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Lot 23

Domestic and commercial hobs and grills included when incorporated in cookers

Task 8: Policy-, Scenario-, Impact- and Sensitivity Analysis

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ERA TECHNOLOGY

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8. TASK 8 –POLICY-, SCENARIO-, IMPACT- AND SENSITIVITY ANALYSIS

8.1. INTRODUCTION

This task summarises the outcomes of all previous tasks. It looks at suitable policy means to achieve the potential implementing Least Life Cycle Cost (LLCC) as a minimum and Best Available Technology (BAT) as a promotional target, using legislative or voluntary agreements, labelling and promotion. It draws up scenarios for the period 2010-2025 quantifying the improvements that can be achieved with respect to a Business-as-Usual (BAU) scenario and compares the outcomes on EU energy targets.

Besides, an estimation of the impact on consumers (purchasing power, societal costs) and industry (employment, profitability, competitiveness, investment level, etc.) is also presented. In addition, an analysis of which significant impacts may have to be measured under possible implementing measures and what measurement methods would need to be developed or adapted is provided. Finally, a sensitivity analysis of the main parameters is performed to ensure the robustness of the outcomes.

Note that the policy recommendations provided are the opinions of the consultants and do not reflect the views of the European Commission.

8.2. POLICY ANALYSIS

Scope

The policy analysis identifies potential policy options considering the outcomes of all previous tasks. Such options would notably:

- Be based on the exact definition of the product, according to Task 1 and modified/ confirmed by the other tasks;
- Provide ecodesign requirements, such as minimum (or maximum) requirements.
- Be complemented, where appropriate, with labelling and benchmark categories linked to possible incentives, relating to public procurement or direct and indirect fiscal instruments;
- Where appropriate, apply existing standards or propose needs/generic requirements for harmonized standards to be developed;
- Provide measurement requirements, including test standards and/or methods;

- Consider possible self-regulation, such as voluntary agreement or sectoral benchmarks initiatives;
- Provide requirements on installation of the product or on user information.

This task will also provide a simple tool (e.g. in Excel), allowing estimates of the impacts on different scenarios.

Differentiation between the domestic and commercial sectors

Similar to the previous tasks, analyses and outcomes will be separately presented for the domestic and commercial sectors.

The domestic sector includes hobs and grills that are primarily meant to be used by households. It is part of the Business-to-Customer market.

The commercial sector includes hobs and grills that are meant to heat or cook product for customers such as in restaurants, hotels, catering facilities, etc. It is part of the Business-to Business market.

Caveat

In this section 8.2, some of the options considered require the conversion of electricity into primary energy. For that purpose, the factor used is the one mentioned in Annex II of the Energy Service Directive, reflecting the estimated 40 % average EU generation efficiency (2.5), which is also used in the current version of the working documents concerning DG ENER Lot 1 on boilers. However, the use of this factor remains a sensitive issue as it could be wrongly perceived as a locked value, based on precedence with Lot 1, although it should be reassessed when renewable shares within the electricity generation vary. Please note that all other primary energy consumption presented in this study were calculated using the EcoReport tool, required by the European Commission to undertake the cost and environmental impact analysis in Ecodesign preparatory studies. Consequently, for primary energy consumptions presented in Task 5, Task 7 and in the other sections of Task 8, 1 kWh of electricity was converted into 10.5 MJ of primary energy (conversion factor: 2.917).

8.2.1. Domestic sector

8.2.1.1. Proposed exact product definitions and scope for policy measures

Suitable definitions proposed in existing standards or used in some voluntary or mandatory programmes are reminded for the product categories within the scope of ENER Lot 23.

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 where pans are placed for heating.
- A grill is defined as an appliance or part of an appliance in which food is cooked by radiant or contact heat.

8.2.1.2. Generic ecodesign requirements

Generic ecodesign requirements for hobs and grills would enable the customer to know more about the products on the market, in order to allow easier comparison and foster a sustainable behaviour. Instruction booklets are to provide specific information and tips on how to minimise the energy consumption of the domestic cooking hobs/grills, in a very consumer friendly approach. That includes:

- Using a lid, with the comparative (with or without lid) energy consumptions of a heating-up phase and/or a simmering phase for key meals
- Decreasing/Turning off the power when anticipating the end of the cooking process, to avoid residual overheating
- Making sure that the cooking appliance is turned-off after each usage (and not just set to a simmering level)
- Avoiding preheating when possible
- Reducing the amount of water in the pot as it is possible to cook pasta, eggs, potatoes, vegetables etc. in a limited amount of water.
- Matching the diameter of the pan and the hob surface (for hobs only)
- Informing on retained heating techniques. Indeed, retained heat cooking enables energy savings as the food that is heated up and simmered for a few minutes is then removed from the stove and tightly placed in an insulated box or other insulated container where the cooking process continues without consuming energy.
- Informing on the properties / impacts of the cookware type (for hobs only)
- Informing on the existence and usefulness of pot and cooking sensors

This soft measure would significantly contribute to energy savings as consumer behaviour has a significant impact on the energy performance of these products as presented in Tasks 3 and 7.

8.2.1.3. Need for the development of harmonised test standards

Standards, levels and measurement methods are necessary to enable MEPS to be set. To date, there are no officially and widely used energy standards in place in the EU for the product categories in the scope of the study. Discussions are currently ongoing at the EU level within CECED and CENELEC Technical Committee 59X with regard to domestic electric hobs.

The measurement procedure principle, according to the Draft of CENELEC/TC59X/WG10 is based on a cooking process of a water load, which includes a heating-up phase but also a simmering phase of a fixed duration of 20min (see Figure 8-1). It defines a reference pot size and a water quantity. The energy consumption for the whole hob is determined by the average of the energy consumption of all cooking zones normalized per kg of water. CEN/TC49/WG2 is also drafting the equivalent methods for gas hobs, with the difficulty of using the same settings/ parameters.

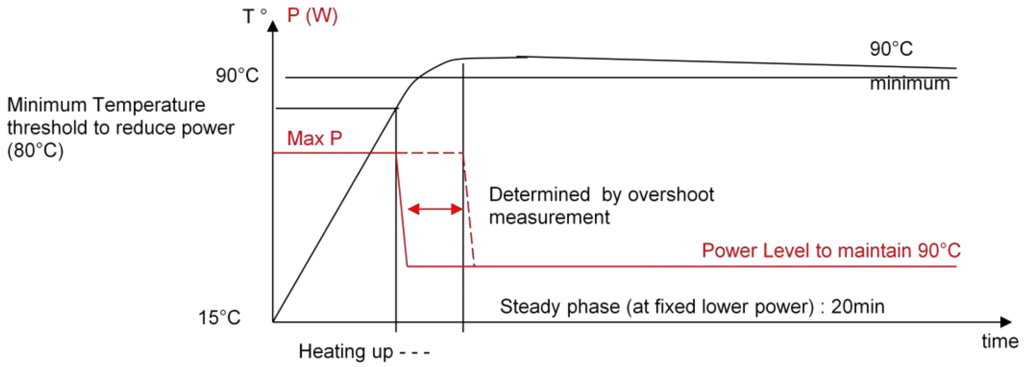


Figure 8-1: Characterisation of a cooking cycle to be considered in the pending test standard (source CECED)

8.2.1.4. Specific ecodesign requirements: Minimum Energy Performance Standards (MEPS)

MEPS requirements are a relevant option to push the market towards more efficient appliances and to remove the least efficient appliances. Indicative levels are suggested in this section, based on those developed on a mandatory or voluntary basis in various countries inside or outside the European Union, and on the energy performance of existing products (based on the outcomes of Task 5) and BAT models (based on outcomes of Tasks 6 and 7).

MEPS can only be defined after the elaboration of a European standard for measuring the energy consumption of hobs and grills. Because of the current lack of harmonised data on product performance (even if draft standards are currently elaborated by CENELEC/TC59X/WG10 and CEN/TC49/WG2 for domestic hobs), these levels should be considered with caution and discussed again once harmonised tests and measurements have been defined. Besides, as the tolerances of the draft method are currently assessed to around ±5-10 % per cooking zone, it is expected that overall uncertainties when measuring the energy consumption for the whole hob would be even higher. As EU averages were used to carry out the environmental and economic analysis, the results might not be representative for all situations. Finally, as a further delay will apply before standards can be finalised, the market will have continued to evolve and more ambitious targets might be appropriate when MEPS levels are decided.

It is useful to think of MEPS in terms of “Tier 1” and “Tier 2” requirements. “Tier 1” would apply from 2014 onwards. “Tier 2” would apply from 2018 onwards. By that time, new technologies may become available. The advantage of defining "Tier 2" now would give a clear signal regarding the direction in which the market should be heading.

The table below summarises the performance levels that could be suggested as MEPS for domestic hobs, in terms of maximum energy consumption per cooking cycle or per year (considering 1.2 use per day, 365 days per year). Using the "per cycle"' value appears to be appropriate as the test standard seems to be reasonably typical but informing on the energy consumption per year would enable the end-users to better assess their annual costs. The values correspond to the improvement options/scenarios in Task 7, which are based on average EU parameters.

Table 8-1: Proposals for MEPS by product category (kWh final energy consumption per cooking cycle and per year)

		Base-Case	Tier 1 (2014)	Tier 2 (2018)
Domestic electric hob	kWh/cycle	0.55	0.55	-
	kWh/year	240	240	-
Domestic gas hob	kWh/cycle	0.750	0.716	-
	kWh/year	330	313.5	-

These MEPS are based on the analysis performed in Task 7 and the identification of the improvement options (or their combinations) leading to the LLCC (Least Life Cycle Cost) option. However, any manufacturer is free to use any technology to achieve these MEPS:

- For domestic electric hobs: the base-case product is the LLCC. Thus, it is proposed to adopt such a performance level for Tier 1. No Tier 2 requirement is currently foreseen.
- For domestic gas hobs: the LLCC product is the Option 5 "High efficient gas sealed burners with single outlet progressive gas valve". Thus, it is proposed to adopt such a performance level for Tier 1, leading to a 5% improvement. No Tier 2 requirement is currently foreseen.

Due to the variety of domestic grills and the lack of appropriate test standards, no MEPS are currently recommended for such cooking appliances.

8.2.1.5. Specific ecodesign requirements: Policy recommendations for energy labelling

This section considers how energy labelling can promote the manufacture and purchase of efficient hobs. Similar to MEPS, energy labelling for domestic grills is currently not considered relevant (due to the diverse panel of products and no related energy test standards) and is therefore not further discussed.

Currently, there is no mandatory energy label for domestic hobs. According to the technical analysis of the current products (Task 4) and of the Best Available products (Task 6), there is room for improvement, and an energy label would reduce the EU energy consumption.

An energy labelling scheme would complement minimum requirements by incentivising a voluntary shift in the market.

Energy labels can have different objectives:

- Directly promote the energy efficiency of the cooking appliance and give more visibility to environmental and energy concerns in order to encourage sustainable consumption and production patterns.
- Enable the consumer to clearly understand the energy consumption of the appliance, have thereby an indication of the induced costs and finally provide more decisive factors during the purchasing decision process. An overly complex label would confuse consumers, who may then not take it into account. In order to be effective, information must be clear and concise, implying also some simplifications and omissions.

A labelling scheme needs to be based on harmonised standards and definitions and so these would need to be developed first before it could be put in place. For setting thresholds for energy classes, the calculations will need to be made again using a database with information on energy consumption and operating modes for the relevant product categories.

In the future, CECED may be able to provide such a database for hobs manufactured by its members (The approval process for the measurement method for the whole hob has already been started and it is expected to be finalised in the first half of 2012). The classes would then need to be specified and adjusted every few years as appliances become more efficient in order to maintain the incentive. However, at this stage of the study, CECED is unable to provide a comprehensive database and early measurements based on the draft test standard show little differentiation (15%) in the energy consumption of electric hobs, considering induction, radiant or solid plates. Therefore, it is currently not possible to define an energy scale giving the panel of products and the related uncertainties.

However, once the test standard further validated, some energy scaling and labelling could be further envisaged. But some issues on the most appropriate labelling approach can be already expected. That concerns:

- Whether electricity and gas appliances should fall under a common label or not (and which energy unit (final and or primary) should be explicitly indicated).
- Which energy consumption rate (estimated annual energy consumption or consumption per cycle) is to be used for the energy class determination.
- How to take into account the potential benefits of sensors into the label.

- How to address mixed hobs.

How to address the energy source in the label

- Common approach

A common label for gas or electric cooking appliances based on primary energy for ranking seems a feasible option, if a common test standard is to be established. As previously presented, the pending test standard for electric hobs is based on a cooking process of a water load, including heating-up phase + simmering phase (20min). The corresponding protocol for gas hobs is also in preparation with possible different settings (to optimise the energy consumption, different types and sizes of pan would be used). A common methodology would then also depend on the manufacturers' cooperation but some harmonisation work seems technically possible - although it is not currently implemented. Very similar test protocols for gas and electric hobs for which equivalence is well-accepted may also be envisaged. Given this harmonisation work, it may also require more time than for a separate labelling to ensure an effective implementation.

It would provide accurate information to compare environmental impacts of products whatever the energy used, with a well-to-wheel approach and thereby promote the appliances which are the most "primary energy efficient", which are in fact gas hobs in most of the time. It would require the conversion of electricity into primary energy, using a conversion factor currently assessed to 2.5, as mentioned in Annex II of the Energy Service Directive, reflecting the estimated 40 % average EU generation efficiency. . It is likely that the effectiveness of this common labelling could potentially contribute to reverse the current trend towards more and more electric hobs. That may not be in perfect line with the EU Roadmap for moving to a competitive low carbon economy, which forecasts a more carbon-neutral renewable electricity. Besides, the risk with such common labelling is that there is no incentive for gas hobs to perform better in terms of efficiency as they would already be highly classed compared to electric ones. Furthermore, amongst a specific energy source less differentiation would be possible - That is actually already an issue for electric hobs, based on the preliminary results of the draft test standard (as stated earlier). Therefore, it is difficult to predict if common energy classes would bring about more primary energy savings at EU level than separate ones.

As observed for ovens, the primary purchase criterion for consumers is likely to be the energy source. Energy performance - to a greater extent than energy consumption - would be considered as being of "high importance", but at the same level than size or design. Thus, an energy-friendly consumer that wishes to buy an electric hob may be slightly confused not to find any electric hobs from top energy classes, although it is only due to intrinsic technical limitations of electric devices.

In order to provide guidance to the consumers in terms of related operating costs, additional information can be given on the label, such as indicative annual consumptions of gas and electricity in billing units (i.e. kWh/year for electricity, kWh (GCV)/year or m^3/year for gas). Figure 8-2 presents an example of what a common label would look like. However, there will be no obvious link between the energy class and the energy consumption figures displayed, which can be considered as inconsistent for the consumers.

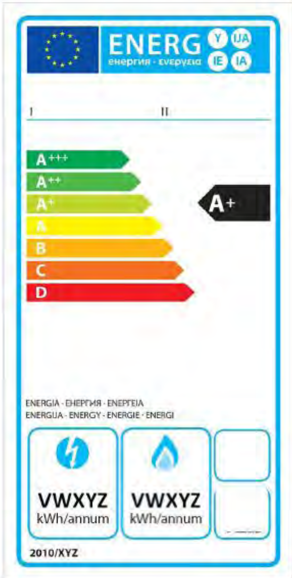


Figure 8-2: Example of a common label for domestic hobs

- Separated Approach

Separate energy classes for gas and electric hobs would be more adapted to independently foster further improvements for each type.

Energy classes could be determined based on final energy consumptions and expressed in billing units, in order to enable consumers to evaluate their annual running costs. Converting energy consumption into costs is a way to compare energy sources, although not optimal. As shown in Tasks 5 and 7, gas hobs are less expensive to run than electric ones. However, this information does not enable a direct comparison as it is likely that an average consumer is not aware of the price per unit (e.g. kWh) of gas and electricity.

Informing the consumer about primary energy consumption in MJ, in addition to the annual final energy consumption in kWh is a possible solution. However, the distinction between primary and final energy is a concept with which the general public is unfamiliar.

With separated labels, the differentiation between energy classes would be more challenging as current results with the draft test standard for electric hobs show little variation. There is a risk to introduce thin energy classes with a non-negligible uncertainty.

The setting of an energy label for domestic hobs depends on the establishment of reliable test standards. The question between a common or separate approach will surely be raised earlier / at the same time with domestic ovens. It will be necessary to ensure consistency in the respective approaches in order to not create any regulatory confusion when addressing the case of cookers which integrate both ovens and hobs.

- **Which energy consumption (annual or per cycle) to use for the energy class determination**

The energy class is the main information on an energy label. For the current label for electric ovens, the energy class is attributed according to the energy consumption measured by the test standard EN 50304/60350:2009, and only consumption for a typical cooking cycle is displayed. However, for many new energy labels, the annual energy consumption is used, taking into account not only the energy consumption in active mode, but also for the other minor modes, such as potential standby or left-on modes. Those 2 options also apply for the domestic hobs.

For a hob, most of the energy is consumed during the cooking cycles. As assessed in the consumer behaviour analysis in Task 3, domestic hobs are used 1.2 times a day in average. Therefore, it is likely that a similar ranking would be obtained by considering the annual energy consumption or the energy consumption per cycle, as the standby consumption would have a very limited impact on lot 23 domestic appliances. From a consumer point of view, the annual energy consumption is interesting information to have, as it can be used to calculate the annual running costs. This would help them estimating the payback time of their purchase. However, such estimation could be misleading as it directly depends on the average frequency which can show high variability in terms of Member States and population categories.

- **How to take into account the potential benefits of sensors into the label**

In order to help promoting the hobs which include pot and/or cooking sensors, an adjustment on the potential label classification could be recommended. Indeed, as the impact of sensors cannot be directly measured within a test standard, the related benefits could be translated into a class upgrade. Such approach is similar to what is currently established with motors. Indeed, the electric motor Regulation (640/2009) states that motors must not be less efficient than the IE3 energy efficiency but with a variable speed drive (VSD), the minimum is set to a lower IE2 efficiency. In this way, the additional feature modifies the energy requirements of the systems.

- However, as the benefits of cooking sensors will strongly depend on the consumer behaviour, the introduction of a class upgrade may still be considered unjustified to several stakeholders. If such sensor technologies designed to save energy are expected to be more common, then the test standard should be developed to reflect their use. The presence of a cooking sensor may just be stated on the label and information about the benefits of cooking sensors could be included in instruction booklets.**How to address mixed hobs**

Mixed hobs would be addressed differently depending on whether a common or separate approach is adopted.

If a common approach is foreseen, the label would then be determined as the average of the primary energy consumptions of the different cooking zones. However, such a case could be discussed in a common standard which would directly enable manufacturers to assess the energy consumption of their mixed hobs.

If a separate approach is preferred, the mixed hob would then have two labels - one for each energy source. That could lead to some confusion for the consumers, but as the pictograms representing gas and electricity should be well-differentiated, little impact on information perception is expected. However, some issues could be raised regarding the choice of the type of device (mixed vs. one type of energy) and how to better promote an energy-efficient purchase. As seen before, the separate approach prevails the situation where the consumer already knows beforehand what type of hobs that he would like to buy.

8.2.1.6. Other policy options

- **Benchmarking**

Benchmarks could also be considered, although the role of benchmarking under the Ecodesign Directive is less clear than the other measures described here. Benchmarks are non-binding for manufacturers but could also give a kick start to product innovation and development prior to any other policy options. It would also allow the evaluation of the environmental performance achieved by a new product against the best-performing products available on the EU market at the time when the Regulation is published.

Benchmarks could be specified by the European Commission in an Ecodesign Regulation based on the information provided in this study and any harmonised standards that are developed. It might be possible to implement a well-chosen and widely disseminated set of benchmark products even more quickly than energy labels.

- **Proposed policy actions related to Best Not yet Available Technology (BNAT)**

As mentioned earlier, information on BNATs was sparse to obtain from manufacturers and there is a lack of independent research, although some was identified but lacked visibility. However, it does not seem appropriate to recommend any specific policy support for R&D in this area as it would be difficult to show the additionality of such funding compared to what companies are already doing in this competitive market.

- **Green Public Procurement**

This policy option is not considered relevant to domestic hobs and grills.

8.2.2. COMMERCIAL SECTOR

8.2.2.1. PROPOSED EXACT PRODUCT DEFINITIONS AND SCOPE FOR POLICY MEASURES

"Best" definitions proposed in existing standards or used in some voluntary or mandatory programmes will be included for all product categories within the scope of ENER Lot 23.For the commercial sector, a hob remains 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 where pans are placed for heating.

For commercial grills / fry-tops, the Energy Star label (US) is slightly more specific and defines them as appliances designed for cooking food in oil or its own juices by direct contact with either a flat, smooth, hot surface (e.g., polished steel or chrome plate) or a hot channelled cooking surface (e.g., polished steel or chrome 1/2-inch grooved plate) where plate temperature is thermostatically controlled.

8.2.2.2. GENERIC ECODESIGN REQUIREMENTS

Generic ecodesign requirements for commercial hobs and grills would enable the end-users to know more about the available product, in order to allow easier comparison and foster a sustainable behaviour. Instruction and technical booklets are to provide specific information and tips to minimise the energy consumption of the commercial cooking hobs/grills. That includes:

- Use of a lid, with the comparison of energy consumption
- Decrease of the power when anticipating the end of the cooking process, to avoid residual overheating
- Ensure the switch-off of the cooking appliance at the end of a service
- Avoid preheating when possible
- Match the diameter of the pan and the hob surface (for hobs only)
- Inform on the properties / impacts of the cookware type (for hobs only)
- Inform on the existence and usefulness of pot and cooking sensors

This soft measure would significantly contribute to energy savings. It is important to ensure that end-users are exposed to such information. In a commercial setting, there is a risk that numerous users are not directly involved in the purchasing of a product and therefore are unlikely to review the instructions. To address this issue, professional training sessions could be organised in order to further educate professionals during practical situations.

Information about commercial hobs and grills is usually provided by manufacturers through a technical sheet, describing different parameters such as power requirements or external dimensions. Once a European standard for measuring the energy efficiency of commercial appliances is available, it would be possible to make compulsory for manufacturers to inform users about how much energy their product is consuming according to this standard.

8.2.2.1. NEED FOR THE DEVELOPMENT OF HARMONISED TEST STANDARDS

Standards, levels and measurement methods are necessary to enable Minimum Energy Performance Standards. To date, there are no officially and widely used energy standards in place in the EU for the product categories in the scope of the study. Discussions are currently ongoing at the EU level within the European Federation of Catering Equipment Manufacturers (EFCEM).

The proposed specific ecodesign requirements should be taken with caution and as a signal to the industry. Any effective implementation of policy options should wait until the test standards are available and the levels of performance of current products are thoroughly analysed.

8.2.2.2. SPECIFIC ECODESIGN REQUIREMENTS: MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS)

MEPS requirements are a relevant option to push the market towards more efficient appliances and to remove the least efficient appliances. Indicative levels are suggested in this section, based on those developed on a mandatory or voluntary basis in various countries inside or outside the European Union, and on the energy performance of existing products (based on the outcomes of Task 5) and BAT models (based on outcomes of Tasks 6 and 7).

MEPS can only be defined after the elaboration of a European standard for measuring the energy consumption of hobs and grills. Because of the current lack of harmonised data on product performance (even if a draft standard is currently elaborated by European Federation of Catering Equipment Manufacturers (EFCEM)), these levels should be considered with caution and discussed again once harmonised tests and measurements have been defined. As EU averages were used to carry out the environmental and economic analysis, the results might not be representative for all situations. Finally, as a further delay will apply before standards can be finalised, the market will have continued to evolve and more ambitious targets might be appropriate when MEPS levels are decided.

It is usually useful to think of MEPS in terms of “Tier 1” and “Tier 2” requirements. “Tier 1” would apply from 2014 onwards and “Tier 2” would apply from 2018 onwards. By that time, new technologies may become available. For lot 23 commercial appliances, Tiers 2 requirements are actually not systematically relevant as explained later in this section.

The table below summarises the performance levels that could be suggested as MEPS for domestic hobs, in terms of maximum energy consumption per year (considering 4 equivalent hours of full power per day, 6 days a week). The values correspond to the improvement options/scenarios in Task 7, which are based on average EU parameters.

Table 8-2: Proposals for MEPS by product category (kWh final energy consumption per year)

	Base-Case	Tier 1 (2014)	Tier 2 (2018)
Commercial electric hob	20,000	19,000	-
Commercial gas hob	35,000	33,250	31,500
Commercial electric grill	8,200	7,380	6,724
Commercial gas grill	12,500	11,250	8,375

These MEPS are based on the analysis performed in Task 7 and the identification of the improvement options (or their combinations) leading to the LLCC (Least Life Cycle Cost) option. This preliminary approach should be considered with caution. However, any manufacturer is free to use any technology to achieve these MEPS:

- For commercial electric hobs: the LLCC is Option 2 "Thermal insulation" when considering a user-independent scenario. It is proposed to adopt such a performance level for Tier 1 as such an improvement compared to the Base-case (5%) seems reasonable to avoid asking too much efforts from manufacturers in a short delay. No "Tier 2" is currently foreseen for such products, as any recommendations beyond the LLCC may economically challenge the consumers.
- For commercial gas hobs: the LLCC is Scenario C "Electronic Ignition and wider output range" when considering a user-independent scenario. It is proposed to adopt such a performance level for Tier 2. A less stringent Tier 1 requirement, corresponding to a 5% improvement compared to the Base-case is suggested as a mid-term target.
- For commercial electric grills: the LLCC is Scenario A "Zone isolation and Thermal insulation" when considering a user-independent scenario. It is proposed to adopt such a performance level for Tier 2. A less stringent Tier 1 requirement, corresponding to a 10% improvement compared to the Base-case is suggested as a mid-term target.
- For commercial gas grills: the LLCC is Scenario A "Zone isolation, Thermal insulation, electronic ignition and improved air control" when considering a user-independent scenario. It is proposed to adopt such a performance level for Tier 2. A less stringent Tier 1 requirement, corresponding to a 10% improvement compared to the Base-case is suggested as a mid-term target.

