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COMMISSION STAFF WORKING DOCUMENT

EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT

Accompanying the documents

Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers

Commission Delegated Regulation supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices

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1. INTRODUCTION

The report assesses the impacts of different policy options for energy efficiency, emission and labelling requirements for solid fuel boilers under the Ecodesign Directive 2009/125/EC and the Energy Labelling Directive 2010/30/EU. Solid fuel boilers are heaters using solid fuel that heat multiple rooms through a water-based central heating system and are located in a separate boiler room or outside. The preparatory study addressing these appliances concluded that solid fuel boilers comply with the criteria laid down in the Ecodesign Directive and are therefore a candidate for regulation. The scope of the impact assessment covers boilers used for indirect indoor space heating and targets appliances with a rated heat output of 1000 kW or less that are designed to use one or more types of solid fuel.

In accordance with the Ecodesign Directive, stakeholders were consulted via the Consultation Forum on 12 July 2012, consisting of Member States' representatives and interested parties with regard to solid fuel boilers as a product group.

2. PROBLEM DEFINITION

The solid fuel boilers currently used and sold in the EU are significant energy users and contributors to greenhouse gas emissions. Improving energy efficiency, and thereby reducing or slowing the growth of solid fuel consumption, could increase security of energy supply and allows the limited biomass resources in Europe to be used more efficiently.

Solid fuel boilers are also major emitters of particulate matter, organic gaseous compounds and carbon monoxide, which are harmful for human health and the environment. Domestic solid fuel combustion has traditionally been the major source of particulate emissions in the EU. Furthermore, solid fuel boilers also release emissions of nitrogen oxides. The adverse impacts of emissions on air quality and human health could be significantly reduced.

Currently, there is no EU legislation specifically dealing with the energy consumption and emissions of solid fuel boilers. There is national legislation in a number of Member States, but this does not address the problem for the EU as a whole and maintains the situation of transboundary air pollution as not all Member States are legislating on emissions of solid fuel boilers.

3. IS ACTION AT EU LEVEL JUSTIFIED?

EU action is necessary because without harmonised and specific regulation of solid fuel boilers in the EU there is a risk that individual energy efficiency requirements and emission limits set by Member States will hamper the functioning of the EU internal market. The Ecodesign Directive (which takes the internal market objective of the Treaty as its legal basis) and the Energy Labelling Directive give the European Commission a mandate to adopt implementing measures reducing the energy consumption and emissions of solid fuel boilers and guiding consumers towards the most efficient boilers.

4. OBJECTIVES

The impact assessment focuses on operational objectives, since the general and specific objectives were set out in the impact assessments for the Ecodesign and Energy Labelling Directives. The preparatory study confirmed that for solid fuel boilers there is significant cost-effective potential for reducing energy consumption and certain types of emissions, leading to the following operational objectives:

- to reduce the energy consumption of solid fuel boilers and related greenhouse gas emissions;
- to reduce particulate matter, organic gaseous compounds and carbon monoxide emissions.

Article 15(5) of the Ecodesign Directive lays down conditions for implementing measures which are further operational objectives for this impact assessment:

- there must be no significant negative impact on product functionality, from the perspective of the user;
- health, safety and the environment must not be adversely affected;
- there must be no significant negative impact on consumers in particular as regards the affordability and the life cycle cost of the product;
- there must be no significant negative impact on industrial competitiveness;
- in principle, setting an ecodesign requirement must not have the consequence of imposing proprietary technology on manufacturers;
- no excessive administrative burden must be imposed on manufacturers.

The need for consistency with existing legislation is behind further operational objectives:

- to set requirements that are not less stringent than existing requirements in Member States;
- to achieve consistency with ecodesign and energy labelling requirements for non-solid fuel direct heaters (including boilers);
- to achieve consistency with the promotion of renewable energy under the Renewable Energy Directive 2009/28/EC.

5. POLICY OPTIONS

Certain options ('no EU action', 'self-regulation', 'ecodesign requirements only' and 'energy labelling only') were discarded since they do not achieve the objectives and received no support from stakeholders. The option 'ecodesign requirements and labelling' was divided into six sub-options. All of them would include the same labelling scheme from 2016 for

energy efficiency that applies to other (non-solid-fuel) indirect heaters, in order to provide comparable information on indirect heating appliances to end-users. For biomass boilers, the boiler's efficiency would be multiplied by a biomass label factor. This compensates for the fact that biomass fuel boilers are inherently less efficient than gas and oil boilers, but their use is preferred because they use renewable energy. The approach applied to other renewable (non-solid-fuel) indirect heaters, i.e. considering the renewable energy input as zero energy input, would not achieve the objective of more efficient biomass fuel utilisation if applied to these boilers.

The requirements of **option A** are given in Table 1 and

Table 2 and correspond to the proposal set out in the working document for the 12 July 2012 Consultation Forum. Stakeholders did not select this option. They considered the requirements to be insufficiently stringent.

