European Commission (DG ENER)

Preparatory Studies for
Ecodesign Requirements of EuPs (III)
[Contract N° TREN/D3/91-2007-Lot 25-SI2.521716]

Lot 25
Non-Tertiary Coffee Machines

Task 3: Consumer behaviour and local infrastructure – Final version

July 2011

In association with

Bio Intelligence Service - Scaling sustainable development
Industrial Ecology - Nutritional Health

Bio Intelligence Service S.A.S - bio@biois.com
20-22 Villa Deshayes - 75014 Paris - France
Tél. +33 (0)1 53 90 11 80 - Fax. +33 (0)1 56 53 99 90

Contact BIO Intelligence Service
Shailendra Mudgal – Benoît Tinetti
☏ + 33 (0) 1 53 90 11 80
shailendra.mudgal@biois.com
benoit.tinetti@biois.com

Project Team

BIO Intelligence Service

Mr. Shailendra Mudgal

Mr. Benoît Tinetti

Mr. Lorcan Lyons

Ms. Perrine Lavelle

Arts et Métiers Paristech / ARTS

Mr. Alain Cornier

Ms. Charlotte Sannier

Ms. Aude Jean-Jean

Disclaimer:

The project team does not accept any liability for any direct or indirect damage resulting from the use of this report or its content.

This report contains the results of research by the authors and is not to be perceived as the opinion of the European Commission.

Contents

3. TASK 3 – CONSUMER BEHAVIOUR AND LOCAL INFRASTRUCTURE

Consumer behaviour is a key parameter affecting the energy consumption of non-tertiary coffee machines: most importantly through the manner in which the coffee machine is used over its lifetime (e.g. time spent in on/off/standby modes) and to a lesser extent through the selection of the appliance for purchase and at end-of-life. To some extent, product design can also influence consumer behaviour and consequently the environmental impacts and the energy consumption of the product.

Consumer behaviour and product use conditions have a direct influence on product performance as real-life use conditions might be different to the intended or standard use conditions. Differences may arise for cultural or infrastructural reasons (from one Member State to another) for example, or because of different ambient temperature conditions. Even within the same country, different individuals may use the same appliance in a variety of manners. Such differences might represent barriers to the implementation of Ecodesign requirements and therefore it is important to identify them in order to assess the real environmental and economic impacts of the product.

The objective of this task is to explore these aspects for products within the scope of Lot 25 and more specifically to investigate the influence of consumer behaviour on the energy and environmental performance of non-tertiary coffee machines, and to provide examples of sustainable product use.

The first section focuses on the real-life energy efficiency of non-tertiary coffee machines. Consumer behaviour is an important input for assessing the environmental impacts and life-cycle cost of a product and relevant parameters (e.g. frequency and use characteristics) are quantified as inputs to Tasks 5 and 7. The effect of providing product information to end users will also be considered as well as whether it could be useful to consider product labelling or provision of information in other forms (e.g. ecological footprint). Social, cultural and infrastructural barriers to the provision of such information will also be investigated.

3.1. REAL-LIFE ENERGY EFFICIENCY

The aim of this subtask is to understand how the real-life energy efficiency of non-tertiary coffee machines differs from that under laboratory conditions and to quantify user-defined parameters. Two sources of information have been sought to determine this difference: firstly, reported values of the share in the overall energy bill accounted for by non-tertiary coffee machines (country-level data) and secondly, reported behavioural data from tests and surveys conducted in households (user-level data).

3.1.1. USE PATTERNS

Like all consumer electronics products, coffee machines' energy use depends on both the power requirements in different operation modes (ready mode, standby mode, and off mode, as discussed in Task 1) and on the use pattern (average time in each of these modes), which can vary considerably depending on the user's habits.

As seen in Task 1, test standards exist to measure the power requirements of coffee machines and some of these standards also provide a method to determine the electricity consumption of coffee machines in standard conditions which may differ from real life.[1]

This sub-section defines a typical coffee machine use pattern. This typical use pattern should represent as closely as possible the real-life situation in order to provide an accurate picture of the real energy consumption.

3.1.1.1 COUNTRY-LEVEL DATA

- **Electricity consumption**

Coffee machines use a significant amount of electricity. Their total consumption in a typical household is around 4%, depending on the device and user behaviour.[2] Three-quarters of their electricity consumption is due to the "keeping warm" function and the stand-by mode.

The stock of non-tertiary coffee machines in the EU was estimated at about 100 million units in 2006, consuming 17 TWh per year and imposing electricity costs of about 2 500 million euros.[3] Few data are available at Member State level.

- **Coffee consumption**

Individual countries display differences in household consumption patterns due to changes in habits or preferences for certain equipment. For example, according to a study by Öko-Institut,[4] Germans drank 146 l of coffee per person in 2008 (5.3 cups of 75 ml per day, 3.2 cups of 125 ml). This value remained constant compared to 2006 when the consumption was about 3.1 cups of 125 ml.

Figure 3-1 compares coffee consumption (in cups of 125 ml) per day per person in 2006 in various countries and regions. As expected, huge differences exist between Member States.

---

[1] These standards are under revision in order to be closer to the reality.

