Efficient Appliances for People & the Planet

Total Cost of Ownership of Domestic Gas and Electric Hobs in Europe

Updated March 2024

1. INTRODUCTION AND OBJECTIVE

Cooking with fossil gas needs to be phased out if the EU and UK are to meet their net-zero targets, as this would require moving away from gas and using electricity generated from renewable energy sources. Moreover, research conducted in both the United States (Frontier Energy 2019) and Europe[1] indicates that gas hobs are significantly less efficient than electric hobs. Gas cooking appliances can also harm our health: CLASP research has established that they emit hazardous air pollutants, specifically nitrogen dioxide.

Public awareness of these issues is low, however. Many people prefer gas cooking appliances, believing that they're better for cooking, heat up faster, and are cheaper to purchase and use than electric alternatives (Blair and Demartini 2023).

The European Commission and the UK government are currently conducting a review of the Ecodesign and Energy Labelling requirements for domestic cooking appliances (European Commission 2017b; 2017a), presenting a key opportunity to address the health and environmental impacts of gas hobs and ovens. However, the Joint Research Centre's preparatory study that is informing the policy revisions does not address differences in pollution or efficiency between gas and electric cooking appliances (Joint Research Centre 2022). Also, since no gas hob phase out scenario was included, the potential costs and benefits of phasing out gas appliances were not considered.

This paper provides an overview of the total cost of ownership of both gas and electric appliances, taking into consideration the above factors. It presents an overview of the domestic gas and electric hobs[2] market across Europe and in select countries. It then considers multiple cost factors to assess and compare the actual costs involved in cooking with gas or electric hobs. This information will help inform the need to accelerate the transition to electric cooking via energy labelling and Ecodesign requirements entering into force in 2025.

[1] CLASP has developed a common test method for gas and electric hobs, and preliminary results show that gas hobs are less efficient than electric. Results will be published later this year.

[2] This report uses "hobs" to refer to the cooktop and to cooking zones or burners – to refer to where the pot sits.

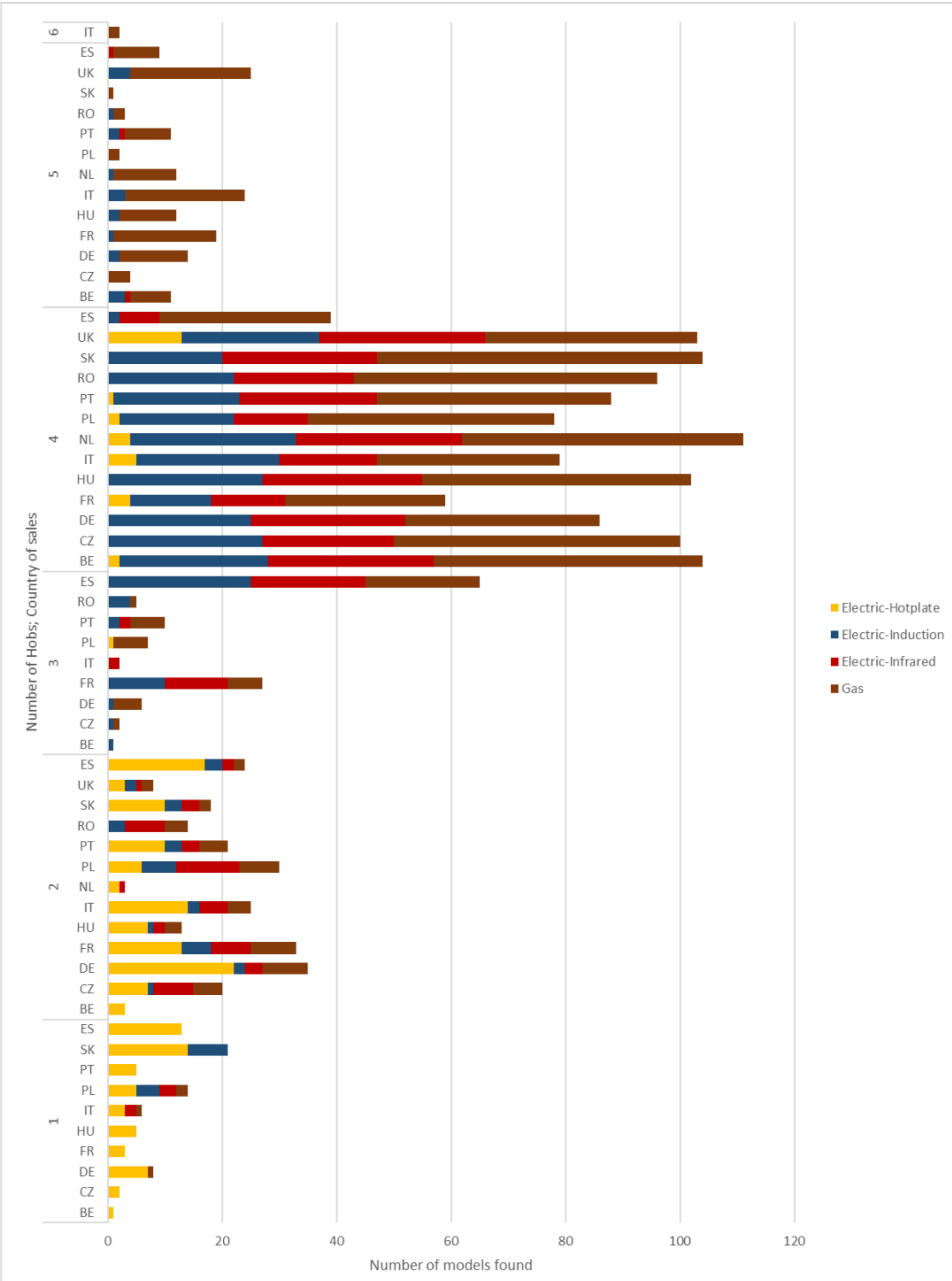
2. HOB AVAILABILITY AND PRICING IN EUROPE

