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Preparatory Studies for
Eco-design Requirements of EuPs (III)

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Lot 23
Domestic and commercial hobs and grills, included when incorporated in cookers

Task 1: Definition

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INTRODUCTION

The Ecodesign Directive

This study on domestic and commercial hobs and grills, included when incorporated in cookers (the "Lot 23 study"), is one of the preparatory studies carried out for the European Commission in the context of **Directive 2009/125/EC on the ecodesign of Energy-related Products (ErP)**. This framework Directive does not introduce binding requirements for specific products directly, but defines conditions and criteria for setting requirements, through subsequent implementing measures, regarding environmentally relevant product characteristics.

According to the Directive, the implementing measures can be proposed for product categories which meet the following criteria:

- Significant volume of products placed on the EU market (indicatively > 200,000 units per year)
- Significant environmental impact (indicatively > 1,000 PJ/year)
- Significant potential for improvement (indicatively > 20%)

The implementing measures are to be based on an environmental assessment taking into account product characteristics and functionality. Technologies available on the market should be taken as a reference.

The first step, in considering whether and which eco-design requirements should be set for a particular product group, is a preparatory study recommending ways to improve the environmental performance of the product. The preparatory study will provide the necessary information to prepare the next phases in the policy process (carried out by the Commission) and in particular the impact assessment, the consultation forum, and the possible draft implementing measures laying down eco-design requirements for EuPs.

As in all Ecodesign preparatory studies, a common and coherent methodology (MEEuP)[1] is used for analysing environmental impact and improvement potential of the products, and ecodesign options are analysed from the life cycle costing perspective. This methodology consists of eight main tasks which will be conducted in an iterative manner:

- Task 1: Definition
- Task 2: Economic and market analysis
- Task 3: Consumer behaviour and local infrastructure

[1] VHK (2005) Methodology for Eco-design of Energy-using Products (MEEuP), Final Report, European Commission (DG ENTR). Available at: ec.europa.eu/enterprise/eco_design/finalreport1.pdf

- Task 4: Technical analysis of existing products
- Task 5: Base-cases
- Task 6: Technical analysis of BAT
- Task 7: Improvement potential
- Task 8: Final analysis: policy, scenario, impact, and sensitivity analysis

1. TASK 1 – DEFINITION

The objective of this task is to discuss definition and scope-related issues for the Ecodesign Lot 23 preparatory study. It consists of a categorisation of the products that could fall into the scope of "domestic and commercial hobs and grills" and a correlation with classification scheme(s) used in existing Prodcom categories (used in Eurostat) and in other approaches e.g. EN standards. This task provides product definitions for the purpose of this study and of the overlaps with the Prodcom classification categories.

Further, existing harmonised test standards and sector-specific procedures for product-testing are identified and discussed, covering the test protocols for:

- Primary and secondary functional performance parameters (Functional Unit)
- Resource use (energy, etc.) during product-life
- Safety (electricity, EMC, stability of the product, etc.)
- Other product specific test procedures.

Finally, this task identifies existing legislations, voluntary agreements, and labelling initiatives at the EU level, in the Member States, and in the countries outside the EU.

1.1. PRODUCT CATEGORY AND PERFORMANCE ASSESSMENT

The objective of sub-task 1.1 is to define the categories of product that fall within the scope of the Ecodesign preparatory study Lot 23, from a broad functional and technical perspective. Additional sub-categories of products, based on finer technical differences, may be defined in Task 4.

This scoping exercise is a crucial step, since there is no established agreement on the exact meaning of "Domestic and commercial hobs and grills, including when incorporated in cookers".

1.1.1. DEFINITIONS

As specified in the Terms of Reference, the scope of the study is limited to "commercial and domestic hobs and grills, including when incorporated in cookers". The definition of the scope is therefore based on the analysis of the two key features mentioned in this definition: product (hob, grill, cooker), end user (domestic, commercial). These terms are discussed below in order to facilitate the scope definition.

- **PRODUCT**

  - Hob: there are several definitions for hobs.

- A hob is defined as the flat top part of a cooker, or a separate flat surface, containing hotplates or burners[2].
- EN 60335-2-6 (Safety of household and similar electrical appliances) gives several hobs-related definitions:
  - A hob is an appliance that incorporates a hob surface and one or more hob elements and is built-in or part of a cooking range.
  - A hob surface is a horizontal part of the appliance on which vessels can be placed.
  - A hob element is a heating unit attached to the hob surface or positioned below the cooking zone.
- EN30-1-1:2008 : 3.4.3.4 (Gas appliances definition)
  - Hotplate: part of a cooking appliance comprising one or several covered or uncovered burners, and/or one or more electric cooking plates, and possibly a griddle.
- According to EN 60350 (Electric cooking ranges, hobs, ovens and grills for household use) and EN 61817 (Household portable appliances for cooking, grilling and similar use), a hob is defined as an appliance or part of an appliance which incorporates one or more cooking zones, where a cooking zone is part of the hob or area marked on the surface of the hob which pans are placed for heating. **In the scope of this study, we will use this definition for hobs**.

  - Cooker: there are several definitions for cookers.

- A large metal device for cooking food using gas and/or electricity. A cooker usually consists of a grill, an oven, and some gas and/or electric rings[2].
- A unit for cooking, typically including an oven and surface heating units and usually operated by gas and/or electricity[3]. When a cooktop and an oven are combined in a single unit, the appliance is referred to as a cooker[4].

  - Grill: several definitions can be found for grills.

- A grill is defined as a device on a cooker that radiates heat downwards for grilling food[2].
- According to the standard EN 60335-2-9:2005, a radiant grill is an appliance having a visibly glowing heating element and a support on which food can be placed whereas a contact grill is an appliance having a heated surface on which food is placed.

[2] Collins English definition-Thesaurus
[3] Webster's New World College Dictionary
[4] Kreith, F. and West, R.E. (1996), CRC handbook of energy efficiency

- According to EN 60350 and EN 61817, a grill is defined as an appliance or part of an appliance in which food is cooked by radiant or contact heat. **In the scope of this study, we will use this definition for grills.**

END USER

- As the study covers domestic and commercial hobs and grills, it is important to define what "domestic" and "commercial" mean, in order to know what appliances fall under these categories. Domestic hobs and grills are primarily designed for use in households. However, they are sometimes used in commercial establishments, e.g. kitchens of small restaurants. The following definitions are used in this study:

- Domestic appliances: this category includes hobs and grills that are primarily meant to be used by households.
- Commercial appliances: this category includes hobs and grills that are meant to heat or cook product for customers such as in:
  - restaurants,
  - hotels,
  - ...

Radiation is the main heating mechanism for grills, whereas conduction and radiation are the main heating mechanisms for hobs. For clarification matters, the different heating mechanisms mentioned in this study are explained in the following paragraphs.

HEATING MECHANISMS

Four main heating mechanisms (conduction, convection, radiation, induction) are identified in the scope of this study and can be classified under three main categories, radiation and induction both falling under the category "Electromagnetic field":

- Conduction: heat flows from the source to the material absorbing it. Different materials have different conducting properties, for example copper has excellent conducting properties, aluminium a little less, and steel even less, while glass is a really poor heat conductor (about 400 times worse than copper)[5].
- Convection: when a liquid or air is heated it becomes less dense, causing it to rise and to be replaced by denser fluid; i.e. convection flows from more dense to less dense areas. The convection currents typically flow upwards. Convection is the main heating process during roasting[6].
- Electromagnetic field: the electromagnetic field can be classified into two types: radiation and induction.

[5] Barham, P. (1950), The science of cooking.
[6] This, H. (1993), Kitchen Mysteries, revealing the science of cooking.

- Radiation: infrared radiation is heat that is transferred directly from a heat source to an object as an electromagnetic wave, as opposed to through the air, like convection, or through a solid, like conduction. In cooking when radiation is used, only the surface is heated by the incident radiation. It does not penetrate the food. The rest of the food is cooked mostly through conduction. Radiation is the main mechanism for broiling and toasting[7].
- Induction: induction is linked to a changing magnetic field which is created by passing an electric current through a wire. If an electrically conductive pot is placed in the magnetic field (by placing it on the cooking surface), a current is induced in the pot. Restive losses in the pot convert this current into heat[8].

Generally speaking, conduction is the primary heating mechanism for electric hobs. Indeed, the pan placed on the hob is heated through conduction, convection, radiation or induction (or more often a mix of several heating mechanisms) and the heat is transferred to the food through conduction. For gas hobs, convection is the main mechanism.

Radiation and conduction are the main heating mechanisms for grills. The extent to which each of these mechanisms contributes to heating will differ from one grill to another.

1.1.2. OTHER CRITERIA FOR DEFINING THE SCOPE

On top of the primary definitions covered in the previous section, key criteria are used in this study to classify the products. This section provides some preliminary elements of classification. The definitions of hobs and grills are quite general, and some criteria are needed in order to depict the hob and grill situation, and in order to classify hobs and grills in several categories. There exists a wide diversity between these product types from the following perspectives:

- **ENERGY SOURCE**

Hobs can use different sources of energy:

- Gas: gas hobs burn gas directly to produce the heat necessary to cook.
- Electricity: electric hobs are found in different forms and in many technologies (solid plates, radiant hobs, induction hobs) falling under this classification. These different technologies are presented later, in section 1.1.4. (p16).
- Mix: mixed fuel hobs use both electricity and gas on the same hob. For instance, a 4 burner hob can have two burners working on gas and two burners working on electricity.

[7] Amendola, J. and Rees, N. (2003), Understanding baking, 3rd edition, the art and science of baking.
[8] Bennett, C. (2008), Greening your home, sustainable options for every system in your house.

As for grills, energy sources can be more diverse:

- Electricity: electric grills typically involve resistive heating and cooking of the food through conduction and radiation.
- Gas: gas grills typically use gas as a fuel source with a gas flame either cooking the food directly or heating grilling elements that in turn, radiate heat that cooks food. The grills are typically designed for propane or natural gas, although it is possible to convert them from one source to another.
- Charcoal: charcoal grills transform charcoal into embers radiating the heat necessary to cook food. These kinds of grill can use wood equally, in order to give a smoky flavour. However, charcoal being a more common fuel, this study considers wood grills under the category "charcoal grills".
- Gas-charcoal: some grills can use gas and charcoal, most of the time in two different chambers combined in one grill.

USAGE LOCATION

Hobs are used mostly indoors. As for grills, the differentiation can be made:

- Outdoor use: this concerns mainly outdoor grilling, which is a popular way of grilling food using charcoal, wood, gas or electricity.
- Indoor use: many restaurants incorporate an indoor grill as part of their cooking appliances. These grills look like outdoor grills, in that they are made up of a grid suspended over a heat source. Indoor grills are more likely to use electric or gas-base heating elements, however.

