Electric Appliances

HIGHLIGHTS

■ **PROCESS AND TECHNOLOGY STATUS –** This brief deals with residential and commercial electric appliances other than space heating and cooling devices, water heaters, lighting, cold appliances, cooking devices, washing machines, dish washers and dryers, which are dealt with by ETSAP R02 to R09, respectively. Among remaining electric appliances, electric irons, coffee machines and vacuum cleaners are the most energy-consuming and significant products. In particular, the brief focuses on coffee machines and vacuum cleaners as currently available data on electric irons are insufficient for technology characterisation. Coffee machines are countertop appliances used to brew coffee. There are three main domestic models available on the market: automatic drip filters, single servers and espresso machines. Commercial models include coffee urns or large-capacity filter coffee machines, filter coffee machines with one or several integrated warmers, commercial espresso machines and small vending machines. In 2010 it was estimated that there were approximately 111 million units of non-commercial coffee machines on the EU-27 market, with drip filter coffee machines accounting for 53% of the market share. In the US, over the same time period, 24.6 million units were sold, with sales values of $1.1 billion. Automatic drip coffee machines made up 75% of the US market share of units sold in 2010; single serve and espresso machines made up 19% and 6% respectively. At present there is limited information on commercial models. All coffee machines function by passing water through ground coffee, although coffee can be inserted in different forms depending on the model type. Vacuum cleaners are used to remove dirt, dust and soil and used to create a cleaner, more hygienic environment. Models available on the market include: upright, canister, stick, wet-dry, wide-area and steam/deep cleaner vacuum cleaners. Each design incorporates a motor, separation system (bag/bagless system), filtration system, cleaning head and power source. In addition, some models also have a clean carpet sensor. In 2005, approximately 45 million vacuum cleaner units were purchased in Europe, of which the total annual expenditure for domestic vacuum cleaners (both canister and upright) in Europe was €4.7 billion; the commercial vacuum cleaner expenditure in Europe was € 325 million.

■ **PERFORMANCE AND COSTS –** The energy consumption of coffee machines, as with most electrical appliances, depends on a number of factors. These include power requirements in different operational settings (on-mode, off-mode, and standby-mode) and usage, which refers to the average time the appliance, is left in a particular operational mode. It is estimated that the total European coffee machine stock consumes approximately 17,000 million kWh per year; this has a resulting electricity cost of about € 2.5 billion. In the European market, the most expensive coffee machine available is a fully automatic model retailing at an average of € 595 per unit, and the cheapest, a drip filter, retails at an average of €35. Input power ranges can vary between 550 to 1500 Watts depending on the model. Vacuum cleaners have shown an increase of input wattage from approximately 400 Watts in 1978 to 2,700 Watts in 2008. The increase in input power is due to the use of more powerful electric motors. In Europe, 39% of the vacuum cleaners sold in 2007 were models with an input power of 1,800 Watts or above. The average base case price for domestic and commercial vacuum cleaners was € 110 and € 250 respectively. Other life cycle costs such as electricity running cost, vacuum cleaner bags, office paper (for filters, instruction manuals etc.) and repair and maintenance have been calculated as € 91, € 52, € 2 and € 8 respectively.

■ **POTENTIAL AND BARRIERS –** There are a number of barriers limiting the uptake of more efficient coffee machine and vacuum cleaner models including: cost, style/design of the product; inertia, convenience and lack of knowledge; and lack of consumer awareness. For coffee machines, water heating is the primary source of energy consumption, with small amounts also being used by motors for mechanical action, by the electronics and lost as heat. Manufacturers have targeted the active/ 'on' mode and the standby mode as areas for energy reduction in espresso machines, whilst in drip filter coffee machines, the components that keep the coffee hot have been targeted. Although coffee machines and vacuum cleaners fall under standards that address measurement and safety there are currently no European Union legislation specifically targeting the energy efficiency of each appliance. National energy performance testing standards that capture coffee machines exist in non-EU countries such as Australia, Brazil, Canada, Chile, China, Japan, Russia, and the United States A preparatory study has been launched with proposals that include an energy label of vacuum cleaners, under the Ecodesign Framework Directive 2010/30/EU. The European Union has also proposed a cap on the input power rating of vacuum cleaners; these range from 750 Watts for canister cleaners and uprights with integral hoses, to 1250 Watts for commercial vacuum cleaners with dual motors in 2014. Other areas targeted for improved efficiency are: input power, suction power, airflow, and nozzle design.

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