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**COMMISSION STAFF WORKING DOCUMENT**

**EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT**

*Accompanying the document*

**Commission Regulations**

**implementing Directive 2009/125/EC of the European Parliament and of the Council  
with regard to ecodesign requirements for space heaters and combination heaters**

**and**

**supplementing Directive 2010/30/EU of the European Parliament and of the Council  
with regard to the energy labelling for space heaters, combination heaters, packages of  
space heater, temperature control and solar device and packages of combination heater,  
temperature control, solar device**

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**Lead DG:** DG ENER

**Associated DG:** DG ENTR

**Other involved services:** SG, SJ, DG CLIMA, DG ENV, DG COMP, DG ECFIN, DG INFSO, DG MARKT, DG SANCO, DG TRADE, DG EMPL

**Agenda planning or WP reference:** 2010/ENER+/003, 2010/ENER/018 and 2011/ENER/013

#### **EXECUTIVE SUMMARY**

EU leaders are aware of the significant benefits that energy efficiency and savings can have for the EU's social, economic and environmental agendas. They are committed to meeting a target of cutting primary energy consumption by 20% by the year 2020. This means saving 368 million tons of oil equivalent (Mtoe) of primary energy (gross inland consumption minus non-energy uses) by 2020. The projected consumption for that year currently stands at 1 842 Mtoe.

The target is thus expressed in terms of energy savings (i.e. an absolute decrease of energy consumption). However, most of the savings can be achieved through energy efficiency improvements (i.e. using less energy input for an equivalent level of economic activity or service). Achieving this potential is the focus of EU action. Meeting the 20% energy savings target would also help to achieve the EU's 2050 vision of a resource-efficient, low-carbon economy, as set out in the Low Carbon Roadmap 2050<sup>1</sup>.

The Ecodesign Framework Directive 2009/125/EC lists products which the Council and European Parliament have identified as priorities for the Commission to address. The list is based on the European Climate Change Programme which identified products with a high potential for cost-effective improvements in energy performance and reductions of CO<sub>2</sub> emissions, including heating equipment (Article 16).

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<sup>1</sup> COM(2011) 112 final.

The Energy Labelling Directive 2010/30/EU<sup>2</sup> requires products with significant potential for energy saving and wide disparity in performance levels for equivalent functionality to be covered by an energy labelling implementing measure.

The Energy Efficiency Action Plan (EEAP) of 2006<sup>3</sup>, endorsed at the Spring 2007 European Council, was important as a first step towards reaching the 20% objective<sup>4</sup>. The Plan comprised 85 policy measures, which taken together would enable a reduction of about 14% by 2020. The Spring Council 2007 called for thorough and rapid implementation of the five priorities<sup>5</sup> the Energy Council set on 23 November 2006<sup>6</sup>, based on the Commission's Action Plan on Energy Efficiency. The priorities include action to 'dynamically and regularly improve and expand the scope of minimum efficiency requirements for energy-using products' [...], by 'fully utilising the Eco-Design Directive'. The European Parliament welcomed the strategy of adopting minimum energy performance standards for equipment and appliances.<sup>7</sup>

Much work has been done to implement the EEAP, including implementation of the Energy Services Directive of 2006 and the Co-generation Directive of 2004 (the CHP<sup>8</sup> Directive)<sup>9</sup>; revision of the Ecodesign Directive, the Energy Performance of Buildings Directive and the Energy Labelling Directive (adopted in 2009-2010)<sup>10</sup>; and the development of the Energy Efficiency Plan 2011 (adopted in 2011).

The Energy Efficiency Plan includes measures that need to be implemented through new legislative proposals. These include setting clear political objectives; developing the energy services market; increasing the role of the public sector; improving consumers' awareness of their energy consumption; and increased efficiency in energy supply.

The Plan also identifies policy initiatives to be achieved by other means, including financial instruments, and implementation measures under the existing Ecodesign, Energy Labelling and Energy Performance of Buildings Directives.

Regarding heaters<sup>11</sup>, the problem is that consumers have been slow to switch to heaters with improved environmental performance. This impact assessment investigates which policy option would do most to remedy this, taking into account that measures for ecodesign requirements and energy labelling for heaters would fit well in the context described above.

The approach for developing the proposed ecodesign implementing regulation for heaters and this impact assessment was structured in four steps:

**Step 1:** assessment of the criteria for ecodesign and energy labelling implementing measure as laid out in Article 15(2)(a) to 15(2)(c) of the Ecodesign Directive and Article 10(2)(a) to 10(2)(c) of the Energy Labelling Directive, taking into account the ecodesign parameters identified in Annex I of the Ecodesign Directive;

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<sup>2</sup> OJ L 153, 18.6.2010, p. 1.

<sup>3</sup> COM(2006) 545.

<sup>4</sup> SEC(2006) 1174.