Data on the availability and prices of hobs were collected for 12 European Union countries, including Belgium, Czechia, France, Germany, Hungary, Italy, the Netherlands, Poland, Portugal, Romania, Slovakia, and Spain, as well as for the United Kingdom. These countries were selected because they have a high percentage of households that cook on gas (Eurostat 2022) as well as a strong mix of gas and electric hobs sold on the market.

During the summer of 2022, CLASP conducted online research from 3 popular retailers in each country and gathered data for 120 to 160 models of hobs, covering all 4 technologies (electric hotplates, electric radiative/infrared, induction and gas) and all numbers of electric cooking zones and gas burners, referred to as cooking zones throughout the remainder of this paper. In total, we collected data for 1,748 hobs, from 39 websites.

Electric hotplate hobs were more difficult to find in some countries and were not proposed by some of the selected online retailers. Hotplates were very common for smaller models, with 1 or 2 cooking zones, while infrared, induction, and gas hobs dominated the market for larger models (Figure 1). This could be an indication that electric hotplates are the preferred electric technology for models sold at a lower price point.

FIGURE 1 SAMPLE DISTRIBUTION PER COUNTRY, NUMBER OF COOKING ZONES AND TECHNOLOGY



Hobs with 4 cooking zones were by far the most widely represented on the online stores visited (Figure 1). This is consistent with the choice made in the Joint Research Centre's (JRC) Preparatory study of Ecodesign and energy labelling measures for domestic cooking appliances (Joint Research Centre 2022) to use 4 cooking zones for the base cases. While the JRC study excluded hotplates from its analysis, this research kept them to get a full picture of the options available to consumers.

Table 1 provides an overview of the sample collected for each hob technology, including the number of cooking zones and models in our sample and the minimum, maximum, average and standard deviation of prices found for each of those sub-categories. Prices were converted to Euros to simplify analysis[3].

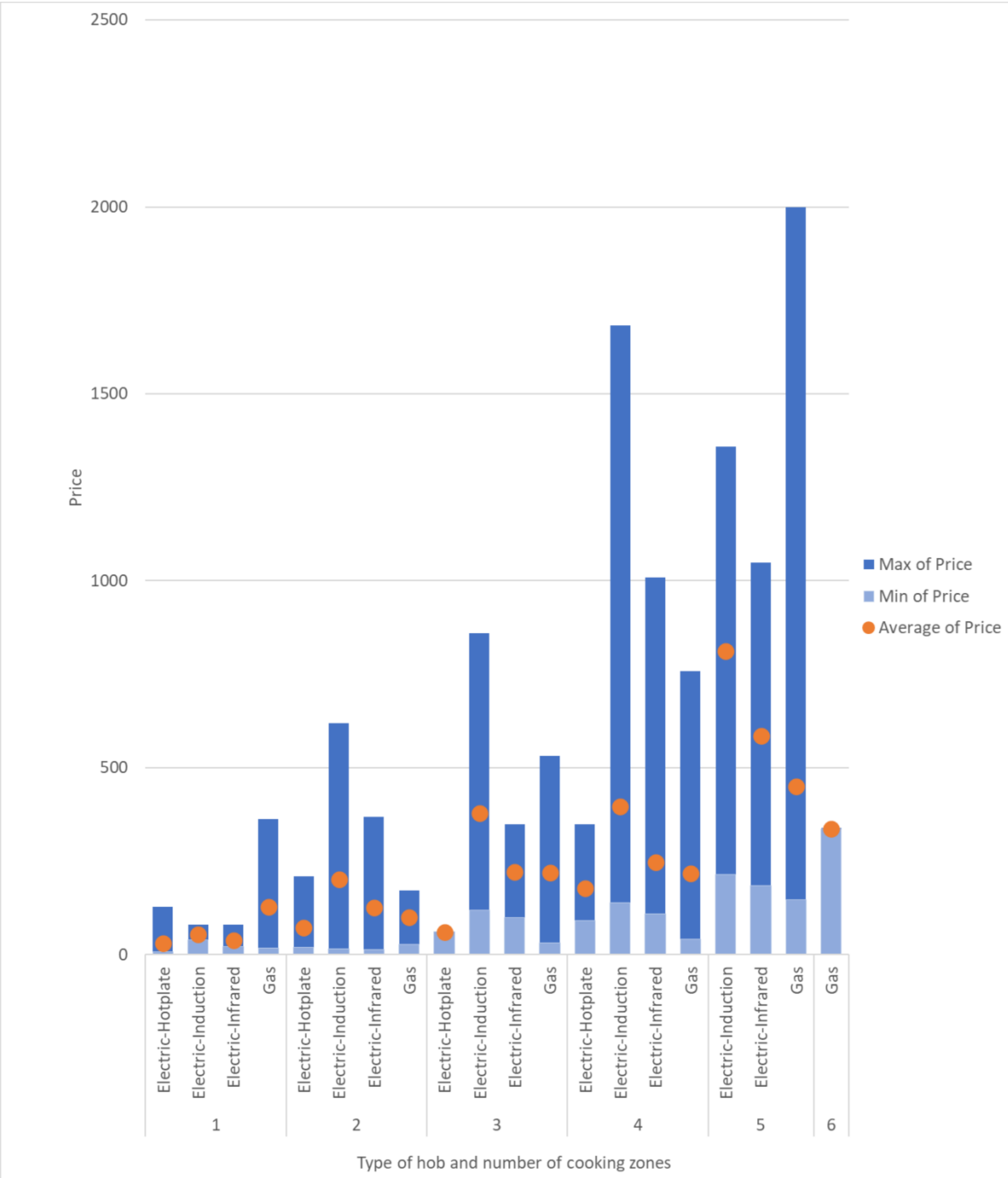
[3] Rates of September 2022 from https://www.xe.com/currencyconverter/.