8.2.2.3. Specific ecodesign requirements: Policy recommendations for energy labelling

Given the fragmented market and the relatively low market sales at EU level, it is currently not considered relevant to create an energy labelling for commercial hobs and grills.

8.2.2.4. Other policy options

- **Benchmarking**

More than energy labelling, benchmarks could be more relevant for commercial cooking appliances - especially as a short-term tool, although the role of benchmarking under the Ecodesign Directive is less clear than the other measures described here. Benchmarks are non-binding for manufacturers but would allow the evaluation of the environmental performance achieved by a new product against the best-performing products available on the EU market and it would thereby also contribute to a better characterisation of the EU commercial market, which would be useful to build-on Task 2 findings.

Benchmarks could be specified by the European Commission in an Ecodesign Regulation based on the information provided in this study and any harmonised standards that are developed. It might be possible to implement a well-chosen and widely disseminated set of benchmark products.

- **Green Public Procurement (GPP)**

Public procurement accounts for a large share of EU GDP and has a key role to play in market transformation by favouring products with the least environmental impact. In the context of this study, an appropriate approach might be to consider putting in place more ambitious requirements for public procurement than the ones put in place for the rest of the market. As the MEPS already consider the implementation of BAT levels from 2014 (considering a user-independent perspective), it is here suggested to require the use of pot and/or cooking sensors in order to target energy consumption induced by non-optimised user behaviour, without setting any further energy requirements. This is particularly relevant in the public sector where the end-user is usually not aware the related operating costs as they do not deal with the accounting tasks. Thus, all public buildings (e.g. hospitals, schools, etc.) could help drive the market towards more efficient appliances, as they represent a significant share of the markets concerned. However, there is a risk that such GPP requirements introduce some market competition issues as large suppliers are more likely to be able to adjust their product catalogues to the public/private sectors, compared to small manufacturers.

With such measures, the BAT scenarios (including sensors) presented in section 8.3.2.2 can be used as an indicative reference to evaluate maximum energy savings.

According to the statistics on restaurant industry presented in section 2.2.2.2 of Task 2, around 40% of the meals served in restaurants in EU are served in institutional restaurants. In public contracted catering, the equipment is usually owned by the institution, and only run by the contractor. As a raw estimate, the public sector could represent around 30% of the sales of commercial hobs and grills.

Based on the calculations made using the Scenario tool presented in section 8.3.2.2, this measure would save 25 PJ (primary energy) over the 2010-2025 period, which represents 2.6% of the EU primary energy consumption due to commercial hobs and grills in compliance with the MEPS (user-independent scenario). Moreover, the energy savings made would save 272 million Euros on the period 2014-2025 (2.1% of the expenditure on the same period).

8.3. SCENARIO ANALYSIS

An Excel tool was created to allow the impacts of different scenarios to be modelled (2010-2020 and 2010-2025). The tool was designed quite simply and relies on the following assumptions:

- The model is built on a discrete annual basis to match the available data.
- Annual sales growth rates over the period 2010-2025 have been reused from the market data presented in Task 2.
- Primary energy consumption was judged to be the most relevant and representative indicator to be modelled using the tool (see Task 7). The tool calculates the expenditure in euros and primary energy in GJ related to hobs and grills, under different scenarios. The primary energy results take into account the energy required over the whole lifetime (including the manufacturing, distribution and end-of-life phases), even though the use phase was identified as the main energy consuming phase in Task 5.
- Energy consumption is allocated uniformly over the lifetime of the product although in theory this is only true for the use phase. Given the low shares of other life-cycle phases in energy consumption (see Task 5), this assumption is considered reasonable in order to carry out the analysis; a more "realistic" modelling would not make a significant difference to the overall results.
- Expenditure measures the yearly value of the entire market. It consists of the money spent to buy the product (purchase price), taken into account at the time of purchase, and the operating costs (energy, maintenance and repair), which are spread over the lifetime of the machine.

In the following subsections, several scenarios are described:

- Business-as-Usual (BAU), which shows a "freeze" projection that assumes that products on the market do not include any new improvement options in future
- Least Life-Cycle Cost (LLCC) scenario, which assumes that the LLCC options for all product categories are implemented from 2014;
- Best Available Technology (BAT) scenario, which assumes that the BAT options are implemented from 2014 (ideally, that would be the medium-term target);
- An "All gas" scenario, where a complete shift to gas BAT appliances is implemented from 2014 for the electric appliances, as they appear to be more efficient (primary energy) from Tasks 5 and 7 outcomes. This scenario is

analysed with the only purpose of estimating the maximum primary energy savings that could be theoretically achieved. This does not mean that any recommendation on banning electric hobs and grills is made to the European Commission, especially if a more-renewable-electricity EU scenario is to be envisaged with the benefit of decarbonising the whole European power production.

- An "user-independent" scenario, where the implemented options are not related to the user behaviour. Hence, no pot or cooking sensors could be considered as related energy savings are more sensitive to assess as explained in Task 7.
- For the domestic sector, an extra scenario is investigated, based on the distributed market shares between radiant and induction hobs for domestic electric hobs (BC1). It will enable to address and/or validate the assumption made in Task 5, where radiant technology is chosen as the most representative for the domestic electric hobs, although the increasing share of induction hobs is acknowledged in Task 2.

The different scenarios are also compared to the BAU scenario, in order to estimate the overall potential of the improvement options. Most of the description in the sections below refers to 2025 for comparison.

8.3.1. DOMESTIC SECTOR

8.3.1.1. BAU SCENARIO

In the BAU scenario, the Base-Cases remain the only products sold on the market over the outlook period. No improvement option is introduced to the market as the full implementation of the Standby Regulation (1275/2008) from 2013 is assumed to have an insignificant impact on Lot 23 appliances. This scenario is used as a baseline in order to compare the results with other scenarios.

Figure 8-3 and Figure 8-4 show the breakdown by Base-Case of energy consumption and expenditure over the period 2010-2025. For both parameters, domestic electric hobs represent 3 times the values of domestic gas hobs.

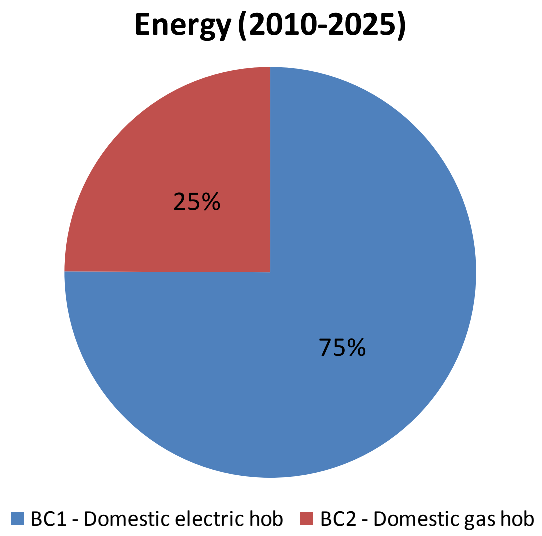


Figure 8-3: Total BAU energy consumption by Base-case, 2010-2025

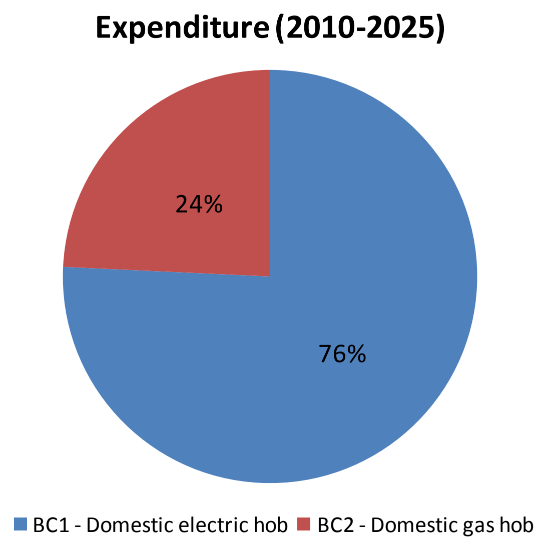


Figure 8-4: Total BAU expenditure by Base-case, 2010-2025

Table 8-3 presents the results of the scenario modelling. In 2025, the domestic hobs market would require 313 PJ of primary energy and would represent 6 650 M€. Over the period 2010-2025, total primary energy consumption would be 4 626 PJ and total expenditure would be around 99.7 €bn over the period.

Table 8-3 Market data of the scenario tool (number of units)

		BC1 - Domestic electric hob	BC2 - Domestic gas hob	Total Domestic
		2007 Base-case 1	2007 Base-case 2	
Energy (GJ/unit/year)		2,6	1,28	
Operating cost (€/year)		28	13	
Product price (€/unit)		380	268	
2007	Stock (units)	71 500 000	62 150 000	133 650 000
	Sales (units)	5 227 227	3 294 839	8 522 065
	Energy (TJ)	185 900,0	79 813,7	265 713,7
	Expenditure (m€)	3 962,0	1 704,1	5 666,1
2008	Stock (units)	72 230 000	61 575 000	133 805 000
	Sales (units)	5 322 520	3 261 972	8 584 492
	Energy (TJ)	187 798,0	79 075,3	266 873,3
	Expenditure (m€)	4 018,4	1 687,6	5 706,0
2009	Stock (units)	73 041 100	61 005 525	134 046 625
	Sales (units)	5 426 038	3 229 434	8 655 472
	Energy (TJ)	189 906,9	78 343,9	268 250,8
	Expenditure (m€)	4 080,1	1 671,4	5 751,5
2010	Stock (units)	73 940 807	60 441 521	134 382 328
	Sales (units)	5 538 252	3 197 222	8 735 474
	Energy (TJ)	192 246,1	77 619,6	269 865,7
	Expenditure (m€)	4 147,6	1 655,3	5 803,0
2011	Stock (units)	74 824 238	59 838 606	134 662 844
	Sales (units)	5 639 012	3 165 331	8 804 343
	Energy (TJ)	194 543,0	76 845,4	271 388,4
	Expenditure (m€)	4 210,3	1 638,8	5 849,1
2012	Stock (units)	75 812 192	59 241 720	135 053 912
	Sales (units)	5 747 459	3 133 760	8 881 219
	Energy (TJ)	197 111,7	76 078,8	273 190,5
	Expenditure (m€)	4 278,8	1 622,5	5 901,3
2013	Stock (units)	76 915 327	58 650 802	135 566 130
	Sales (units)	5 863 991	3 102 504	8 966 495
	Energy (TJ)	199 979,9	75 320,0	275 299,8
	Expenditure (m€)	4 353,6	1 606,3	5 959,9
2014	Stock (units)	78 145 621	58 065 794	136 211 416
	Sales (units)	5 989 037	3 071 561	9 060 598
	Energy (TJ)	203 178,6	74 568,7	277 747,3
	Expenditure (m€)	4 435,1	1 590,3	6 025,4
2015	Stock (units)	79 516 530	57 486 636	137 003 166
	Sales (units)	6 123 066	3 040 927	9 163 993
	Energy (TJ)	206 743,0	73 824,9	280 567,9
	Expenditure (m€)	4 523,9	1 574,4	6 098,3

		BC1 - Domestic electric hob	BC2 - Domestic gas hob	Total Domestic
2016	Stock (units)	80 784 488	56 913 270	137 697 758
	Sales (units)	6 221 346	2 980 272	9 201 618
	Energy (TJ)	210 039,7	73 088,6	283 128,3
	Expenditure (m€)	4 596,3	1 550,6	6 146,9
2017	Stock (units)	82 167 455	56 345 637	138 513 093
	Sales (units)	6 324 820	2 920 830	9 245 651
	Energy (TJ)	213 635,4	72 359,7	285 995,0
	Expenditure (m€)	4 673,8	1 527,1	6 201,0
2018	Stock (units)	83 676 549	55 783 681	139 460 230
	Sales (units)	6 433 697	2 862 577	9 296 274
	Energy (TJ)	217 559,0	71 638,0	289 197,0
	Expenditure (m€)	4 756,9	1 504,1	6 261,0
2019	Stock (units)	85 324 000	55 227 344	140 551 345
	Sales (units)	6 548 196	2 805 489	9 353 685
	Energy (TJ)	221 842,4	70 923,5	292 765,9
	Expenditure (m€)	4 846,0	1 481,5	6 327,4
2020	Stock (units)	87 123 269	54 676 571	141 799 839
	Sales (units)	6 668 551	2 749 543	9 418 095
	Energy (TJ)	226 520,5	70 216,2	296 736,7
	Expenditure (m€)	4 941,4	1 459,2	6 400,6
2021	Stock (units)	88 427 986	54 131 305	142 559 291
	Sales (units)	6 739 646	2 694 716	9 434 363
	Energy (TJ)	229 912,8	69 516,0	299 428,8
	Expenditure (m€)	5 004,5	1 437,3	6 441,8
2022	Stock (units)	89 849 506	53 591 492	143 440 998
	Sales (units)	6 814 027	2 640 985	9 455 012
	Energy (TJ)	233 608,7	68 822,8	302 431,5
	Expenditure (m€)	5 072,0	1 415,8	6 487,8
2023	Stock (units)	91 396 989	53 057 077	144 454 066
	Sales (units)	6 891 775	2 588 329	9 480 105
	Energy (TJ)	237 632,2	68 136,5	305 768,6
	Expenditure (m€)	5 144,3	1 394,6	6 538,9
2024	Stock (units)	93 080 327	52 528 006	145 608 333
	Sales (units)	6 972 979	2 536 726	9 509 706
	Energy (TJ)	242 008,8	67 457,0	309 465,9
	Expenditure (m€)	5 221,7	1 373,8	6 595,5
2025	Stock (units)	94 910 207	52 004 226	146 914 434
	Sales (units)	7 057 730	2 486 155	9 543 886
	Energy (TJ)	246 766,5	66 784,4	313 550,9
	Expenditure (m€)	5 304,5	1 353,3	6 657,7
2010-2025	Energy (TJ)	**3 473 328**	**1 153 200**	**4 626 528**
	Expenditure (m€)	**75 511**	**24 185**	**99 696**

8.3.1.2. LLCC Scenario

The LLCC scenario considers that the LLCC improvement option as described in Task 7 is implemented for each Base-case. From 2014 onwards, all products sold include these LLCC options and no more Base-cases are sold (the market shift takes place from one year to the next). Table 8-4 is a reminder of the LLCC options for each Base-case identified in Task 7.

Table 8-4: LLCC improvement options by Base-case

Base-case	LLCC improvement option	Description
BC1	Base-case	-
BC2	Option 5	High efficient gas sealed burners with single outlet progressive gas valve

Figure 8-5 and Figure 8-6 show the breakdown by Base-case of energy consumption and expenditure over the period 2010-2025. For both parameters, domestic electric hobs represent 3 times the values of domestic gas hobs.

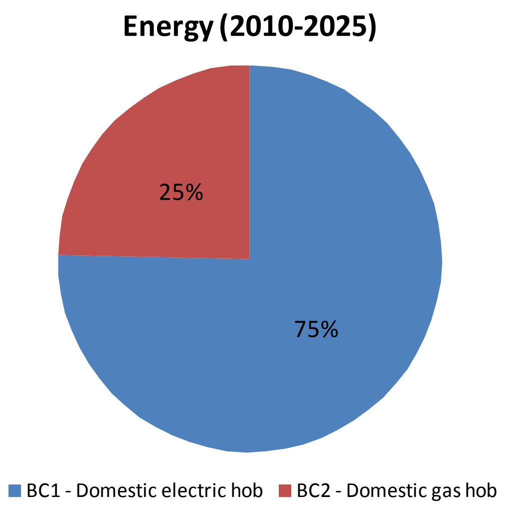


Figure 8-5: Total LLCC energy consumption by Base-case, 2010-2025

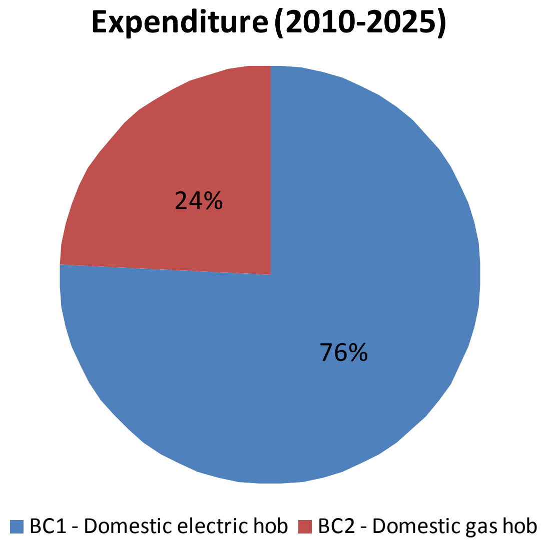


Figure 8-6: Total LLCC expenditure by Base-case, 2010-2025

In 2025, the domestic hobs market would require 312 PJ of primary energy (-0.6% compared to BAU), and would represent 6 643 M€ (-0.2% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 4 614 PJ (-0.3% compared to BAU) and total expenditure would be 99.6 €bn over the period (-0.1% compared to BAU).

8.3.1.3. BAT Scenario

The BAT scenario considers that the BAT improvement option as described in Task 7 is implemented for each Base-case. From 2014, all sold products include these BAT options and no more Base-cases are sold (the market shift takes place from one year to the next). Table 8-5 is a reminder of the BAT options for each domestic Base-case identified in Task 7.

Table 8-5: BAT improvement options by Base-case

Base-case	BAT improvement option	Description
BC1	Scenario A	Heat output accuracy, pot and cooking sensors
BC2	Scenario A	Heat output accuracy, pot and cooking sensors, independently controlled burners and high efficient gas sealed burners

Figure 8-7 and Figure 8-8 show the breakdown by Base-case of energy consumption and expenditure over the period 2010-2025. For both parameters, domestic electric hobs represent 3 times the values of domestic gas hobs.

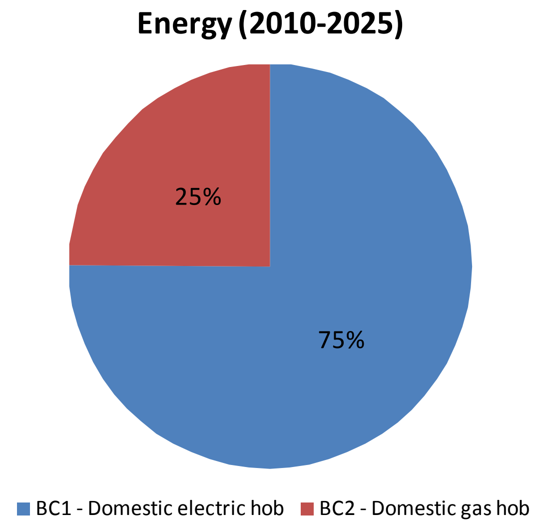


Figure 8-7: Total BAT energy consumption by Base-case, 2010-2025

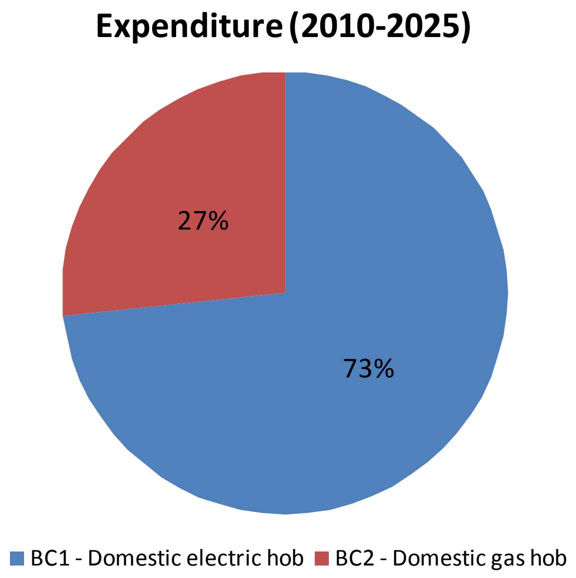


Figure 8-8: Total BAT expenditure by Base-case, 2010-2025

In 2025, the domestic hobs market would require 279 PJ of primary energy (-11% compared to BAU), and would represent 7950M€ (+19.4% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 4 421 PJ (-4.4% compared to BAU) and total expenditure would be 118 €bn over the period (+17.9% compared to BAU).

8.3.1.4. "All Gas" Scenario

The "All gas" scenario considers a full shift to gas appliances. From 2014, all products sold include the BAT option and no more Base-cases are sold (the market shift takes place from one year to the next). However, BC1 is respectively replaced by BAT improvement options which relate to BC2. Table 8-6 is a reminder of the implemented options for each Base-case identified in Task 7.

This does not mean that any recommendation on banning electric hobs is made to the European Commission, especially if a more-renewable-electricity EU scenario is to be envisaged with the benefit of decarbonising the whole European power production.

Table 8-6: "All Gas" improvement options by Base-case

Base-case	LLCC / BAT improvement option	Description
BC1	Scenario A of BC2	Heat output accuracy, pot and cooking sensors, independently controlled burners and high efficient gas sealed burners
BC2	Scenario A	Heat output accuracy, pot and cooking sensors, independently controlled burners and high efficient gas sealed burners

Figure 8-9 and Figure 8-10 show the breakdown by Base Case of energy consumption and expenditure over the period 2010-2025.

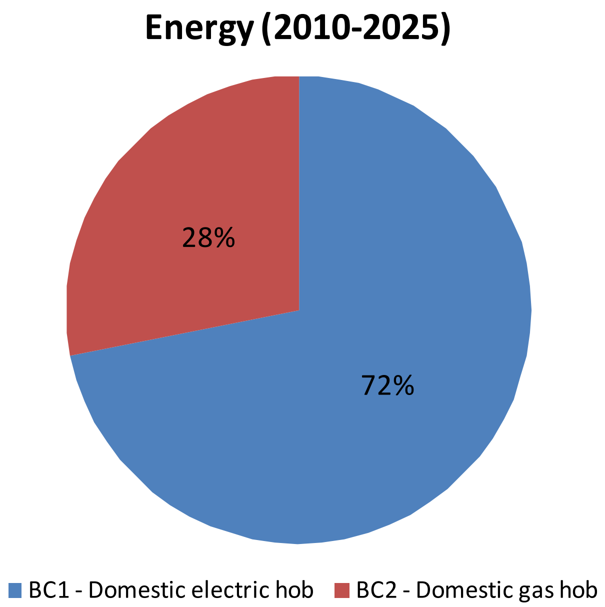


Figure 8-9: Total "All Gas" energy consumption by Base-case, 2010-2025 (BC1, still represented as electric hob, in correspondence with BAU, although it actually switches to gas)

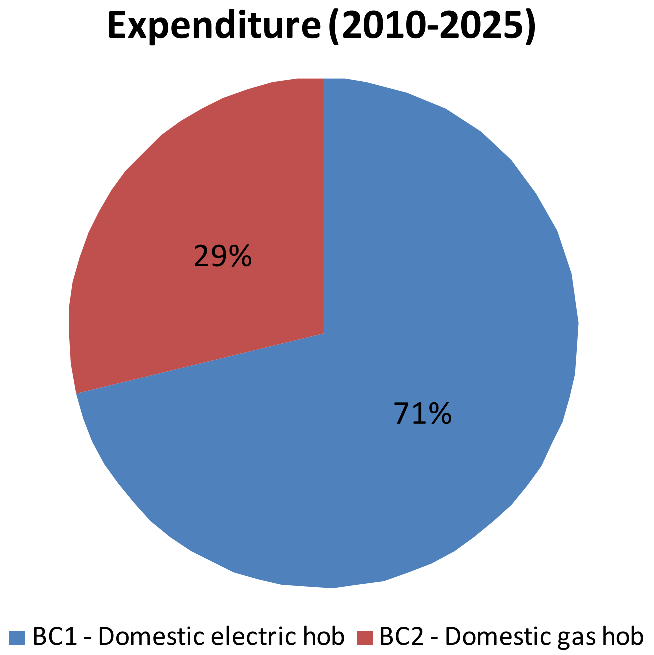


Figure 8-10: Total "All Gas" expenditure by Base-case, 2010-2025 (BC1, still represented as electric hob, in correspondence with BAU although it actually switches to gas)

In 2025, the domestic hobs market would require 192 PJ of primary energy (-38.7% compared to BAU), and would represent 6 723 M€ (+1% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 3 914 PJ (-15.4% compared to BAU) and total expenditure would be 109 €bn over the period (+9.2% compared to BAU).

8.3.1.5. “User-Independent” Scenario

The “user-independent” scenario considers the implemented options that are not related to the user behaviour. Hence, no pot or cooking sensors could be considered as related energy savings are more sensitive to assess as explained in Task 7. The updated BAT improvement option identified in Task 7 is implemented for each Base-case. From 2014, all products sold include these BAT options and no more Base Cases are sold (the market shift takes place from one year to the next).

Table 8-7: “User-independent” improvement options by Base-case

Base-case	LLCC / BAT improvement option	Description
BC1	Option 1	Heat output control accuracy
BC2	Scenario C	Heat output control accuracy, individually controlled multiple crown burners and high efficient gas sealed burners

Figure 8-11 and

Figure 8-12 show the breakdown by Base-case of energy consumption and expenditure over the period 2010-2025.

