, with a minimum brewing capacity of 40±1 g of coffee in a recipient within 2 minutes after being activated and a maximum capacity of simultaneously producing 2 coffee portions of 120±5 g in two different recipients within 2 minutes after being activated;

(22) "activated" means connected to a power supply and operated to brew the desired volume of coffee according to manufacturer's instructions, after a preceding period of being disconnected for 6 h in an ambient with 20±1 °C air temperature, after being prepared –immediately prior to the connection to a power supply-- according to manufacturer's instructions with an appropriately filled reservoir of cold water of 10±1 °C and medium hardness, roasted and possibly ground coffee beans as well as possibly other auxiliary materials required;

(23) "coffee beans" means the bean-like seeds of a tropical shrub Genus Coffea (family Rubiaceae: several species);

(24) "ground coffee beans" means roasted and ground non-decaffeinated coffee beans;

(25) "coffee" means a hot drink made from roasted and ground coffee beans;

(26) “filter” means a container or part of a container that holds ground coffee beans ready for extraction of coffee in a domestic coffee maker that prevents ground coffee beans from entering the coffee, for single or multiple use;

(27) “pad” means a closed filter envelope for single use, permeable to oxygen, containing a specific weight-portion of grinded coffee beans;

(28) “capsule” means a closed filter envelope for single use, non-permeable to oxygen, containing a specific weight-portion of grinded coffee beans;

(29) “cup” is the coffee recipient in a portioned filter coffee machine or an espresso machine as well as an accounting unit for domestic coffee makers indicating a volume of 40±1 g for espresso machines and 125±1 g for other types of domestic coffee machines;

(30) “coffee jug” means recipient of coffee in a drip filter coffee machine;

(31) “thermos coffee jug” means a coffee jug with the characteristic that, when filled to half of its volume-capacity with water of a temperature between 77 °C and 97 °C and placed in an ambient with 20±1 °C air temperature not exposed to direct sunlight or other radiative heat sources, the water temperature, measured in the middle of the jug, between the moment immediately after filling and 30 minutes after filling does not exceed 10 K;

(32) “water dosage device” means a device that is capable of administering ground coffee beans with an accuracy of ±0,1 g to the filter of a domestic coffee maker;

(33) “coffee dosage device” means a device that is capable of supplying heated water to the ground coffee beans in the filter with an accuracy of ±1 g, following user settings controlling the desired composition of the coffee;

(34) “automatic dosage device” means a device that is capable of preparing a desired volume of coffee, with an accuracy of ±1 g and with a user-set fixed portion size of at the most 40±5 g, at a desired user settings controlling the desired composition of the coffee;

(35) “hard off switch” means a switch on the domestic coffee machine that fully cuts off the machine from the external power supply;

(36) “end of brewing cycle” means the moment the flow of coffee in the recipient stops and more specifically for filter types means the moment at which the period between two drops falling consecutively into the coffee container is approximately 2 s.

TESTING METHOD

The following test cycle, using the definitions in Art. 2 of this Regulation, applies:

(a) The domestic coffee maker is activated, whereby the cold water reservoir of drip filter coffee machines without automatic water dosage shall be filled with

- 540±1 g of water if the machine has no thermos jug and no semi-automatic or fully automatic dosage device;

– 472±1 g of water if the machine is equipped with a thermos jug or automatic coffee dosage device;

– 405±1 g of water if the machine is equipped with a thermos jug and an automatic coffee dosage device

and the filter of drip filter coffee machines without automatic coffee dosage shall be filled with

– 24±0,1 g of ground coffee beans if the machine has no thermos jug and no semi-automatic or fully automatic dosage device;

– 21±0,1 g of coffee beans if the machine is equipped with a thermos jug or automatic coffee dosage device;

– 18±0,1 g of ground coffee beans if the machine is equipped with a thermos jug and an automatic coffee dosage device.

(b) Within 60 s after the end of the brewing period 2 cups are poured from the jug (drip filter coffee machine) or the machine is operated to brew a second cup (other types).

