EUROPEAN
COMMISSION

Brussels, 28.4.2015
SWD(2015) 90 final

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for local space heaters, and

Commission Delegated Regulation implementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling for local space heaters

{C(2015) 2643 final}
{SWD(2015) 91 final}

1. INTRODUCTION

Directive 2009/125/EC of the European Parliament and of the Council establishes a framework for the Commission, assisted by a regulatory committee to set Ecodesign requirements for energy-related products.

An energy-related product, or a group of energy-related products, shall be covered by Ecodesign implementing measures, or by self-regulation (cf. criteria in Article 17), if the energy-related product represents significant sales volumes, while having a significant environmental impact and significant improvement potential (Article 15). The structure and content of an Ecodesign implementing measure shall follow the provisions of the Ecodesign Directive (Annex VII).

Directive 2010/30/EU of the European Parliament and of the Council establishes a framework for the harmonisation of national measures on end-user information, particularly by means of labelling and standard product information, on the consumption of energy and where relevant of other essential resources during use, and supplementary information concerning energy-related products, thereby allowing end-users to choose more efficient products.

Delegated acts laying down details relating to the label and the fiche shall be adopted by the Commission if the energy related product has a significant potential for saving energy and where relevant other essential resources and when products with equivalent functionality available on the market shall have a wide disparity in the relevant performance levels (Article 10). The structure and content of an Energy Labelling implementing measure shall follow the provisions of the Energy Labelling Directive.

This study assesses the impacts of different policy options, in the context of the Ecodesign Directive 2009/125/EC and of the Energy Labelling Directive 2010/30/EU, for Local Space Heaters (or 'LSH')[1].

Local space heaters have been analysed in two different preparatory studies: the preparatory study on small scale solid fuel combustion installations Lot 15 which covered solid fuel fireplaces and stoves, and the preparatory study on Local room heating products which covered electric, gaseous and liquid fuel fired room heaters. Both studies concluded that LSH comply with the criteria in Art. 15, sub 1, of the Ecodesign Directive and with the criteria in Art 10, sub 2 of the Energy Labelling Directive and are therefore a candidate for measures under both Directives.

The scope of this report includes local space heaters, i.e. space heating devices that convert electricity, gaseous, liquid or solid fuels directly into heat in order to provide heating comfort in the space they are situated.

The proposed initiative complements previous initiatives covering heaters that distribute the energy by using a water based central heating system. These products have been analysed under impact assessments covering boilers and solid fuel boilers.

Local space heaters differ from products connected to a hydronic heat distribution system by its size, power output, installation requirements and patters of use. These specific characteristics make it adequate to analyse them under a specific measure.

[1] See definition of the product group in Section 2

2. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

2.1. Organisation and timing

The implementing measure for LSH is one of the priorities of the Action Plan on Energy Efficiency (COM(2006)545 final[2]), and fits the 2008 Catalogue of actions to be adopted by the Commission for the year 2008 (COM(2008)11 final).

The inter-service Impact Assessment Steering Committee[3] was consulted on this impact assessment. The present impact assessment takes into account the recommendations formulated by the Impact Assessment Board on 30 January 2013 which stressed the need to improve the problem definition and the baseline scenario, clarify the objectives and better present the policy options, better explain and assess the impacts and provide a clearer comparison of the options.

Article 19 of the Directive 2009/125/EC foresees a regulatory procedure with scrutiny for the adoption of implementing measures. Subject to qualified majority support in the regulatory committee and after scrutiny of the European Parliament and of the Council, the adoption of the measure by the Commission is planned by late 2013.

2.2. Consultation and expertise

External expertise on local space heaters was gathered in particular in the framework of two studies4,5 providing a technical, environmental and economic analysis (in the following called "preparatory study") carried out by external consultants on behalf of the Commission's Directorate General for Energy (DG ENER): the "Lot 15" preparatory study on small scale solid fuel combustion installations which covered solid fuel fireplaces and stoves, and the "Lot 20" preparatory study on local room heating products which covered electric, gaseous and liquid fuel fired room heaters. The preparatory studies followed the structure of the "MEEuP" Ecodesign methodology6 developed for the Commission's Directorate General for Enterprise and Industry (DG ENTR). MEEuP has been endorsed by stakeholders and has been used by all Ecodesign preparatory studies so far.