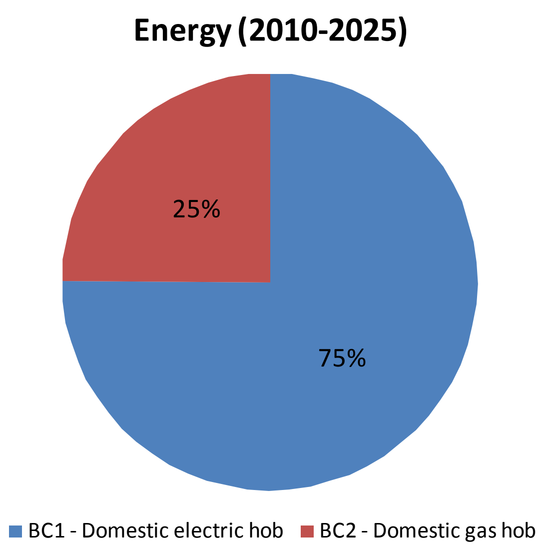


Figure 8-11: Total “user-independent” energy consumption by Base-case, 2010-2025

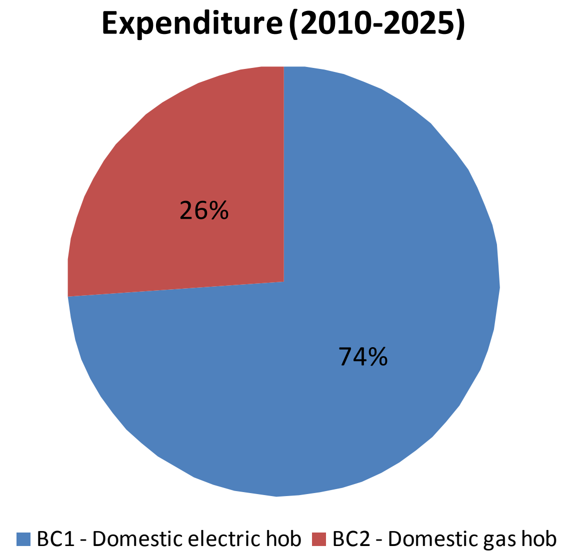


Figure 8-12: Total "user-independent" expenditure by Base-case, 2010-2025

In 2025, the domestic hobs would require 305 PJ of primary energy (-2.6% compared to BAU), and would represent 7 210 M€ (+8.3% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 4 576 PJ (-1.1% compared to BAU) and total expenditure would be 107 €bn over the period (+7.4% compared to BAU).

8.3.1.6. Potential Adjustement for BC1-BAU Scenario

In Task 2, radiant technology is identified as the most representative technology for domestic electric hobs and is therefore chosen as base-case in Task 5. However, based on stakeholders' feedback, it would actually be interesting to investigate the impacts of the increasing share of induction hobs in the market as seen in Task 2. In the paragraph, it is proposed to adjust the business-as-usual scenario of BC1 in order to better match with the reality of the hob market and check if the assumption taken in Task 5 is legitimate.

Therefore the stock / sales data provided for BC1 are differentiated for induction and radiant systems, based on the forecasts presented in Task 2. (Note that in order to simplify the approach, solid plates are still considered within the radiant data). Moreover, an adjusted Ecoreport for induction hob is also produced. Table 8-8 presents the updated inputs and outputs that are used to characterise the induction hobs. The Bill-of-Materials is considered unchanged for convenience purposes, although it is established that around 70% of the material content will actually differ based on stakeholders' feedback. However an update of the BOM would not have a significant impact as the focus is here set on energy consumption and the use phase is the main contributor.

Table 8-8: Inputs and outputs data to be used for the adjusted BAU scenario

		Base-case "radiant hob"	Base-case "induction hob"
Inputs for the Ecoreport	Annual energy consumption (kWh / year)	240	190
	Average price (€)	380	810
	Lifetime (years)	19	15
Outputs from the Ecoreport	Energy (GJ/unit/year)	2,6	2,1
	Operating cost (€/year)	27,6	23,1

The purchase price for induction refers to Task 2 outcomes. In order to model its expected decrease over the overlook period a 4% discount rate per year has been inputted in the scenario analysis.

In 2025, the adjusted BAU scenario consumes 5.7% less energy than the BAU scenario with a reduced expenditure of -1.8%. Over the 2007-2025 period, it corresponds to -3.7% less consumed energy and +4.4% of increased expenditure. Figure 8-13 and Figure 8-14 show that the BAU and the adjusted BAU follow similar trends. These results tend to confirm that the adjustment of the BAU scenario has little impact and that the use of the BAU scenario as a reference baseline and thereby the representativeness of radiant technology for domestic electric hobs are acceptable.

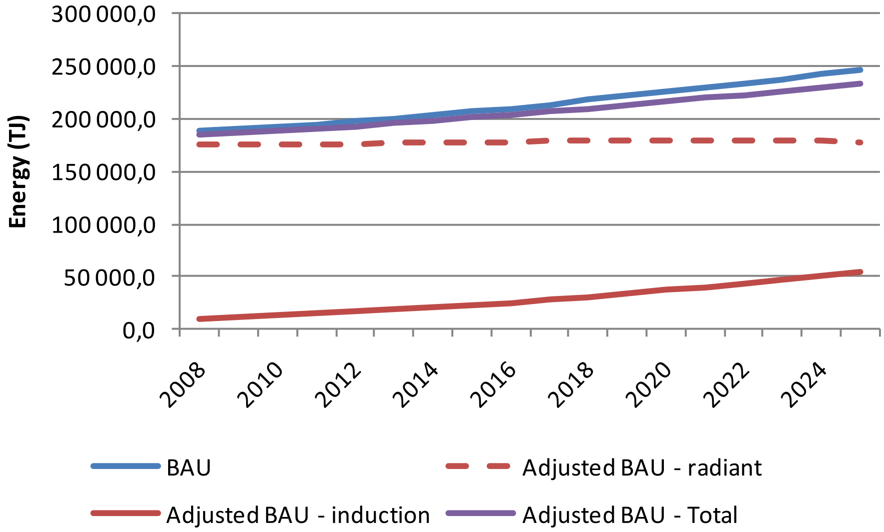


Figure 8-13: Total BAU / Adjusted BAU energy for BC1, 2010-2025

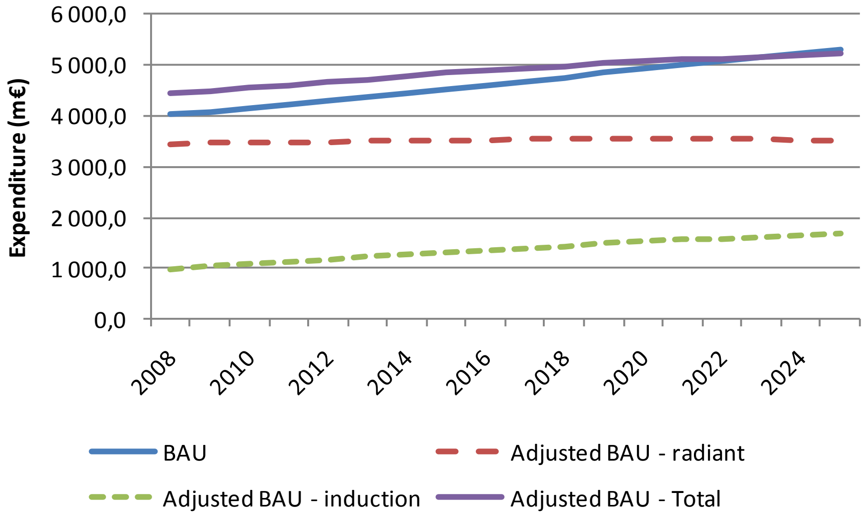


Figure 8-14: Total BAU / Adjusted BAU expenditure for BC1, 2010-2025

8.3.1.7. Comparison of the scenarios

This comparison is made in terms of electricity consumption and consumer expenditure. Figure 8-15 and Figure 8-16 show projected total primary energy consumption and expenditure between 2010 and 2025 by Base-case and according to the BAU, LLCC, BAT, All Gas, User-independent scenarios previously described.

It can be seen that the user-independent scenario is having a limited impact compared to the BAU. The graphs confirm that BAT options which include the use of sensors show more energy saving potential and that user-behaviour is indeed a major element to address energy efficiency. It should be reminded that the "All gas" scenario is set as an indicative theoretical reference. This does not mean that any recommendation on banning electric hobs and grills is made to the European Commission, especially if a more-renewable-electricity EU scenario is to be envisaged with the benefit of decarbonising the whole European power production.

Table 8-9 shows the cumulative savings in energy and in costs for the 2010-2025 period.

Table 8-9 Savings for the domestic sector, cumulative 2010-2025 compared to BAU

	Energy (PJ)	Cost (€bn)
LLCC	-12	-0.05
BAT	-205	18
All gas	-713	9.2
User-independent	-50	7.4

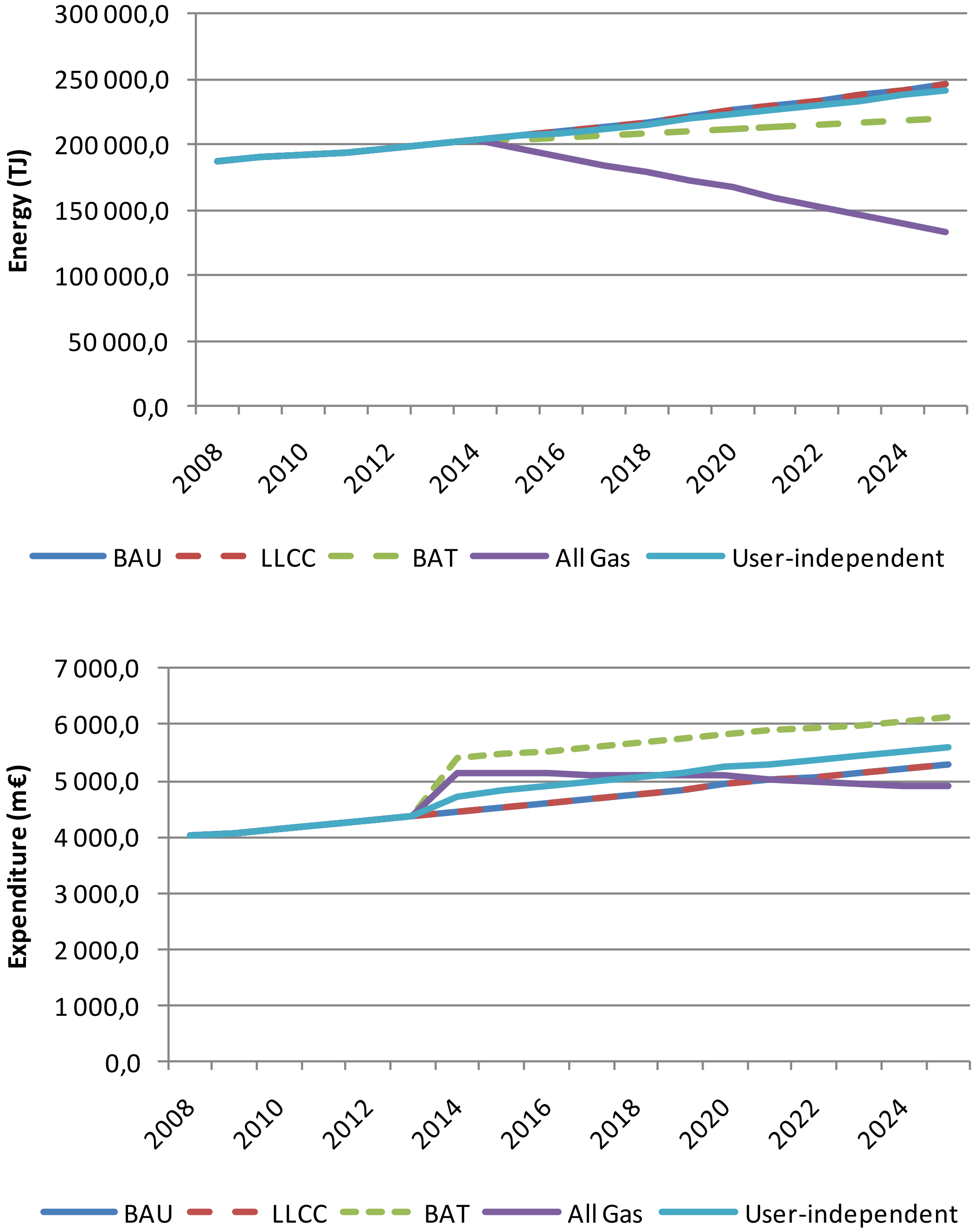
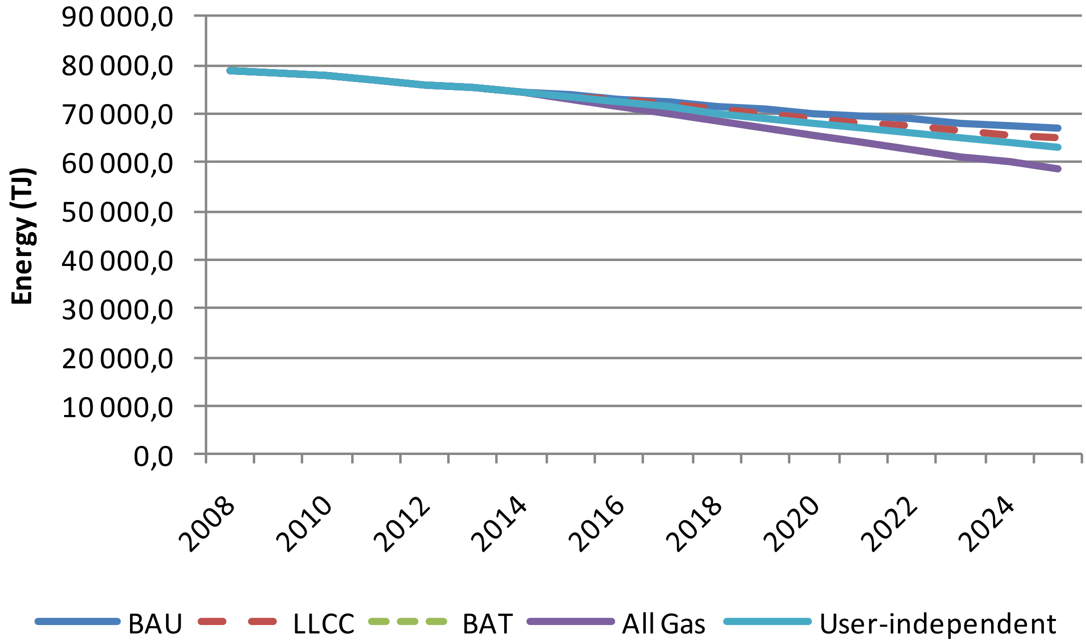


Figure 8-15: Primary energy consumption and expenditure by scenario, Base-Case 1



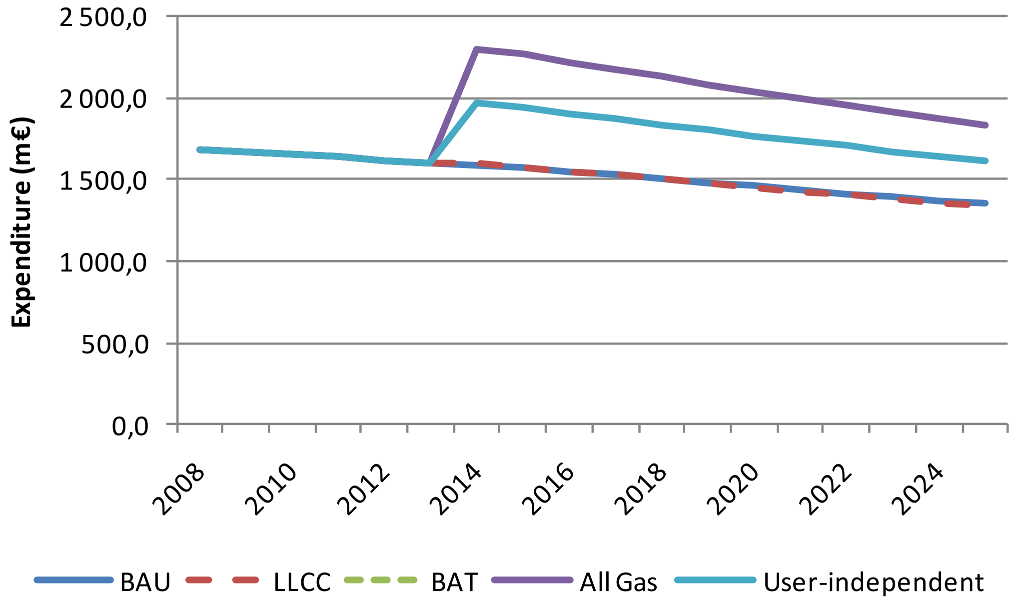
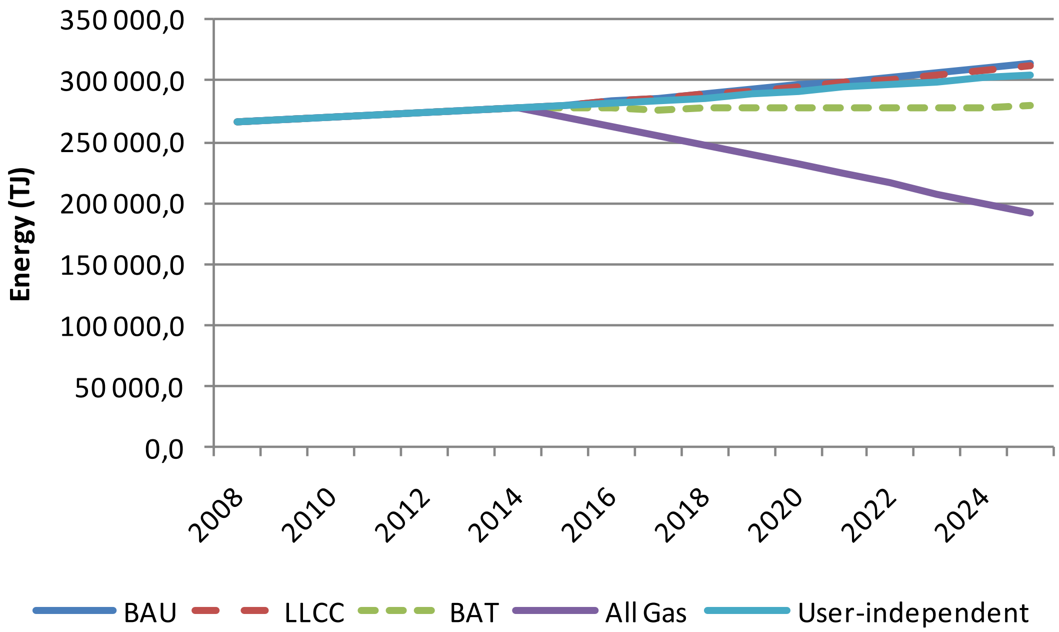


Figure 8-16: Primary energy consumption and expenditure by scenario, Base-Case 2 (BAT = All gas)



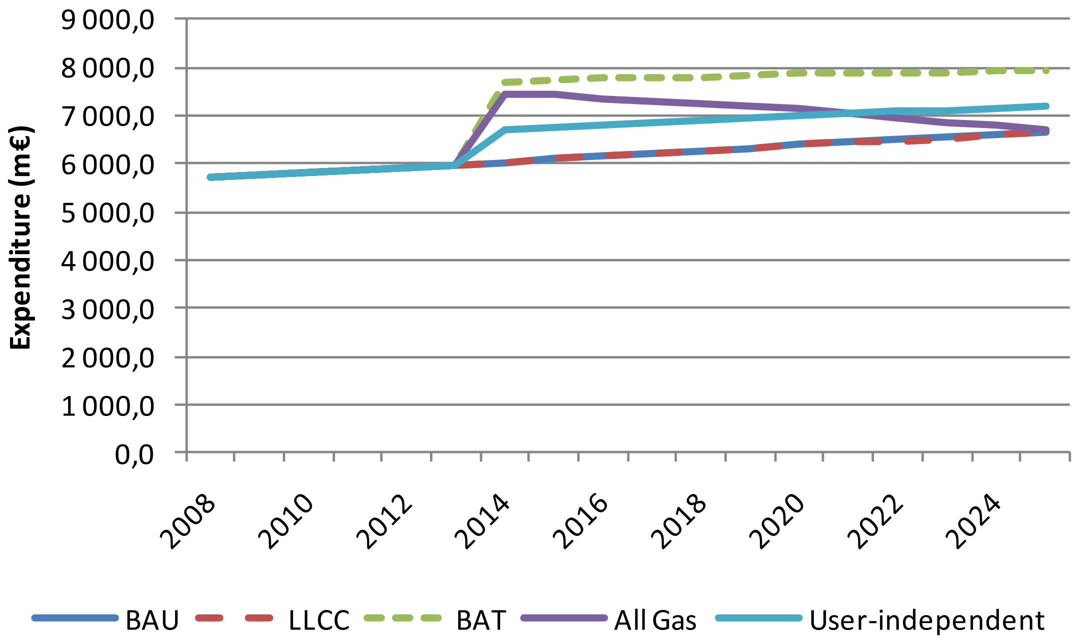
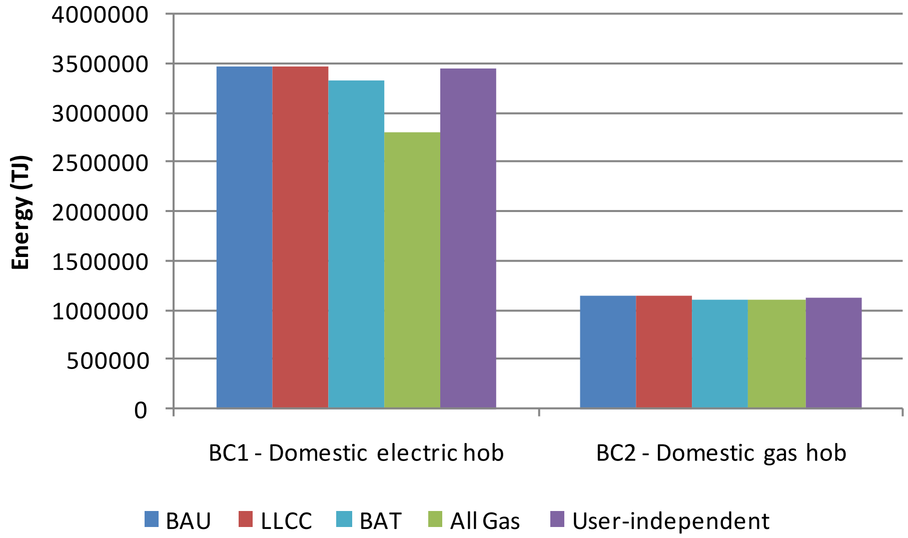


Figure 8-17: Primary energy consumption and expenditure by scenario, total domestic



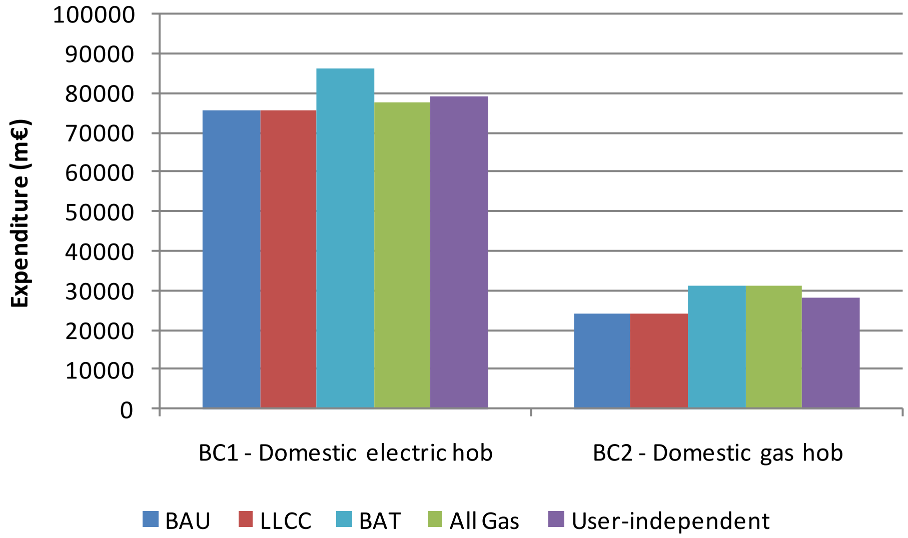


Figure 8-18: Primary energy consumption and expenditure by Base Case over the period 2010-2025

8.3.2. Commercial sector

8.3.2.1. BAU Scenario

In the BAU scenario, the Base-cases remain the only products sold on the market over the outlook period. This scenario is used as a baseline in order to compare the results with other scenarios.

Figure 8-19 and Figure 8-20 show the breakdown by Base-Case of energy consumption and expenditure over the period 2010-2025.

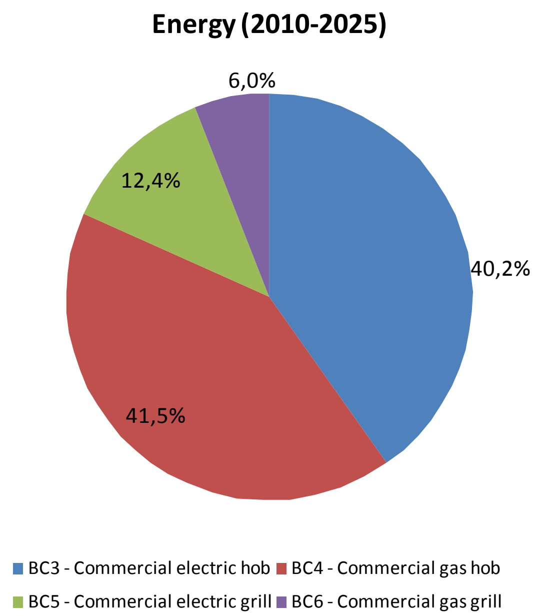


Figure 8-19: Total BAU energy consumption by Base-case, 2010-2025

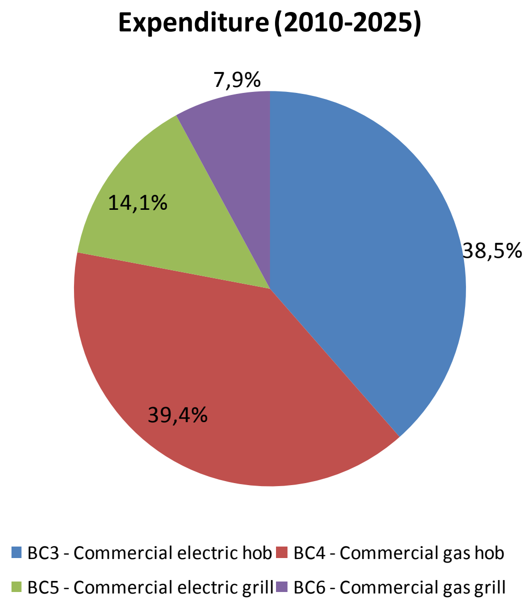


Figure 8-20: Total BAU expenditure by Base-case, 2010-2025

In 2025, the commercial hobs and grills market would require 62 PJ of primary energy and would represent 840 M€. Over the period 2010-2025, total primary energy consumption would be 1 000 PJ and total expenditure would be around 13.5€bn over the period.

