ENERGY STAR Market & Industry Scoping Report
Coffee Makers
November 2011

The U.S. Environmental Protection Agency (EPA) consistently looks for new opportunities to expand ENERGY STAR to new product categories that will deliver significant benefits to consumers and the environment in the form of energy and dollar savings plus greenhouse gas reductions. A key step in this evaluation is the development of a scoping report that provides a snapshot of the product market, energy use, and savings potential associated with an ENERGY STAR program for the scoped product type. EPA uses scoping findings to prioritize product specification development work. While scoping reports are drafted primarily for internal evaluation purposes, and are not intended to be exhaustive but rather a guidepost for the ENERGY STAR program, EPA makes the reports available with the interest of benefiting other efficiency programs evaluating similar opportunities. For more information about the ENERGY STAR specification development process, go to: www.energystar.gov/productdevelopment.

1. Product & Technology Overview

Coffee makers are countertop appliances used for brewing coffee. Products are designed for usability, ease of maintenance, and various brewing options. This study focuses on coffee makers used in households and excludes coffee makers intended for commercial use.

Table 1: Product Types

Product Type	Description	Details
Automatic Drip Filter Coffee Maker	Brews coffee by percolating hot water through a brew basket of coffee grounds. Coffee is captured in a decanter that may be heated by a warming plate.	Water is usually heated through internal electrical resistance. Coffee may be contained in insulated or non-insulated pots.
Single-Serve Coffee Maker	Brews coffee product by forcing a precise amount of hot water through a small container of coffee grounds to make a single serving.	Also known as a pad or pod filter machine. Typically pressurized by a pump to approximately 3 bars (less than an espresso machine but more than drip filter machines, which have no infusion pressure).
Espresso Machine	Produces a coffee product called espresso by forcing hot water through coffee grounds. Pressure, typically around 15 bars, and gravity drive the coffee product into a cup. Includes both pump (pump driven) and steam (steam driven) machines.	Includes automatic, semi-automatic, and manual machines with independent electricity heat source. Semi-automatic machines allow the operator to control coffee extraction and steaming. Fully automatic machines are capable of grinding, dosing, tamping, and brewing coffee. Espresso machines often include auxiliary milk steaming and frothing functions. A combination espresso machine allows for brewing of both regular coffee and espresso.

Main Product Components

- Heating Element: An electric resistance heating element in the water reservoir is used to heat up water for brewing in drip coffee makers.
- Decanter/Carafe: Glass or multi-layer insulated stainless steel carafes are common in drip filter coffee makers. Insulated carafes are typically more efficient, since less energy is required to keep brewed coffee warm.
- Grinder: An electric motor powers a grinder to prepare whole coffee beans for brewing.
- Warming Plate: An electric resistance heater is used to maintain brewed coffee at a temperature between 160 and 190°F.
- Microprocessor: A microprocessor is used to control various user-selectable product functions, including carafe pre-warming and automatic brewing start/stop timers.
- Boiler or Thermoblock: These espresso machine components create hot water for brewing and steam for frothing. Non-pump machines use pressure from steam, which is generated by boiling water in a sealed chamber. In a thermoblock arrangement, the high-pressure water pump forces cold water into the thermoblock after it is preheated.
- Electric pump/piston: During the brewing process the pump takes cold water from the water reservoir and injects it into the boiler under pressure greater than 100 psi. The pressure of the incoming water forces the hot water already in the boiler into the group or brew head.
- Steam wand: Vessel in which a steam-air mixture is discharged to froth milk. Contains a conduit having an air admitting inlet and an air discharging outlet.

2. Market Assessment

Household Environment

In 2010, U.S. retail unit sales of coffee maker products were reported to be about 24.6 million. Automatic drip coffee markers account for the largest segment of the market, however, sales of single-serve coffee makers and espresso machines continue to grow.

Table 2: U.S. Retail Sales of Coffee Makers – 2010[1]

Product Type	Retail Dollar Sales (in millions)	Market Share by Retail Dollar Sales	Retail Unit Sales (in millions)	Market Share by Unit Sales
Automatic Drip	$481	43%	18.5	75%
Single-Serve	$505	45%	4.7	19%
Espresso	$136	12%	1.4	6%
Total	**$1,122**		**24.6**	

[1] HomeWorld Business, Housewares Census 2011.