[2] Bush, E., Josephy, B. and J. Nipkow (2007) Hintergrundinformationen: *Stromsparpotenzial von Kaffeemaschinen*, Bush Energie and Arena, Felsberg and Zürich.

[3] Nipkow, J., Bush, E., Josephy, B., Heutling, S., Griesshammer, R. (2009) *Strategies to enhance energy efficiency of coffee machines*, Topten, S.A.F.E., Federal Environment Agency, Öko-Institut.

[4] Stratmann, B. and R. Griesshammer (2009) *PROSA Espressomachinen, Kriterien für das Umweltzeichen für klimarelevante Produkte und Dienstleistungen*, Öko-Institut.

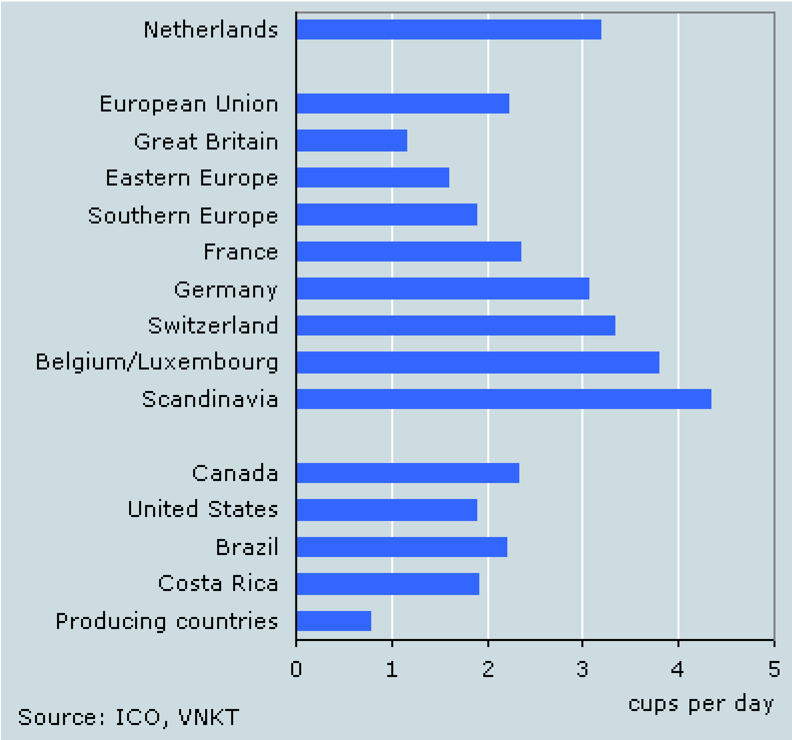

Figure 3-1: Coffee consumption, 2006 (cups per person per day)

Notes:
- 1 cup = 125 ml
- Scandinavia = Denmark, Finland, Norway, Sweden
- Eastern Europe = Bulgaria, Hungary, Poland, Romania, Slovenia, Slovakia, Czech Republic
- Southern Europe = Cyprus, Greece, Italy, Malta, Portugal, Spain
- Producing countries = Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Ethiopia, Philippines, Guatemala, Haiti, Honduras, Indonesia, Ivory Coast, Madagascar, Mexico, Nicaragua, Panama, Venezuela

3.1.1.2 USER-LEVEL DATA

- **Domestic use**

Synovate (UK) conducted a study for CECED from January to March 2009 in four EU Member States (France, Germany, Italy and the Netherlands) to better understand how consumers use espresso coffee machines in practice.[5] Note that the categories of machine are different to those defined in this study.

The rate of ownership of electric espresso machines is significantly higher in Italy. Ownership of other types of electric coffee machine is significantly lower in Italy compared to France, Germany and the Netherlands (see Figure 3-2).

[5] Synovate (UK) Ltd., *Electric Espresso Machine Usage: Input to establish energy usage ratings*, March 2009.