TECHNOLOGY USED FOR ELECTRIC HOBS

An electric hob consists of a horizontal surface with one or more electrically-powered heating elements located either above the hob surface (open coil type cooktop) or below the hob surface (smooth cooktop). Three technologies of electric hobs are widely available: solid plate, radiant, and induction.

- Coil elements
  - Solid plate hob: solid element hobs use iron discs that contain electrically resistive wires that heat up with current. The wires are embedded in ceramic insulation to transfer the heat.
- Smooth surfaces
  - Radiant hob: radiant hobs are made of metal ribbon/wire spirals formed in a circle as the element. When the element is switched on, an electric current flows through the ribbon/wire and, because of the metal's resistance, the

ribbon/wire heats up. Almost instantly, it starts to glow red hot and its temperature reaches about 1000°C; 97% of the energy it supplies is heat, and just 3% is light. Heat and light from the ribbon/wire radiate up through the ceramic material of the hob (glass-ceramic), and are absorbed by the base of the pan. Radiation accounts for 40% of the heat supplied and conduction upwards through the solid ceramic accounts for the remaining 60%[9]. Halogen hobs included in this category use tungsten filament lamps to supply energy almost instantly. The filament is closely surrounded by a quartz envelope capable of withstanding high temperatures. The envelope is filled with halogen. The lamp is in the form of a ring, so that the glowing filament matches the shape of the base of the pan. The cooktop is made from a specially toughened ceramic glass that can withstand sudden high temperatures and the weight of heavy cooking pots without cracking. A cooking pot on the glass is warmed up by a mixture of radiation and conduction: heat from the halogen lamp irradiates the pot, but is also conducted to the pot through the hot glass just beneath it[10].

- Induction: an induction cooker uses a type of induction heating for almost instant cooking. A coil of copper wire is placed underneath the cooking pot. An oscillating current is applied to this coil, which produces an oscillating magnetic field. This magnetic field induces a current in an electrically conductive pot, which produces resistive heat. This heat is conducted into the food[11].

SIZE

Standards sizes for domestic hobs (with one to six cooking zones) are 30, 60 and 90 cm (in width). Commercial hobs cover larger sizes and can have a width up to 150cm.

Sizes for grills range typically from around 30cm * 30cm for the Panini grill to larger than a square metre for some grills.

APPLIANCE TYPE

The hob can be described as built-in or free-standing:

- Built-in hobs: this category encompasses appliances that are incorporated in a wall or integrated in modular kitchens. According to the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE)[12], built-in means the product is part of a modular kitchen, cabinetry, or other similar structures[12].

[9] Sand, D(2004) Cook electric
[10] Breipthaupt, J. (2001), Keyscience, Physics, 3rd edition
[11] Anderson W. (2007), Green up! An A-Z of environmentally friendly home improvements
[12] U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (1997), 10 CFR Part 430 Subpart B App I Appendix I to Subpart B of Part 430

- Free-standing hobs: this category represents appliances that are for example combined with an oven, but that are not incorporated in a wall or a modular kitchen. According to the EERE, free-standing means the product is not supported by surrounding cabinetry, walls, or other similar structures. This category can be further sub-divided into portable and non-portable. In safety standard such as EN 60335-1, the limit below which an appliance is considered as portable is 18 kilograms.

Grills can also be found in built-in models (contact grills referred to as domino modules) and free-standing. Both free-standing and built-in appliances are part of the scope of the study.

NUMBER OF BURNERS/COOKING ZONES

The number of burners can vary from one to eight burners, although a typical configuration for household appliances only reaches 6 burners. The most common is four burners and the most popular configuration of burners (or zones on a ceramic hob), whether on a gas or electric hob, is one large, two medium and a simmer. Some hobs now have specialist burners for fish kettles or for woks.

POWER CAPACITY

The input power unit used in Europe, according to EN Standards is the W. Gas hobs input power range from 3000 W up to 20 000 W and more. Electric hobs range from 1000 W up to 10000 W and more.

TYPE OF CONTROL SETTING DEVICES

Different kinds of control setting devices are used depending on the type of appliance. Knobs to burn and buttons are being phased out in favour of touch-sensitive controls.

OTHER FEATURES

Other features, such as food thermometers or auto shut-off features may be of interest for further classification.

Table 1-1 presents some of the main technical and convenience elements, which have an influence on environmental performance and add to the functionality of the appliance. All these aspects need to be taken into account thoroughly (including future trends regarding additional parameters and functionalities) throughout the study.

Table 1-1: Key product parameters for hobs

Electric	Gas
Technical / functional parameters:	
▪ Electrical connection rating (W); Current (A); Voltage (V); Frequency (Hz)	▪ Gas connection rating (W); Gas type; alternative gas type

- Type of appliance (Free-standing; Built-in)
- Number of cooking zones that can be used at the same time
- Number of cooking zones
- Type of control devices
- Location of controls
- Dimensions of the product
- Dimension and power of each electric cooking zone

Convenience factors:

- Is there a control light when the hob is on?
- What kind of regulation (switches) does the hob have?
- Are there valves to protect against leaks? (Note: mandatory for gas or combined hobs)
- Does the hob have automatic electronic ignition system?
- What kind of pan supports does the hob have? (Note: mandatory for gas or combined hobs)
- Description of the safety device if there is one.
- Is there safety indication of hot zones after the heat source is turned off?
- Is there an electric timer?
- What kind of frame does the hob have? (stainless steel, painted, enamelled, etc.)
- Does the heat cut off automatically if a pan boils over?

1.1.3. EXISTING PRODUCT CATEGORIES

PRODCOM CLASSIFICATION

Prodcom[13] classifies domestic hobs and grills in the categories NACE 27.51 – "Manufacture of electric domestic appliances"- and NACE 27.52 - "Manufacture of non-electric domestic appliances". Different types of hobs and grills are listed in subcategories, which are presented in Table 1-2.

Prodcom does not classify commercial hobs and grills explicitly in a specific NACE category. However, these appliances can be considered to fall into a sub-category of the NACE 28.93 – "Manufacture of machinery for food, beverage and tobacco processing" – as presented in Table 1-3.

A first distinction can be made between domestic and non domestic hobs and grills even if these cooking appliances are not concerned by a specific PRODCOM category. Domestic hobs and grills can be distinguished according to the energy source (electric and non-electric). Further, among electric hobs, the PRODCOM classification separates those that are built-in (NACE 27.51.28.33) from those which are free-standing, integrated in cookers or not (NACE 27.51.28.10 and NACE 27.51.28.35). For gas hobs, the PRODCOM classification covers gas domestic cooking appliances with an oven (27.52.11.13) and without (27.52.11.15). Other non electric appliances are under the section (27.52.11.90). In the case of commercial use, no distinction is made according to

[13] PRODCOM Classification: List of PRODucts of the European COMmunity

the energy source, and hobs and grills are included in the same category (NACE 28.93.15.80).

Table 1-2: Prodcom classification for domestic hobs and grills

Prodcom code	Prodcom category
27.51	**Manufacture of electric domestic appliances**
27.51.28	**Other ovens; cookers, cooking plates, boiling rings; grillers, roasters**
27.51.28.10	Domestic electric cookers with at least an oven and a hob (including combined gas-electric appliances)
27.51.28.33	Domestic electric hobs for building-in
27.51.28.35	Domestic electric cooking plates, boiling rings and hobs (excluding hobs for building-in)
27.51.28.50	Domestic electric grills and roasters
27.52	**Manufacture of non-electric domestic appliances**
27.52.11	**Domestic cooking appliances and plate warmers, of iron or steel or of copper, non electric**
27.52.11.13	Iron or steel gas domestic cooking appliances and plate warmers, with an oven (including those with subsidiary boilers for central heating, separate ovens for both gas and other fuels)
27.52.11.15	Iron or steel gas domestic cooking appliances and plate warmers (including those with subsidiary boilers for central heating, for both gas and other fuels; excluding those with ovens)
27.52.11.90	Other domestic cooking appliances and plate warmers, of iron or steel or of copper, non electric

Table 1-3: Prodcom classification for commercial hobs and grills

Prodcom code	Prodcom category
28.93	**Manufacture of machinery for food, beverage and tobacco processing**
28.93.15.80	Non-domestic equipment for cooking or heating food (excluding non-electric tunnel ovens, non-electric bakery ovens, non-electric percolators)

DOE CLASSIFICATION

The US DoE (Department of Energy) has classified hobs in different categories:

- Gas hobs
  - Domestic hob (≤ 14000 Btu(4.1 kWh)/h)
  - Commercial hob (>14000 Btu(4.1 kWh)/h)
- Electric hobs
  - Coil elements
  - Smooth surfaces
    - Induction
    - Radiant
    - Halogen

CLASSIFICATION OF HOBS AND GRILLS USED IN THIS STUDY

As presented before, hobs can be classified under three main categories:

- Gas hobs
- Electric hobs
- Gas/Electric hobs

In turn, these categories can be broken down into free-standing and built-in. Portable appliances as defined in the safety standard having less than 18kg can be considered a subcategory of free-standing appliances.

Grills can also be classified according to their fuel source:

- Charcoal grill
- Gas/Charcoal grill
- Gas grill
- Electric grills

1.1.4. CONCLUSIONS: SCOPE OF THE STUDY

The grill functionality included in some ovens is not discussed in this study as it is discussed within the context of the Lot 22 preparatory study related to domestic and commercial ovens. The discussion of the scope will have to be elaborated further during the process of the study.

1.1.4.1 APPLIANCES WITHIN THE SCOPE OF THE LOT 23 STUDY

- **DOMESTIC BUILT-IN APPLIANCES**

  - **Domestic gas hobs**

In a gas hob, pressurised gas or propane is supplied to each burner by means of an orifice and Venturi on the underside of the hob surface. A sheet metal box encloses the burner supply lines as well as the controls for gas delivery and ignition, if provided. Some gas hobs have automatic ignition to light the burners, while others is done by pushing an ignition button or manually lighting the flame.

Figure 1-1: Typical built-in gas hob from Duvallion

  - **Domestic electric hobs**

    - Solid plate hobs: When the cooking zones are located above the cooktop surface, the cooking vessel is placed directly on an element to heat the vessel and contents through conductive heat transfer. The elements are resistively heated by means of the current supplied to them. An open coil-type cooktop operates a spiral-wound sheathed heating element. Solid disk elements contain a similar resistive element embedded in a flat, circular cast iron housing to provide a more even heating surface and greater cleanability than for a coil element.