Table 3: U.S. Retail Unit Sales of Coffee Makers (in millions) – 2006-2010[2]

Product Type	2006	2007	2008	2009	2010	2009-2010 Compound Annual Growth Rate
Automatic Drip	19.4	19.4	19.3	19.2	18.5	-1.2%
Single-Serve	1.2	1.7	1.8	2.7	4.1	36.0%
Espresso	1.1	1.2	1.3	1.4	1.4	6.2%
Total	**21.7**	**22.3**	**22.4**	**23.3**	**24.0**	**2.6%**

HomeWorld Business notes that while price continues to be an important part of consumers' decision-making process, there is growing evidence that other factors, including durability and performance, are being weighed more heavily than in years past.[3] At this time, power management features and more efficient models are not rewarded in the market place. Moreover, energy efficiency is not a factor in coffee maker pricing according to industry stakeholders. Provided in Table 4 are price ranges for the various types of coffee makers.

Table 4: Price Range by Product

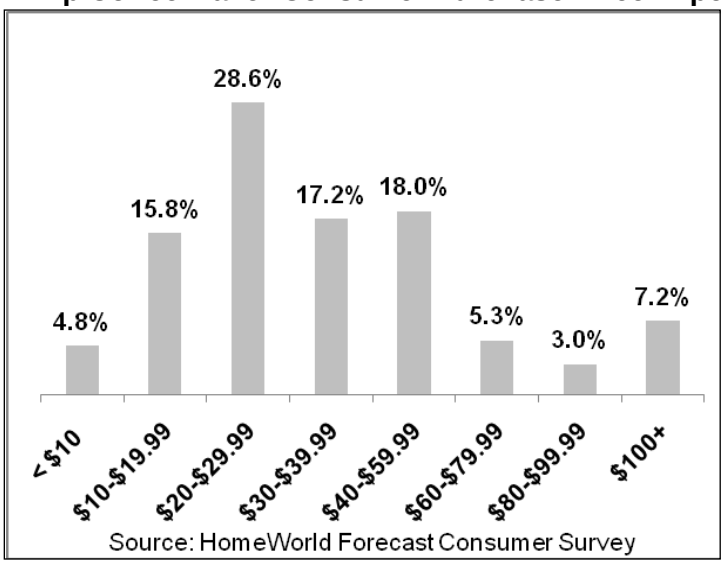
Product Type	Price Range
Automatic Drip (small capacity)	$15 - $70
Automatic Drip (full capacity)	$23 - $130
Automatic Drip (thermal carafe)	$60 - $190
Pod / Capsule	$18 - $130
Espresso (Pump)	$74 - $133
Espresso (Steam)	$45 - $100

Automatic Drip Coffee Makers

In 2009, AHAM estimated the U.S. household penetration of automatic drip coffee makers to be 73%.[4] The drip coffee maker business has been challenged by the economy and consumer reticence to replace existing models. In response, retail mixes have shifted downward in price in recent years. The results of the HomeWorld Forecast 2011's annual survey of U.S. consumers presented in Figure 1 indicate how much money consumers expect to pay for drip coffee makers.

[2] HomeWorld Business, Housewares Census 2011.
[3] Ibid.
[4] Association of Home Appliance Manufacturers, "Portable Home Appliances Saturation & Usage Study," July 2009.

Figure 1: Drip Coffee Maker Consumer Purchase Price Expectations



With no major new brewing technology developments within the drip filter coffee maker segment, increasing attention has been focused on product aesthetics. The 12-cup models continue to be the most popular; however, many manufacturers have responded to the shift in drinking habits towards the single-serve style by developing larger drip units that also offer single-serve dispensing and brewing capabilities.

Table 5: U.S. Drip Coffee Maker Unit Share by Number of Cups– Excluding Single-Serve Pod Coffee Makers[5]

4 cups	10 cups	12 cups	Other
8%	18%	64%	10%

Single-Serve Pod Coffee Makers

In 2009, AHAM estimated the U.S. household penetration of single-serve coffee makers to be 23%.[6] More recent industry projections estimate that U.S. household penetration may now surpass 30%.[7] After widespread adoption in Europe, the increasing popularity of single-serve coffee makers in the United States has made it one of the fastest growing segments in the housewares industry.