Table 1: Overview of energy requirements for option A

Fuel	Rated heat output	Tier 1 (2016)	Tier 2 (2018)	Tier 3 (2020)
Biomass	< 70 kW	$\eta_s > 60\%$	$\eta_s > 67\%$	$\eta_s > 76\%$
	> 70 kW	$\eta_s > 65\%$	$\eta_s > 69\%$	$\eta_s > 76\%$
Non-biomass	< 70 kW	$\eta_s > 65\%$	$\eta_s > 71\%$	$\eta_s > 77\%$
	> 70 kW	$\eta_s > 68\%$	$\eta_s > 74\%$	$\eta_s > 77\%$

Table 2: Overview of emission limit values for option A (given in mg/m³ at 10% O₂, referring to dry exit flue gas, 0°C, 1013 mbar).

		CO			OGC			PM			
		mg/m ³ at 10%O ₂			mg/m ³ at 10%O ₂			mg/m ³ at 10%O ₂			
Tier proposed		1	2	3	1	2	3	1	2	3	
Manual	Biomass	0-50 kW	5000	1200	700	150	50	30	150	75	60
		50-150 kW	2500	1200	700	100	50	30	150	75	60
		150-500 kW	1200	1200	700	100	50	30	150	75	60
	Non-biomass	0-50 kW	5000	1200	700	150	50	30	125	75	60
		50-150 kW	2500	1200	700	100	50	30	125	75	60
		150-500 kW	1200	1200	700	100	50	30	125	75	60
Automatic	Biomass	0-50 kW	3000	1000	500	100	30	20	150	60	40
		50-150 kW	2500	1000	500	80	30	20	150	60	40
		150-500 kW	1200	1000	500	80	30	20	150	60	40
	Non-biomass	0-50 kW	3000	1000	500	100	30	20	125	60	40
		50-150 kW	2500	1000	500	80	30	20	125	60	40
		150-500 kW	1200	1000	500	80	30	20	125	60	40

Option B would skip Tier 1 of option A and apply option A's Tier 2 levels in 2016 and its Tier 3 levels in 2018, but with the energy efficiency requirements for biomass boilers at 77% rather than 76%. Many stakeholders suggested such an approach in the Consultation Forum.

Option C is based on written comments from a number of Member States in which stringent regulations are already implemented and for whom the Tier 1 requirements might be weaker than their national regulations. Since ecodesign harmonises legislation in the EU and leaves little room to deviate at national level, they argued for stringent requirements. However, early implementation of ambitious requirements at EU level could be a challenge for those manufacturers that do not currently have 'best available technology' (BAT) products in their portfolio and need time to develop products complying with the new regulation. Approximately four years are necessary to develop such a new product. Therefore, this option has stringent requirements but only one tier, in 2018, which for energy efficiency is 77% and for emissions as indicated in Table 3.

Table 3: Overview of the emission limit values proposed for option C (given in mg/m³ at 10% O₂, referring to dry exit flue gas, 0°C, 1013 mbar).

	CO mg/m ³ at 10%O ₂	OGC mg/m ³ at 10%O ₂	PM mg/m ³ at 10%O ₂
Fuel	Tier 1 (2018)		
All	300	10	20

Option C+ adds to option C by stating the particulate matter (PM) value on the label as from 2016. This was suggested by one Member State and by environmental NGOs.

Option D is the same as option C with the exception that the emission limit value for particulate matter for non-biomass boilers is set at 40 mg/m³ rather than at 20 mg/m³. This is because today's BAT coal boilers cannot achieve the levels of particulate matter required by option C without significant additional investment costs, which would make them uncompetitive.

Option D+ adds to option D by stating the particulate matter value on the label.

6. IMPACTS

The quantitative impacts presented cover solid fuel boilers with a rated capacity below 500 kW, as comprehensive data are available from the preparatory study. For boilers with a rated capacity between 500 and 1000 kW no such comprehensive data are available, but they have similar characteristics and impacts for such boilers would be similar.

Economic impact

Options B, C, C+, D and D+ have the same impact on energy efficiency over time and lead to the best result. Compared to the baseline, efficiency is improved by 5.9% in 2019. The improvement is 1.6% more than for option A in 2019 and 0.7% more than for option A in 2021.

Options A, B, D and D+ do not affect the competitiveness of the industry. While such measures would remove many models from the market, the effect would be limited, the technical analysis suggests, because the cost of redesign to meet the proposed requirements is not particularly great. Options C and C+ would remove all coal boilers from the market from 2018, which would affect the competitiveness of manufacturers that have mostly or only such boilers in their portfolio. The specific impact on small and medium-sized enterprises could be limited by scheduling the entry into force of the requirements as in options C, C+ D and D+.

All options have almost the same total turnover, which is slightly higher than in the baseline. Options B, C, C+, D and D+ have the most stringent energy efficiency requirements and therefore more efficient technologies are required, which has a positive impact on manufacturer turnover. Administrative costs are low for the options analysed and almost the same for all of them. Testing costs are significant, but the same, for all options.

Environmental impact

Options A, B, D and D+ have a similar impact on greenhouse gas emissions, since they have almost the same energy efficiency requirements in their respective last tier. Compared to the baseline, these options achieve from 3.5% to 4.1% greenhouse gas emission reductions in 2040. Option C and C+ score the best with a 13.4% greenhouse gas reduction in 2040 compared to the baseline. This is mostly because no coal boiler is expected to achieve the

particulate matter requirements after 2018 and therefore biomass boilers will be purchased instead of coal boilers.