The preparatory studies on local space heaters were developed in an open process, taking into account input from relevant stakeholders including manufacturers and their associations, environmental NGOs, consumer organisations and EU Member State experts. Both studies provided dedicated websites7 where interim results and further relevant materials were published regularly for timely stakeholder consultation and input. Both studies were promoted on the Ecodesign-specific websites of DG ENER and DG ENTR.

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[2] Priority Action 1: Appliance and equipment labelling and minimum energy performance standards

[3] Chaired by DG Energy. Other Commission Directorates General who were part of this group included Secretariat-General, DG Climate Action, DG Communication Networks, Content and Technology, DG Competition, DG Employment, DG Enterprise and Industry, DG Environment, DG Health and Consumers, DG Markt, DG Trade and the Joint Research Centre.

[4] Ecodesign preparatory study "Solid fuel small combustion installations Lot 15", by Bio Intelligence service, final report of March 2012..

[5] Ecodesign preparatory study "Local room heating products DG ENER Lot 20" by Bio Intelligence service, final report of June 2012.

[6] "Methodology for the Ecodesign of Energy Using Products", Methodology Report, final of 28 November 2005, VHK, available on DG ENER and DG ENTR ecodesign websites:
http://ec.europa.eu/energy/demand/legislation/eco_design_en.htm
http://ec.europa.eu/enterprise/eco_design/index_en.htm

[7] See www.ecosolidfuel.org for solid fuel heaters and www.ecoheater.org for local room heating products.

In the context of the Lot 15 study, open consultation meetings for directly affected stakeholders were organised at the Commission's premises in Brussels on 3 March 2008, 18 December 2008 and 13 July 2009 for discussing and validating the preliminary results of the studies. A preliminary background impact assessment study was carried out from October 2008 until July 2010 in order to assist the Commission in analysing the likely impacts of the planned measures[8].

In the context of the Lot 20 study, open consultation meetings for directly affected stakeholders were organised at the Commission's premises in Brussels on 18 April 2011, 28 September 2011 and 16 April 2012 for discussing and validating the preliminary results of the studies.

During the preparation of the Working Document on mid 2012, it was decided to split up Lot 15 into direct heaters (covered by this document) and indirect heaters (covered by a separate Working Document, enabling a more straightforward integration with other indirect heating products as covered by the preparatory study Lot 1).

Since these solid fuel fired direct heaters may have a similar heating function as other direct heating products covered by the Lot 20 study, it was decided to integrate these two product scopes into a single document.

This split-up of Lot 15 into direct and indirect heating products was discussed in the formal consultation of stakeholders (Ecodesign Consultation Forum, consisting of a balanced participation of Member States' representatives and all interested parties concerned with the product group of solid fuel boilers, further to Article 18 of the 2009/125/EC Directive) on 12 July 2012. The participants were provided working documents one month in advance of the meeting and were invited to comment in writing until two months after the meeting.

The Lot 20 room heating products were discussed in the formal consultation of stakeholders (Ecodesign Consultation Forum, consisting of a balanced participation of Member States' representatives and all interested parties concerned with the product group of local room heating products, further to Article 18 of the 2009/125/EC Directive) on 20 September 2012. Further detail on the public consultation can be found in Annex 1. The participants were provided working documents one month in advance of the meeting and were invited to comment in writing until one month after the meeting.

3. PROBLEM DEFINITION

3.1. What is the issue or problem that may require action?

The local space heaters in the current stock of the EU space heating appliances are significant energy users, thereby contributing to greenhouse gas emissions. This is in particular relevant for the electric local space heaters as these consititue the bulk of the products in the installed base.

Solid fuel fired local space heaters in particular contribute significantly to emissions of particulate matter (PM), organic gaseous carbon (OGC) and carbon monoxide (CO), also if fired with biomass.

[8] By contractor Van Holsteijn en Kemna (VHK) B.V., with CSTB, France, and Wuppertal Institute, Germany, as subcontractors for impact assessment study for Lot 15, solid fuel small combustion installations (direct and indirect heaters).

The installed base of gaseous and liquid fuel local space heater sales is smaller than that of the products listed above, but the energy consumption and emissions are nonetheless relevant.

Overall sales of local space heaters are expected to remain fairly constant or slightly decreasing, perhaps excluding the solid fuel fired (biomass) heaters. But even with only modest changes in overall sales, the size of the stock results in an overall energy consumption and emissions to air that will remain significant for the near future.