Espresso Machines

In 2009, AHAM estimated the U.S. household penetration of espresso makers to be 16%.[8] More affordable variations of super-automatic coffee centers continue to advance the segment's market share against espresso-dedicated automatic machines. Manufacturers and retailers are positioning premium, fully automatic espresso machines as high-quality investments that should save espresso-beverage drinkers money in the long-run.

[5] HomeWorld Business, Housewares Census 2011.
[6] Association of Home Appliance Manufacturers, *Portable Home Appliances Saturation & Usage Study*, July 2009.
[7] HomeWorld Business, Housewares Census 2011.
[8] Association of Home Appliance Manufacturers, *Portable Home Appliances Saturation & Usage Study*, July 2009.

Table 6: U.S. Retail Sales by Type of Espresso Machine[9]

Type	Steam	Pump	Fully Automatic
Unit Share	40%	26%	34%
Dollar Share	31%	26%	43%

Hospitality Environment

There are likely more than 4.25 million coffee makers in U.S. hotel guestrooms.[10] With a 60% average occupancy rate, approximately 2 million coffee makers may be used daily on average. Most hotels purchase coffee makers through commercial distribution channels.

Office Environment

A large number of household coffee makers may be used in office environments, though few detailed studies exist regarding the characteristics of this market and associated product usage patterns.

3. Energy Efficiency Assessment

Available Test Procedures

Below is a list of the most applicable test procedures for coffee maker products intended for residential use.

- Swiss Agency for Efficient Energy Use (S.A.F.E.) and Euro-TopTen (2005, latest update May 2009): The *Measuring Method and Calculation Formula for the Electricity Consumption of Coffee Machines for Household Use* calculates the energy consumption of single-serve coffee makers and espresso machines in ready, standby, and off modes. The aim of the Euro-TopTen method is to identify the total energy consumption for the typical use of the machine during one year. Energy consumption during the brew cycle is generally not measured, but is accounted for with a standard value, as it requires relatively little energy and the difference from one machine to another is minimal.[11]
- ANSI/AHAM CM-1-2007: The *Method for Measuring Performance of Household Electric Coffee Makers* does not include a method to measure energy consumption. Note: AHAM is currently developing a test procedure that will include an energy measurement.IEC-60661 *Methods for Measuring the Performance of Electric Household Coffee Makers* does not include a method for measuring energy consumption of coffee makers.
- IEC-62301: *Household Electrical Appliances – Measurement of Standby Power* specifies standard methods of measurement of electrical power consumption in standby mode and is applicable to household coffee makers. This standard does not set minimum performance requirements or maximum limits on power or energy consumption.
- CECED[12]/FEA: *Measuring Method and Calculation Formula for the Electricity Consumption of Espresso Machines* is applicable to all manual and automatic espresso and multipurpose

[9] "Housewares Census 2011," HomeWorld Business, January 2011.
[10] 4.76 million U.S. Guestrooms. Source: http://www.ahla.com/
[11] Euro-TopTen and S.A.F.E, *Measuring Method and Calculation Formula for the Electricity Consumption of Coffee Machines for Household Use.* 2009. Available at: www.topten.info
[12] European Committee of Domestic Equipment Manufacturers

machines characterized by the fact that they are based on high pressure (>5 bar maximum working pressure) espresso technology and on a cup-by-cup system.

In addition, Savenia Labs is also developing test procedures for rating the energy performance of several countertop appliances, including coffee makers.[13]

Product Modes

Suggested product mode classifications for coffee makers, single-serve machines, and espresso machines are provided in the Table 7 for reference. The modes are closely aligned with IEC-62301(*Household Electrical Appliances – Measurement of Standby Power*).

The use phase for coffee machines extends beyond coffee-making. For drip filter machines, usage patterns tend to concentrate energy consumption in the keeping coffee warm function. Gains in energy efficiency cab be achieved through thermal insulation of the carafe and the heating unit to reduce losses. If the cup warming plate of a machine can be switched on or off in the program menu, two different active mode energy use levels need to be taken into consideration.

For espresso machines, active mode includes the condition sometimes referred to as "ready-to-use-mode" in which the machine is ready to produce coffee at the push of a button, without any lag in time. Power input in active mode is not constant; when heating water it can rise above 1000 W, but settle to low values between heating intervals. Maintaining temperature is usually achieved by pulses lasting several seconds and at intervals of several minutes.[14] New machines with flow-type heaters have no defined "ready-to-use" mode and may be operating in standby mode just before the machine is prompted to brew.