Figure 1-2: Typical built-in solid plate electric hob from Hotpoint

    - Radiant hobs: Radiant elements lie underneath a glass-ceramic panel. They transfer heat to pans by direct infrared radiation from resistors. They offer a faster response than solid plate hobs. Hobs including a halogen element are considered in this category, where halogen elements transfer energy to the cooking vessel by direct infrared radiation from high-powered tungsten-halogen lamps. The halogen element lies underneath a glass-ceramic panel and consist of one or more lamps installed horizontally within a corrosion-protected metal dish. The bottom of the metal dish is

insulated with microtherm insulation. Frequently, radiant heating coils are fitted around the halogen element to provide heat around the element's edge. This results in a highly responsive element that provides a good temperature distribution

Figure 1-3: Typical built-in radiant hob from Fagor

- Induction hobs: Induction elements use a solid-state power supply to convert 50/60 Hz alternating line current into a high-frequency (approximately 25 kHz) alternating current. This high-frequency current is supplied to an inductor. The inductor is a flat winding spiral, located just underneath a glass-ceramic panel. The high-frequency current, which is supplied to the inductor, causes it to generate a magnetic field which passes through the glass-ceramic panel unaffected and produces eddy currents in the bottom of the cooking vessel. The vessel must be made of some type of ferromagnetic material, and the currents that are generated within the vessel cause it to heat up. Thus, the vessel essentially becomes the heating element. This technology provides a fast response.

Figure 1-4: Typical built-in induction hob from De Dietrich

➢ **Domestic combined gas/electric hobs**

Some hobs include both electric cooking zones and gas burners in order to offer more flexibility to consumers. In this type of hobs, burners can be fitted either with solid plates or induction or radiant cooking zones.

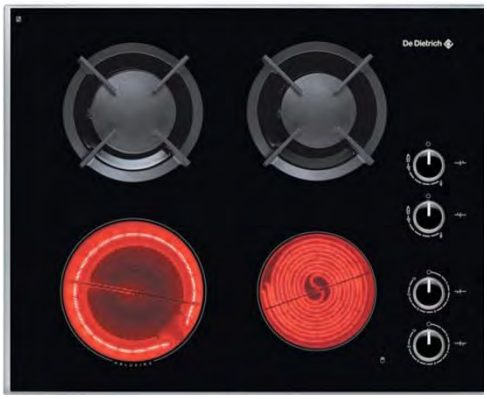

Figure 1-5: Typical built-in combined gas/electric hob from De Dietrich

➢ **Domestic range cookers**

A range cooker has a hob on top and an oven beneath. It can also include two full sized ovens and a separate grill. This type of cooking appliance can use both gas and electricty or a combination and targets mainly commercial applications (e.g. restaurant kitchens).

Figure 1-6: Typical range cookers with hob included (domestic Electrolux hob on the left, Cannon on the right for professionals)

➢ **Domestic free-standing gas hobs**

Small gas hobs with one or two burners or more are also available on the market.

Figure 1-7: Typical free-standing gas hob from Mercury

COMMERCIAL HOBS

Catering equipment manufacturers usually design series of modular elements with standard dimensions, so that appliances can be placed side by side to form a worktop. Clients can choose to buy a cook top on top of an oven or a cabinet. It is also possible to buy only a cook top to replace and old one. The main technologies produced for the European market are:

Commercial gas open burners

Pots are placed on top of open burners and are directly heated by the gas flame.

Figure 1-8: Commercial gas open burners

Commercial gas solid top

A cast-iron plate on which pots are placed is heated by one or several gas burners. The temperature is lower on the sides than on the centre of the solid plate, which allows to simmer easily by placing the pot far from the burner.

Figure 1-9: Commercial gas solid top
(left: cast-iron plate, right: stainless steel plate)

Commercial electric boiling table

Electric boiling tables have several cooking zones, heated by solid plates, and can be used to cook with several pots at the same time.

Figure 1-10: Commercial electric boiling table

➢ **Commercial electric hob**

Some manufacturers produce electric hobs which designed with a worktop in stainless steel, heated by electric resistances. It allows to have a homogeneous temperature, and to place bigger pots than the electric boiling table.

Figure 1-11: Commercial electric hob

➢ **Commercial electric infrared hobs**

Infrared hobs used in restaurants use the same technology than their domestic equivalent.

Figure 1-12: Commercial electric infrared hob

➢ **Commercial electric induction hobs**

Induction hobs used in restaurants use the same technology than their domestic equivalent.

Figure 1-13: Commercial electric induction hob

■ **PORTABLE HOBS**

➢ **Portable solid plate hobs**

Small solid plate electric hobs with one or two cooking zones are also available. They fit in a lot of places.

Figure 1-14: Typical free-standing solid-plate hob from Best

➢ **Portable radiant hobs**

Professionals (e.g. restaurants) can use free-standing radiant hobs with one or two cooking zones. The design of this hob is very similar to that of free-standing induction hobs. In this study, they are classified as "radiant hobs".

Figure 1-15: Typical free-standing radiant hob from Foshan Huafeng Appliance co.

➢ **Portable induction hobs**

Professionals (e.g. restaurants) can use free-standing induction hobs with one or two cooking zones.

Figure 1-16: Typical free-standing induction hob from Cooktek

■ **GRILLS**

Regarding grills, most available models are free-standing. In the following paragraphs various examples are presented. **Further, the grill functionality included in some ovens is not discussed in this study as it is more relevant to the Lot 22 preparatory study related to domestic and commercial ovens.**

➢ **Commercial gas fry top**

Fry tops are equivalent to a frying pan on top of a hob. It is possible to fry a bigger amount of food, and it is easiest to clean. Fry tops can be powered with gas or electricity.

Figure 1-17: Commercial electric and gas fry top

➢ **Commercial grills**

Commercial grills are used to grill food in large quantity. They are available both in gas and electric versions.

Figure 1-18: Commercial grills

➢ **Electric "Panini" grills**

This type of grill uses electricity and is mainly used commercially for heating snacks. They are usually made of two cast iron plates and can contain several sandwiches and rolls of different sizes.

Figure 1-19: Typical electric "Panini" grill from Villaware

➢ **Gas grill**

The majority of gas grills follow the cart grill design concept: the grill unit itself is attached to a wheeled frame that holds the fuel tank. The wheeled frame may also support side tables and other features.

Figure 1-20: Typical commercial grill from Char-Broil (left) and domestic gas grill from Meco (right)

➢ **Gas or electric flat-top grill**

A flat-top grill is a cooking appliance that resembles a griddle but performs differently because the heating element is circular rather than straight (side to side). This heating technology creates an extremely hot and even cooking surface, as heat spreads in a radial fashion over the surface. Many flat-top grills are powered by natural gas or propane, but electric models exist also. In addition, there are models made for indoor or outdoor cooking that can be built-in or free-standing.

Figure 1-21: Typical flattop grill from Evo

➢ **Combined gas/charcoal grill**

A combined grill is a grill used for outdoor cooking with charcoal and natural gas or liquid propane, and can cook in the same manner as a traditional outdoor gas grill.

In addition to providing the cooking heat, gas burners in a hybrid grill can be used to start a charcoal/wood fire quickly, or to extend the length of a charcoal/wood cooking session. In this case, only the gas function will be taken into account.

Figure 1-22: Typical gas/charcoal grill from Char Griller

- **Charcoal grill**

Charcoal grills use either charcoal briquettes or all-natural lump charcoal as their fuel source. The charcoal, when burned, transforms into embers radiating the heat necessary to cook the food. There are many different charcoal grill configurations. Some grills are square, round, or rectangular, some have lids while others do not, and some may or may not have a venting system for heat control. The charcoal can be replaced or supplemented with wood.

Figure 1-23: Typical charcoal grill from Belson

- **Charcoal kettle grill**

The kettle grill is composed of a lid, cooking grid, charcoal grid, lower chamber, venting system, and legs. Some models include an ash catcher pan and wheels. The lower chamber that holds the charcoal is shaped like a kettle, giving the grill its name. The key to the kettle grills' cooking abilities is its shape. The kettle design distributes heat more evenly. When the lid is placed on the grill, it prevents flare-ups from dripping grease,

and allows heat to circulate around the food as it cooks. Restricted airflow means a lower cooking temperature and a slower burning of charcoal.

Figure 1-24: Typical charcoal kettle grill from Weber

1.1.4.2 FUNCTIONAL UNIT

- **FUNCTIONAL UNIT FOR A HOB**

The purpose of a hob is to provide heat in order to cook food. The functional unit of a hob is to convert energy (electricity, gas, etc.) into heat to cook food on it at a certain temperature for a given time.

- **FUNCTIONAL UNIT FOR A GRILL**

The purpose of a grill is to provide heat in order to cook food. The functional unit of a grill is to convert energy (electricity, gas, etc.) into heat to cook food through radiation at a certain temperature for a given time.

1.1.4.3 MAPPING OF PRODUCT GROUPS COVERED BY LOT 23 WITH PRODCOM CATEGORIES

A classification of different products that could be covered within the scope of the Lot 23 study mentioned above is presented in Figure 1-25 below including the Prodcom categories. It also shows potential overlaps with the Lot 22 study on domestic and commercial ovens. It can be seen that Lot 23 appliances are commercial and domestic appliances, which can be categorised according to their likely end use and according to the existing product definitions in EN standards.