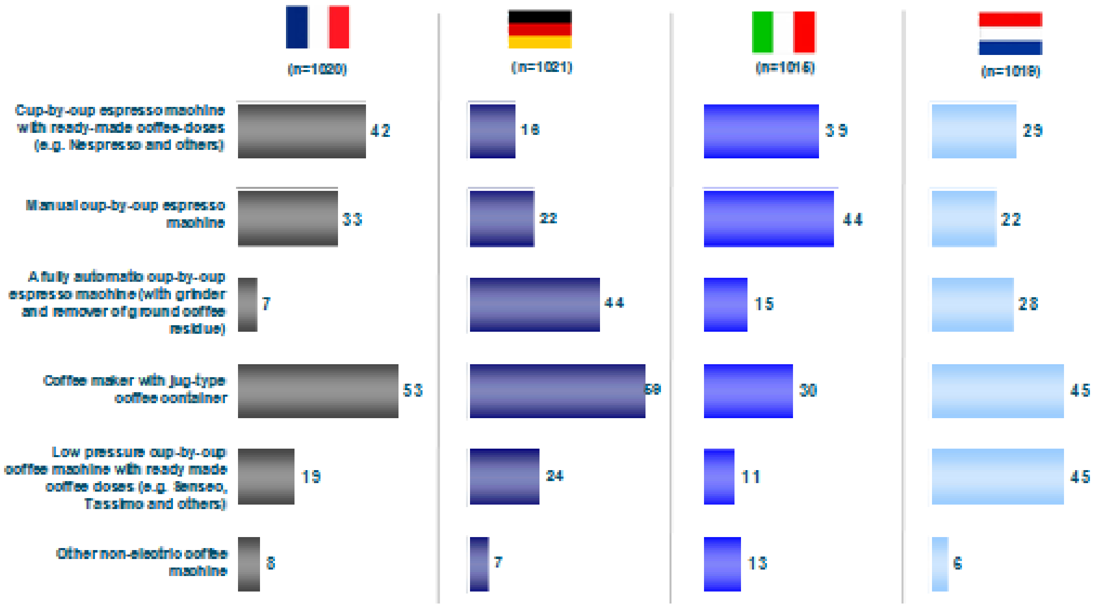

Figure 3-2: Types of electrical coffee machines used at home in four EU Member States[6]

The rate of ownership of specific types of electric espresso machine differs significantly across the different markets:

- Cup-by-cup espresso machines with ready-made coffee-doses are most used in France (42%) and Italy (39%). They are least widely owned in Germany (16%).
- Manual cup-by-cup espresso machines are most owned in Italy (44%).
- Fully automatic cup-by-cup espresso machines are most widely owned in Germany (44%), and least present in France (7%).

The share of fully automatic espresso machines in Germany reported by Synovate may be too high. According to another source,[7] ownership of these machines in Germany is around 11%.

There are also different ownership rates of other types of electric coffee machines:

- Coffee machines with a jug-type coffee container are more used in Germany (59%) and France (53%). They are least owned in Italy (30%).
- Low pressure cup-by-cup coffee machines with ready-made coffee doses are most widely owned in the Netherlands (45%). They are least owned in Italy (11%).

A minority of electric coffee machine users also owned and used a non-electric coffee machine at home. Usage is highest in Italy (13%).

[6] Source: Synovate.
[7] See www2.dialego.de/uploads/media/080117_DD_Kaffeemaschinen_01.pdf.

Across the sample, an average of 1.6 types of electric espresso or coffee machines is used per household. This average is higher in the Netherlands (1.7) and Germany (1.7) than in Italy (1.4).

Table 3-1: Number of type of electric coffee machine used (average per household)[5]

	FR	DE	IT	NL
Electric espresso / other coffee machine used (among all electric coffee machine owners)	1.6	1.7	1.4	1.7
Electric espresso / other coffee machine used (among espresso machine owners only)	1.6	1.8	1.3	1.8
Electric espresso machine used (among espresso machine owners only)	1.1	1.1	1.2	1.1

Users of electric espresso machines in the Netherlands, Germany and France are even more likely to use more than one type of electric coffee machine (owning an average of 1.8, 1.8 and 1.6 types of electric coffee machine respectively). Users of electric espresso machines in Italy are less likely to own more than one type of electric coffee machine (average of 1.3 appliances).

Most do not own more than one type of electric espresso machine. Espresso machine owners in Italy are slightly more likely to own more than one type of electric espresso machine (average of 1.2 types of electric espresso machine, compared with an average of 1.1 for the other markets).

Regarding switching behaviour, almost all owners of coffee machines claim to switch them off at some point (or the machine switches off automatically). Most switch them off after each usage.[8]

[8] These switching-off percentages need to be considered with care since people may declare desirable behaviour rather than the reality, and new appliances may themselves influence behaviour. For example, with automatic switching-off, manual switching-off may be abandoned. Therefore, usage pattern estimates would ideally not be based solely on survey results.

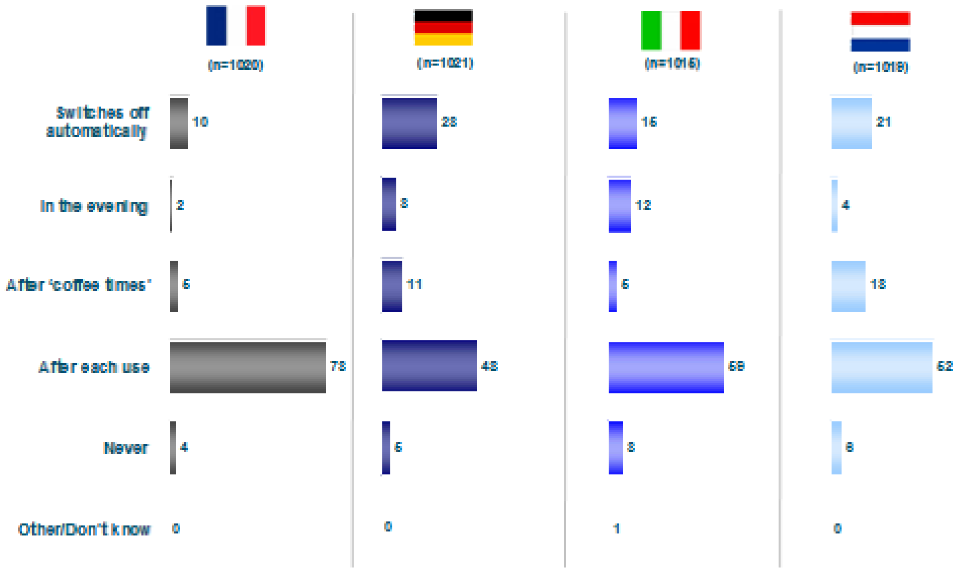

Figure 3-3: Switching behaviour at home in France, Germany, Italy and the Netherlands[9]

Automatic cup-by-cup espresso machines are more likely to switch themselves off after each usage. Those who own one (as opposed to more than one) coffee machine at home are significantly more likely to switch it off after each usage.