An improvement in energy efficiency of and a reduction of emissions by these products, would increase the security of supply of energy sources, would help abating emissions of greenhouse gases and other polluting substances and would allow for a more efficient utilization of the limited biomass resources in Europe.

Therefore the issue that requires action (the market failure) is the lack of Community incentives to reduce the energy consumption and the emissions to air of local space heaters during use. At the moment only some Member States address these issues but their national approaches are not harmonised, hampering the internal market for these products.

3.2. What is the scale of the problem?

As required by Article 15 of the Ecodesign Directive, the preparatory studies identified the relevant environmental aspects of local space heaters. The assessment showed that of the total product lifecycle, the use phase dominates the energy consumption and emissions for up to more than 95% of the product's total energy use over the lifetime and for 70%[9] to 85%[10] of the product's total emissions of particulate matter depending on the product type.

The combined total energy consumption related to the use of local space heaters is estimated in the combined preparatory studies to be 2 300 PJ in the year 2010, of which 67% (1 545 PJ or 172 TWh_{elec}) is related to electricity consumption by electric local space heaters. The energy consumption of local space heaters therefore makes up almost 5% of the total EU energy consumption in 2010 of almost 50 000 PJ[11].

In 2005, small sources of solid fuel combustion contributed about one third of total EU emissions or 616 kton of fine particles ($PM_{2.5}$)[12]. About three quarters is related to combustion of biomass, about one quarter is from coal combustion and other fuels sources are insignificant. The assessment shows that solid fuel operated LSH are estimated to account for one quarter (142 kton) of the total PM emissions in the EU.

Furthermore, local space heaters also realease emissions of NO_x (oxides of nitrogen) as well as dioxins and furans. According to the current state of knowledge and to stakeholder comments, the emissions of NO_x are mostly fuel derived. Due to lack of data regarding NO_x emissions from local space heaters in Europe, it is not possible to quantify the impacts of NO_x regulation in the context of this IA. Nevertheless, it is proposed to include a maximum value for this emissions in order to avoid their excessive increase in the future.

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[9] This applies to a gas fired heater, or Base Case 1 of the Lot 20 preparatory study.

[10] This applies to an open fireplace, or Base Case 1 of the Lot 15 preparatory study.

[11] The 50 000 PJ was calculated on the basis of the data provided in the MEErP Part 1 report (November 2011), which calculated for 2010 some 2780 TWh electricity consumption (equals 25 000 PJ) and 24 720 PJ fuel energy consumption. In this study the 'electric space heating energy consumption' was estimated to be 170 TWh_{elec} and the 'fuel-fired local space heating' energy consumption was estimated to be 800 PJ.

[12] Janusz Cofala, Zbigniew Klimont, "Emissions from households and other small combustion sources and their reduction potential", TSAP Report #5 Version 1.0, IIASA, June 2012 (Service Contract on Monitoring and Assessment of Sectorial Implementation Actions (ENV.C.3/SER/2011/0009)).

Dioxins and furans are also mostly fuel specific and could be reduced by optimisation of the combustion technology to a certain extent. Measures taken to reduce PM, OGC and CO emissions may achieve this. Due to a general lack of data and experience for measuring as well as regulation furans and dioxins emissions in local space heaters, no emission limit levels for dioxins and furans can be set and assessed in this IA.

More information on PM and other pollutants derived from solid fuel combustion is given in Annex 7.

3.3. What are the underlying drivers of the problem?

Market and regulatory failures are the main barriers and obstacles that hinder the realisation of the existing and substantial economic saving and environmental improvement potential at the time of purchase of an appliance.

3.3.1. Regulatory failure

Currently, there is no EU legislation specifically dealing with the energy consumption and the emissions of local space heaters. This has led to a situation where individual Member States have addressed environmental parameters of local space heaters through national regulations, especially with regard to solid fuel operated LSH.

Further, due to a lack of commonly accepted or harmonised methodologies and norms regarding the measurement of emissions like PM, there is currently a considerable variability of used test methods and national regulations within the EU.