<sup>5</sup> Brussels European Council 8/9 March 2007, Presidency Conclusions, 7224/07.

<sup>6</sup> TTE (Energy) Council on 23 November 2006, 15210/06.

<sup>7</sup> European Parliament resolution of 31 January 2008 on an Action Plan for Energy Efficiency.

<sup>8</sup> The terms cogeneration and CHP (combined heat and power) are used interchangeably in this IA.

<sup>9</sup> Directive 2006/32/EC and Directive 2004/8/EC, respectively.

<sup>10</sup> Directives 2009/125/EC, 2010/30/EU and 2010/31/EU respectively.

<sup>11</sup> Heaters comprise boilers, cogeneration units and heat pumps, both as space heaters providing space heating and combination heaters providing space and water heating. A cogeneration unit is not placed on the market as combination heater, only as space heater (with a separate water heater or hot water storage tank).

**Step 2:** consideration of relevant Union initiatives, market forces and environmental performance disparities of the equipment on the market with equivalent functionality as laid out in Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy Labelling Directive;

**Step 3:** setting policy objectives, including the desirable level of ambition, the policy options to achieve them, and the key elements of the ecodesign and energy labelling implementing measure as required by Annex VII of the Ecodesign Directive and Article 10(4) of the Energy Labelling Directive;

**Step 4:** environmental, economic and social assessment of the impacts on the environment and consumers, with a view to the criteria on implementing measures set out in Article 15(5) of the Ecodesign Directive and Article 10(3) of the Energy Labelling Directive.

**Step 1: Assessment of the criteria for ecodesign and energy labelling implementing measures**

To assess the criteria for ecodesign and energy labelling implementing measures as laid out in Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy Labelling Directive, the Commission has carried out a technical, environmental and economic study for heaters ('preparatory study') according to the provisions of Article 15(4)(a) and Annex II of the Ecodesign Directive.

With regard to the criteria set in Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy Labelling Directive, the preparatory study concludes for the EU-25<sup>12</sup>:

Article 15(2)(a) Ecodesign Directive and Article 10(2)(a) Energy Labelling Directive:	Annual sales volume in the Union:	approx. 6,6 million
Article 15(2)(b) Ecodesign Directive:	Most significant environmental impact, the energy consumption of installed base (2005):	12 000 PJ (287 Mtoe)
Article 15(2)(c) and Article 10(2)(b) Energy Labelling Directive:	Improvement potential (at complete stock change):	35 %/60 % compared to average ('base case') product without/with renewable energy input

The volume of sales for heaters, about 6,6 million units per year, is above the indicative 200 000 units provided for in the Ecodesign Directive.

The annual energy consumption of heaters corresponds to about 16% of the total gross energy consumption of the EU-27 in 2006. That is approximately the annual gross energy consumption of France. Reducing consumption by 35% would mean saving energy amounting to the annual gross energy consumption of Poland.

Energy savings are possible because there are technical solutions which reduce the gas or electricity consumption of heaters, compared to the market average, implying a wide disparity in the performance of products available on the market.

<sup>12</sup> Figures for EU-27 are somewhat higher and can be corrected on the basis of GDP.

There is considerable scope for improvements that do not rely on the input of renewable sources of energy. Such improvements could lead to reduced costs over the life cycle of better appliances without significantly raising the purchase price of heaters. This is because improvements incorporate technical solutions that do not involve significant additional costs. For heaters with medium load profiles and above, improvements implying the input of renewable sources of energy are also becoming cost-effective, at least for warmer and average climate conditions. For the largest heaters, the input of renewable sources of energy is also cost-effective under colder climate conditions.

## **Step 2: Analysis of relevant initiatives at Union and Member State level**

Further to Articles 15(2) and 15(4)(c) of the Ecodesign Directive and to Article 10(2)(c) of the Energy Labelling Directive, relevant Union and national environmental legislation is considered. Related (voluntary) initiatives both at Union and Member State levels are taken into account, and barriers to market take-up of technologies with improved environmental performance are analysed.

Several market failures have been identified, accounting for a situation in which market forces alone are not directing consumers towards decisively preferring cost-effective technologies offering energy efficiency improvements.

The energy consumption of a heater is not a decisive factor accounting for consumers' purchasing decisions. Information on running costs/energy savings is not easily accessible and understandable. Consumers have little awareness of energy consumption and associated costs (asymmetric information). Furthermore, not all environmental costs are included in gas and electricity prices. Builders and developers do not pay the operating costs for energy, so they have little incentive to endow buildings with energy efficient installations, including heaters.

As a result, consumers', builders' and manufacturers' purchasing and product design choices are made largely on the basis of production and purchasing costs, not reflecting environmental costs for society (negative externality), so the opportunity to achieve cost-effective improvements is often missed.