Table 3-2: Switching behaviour at home in France, Germany, Italy and the Netherlands[9]

	Any electric espresso machine	Auto cup-by-up	Manual cup-by-cup	Ready-made doses	Any other coffee machine	Low pressure cup-by-cup	Jug type
Switches off automatically	19%	38%	10%	12%	17%	14%	19%
In the evening	8%	11%	5%	8%	2%	3%	1%
After 'coffee times'	12%	18%	8%	11%	5%	6%	4%
After each use	55%	27%	73%	60%	70%	72%	69%
Never	6%	5%	4%	8%	5%	5%	6%
Don't know	1%	0%	1%	1%	1%	0%	1%

S.A.F.E. (Swiss Agency for Efficient Energy Use) conducted a study (survey and measurements) in 2003 for S.F.O.E. (Swiss Federal Office of Energy) concerning coffee machine energy consumption.[10] Measurements show that most coffee machines

[9] Synovate (UK) Ltd. (2009) *Electric Espresso Machine Usage: Input to establish energy usage ratings*.

[10] Nipkow, J. and E. Bush (2003) *Standby consumption of household appliances*, Swiss Federal Office of Energy, Berne. Available at: www.electricity-research.ch.

consume the greatest amount of electricity for heating purposes (maintaining water temperature) in "ready mode". In ready mode, the machine is ready to produce coffee at the push of a button (i.e. within less than three seconds).[11] If a coffee machine is not switched off at night, then the electricity requirement for heating would be as much as six times higher than the level required for making coffee.

The findings with respect to mean consumption levels obtained from the representative survey were as follows: 100 kWh/y for coffee machines in households (between "economical" and "normal") and 260 kWh/y for coffee machines in offices (between "normal" and "negligent"). These values have to be considered with caution as they are based on estimates from 2002 and on specific user behaviour. Furthermore, the standby power consumption is 2 W and does not consider the Standby Regulation (1275/2008) adopted under the Ecodesign Directive and which limited in 2010 this power at 1W (2W in case of the presence of a status display).

<u>Conclusions on domestic user patterns</u>:

According to information provided by the Synovate study and by CECED, the use patterns for pressure coffee machines (excluding the manual models) should be:

- 11 hours per day in stand-by mode
- 8 hours per day in off mode
- 5 hours of coffee period per day
- 720 ml of coffee per day split into three coffee periods

The description of the coffee period is provided in Figure 3-4.

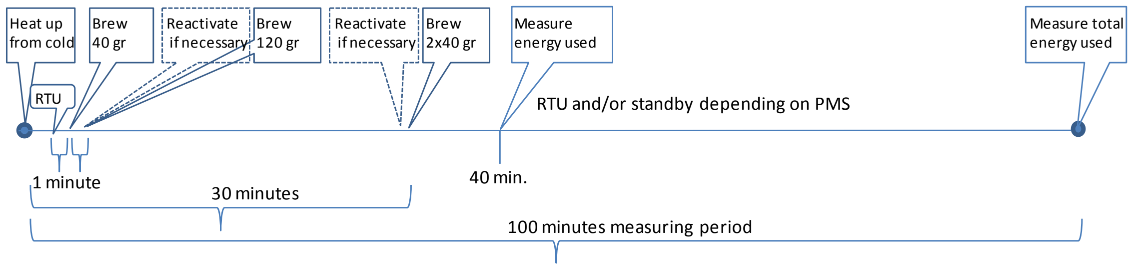

Figure 3-4: Description of a coffee period for a cup-by-cup coffee machine

These parameters are in discussion within CENELEC TC59X/WG15 comprising representatives of industry and consumer organisations (e.g. Topten). Indeed, as presented in Task 1 (section 1.2.3), two main voluntary methods are currently used: FEA/CECED and Euro-Topten/S.A.F.E. After several discussions between these organisations, it was agreed that both methods have benefits and drawbacks, and that it would be useful to have only one revised approach, validated by CENELEC. A draft standard is to be discussed by the CENELEC Working Group in May 2011.

[11] Note that power input in this mode is not constant; when heating it can rise above 1 000 W, then sink to low values again between the heating intervals.

Regarding drip filter coffee machines, Topten has drafted a method to calculate the annual electricity consumption of this type of appliance. The draft is being used as the basis for a draft being developed by the Working Group. For drip filter coffee machines with a jug container, it has to be noted that usually more coffee than required is produced. Some stakeholders mentioned that 10% waste seems to be a reasonable assumption. The preliminary definition of a coffee period for this type of coffee machine is presented in Figure 3-5.