In addition, there is little information on the emissions and relative efficiency of these appliances available at the point of sale

3.3.2. Negative externality[13]

There is also a lack of a common interest to reduce emissions like PM, OGC and CO, because emitting these substances to the ambient is free of charge. This situation is fostered by the fact that external costs (e.g. health costs) are not included in the fuel prices or other operation costs. This is the reason why consumer and producer choices are commonly made on the basis of operation costs not reflecting environmental or health costs for the society. This market failure both applies to LSH using fuels (solid, gaseous or liquid) as electricity (as part of the electricity consumed in the EU is generated by power plants using fossil fuels).

The growth of particulate emissions in recent years by small solid fuel combustion installations in particular (stoves, fireplaces) gives concerns for three reasons[12]. First, there is increasing concern about the threat to human health from the exposure to fine particulate matter. Combustion of solid fuels (wood and coal) in small stoves is a major source of primary emissions of $PM_{2.5}$ to the atmosphere. Second, stringent emission control legislation has been established for other sources of pollution, so that over time (uncontrolled) small combustion sources are developing into the main sources of PM emissions. Third, greenhouse gas strategies and targets for renewable energy favour enhanced use of wood and other biomass in small combustion sources, which would lead to even higher emissions if combustion would not take place in most advanced installations.

Further detail on negative externality in this context is provided in the impact assessment accompanying the Commission proposal for the Ecodesign Directive.[14]

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[13] Side effect or consequence of an industrial or commercial activity that affects other parties without this being reflected in the cost of the goods or services involved.

3.3.3. *Asymmetric information and myopia*

One of the main reasons for the persistent sales of low efficiency local space heaters (leading to an out-dated, inefficient stock) is that end-user purchase decisions are commonly not based on life cycle costs of products which include purchase, installation and maintenance. In contrast, most consumers base their choice rather on purchase price and on other factors like availability, service or existing installation in the place where the local space heater is going to be placed. Few people realise that energy costs are commonly the major part of total life cycle cost.

The necessary information on available technology and their impact may be available somewhere (e.g. on a web site or in technical documentation) but is hard to locate and/or to understand. Therefore, the complexity or lack of understandable information for consumers introduces asymmetrical information. This problem can be even intensified by a lack of qualification and lack of economic incentive of wholesalers, retailers and installers, who give advice to end-users. Consequently, even cost-effective improvement potentials for the end-user are often not realised.

Further detail on asymmetric information and myopia in this context is provided in the impact assessment accompanying the Commission proposal for the Energy Labelling Directive.[15]

3.3.4. *Other barriers*

In addition, there are problems regarding the use of solid fuel combustion installations (in general, not limited to solid fuel operated LSH only) that can only partly be addressed by an Ecodesign implementing measure. In particular, these problems refer to the quality and selection of the used solid fuel, e.g. traditions like using coal or the burning of materials not recommended by the manufacturer such as firewood with too high moisture content. Other examples are over-dimensioned heating installations, insufficient chimney systems as well as inadequate maintenance or setting of manual/automatic air controls. For some users, e.g. owners of forest estates, life cycle costs may also appear much less relevant due to the very low primary costs to obtain biomass solid fuels.

3.4. Who is affected, in what ways and to what extent?

Every user of local space heating products will carry the energy costs related to the use of these products. Promoting the use of more energy efficient products will reduce overall running costs.

The energy consumption of fossil fuel fired (and to a certain degree also electric) local space heaters makes the EU economy more prone to issues related to security of supply, because of the economies' dependence on fossil fuel imports. Promoting the use of more energy efficient products will reduce the EU's dependency on fossil fuels. The energy consumption of fossil fuel fired (and indirectly also electric) local space heaters is linked to emissions of greenhouse gases which are thought to be (partly) responsible for global climate change. Promoting the use of more energy efficient products will reduce the EU's contribution to climate change.

The promotion of biomass fired local space heaters is linked to policies that aim to reduce fossil fuel-related greenhouse gas emissions, improve the security of energy supply due to a reduced dependence on fossil fuel imports, while lowering fuel costs. As biomass resources in

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[14] SEC(2008)2115

[15] SEC(2008)2862

Europe are limited a more efficient usage of these resources is a key element to achieve the above goals, whilst minimising the impact on other sectors and environmental categories.