8.3.2.2. LLCC SCENARIO, ALSO IDENTIFIED AS BAT SCENARIO

The LLCC scenario considers that the LLCC improvement option as described in Task 7 is implemented for each Base Case. For all the commercial base-cases, the LLCC was also identified as BAT in Task 7. Therefore, the BAT Scenario is here simultaneously presented. From 2014, all products sold include these LLCC/BAT options and no more Base-cases are sold (the market shift takes place from one year to the next). Table 8-10 is a reminder of the LLCC/BAT options for each Base-case identified in Task 7.

Table 8-10: LLCC/BAT improvement options by Base Case

Base-case	LLCC / BAT improvement option	Description
BC3	Scenario A	Pot sensors and thermal insulation
BC4	Scenario A	Pot sensors, electronic ignition and independently controlled burners
BC5	Scenario A	Zone isolation and thermal insulation
BC6	Scenario A	Zone isolation, thermal insulation and electronic ignition and improved combustion air control

Figure 8-21 and Figure 8-22 show the breakdown by Base Case of energy consumption and expenditure over the period 2010-2025.

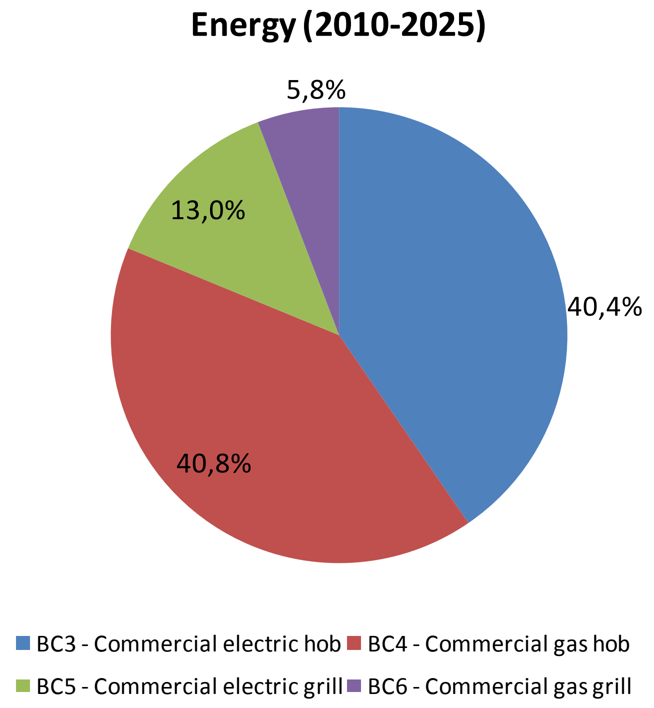


Figure 8-21: Total LLCC/BAT energy consumption by Base-case, 2010-2025

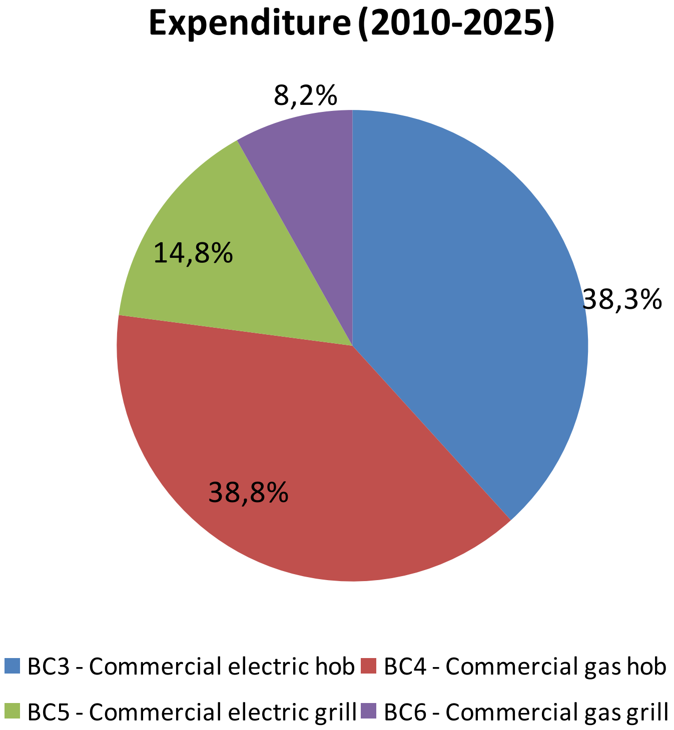


Figure 8-22: Total LLCC/BAT expenditure by Base-case, 2010-2025

In 2025, the commercial hobs and grills market would require 44 PJ of primary energy (-28.8% compared to BAU), and would represent 645 M€ (-23.1% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 873 PJ (-12.7% compared to BAU) and total expenditure would be 12 €bn over the period (-9.9% compared to BAU).

8.3.2.3. "All Gas" Scenario

The "all gas" scenario considers a shift to gas appliances. From 2014, all products sold include the LLCC/BAT options and no more Base Cases are sold (the market shift takes place from one year to the next). However, BC3 and BC5 are respectively replaced by LLC/BAT improvement options which relate to BC4 and BC6. Table 8-11 is a reminder of the LLCC/BAT options for each Base-case identified in Task 7.

This does not mean that any recommendation on banning electric hobs and grills is made to the European Commission, especially if a more-renewable-electricity EU scenario is to be envisaged with the benefit of decarbonising the whole European power production.

Table 8-11: LLCC improvement options by Base Case

Base-case	LLCC / BAT improvement option	Description
BC3	Scenario A of BC4	Pot sensors, electronic ignition and independently controlled burners
BC4	Scenario A	Pot sensors, electronic ignition and independently controlled burners
BC5	Scenario A of BC6	Zone isolation, thermal insulation and electronic ignition and improved combustion air control
BC6	Scenario A	Zone isolation, thermal insulation and electronic ignition and improved combustion air control

Figure 8-23 and Figure 8-24 show the breakdown by Base-case of energy consumption and expenditure over the period 2010-2025.

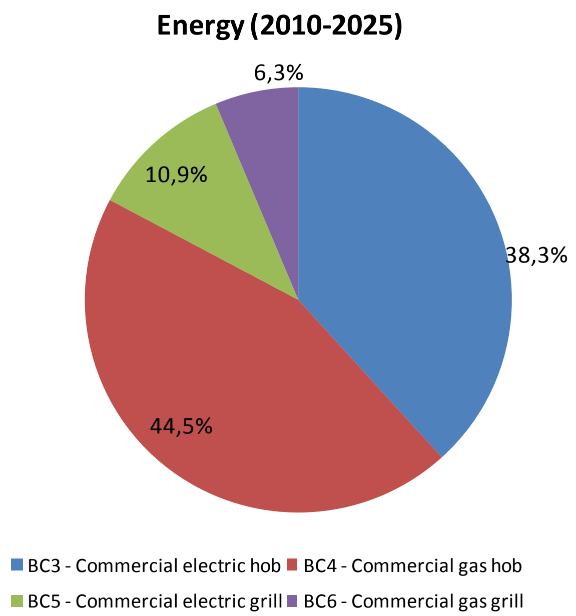


Figure 8-23: Total "All Gas" energy consumption by Base-case, 2010-2025

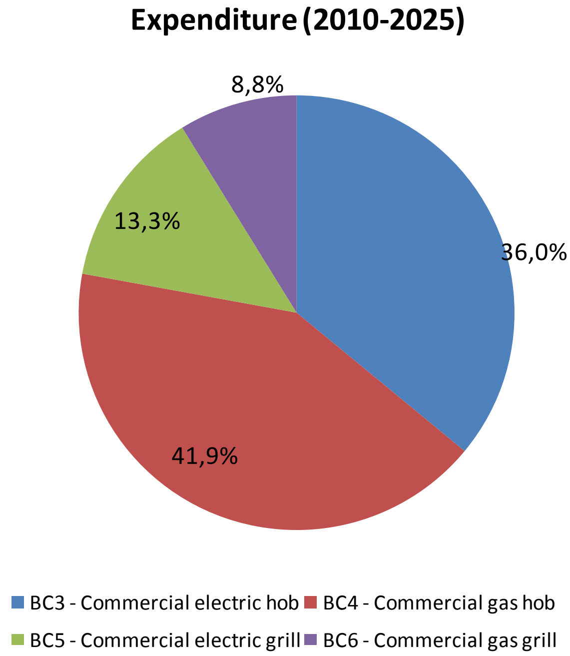


Figure 8-24: Total "All Gas" expenditure by Base-case, 2010-2025

In 2025, the commercial hobs and grills market would require 34 PJ of primary energy (-45.3% compared to BAU), and would represent 517 M€ (-38.4% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 801 PJ (-19.9% compared to BAU) and total expenditure would be 11.3 €bn over the period (-16.5% compared to BAU).

8.3.2.4. "USER-INDEPENDENT" SCENARIO

The "user-independent" scenario considers the implemented options that are not related to the user behaviour. Hence, no pot or cooking sensors could be considered as related energy savings are more sensitive to assess as explained in Task 7. The updated BAT improvement option identified in Task 7 is implemented for each Base-case. From 2014, all products sold include these BAT options and no more Base-cases are sold (the market shift takes place from one year to the next). Compared to the LLCC/BAT Scenario, only BC3 and BC4 are affected.

Table 8-12: "user-independent" improvement options by Base-case

Base-case	LLCC / BAT improvement option	Description
BC3	Option 2	Thermal insulation
BC4	Scenario C	Electronic ignition and independently controlled multi-ring burners
BC5	Scenario A	Zone isolation and thermal insulation
BC6	Scenario A	Zone isolation, thermal insulation and electronic ignition and improved combustion air control

Figure 8-25 and Figure 8-26 show the breakdown by Base-case of energy consumption and expenditure over the period 2010-2025.

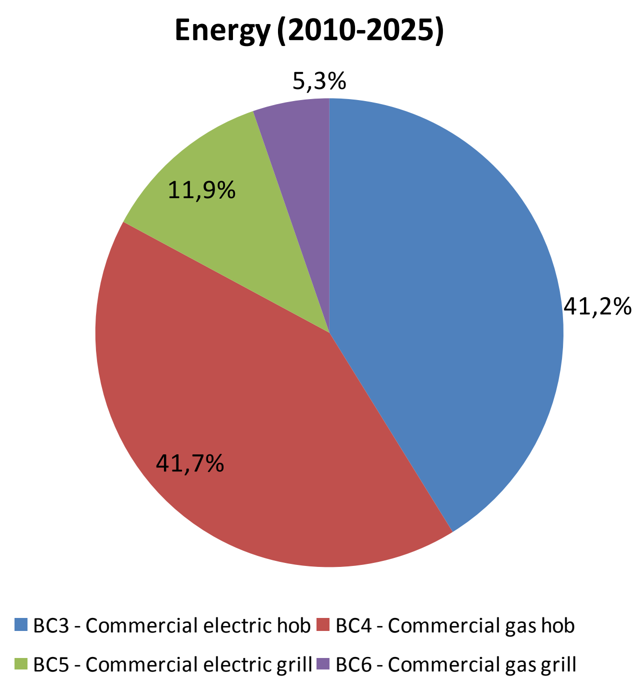


Figure 8-25: Total "user-independent" energy consumption by Base-case, 2010-2025

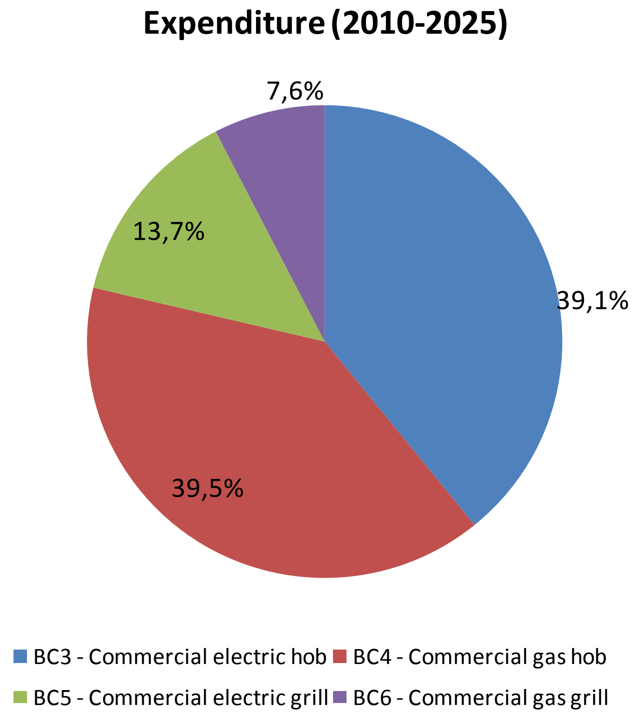


Figure 8-26: Total "user-independent" expenditure by Base-case, 2010-2025

In 2025, the commercial hobs and grills market would require 55 PJ of primary energy (-10% compared to BAU), and would represent 774 M€ (-7.7% compared to BAU). Over the period 2010-2025, total primary energy consumption would be 955 PJ (-4.4% compared to BAU) and total expenditure would be 13 €bn over the period (-3.2% compared to BAU).

8.3.2.5. COMPARISON OF THE SCENARIOS

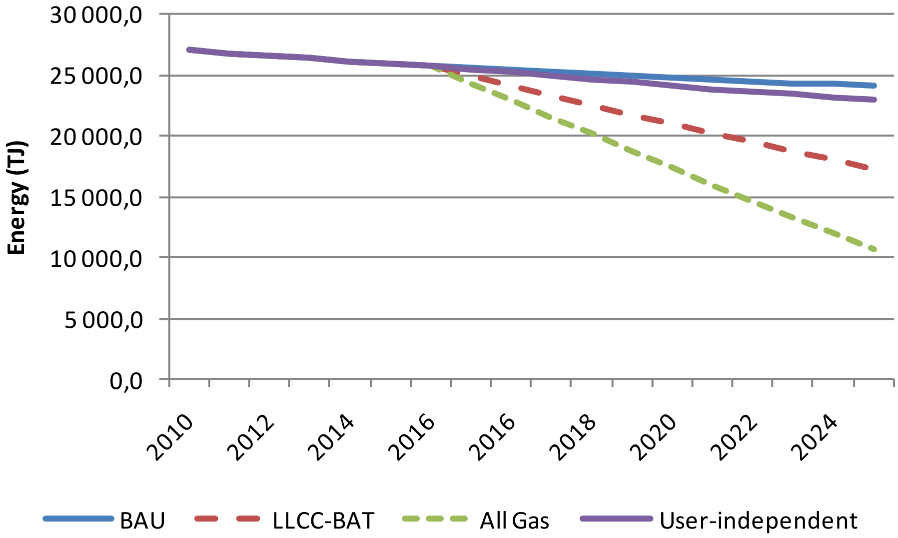
This comparison is made in terms of electricity consumption and consumer expenditure. Figure 8-27 to Figure 8-30 show projected total primary energy consumption and expenditure between 2010 and 2025 by Base-case and according to the BAU, LLCC/BAT, All Gas, User-independent scenarios previously described.

It can be seen that the user-independent scenario is having a limited impact compared to the BAU in case of BC3 and BC4. The graphs confirm that BAT options which include the use of sensors show more energy saving potential and that user-behaviour is indeed a major element to address energy efficiency, as it was observed at domestic level. It should be reminded that the "All gas" scenario is set as an indicative theoretical reference. This does not mean that any recommendation on banning electric hobs and grills is made to the European Commission, especially if a more-renewable-electricity EU scenario is to be envisaged with the benefit of decarbonising the whole European power production.

Table 8-13 shows the cumulative savings in energy and in costs for the 2010-2025 period.

Table 8-13 Savings for the commercial sector, cumulative 2010-2025

	PJ	€bn
LLCC	-127	-1.3
BAT	-127	-1.3
All gas	-199	-2.2
User-independent	-44	-0.4



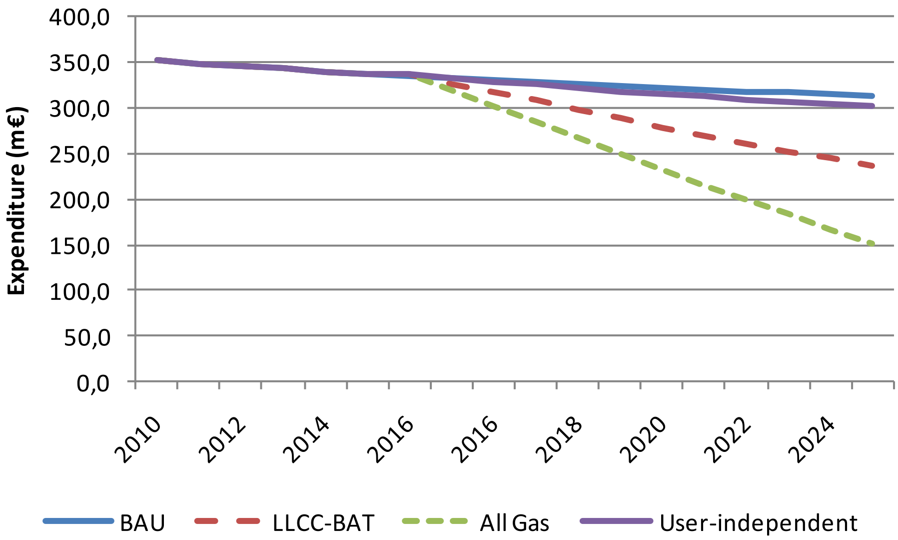


Figure 8-27: Primary energy consumption and expenditure by scenario, Base-Case 3

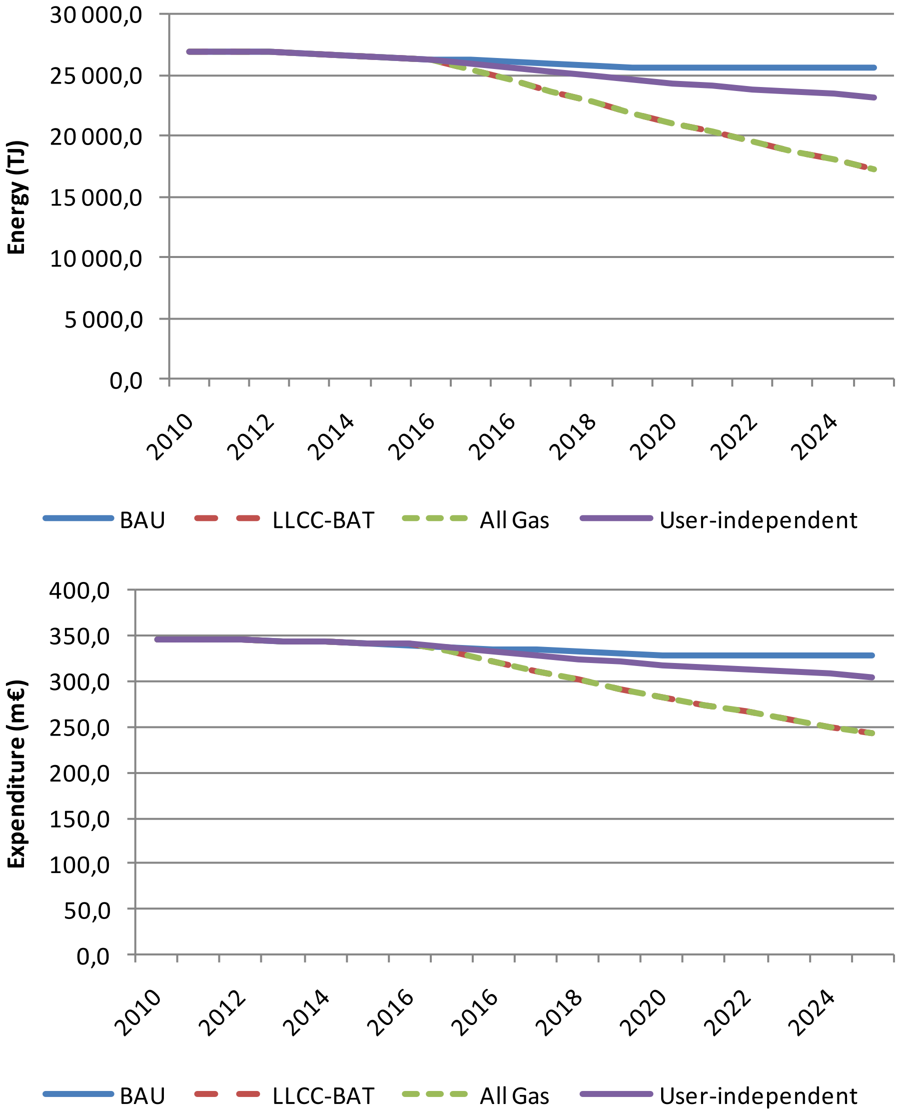


Figure 8-28: Primary energy consumption and expenditure by scenario, Base-Case 4

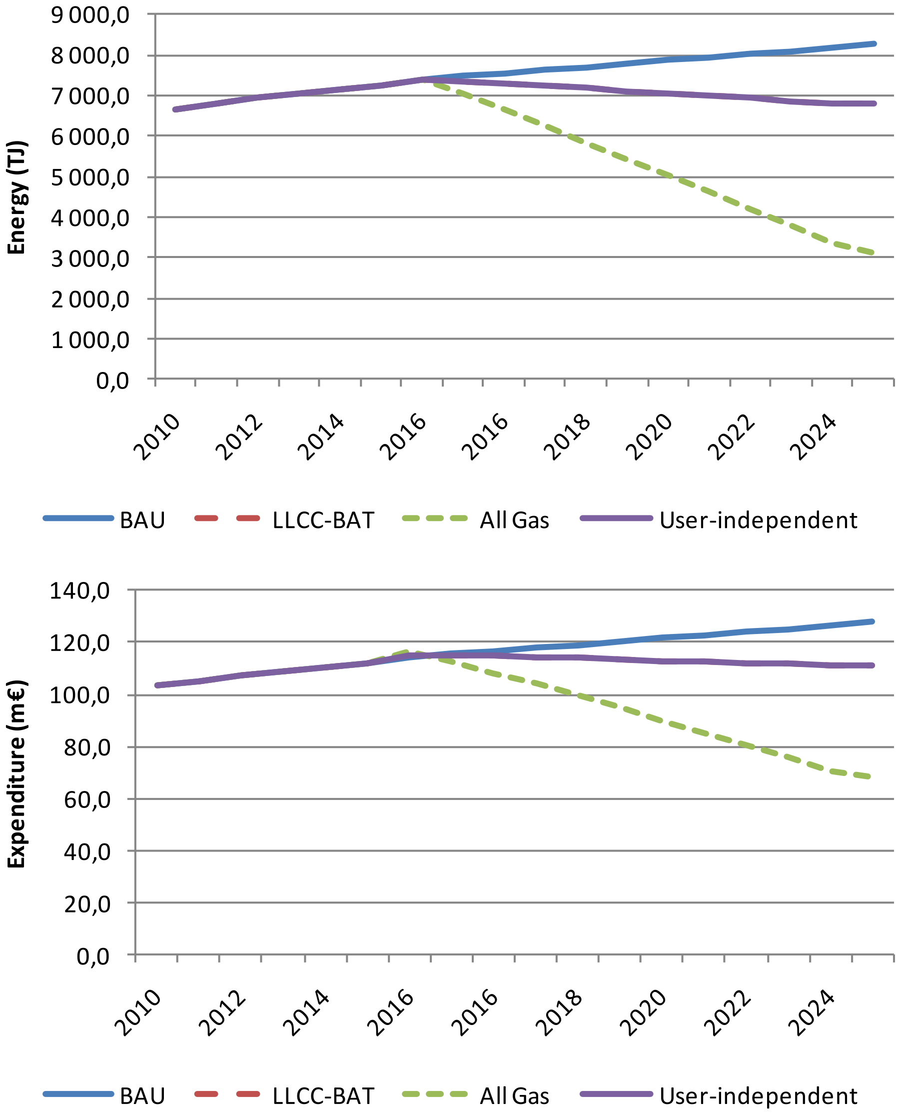
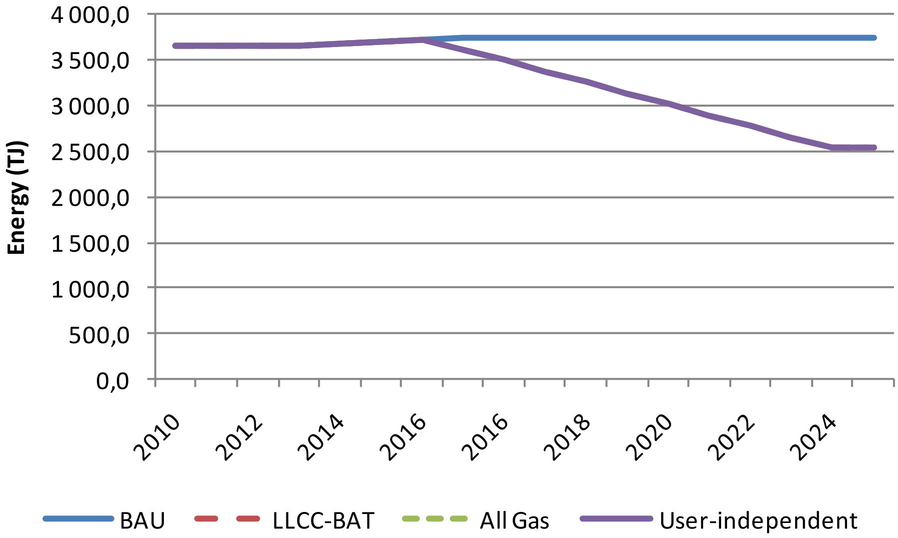


Figure 8-29: Primary energy consumption and expenditure by scenario, Base-Case 5 (LLCC-BAT is combined with the user-independent scenario)