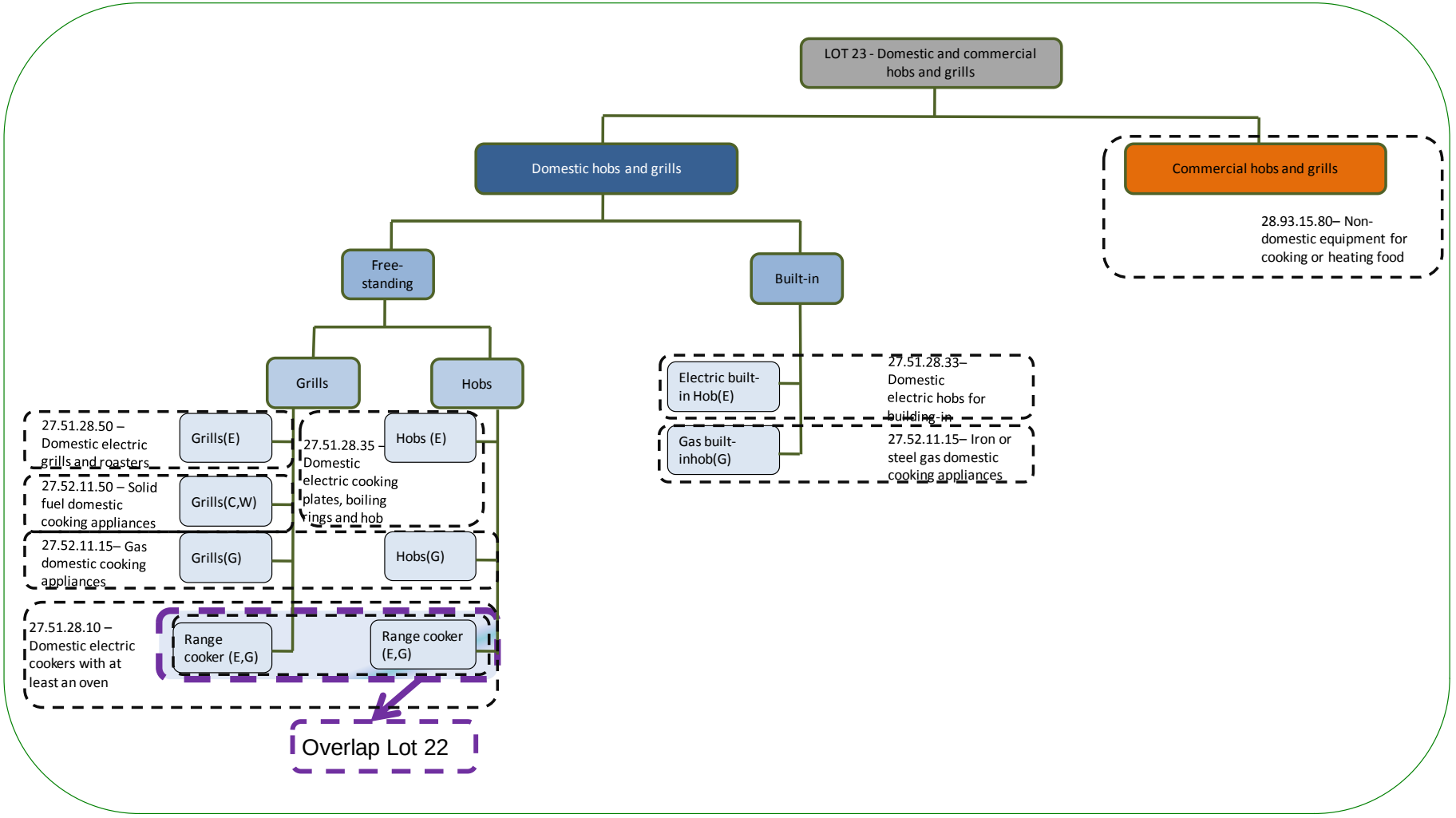

Figure 1-25: Overview of the main product groups projected to be covered in Lot 23 (E, G, C and W stand for electric, gas, charcoal and wood devices)

1.2. TEST STANDARDS

The aim of this section is to give an overview of existing test standards for the products to be potentially covered by Lot 23 and to identify needs and requirements for standards to be developed.

For technical use, a standard is a concrete example of an item or a specification against which all others may be measured or tested.

The focus of this task is on the environmental performance and related technical aspects, e.g. energy consumption and other resource consumption, in relation to the functional performance of the product. The issue of particular interest is standardisation methodology and related parameters, e.g. allocation of environmental loads to different life cycle stages, usage scenarios, and data requirements. The findings of this investigation will be summarised in an extended matrix based on the product classification defined in subtask 1.1. Relevant test standards along with their methodological features and parameters will be correlated to the main life cycle stages of the product:

- Manufacture/design (materials, fire and electrical safety, etc.)
- Distribution/redistribution (packaging materials, methods of transport, etc.)
- Product usage (functionality, resource efficiency, safety, noise and vibration, etc.)
- End of life (reuse, recycle, final disposal, etc.)

1.2.1. STANDARDS AT EUROPEAN COMMUNITY LEVEL

The European standard defining method to measure the performance of domestic electric hobs and grills is EN 50304/**EN 60350:2009** (Electric cooking ranges, hobs, ovens and grills for household use – Methods for measuring performance). For commercial hobs and grills, no specific European standard exists.

This and other safety and technical requirements are presented in Table 1-4.

Table 1-4: Other European standards relevant for hobs and grills

Standard	Type	Grill/hob
EN 203-1:2005+A1:2008	Safety	Gas (professional)
EN 203-2-1:2005	Safety/Performance	Gas(professional
EN 30-1-1:2008	Safety	Gas (domestic)
EN 30-1-2:1999	Safety	Gas (domestic forced convection)
EN 30-2-1:1998 / A2:2005	Performance	Gas (domestic)
EN 30-2-2:1999	Performance	Gas (domestic forced convection)
EN 60335-1	Safety	Electric
EN 60335-2-6:2003	Safety	Electric (domestic)
EN 60335-2-9:2008	Safety	Electric (domestic portable)
EN 60335-2-36:2002:2008	Safety	Electric (commercial)
EN 60335-2-38:2002 + A2:2008	Safety	Electric (commercial)
EN 60335-2-48:2008	Safety	Electric (commercial)
EN50304/60350 : 2009	Performance	Electric (domestic)
EN61817:2001	Performance (test method)	Electric (domestic portable)

- **EN 203-1:2005+A1:2008** Gas heated catering equipment – Part 1: General safety rules

Prepared by: CEN Technical Committee GSE/19, Catering equipment (gas).

Implemented date: Approved 21 April 2005, amendment approved 5 March 2008, current version published May 2008.

Description: This safety standard is used for all types of professional catering equipment heated by gas. It includes definitions used by the rest of the same family of standards, specifies materials that can be used and designs for safe use and hygiene. It also specifies maximum carbon monoxide concentration in emissions and provides comprehensive and detailed standards.

- **EN 203-2-1:2005** Gas heated catering equipment – Part 2-1: Specific requirements – Open burners and wok burners

Prepared by: CEN Technical Committee GSE/19, Catering equipment (gas).

Implemented date: Approved 22 July 2005, published October 2005.

Description: This standard targets safety for professional equipment to be used in conjunction with EN 203-1. The gas heating efficiency test is based on heating pans of water at maximum burner to 70°C. CO_2 / CO are also measured. The ability to simmer is not assessed, so products may use more energy than necessary.

- **EN 30-1-1:2008** Domestic cooking appliances burning gas - Part 1-1: Safety - General

Prepared by: CEN Technical Committee GSE/35, Gas cooking appliances (domestic).

Implemented date: Approved 1 July 2008, current version published September 2008.

Description: This is a very detailed standard covering the design and performance of domestic ovens, grills, hotplates and other appliances. It includes electrical thermal, stability and gas safety issues. It describes various tests related to safety issues. Maximum CO content of outlet gases = 0.1 – 0.2%. Standard designed to ensure products are safe to use. Energy efficiency is not considered.

- **EN 30-1-2:1999** Domestic cooking appliances burning gas - Part 1-2: Safety - Appliances having forced-convection ovens and/or grills

Prepared by: CEN Technical Committee GSE/35, Gas cooking appliances (gas).

Implemented date: Approved 15 April 1999, current version published September 2008.

Description: This safety standard is to be used with EN 30-1-1 and provides additional test and safety requirements for ovens and grills that use forced convection. In most circumstances, EN 30-1-1 applies.

- **EN 30-2-1:1998 / A2:2005** Domestic cooking appliances burning gas - Part 2-1: Rational use of energy – General

Prepared by: CEN Technical Committee GSE/35, Gas cooking appliances (domestic).

Implemented date: Approved 18 January 1997, published March 1998. The first amendment was published in September 2003 and the second in 2005.

Description: This is a gas energy efficiency test standard for open and covered gas burners (as well as gas ovens). Test methods are based on EN 30-1-1 and the limits specified are:

  - Uncovered burners > 52%
  - Covered burners from cold >25%
  - Covered burners from hot >35%

The standard gives the test procedure and the method to calculate % efficiency as follows:

$$\eta = 4.186 * 10^{-3} * m_e * 100 * \frac{t_2 - t_1}{V(orM_c)H_s}$$

Where η is the efficiency in %, m_e the equivalent mass of the pan filled, V is the volume of dry gas consumed in cubic metres (formula provided to account for pressure and temperature), M_c is dry mass of gas in kilograms, H_s is the gross calorific value of the gas, t_1 is 20°C and t_2 is 90°C.

- **EN 30-2-2:1999** Domestic cooking appliances burning gas - Part 2-2: Rational use of energy - Appliances having forced-convection ovens and/or grills

Prepared by: CEN Technical Committee GSE/35, Gas cooking appliances (domestic).

Implemented date: Approved 15 April 1999, and comes into effect in December 2009.

Description: This is a gas energy efficiency test standard for domestic forced convection ovens based on EN 30-2-1.

The energy efficiency requirement is the same as ovens/grills without fans whereas fan-assisted appliances should be more energy efficient.

- **EN 60335-1** Household and similar electrical appliances — Safety — Part 1: General requirements

Prepared by: CENELEC Technical Committee CPL/61, Safety of household and similar electrical appliances.

Implemented date: Originally approved 2 July 2002 with several amendments, current version published November 2008.

Description: This is derived from IEC 60335-1:2001, it is a safety standard for domestic appliance to show conformity with the Low Voltage Directive. The scope includes appliances intended for household use and appliances used by laymen in shops, light industry, etc.

- **EN 60335-2-6:2003** Safety of household and similar electrical appliances – Part 2-6: Particular requirements for stationary cooking ranges, hobs, ovens, and similar appliances.

Prepared by: CENELEC Technical Committee CPL/61, Safety of electrical appliances, to Subcommittee CPL/61/07, Safety of electrical appliances — Heated appliance group.

Implemented date: Published March 2003, amended February 2005.

Description: This is a safety-related standard derived from IEC 60335-2-6:2002, based on EN 60335-1 with applicable additions, modifications and replacements for domestic electric ranges, hobs and ovens. The test loads for rotating spits, hotplates and induction hotplates are specified.

- **EN 60335-2-9:2008** Safety of household and similar electrical appliances – Part 2-9: Particular requirements for grills, toasters and similar portable cooking appliances

Prepared by: CENELEC Technical Committee CPL/61, Safety of electrical appliances, to Subcommittee CPL/61/07, Safety of electrical appliances — Heated appliance group.

Implemented date: Amended version derived from IEC 60335-2-9:2002 published November 2007.

Description: This is a safety-related standard based on EN 60335-1 with applicable additions, modifications and replacements for domestic electric potable cooking appliances such as grills, breadmakers, ovens, portable hotplates, rotisseries and toasters. The safety test conditions are specified such as maximum surface temperatures.

- **EN 60335-2-36:2002 + A2:2008** Safety of household and similar electrical appliances - Part 2-36: Particular requirements for commercial electric cooking ranges, ovens, hobs, and hob elements.

Prepared by: CENELEC Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/5, Commercial catering equipment.

Implemented date: Published 2002, amended April 2008.

Description: This is identical to IEC 60335-2-36:2002. EN 60335-2-36:2002 is a safety standard based on EN 60335-1 with applicable additions, modifications and replacements for commercial electric ranges, hobs and ovens.

- **EN 60335-2-38 :2008** Safety of household and similar electrical appliances - Part 2-38: Particular requirements for commercial electric griddles and griddle grills

Prepared by: CENELEC Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/5, Commercial catering equipment.

Implemented date: Published April 2008.

Description: This is identical to IEC 60335-2-38:2002, safety standard based on EN 60335-1 with applicable additions, modifications and replacements for commercial electric griddles and grills.

- **EN 60335-2-48 :2008** Safety of household and similar electrical appliances – Part 2-48: Particular requirements for commercial electric grillers and toasters

Prepared by: CENELEC Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/5, Commercial catering equipment.