Some models of espresso machines offer an energy saving, or "eco mode", which lowers the temperature of the heating elements after a given delay of inactivity. The energy consumption of the machine is lower than in normal active mode and allows a quick preparation of coffee, if needed, as the heating elements are not as cold as in standby or off mode. Heating functions are optimized to compromise between quick service upon re-initialization and energy savings due to lower temperatures maintained over extended periods.

Table 7: Coffee Maker Product Modes

Product Mode	Description
Active Mode	Condition in which the equipment is connected to the AC power source and at least once of the main function(s) providing the intended service of the equipment has been activated. Active mode consists of the brewing, grinding, carafe/cup warming, steaming, and rinsing functions, as applicable.
Standby Mode	Condition where the equipment is consuming AC power, but only for the following functions: • To facilitate the activation of other modes (including activation or deactivation of active mode) by remote switch, internal sensor, timer; • Continuous function: information or status displays including clocks; • Continuous function: sensor-based functions.
Off Mode	Condition in which the equipment is connected to the mains power source and is not providing any standby or active mode function. An indicator that shows the user that the product is in the off position is included within the classification of off mode.

[13] For more information, see: http://www.savenialabs.com/
[14] Euro-TopTen and S.A.F.E. (2009) *Measuring Method and Calculation Formula for the Electricity Consumption of Coffee Machines for Household Use.* Available at: www.topten.info/uploads/images/upload/Measuring%20Method%20Coffeemachines-090509.pdf

Product Usage Patterns

Coffee machines may account for a sizable amount of household electricity consumption. The 2005 Energy Information Administration's Residential Energy Consumption Survey (RECS) estimated that coffee makers accounted for 0.5% of end use residential electricity consumption.[15] However, the proportion of coffee maker energy use relative to total household energy use may have decreased slightly due to increased energy use of electronics such as TVs, computers, and other small devices. According to one European study, coffee machine use accounts for around 4% of the electricity consumption of households in the European Union, depending on the device and user behavior.[16]

Household penetration of electric coffee makers is over 60% in the US.[17] RECS estimates for coffee maker usage are provided below. Over 65% of households owning a coffee maker use it a least once a day. Over half of coffee makers are typically left on for more than 15 minutes.

Table 8: Electric Coffee Maker Usage[18]

Usage Pattern	Households Owning a Coffee Maker
3 or More Times a Day	4%
2 Times a Day	8%
Once a Day	55%
A Few Times Each Week	14%
About Once a Week	7%
Less than Once a Week	11%

Table 9: Time Coffee Maker is Left On[19]

Time Coffee Maker is Left On	Households Owning a Coffee Maker
Turned off Right Away	32%
Less than 15 Minutes	17%
15 Minutes to 1 Hour	31%
More than 1 Hour	20%

The data from the AHAM 2009 *Portable Home Appliances Saturation & Usage Study*, a survey of more than 2,500 US households, provides more recent and detailed information on product usage for each type of coffee maker.[20]

- Automatic Drip Coffee Makers: Typical operating time for an automatic drip coffee maker (including brewing and warming cycles) varies from 3 to 60 minutes. Once the brewing cycle is complete, 28% of households leave the warming plate on for 30 minutes or less and 24% of households leave it on for 31 to 60 minutes, and over a quarter of

[15] U.S. Energy Information Administration, 2005 Residential Energy Consumption Survey.
[16] European Commission, *Preparatory Studies for Ecodesign Requirements of EuPs (III) Lot 25 Non-Tertiary Coffee Machines*, February 2011.
[17] U.S. Energy Information Administration, 2005 Residential Energy Consumption Survey.
[18] Ibid.
[19] Ibid.
[20] Association of Home Appliance Manufacturers, *Portable Home Appliances Saturation & Usage Study*, July 2009.

households leave it on for an hour or longer. A total of 18% of households do not use a warming plate at all.

- Pod Machines: The length of time a pod machine is used ranges from 1 to 10 minutes. Pod machines typically do not have a warming mode function.
- Espresso Machines: Espresso machines are used less frequently than other types of coffee machines, and brewing time ranges from 3 to 10 minutes.