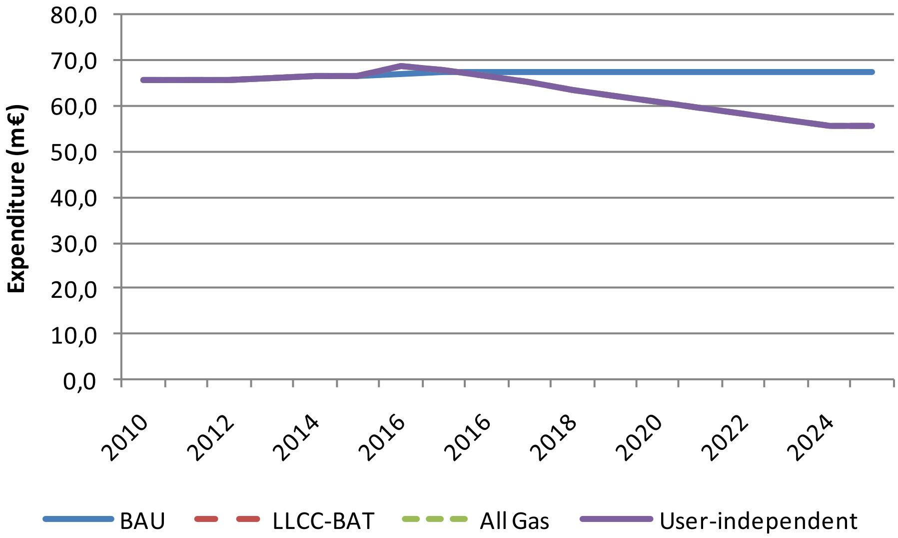
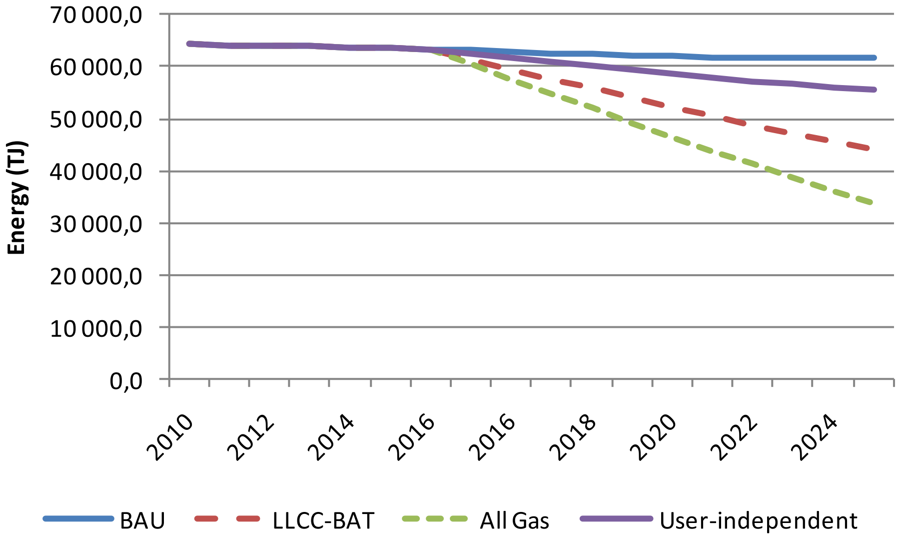


Figure 8-30: Primary energy consumption and expenditure by scenario, Base-Case 6



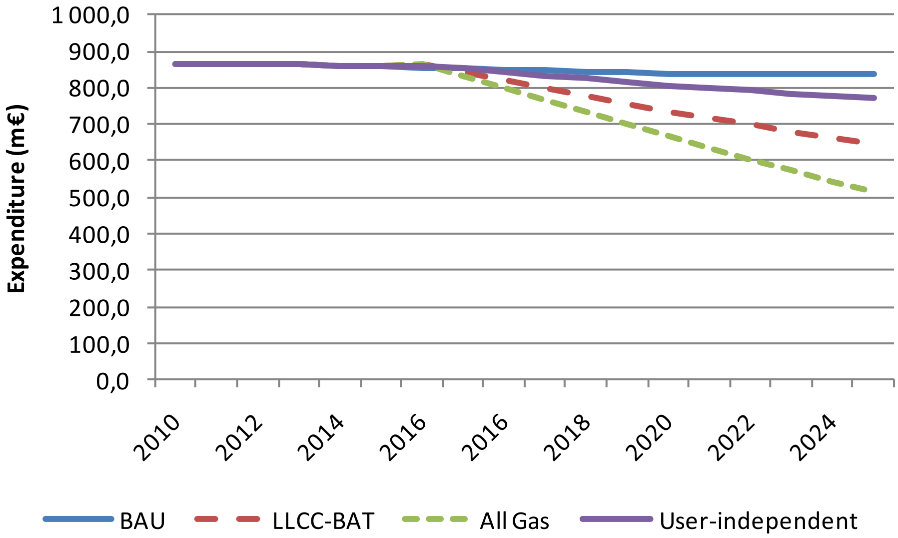
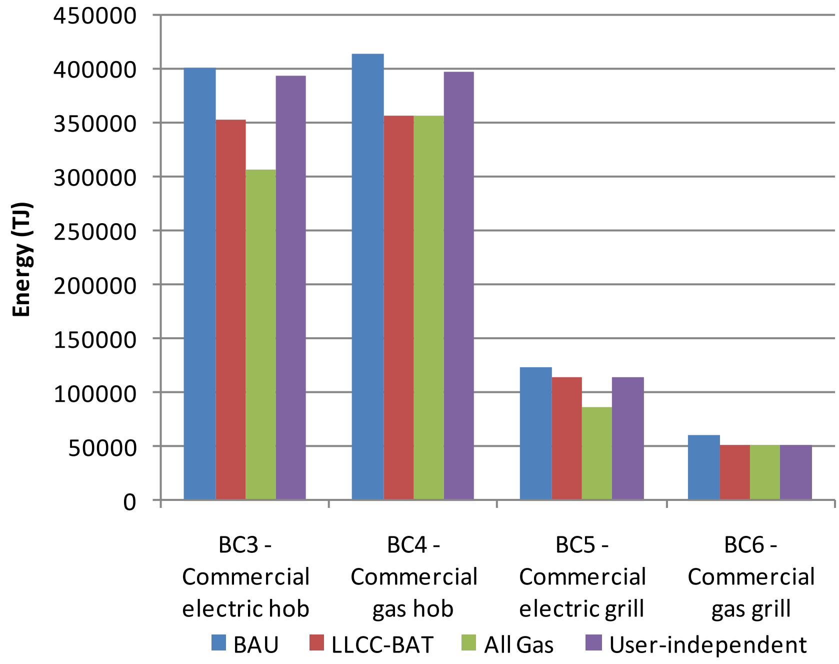


Figure 8-31: Primary energy consumption and expenditure by scenario, total commercial



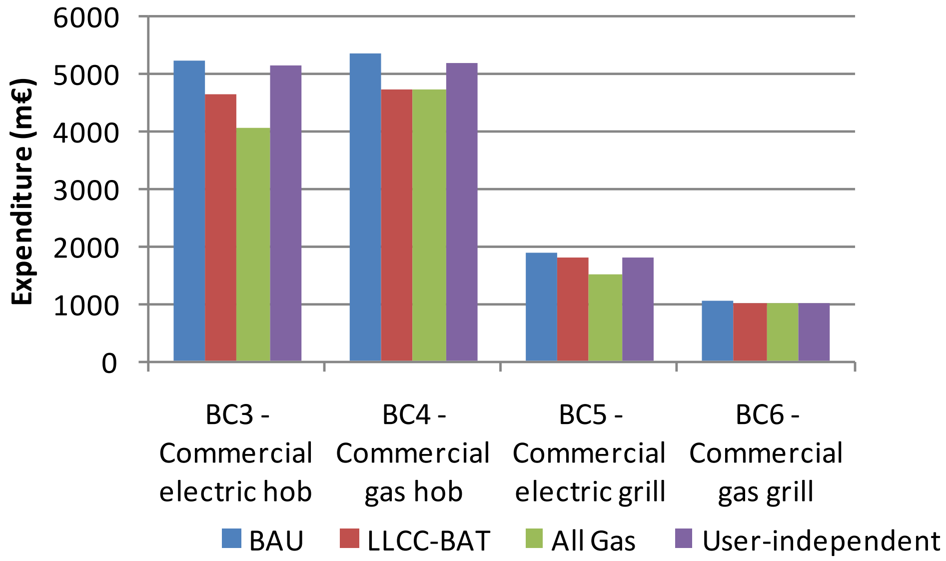


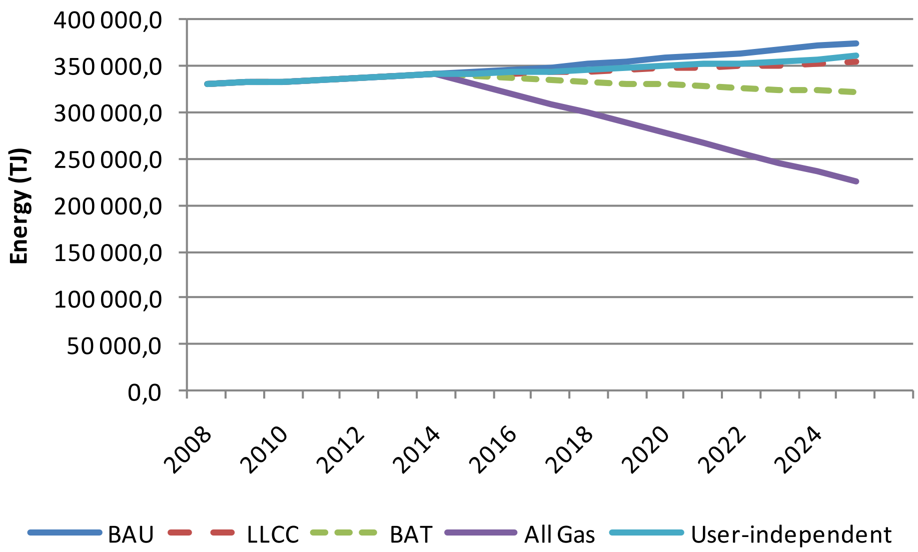
Figure 8-32: Primary energy consumption and expenditure by scenario, by Base-case over the period 2007-2025

8.3.1. Overall Scenarios

When considering both the domestic and commercial sectors, the implementation of the user-independent options would lead to 82 PJ of energy savings for the 2010-2025 period as it can be seen in Table 8-14 and further illustrated in Figure 8-33.

Table 8-14 Savings for the domestic and commercial sectors, cumulative 2010-2025

	PJ	€bn
LLCC	-139	-1.3
BAT	-332	16.7
All gas	-912	7
User-independent	-94	7



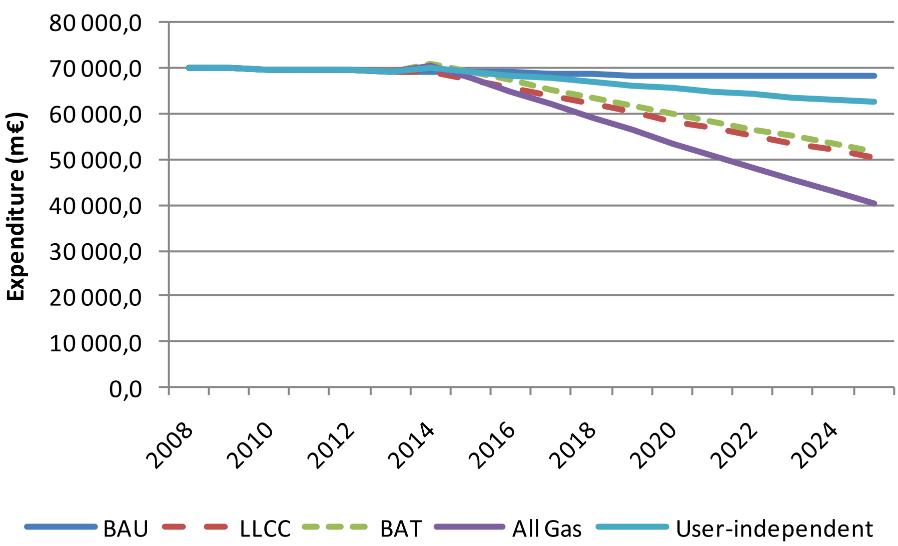


Figure 8-33: Primary energy consumption and expenditure by scenario, total

8.4. IMPACT ANALYSIS

The ecodesign requirements should not entail excessive costs nor undermine the competitiveness of European enterprises and should not have a significant negative impact on consumers or other users. In this section, the following impacts are assessed:

- Impacts on manufacturers and competition
- Monetary impacts
- Impacts on consumers
- Impacts on innovation and development
- Social impacts.

8.4.1. IMPACTS ON MANUFACTURERS AND COMPETITION

All the technologies described in this study and considered as improvement options in the scenarios are already available on the market. As a result, the implementation of MEPS dealing with saving targets is technically achievable although it would need an economical effort from the manufacturers.

Regarding the definition of a timeline to implement standards, it should take into account the time necessary to adapt production lines. This redesign time varies depending on the type of change to be achieved: it has been estimated that between 6 and 12 months are needed to replace a single part of the appliance, which is the case for every improvement option presented within the study. Assuming the development of the required standards is finished by 2012, Tier 1 has thus been set at 2014 for the MEPS and the scenario models.

Most manufacturers for the domestic sector - represented by CECED - seem to agree on the BAT products, with the implementation of the same improvement options, with a clear distinction for the sensors which have not been well-accepted by the customers when first introduced into the market. The European market mainly consists of large international companies. If minimum performance standards were set, it is believed that they should all be able to keep up with the market requirements, using common technology or their own technological developments.

Regarding the commercial sector, the manufacturers of hobs and grills is more fragmented with less organised actions, especially at EU level. Therefore, the potential measures may be more difficult to be accepted and to implement than in the domestic sector. However, given the intensive use for commercial cooking purposes and the potential energy savings (in %), it is believed that they could all comply with the market requirements.

EU manufacturers claim to produce amongst the most efficient cooking appliances produced worldwide. Therefore, the implementation of minimum performance standards is not expected to significantly hamper the economic development of large EU manufacturers to the benefit of extra-EU competitors.

8.4.2. MONETARY IMPACTS

The scenario analysis partly addresses monetary impacts. The "user-independent" scenario, which corresponds to MEPS, quantifies the monetary impacts for the domestic sector with an additional 552 M€ in 2025.

The possible implementation of MEPS requires additional capital investment from manufacturers to adapt manufacturing techniques to produce the more efficient products (e.g. changing production lines). In the domestic sector, these investments represent a significant concern for manufacturers in order to sustain the improved efficiency of their appliances. Investment costs can be partly offset by higher selling prices of more efficient machines but a good balance should be found in order to not strongly affect the purchaser. Besides, economies of scale may enable manufacturers to have a larger margin and/or drop prices when selling efficient appliances.

On the consumer side, purchasing a more efficient cooking appliance represents a larger initial investment, which is unlikely to be compensated within the product lifetime as seen in Task 7. This is a problematic for the consumer. This assessment was made considering a discount rate affecting the energy tariff in the ecoreport tool. However in reality, the energy prices may evaluate differently and the actual operating costs could actually offer a better offset to the increased of the purchase price in the future. Policy options could aim to encourage this long-term vision.

For the commercial sector, the monetary impacts would be beneficial from 2015 and would reach 65M€ savings in 2025, considering the "user-independent" scenario. Therefore, policy options could aim to encourage this short-term vision, which is beneficial both from the environmental and economic points of view.

8.4.3. IMPACTS ON CONSUMERS

For the improvement options presented, the functional unit and the quality service given by the improved product remains the same as the Base-Case (this is a necessary condition to make a relevant comparative LCA), even though an increase in the purchase price is likely to be problematic for the domestic sector.

There should be no trade-off in terms of functionality (e.g. reduced food nutritional quality or loss of taste features), as a result of the increased energy efficiency.

8.4.4. IMPACTS ON INNOVATION AND DEVELOPMENT

BNATs and current research axes in the sector were not very thoroughly detailed in this study because of a lack of data, especially in the commercial sector. Such information is obviously very sensitive and manufacturers may not be willing to share. In addition, little or no independent research has been carried out. The possible implementation of MEPS can be seen as an opportunity for manufacturers to look for innovative and efficient technological solutions in order to decrease costs. Again, given the competitiveness of the sector, it seems that following the current trend regarding research and development is feasible for the manufacturers and should enable them to meet proposed requirements.

8.4.5. SOCIAL IMPACTS (EMPLOYMENT)

Most EU manufacturers have their production plants within the EU. If performance standards were set, they should not have a detrimental impact on the number of jobs or the well-being of the EU manufacturers' employees. In addition, the improvement options presented do not require any specific material that might be difficult to obtain within the EU so that the supply chain would not be unduly affected nor EU industries disadvantaged.

8.5. SENSITIVITY ANALYSIS

Scope: The sensitivity analysis checks the robustness of the overall outcomes. It should cover the main parameters as described in Annex II of the Ecodesign Directive (such as the price of energy, the cost of raw materials or production costs, discount rates, including, where appropriate, external environmental costs, such as avoided greenhouse gas emissions), to check if there are significant changes and if the overall conclusions are reliable and robust.

The parameters that would be considered the most relevant for this sensitivity analysis (because of their importance and/or uncertainty) in the case of hobs and grills are listed below:

- Energy rates;
- Discount rate;
- Product purchase price;
- Product Lifetime;
- Number of cycles/operating hours per year.

Parameters such as the energy rate, the discount rate and the product purchase price have a direct influence on the LCC calculations of the base-cases and their improvement options (but not on the environmental impacts of the products) while the product lifetimes and the energy consumption during a cooking cycle will influence both the environmental impacts of the products and the LCC through operating costs.

Note that average EU prices for all calculations are used but there are significant differences between Member States. The BAT might be cost-effective in one Member State and not cost-effective in another.

The options and scenarios that were already identified in Task 7 and further evaluated in Task 8 are recalled in Table 8-15.

Table 8-15: Description of options and scenarios applied to the Base-cases

Base-Cases	Option	Description
BC1: Domestic electric hob	Option 1	Heat output accuracy by electronic control
	Option 2	Pot sensors
	Option 3	Cooking sensors
	Scenario A	1 + 2 + 3
	Scenario B	2 + 3
BC2: Domestic gas hob	Option 1	Heat output accuracy by electronic control
	Option 2	Pot sensors
	Option 3	Cooking sensors
	Option 4	Individually controlled multiple crown burners
	Option 5	High efficient gas sealed burners with single progressive gas valve

Base-Cases	Option	Description
	Scenario A	1 + 2 + 3 + 4 + 5
	Scenario B	2 + 3
	Scenario C	1 + 4 + 5
BC3: Commercial electric hob	Option 1	Pot sensors
	Option 2	Thermal insulation
	Scenario A	1 + 2
BC4: Commercial gas hob	Option 1	Pot sensors
	Option 2	Electronic ignition
	Option 3	Individually controlled multiple crown burners
	Scenario A	1 + 2 + 3
	Scenario B	1 + 2
	Scenario C	2 + 3
BC5: Commercial electric grill	Option 1	Zone isolation
	Option 2	Thermal insulation
	Scenario A	1 + 2
BC6: Commercial gas grill	Option 1	Zone isolation
	Option 2	Thermal insulation
	Option 3	Electronic ignition
	Option 4	Improved combustion air control
	Scenario A	1 + 2 + 3 +4
	Scenario B	2 + 3 + 4

In Task 5, average product prices and data on energy consumption were determined for the Base-cases. Given the uncertainty that remains regarding the definition of "average market" products, the sensitivity analysis will consider different error margins depending on the considered parameter. The new tested values are therefore presented in Table 8-16, Table 8-17, Table 8-18, Table 8-19 and Table 8-20.

8.5.1. Assumption related to the energy rate

With regard to energy rates (see Table 8-16), the lowest and highest values correspond the ones observed within the panel of the EU 27 MS. For both gas and electricity rates in the domestic sector, Bulgaria offers the cheapest energy tariffs whereas the most expensive tariffs relate to Denmark. In the commercial sector, the cheapest tariffs occur in Estonia (for electricity) and Romania (for gas) and the most expensive ones in Italy (for electricity) and Denmark (for gas), based on 2009 Eurostat data.

Table 8-16: Variation of energy rates for each Base-case

Base-case	Current value	Lower value	Upper value
Base-case 1	0.1658 €/kWh	0.0823 €/kWh	0.2698 €/kWh
Base-case 2	16.21 €/GJ	8.11 €/GJ	25.55 €/GJ
Base-case 3	0.1554 €/kWh	0.078 €/kWh	0.2928 €/kWh

Base-case	Current value	Lower value	Upper value
Base-case 4	14.81 €/GJ	7.94 €/GJ	25.55 €/GJ
Base-case 5	0.1554 €/kWh	0.078 €/kWh	0.2928 €/kWh
Base-case 6	14.81 €/GJ	7.94 €/GJ	25.55 €/GJ

Figure 8-34 to Figure 8-39 show the influence of the variation of the energy rates on the life-cycle costs and the total energy consumption of the different base-cases and associated improvement options. For most situations, despite the expected variations in absolute values regarding the LLC, the ranking of the different improvement options remains the same whether the minimum or maximum parameter is used.

A slight change regarding the domestic electric hob (BC1) can be observed when considering the max value of the electricity rate where option 1 becomes more costly than option 3 and Scenario A. However, the base-case remains LLCC.