Several initiatives at Union level and at Member State level have been or are intended to improve the energy efficiency of heaters. In particular, Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings<sup>13</sup> requires Member States to set requirements for the energy performance of new buildings, and buildings subject to major renovations, and to provide for a system for the energy certification of buildings. It also requires Member States to set energy efficiency requirements for technical building systems, including heating systems.

These initiatives have gone some way towards improving the energy efficiency of heaters, though not nearly enough. That is why further legislative action pursuant to the Ecodesign Directive and to the Energy Labelling Directive should be taken at EU level, and Member States expect a harmonised legislative framework to be set up.

## **Conclusion of Steps 1 and 2**

The analysis carried out in Steps 1 and 2 shows that:

- a significant number of heaters are sold in the EU;
- the appliances have a significant environmental impact, mainly due to their energy consumption;

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<sup>13</sup> OJ L 153, 18.6.2010, p. 13.

- their energy consumption could be significantly improved in a cost-effective manner, given the wide disparity in the energy performance of heaters with similar or identical functionality;
- current initiatives at EU and Member State level and consumer behaviour alone are not capturing the full potential to reduce energy consumption.

The conclusion is that the criteria for ecodesign implementing measures as set out in Article 15(2) of the Ecodesign Directive and in Article 10(2) of the Energy Labelling Directive are met, and heaters ought to be covered by an ecodesign implementing measure pursuant to Article 15(1) of the Ecodesign Directive, and by an energy labelling measure pursuant to Article 10(2) of the Energy Labelling Directive.

### **Step 3: Policy objectives and options**

Further to Annex II of the Ecodesign Directive, the level of ambition for improving energy consumption/efficiency aims to achieve the lowest possible cost to the user over the life of the appliance, while taking into account requirements on ecodesign implementing measures related to functionality, affordability and other aspects, as set out in Article 15(5). Furthermore, benchmarks for technologies yielding best performance, as developed in the preparatory study with additional input from the Consultation Forum, are considered. The results are reflected in the objectives set for the proposed ecodesign regulation and energy labelling regulation.

Several policy options for making a positive impact on the market while achieving a satisfactory level of ambition are considered. These include the ‘business-as-usual’ scenario, self-regulation, energy labelling alone, ecodesign regulation alone, a combination of the latter two, and requirements on heating systems set under the Energy Performance of Buildings Directive (EPBD) alone.

However, because the Legislator has a clear mandate to set ecodesign requirements and energy labelling for heaters, the extent of analysis for other options set out below is limited. The focus is on the assessment of the proposed implementing regulations.

### **Step 4: Impact assessment**

An impact assessment of possible policy measures is carried out, taking into account the criteria set out in Article 15(5) of the Ecodesign Directive, and the impacts on manufacturers, including SMEs.

Sub-options for the timing of ecodesign requirements for the energy efficiency of heaters have been taken into account, but because of delay in the consultation procedure, alternatives in timing have become irrelevant. As a result, only a one- and two-stage implementation of minimum requirements was taken into account for the various policy options.

The one-stage implementation entails ecodesign requirements for heaters applying within two years of the regulation entering into force. These requirements correspond to improving the energy efficiency of heaters by 20% to 30% over today’s average. Section 5 of the Impact Assessment gives more details.

The assessment is based on stock models developed as part of the preparatory study for heaters and water heaters. This report covers only heaters and assesses the impact of their space heating function, the water heating function of combination heaters and the aggregated overall impact. Dedicated water heaters are addressed in separate regulations and a separate impact assessment.

The stock models have been revised for new data and the scenarios updated in line with the specifications for the impact assessment. Four different scenarios have been modelled, including a reference ‘business-as-usual’ scenario showing what would occur in the absence of policy measures.

The other scenarios are: minimum energy efficiency performance standards (Min Only); minimum energy efficiency performance standards with product labelling, combined with the EPBD (Min+Lbl); and minimum energy efficiency performance standards with product labelling, but with reduced efficiency performance standards for the smallest heaters combined with the EPBD (Min+Lbl-Small).

Finally, three sub-scenarios (NO<sub>x</sub> scenarios) based on the Min+Lbl scenario were modelled, evaluating the impact of varying legislative limits on NO<sub>x</sub> emissions. The key findings of this assessment are summarised in the table below.