Table 10: Coffee Machine Frequency of Use[21]

Product Type	Twice per day	Once per day	2-3 times per week	Once per week	2-3 times per month	Once per month	Once every 2-3 months	Once every 6 months
Automatic Drip	19%	48%	15%	4%	5%	4%	3%	1%
Pod	16%	32%	26%	9%	6%	2%	5%	2%
Espresso	9%	18%	17%	13%	12%	9%	17%	3%

Over half of the households with drip coffee makers report that their products are plugged into the electrical outlet all of the time. This pattern may be due to more frequent daily use of drip coffee makers and greater reliance on the timer function relative to the pod and espresso product types.

Table 11: Power Usage and Products with Clock/Timer Function[22]

Type of Product	Automatic Drip	Pod	Espresso
Respondents using a product with a clock or timer function	61%	35%	27%
Respondents keeping product plugged in all of the time	60%	36%	18%

Table 12 summarizes the approximate lifetimes associated with each product type.

Table 12: Typical Coffee Machine Product Lifetime[23]

Product Type	Lifetime
Drip Filter Coffee Machine	6
Pad Filter Coffee Machine	7
Hard Cap Espresso Coffee Machine	7
Semi-Automatic Espresso Coffee Machine	7
Fully Automatic Espresso Coffee Machine	10

[21] Association of Home Appliance Manufacturers, *Portable Home Appliances Saturation & Usage Study*, July 2009.
[22] Ibid.
[23] European Commission, *Preparatory Studies for Ecodesign Requirements of EuPs (III) Lot 25 Non-Tertiary Coffee Machines*, February 2011.

4. Energy and Cost Savings Potential

The energy consumption of coffee machines primary results from water heating, with small amounts for motor energy for mechanical action, for electronics, and heat losses. In order to reduce energy consumption, manufacturers focus on the active, or ready-to-use, mode and standby mode for espresso machines, while focusing on the components that keep coffee warm for drip filter coffee makers.

This section assesses the available options for energy efficiency improvements and summarizes the technical analysis and findings of the Ecodesign study.[24] All improvements should be capable of being introduced within the design life cycle of the product, which is typically three years.

Drip filter coffee makers are significantly different from pod and espresso machines in both user behavior and components. Drip filters are a mature technology with little change in product features in recent years. Some energy efficiency improvement options identified use different analysis methodology or do not apply to this product category as noted.

Automatic Power Down

Primarily for safety reasons, most drip filter coffee makers on the market offer some form of auto power down, usually in the range of 20 minutes to a maximum of four hours. Today the factory set lag before auto-power down is typically two hours. Higher-end programmable coffee makers allow consumers to adjust the auto-power down settings. However, there may be a less awareness on how to use these types of power management features among consumers.

Over half of households use the warming plate for over 30 minutes, with nearly a quarter of households using it for over an hour to heat carafes with brewed coffee.[25] The exact effect of a programmable auto-power down function on consumer usage time for drip filter coffee makers is not clear. According to the Ecodesign study, auto-power down after 60 minutes and 30 minutes following brewing completion has the potential for 14% and nearly 23% energy savings, respectively, compared to the base case scenario for drip filter coffee makers.

Reducing the duration of the active mode is the first and very simple efficiency measure to consider. Stakeholders agree that auto-power down has the biggest potential to improve the energy consumption of a coffee machine. Measurements by the Swiss Agency for Efficient Energy Use (SAFE) show that most single-serve and espresso machines consume the greatest amount of electricity for heating purposes (maintaining water temperature) in ready-to-use mode. 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 function is especially important for coffee makers that are used in office settings, as they are seldom, if ever, manually switched off.

Table 13 illustrates the potential energy savings from having a pod or espresso machine set to switch off automatically after a certain period of inactivity, reducing the amount of time spent in ready-to-use mode per coffee period, and thereby reducing energy consumption.

[24] European Commission, *Preparatory Studies for Ecodesign Requirements of EuPs (III) Lot 25 Non-Tertiary Coffee Machines*, February 2011.
[25] Association of Home Appliance Manufacturers, *Portable Home Appliances Saturation & Usage Study*, July 2009.