(c) 30 minutes after the end of the brewing period 1 cup is poured from the jug (drip filter coffee machine) or the machine is operated to brew another cup (other types).

(d) 45 minutes after the end of the brewing period machines with a hard on-off switch, i.e. that fully disconnect the machine from the power supply, are switched off.

(e) 100 minutes after finishing the brewing cycle machines without a hard on-off switch are unplugged from the power supply.

During the test the following parameters are determined:

(i) electric power consumption with an accuracy of 0,1 W at a sample rate of 1 s;

(ii) temperature of the water leaving the filter before entering the cup or jug with an accuracy of ±0,1 K;

(iii) temperature of the coffee in the cup (from the machine or jug) is measured immediately after the cup is filled with an accuracy of ±0,1 K ;

(iv) mass of the coffee in the cup with an accuracy of ±1 g;

(v) the mass of the ground coffee beans consumed during the test sequence with an accuracy of ±0,1mg;

(vi) the mass of the pad and capsule without ground coffee beans consumed during the test sequence with an accuracy of ±0,1 mg;

From the above parameters the following intermediate calculations are made:

(1) from measurements (i), the accumulative electricity consumption for the test cycle until 100 minutes after finishing the brewing cycle E_{tst} is calculated, expressed in kWh with 4 decimal precision, possibly increased with the corrections under points 3), 4) and 5);

(2) from measurements (i), the average power consumption between 100 minutes after finishing the brewing cycle until the end of the test cycle PD_{tst} is calculated, expressed in kW with 4 decimal precision of 4 decimals;

(3) from measurements (ii), if the temperature is lower than 75 °C the accumulative electricity consumption E_{tst} shall be increased with 2% for every degree that the lowest measured temperature measured in point (ii) is below 80 °C;

(4) from measurements (iii), if the temperature of the last cup in the test cycle is below 67 oC and the drip filter coffee machine was tested as an appliance with a thermos jug the test shall be repeated at conditions for a drip filter coffee machine without thermos jug and there shall be a correction of 0,1 kWh added to the accumulative electricity consumption E_{tst};

(5) from measurements (iv), the accumulative electricity consumption E_{tst} shall be corrected by the ratio of the mass per cup and the applicable standard cup size if the difference between the two latter parameters is more than 2 g;

(6) from measurement (v), the dry mass of the ground coffee beans consumed during the test sequence MC_{tst} , expressed in g with 1 decimal precision should be in the range of 6±0,2 g/cup for drip filter machines with automatic coffee dosage or 7±0,2 g/cup for other coffee machine types or otherwise the user-setting for the coffee dosage shall be adjusted or another commercially available portioned pad or capsule shall be selected;

(7) from measurement (vi) the dry mass of pads without ground coffee beans consumed during the test shall be in the range of 1,3±0,2 g/cup in order to assume a default value of 1,3 g, otherwise a more suitable commercially available pad shall be used, whereas for capsules the actual capsule mass MF_{tst} is recorded and for drip filter coffee machines a default mass of 3 g is assumed;

CALCULATION OF THE ENERGY EFFICIENCY

For the calculation of the Energy Efficiency Index (*EE*) of a domestic coffee machine, the Annual Energy Consumption of a domestic coffee machine is compared to its Standard Annual Energy Consumption.

(a) The Energy Efficiency (*EE*) is calculated as follows and rounded to one decimal place:

$$EE = \frac{SAE}{AE}$$

where

– *SAE*= calculated Standard Annual Energy Consumption of the domestic coffee machine, in kWh/year with SAE_C is 110 kWh/a for drip filter coffee machines, 137 kWh for portioned filter coffee machines and 110 kWh/a for espresso machines;

– AE = calculated Annual Energy Consumption of the domestic coffee machine, in kWh/year and rounded to one decimal place

CALCULATION OF THE ANNUAL ENERGY CONSUMPTION

(b) The Annual Energy Consumption (AE) is calculated, in kWh/year and rounded to one decimal place, for 730 coffee making cycles as follows:

$AE = AEL + AEC + AEF$

where
AEL is Annual Electricity consumption in kWh/a,
with
$AEL = (E_{tst} + PD_{tst} \times 22) \times 730$;

AEC is electricity equivalent of indirect energy requirement for production and procurement of ground coffee beans in kWh/a
with
$AEC = AMC_{tst} \times 730 \times GERC$
where
AMC_{tst} is calculated dry mass of ground coffee beans consumed in a year, expressed in kg/yr with 1 decimal precision,
with
$AMC_{tst} = MC_{tst} \times 730$,
where
MC_{tst} is the dry mass of ground coffee beans consumed in the test in kg/cycle with 4 decimal precision;
$GERC$ is the Gross Energy Requirement for the production and procurement of ground coffee beans, expressed in kWh electricity equivalent with default value of 6,5 kWh/kg

AEF is electricity equivalent of indirect energy requirement for production and procurement of filter material in kWh/a,
with
$AEF = AMF_{tst} \times 730 \times GERF$
where
AMF_{tst} is the calculated dry mass of filter material consumed in a year, expressed in kg/yr with 1 decimal precision;
with
$AMF_{tst} = MF_{tst} \times 730$,
where
MF_{tst} is the dry mass of filter material consumed in the test in kg/cycle with 4 decimal precision, with a default value of 0,0030 kg/cycle for drip filter coffee machines using a paper filter, 0,0052 kg/cycle for portioned filter coffee machines, a measured mass MF_{tst} for capsules and for machines with only mechanical filters the default value is 0;
$GERF$ is the Gross Energy Requirement for the production and procurement of the filter material with default 3 kWh/kg for paper filters or pads and 18 kWh/kg for aluminium capsule material.

PROPOSAL 3

No action

This proposal does not deliver any savings directly but the Standby Regulation will bring ca. 2 TWh annual savings and probably further savings could be expected from the general trend that more efficient machine are making it eventually to the market. This option would free resources to focus on other priority product groups.

Summary and explanatory Notes

This working document is meant to contribute to achieving the aims of Directive 2009/125/EC and Directive 2010/30/EU in relation to domestic coffee machines. The proposed ecodesing requirements are set out based on the recommendations of the preparatory study and calculations made by the Commission services.

Form of the implementing measure

The intention is to give to the Ecodesign implementing measure the form of a directly applicable regulation and the Energy Labelling measures the form of a directly applicable delegated regulation.

Scope

Unless indicated differently, the first two proposals in this working document cover domestic coffee machines including:

- drip filter coffee machines;
- portioned filter coffee machines;
- espresso machines and
- combination machines.

Note that for labelling measures Proposal 1 only include espresso machines.

Only electric machines are in scope. The capacity and performance range as indicated is typically fitting for a household environment.

Exclusions

Excluded from the scope of the first two proposals of the working document are:

- non-electric coffee makers (e.g. ‘cafet(i)era’);
- non-domestic coffee machines;
- niche markets in the EU, such as electric percolators, drip filter machines with capacity smaller than 0,5 litre, coffee makers using soluble coffee, etc..

Summary

Proposal 1

Data from the preparatory study identify an electricity consumption for domestic coffee machines of 17 TWh/a.

Under the current legislation, i.e. the Standby Regulation, the off-mode and standby-mode power of coffee makers should be reduced to maximum 0,5 and 1 W respectively by 1.1.2013. Furthermore, an appropriate auto power down time should be implemented. The preparatory study calculates that this existing piece of legislation, with an auto power down time of 100 minutes, will lead to a 2 TWh per year saving by 2020-2025.

Instead, the industry proposes to exclude domestic coffee machines from the scope of the standby regulation and implement a maximum off-mode and standby-mode power requirement of 1 and 2 W respectively. This reduces the autonomous saving by some 20-30%, i.e. there is a negative saving of 0,5 TWh per year.