MAIN IMPACTS			Scenarios 2020							
			Base	1	2	3	4	5a*	5b*	5c*
(as Article 15(4)(e) of 2009/125/EC)			2005	BAU	Min Only	Min+Lbl	Min+Lbl-Small	Min+Lbl+NO <sub>x</sub>		
ENVIRONMENT										
EU totals	ENERGY (primary)	PJ/annum	12089	10688	9678	8761	8804	8761		
	GHG	Mt CO <sub>2</sub> eq/annum	698	617	558	506	508	506		
	AP	kt SO <sub>x</sub> eq/annum	821	783	783	566	566	515	491	449
CONSUMER										
EU totals	Expenditure	€ bn/annum	211	290	276	264	264	264		
	Purchase costs	€ bn/annum	25	25	34	42	41	42		
	Running costs	€ bn/annum	186	265	243	222	223	222		
Per product	Product price	€	2247	2090	2860	3560	3519	3560		
	Installation cost	€	1627	1725	2330	2919	2884	2919		
	Energy costs	€/annum	1437	1737	1317	1031	1044	1031		
	Payback	years	N/A	reference	3,3	3,8	3,7	3,8		
BUSINESS										
EU turnover	Manufacturers	€ bn/annum	7,9	8,7	12	15	15	15		
	Wholesalers	€ bn/annum	2,4	2,6	3,5	4,4	4,4	4,4		
	Installers	€ bn/annum	28	35	40	45	44	45		
	TOTAL	€ bn/annum	38	47	55	64	63	64		
EMPLOYMENT										
Employment (jobs)	Industry EU (including OEM)	'000	94	105	139	176	174	176		
	Industry non-EU	'000	47	52	69	87	86	87		
	Wholesalers	'000	11	13	17	21	21	21		
	Installers	'000	445	563	627	705	701	705		
	TOTAL	'000	598	734	852	990	982	990		
	Of which EU	'000	551	681	783	903	896	903		
	EXTRA EU jobs	'000	reference	reference	101	221	214	221		
	Of which SME	'000	reference	reference	70	153	148	153		

\* 5a = NO<sub>x</sub> scenario at 90 mg/kWh, 5b = NO<sub>x</sub> scenario at 70 mg/kWh, 5c = NO<sub>x</sub> scenario at 35 mg/kWh.



BOUNDARY CONDITIONS ('should be no negative impacts')	Scenarios 2020/ 2025						
	1	2	3	4	5a	5b	5c
'No negative impacts' following Article 15(5) of 2009/125/EC	BAU	Min Only	Min+Lbl	Min+Lbl-Small	Min+Lbl+NO <sub>x</sub>		
Functionality of product	+	+	+	+	+	+	+
Health, safety and environment	+	+	+	+	+	+	+
Affordability and life cycle costs	+	+	+	++	+	0	-
Industry competitiveness	+	+	+	+	+	+	+
No proprietary technology	+	+	+	+	+	+	+
No excessive administrative burden	+	+	+	+	+	+	+

Key: ++ = Strong Positive Rating, + = Positive Rating, 0 = Neutral Rating, - = Negative Rating.

### Conclusion on Step 3 and Step 4

Based on assessment of costs and benefits, a combination of Scenarios 4 and 5b is the preferred option. It would be the best way to encourage the uptake of heaters with a better environmental performance, as it optimally fulfils the requirements of the Ecodesign and Energy Labelling Directives. Therefore ecodesign requirements for energy efficiency of heaters should be set in one stage, effective two years after the regulation enters into force. A complementary energy labelling scheme would set benchmarks for the energy efficiency of heaters.

This combination of ecodesign requirements and energy labelling implies the following:

- ecodesign requirements achieve cost-effective improvement potential for energy-efficient heaters;
- the labelling scheme creates market transparency for consumers and provides incentives for manufacturers to make innovations/investments in energy efficiency;
- the combined effects have a favourable impact on the market, yielding significant annual energy savings of 45 Mtoe by 2020 (comparable to the annual gross inland energy consumption of the Czech Republic), corresponding to annual energy cost savings of about €42 billion and about 110 Mt avoided CO<sub>2</sub> emissions, compared to a 'business-as-usual' scenario;
- once the full stock of (combination) heaters has been replaced, taking into account ecodesign and labelling measures (assuming a product lifetime of 17 years), the measure will lead to annual energy savings of around 100 Mtoe by 2031. That is comparable to the annual gross inland energy consumption of Poland or the whole EU iron and steel industry, or 5,5 % of the EU's annual gross energy consumption. This would correspond to annual cost savings of about €93 billion and about 244 Mt avoided CO<sub>2</sub> emissions, compared to a 'business-as-usual' scenario;
- consumers would have to pay more for a new heater and its installation, but would benefit from considerable savings in energy, resulting in a pay-back time of less than four years for a heater with an estimated life of 15-17 years;
- a clear legal framework is created which ensures fair competition;

- requirements for marketing more energy-efficient heaters would be harmonised, thus limiting administrative burdens and costs for businesses;
- manufacturers are spared extra administration due to transition periods, as these duly take into account re-design cycles, speed of innovation and return on investments.

Member State authorities will carry out monitoring of impacts, ensuring that the requirements for ecodesign and energy labelling of heaters are met, while the appropriateness of scope, definitions and concepts will be monitored in on-going dialogue with stakeholders and Member States.