TABLE 1 NUMBER OF HOB MODELS BY COOKING ZONE NUMBER AND PRICES (MINIMUM, MAXIMUM, AVERAGE, AND STANDARD DEVIATION) IN THE SAMPLE.

Type of hob, with number of cooking zones	Models (#)	Min Price (€)	Max Price (€)	Average Price (€)	StdDev of Price (€)
1	**78**	**7,92**	**363,49**	**39,30**	**42,38**
Electric-Hotplate	58	7,92	129,00	30,16	17,50
Electric-Induction	11	39,69	80,90	55,46	12,27
Electric-Infrared	5	21,00	79,99	38,11	23,97
Gas	4	16,80	363,49	128,94	160,38
2	**247**	**13,99**	**619,00**	**105,39**	**86,92**
Electric-Hotplate	114	20,42	210,30	71,69	44,42
Electric-Induction	31	14,99	619,00	202,16	174,10
Electric-Infrared	52	13,99	369,00	126,35	64,43
Gas	50	27,09	171,45	100,40	38,01
3	**125**	**31,29**	**860,59**	**274,62**	**155,41**
Electric-Hotplate	1	60,69	60,69	60,69	-
Electric-Induction	44	119,99	860,59	378,29	174,44
Electric-Infrared	35	99,99	349,00	220,88	72,17
Gas	45	31,29	532,49	219,81	130,96
4	**1149**	**41,79**	**1.682,00**	**267,70**	**157,08**
Electric-Hotplate	31	91,64	349,00	177,22	65,54
Electric-Induction	283	139,19	1.682,00	395,64	203,00
Electric-Infrared	287	110,19	1.008,04	247,45	118,24
Gas	548	41,79	759,00	217,36	106,35
5	**147**	**146,97**	**1.999,00**	**500,06**	**325,45**
Electric-Induction	19	214,59	1.359,00	812,72	339,59
Electric-Infrared	3	184,99	1.049,00	584,66	435,62
Gas	125	146,97	1.999,00	450,51	295,43
6	**2**	**335,00**	**338,50**	**336,75**	**2,47**
Gas	2	335,00	338,50	336,75	2,47
Grand Total	**1748**	**7,92**	**1.999,00**	**254,69**	**195,86**

The analysis of prices showed that, except for hotplates, which never reached high prices, all other technologies can be found across a wide range of prices for each of the selected countries. Hotplates are on average the cheapest option, although the minimum prices show that all other technologies can offer very competitive prices, in particular for the smaller models.

FIGURE 2 MINIMUM, MAXIMUM, AND AVERAGE PRICES FOUND ACROSS THE SAMPLE OF 12 EU COUNTRIES AND THE UK



The results of the research showed a wide price range, in particular in the models with 4 or 5 cooking zones. The higher prices of some models seemed linked to other aspects of that technology, such as design or longer warranty time. For hobs with 3 and 4 cooking zones, the average price of infrared hobs was similar to the average price of gas hobs, with hotplates being cheaper and induction representing an extra investment of the order of 150€, on average. For all sizes, the minimum price found for induction hobs was lower than the average prices for gas and infrared.

Based on this analysis, all four technologies are widely available across Europe, and **the purchase price of most electric hob technologies is not a barrier to transitioning from gas to electric cooking. A small upfront investment in the form of government incentives would accelerate the take-up of typically more costly, but very efficient, induction hobs.**

3. COST OF COOKING COMPARISON – GAS VS. ELECTRIC

As shown in the previous section, models can be found across a wide range of prices for each technology, except for hotplates, which were not found in high-range models. This suggests that the purchase price of cooking appliances is not strongly determined by their fuel type. Therefore, opting for electric is not necessarily associated with a higher initial investment.

To further understand the implications of purchasing different hob types, this study carried out an analysis to estimate and compare the total cost of ownership of an average model for each technology. To complement CLASP's 2022 data collection on the pricing of various hob technologies, we acquired data from Transparency Market Research. The dataset we obtained provides only the average prices for product groups and subgroups, rather than offering a more thorough view on the range of prices collected through CLASP's research. Despite this, we used the data from Transparency Market Research to estimate the total cost of ownership, given the organization's reputation as a reliable data source. However, it should be noted that the conclusions drawn from CLASP's data align with those obtained from Transparency Market Research's data.

3.1 Methodology

This study applied the same methodology used in the Ecodesign preparatory studies. The intended outcome is to facilitate the assessment and interpretation of the hypothesis and results for European stakeholders. We defined base cases considering the popularity and representativeness of products and used the total cost of ownership formulas provided in the Methodology for the Ecodesign of energy-related products and the Ecodesign Ecoreport tool (European Commission 2022).