Particulate matter emissions in options A and B are 60% below the baseline in 2040; options C and D achieve a reduction of around 77.5%. Stating the particulate matter value on the label contributes to an additional 1% reduction in absolute particulate matter emissions. This improvement is limited, since the emission limit values in options C+ and D+ are already close to BAT level.

Carbon monoxide emissions will be reduced in 2040 by 63% to 70% compared to the baseline. The largest carbon monoxide emission reduction is achieved by implementing options C, C+, D or D+.

Organic gaseous compound emissions follow a similar trend to carbon monoxide emissions. Options C, C+, D and D+ achieve the largest reduction in organic gaseous compound emissions at 86% below the baseline in 2040.

Social impact

In all investigated options, employment in 2030 exceeds the baseline. In options B, C, C+, D and D+, more than 67 100 employment places are created.

In terms of consumer affordability, the weighted average payback time varies between 17.1 and 19.2 years in the options considered, which is within the range of the weighted average boiler lifetime of 18.5 years. Thus, on average, the options will not lead to additional costs for the consumer, i.e. the cost of a boiler plus the fuel costs remains the same. The options discussed will lead to a higher market share for innovative technology without affecting the functionality of the products.

In terms of health and safety, particulate matter emissions are of particular concern; the emission reductions achievable for the different policy options are given above, under *Environmental impact*.

7. CONCLUSIONS

All options analysed in the impact assessment contribute to improving energy efficiency and therefore to reducing solid fuel consumption and significantly reducing emissions compared baseline projections. The analysis for solid fuel boilers shows that, compared to the baseline, the policy options save between 17.43 PJ and 21.98 PJ in 2040 and reduce PM emissions by 59.6 to 78.4% while increasing employment. While option C and C+ score best on emission reductions in greenhouse gases and particulate matter, they would remove all coal boilers from the market as from 2018, which would adversely affect the competitiveness of manufacturers for which such boilers are an important part of their portfolio.

In terms of sensitivity analysis, the scenarios in options A, B, C and D are robust since the input parameters are representative and reliable. For options C+ and D+, however, the labelling of particulate matter emissions is sensitive to assumptions about its effect on consumers and industry, for which no specific evidence was available.

Table 4: Evaluation of policy options in terms of their impacts

	Option					
	A	B	C	C+	D	D+
<i>Effectiveness and efficiency (compared to baseline)</i>						
Reduce the energy consumption of solid fuel boilers	+	++	++	++	++	++
Reduce related greenhouse gas emissions	+	+	++	++	+	+
Reduce PM, OGC and CO emissions	+	+	++	++	++	++
<i>Coherence</i>						
No significant negative impacts on product functionality from the perspective of the user	+	+	+	+	+	+
Health, safety and the environment must not be adversely affected	+*	+*	+*	+*	+*	+*
No significant negative impact on consumers in particular as regards affordability and life-cycle costs	+	+	+	+	+	+
No significant negative impacts on industry's competitiveness	+	+	-	-	+	+
Setting an ecodesign requirement must not have the consequence of imposing proprietary technology on manufacturers	+	+	+	+	+	+
Impose no excessive administrative burden on manufacturers	+	+	+	+	+	+
Requirements no less stringent than existing ones in Member States	-	-	+	+	+	+
Consistency with ecodesign and energy labelling for non-solid fuel direct heaters	+	+	+	+	+	+
Consistency with the promotion of renewable energy	+	+	+	+	+	+

* If the sub-option is accompanied by an emission limit value for NO_x of 200 mg/Nm³ (at 10% O₂), otherwise '-'.¹

The preferred option would be option D¹. Stating the particulate matter value on the label (option D+) could in principle be added to that. However, given the stringent ecodesign requirements and the relatively large uncertainty affecting the measurement of emissions, it is not possible to state emission levels on the label in the form of a single reliable number or an A-G scale.

In order to prevent an increase in nitrogen oxides emissions due to new boiler technology it is recommended that an emission limit value for nitrogen oxides is set at 200 mg/Nm³ (at 10% O₂), a level that is technically feasible. This would ensure that technological development of solid fuel boilers to achieve the ecodesign requirements of option D does not result in increased nitrogen oxides emissions and adversely affect health and environment.

¹ The Ecodesign Regulatory Committee voted on 13 October 2014 on ecodesign requirements for solid fuel boilers for the year 2020 that closely resemble tier 3 of option A.

8. MONITORING AND EVALUATION

The main form of monitoring will be testing to verify that energy efficiency, emission levels and labelling are correct. This compliance verification will be done by means of market surveillance carried out by Member State authorities.

Another aspect of monitoring is assessing how the efficiency and emission levels of solid fuel boilers sold changes over time. This information is available from the label and the product fiche. A market shift towards greater efficiency and lower emission levels will be the main indicator of progress. This is a task for the Commission, with a view to conducting the review of this specific regulation and of the Ecodesign and Energy Labelling Directives.