- **Base-case 1: Domestic electric hob**

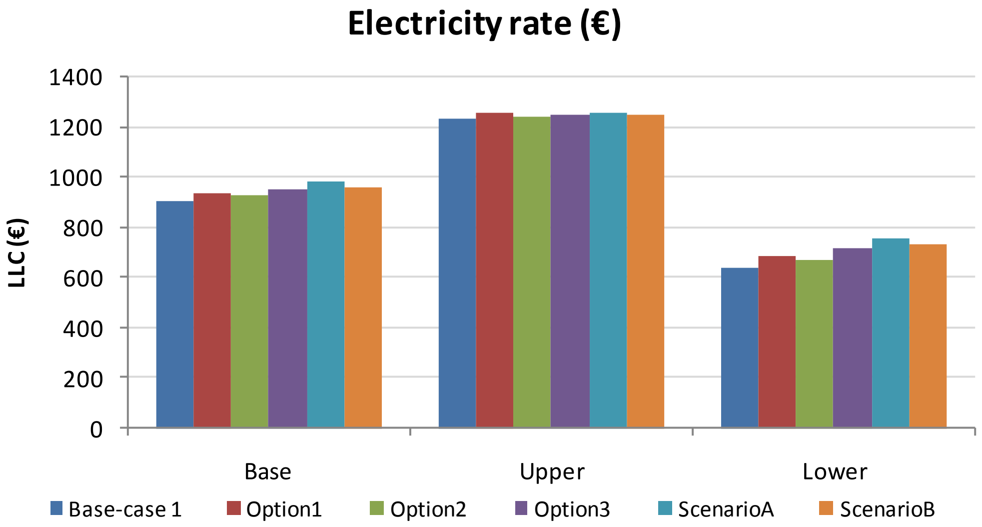


Figure 8-34: Sensitivity to electricity rates for BC1 Life Cycle Cost

- **Base-case 2: Domestic gas hob**

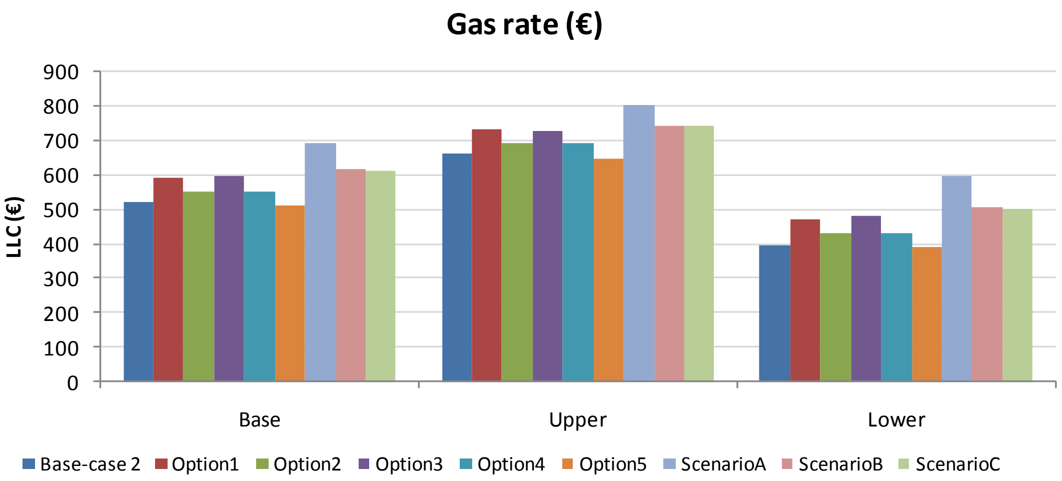


Figure 8-35: Sensitivity to gas rates for BC2 Life Cycle Cost

- **Base-case 3: Commercial electric hob**

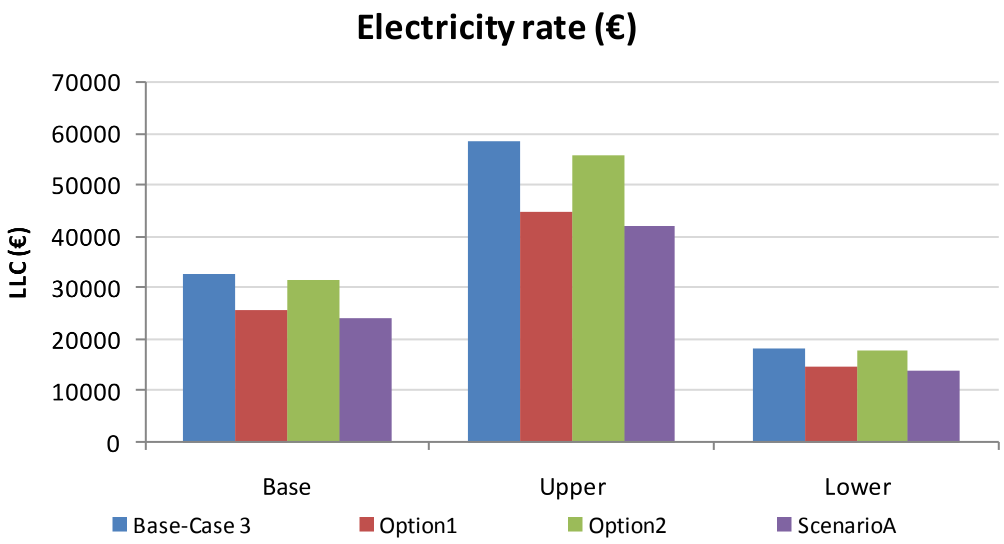


Figure 8-36: Sensitivity to electricity rates for BC3 Life Cycle Cost

- **Base-case 4: Commercial gas hob**

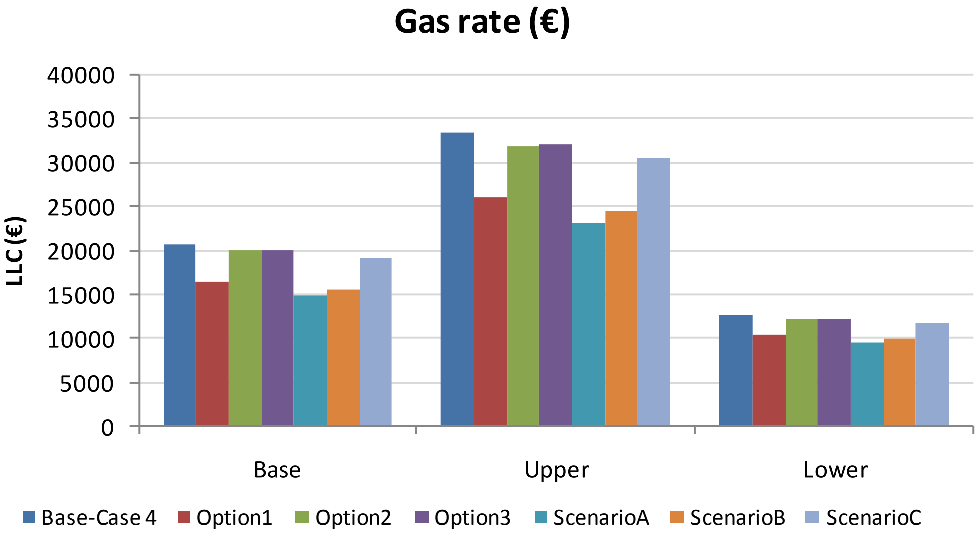


Figure 8-37: Sensitivity to gas rates for BC4 Life Cycle Cost

- **Base-case 5: Commercial electric grill**

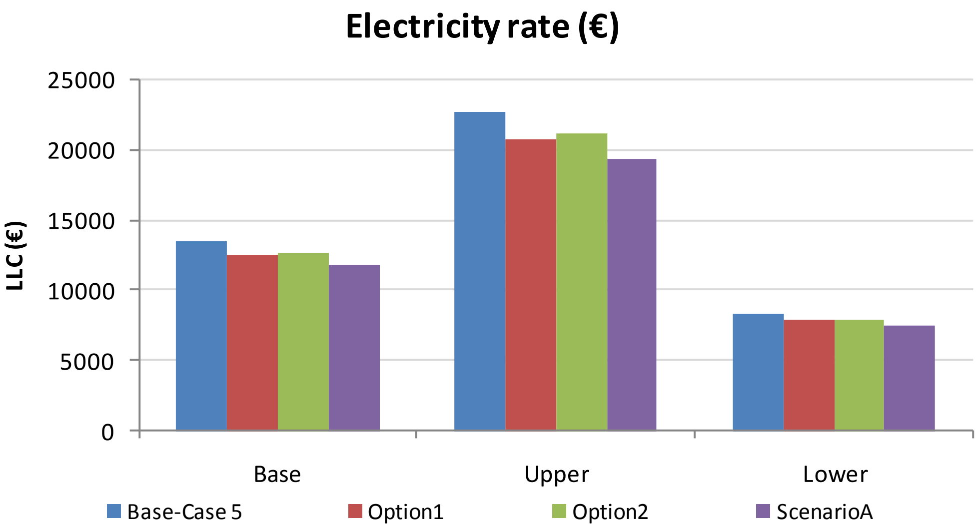


Figure 8-38: Sensitivity to electricity rates for BC5 Life Cycle Cost

- Base-case 6: Commercial gas grill

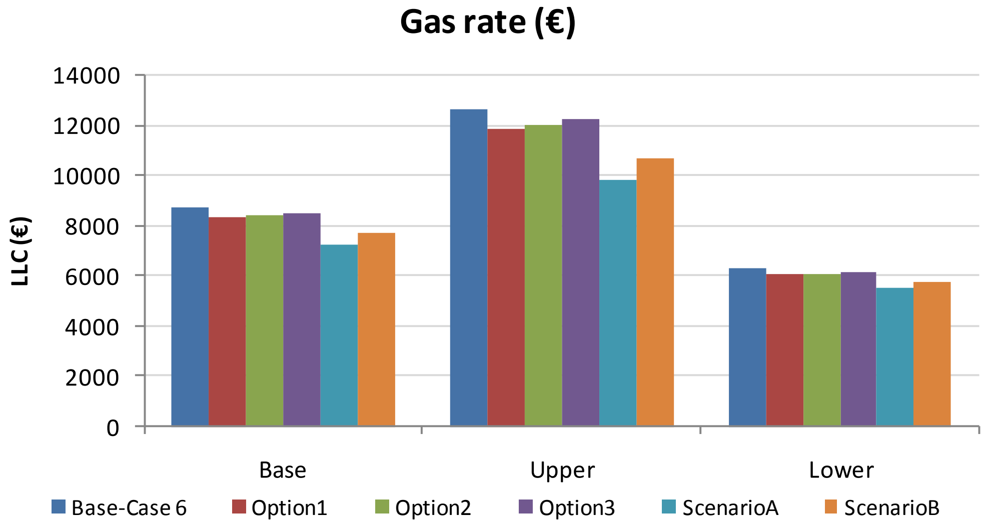


Figure 8-39: Sensitivity to gas rates for BC6 Life Cycle Cost

8.5.2. Assumption related to the discount rate

Regarding the discount rates, the sensitivity analysis will consider a 50% error margin, as it can be seen in Table 8-17.

Table 8-17: Variation of discount rates for each Base-case

Base-case	Current value	Lower value	Upper value
Base-case 1	4%	2%	6%
Base-case 2	4%	2%	6%
Base-case 3	4%	2%	6%
Base-case 4	4%	2%	6%
Base-case 5	4%	2%	6%

Figure 8-40 to Figure 8-45 show the influence of the discount rate on the total energy consumption and life-cycle costs of the different base-cases and associated improvement options. For all situations, despite the expected variations in absolute values regarding the LCC, the ranking of the different improvement options remains the same whether the minimum or maximum parameter is used.

■ **Base-case 1: Domestic electric hob**

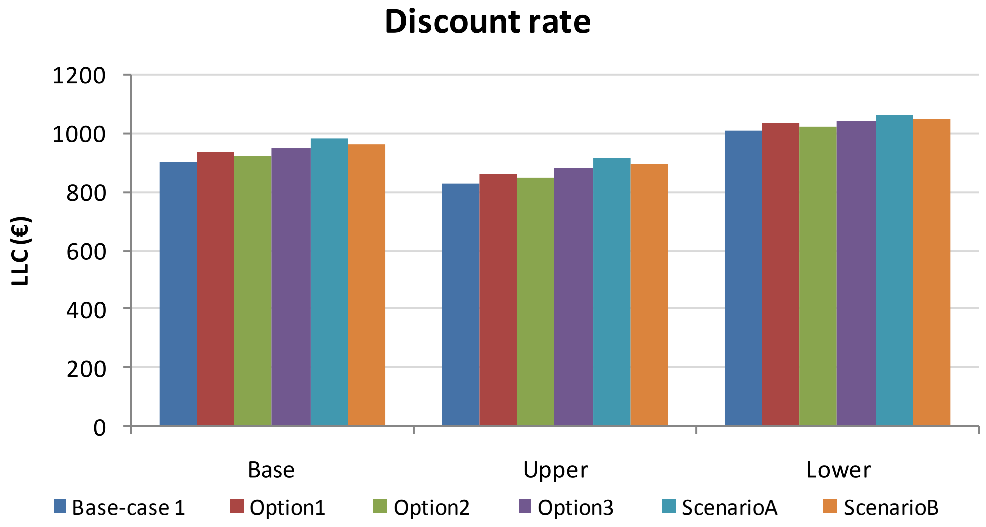


Figure 8-40: Sensitivity to discount rates for BC1 Life Cycle Cost

■ **Base-case 2: Domestic gas hob**

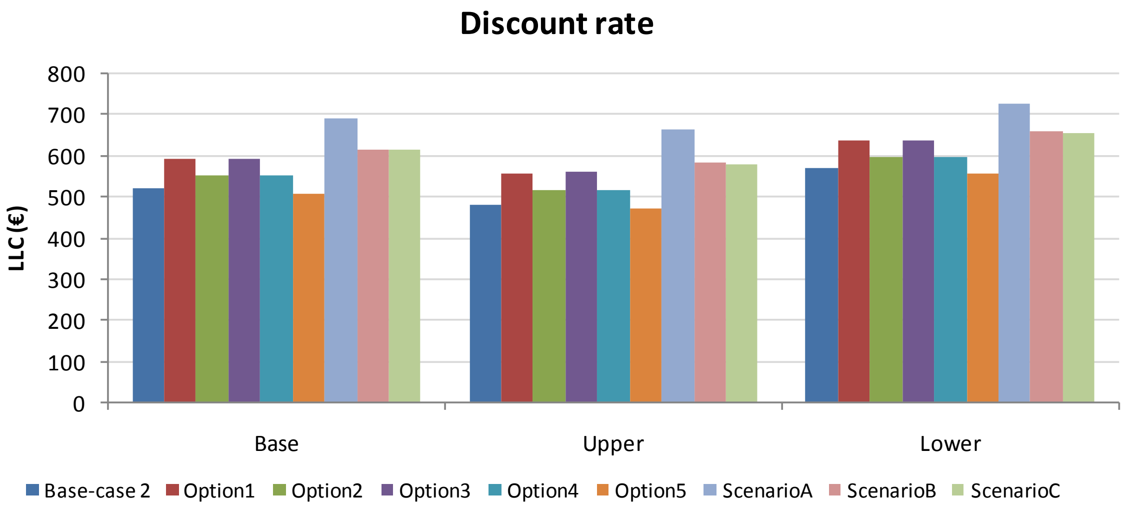


Figure 8-41: Sensitivity to discount rates for BC2 Life Cycle Cost

■ **Base-case 3: Commercial electric hob**

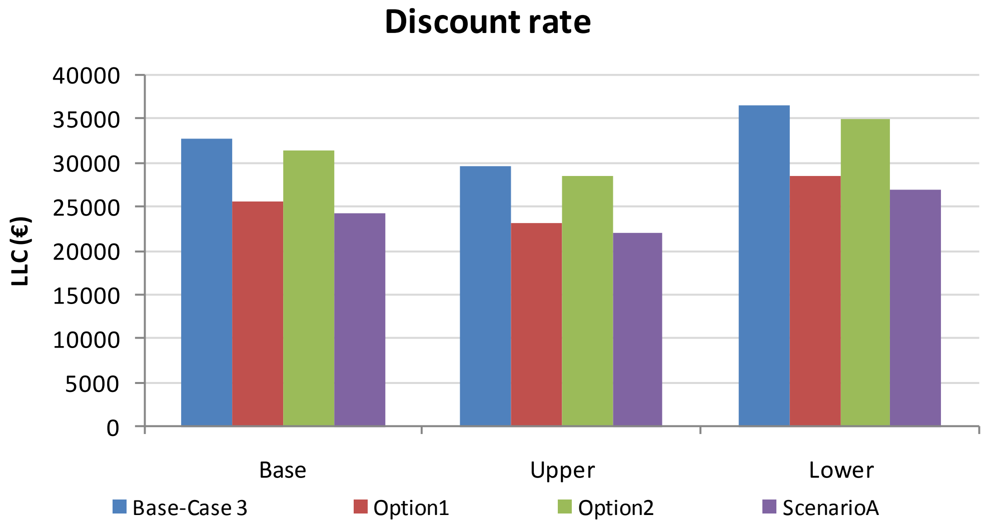


Figure 8-42: Sensitivity to discount rates for BC3 Life Cycle Cost

■ **Base-case 4: Commercial gas hob**

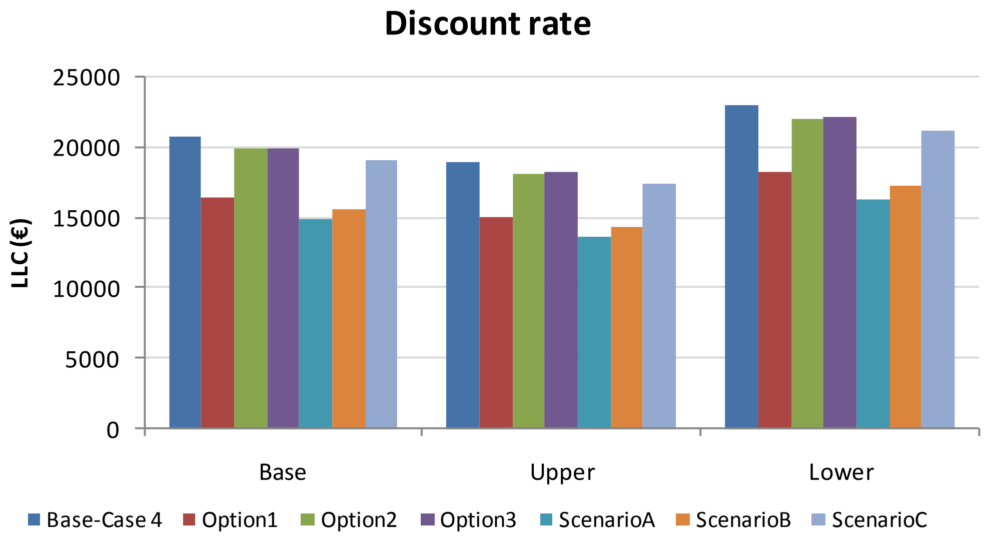


Figure 8-43: Sensitivity to discount rates for BC4 Life Cycle Cost

- **Base-case 5: Commercial electric grill**

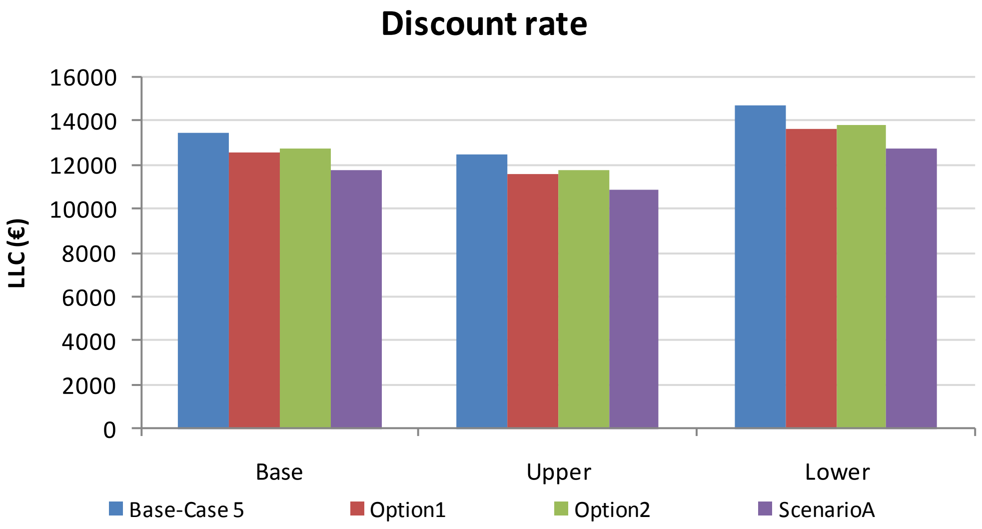


Figure 8-44: Sensitivity to discount rates for BC5 Life Cycle Cost

- **Base-case 6: Commercial gas grill**

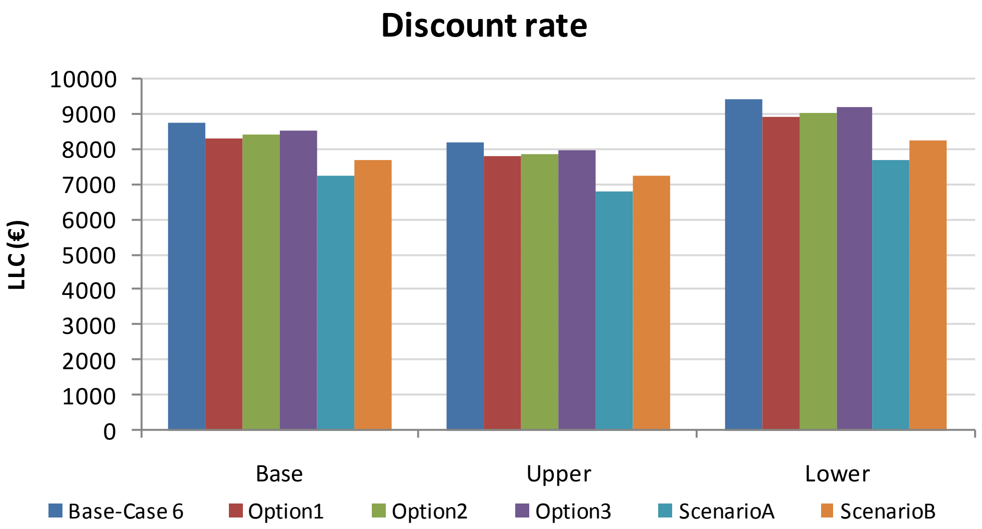


Figure 8-45: Sensitivity to discount rates for BC6 Life Cycle Cost

8.5.3. ASSUMPTION RELATED TO THE PRODUCT PRICE

Regarding the product prices, the sensitivity analysis will consider a 10% error margin for the domestic sector and a 20% error margin for the commercial sector, as it can be seen in Table 8-18. The error margin is also applied to the additional costs related to the improvement options.

Table 8-18: Variation of product price for each Base-Case (before any additional costs due to improvement options)

Base-case	Current value (in €)	Lower value	Upper value
Base-case 1	380	342	418
Base-case 2	268	241.2	294.8
Base-case 3	2,900	2,320	3,480
Base-case 4	2,950	2,360	3,540
Base-case 5	2,300	1,840	2,760
Base-case 6	2,400	1,920	2,880

Figure 8-46 to Figure 8-53 show the influence of the product price on the total energy consumption and life-cycle costs of the different base-cases and associated improvement options. For all situations, despite the expected variations in absolute values regarding the LCC, the ranking of the different improvement options remains the same whether the minimum or maximum parameter is used.