The analysis was carried out per country, incorporating cooking appliance prices sourced from Transparency Market Research and installation and repair costs derived from the JRC study. Energy prices and inflation data were sourced from Eurostat, both at the national level and for the EU-27.

For the United Kingdom, appliance prices were also provided by Transparency Market Research, while energy prices and inflation information was collected from datasets, reports, and announcements available on https://www.gov.uk/, https://www.ofgem.gov.uk and https://www.ons.gov.uk. Installation and end-of-life costs for the UK are based on the JRC study, as well as information available on the websites of large retailers and quote requests websites.

3.2 Base cases and basic assumptions

CLASP's analysis of the availability of technologies and sizes of hobs determined four base cases for each technology option. Since hobs with 4 cooking zones were by far the most common option, we focused our cost analysis on this type of model. Even though hotplates seem less common for hobs with 4 cooking zones than infrared, induction, or gas, the technology is still widely available and may be desirable where more robust equipment is required (e.g., in student accommodations).

We used the same lifetime, installation costs, and maintenance and repair costs as the JRC did in the Ecodesign review study (Joint Research Centre 2022) but updated the average prices of each base case using the 2023 prices provided by Transparency Market Research. For hotplates, which are not one of the base cases in the JRC study, we assumed the same installation costs as for all other options. We assumed lifetime and maintenance and repair costs similar to gas, as they both are robust technologies.

TABLE 2 COSTS AND LIFETIME FOR EACH BASE-CASE

		Ecodesign review study			Used in this report			
Technology		Infrared	Induction	Gas	Hotplates	Infrared	Induction	Gas
EU-27 (EUR)	Average purchase price	252	535	210	127	320	407	243
	Lifetime (years)	19	15	19	19	19	15	19
	Installation costs	82	82	82	82	82	82	82
	Maintenance and repair costs	15.75	27.60	11.00	11.00	15.75	27.60	11.00
UK (GPB)	Average purchase price				111	280	356	212
	Lifetime (years)				19	19	15	19
	Installation and end of life				110	110	110	170
	Maintenance and repair costs				9.48	13.58	23.79	14.48

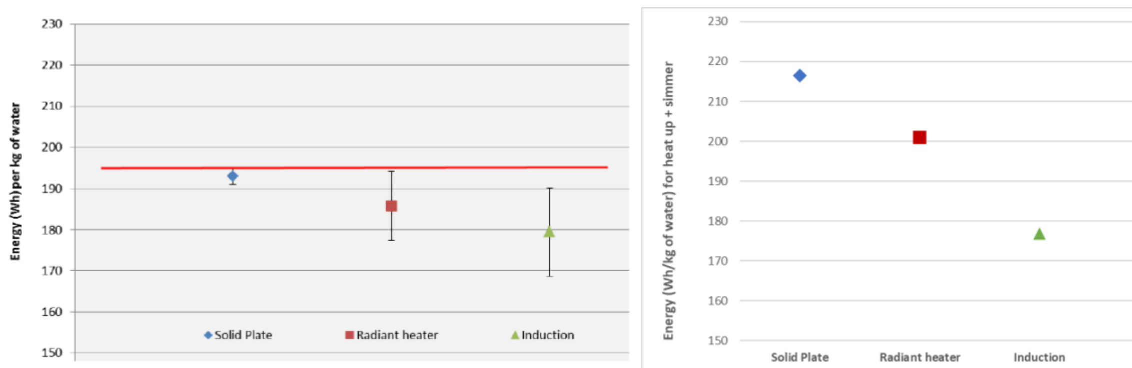
With different test methods for gas hobs and electric hobs, the available European literature did not provide comparable consumption or efficiency figures for all technologies. The annual energy consumption used for this cost analysis was therefore calculated based on the results of the efficiency tests led by CLASP on 8 hob samples, using the same methodology for all hob technologies. The only difference was that gas hobs' efficiency was tested with aluminum pans, while stainless steel pans were used for testing electric hobs, consistent with the existing testing standard requirements[4]. The tests included a heat-up test and a simmering test, both performed using 18 mm pans and 15 mm pans. For the purpose of these calculations, we considered the sum of one heat-up and one simmer test to count as one cycle and used the results of both pan sizes with a weighting of ¼ for 15 mm and ¾ for 18 mm – consistent with consumer surveys on cooking habits and the use of undersized pans (cf. forthcoming CLASP publication). The details of the test method can be found in CLASP's proposed transitional test method for domestic hobs.

For reference, the consumption per kilogram of water measured with the CLASP proposed test method can be compared with the energy consumption per kg of water communicated by APPLiA and mentioned in the Ecodesign review study (JRC 2022, Figure 264), as shown in Figure 3. The energy consumption measured by CLASP

[4] CLASP also tested gas hobs with stainless steel pans, which led to higher consumption than with aluminium pans. For the purpose of these calculations, we used the results of the tests carried out with aluminium pans, as this is the existing test method used to determine gas hob efficiency.

corresponds to the average reported by APPLiA for induction, while it slightly exceeds the reported values for radiant and solid plates. This difference is due to the inclusion of a test with a smaller pot, contributing to the differentiation in efficiencies between technologies.