Implemented date: Original standard approved 1 February 2003, latest version published April 2008.

Description: This standard is identical to IEC 60335-2-48:2002, it is a safety standard based on EN 60335-1 with applicable additions, modifications and replacements for

electric grillers and toasters used in restaurants, canteens, hospitals and commercial enterprises but not industrial applications. This standard has different requirements to EN 60335-2-9 which cover domestic appliances only.

- **EN 50304/EN 60350:2009** Electric cooking ranges, hobs, ovens and grills for household use – Methods for measuring performance

Prepared by: CENELEC Technical Committee CPL/59, Performance of household electrical appliances.

Implemented date: Approved 1 December 2008, published March 2009.

Description: This standard includes EN 50304:2001 and is almost identical to IEC 60350:1999 with slight modifications.

This standard describes test methods for domestic electric ranges, ovens, hobs and grills. Tests include performance tests that determine evenness of cooking, such as pancakes on hobs, toast under grills. Permitted tolerances are given. Only one test for hobs gives an energy consumption to heat up water and this is not accurate[14]. Contrary to the wet brick test for oven, the hotplate and hob energy consumption are not used for energy labelling. There are also several tests for grilling uniformity (bread and burgers). Cleaning is also assessed. This standard includes a wide variety of tests that covers most ways that grills and hobs are utilised.

- **EN 61817:2001** Household portable appliances for cooking, grilling and similar use — Methods for measuring performance

Prepared by: CENELEC Technical Committee CPL/59, Performance of household electrical equipment, to Subcommittee CPL/59/7, Small kitchen appliances.

Implemented date: Originally approved 1 November 2001, latest version published August 2004.

Description: This standard is equivalent to EN 60350 and is solely for household portable appliances. The methods for assessing performance are described but this standard is not concerned with performance requirements but does describe energy consumption measurement procedure (in Wh). The tests are very similar to those in EN 60350:2009 and they cover the more common types of portable appliances.

In addition, the European Committee for Electrotechnical Standardization CENELEC, through its working group TC 59X WG 10 is preparing a method to measure energy efficiency of hobs.

[14] Comment from CECED related to the accuracy of energy consumption measurements of standard tests.

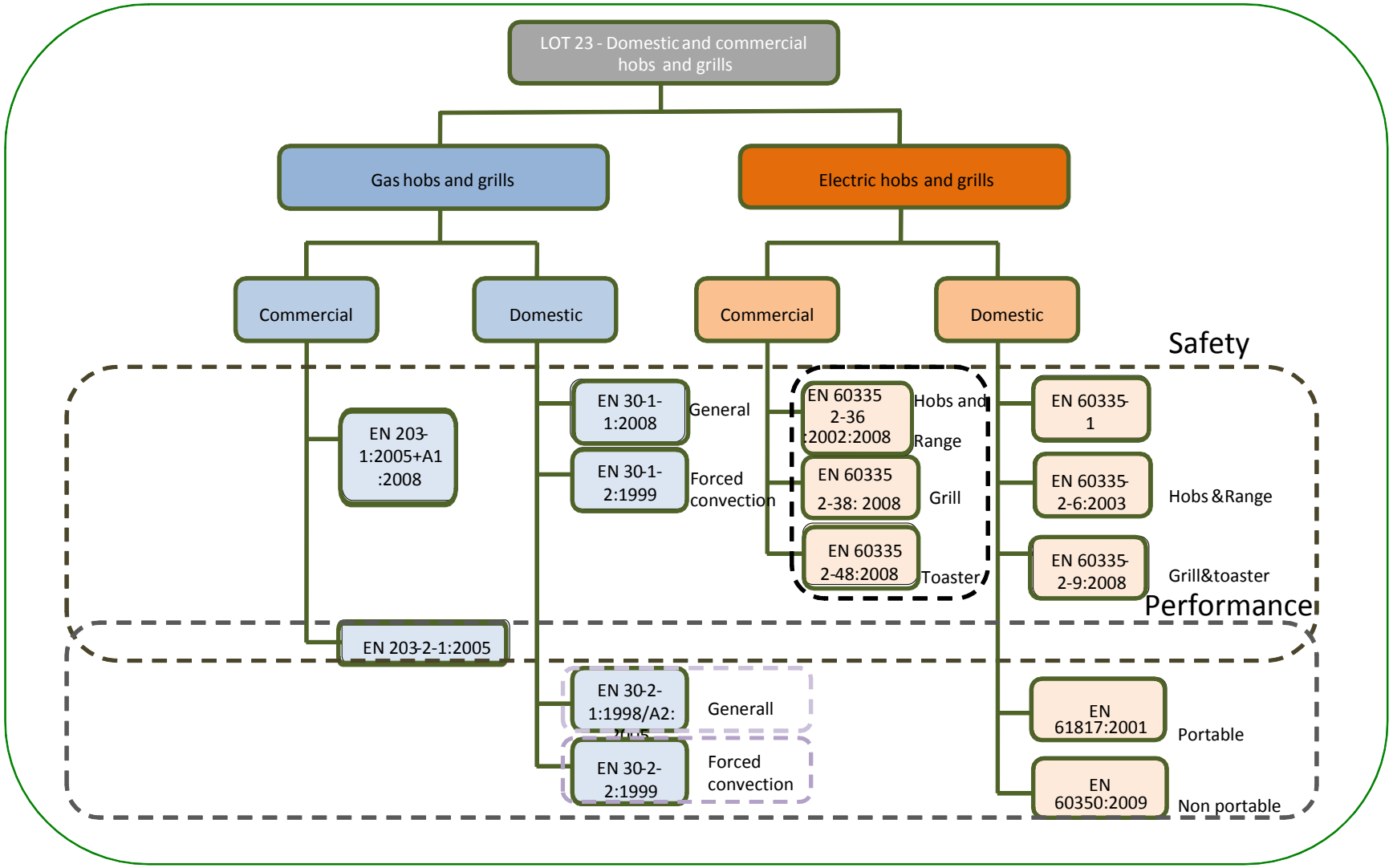

Figure 1-26: Safety and Energy related standards for domestic and commercial hobs and grills

The scope of standards presented is illustrated in Figure 1-26. They are classified under two main categories: gas hobs and grills, electric hobs and grills. These are, in turn, broken down into commercial and domestic. Finally they are classified by the type of standard, safety or performance.

Regarding standards covering energy efficiency, domestic gas cooking appliances are covered by EN 30-2-1:1998/A2:2005 for conventional gas hobs and grills and EN 30-2-2:1999 for forced convection hobs and grills.

Regarding commercial hobs and grills, only the EN 203-2-1:2005 standard is available but it only targets gas appliances. Commercial electric hobs and grills are not covered by any standard. However, the European Federation of Catering Equipment Manufacturers (EFCEM) - is developing a new drat test standard for commercial hobs and grills in parallel of this study.

All the above-mentioned standards measure the energy efficiency through heating a pan of water to a high temperature, typically 90°C, close to boiling. These tests seem to be fairly representative of the energy efficiency. However, this only includes the heating of the pan and does not cover maintaining the pan at a high temperature, which would be helpful to represent the real use of the pan. Only electric commercial hobs and grills are not covered by any standards (either safety or performance).

Table 1-5 gives us an overview of what is covered by the different test standards and what is not. It appears that standards for commercial electric hobs and grills are missing.

Table 1-5: Standards covering energy efficiency

	Gas		Electricity	
	Domestic	Commercial	Domestic	Commercial
Hob				
Range				
Grill				
Toaster				

Not covered yet

Covered by a standard not close to real use

Covered by a standard approaching real use

1.2.2. STANDARDS AT MEMBER STATE LEVEL

Standards published by EU Member States for hobs and grills that do not have European equivalents are presented in Table 1-6 below.

Table 1-6: Member States standards for hobs and grills without European equivalents

Country	Number	Title	Publication date
Germany	DIN 3360-4	Gas-Appliances; Household Cooking Appliances For Gaseous Fuels; Heating Ranges	1985
	DIN 3360-12	Domestic Cooking Appliances Burning Gas - Part 12: Fitness For Purpose	2003
	DIN 3363-3	Gasfired Catering Equipment; Glass Ceramic Hobs Requirements And Testing	1992
	DIN 4732	Oil Fired Kitchen Stoves With Vaporizing Burners	1990
	DIN 18851	Equipment For Commercial Kitchens - Ranges - Requirements And Testing	2008
	DIN 18852	Equipment For Commercial Kitchens - Frying And Grilling Appliances - Requirements And Testing	2003
	DIN 18858	Equipment For Commercial Kitchens - Salamander Broilers And Giros Grills - Requirements And Testing	2003
	DIN 18862-1	Equipment For Commercial Kitchens - Automatic Units For Grilling Products - Requirements And Testing - Part 1: Meal For Short-Time Roasting	2003
	DIN 18862-2	Equipment For Commercial Kitchens - Automatic Units For Grilling Products - Requirements And Testing - Part 2: Meat For Long-Time Roasting	2003
	DIN 18870	Equipment For Commercial Kitchens - Limits For Wastegas Heat Losses Of Catering Equipments	2000
	DIN 30694-4	Built-in Appliances For Lpg In Vehicles; Hotplates, Ovens, Grills, Refrigerators And Freezers; Requirements And Testing	1990
	DIN 44543	Electric Household Infra-Red Grill; Terms	1969
	DIN 44544	Electric Household Infra-Red Grill; Test	1969
	DIN 44545	Electric Household Infra-Red Grill; Requirements	1969
	DIN 44549-1	Electric Warming Plates For Household Use; Performance, Definitions	1973
	DIN 44549-2	Electric Warming Plates For Household Use; Performance, Tests	1973
	DIN 44549-3	Electric Warming Plates For Household Use; Performance, Requirements	1973
	DIN 44550	Electric Cookers (Household Electric Ranges); Automatic Boiling Plates And Glass Ceramic Cooking Zones; Characteristics Of Performance, Tests	1984
	DIN 44551	Electric Cookers (Household Electric Ranges); Automatic Boiling Plates And Glass Ceramic Cooking Zones; Characteristics Of Performance, Requirements	1984
	DIN 68903	Kitchen Equipment - Stoves For Domestic Use, Concepts	1976

Country	Number	Title	Publication date
	DIN 68905	Kitchen Equipment; Ventilation Appliances, Concepts	1977
France	NF CR 1472	General Guidance For The Marking Of Gas Appliances	1999
	NFD 30 505-2	Appliances Using Combustible Gases - Guidelines For Testing Of Gas Appliances - Part 2: Specific Applications	1999
	NFD 30 512	Controls Done By The Manufacturer - Minimal Requirements About Control And Tests - Gas Cooking Appliances	1992
	NFD 31 001	Domestic Economy - Terminology Of Home Kitchen Stoves Running Of Solid Fuels, Gas Or Electricity	1954
	NFD 32 301	Domestic Economy - Metal Kitchen Ranges With Continuous Fires For Solid Fuels	1960
	NFD 35 360	Lpg Fired Itinerant Professional Cooking Facilities Intended For Food Applications	2004
Austria	ÖNORM OVGW G 81	Servicing On Gas Appliances	2001
	ÖNORM S 3031	Commercial Catering Equipment - Ranges And Auxiliaries - Definitions, Dimensions, Materials	1997
Ireland	I.S. 258-1 & 2	Domestic Soled Fuel Cookers With Integral Boilers - Part 1: Safety Requirements, Part 2: General Requirements	1984
Italy	UNI 10474	Cooking Ovens Burning Solid Fuel - Classification, Characteristics And Heat Test	1995
Poland	PN 86/A-55542	Commercial Catering Steam Boiling Pans - Requirements And Tests	1986
	PN 91/A-55538	Commercial Catering Coal-Fired Boiling Pots	1991
	PN A-55534	Commercial Catering Appliances - Heat Boilers - General Requirements And Tests	1997
	PN C-96004-4	Gas Engineering - Terminology - Gas Appliance For General Use	1994
Spain	UNE 20409	Methods For Measuring The Performance Of Electric Warming Plates For Household And Similar Purposes	1978
UK	BS 7462:1991	Specification For Electrical Safety Of Domestic Gas Appliances	1991

It seems that none of these standards are directly related to energy efficiency.