As auto power down, the industry is proposing 60 minutes. This will lead to some saving with respect of the autonomous (100 minutes) power down; probably in the order of magnitude to compensate the negative saving.

The industry proposes labelling only for espresso machines, representing ca. 10% of installed stock and electricity use. This would save 0,5 TWh by 2020. If portioned filter and drip filter coffee machines would be included then the savings would be higher, ca. 3-4 TWh.

In terms of consumer expenditure, labelling espresso machines only result in savings of between € 0 and 90 million per year, or € 0-0,45 per EU household per year. If all types of machines are labelled, savings could go up to 3-4 TWh per year, or € 2,70 - € 3,60 per EU household per year[4].

Proposal 2

The Lot 25 preparatory study and additional analysis by the Commission services show that direct electricity consumption and indirect energy consumption for the production of coffee and filter/pad/capsules in the use-phase dominate the life-cycle impact of domestic coffee machines. Direct electricity consumption is estimated at 12-15 TWh per year, coffee consumes the equivalent of 15 TWh electricity per year and filter/pad/capsule materials account for the equivalent of 1,6 TWh electricity annually. In total, the direct and indirect energy consumption amounts to around 30 TWh electricity equivalent per year, most of which is in the European Union.

[4] The saving from the industry proposal if they only tackle the labelling of espresso-machine = 0 – 0,5 TWh/a = 0 -90 million Eur = € 0 - € 0,45 per EU household
The saving from the industry proposal if they only tackle the labelling of all machines (incl. drip filter) = 3-4 TWh/a = 540-720 mln euro = € 2.70 - € 3.60 per household.

Accordingly, this proposal entails minimum energy efficiency requirements and labelling measures that take into account all three energy impacts and benchmarks in relation to direct and indirect energy consumption in the use phase.

For this particular product, as for most domestic appliances, energy labelling is expected to be as least as effective as setting minimum requirements. But it is the combination of both that supports EU and Member State action and will hopefully add a 'consumer and retailer pull' to the 'market push' of eliminating the worst on the market.

In total, a direct and indirect energy saving in 2020-2025 is expected to be of 25%, half of which is to be realised in making coffee machines that will help people to make a good cup of coffee with precision dosage of the ingredients, using thermos jugs instead of a keep-warm plate that ruins leftover coffee, and smart heating element insulation. Thus electricity use can be reduced by 30-40%, coffee, by not being wasted, saves the electricity equivalent of 20%. Filter/pads/capsules, which make up a relatively small share of the total, except with certain espresso machine, can still contribute their part: comparing highest and lowest aluminium espresso capsule weight on the market there could still be a 40-50% gain. Overall, the savings would amount to 7.5 TWh per year, or € 68.70 - € 69.60 per EU household taking into account the cost of coffee, filters, pads and capsules[5].

EU-27 domestic coffee machines	**Consumption**	**Saving potential**	**Saving potential**
	TWhe eq./a	**TWhe eq./a**	**billion EURO**
Electricity	12-15	3-4	0.54 - 0.72
Coffee	15	3.6	13.2
Filters & caps	1.6	0.3	pm
TOTAL (approx.)	30	7.5	13.8

Note that the above excludes the saving from the standby regulation, which particularly impacts on espresso and portioned filter machines.

Proposal 3

This proposal does not deliver any savings directly but the Standby Regulation will bring ca. 2 TWh annual savings and probably further savings could be expected from the general trend that more efficient machine are making it eventually to the market.

[5] The saving is 3-4 TWh/a electricity (= 540-720 mln euro = € 2.70 - € 3.60 per household) + € 13.2 billion/a in coffee = € 13.74 to € 13.92 billion/a = € 68.70 - € 69.60 per household.