FIGURE 3 ENERGY CONSUMPTION RANGES OF ELECTRIC HOBS. SOURCE: (LEFT:APPLIA IN JRC, 2022; RIGHT: CLASP MEASUREMENTS)



CLASP built scenarios based on:

- The earliest year in which revised Ecodesign and energy labelling regulations were likely to be implemented and, therefore, consumers' hob choices impacted.
- Estimated energy efficiency as explained above.
- Projections of energy prices that take into account the prices and trends observed over the past 5 years.

Several scenarios are presented below to demonstrate the impact of different parameters on the cost estimates.

3.2.1 Implementation date

The policies in both the EU and the UK are currently under review.

In the EU, the European Commission prepared and shared a preparatory study report on domestic cooking appliances in late 2022 and organized a first consultation thereafter. It is hosting a second Consultation Forum in March 2024, and the regulation is currently expected to be adopted in late 2024. An implementation date for the regulations is assumed in 2026. A similar timeline is expected in the UK.

3.2.2 Efficiency and annual consumption of hobs

As explained above, we relied on CLASP's energy efficiency measurements to ensure comparable efficiency estimates across all technologies. While our basis scenario is based on CLASP's data, we used the consumption figures from the 2022 JRC study in one of our scenarios.

We considered several sources to translate the consumption per kilogram of water into annual consumptions. The 2022 JRC study indicates 12 cooking cycles per week without specifying the average volume of water, whereas the 2022 Ecodesign Impact Accounting study assumes an average of 1229 liters of water per year to be heated up by 75K and kept warm for 20 minutes. For the basis scenario, we used an assumption of 1.5 liters of water 12 times per week, while for a heavy usage scenario, we adopted the 1229 liters of water per year assumption.

3.2.3 Energy prices

The current prices of electricity and gas were taken from Eurostat: Electricity prices for household consumers [nrg_pc_204, band DC] and Gas prices for household consumers [nrg_pc_202, band D2] for the prices of gas and electricity for each country, and HICP – monthly data (annual rate of change) [prc_hicp_manr] for the average inflation and the specific inflation of the price of electricity and of gas.
For the UK, the scenarios were based on data found on the websites of the national government, the energy regulator, and the Office for National Statistics (https://www.gov.uk/, https://www.ofgem.gov.uk, and https://www.ons.gov.uk).

Even before the beginning of the war in Ukraine, energy prices had been changing faster than in the past few years. The increase in prices was faster than general inflation and does not fit in the framework for the application of the default rules of the life cycle cost analysis as defined in the Ecodesign methodology[5]. This trend was reflected in the study scenarios and the formulas from the Ecodesign Ecoreport were used. The sources of the observed price evolution, as well as the future decision-making, differ between the EU-27 and the UK. We therefore separated the analysis between EU and UK.

3.2.4 European Union price projections

The prices and trends were collected from Eurostat. The observed trends were reflected in our scenarios through:

- Higher energy prices in the year of entry into force of the Ecodesign and energy labelling regulations compared to 2023 prices (most recent average annual prices available), using the average annual rate of change for electricity and for gas over the period 2019-2023
- Escalation rates for electricity and for gas that differ from the discount rate, also considering the trend of the 2019-2023 period

[5] The default rules of the life cycle cost analysis, as defined in the Ecodesign MEErP, consider that the escalation rate and discount rate cancel each other out. The MEErP, however, sets a boundary condition that “the real inflation-corrected energy prices growth rate do not deviate more than 1% point from the given 4%”, which has not been the condition of the past years. We therefore applied the more complex formulas as included in the Ecodesign Ecoreport spreadsheets.

To estimate the 2026 electricity and gas prices, we applied to the period 2024-2026 the average annual growth rate of energy prices over the period 2019-2023 (nearly 9% for electricity and over 13% for gas). 2023 energy prices were taken directly from Eurostat.

Concerning the escalation rate, the MEErP (European Commission 2022) mentions that:

> *"The energy rates given here are valid for Jan. 2011 . . . [I]t is proposed to use these rates in all preparatory studies, adjusted with an overall escalation rate of 4%/a (energy price growth rate corrected for inflation). Boundary condition is that the real inflation-corrected energy prices growth rates do not deviate more than 1%-point from the given 4%. If that happens, the differentiated LCC calculation with actual prices should be followed."*

Over the period 2019–2023, according to Eurostat data, the average difference between the general inflation and the electricity-specific inflation is 4.8%; the average difference between the general inflation and the gas-specific inflation is 9.1%. We used escalation rates reflecting these values over the lifetime of the equipment.

TABLE 3 ENERGY PRICE ESTIMATES FOR THE EU

Values for the EU 27 (EUR)	Eurostat 2023 prices	Estimated 20242–2026 average annual rate of change	Estimated 2026 prices	Escalation rate over lifetime of equipment
Electricity	0.289 €/kWh	8.92%	0.37 €/kWh	4.8%
Gas	32.97 €/GJ	13.26%	47.90 €/GJ	9.1%

Those values are EU-27 averages. For the 12 countries for which market data were collected, the study used national prices as a starting point and applied EU-average rates of change. We used the same estimated escalation rates over the lifetime of the equipment for all countries.