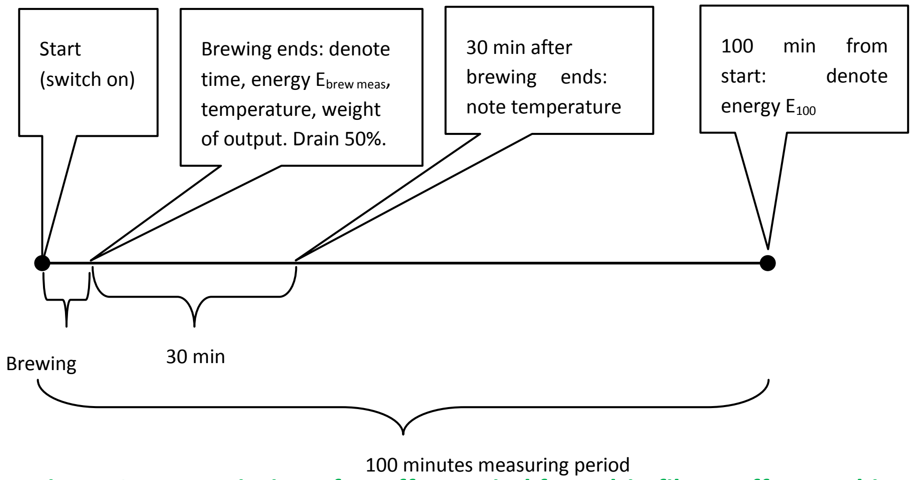

Figure 3-5: Description of a coffee period for a drip filter coffee machine

These developments should allow the revision of the standard EN 60661 which would include one part on pressure coffee machines and one part on filter coffee machines.

- **Office use**

A large number of household coffee machines are used in offices and the use pattern in offices is very different from household use (see Figure 3-6). Overall, 30% of people who use an electric coffee machine at home have access to an electric coffee machine at work.[9]

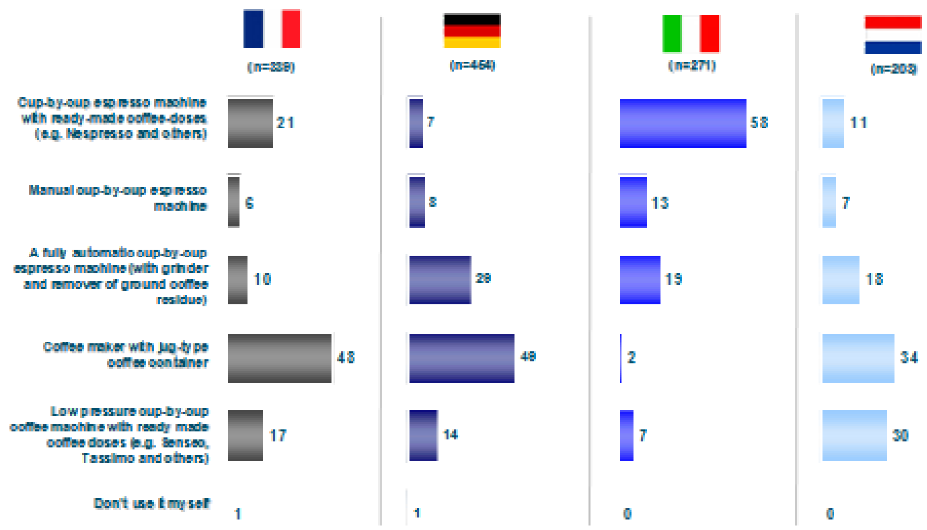

Figure 3-6: Types of electrical coffee machines used at work in France, Germany, Italy and the Netherlands[9]

Behaviour in relation to switching off workplace coffee machines is significantly different from switching behaviour at home. The coffee machine is usually switched off after working, and sometimes even never.[6]

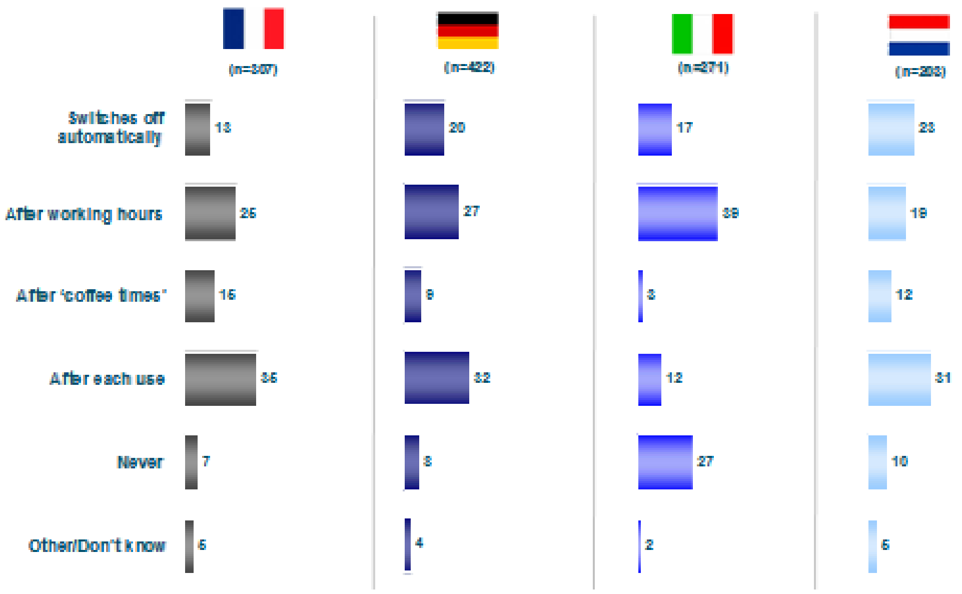

Figure 3-7: Switching behaviour at work in France, Germany, Italy and the Netherlands[9]

Automatic cup-by-cup espresso machines and espresso machines with ready-made doses are more likely than other types to be left on constantly (but most are still switched off at some stage).