Table 13: Energy Saving Potential (%) for Auto-Power Down[26]

Product Type	5-min	30-min	60-min
Pod	34.1	18.2	7.5
Hard Cap Espresso	24.4	13.4	5.5
Semi-automatic Espresso	18.4	11.3	6
Fully Automatic Espresso	27.6	15.6	6.9

While many machines are already equipped with an auto-power down function, savings can be achieved by reducing factory-set time lags and enabling machines with effective consumer programming options.

Insulation

Thermal losses from heaters can be substantially lowered by the addition of insulation to hot parts. Even with flow-through water heaters (see section below) a further efficiency gain from insulation can be expected. The insulation prevents the cooling effect of air ventilating those parts. For espresso and pod machines, it is assumed that it is possible to save 5% of energy in on-mode by using a thicker/denser layer of insulation. However, thicker insulation may also result in an increase of the machine size and/or decrease of the internal volume. Improved insulation materials are not expected to be available within the next 2-3 years but may be developed over a longer time period.

For drip filter coffee makers, the insulation option corresponds to the use on an insulated carafe/jug where it is assumed a warming plate is not needed. The thermos jug can reduce heat losses but might result in some loss of function for consumers who prefer a transparent jug. Additionally, some consumers may prefer for their coffee to stay warm for longer periods in which case a heating plate offers more function. On the other hand, manufacturers of models with thermal jugs and no heating element, claim that these features avoid the “burnt flavor” in coffee that may occur due to overheating in a glass pot on a heating element.

As specified in the draft CENELEC standard for filter coffee makers, the electricity consumption normally consumed for the keeping hot function is equal to 25% of the electricity consumption for brewing when the product has a thermos jug. Insulation offers an energy efficiency potential of nearly 15% compared to the base case scenario for drip filter coffee makers.

Flow-through water heaters (as applicable to single-serve and espresso machines)

Flow-through water heaters or continuous-flow heaters in single-serve machines do not need auto-power down because they only activate just before coffee production begins and they switch off once it is finished. With instant heating devices such as these, there is no ready-mode energy consumption. Flow-through heaters are the most efficient water heaters for coffee machines available today. They can be found in Bosch Tassimo single-serve coffee machines.

This technology can achieve significant energy savings in pod/single-serve and espresso machines with little to no functional and design constraints. Note that drip filter machines technically also use flow-through heating but with steam rather than pump pressure.

[26] European Commission, *Preparatory Studies for Ecodesign Requirements of EuPs (III) Lot 25 Non-Tertiary Coffee Machines*, February 2011.

Energy efficiency potential is nearly 50% compared to the base case scenario for single-serve and pod models. For espresso machine product types, flow-through water heaters have the potential energy savings of over 30%.

Standby

A zero watt standby capability should be technically feasible for all coffee maker product types. The modification is not expected to impact price as it is assumed manufactures can implement this option without a significant cost burden. Note that certain consumers prefer automatic timer and clock display functionality, which would preclude a zero watt standby. A well-designed timer may require 0.5 W for operation. Overall energy efficiency savings from standby power modifications range from 3-5%.

Estimated Savings Potential

The overall efficiency potential of each type of coffee machine is based on various scenarios incorporating one or more of the improvement options identified above. Since the energy efficiency potentials rely on an established base case scenario in Europe, it is possible that savings could be greater in the U.S., at least in the short-term, since the U.S. coffee maker market may currently lag behind European coffee market slightly in terms of energy efficiency.

Table 14: Initial Estimates of Energy Savings Potential[27]

Drip Filter	Single-Serve	Semi-automatic Espresso	Fully Automatic Espresso
15% to 24%	35% to 51%	19% to 36%	28% to 42%

Given that there is currently no widely adopted procedure in the U.S. for measuring the usage energy consumption of coffee makers, comprehensive and comparable data are not currently available. Table 15 identifies the range of input power for each product type, used to develop a baseline. Informal surveys of products available on the market indicate that there is considerable variation among input power ratings for models of similar size and function.