3.3 United Kingdom price projections

The prices and trends were collected from the government and regulator official numbers. The general observations were that after years of slow increase or stability, the prices of electricity and gas had started to rise in the second half of 2021, before the beginning of the war in Ukraine. 2022 saw a price increase of over 100% for gas, half as much for electricity. Assuming that such a steep increase could not be the basis for projections, we used the 2023 energy prices as a basis and applied the rate of consumer price increases for gas and electricity reported by the Office of National Statistics after the energy price cap rose in October 2021: 17% for gas and 9%

for electricity. Applying it to the 2024–2026 period led to 2026 prices of 0.39 GBP/kWh for electricity and 0.1442 GPB/kWh (40 GBP/GJ) for gas.

Similar to the rest of Europe, the inflation-corrected energy price growth rates deviate by more than 1% from the given 4%. We therefore used the differentiated LCC calculation as per the Ecodesign Ecoreport formula. According to the Office for National Statistics, the average general inflation over the period 2019–2023 was an annual 4%. We used escalation rates for gas and electricity that represent the difference between this average for general inflation and the 17% and 9% annual increase used for gas and electricity, respectively.

TABLE 4 ENERGY PRICE ESTIMATES FOR THE UK

Values for the UK (GBP)	Official 2023 prices	Projected2024–2026 average annual rate of change	Estimated 2026 prices	Escalation rate over lifetime of equipment
Electricity	0.30 GBP/kWh	9%	0.39 GBP/kWh	4.7%
Gas	24.94 GBP/GJ	17%	40 GBP/GJ	13.1%

4. SCENARIOS, RESULTS, AND DISCUSSION

Considering the different basis scenarios, currency, and context, it seemed more relevant to differentiate the UK scenarios and analysis from what was developed for the EU-27. This section therefore presents the EU and UK analysis separately.

European Union

The above-mentioned assumptions lead to the estimated total costs of ownership presented in Table 5 for a purchase in 2026 and for each base case: 4-cooking zone hobs with hotplates, infrared, induction, and gas. Table 5 also presents the difference between the total cost of ownership for a gas hob versus each of the electrical options, over a 15-year harmonized lifetime.

TABLE 5 ESTIMATED TOTAL COSTS OF OWNERSHIP FOR EACH BASE CASE IN EACH COUNTRY OF THE SAMPLE AND EU-27 AVERAGE OVER A 15-YEAR LIFETIME.

	Total cost of ownership (EUR)				Cost differences (EUR)		
Country	**Induction**	**Infrared**	**Hotplates**	**Gas**	**Gas vs. Induction**	**Gas vs. Infrared**	**Gas vs. Hotplates**
Belgium	2,061	2,084	2,046	1,642	-419	-442	-404
Czechia	1,574	1,569	1,514	1,572	-2	3	59
France	1,321	1,253	1,166	1,497	176	244	331
Germany	1,916	1,952	1,929	1,705	-211	-247	-224
Hungary	822	727	624	609	-213	-118	-15
Italy	1,814	1,825	1,782	1,419	-396	-407	-363
Netherlands	2,183	2,234	2,216	3,196	1,012	962	979
Poland	1,000	948	871	996	-4	48	126
Portugal	1,224	1,145	1,044	1,906	683	762	863
Romania	1,829	1,905	1,899	1,868	39	-37	-31
Sweden	1,538	1,454	1,353	2,889	1,351	1,434	1,536
Slovakia	1,095	1,032	950	899	-196	-133	-51
Spain	1,147	1,054	950	1,531	384	477	581
European Union - 27 countries	**1,504**	**1,470**	**1,402**	**1,656**	**152**	**186**	**255**

On average, in the EU-27, the total cost of ownership of a gas hob would be the highest among all technologies. We observe significant differences between countries, reflecting national differences in the pricing of gas compared to electricity. On average, both infrared and hotplate technologies offer a lower total cost of ownership than gas hobs, with no barrier due to purchase costs. Induction hobs involve a slightly higher initial investment, with purchase prices averaging higher than those of other technologies. However, under our default scenario, the price difference of induction hobs compared with gas appliances would be more than compensated over the lifetime of the equipment. This difference will be influenced by the future actual evolution of prices. We do not have sufficient elements to anticipate the relative price evolution of the different technologies, but we modelled a few scenarios reflecting different assumptions on other parameters, which reflects the sensitivity of the results to each of those aspects.

As detailed in Table 6, CLASP tested scenarios with:

- Annual consumptions from the 2022 JRC study (incl. 56% efficiency for gas hobs)
- More intensive use patterns, reflecting loads from the Ecodesign Impact Accounting study.
- Higher and lower escalation rates
- Integrating the health costs of cooking with gas over the lifetime of the equipment, as estimated in CLASP and EPHA's report (Blair et al. 2023).

Changing the discount rate would most clearly illustrate its impact on the financial interest of investing in induction rather than hotplates or infrared, which is not the focus of this report. The health costs were estimated apportioning the 3.5 billion Euro annual societal cost associated with pediatric asthma cases across the estimated 62.6 million EU-27 homes cooking with gas today, resulting in an average 55.90€ per year of gas-cooking-related health costs per household.

TABLE 6 SENSITIVITY ANALYSIS — OVERVIEW OF TESTED SCENARIOS

	Annual consumption				Escalation rates		Health costs over lifetime of the equipment
	Induction	Infrared	Hotplates	Gas	Electricity	Gas	
Basis scenario	165	188	203	319	4.8%	9.1%	0
JRC 2022 consumption	115	119	122	143	4.8%	9.1%	0
High usage	217	247	266	419	4.8%	9.1%	0
Low escalation1	165	188	203	319	4%	4%	0
Low escalation2	165	188	203	319	4.4%	6.6%	0
High escalation	165	188	203	319	5.2%	11.7%	0
Health costs	165	188	203	319	4.8%	9.1%	55.90€ per year

The results of the scenarios illustrated in Table 6 where differences from the basis scenario existed, are reported in orange. Results at the EU-27 level are summarized in Table 7.