Table 3-3: Switching behaviour at work in France, Germany, Italy and the Netherlands

	Any electric espresso machine	Auto cup-by-cup	Manual cup-by-cup	Ready-made doses	Any other coffee machine	Low pressure cup-by-cup	Jug type
Switches off automatically	21%	31%	20%	12%	15%	26%	10%
After working hours	39%	32%	38%	47%	17%	18%	16%
After 'coffee times'	4%	3%	7%	4%	15%	7%	19%
After each use	11%	5%	23%	13%	45%	39%	47%
Never	20%	21%	8%	22%	5%	8%	4%
Don't know	5%	8%	3%	2%	3%	2%	4%

Conclusions on office use patterns:

Little detailed information exists on the office use of coffee machines, making it difficult to define assumptions like those made for domestic usage. However, Euro-

Topten/S.A.F.E assumed in their instruction “Measuring Method and Calculation Formula for the Electricity Consumption of Coffee Machines for Household Use” published in 2009, that coffee machines without an auto-power down function are in ready mode for 12 hours per day.

3.1.2. Power management enabling and other user settings

- **Auto-power down function**

Most coffee machines consume more electricity for heating than for any other purpose. This consumption can be reduced through the use of efficient electronic controls such as auto-power down.

An auto-off function normally reduces electricity consumption by at least half and it lengthens the lifetime of the coffee machine. The auto-off function is often configured by the manufacturer; the consumer should verify if the switch-off time is not too long.

- **Insulation of boilers/application of flow-type heaters**

Better insulation of boilers and thermo-blocks or the implementation of flow-through water heaters are other options to strongly enhances the energy efficiency of coffee machines. Presentation of this improvement option will be provided in Task 6 and energy savings will be quantified in Task 7.

- **Cleaning of the coffee machine**

A coffee machine that is not maintained will produce inferior results. Cleaning programmes certainly do some of the work, but this requires the user’s intervention. For example, the central unit of the coffee machine must be regularly cleaned. However, the removal and reinstallation of this unit is not easy on all devices. This is particularly the case for fully automatic espresso machines.

Moreover, decalcification is a technique that has to be repeated regularly depending on the frequency of use and the hardness of the water. This is an important procedure to ensure the quality of the coffee as well as the good operation of the machine.

3.1.3. Consumables used

Based on a selection of coffee machine manuals and stakeholder comments, the quantities of consumables advised by manufacturers are provided in Table 3-4. Most manuals exclude vinegar as a decalcifier, especially for espresso machines. The recommendation for pad or capsule machines tends to be a decalcifier based on citric or lactic acid. Vinegar is allowed only for drip filter coffee machines.

Table 3-4: Dosage of consumables recommended by manufacturers

	Coffee	Water	Detergent for decalcification
Drip filter coffee machine	50g coffee per litre water (1 cup = 80 ml)		250 ml white vinegar or 250 ml water + decalcifier
Espresso coffee machine	7g per cup	35 ml per cup (adjustable)	500 ml water + decalcifier
Pads/caps machine	1 pad/cap (7g) per cup	80 ml per cup	450 ml water + 40g decalcifier

3.1.4. Best practices in sustainable product use

With relatively simple measures as auto-power down, better insulation of boilers and thermoblocks, and low or 0W standby consumption, the energy efficiency of coffee machines can be strongly enhanced. The best practices are to clean the coffee machine regularly and to switch off the machine once the coffee is made.

In order to have the Blue Angel label,[12] the factory-set delay time of the automatic switch-off function shall not exceed 45 minutes for fully automatic and semi-automatic coffee machines and 30 minutes for pad filter machines. From an environmental perspective, Öko-Institut recommends that the delay should be as short as possible. However, this might conflict with consumers' functionality expectations. Their recommendation for drip filter machines is for machines with a thermos jug and without a heating plate.

3.2. END-OF-LIFE BEHAVIOUR

The information available regarding the end-of-life phase of non-tertiary coffee machines is very limited. Impacts associated with the energy consumption of the machines during their lifetimes are thought to be more important than those at end-of-life. End-of-life behaviour varies widely from one country to another.

3.2.1. Economic product lifetime

The economic lifetime of a product is defined as the operating life of the product. In other words, it is the number of years of use of the product by one or several customers.

It is important to estimate an average coffee machine lifetime in this study as a required parameter in the calculation of environmental impacts using the MEEuP

[12] Basic Criteria for Award of the Environmental Label - RAL-UZ 136.

methodology. In this context, what counts is the "economic lifetime", i.e. the time in service (in practice).