Table 15: Coffee Maker Input Power Rating Ranges

Product Type	Type	Input Power Rating
Automatic Drip Filter	Small Capacity (4/5 cup)	550-900 W
Automatic Drip Filter	Full Size (10/12 cup)	750-1200 W
Single-Serve Coffee Maker	Capsule	900-1500 W
Espresso Machine	Pump & Fully Automatic	1000-1500 W
Espresso Machine	Steam	600-800 W

A coffee maker or espresso machine may use a wide range of power to achieve each function. Thus, in order to determine energy use, it is necessary to take into consideration the power usage over the entire “coffee period” or the time in which the active mode is engaged. Table 16 estimates energy use by product type based on stakeholder input, prior energy use estimates, and the usage patterns indentified in Section 3 of this report.

[27] European Commission, *Preparatory Studies for Ecodesign Requirements of EuPs (III) Lot 25 Non-Tertiary Coffee Machines*, February 2011.

Table 16: Estimated Household Annual Energy Use & Savings Opportunity

Product Type	Estimated Household Annual Energy Use (kWh)	Estimated Savings Potential
Drip Filter Coffee Maker (Full 10/12 cup)	100-150	20%
Single-Serve Coffee Maker	45-65	40%
Espresso Machine (Pump & Fully Automatic)	30-50	25%
Espresso Machine (Steam)	10-30	35%

The estimated unit energy savings for more efficient residential coffee makers range from about 7 kWh/year (for an espresso machine), up to about 25 kWh/year (for a drip filter coffee maker), which would offer lifetime savings of $7-21, depending on coffee maker type, over an assumed 7-year lifetime.

Based on 2010 retail sales data discussed in Section 2 of this report, the national annual energy savings opportunity is estimated to be on the order of 124,000 MWh if 25% of products sold were replaced with energy efficient models. This reduction in energy use would reduce annual CO_2 emissions by approximately 190 million lbs (assuming a conversion of 1.54 lbs CO_2 per kWh).

Note that the sales data discussed earlier may not account for coffee makers in hospitality and office settings and thus may be an underestimate of overall energy use and cost associated with these types of products.

5. Key Market Players

Industry Associations

The Association of Home Appliance Manufacturers (AHAM) is a trade association of home appliance manufacturers. AHAM performs market research and supplies business data to its members. AHAM does not currently offer a certification program for coffee makers.

Product Manufacturers

Table 20: Coffee Maker Manufacturers

Manufacturer	Brand(s)
Applica Organization	Black & Decker
Braun	
BSH	Bosch
BUNN	
Cusinart	
De'Longhi	
Focus Electronics	West Bend, Back to Basics
Gevalia	

Manufacturer	Brand(s)
Groupe SEB	Krups, Rowenta, T-Fal
Hamilton Beach	
Jarden Consumer Solutions	Mr. Coffee, Sunbeam, Rival
Keurig	
Melitta	
Proctor-Silex	
Zojirushi	

6. International Activity

- Euro-TopTen: Euro-TopTen[28] is an international project that identifies best products available in Europe based on energy efficiency. The program covers fully automatic coffee machines and capsule/pod coffee makers and excludes filter coffee machines, manual piston lever machines, combination machines, and commercial appliances with a permanent water supply. Coffee machines must meet the following technical criteria in order to be labeled by Blue Angel or listed on Topten:
    - Include an auto-power-down function that switches off permanent heating of water after a certain period of time;
    - Time lag of the auto-power-down (auto-off), according to factory setting, must not exceed 1 hour for fully automatic and semi-automatic piston hand-operated machines and 30 minutes for capsule (pod) machines;
    - Power draw in the standby (or sleep) mode following auto-power-down must not exceed 1 watt;
    - The machine must have a hard on/off power switch;
    - Energy consumption in the ready mode period must not exceed 35 Wh for fully automatic and semi-automatic piston hand-operated machines, and 30 Wh for pod machines.
- European Union Ecodesign: The European Union is currently conducting the Ecodesign of Energy using Products (EuP)[29] Preparatory Study Lot 25 covers the energy efficiency of non-tertiary (excluding commercial use) coffee machines. Coffee machines are covered by the standby and off mode regulation effective in January 2010. Products must have a maximum standby consumption of 1 W (2W with display) and must provide an auto-power down function.
- German "Blue Angel": The German **"**Blue Angel" eco-labeling program[30] covers espresso and pod machines. As of October 2011 there are no vendors or products listed in this category on the Blue Angel website.

[28] For more information, see: www.topten.info
[29] For more information, see: www.topten.info
[30] For more information, see: www.blauer-engel.de/en/index.php