TABLE 7 SENSITIVITY ANALYSIS – OVERVIEW OF RESULTS FOR THE EU-27

EU-27 results – TCO estimates (EUR)	Induction	Infrared	Hotplates	Gas
Basis scenario	1,504	1.470	1,402	1,656
JRC 2022 consumption	1,206	1,049	916	892
High usage	1,813	1,827	1,786	2,090
Low escalation1	1,443	1,384	1,309	1,091
Low escalation2	1,473	1,426	1,354	1,331
High escalation	1,537	1,516	1,451	2,098
Health costs	1,504	1,470	1,402	2,495

In the JRC 2022 study, energy consumption figures for gas and electric hobs were evaluated using different testing approaches. Initially, based on these methodologies, the total life cycle cost of gas hobs is the lowest among all technologies, equivalent to that of hotplates with a 24-euro difference over the whole life cycle. However, when a more representative and comparable test method is used to assess energy consumption across both gas and electric technologies, gas hobs incur higher life cycle costs.

If gas price increases were to stay below the average rate from 2019 to 2023, owning gas hobs would be cheaper overall than projected in the basis scenario. However, it's worth noting that since 2021, gas prices have increased much faster than electricity prices. This trend is likely to continue under current European objectives and policies, meaning that the financial weight of using a gas hob could increase even faster.

If we add the average health costs associated with gas cooking to the total cost of ownership, the total aggregated cost per household cooking with gas reaches 2.495€, which represents a 840€ difference compared to the same scenario without the health costs. This can be put in perspective with the estimated average 164€ difference between the purchase price of induction and that of gas hobs. For a 160€ purchase incentive that would compensate for the average price difference between induction and gas, each invested euro would save almost 10 euros in health costs.

Although gas hobs may still appear to be the cheapest option, consumers who choose those products will ultimately incur additional costs due to increasing gas prices and related health costs. This disparity highlights a market failure that European product policies should address.

United Kingdom

The assumptions and projections presented above lead to the estimated total costs of ownership presented in Table 8 for a purchase in 2026 and for each base case: 4 hobs for hotplates, infrared, induction, and gas hobs. Table 8 also presents the difference between the total cost of ownership for a gas hob versus each of the electrical options, over a 15-year harmonized lifetime.

TABLE 8 ESTIMATED TOTAL COSTS OF OWNERSHIP FOR EACH BASE CASE IN EACH COUNTRY OF THE SAMPLE AND EU-27 AVERAGE.

	Total costs of ownership (GBP)				Differences (GBP)		
	Induction	Infrared	Hotplates	Gas	Gas Vs Induction	Gas Vs Infrared	Gas Vs Hotplates
UK	1,512.19	1,497.26	1,451.50	2,105.75	593.56	608.49	654.25

Our analysis found that the total cost of ownership of a gas hob would be higher than that of any electric technology, with quite significant differences over the 15-year lifetime of the appliances. Hotplates would be the cheapest option, offering an average total cost of ownership around 650 GBP cheaper than gas hobs. Infrared hobs offer a total cost of ownership over 600 GBP lower than gas hobs, while presenting only a slightly higher average purchase price. As for induction hobs, they still represent a higher initial investment, with an average purchase cost 150 GBP higher than that of gas hobs. However, the total cost of ownership of induction hobs ultimately proves to be significantly lower than that of gas hobs. That difference would obviously be influenced by the future actual evolution of prices. We do not have sufficient elements to anticipate the relative price evolution of the different technologies, but, as for the EU, we modelled a few scenarios reflecting different assumptions on other parameters, which reflects the sensitivity of the results to each of those aspects.

CLASP tested scenarios with:

- Annual consumptions from the 2022 JRC study (incl. 56% efficiency for gas hobs)
- More intensive use patterns, reflecting loads from the Ecodesign Impact Accounting study.
- Higher and lower escalation rates
- Integrating the health costs of cooking with gas over the lifetime of the equipment, as estimated in CLASP and EPHA's report (Blair et al. 2023).

Changing the discount rate would most clearly illustrate its impact on the financial interest of investing in induction rather than hotplates or infrared, which is not the focus of this report. The health costs were estimated apportioning the 1.38 billion GBP annual societal cost associated with pediatric asthma cases across the estimated 15.1 million UK homes cooking with gas today, resulting in an average 91.22 GBP per year of gas-cooking-related health costs per household.

TABLE 9 SENSITIVITY ANALYSIS — OVERVIEW OF TESTED SCENARIOS

	Annual consumption				Escalation rates		Health costs over lifetime of the equipment
	Induction	Infrared	Hotplates	Gas	Electricity	Gas	
Basis scenario	165	188	203	319	4.7%	13.1%	0
JRC 2022 consumption	115	119	122	143	4.7%	13.1%	0
High usage	217	247	266	419	4.7%	13.1%	0
Low escalation1	165	188	203	319	4%	4%	0
Low escalation2	165	188	203	319	4.4%	8.6%	0
High escalation	165	188	203	319	11.6%	22.4%	0
Health costs	165	188	203	319	4.7%	13.1%	91.22 GBP per year

The changes made to the assumptions of each scenario compared to the basis scenario are visible in orange in Table 9. Results at the UK level are summarized in Table 10.
The high escalation scenario represents the trends over the past 5 years (2019-2023).