1.2.3. THIRD COUNTRY STANDARDS

National energy performance testing standards exist in Australia/New Zealand, Canada, China, Russia, and the US. Some of these are briefly described below.

- **AUSTRALIA/NEW ZEALAND**

- **AS 1550-1983** Performance of household electrical appliances - Hotplates for use in ranges and built-in cooking tops

This standard specifies requirements for solid and radiant electric hotplates intended for operation at low voltage in household electric ranges and built-in cooking tops. It includes provisions relating to construction and finish, minimum performance requirements and standard methods of testing. Griddle hotplates which are intended solely for the surface cooking of food by direct contact are excluded from this standard.

- **AS/NZS 3350.2.6:2006** Safety of household and similar electrical appliances - Safety - Particular requirements for stationary cooking ranges, hobs, ovens and similar appliances

This standard deals with the safety of stationary electric cooking ranges, hobs, ovens and similar appliances for household use, their rated voltage being not more than 250 V for single-phase appliances connected between one phase and neutral, and 480V for other appliances. Examples of appliances which are within the scope of this standard are stationary grills; pyrolytic self-cleaning ovens; induction hobs; steam ovens; the electrical part of appliances supplied with energy other than electricity.

- **AS 3350.2.9:1999** Safety of household and similar electrical appliances - Particular requirements - Grills, toasters and similar portable cooking appliances

This standard, published in 2008, deals with the safety of portable electric appliances that have a cooking function such as baking, roasting and grilling, intended for household purposes, the rated voltage being not more than 250 V.

- **AS 4551-2008** Domestic gas cooking appliances

This standard, published in 2008, applies to domestic gas cooking appliances, including cookers, hobs and separate ovens intended for use with natural gas, town gas, liquefied petroleum gas and tempered liquefied petroleum gas.

- **AS 4563-2004** Commercial gas cooking appliances

This standard, published in 2004, applies to various types of commercial catering equipment intended for use with natural gas, town gas, liquefied petroleum gas and tempered liquefied petroleum gas. Specific sections relate to the following product groups: grillers, solid grills plates and barbecue grillers.

- **AS/NZS 60335.2.6:2008** Household and similar electrical appliances - Safety - Particular requirements for stationary cooking ranges, hobs, ovens and similar appliances

This standard is based on the international standard IEC 60335-2-6 published in 2008.

- **CANADA**

The Canadian standard CAN/CSA-C 358-03 establishes the energy consumption test methodology for household electric ranges with ovens. For cooktops, two standardised aluminium blocks are used to measure the heat transferred from the hob in order to cook the the food. The larger block is 228.6mm diameter and 76mm high (8.62kg equivalent to 1980g of water) and is used on hobs over 175mm in diameter. The smaller block is 158mm diameter and 71mm high and is used on hobs less than or equal to 175mm in diameter. Both blocks are made of 6061 aluminium alloy, which has a specific heat of 963 J/kg/°C, and have a thermocouple inserted. The test block (at room temperature) is placed on the hob, which is turned to full power. When the rise of the block temperature is 80°C above ambient, the power is reduced to 25% and allowed to operate for a further 15 minutes. At the end of the test the temperature of the test block and the energy used during the test are recorded. The thermal efficiency is determined from the temperature rise of the block and the energy used to heat it. The annual energy service (useful output) delivered by a cooktop is based on US research and is assumed to be 277.7 kWh of delivered heat per year. The cooktop energy consumption is calculated as this value divided by the efficiency determined during the test.

- **CHINA**

According to the Asia-Pacific Economic Cooperation, one test standards exist in China for hobs and cookers for domestic use:

- **GB 4706.22** Safety of household and similar electric appliances-Particular requirements for stationary cooking ranges, hobs, ovens, and similar appliances
- **GB 4706.29** Safety of household and similar electrical appliances--Particular requirements for electromagnetic cookers

- **JAPAN**

A Japanese test is used in the frame of Top Runner (see section 1.3.3):

- **JIS S2103** is a standard that (gas cooking appliances for home use) provides a method for measuring the heat efficiency. It consists in heating a pan of water to 50°C above its initial temperature.

- **RUSSIA**

According to the Russian Federal Agency on Technical Regulating and Metrology, three test standards exist in Russia for household gas cookers:

- **GOST R 50696-2006**. This standard concerns heating appliances with a capacity of 1.16 – 4.2 kW. The capacity is measured by heating a "can of water". The performance index of an open gas burner must be superior to 52%. "Closed" gas burners must be superior to 35% for warming appliances.

There are several other Russian standards.

- **GOST 14919-83. T**his standard deals with household electric cooking ranges, cooking plates and cooking ovens. General specifications (amended on January 1985, February 1985, July 1987, January 1990, July 1991, January 1997, March 1999).
- **GOST 28398-89.** This standard deals with household electric cooking ranges, cooking plates and cooking ovens. It gives methods for measuring the performance (related to IEC 60350).
- **GOST 30587-98.** This standard deals with electrically operated household food preparation appliances. It gives measuring methods of operating characteristics (related to IEC 60350 and IEC 60619).

USA

The American Department of Energy (DOE) defined a hob test procedure (in document 10 CFR Part 430)[15], based on measuring the amount of energy required to raise an aluminium block test load from room temperature to a specified temperature above room temperature at full input heating rate, then operating the burner or element for a further fixed time at a reduced input heating rate. The size of the test block depends on the burner or element size, and the test is repeated for each burner or element. Annual energy consumption is calculated from the average cooking efficiency of the burners or elements. Hobs are rated using the energy factor (EF), which is the ratio of the annual useful cooking-energy output of the hob to its total annual energy consumption. The annual energy consumption includes the energy input during the time the load is being heated, plus the energy consumed by any standing pilot during standby hours for a gas hob. Therefore, design options that raise the cooking efficiency of a gas or electric hob and/or reduce the energy consumption of a pilot on a gas hob can decrease the total annual energy consumption and therefore improve EF.

1.2.4. STANDARDS AT INTERNATIONAL LEVEL

International standards exist for all major appliances, typically originating from industry standards, government agencies, or professional societies, and are eventually adopted by a national or international standardisation body. The leading international standardisation bodies are the International Standardisation Organisation (ISO) and the International Electro technical Commission (IEC).

[15] Department of Energy (DOE), 10 CFR Part 430,Energy Conservation Program for Consumer Products: Test Procedure for Kitchen Ranges, Cooktops, Ovens, and Microwave Ovens; Final Rule

- **IEC 60350** Electric cooking ranges, hobs, ovens and grills for household use – Methods for measuring performance

The performance test standard for electric hobs and grills is included in IEC 60350. This standard defines the principal performance characteristics of these appliances and describes the standard methods for measuring these characteristics.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM International, originally known as the American Society for Testing and Materials (ASTM), is one of the largest voluntary standard development organisations in the world. It differs from organisations such as BS, DIN and AFNOR, in that it is not a national standards body, as is ANSI in the US. Two standards are relevant in the frame of this study:

- **ASTM F1521-96** Standard Test Methods for Performance of Range Tops

This test method covers the energy consumption and cooking performance of range tops. The food service operator can use this evaluation to select a range top and understand its energy consumption. This test method is applicable to gas and electric range tops including both discreet burners and elements and hot tops. The range top can be evaluated with respect to the following (where applicable):

  - Energy input rate
  - Pilot energy consumption
  - Heat-up temperature response and temperature uniformity at minimum and maximum control settings
  - Cooking energy efficiency and production capacity
  - In order to test the efficiency of the top, the test requires the heating of 20lb (9.07 kilograms) of water of 54.4°C and to stabilize the temperature for 30 minutes.

- **ASTM F1695-03** Standard Test Method for Performance of Underfired Broilers (Grills)

This test method covers the energy consumption and cooking performance of underfired grills. The food service operator can use this evaluation to select an underfired broiler and understand its energy consumption. This test method is applicable to gas and electric underfired grill. The range top can be evaluated with respect to the following (where applicable):

  - Energy input rate
  - Temperature distribution across the broiling area
  - Preheat energy and time
  - Cooking energy efficiency and production capacity

1.3. EXISTING LEGISLATION

The aim of this section is to give an overview of existing legislation and voluntary programmes for hobs and grills included in Lot 23. Further, this subtask includes a comparative analysis of such legislation in the context of possible future Ecodesign implementing measures.

1.3.1. LEGISLATION AND AGREEMENTS AT EUROPEAN COMMUNITY LEVEL

Table 7 presents a screening to identify the most relevant EU legislation.

Table 1-7: Relevant European Community legislation identified

Scope	Legislation
Environmental Legislation	
Entire Product	Waste Electrical and Electronic Equipment Directive 2002/96/EC
	Restriction of the use of certain Hazardous Substances in electric and electronic equipment Directive 2002/95/EC
	The REACH regulation, 1907/2006 (superseding the Marketing and Use Directive regarding substance restrictions)
Energy Legislation	
Standby and off mode power consumption	Commission Regulation No 1275/2008 of 17 December 2008 (only for domestic appliances)
Legislations related to Safety	
Entire product	General Product Safety Directive 2001/95/EC
	Low Voltage Directive 2006/95/EC
	Materials and articles intended to come into contact with foodstuffs – Regulation 2004/1935/EC
	Appliances burning gaseous fuels Directive 90/396/EEC

A first screening allowed identification of the most relevant EU legislation, as presented in Table 1-7. There is no specific legislation for domestic and commercial hobs and grills in Europe. These appliances mainly use electricity or gas as fuel (except charcoal grills) and many European Directives apply to these products. They can be classified in two main categories: environmental and safety. Nevertheless, a horizontal measure on standby power consumption, which being adopted under the Ecodesign Directive, includes electric hobs. Grills are not explicitly specified but fall into the category “Other appliances for cooking and other processing of food, cleaning, and maintenance of clothes”.