- **Base-case 1: Domestic electric hob**

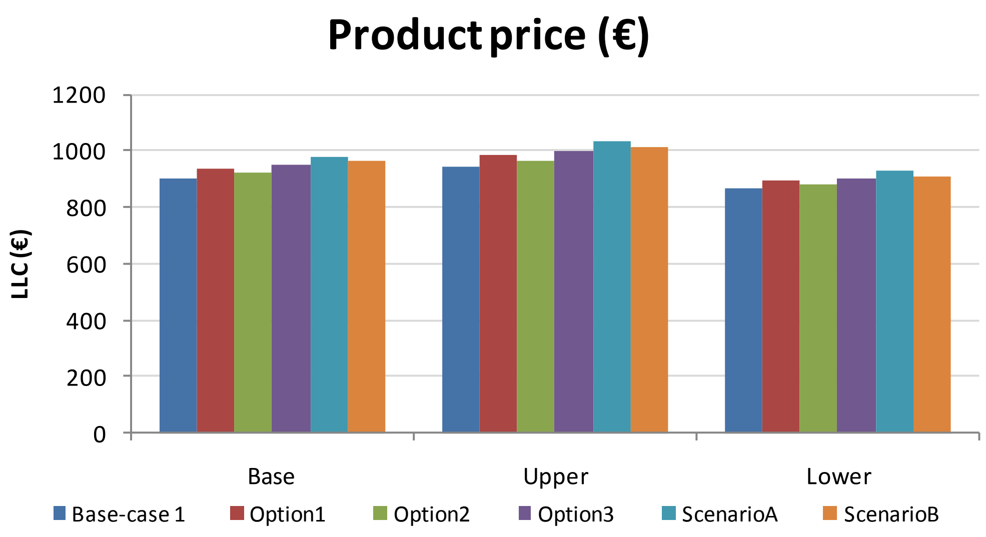


Figure 8-46: Sensibility to product price for BC1 Life Cycle Cost

Base-case 2: Domestic gas hob

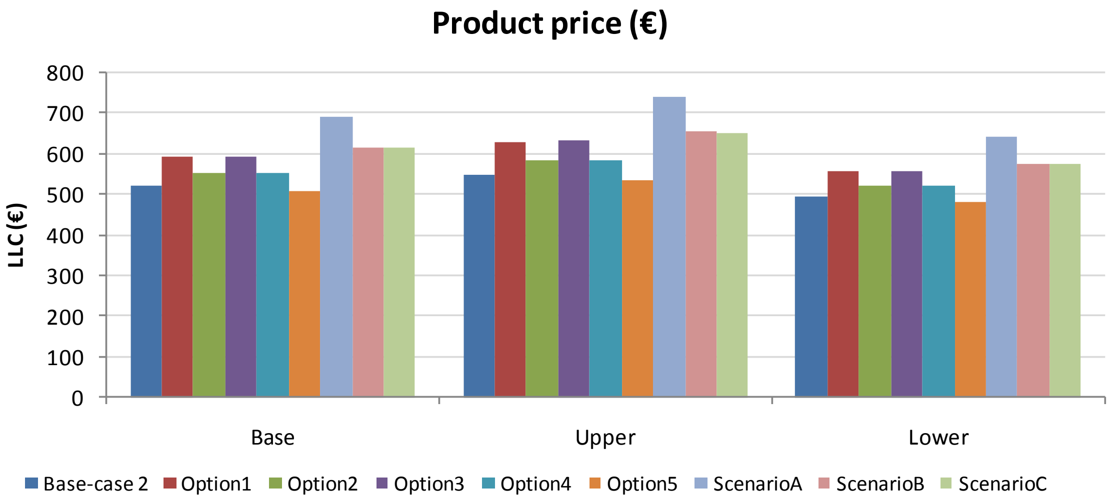


Figure 8-47: Sensitivity to product price for BC2 Life Cycle Cost

Base-case 3: Commercial electric hob

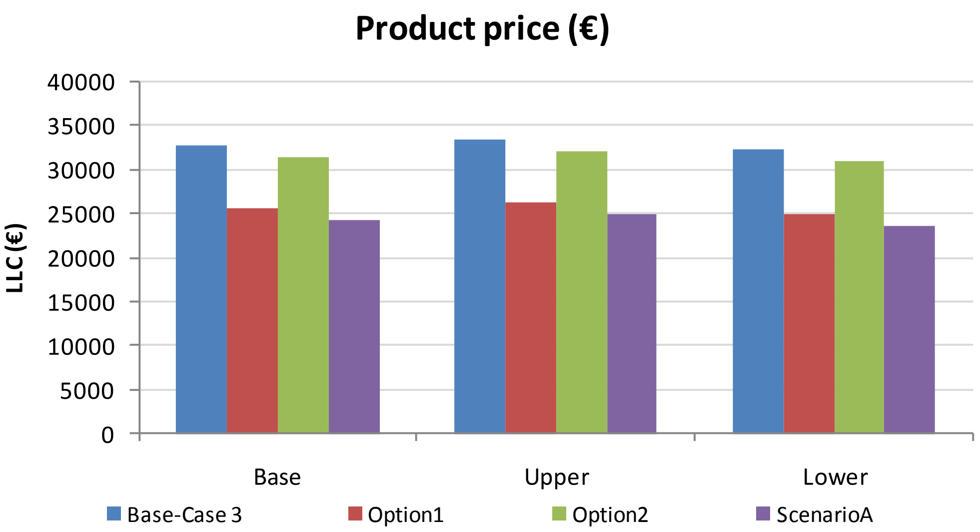


Figure 8-48: Sensitivity to product price for BC3 Life Cycle Cost

■ **Base-case 4: Commercial gas hob**

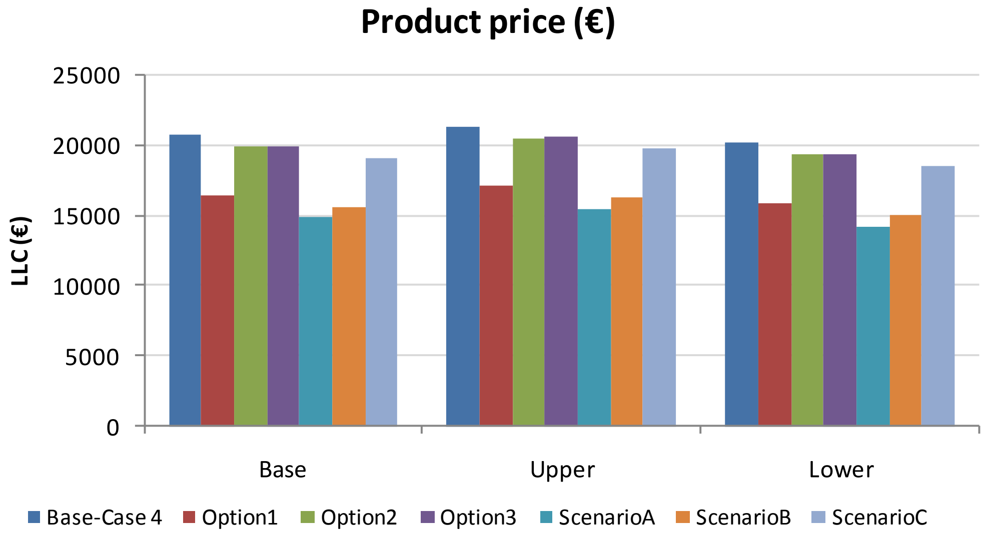


Figure 8-49: Sensitivity to product price for BC4 Life-Cycle Cost

■ **Base-case 5: Commercial electric grill**

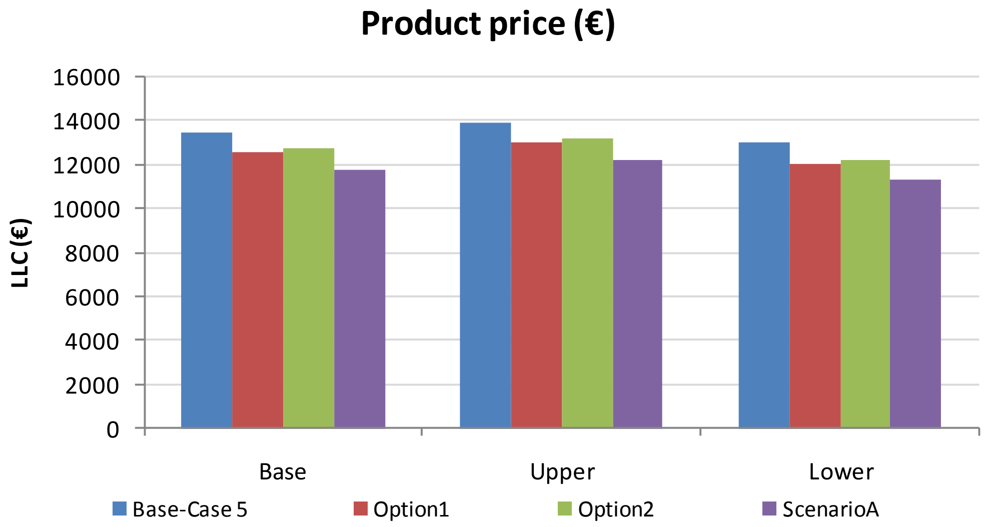


Figure 8-50: Sensitivity to product price for BC5 Life-Cycle Cost

Base-case 6: Commercial gas grill

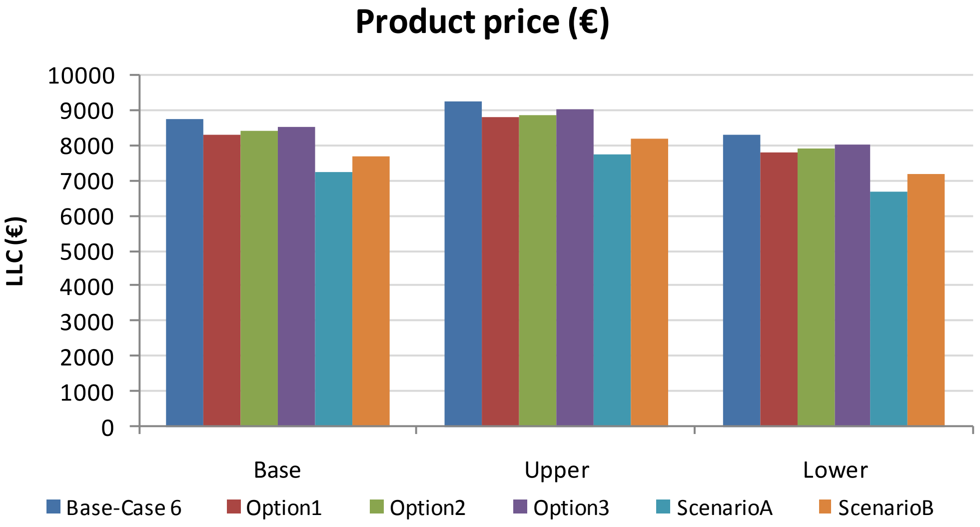


Figure 8-51: Sensitivity to product price for BC6 Life-Cycle Cost

8.5.4. Assumption related to the product lifetime

Regarding the product lifetimes, the sensitivity analysis will consider a 20% error margin, as it can be seen in Table 8-19.

Table 8-19: Variation of product lifetime for each Base-case

Base-case	Current value	Lower value	Upper value
Base-case 1	19	15.2	22.8
Base-case 2	19	15.2	22.8
Base-case 3	12	9.6	14.4
Base-case 4	12	9.6	14.4
Base-case 5	10	8	12
Base-case 6	10	8	12

Figure 8-52 to Figure 8-63 show the influence of the product lifetime on the total energy consumption and life-cycle costs of the different base-cases and associated improvement options. For all situations, despite the expected variations in absolute values, the ranking of the different improvement options remains the same whether the minimum or maximum parameter is used.

■ **Base-case 1: Domestic electric hob**

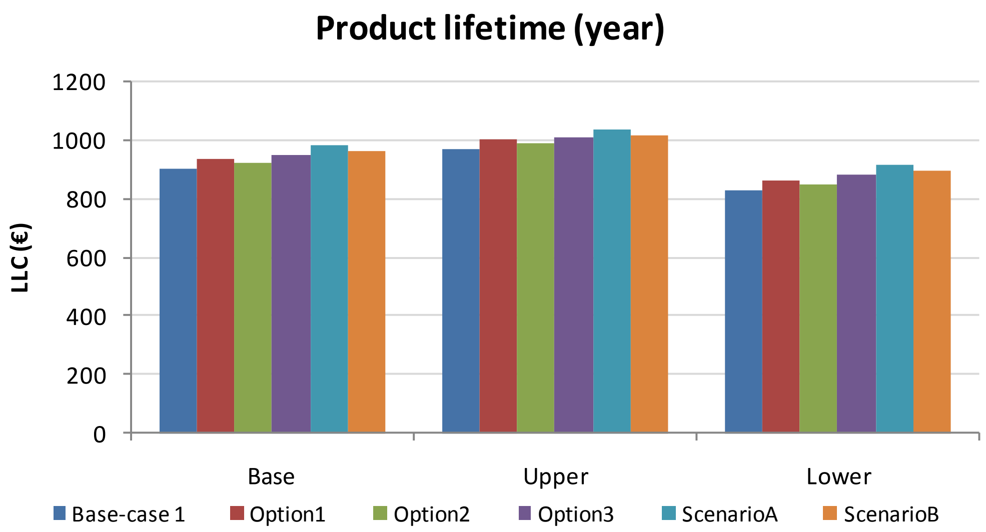


Figure 8-52: Sensibility to product lifetime for BC1 Life Cycle Cost

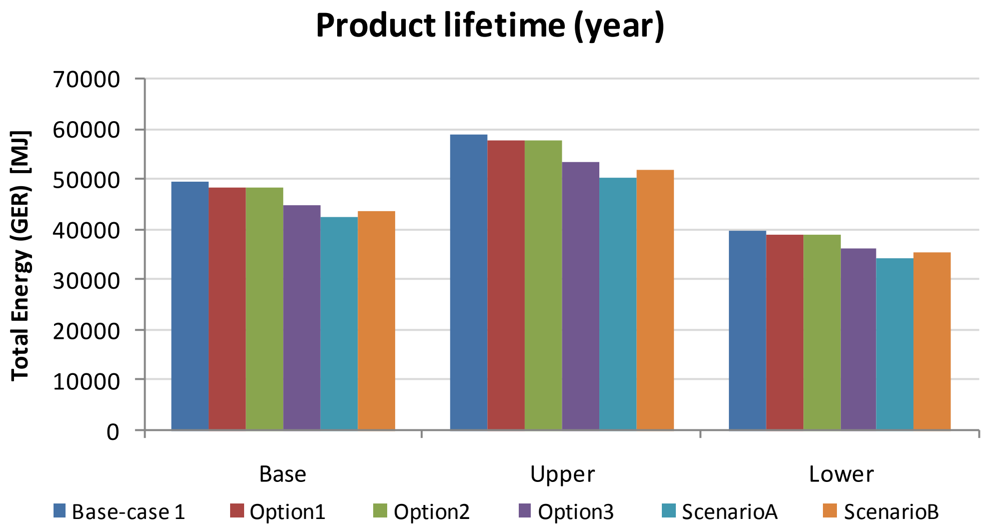


Figure 8-53: Sensitivity to product lifetime for BC1 Total Energy

■ **Base-case 2: Domestic gas hob**

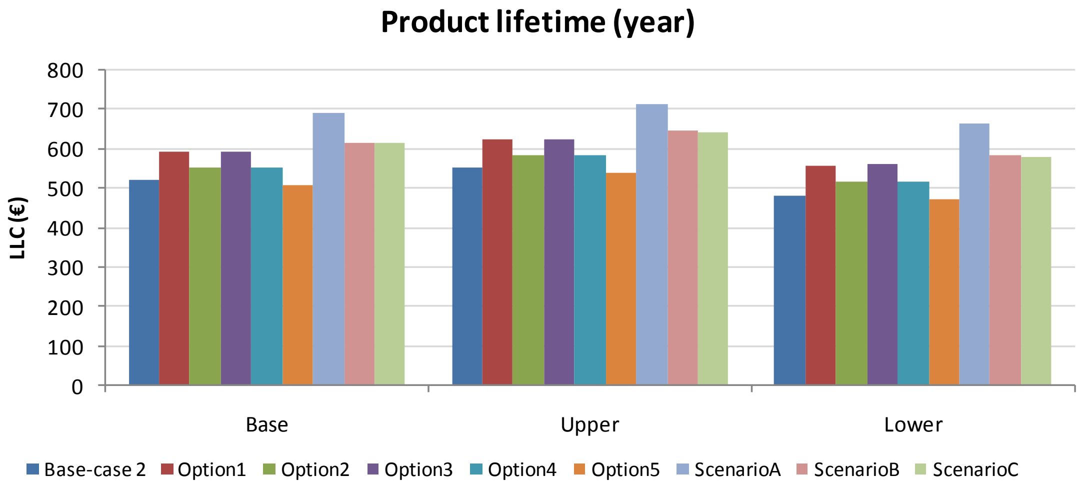


Figure 8-54: Sensitivity to product lifetime for BC2 Life-Cycle Cost

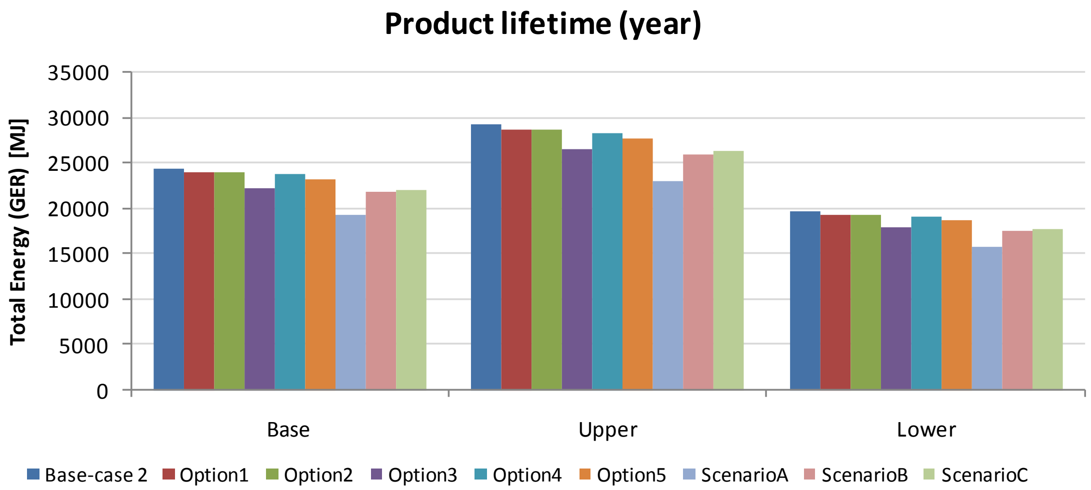


Figure 8-55: Sensitivity to product lifetime for BC2 Total Energy

■ **Base-case 3: Commercial electric hob**

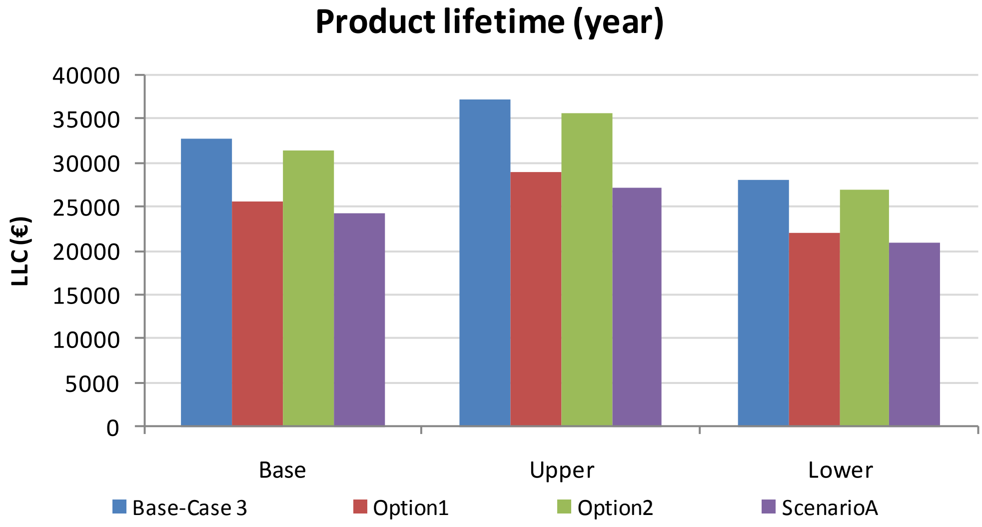


Figure 8-56: Sensitivity to product lifetime for BC3 Life-Cycle Cost

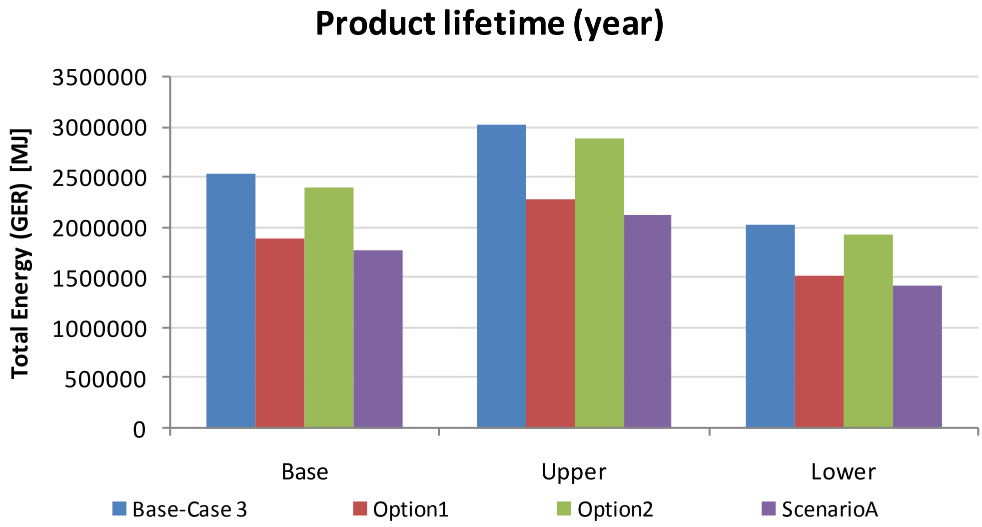


Figure 8-57: Sensitivity to product lifetime for BC3 Total Energy

- **Base-case 4: Commercial gas hob**

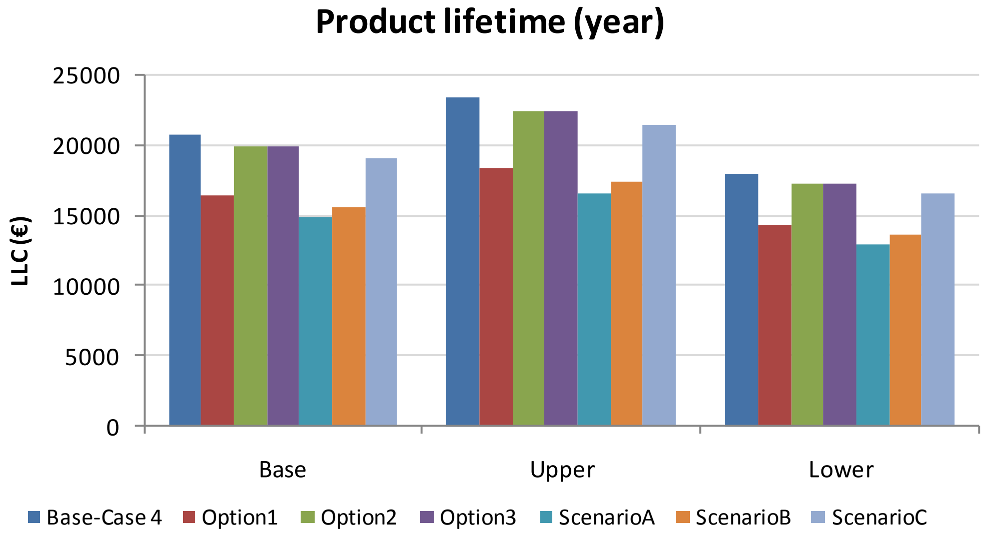


Figure 8-58: Sensitivity to product lifetime for BC4 Life-Cycle Cost

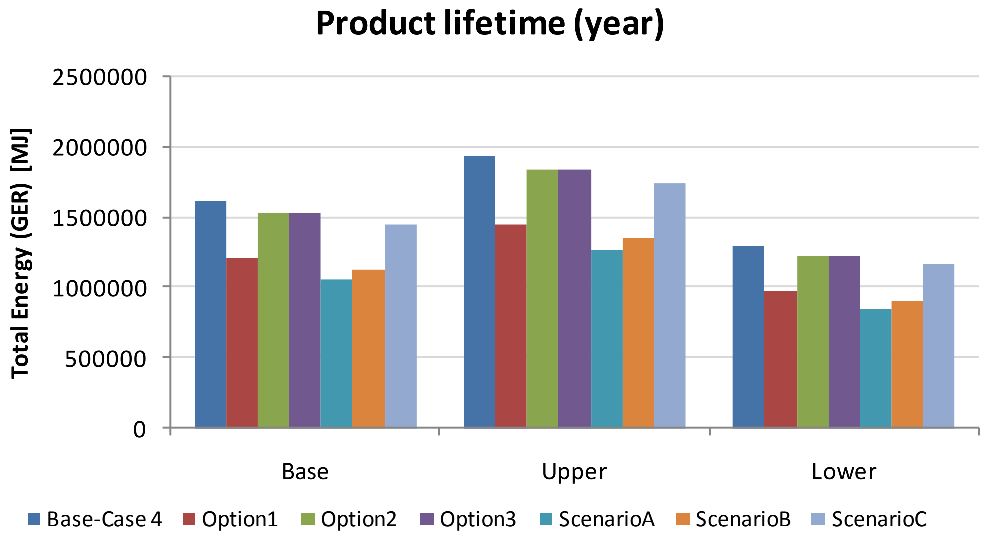


Figure 8-59: Sensitivity to product lifetime for BC4 Total Energy

■ **Base-case 5: Commercial electric grill**

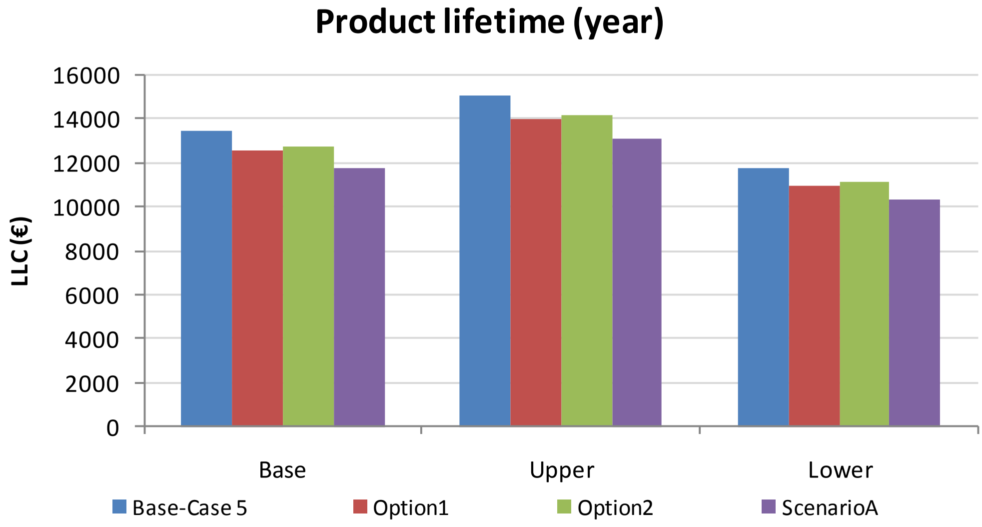


Figure 8-60: Sensitivity to product lifetime for BC5 Life-Cycle Cost

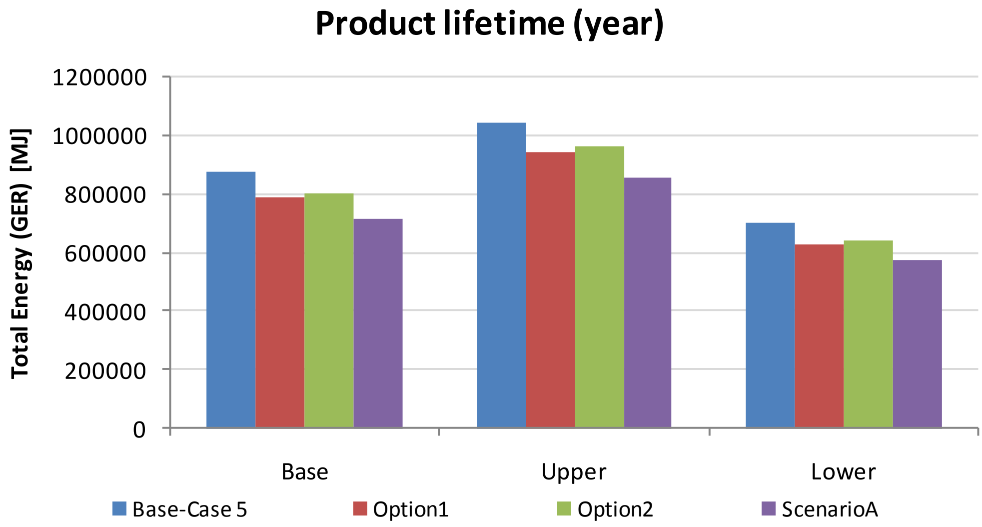


Figure 8-61: Sensitivity to product lifetime for BC5 Total Energy

■ **Base-case 6: Commercial gas grill**

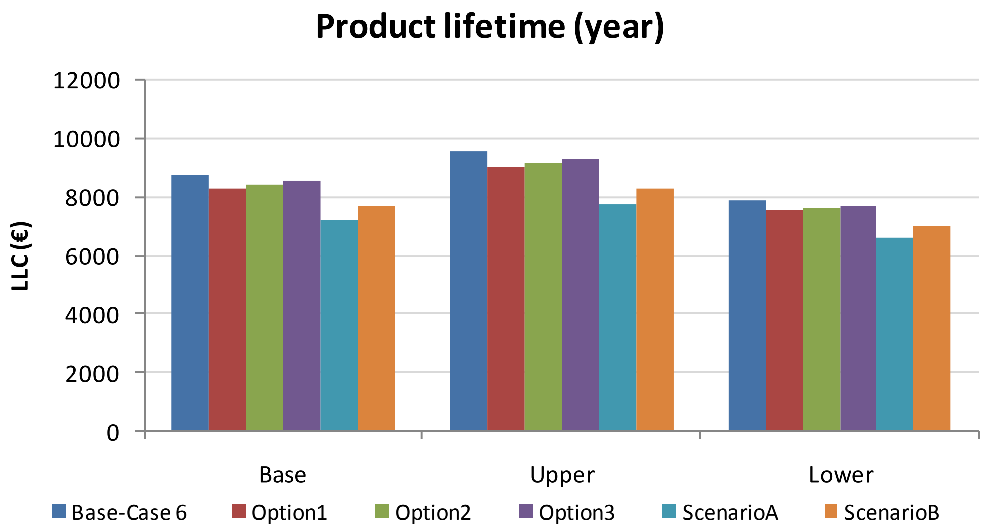


Figure 8-62: Sensitivity to product lifetime for BC6 Life-Cycle Cost

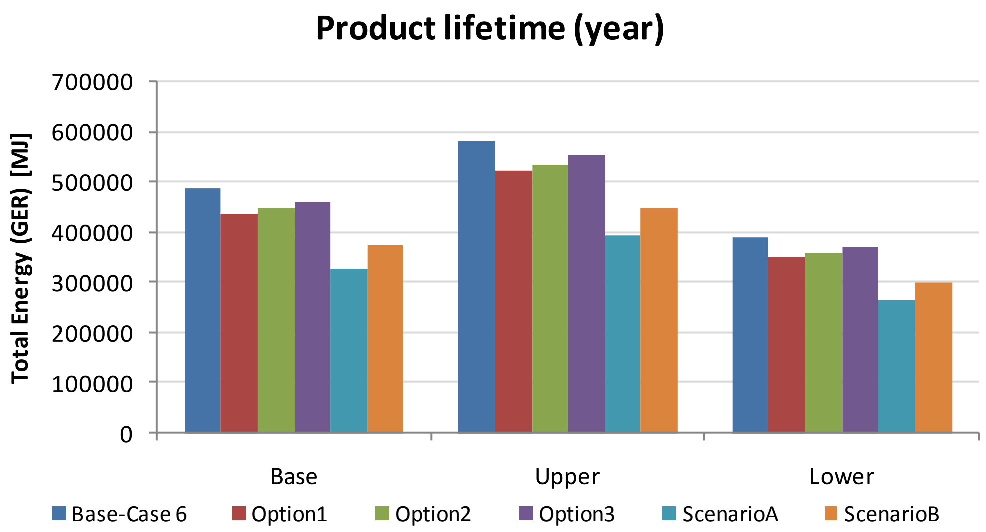


Figure 8-63: Sensitivity to product lifetime for BC6 Total Energy

8.5.5. Assumption related to the number of cycles/operating hours per year

Regarding the energy consumption, the sensitivity analysis will not directly target the consumption per cycle but will consider some variations on the number of cycles or operating hours per year in order to have an overall impact on the annual energy consumption. This is due to the fact that energy savings related to improvement options are already directly inputting on the consumption per cycle and therefore, in order to distinguish the effects of Task 7 improvement options and Task 8 sensitivity analysis, another parameter was chosen.