TABLE 10 SENSITIVITY ANALYSIS — OVERVIEW OF RESULTS FOR THE UK

UK results — TCO estimates in GBP	Induction	Infrared	Hotplate	Gas
Basis scenario	1,512.19	1,497.26	1,451.50	2,105.75
JRC 2022 consumption	1,203.30	1,062.10	949.23	1,126.74
High usage	1,831.96	1,866.00	1,848.74	2,661.20
Low escalation1	1,455.54	1,417.18	1,365.51	1,003.46
Low escalation2	1,483.41	1,456.39	1,407.61	1,409.42
High escalation	2,288.93	2,726.53	2,771.30	5,481.01
Health costs	1,512.19	1,497.26	1,451.50	3,474.01

Using the consumption figures from the JRC 2022 study would reduce the total life cycle costs for all technologies due to lower consumption estimates. However, the total cost of ownership for gas hobs would still not be significantly lower than that of infrared or induction hobs, and hotplates would remain the cheapest option. The average annual escalation rates over the 2019–2023 period are around 11.6% for electricity prices and 22.4% for gas prices. Those are very high and heavily influenced by the 2022 increase, which was significantly higher in the UK than in the EU, making the 2019-2023 average a less realistic figure in the long term, which is why the choice was made to use the 2021 figures. Decoupling the price of electricity from the price of gas may be easier in the UK than in the EU, which would favor scenarios with a significantly lower escalation rate for electricity than for gas.

If we add the average health costs associated with gas cooking to the total cost of ownership, the total aggregated cost per household cooking with a gas hob reaches almost 3.500 GBP: a nearly 1.400 GBP difference with the same scenario without the health costs. This can be put in perspective with the estimated 67 GBP difference between the average purchase price of infrared and that of gas hobs, and the estimated average 143 GBP difference between induction and gas. For a GBP 140 purchase incentive that would compensate for the average price difference between induction and gas, each invested GBP would save almost GBP 10 in health costs.

4.1 Network costs considerations

As electrification progresses, heating installations are converted to electric options. The price of maintaining and upgrading the network will be shared across fewer clients. The ratio of the investment costs compared to the GJ delivered will increase. Beyond the modelled increase of gas prices that is based on an extrapolation of the trends of the past years and largely linked to issues on the supply side, the costs linked to transport and distribution could therefore significantly increase for each client. EU consumers may invest in new equipment that would lock them into using gas without realizing how much the costs may increase. They may live in an area that will be disconnected from gas before the end of the functional life of their equipment or be part of a minority that would force the utility to maintain and upgrade the local gas network. Those maintenance and upgrade costs may be higher where authorities decide to inject significant shares of hydrogen into the gas network. A block in the Netherlands recently was disconnected from the gas network, avoiding maintenance work on the network. The estimation reported by the Volkskrant[6] is that this change will save each household between 150€ and 200€ per year.

Case Study: In the Netherlands, the area of Utrecht-Overvecht engaged in 2017 in a process to become a gas-free district as part of the national plan to disconnect 1.5 million houses from the gas network by 2030. The inhabitants of the 320 dwellings affected by the plan only used gas for cooking, and investments in the local gas network would have been necessary by the following year to keep it safe to operate. Instead, the city council decided to disconnect those houses from the network. During a consultation, only 5% of the inhabitants voted against this decision. The costs of shifting to gas cooking will be covered by the housing corporation and the inhabitants are expected to safe between 150 to 200 euros per year due to this change, mostly because they longer will have to pay for a gas connection.

[6] https://www.volkskrant.nl/nieuws-achtergrond/utrecht-doorbreekt-impasse-bewoners-voor-het-eerst-gedwongen-van-het-gas-af~b7877d3f0/

5. CONCLUSIONS

This analysis examined the total cost of ownership of gas and electric hobs across the EU and UK. Contrary to the assumption that cooking with gas hobs is cheaper than using electric options, when looking at the longer term (based on a 15-year lifetime) and considering the full picture of energy prices and inflation, this is not the case in Europe, on average. Electric hobs are, in fact, the most cost-effective solution in a few European countries. Taking into account the 2023 energy prices and the lowest escalation scenario, hotplates are the cheapest option in Portugal, Sweden and Spain.

In our default scenario, using figures from trends over the past 5 years to estimate the energy prices and escalation rates, induction hobs are cheaper than the gas alternatives in France, the Netherlands, Portugal, Romania, Sweden and Spain (from 40 euros cheaper in Romania to 1,350 euros cheaper in Sweden). On average, under our default scenario, all electric technologies offer a lower total cost of ownership than gas hobs. While the purchase price of hotplates and radiant hobs is close to that of gas hobs, induction hobs involve a higher initial investment, with an average purchase price 160€ higher than gas hobs, requiring incentives to support adoption. These incentives would likely be small, especially when compared with existing incentives aimed at encouraging the transition to heat pumps, for example.

In the UK, hotplates would be the cheapest option, with an average total cost of ownership over 650 GBP cheaper than gas hobs. Similar to the EU, induction hobs remain a more expensive option to purchase, with a nearly 150 GBP higher average purchase price than for a gas hob. However, this higher investment is more than compensated for by the lower running costs for induction, making gas hobs the most expensive type of hob to own. Projections may be subject to change due to price evolution.

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