Comparison table proposals 1, 2 and 3 for domestic coffee machines

	Proposal 1 ('electricity only')	**Proposal 2 ('electricity and consumables')**	**Proposal 3 (no action)**
Target	Targets only specific electricity consumption in the use phase, e.g. power in off- and standby-mode	Targets electricity, coffee and filter/pad/capsule consumption in a holistic approach integrating direct and indirect energy use in as much as they can be influenced by the product design. In other words the manufacturer can choose how to reach targets	Frees resources for the finalisation of other priority product groups
Scope, savings	Labelling Scope and savings: only domestic espresso machines (ca. 10% of stock of the most common types). Represents ca. 2 TWh/a electricity use with saving potential 30% = 0,6 TWh/a	Scope: all three common household types: drip filter, portioned filter and espresso coffee. Representing ca. 30 TWh of direct (40-50%) and indirect (50-60%) energy consumption and an overall 25 % saving of 7,5 TWh/a.	Saving 2 TWh/a
Consumer savings	Consumer savings EU household/year € 0-0.45, if all machines labeled € 2.70-3.60 (including energy cost + purchase cost of machines)	Consumer savings EU household/year € 68.70-69.60 (including energy cost + purchase cost + purchase cost of coffee, filters, pads, capsules)	n/a
Standby	Makes off- and standby mode limits more lenient than existing standby-regulation (1 and 2 W instead of 0,5 and 1 W): negative savings	Maintains existing regulation, 2nd tier effective per 1.1.2013 (0,5 and 1 W). Adds specifically that the appropriate power down time is 100 minutes after the end of the brewing cycle.	Standby Regulation applies
Benchmark	Benchmarks are based on commercial BAT, not further elaborated	Benchmarks are based on theoretical (technical) minimum energy use, calculated transparently	n/a
Measurement method	Uses energy use measurements (parts of AE) and benchmarks (parts of SAE) specifically subdivided for Brewing, Rinsing, Standby, Off, etc.	Uses integrated energy measurement of full cycle in kWh + last part used for powered down power (in W)	n/a

Calculation method	Calculated 3 cycles of 3 cups/day à 9 cups/day (IEC: first 1 x 120 ml + 2 x 40 ml)	Calculated 2 cycles of 3 cups/day à 6 cups/day	n/a
Calculation method	Includes separate test for milk frothing, keep-warm function for cups	Measures just coffee making (and store); inclusion of extra functions and unnecessarily complicates rating	n/a
Calculation method	Prescribes 76 oC as minimum storage temperature	Differentiates between temperature leaving filter (>80 or 76 oC) and storage temperature: 67 oC as minimum stored coffee temperature (note: ideal serving temperature is 55-60 oC)	n/a
Calculation method	Calculation of AE for electro-mechanical dripfilter machines (=90% of market) with 20h/day keep-warm plate action.	Machines with hard off-switch (as electro-mechanical dripfilter machines and others) are switched off 45 minutes after the end of the brewing cycle. The calculation is based on 2 shifts (2 x 45 min. keep-warm action/day).	n/a
Calculation method	Corrections if brewing temperature is too low (<80 oC), but the penalty is calculated immediately and in a direct way that will dissuade suppliers from following this strategy.	Corrections if brewing temperature is too low (<80 oC), but the penalty is calculated in a more complex formula that takes into account the energy use measured.	n/a
Calculation method	Corrections if store temperature is too low (<67 oC), but the penalty is calculated immediately and in a direct way that will dissuade suppliers from e.g. using faulty thermos jugs. [note that thermos jugs are also tested independently to guarantee minimum performance.	Corrections if brewing temperature is too low of the second cup of espresso after 30 minutes(<76 oC). The same temperature is taken for drip filter stored coffee. Penalty is calculated as a fraction of the overall energy use of the cycle.	n/a

Calculation method	Corrections if brewing temperature is too low of the second cup of espresso after 30 minutes(<76 oC) is acceptable (not yet in proposal). A store temperature of 67 oC is taken for drip filter stored coffee. Penalty is calculated as a fraction of the overall energy use of the cycle for the espresso machine. For store temperatures that are too low a worst-case hot plate action is assumed.	Correction for mass of coffee is identical in both proposals	n/a
Calculation method	Correction for mass of coffee	Correction for mass of coffee	n/a