The lifetime of coffee machines depends on the type of machine and on the use pattern (household or office). However, average lifetimes were defined and already presented in Task 2 (see Table 2-6).

Table 3-5: Economic product life for Lot 25 products

	Lifetime (year)
Drip filter coffee	6
Pad filter coffee	7
Hard capsule espresso	7
Semi-automatic espresso	7
Fully automatic espresso	10

3.2.2. Repair and maintenance practices

Repair practices depend on the type and purchase price of coffee machines (see section 2.4.3). Basically, the more functions a machine has the more it needs repairs in several areas. Most defects concern sealing, tubes, brewing unit, dirt, calcification, blockage and electronic faults.

3.2.3. Recycling, reuse and disposal

- **Coffee machine end-of-life**

In the EU, the Waste Electrical and Electronic Equipment Directive (WEEE Directive)[13] imposes the responsibility for the disposal of waste electrical and electronic equipment on the manufacturers of such equipment. All non-tertiary coffee machines considered in this study are included in the scope of this Directive (category 2: Small household appliances). It also encourages the ecodesign of such products to take into account and facilitate dismantling and recovery.

For example, Nespresso[14] is starting a pilot project that is looking at establishing a dedicated machine-recycling programme, which will allow materials from old machines to be reused to produce new machines and increase the recyclability rate above minimum WEEE requirements.

The required rate of recovery for small household appliances is 70% by weight. It is probable that the recast of the WEEE directive, currently under discussion, will increase this target by 5% - probably from 2012 but possibly later if the deliberations drag on.

[13] European Community Directive 2002/96/EC.
[14] Ecolaboration™, Fact Sheet : Designing greener machines, www.ecolaboration.com.

To find information on WEEE recovery figures in different EU Member States is difficult. The end-of life for a coffee machine is very uncertain and seems to vary between MS.

All producers of coffee machines are obliged by the WEEE directive to take responsibility for the collection and treatment of their product for a fee. The precise regime varies from country to country but in general it results in the reporting of the number and weight of appliances recovered, which allows assessment of whether the recovery targets have been achieved. In practice, the customer might give his coffee machine to the municipal recycling authority or take it back to the reseller, or might simply throw it in the common waste bin.

The waste generated by coffee machine disposal is mainly plastic, followed by ferrous and non-ferrous metals. Lot 25 products are also covered by the Restriction of Hazardous Substances directive (RoHS)[15].

- **Consumables end-of-life**

Filters (and pad filters) go to the common waste bin or to compost (coffee grounds are a good fertilizer). Packaging of coffee powder and beans for drip filter and fully automatic machines also go to the common waste bin.

Considering the espresso aluminium capsules, Nespresso is piloting collection and recycling schemes in various countries that separate coffee grounds from the aluminium capsule (the AluCycle™ Initiative was launched in 2008).[16] Since every country has different existing legislation for recycling, they try to develop capsule retrieval systems everywhere (so far, they are in place in Switzerland, France, Germany, Austria, Belgium, Luxembourg and Portugal). They aim to triple their used capsule recycling capacity to 75% by 2013 (already at 60% today in Switzerland). The coffee ground is used as a natural fertilizer or as a fuel source for domestic heating. The aluminium is recycled (which requires very little energy comparing to aluminium production) and reused.

Since the beginning of 2010, Casino and L’Or Maison du Café have proposed caps compatible with Nespresso coffee machines in France. Casino caps are made of biodegradable materials, including corn, whereas l’Or proposes caps made of plastic.

Capsules in Germany can be disposed of in the so called “Gelber Sack” / Duales System Deutschland. There is no special Nespresso retrieval system for the time being (as e.g. in Switzerland). However, recycling of the capsules is possible if the consumer throws them into the “Gelber Sack” and not into the common domestic waste. Coffee grounds need not to be removed; they do not disturb the recycling process. The consumer behaviour in this case is not exactly known. There exist no valid data for the disposal behaviour.

[15] European Community Directive 2002/95/EC

[16] See www.nespresso.com/#/fr/en.

Other types of capsule exist made of various materials. Their waste and impact on the environment is not marginal. According to Öko-Institut, capsule machines using capsules consisting of plastic *and* aluminium have the highest global warming potential. The production and end-of life of the capsules has a relevant environmental impact. Öko-Institut's research into capsules shows that the production of the capsules as well as their disposal cause significant greenhouse gas emissions that impair the overall result of the capsule machines (the capsules' contribution to overall emissions is 20% for the production and 8 to 13% for disposal).

Assumptions made concerning disposal are optimistic with respect to the recycling of the capsules; worse scenarios may pertain in real life.

It has to be noted that the preparatory study does not aim to assess the environmental impacts occurring over the life cycle of consumables, including coffee, filter, caps or decalcifier. However, policy recommendations that will be made by the consultants in Task 8 may include some requirements of these consumables.

3.3. LOCAL INFRASTRUCTURE

The main effect that local infrastructure can have on consumer behaviour is related to water hardness which may have an impact on the descaling frequency of the coffee machine.