- **Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)[16]**

Directive 2002/96/EC of the European Parliament and Council, 27 January 2003, on waste electrical and electronic equipment (WEEE)

The Directive applies to ten categories of electrical and electronic equipment that depend on electric currents or electromagnetic fields. It applies as well as to equipment used for the generation, transfer and measurement of currents and fields that are designed for use with a voltage rating not exceeding 1000 Volt for alternating current and 1500 Volt for direct current. Cooking appliances fall within the scope of this directive, both in Category I (Large household appliances) and Category 2 (Small household appliances).

The directive, which became effective on 13 August 2005, requires the separate collection of electrical and electronic waste. Directive 2008/34/EC, amending Directive 2002/96/EC, also encompasses the categories "cooking" in Category I, without major changes for these two categories.

- **Hazardous substances in electrical and electronic equipment 2002/95/EC**

Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)[17]

This Directive applies to the categories of electrical and electronic equipment that are covered by the WEEE directive, with the exception of Medical devices and Monitoring and control instruments. Hence, cooking appliances fall within the scope of this regulation.

The Directive requires the substitution of four heavy metals (lead, mercury, cadmium, and hexavalent chromium) and two classes of flame retardants; brominated flame retardants (polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)) in new electrical and electronic equipment put on the market from 1 July 2006. Amendments 2005/618/EC, 2005/717/EC, 2005/747/EC, 2006/122/EC, 2008/385/EC, 2009/428/EC and 2009/443/EC, provide new exemptions for applications of lead, cadmium, mercury and hexavalent chromium (some of these exemptions have subsequently expired or been deleted).

- **REACH regulation 1907/2006**

Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

REACH is a new European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances. The new law entered into force on 1 June 2007.

[16] Official Journal L 37, 13/02/2003, p. 24-39
[17] Official Journal L 37, 13/02/2003, p. 19-23

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, the innovative capability and competitiveness of the EU chemicals industry should be enhanced. The benefits of the REACH system will come gradually, as more and more substances are comprehensively tested as a result of the registration requirements of REACH and restrictions on the most hazardous substances are phased into REACH.

The REACH Regulation places greater responsibility on industry to manage the risks from chemicals and to provide safety information on the substances they put on the market. Manufacturers and importers will be required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA) in Helsinki. The Agency will act as the central point in the REACH system: it will manage the databases necessary to operate the system, co-ordinate the in-depth evaluation of suspicious chemicals and run a public database in which consumers and professionals can find hazard information.

The Regulation also calls for the progressive substitution of the most dangerous chemicals when suitable alternatives have been identified.

REACH provisions are being phased-in over 11 years. Companies can find explanations of REACH on the ECHA website, in particular in the guidance documents, and can contact national helpdesks.

- **Low Voltage Directive (LVD) 2006/95/EC**

Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits.

The Directive applies to all electrical equipment designed for use with a voltage rating[18] 50 – 1000 V ac and 75 – 1500 V dc. It requires products to have protection against hazards that could arise from within the product itself or from external influences. All risks arising from the use of electrical equipment, including mechanical, chemical, and all other risks. Noise and vibration, and ergonomic aspects, which could cause hazards, are also within the scope of the Directive.

- **Standby and off mode power consumption**

Commission regulation (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment

[18] Voltage ratings refer to the voltage of the electrical input or output, not to voltages which may appear inside the equipment.

The Directive 2005/32/EC sets ecodesign requirements by the Commission for energy-using products representing significant volumes of sales and trade, having a significant environmental impact and presenting significant potential for improvement in terms of their environmental impact without entailing excessive costs.

This Regulation establishes ecodesign requirements related to electric power consumption in no-load condition and average active efficiency of external power supplies. It sets a few specifications for the maximum Power Output for different power output categories, as well as specifications the measurements.

Conditions of equipment involving sensor-based safety functions are not included in the definition of standby, in order to prevent safety functions from being left out of equipment merely for the sake of meeting ecodesign requirements. Therefore, electricity consumption used for sensors indicating that a cooking field is hot is not taken into consideration for the calculation of the standby power consumption.

Table 1-8: Ecodesign requirements for standby and off mode electricity consumption

		January 2010	January 2013
Stand-by mode	**Reactivation function**	1.00 W	0.50 W
	Reactivation function and status display	2.00 W	1.00 W
Off mode		1.00 W	0.50 W

- **General Product Safety Directive 2001/95/EC**

Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on General Product Safety

The purpose of this Directive is to ensure that products placed on the market are safe. The GPSD 2001/95/EC is designed to protect consumers from unsafe products. These harmonized standards and essential requirements must be met for products to be placed in the European Economic Area. Some examples of products that fall under this directive include sports equipment and household products. Specifically, any product that will be used by consumers or may be used by them unintentionally must comply with this directive.

A “safe” product is defined in this Directive as any product, when used under normal circumstances, that does not contain any risk to the users or the risks are minimized that is compatible with the product’s use. The product will undergo a safety assessment, and only when the product is deemed ‘’safe’’ will it be allowed to be placed on the market in the European Economic Area. Along with this, producers must provide the necessary information on the product, warning the user of the risks associated with the product.

- **Materials and articles intended to come into contact with foodstuffs – Regulation 2004/1935/EC**

Originally Directive 89/109/EEC of 21 December 1988 on the approximation of the laws of the Member States relating to materials and articles intended to come into contact with foodstuffs. The directive has been repealed by the recent Framework Regulation 2004/1935/EC (published in the EU Official Journal on 13 November 2004).

This Regulation applies to materials and articles which, in their finished state, are intended to be brought into contact with foodstuffs or which are brought into contact with foodstuffs and are intended for that purpose, referred to as 'materials and articles'.

Covering or coating substances, such as the substances covering cheese rinds, prepared meat products or fruits, which form part of foodstuffs and may be consumed together with those foodstuffs, are not subject to this Directive.

This concerns, among other metals and alloys, products that are part of the composition of an oven and could come into contact with food.

- **Appliances burning gaseous fuels 2009/142/EC (EX-90/396/EEC)**

Originally Directive 90/396/EEC of 29 June 1990 on the approximation of the laws of the Member States relating to appliances burning gaseous fuels. Directive 2009/142/EC replaced the previous version of 1990 and entered into force following its publication on 16 December 2009 in the Official Journal.

European Council Directive 90/396/EEC ('the Gas Appliance Directive') relating to appliances burning gaseous fuels was adopted in 1990. It is based on the New Approach and contains essential requirements that an appliance must meet when it is placed on the European market. The Directive does not indicate how these requirements must be met, thus leaving flexibility to manufacturers as regards technical solutions to be adopted. This Directive addresses the category of gas hobs and grills.

1.3.2. LEGISLATION AND AGREEMENTS AT MEMBER STATE LEVEL

Currently, there is no voluntary or mandatory programme in any Member State. However, there are developments in progress in some countries such as in UK. Indeed, the Sustainable Products and Materials Programme (earlier the Market Transformation Programme, MTP) analyses the environmental impacts of domestic cooking appliances, including hobs, until 2020. The MTP compares a Business-as-Usual scenario with various improved scenarios aiming at reducing the energy consumption of this product group. Figure 1-27 shows three scenarios for energy use until 2020 for cooking appliances (hobs, ovens, microwave ovens). Three scenarios are developed:

- Business as usual
- The government target (known as P1)

- The "Earliest Best Practice" scenario (scenario representing immediate installation of the best technology available on the market).

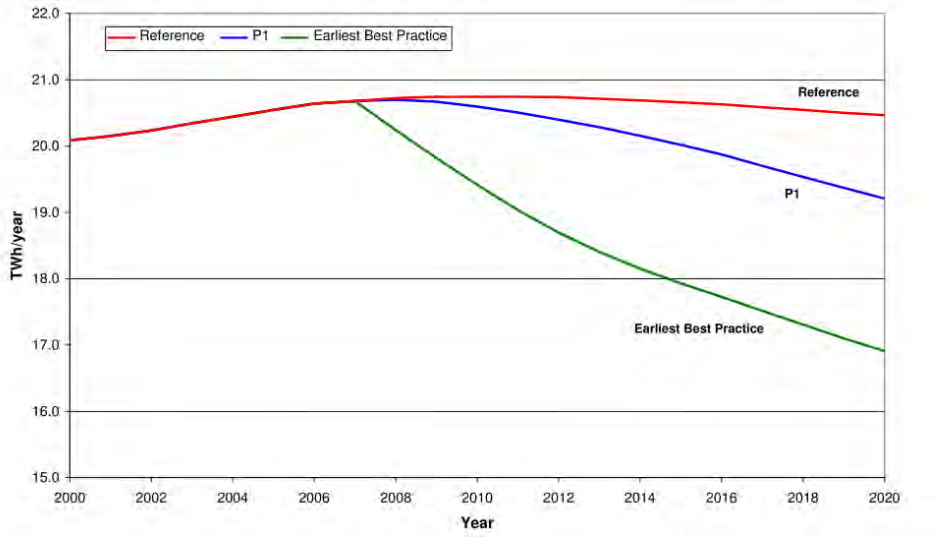

Figure 1-27: Scenarios for cooking appliances (including hobs) until 2020

1.3.3. THIRD COUNTRY LEGISLATION

Most of the third country legislation identified are mandatory Minimum Efficiency Performance Standards (MEPS). The aim of MEPS is to remove the least efficient appliances from the market. Specific test standards for energy consumption measurement are sometimes imposed in these MEPS. A screening allowing identification of the most relevant legislation is presented in Table 1-9.

Table 1-9: Overview of MEPS, labels and test standards by country for hobs or grills

Economy	Minimum Standard	Labelling	National Test Standard	Reference Test Standard
Australia	U		AS 1549-1983	
Brazil	Ym	Ym		
Canada	Ym	Ym	CAN/CSA-C 358-95	
China	Ym	Ym	GB 4706.22	
Costa Rica	Ym	Ym		
Japan		Yv		
Russia	Yv	U	GOST 14919-83 GOST R 51388-99	
USA	Yv	Yv	10 CFR Part 430 Subpart B App I	IEC 60705
California		Ym	Appliance Efficiency Regulations	
International	Yv	Yv		ASTM F1521-96 ASTM F1695-03

Yv = Yes, voluntary; **Ym** = Yes, mandatory; **U** = under consideration

➢ **Brazil**

In Brazil, energy labelling is already implemented in a voluntary or mandatory mode for gas cooking appliances. The cooking table burner individual efficiency is defined as:

*Efficiency ηi(%)= 100 * (measured heat absorbed by the water in a standard pan) / (thermal energy theoretically available to be transferred to water on the gas fuel burn due to its Calorific Power).*

The cooking table efficiency index is defined as:

η (%)= Σ ηi(%) / number of burners

To be granted the CONPET A-label, the efficiency should be above 62%. The current energy thresholds are presented in Figure 1-28. The categories are regularly revised in order to keep challenging the manufacturers. The category F and G have not been authorised for manufacture since 2008.