The sensitivity analysis will consider a 15% error margin, as it can be seen in Table 8-20, except for the max values in the domestic sector where higher values were identified in some studies at MS level (See Task 3).

Table 8-20: Variation of number of cycles in on-mode per year for each Base-Case

Base-case	Current value	Lower value	Upper value
Base-case 1	438	372.3	539.6
Base-case 2	438	372.3	508.8
Base-case 3	1248	1060.8	1435.2
Base-case 4	1248	1060.8	1435.2
Base-case 5	1248	1060.8	1435.2
Base-case 6	1248	1060.8	1435.2

Figure 8-64 to Figure 8-75 show the influence of the number of cycles or operating hours per year on the total energy consumption and life-cycle costs of the different base-cases and associated improvement options. For all situations, despite the expected variations in absolute values, the ranking of the different improvement options remains the same whether the minimum or maximum parameter is used.

- **Base-case 1: Domestic electric hob**

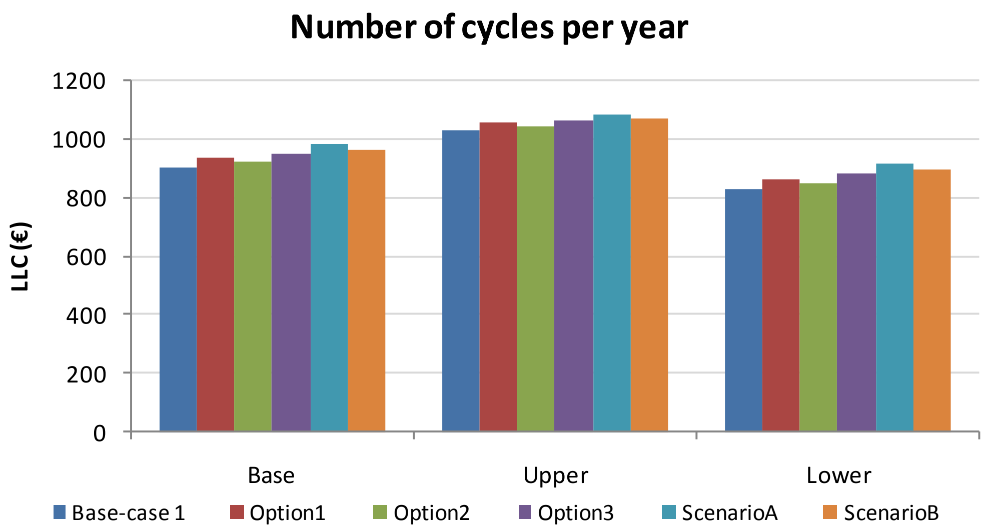


Figure 8-64: Sensitivity to the number of cycles per year for BC1 Life-Cycle Cost

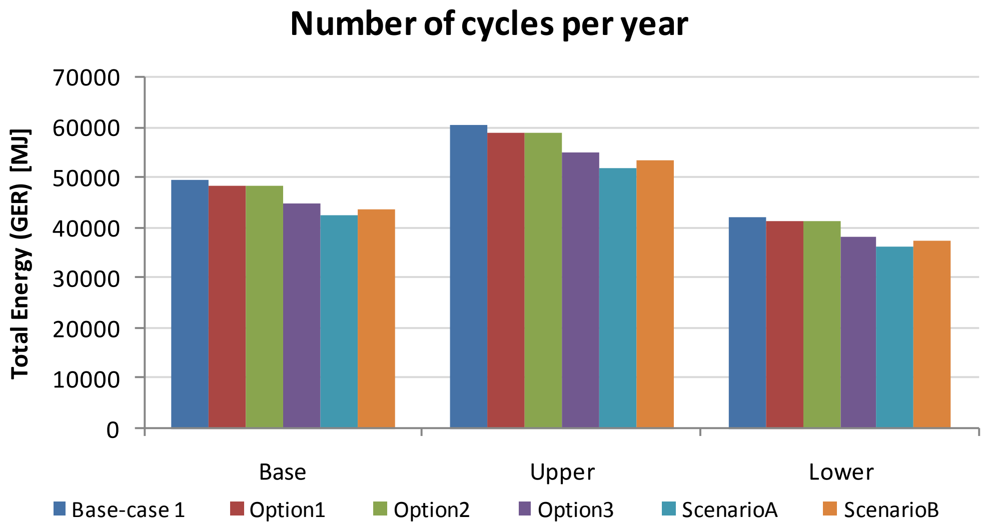


Figure 8-65: Sensitivity to the number of cycles per year for BC1 Total Energy

- **Base-case 2: Domestic gas hob**

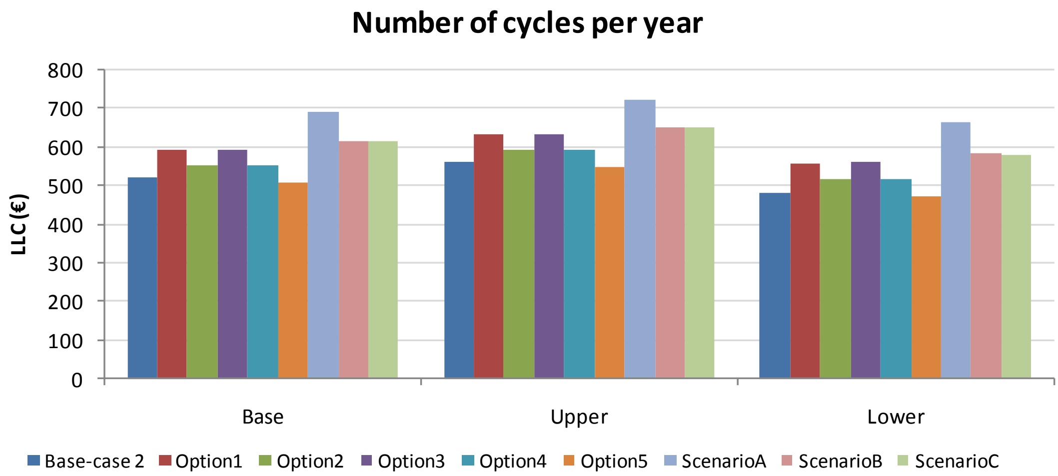


Figure 8-66: Sensitivity to the number of cycles per year for BC2 Life-Cycle Cost

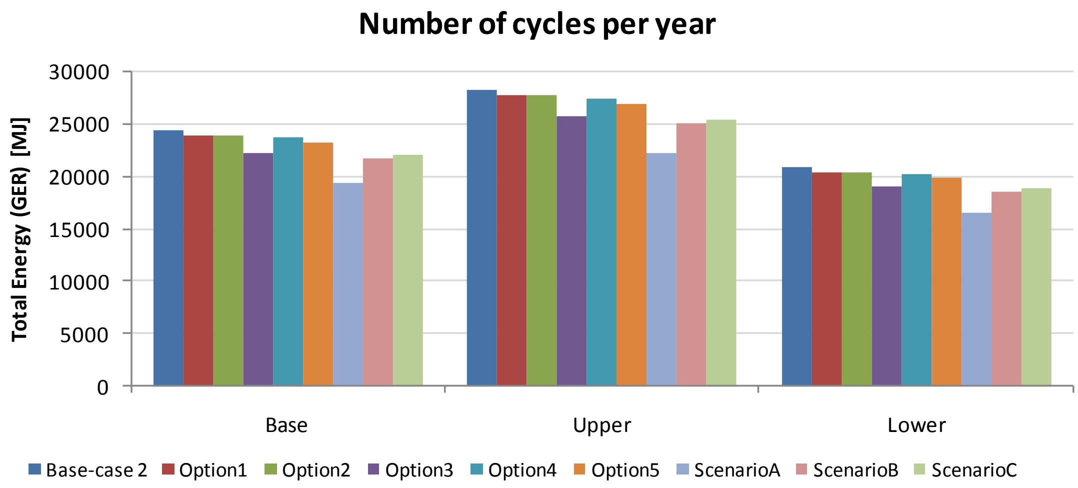


Figure 8-67: Sensitivity to the number of cycles per year for BC2 Total Energy

- **Base-case 3: Commercial electric hob**

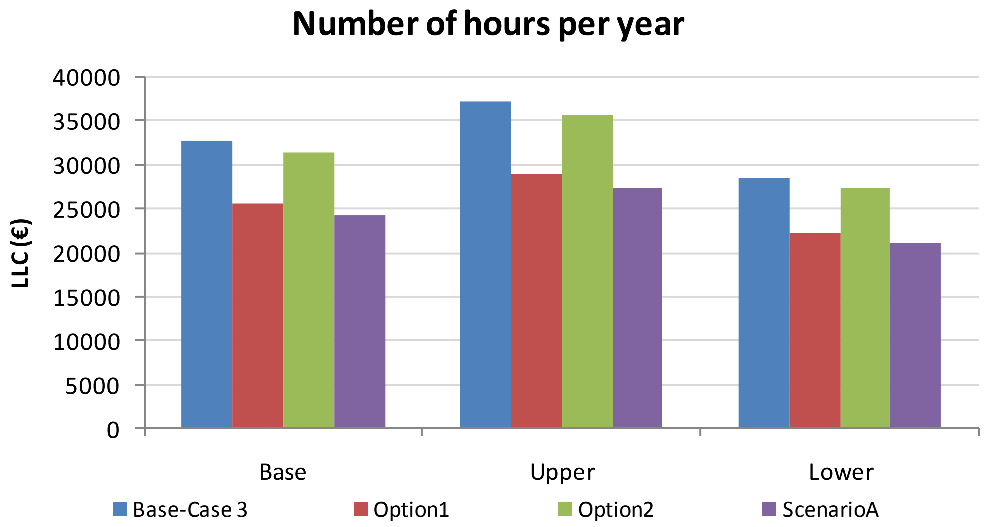


Figure 8-68: Sensitivity to the number of operating hours per year for BC3 Life-Cycle Cost

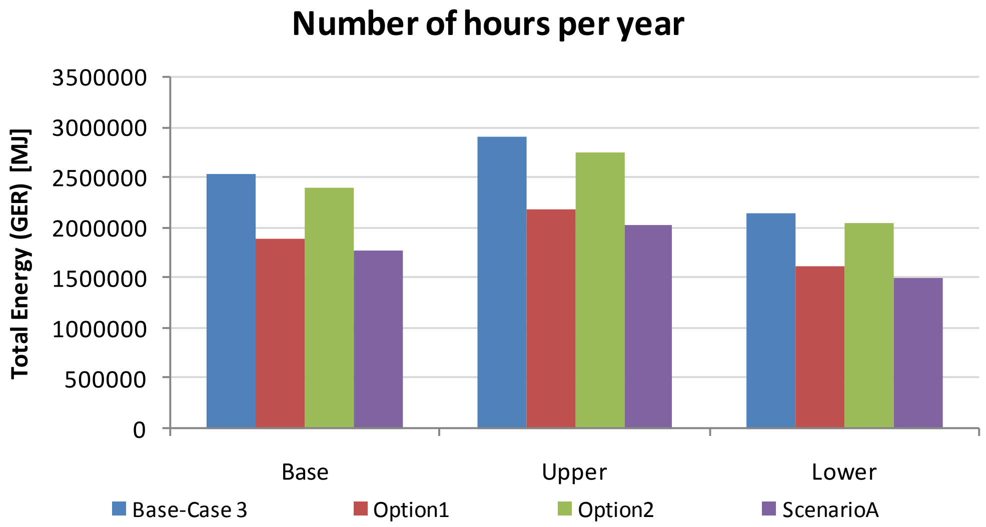


Figure 8-69: Sensitivity to the number of operating hours per year for BC3 Total Energy

- **Base-case 4: Commercial gas hob**

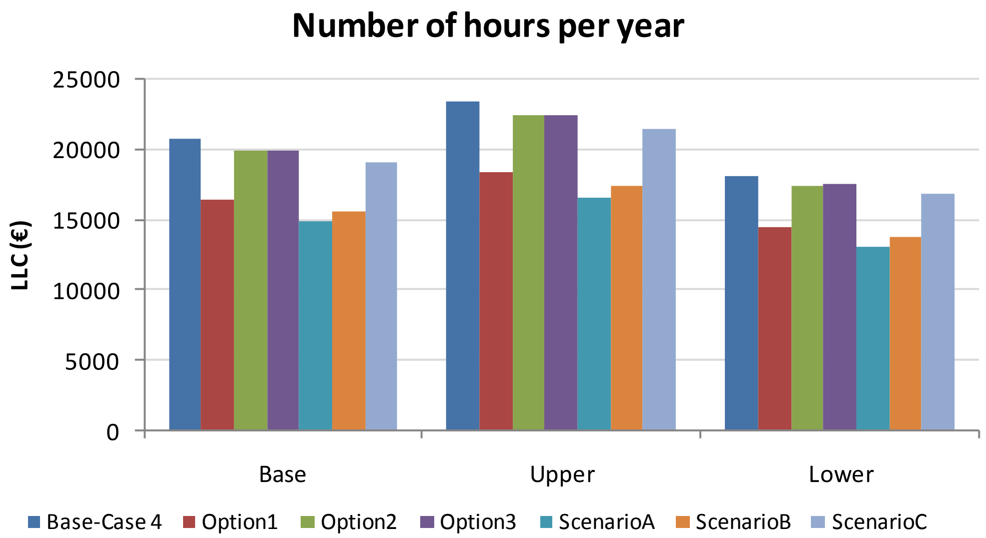


Figure 8-70: Sensitivity to the number of operating hours for BC4 Life-Cycle Cost

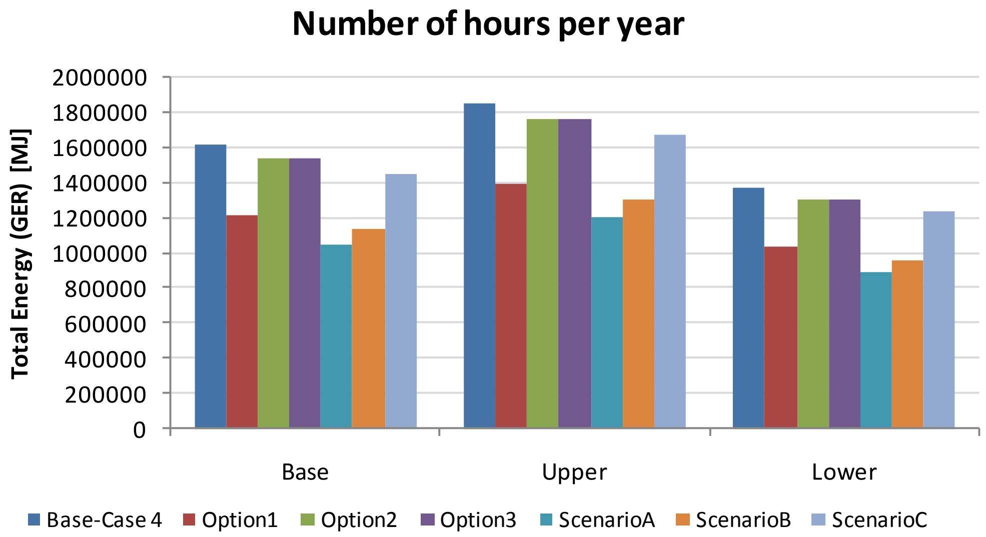


Figure 8-71: Sensitivity to the number of operating hours for BC4 Total Energy

- **Base-case 5: Commercial electric grill**

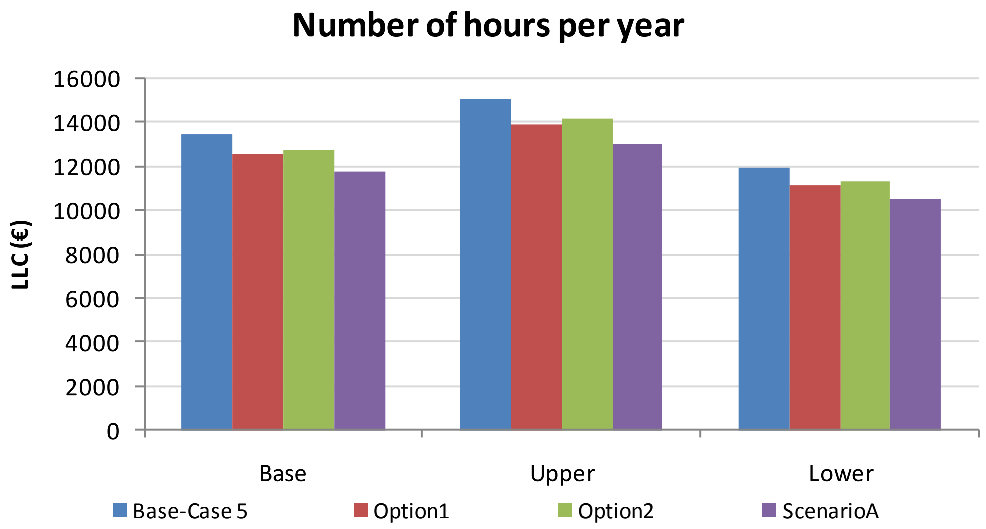


Figure 8-72: Sensitivity to the number of operating hours per year for BC5 Life-Cycle Cost

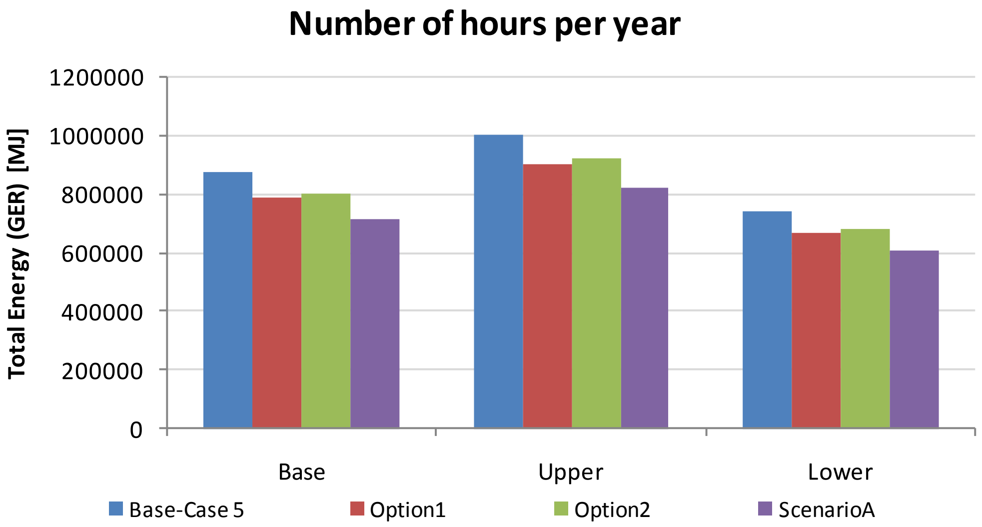


Figure 8-73: Sensitivity to the number of operating hours per year for BC5 Total Energy

- **Base-case 6: Commercial gas grill**

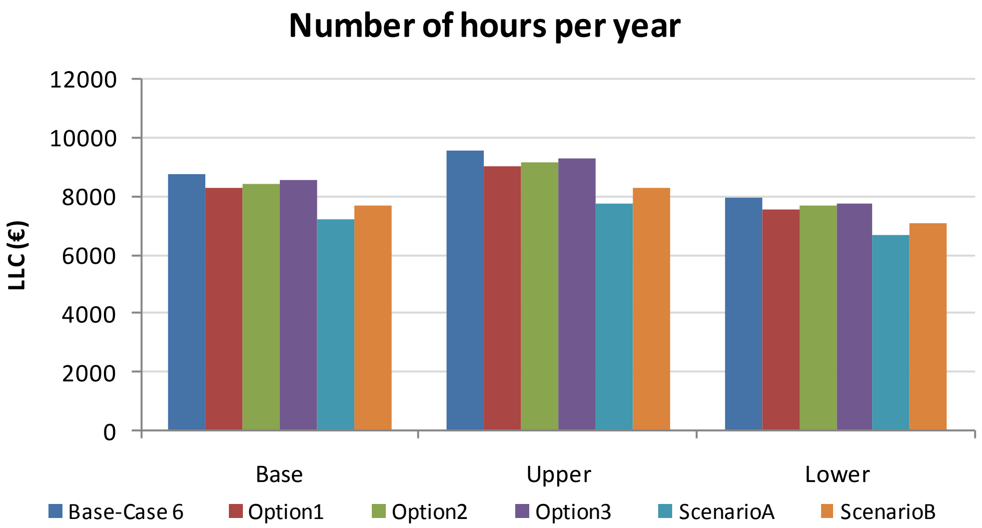


Figure 8-74: Sensitivity to the number of operating hours per year for BC6 Life-Cycle Cost

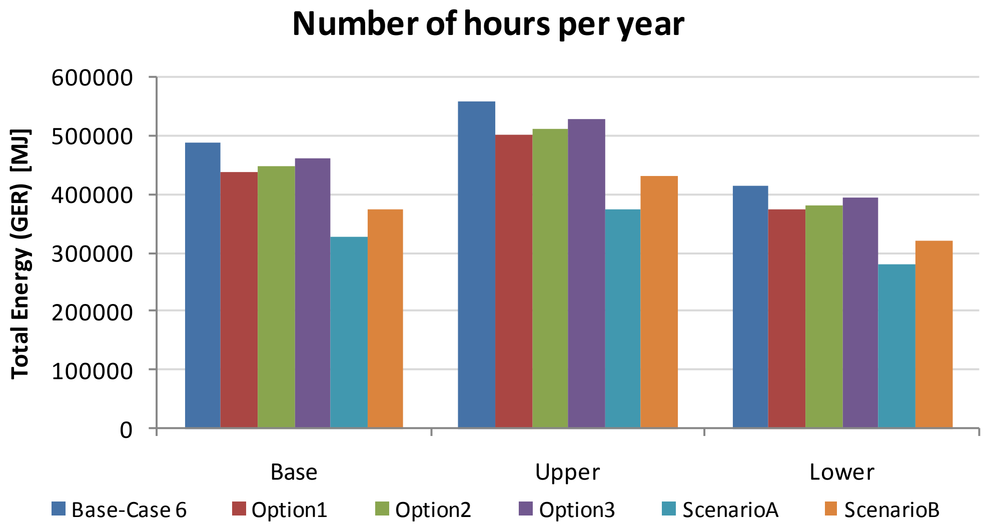


Figure 8-75: Sensitivity to the number of operating hours for BC6 Total Energy

8.5.1. Conclusion on the sensitivity analysis

When varying the input data on 5 parameters: energy rate, discount rate, product purchase price, product lifetime and annual energy consumption, the ranking of the base-case and the different improvement options / scenarios is almost not affected for the 6 different Base-cases. For all situations, the LLCC remains the same option that was already identified in Task 7. This observation strengthens the reliability of the outcomes presented in previous tasks.

8.6. CONCLUSIONS

This Task summarises the final outcomes of the ENER Lot 23 preparatory study. It looked at suitable policies and measures to achieve the environmental improvement potential, notably implementing "user-independent" LLCC products as minimum energy performance standards (MEPS) in the short-term (and also in the medium-term for commercial appliances). Such measures clearly depend on the establishment of harmonised test standards which would enable an objective evaluation of the cooking appliances and a further calibration of the tentative MEPS. Current standardisation work led by CENELEC/TC59X/WG10 and CEN/TC49/WG2 for domestic hobs and EFCEM for commercial hobs and grills, is therefore decisive in that regard.

Such standardisation would also enable the potential implementation of an energy labelling for domestic hobs, as comparative measurements could be analysed with better transparency and the current market could be characterised with a better consistency in order to determine thresholds for energy classes. Preliminary results based on the CENELEC/TC59X/WG10 draft protocol tend to show a low differentiation between electric hobs (solid plates, radiant and induction) given a limited amount of products. Moreover, a further consideration on potential energy labelling for hobs raises the question whether a common approach for gas and electric appliances should be taken (given the existence of a common standard) or a separate one. A common labelling would enable a better comparison in terms of primary energy consumption of any hobs on the market whereas a separate approach would allow final energy consumptions to be expressed in billing units, which would make the classification easier to understand for consumers. Such issue will also need to be addressed for the domestic ovens (ENER Lot 22), where a label for electric ovens already exists. Revised and potential new labelling should ensure consistency within the lots.

For commercial hobs and grills, MEPS are also proposed based on user-independent BAT options identified in Task 7 but energy labelling is less relevant given the rather low sales figures and the fragmented market at EU level. However, benchmarking actions would help to provide performance comparison and to further characterise the market. Some Green Public Procurement requirements would also be relevant as end-users in institutional cooking facilities are often not involved in the appliance purchase and unaware of the related operating costs. Therefore, the use of pot and/or cooking sensors could be required.

More generally, as identified in Task 3, the user-behaviour is a key aspect when promoting energy savings. General requirements to better inform and educate the consumer are strongly recommended, notably on the usefulness of sensors. That is further confirmed when looking at the projected scenarios over the period 2010-2025 to quantify the improvements that can be achieved with respect to a Business-as-Usual Scenario. Indeed, a user-independent scenario including the 6 product categories would allow 94 PJ of energy saving over the 2010-2025 period, whereas 332 PJ could be potentially saved when considering user-dependent options such as sensors (although related savings are more subjective to assess as explained in Task 7).

Finally, a sensitivity analysis was made with respect to the main assumptions used in the study. When varying the input data on 5 parameters: energy rate, discount rate, product purchase price, product lifetime and number of cycles/hours per year, the ranking of the Base-Case and the different improvement options / scenarios shows very limited variations for the 6 different Base-cases and tend to confirm the reliability of the outcomes.