Water hardness can vary widely, from 8.4-14°dH in France for example, to 14.9-24°fH in Germany. Where water is very hard, the consumer has to descale his/her coffee machine more often, implying higher energy consumption.

3.4. POSSIBLE BARRIERS TO ECODESIGN

This subtask aims at presenting the user/consumer's essential role concerning the environmental impacts of non-tertiary coffee machines. One important factor is barriers that hinder users/consumers from behaving in a more environmentally sound way. The issue is related not only to how many and what kind of products are being purchased but also how these products are being used and for how long.

Several barriers have been identified in areas such as increased ownership of cooking appliances, ecodesign (technological) barriers, and consumer behaviour and awareness. Together they account for greater environmental impacts related to the design, purchasing, use and disposal of non-tertiary coffee machines.

3.4.1. BUYING DECISION – BARRIERS TO INCREASED OWNERSHIP OF MORE EFFICIENT APPLIANCES

After development, it takes some time for new energy efficient appliances to penetrate the market. It depends on how often customers buy new coffee machines, this in turn depending on the lifetime of the appliance, on repair and on the second-hand market.

Consumers normally purchase an appliance and use it until it breaks before buying a new one. This implies that new coffee machine models with innovative ecodesign features only enter the households when an old appliance is replaced.

The following barriers to fostering the purchase of energy efficient non-tertiary coffee machines have been identified:

- High costs of better technology: many consumers may opt for a cheaper model (if given a choice) and are very rarely aware of the energy consumed by coffee machines during their lifetime.
- Inertia: some consumers are likely to change their coffee machine when their old model breaks down.
- Lack of knowledge: e.g. relevant information is not available in stores, people do not know how to use power management features.
- Convenience: e.g. use of power management or shutting off devices seems too time-consuming for users.
- Fashion: Drip filter coffee machines are less popular than espresso coffee machines.

3.4.2. BARRIERS TO ECODESIGN - TECHNOLOGICAL BARRIERS

Technology/performance and price are probably the most important criteria when buying a coffee machine.

Another possible barrier for the implementation of ecodesign is the stock of second-hand purchased appliances in households. These are often older coffee machines with worse performances in comparison with new appliances on the market.

3.4.3. LACK OF AVAILABLE INFORMATION

The manual has to be clear for the user of the coffee machine and it has to include environmental information such as the energy consumption, and how to reduce it when the machine is not producing coffee.

If the different modes of use are not explained in the manual, the user could be lost. He should have information on the difference of consumption between on mode and other modes (stand-by, off modes, etc.).

A French consumer NGO called "60 millions de consommateurs" published a report in December 2008[17] on espresso coffee machines including the electricity consumption in off mode. For some machines, it was necessary to unplug them after use not to consume electricity; even switched off, they were consuming energy.

3.4.4. CONSUMER BEHAVIOUR AND AWARENESS

Some of the technological options that might achieve significant energy savings may have an impact on consumer usability. It is arguably already the case with the auto-power down function for example: it is still sometimes configured for two hours or more and the consumer does not take the time, or does not know how, to reduce it when it is possible. However, factory settings of the auto-power-down delay have been shortened over the past few years and for many models the factory setting is now between 10 minutes and 1 hour and for some models 1 minute or even below.

For complex machines with many functions, it may be difficult to learn how to use the coffee machine well and the coffee could be less appetising. Moreover, the controls may be difficult to use and the manual too complicated.

[17] 60 millions de consommateurs, n°433, December 2008

3.5. CONCLUSIONS

The section findings are mostly related to the effect on energy consumption in non-tertiary coffee machines by the users' habits and the differences among EU users. This is particularly true regarding the "switching behaviour". Indeed, according to a survey carried out by Synovate in four MS, coffee machines are not always switched off after each use. This consumption contributes significantly to the overall energy consumption of the appliance. Such practices are more frequent in offices where machines are turned off after working hours, or even not turned off. In light of those observations, it is thus important to reduce the electricity consumption in ready-to-use mode and to incorporate a strong auto-power down function.

This task also allowed use patterns to be defined for domestic usage, which are required when conducting the economic and environmental impact assessment in Task 5. These patterns are based on current discussions within CENELEC between industry and consumer NGOs (represented by Euro-Topten/S.A.F.E.), and thus could be modified afterwards. They are presented in Table 3-6.

Today, the choice of coffee machine is mainly focused on the price and on the performance/functionalities of the product, even though awareness about energy consumption is starting to emerge. Explicit specifications of energy consumption, e.g. through an energy label as is the case in Switzerland (albeit a voluntary one), could be a first step towards better penetration of more efficient coffee machines on the market.

Table 3-6: Summary of user behaviour data

Type of machine	Number of coffee periods per day	Quantity of coffee produced per coffee period (ml)	Duration of a coffee period (minutes)	Time in Ready-to-Use per day (hours)[18]	Time in off mode per day (hours)
Drip filter	2	850[19]	100	12.7	8
All others	3	240	100	11	

[18] For Base-Case calculations, it will be assumed that there is no auto-power down, and so time in standby is considered as time in RTU.

[19] The filter machines coffee period is based on brewing 900 ml of water (testing is done without coffee). In practice this results in around 800-850 ml of coffee.