Cooking Table Burners Mean Efficiency η (%)	Label Classification Levels	Energy Efficiency
≥ 62.0	A	More Efficient
≥ 60.0	B	
≥ 58.0	C	
≥ 56.0	D	
≥ 52.0 *	E	Less Efficient

Figure 1-28: Energy labels for table burners according to gas consumption.

➢ **Canada**

Canada has mandatory Minimum Energy Performance Standard (MEPS) applied to household ranges that are:

- free-standing appliances equipped with one or more surface elements and one or more ovens
- built-in appliances equipped with one or more surface elements and one or more ovens
- built-in appliances equipped with one or more ovens and no surface elements
- wall-mounted appliances equipped with one or more ovens and no surface elements
- counter-mounted appliances equipped with one or more surface elements and no ovens

Canadian MEPS do not cover the following:

- appliances designed for an electrical supply of 120 volts
- household appliances with one or more tungsten-halogen heating elements

The Canadian MEPS are as shown in Table 1-10.

Table 1-10: Canadian MEPS for ovens and ranges

Product category	Maximum E (1 August 2003)
Ranges: Free-standing or built-in ranges with one or more surface elements and one or more ovens	2.0*V + 458
Ovens: Built-in or wall-mounted ranges without surface elements and with one or more ovens	2.0*V + 200

Where: V = Volume of oven in litres
E = Maximum allowable energy consumption in kWh/year

Furthermore, the EnerGuide Program for Cooktops & Ranges/Ovens was introduced in 1995. For the purposes of energy efficiency labelling, it is mandatory that the annual energy consumption value, which shall appear on the EnerGuide label for electric ranges shall be determined using the CAN/CSA-C358-95 energy performance test procedure.

➢ **China**

China set minimum allowable values of energy efficiency and energy efficiency grades for household induction cookers, as shown in Table 1-11. This mandatory programme specifies the minimum allowable values of energy efficiency, evaluating values of energy conservation, energy efficiency grades, test methods and inspection rules of household induction cookers. It applies to household induction cookers with one or multiple heating units and the rating power of one heating unit is from 700 to 2800 W. Commercial induction cooker, power frequency induction cooker and concave induction cooker are not included in the scope of this standard.

Table 1-11: The minimum allowable values of heat efficiency in China

Rated Power	Heat Efficiency (%)	Standby Energy Use (W)
> 1200W	84	5
≤ 1200W	82	

➢ **Costa Rica**

The Dirección Sectorial de Energía del Ministerio de Ambiente y Energía MINAE (Energy Department in the Ministry of Environment and Energy) is responsible for the programme. The Ministry inspectors or those from the Ministry of Economy, Industry and Commerce (MIEC) carry out the testing of products. Labels must be placed on products prior to leaving the factory or customs. Non-compliance results in a fine of 25% of the product sale price. The label displays the product's energy consumption and the required MEPS level for that appliance.

➢ **Japan**

Top Runner is a Japanese program in which energy consumption of domestic gas cooking appliances, among others, is tackled. The product on the market with the highest energy efficiency (the Top Runner) sets the standard. The Top Runner Program triggers the race for the top among manufacturers. The necessity of meeting the Top Runner Program provided the companies with an incentive to use the technologies, which they may otherwise have waited to commercialise. Top Runner is mandatory but is not a MEPS (Minimum Efficiency Performance Standard). Manufacturers and importers are under the obligation to comply with the standards by Energy Conservation Law. Enforcement within the Top Runner Program relies on "blame and shame" which works well in Japan with Japanese manufacturers and importers. Most of appliances and vehicles in Japan are provided by Japanese domestic manufacturers and importers. The following penalties are carried out for not complying with the legislation:

- Publication of the name of the company
- Fine

There is a mandatory labelling program in the frame of the Top Runner Program. The following information shall appear on the label:

- Fiscal year of the label
- Manufacturer and model
- Expected annual electricity bill with the concerned device
- Rating system

Table 1-12: Minimum energy standards for gas cooking appliances

Category				Standard energy consumption efficiency
Gas cooking appliance type	**Installation type**	**Number of burners**	**Category name**	
Gas burners	Tabletop type		A	51
	Built-in		B	48.5
Gas burners with grill	Tabletop type	Less than 2	C	56.3
		3 or more	D	52.4
	Built-in	Less than 2	E	53.0
		3 or more	F	55.6
	Cabinet/stationary type		G	49.7
Gas range			H	48.4

➢ Russia

GOST R 51388-99 (Energy conservation - Informing of consumers about energy efficiency of equipment in the residential sector - general requirements) lays down the rules for delivering the information about energy performance of domestic electric appliances to consumers. The standard determines the general requirements, the rules and amount of information to be delivered to consumers, as well as energy performance classes, indices of saved energy costs, and other parameters of appliances. Electric cooking ranges and ovens are in the list of domestic electric appliances which require a labelling scheme. Information about efficiency performance is delivered by providing an energy performance label, which contains indicators of energy efficiency and data on compliance of these indicators with requirements of respective standards. Energy Labels are assigned to the appliances for a period of three years at most. The indicators of energy performance of appliances are described in GOST R 51541-99 (Energy conservation - Energy efficiency - Composition of indicators - Basic concepts).

GOST 14919-83 sets energy performance requirements of domestic electric cooking ranges, cooking plates and cooking ovens. An average consumed power can be calculated according to a formula that includes the size, the number of cycles and the time.

➢ USA

ENERGY STAR is an international standard for energy efficient consumer products. Griddles intended for commercial use, including thermostatically controlled, gas and electric, single- and double-sided models, can receive the label.

To earn the ENERGY STAR label, griddles must meet minimum cooking energy efficiency requirements, as well as maximum idle energy rates. Cooking energy efficiency represents the amount of energy absorbed by the food product compared to the total energy used by the griddle during the cooking process. Idle energy rate represents the energy used by the griddle while it is maintaining or holding at a stabilized operating condition or temperature.

To receive the ENERGY STAR label, griddles must meet a minimum cooking efficiency of 70% (electric) and 38% (gas) while also meeting maximum idle energy rates. For comparison, standard gas griddles on average have a 32% cooking energy efficiency and use 3,200 Btu/h/ft^2 normalized idle energy rate, whereas ENERGY STAR qualified griddles must meet at least a 38% cooking energy efficiency and have a normalized idle energy rate of 2,600 Btu/h/ft^2.

Green Seal is an independent, non-profit organization that uses scientific-based standards to deliver the green seal label. Green Seal targets, among others, hobs efficiency: hobs efficiency shall be determined according to the procedure specified in the US Code of Federal Regulations.

- Electrically-operated hobs: an electrically-operated hob shall have an efficiency greater than 80%.

- Gas-operated hobs: a natural gas-operated hob shall have an efficiency greater than 40%.

➢ **California (USA)[19]**

On top of the national Program, the California Energy Commission adopted the Appliance Efficiency Regulations on October 10, 2007. The Appliance Efficiency Regulations targets both federally-regulated and non-federally-regulated appliances. The standards within these regulations apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles or other mobile equipment. Conventional range, conventional and cooking tops are included in these regulations, and the following information must be displayed:

- Type
  - Conventional range
  - Conventional cooking top
- Energy Source
  - Gas
  - electric
- Electrical Supply Cord (for gas models only)
  - Yes
  - No
- Constant Burning Pilot Light
  - Yes
  - No
- Annual Cooking Energy Consumption

1.3.4. SUMMARY OF INTERNATIONAL LEGISLATION

Table 1-13 below gives an overview of the different legislation regarding hobs and grills.

Table 1-13: Comparison of the country legislations

Economy	Year adopted	Product category	Performance criteria	Test Standard	Performance value
Brazil	2001	Gas burners and cooktops	Gas energy consumption	NBR 13723: 2003 (Part 2)	Efficiency η A: η >62 B: 60< η <62 C: 58< η <60 D: 56< η <58 E: 52< η <56
Canada	1995	Range cookers	Energy consumption (test)	CAN/CSA-C 358-03	Maximum energy: Range Cookers: E=2*V+458

[19] California Energy Commission, 2007, Appliance Efficiency Regulations

Economy	Year adopted	Product category	Performance criteria	Test Standard	Performance value
China		Induction cookers	Energy efficiency	GB 4706.29-92 , GB 4706.22-2002 , QB/T 1236-91	84% if >1200 W 82% if <1200 W
Costa Rica	1996	Hobs			
Japan	2003	Hobs/range cookers	Energy efficiency	JIS S 2103	Minimum energy efficiency requirements: • Gas burner ○ Free-standing: 51 ○ Built-in: 48.5 • Gas burner with grills(≤2 burners): ○ Free-standing: 56.3 ○ Built-in: 53 • Gas burner with grills(>3 burners): ○ Free-standing: 52.4 ○ Built-in: 55.6 • Cabinet: 49.7 • Range: 48.4
Russia	1983	Range cookers	Average consumed power(test)	GOST 14919-83 GOST R 51388-99	Total power consumed (W) no more than 3 to 9 W (depending on the dimensions and features), no more than 2 to 8 W (depending on the dimensions and features)
USA	1998	Electric hobs, smooth element (kWh) Electric hobs, coil element (kWh)	Annual energy consumption	10 CFR Part 430 Subpart B App I , IEC 60705	Efficiency (Green Seal) • 80 % for electric hobs • 40% for gas hobs
California	2007	range cooker, hob, commercial hob	Energy Source Annual Cooking Energy Consumption Energy Input Rate Cooking, Energy	ANSI/ASTM F1521-96, 10 CFR Section 430.23(i) (2005)	

Economy	Year adopted	Product category	Performance criteria	Test Standard	Performance value
			Efficiency, Test Cooking Vessel Diameter		

1.4. CONCLUSIONS TASK 1

The scope is defined in Subtask 1.1 in order to determine which appliances are covered by Lot 23, and products which have an overlap with other Lots (e.g. grill ovens could also be in Lot 22). The preliminary scope boundary for the lot 23 study is restricted to commercial and domestic hobs and grills. The scope of products investigated in this study will be further refined on the basis of Tasks 2 and 3 and will be finalised in consultation with the Commission and the stakeholders.

Most test standards related to hobs and grills deal with safety and environment. A first analysis of the existing test standards reveals that standards are lacking for commercial electric appliances. EN test standards for domestic hobs and grills will be used in the framework of this study.

Various legislations exist throughout the world but a direct comparison between these is difficult as the scope and test standards are different.