The energy consumption of solid fuel fired (including biomass) local space heaters is linked to emissions of polluting substances, especially particulate matter (PM), affecting citizens of the EU: PM air pollution is pointed out as being responsible of an average 8.6 months life loss for every person in the EU. Studies have highlighted the fact that PM pollution causes cardiovascular and respiratory diseases[16] and even short-term exposure to high PM air concentrations increases the risk of emergency hospital admissions. The burning of solid fuels in households is a contributor in terms of total PM airborne pollution, so regulations for solid fuel heaters will contribute to a substantial PM emission reduction and to an improved air quality in Europe.

Measures regarding local space heaters do not affect competitiveness of European industry. In contrast, development of innovative technology due to requirements set and additional policy implemented will increase competitiveness of European manufacturers in other markets. Moreover, regulation will increase competition between manufacturers within Europe, where markets seem not to be fully integrated yet. Regulations will support those manufacturers that have already gained experiences with energy-efficiency and low-emission technology.

EU regulation would affect consumers, manufacturers, retailers and installers. Consumers are affected since an energy label would give them a more informed choice. Manufacturers are affected as they may have to redesign their products and they would have in the energy label and additional element to compete against each other. Retailers and installers could have their revenues modified if the average product price changes.

Annex 10 includes a non-exhaustive list of relevant companies.

3.5. How are existing policies and legislation affecting the issue?

Directive 2012/27/EU[17] of the European Parliament and of the Council of 25 October 2012 on energy efficiency (EED) provides energy saving targets for Member States and creates the conditions for the development and promotion of the market for energy services, including measures improving the energy efficiency of local space heaters. However, it is up to the Member States to select the concrete measures to achieve the energy savings targets, and no harmonised measures specifically improving the environmental performance of local space heaters are provided.

Directive 2010/31/EU[18] of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (EPBD) requires Member States, amongst others, to apply minimum requirements to the energy performance of new and existing buildings (when undergoing major renovations). Article 8 of the Directive indicates that Member States shall set system requirements in respect of the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of the technical building systems which are installed in existing buildings. Nevertheless, the specific requirements to be set to

[16] Polichetti G. et al. (2009): Effects of particulate matter (PM_{10}, $PM_{2.5}$ and PM_1) on the cardiovascular system.
[17] OJ L 315, 14.11.2012, p. 1.
[18] OJ L 153, 18.6.2010, p. 13.

the system are to be decided by Member States and no harmonised values are set at European level under this Directive.

Directive 2001/81/EC[19] of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (NECD) and its forthcoming revision limit emissions of pollutants from all sources combined arising as a result of human activities in the territory of the Member States. This Directive is expected to contribute to an indirect limitation of emissions from local space heaters, and the approach for limiting the relevant emissions from local space heaters varies to a great extent amongst Member States.

Regulation (EU) No 305/2011[20] of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products covers LSH insofar these are considered part of the building installations[21] (portable types are excluded), but no minimum requirements or mandatory information requirements regarding energy efficiency or emissions have been issued.

Energy efficiency of local space heaters, combined with low emissions of PM, OGC and CO, through the introduction of mandatory standards and a labelling scheme, would contribute to reach the 20% energy savings potential by the year 2020, identified in the Energy Efficiency Action Plan (COM(2006)545). Promotion of market take up of efficient local space heaters complies with the Lisbon and renewed Sustainable Development Strategy[22] as it would encourage investment in R&D and provide for a level playing field for all market actors in the different EU Member States. In addition, it belongs to one of the key objectives defined in the Community Lisbon Programme for 2008-2010 (COM(2007)804), i.e. the promotion of an "industrial policy geared towards more sustainable consumption and production" as further developed in the Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (COM(2008)397). The labelling of local space heaters would also play an important part in the objective of "empowering consumers" formulated in the EU Consumer Policy Strategy 2007-2013 (COM(2007)99) since it would provide consumers with the ability to make informed and better choices when buying local space heaters.

However, the most important aspect is that the current initiatives at EU and Member State level address only parts of the existing market failures regarding local space heaters. The EPBD, ESD and financial instruments at EU and Member State level address market failures related to lack of incentives and financial capacities for investments. The emission or air borne pollutants is only addressed by the NECD, which provides neither emission limit values nor testing and calculation methods for solid fuel local space heaters. NECD is expected to contribute to a general, but unspecific reduction of emissions in the residential sector.

Likewise, the EPBD, the EED and the NECD alone are not expected to correct the market failures related to incomplete information, lack of awareness for (running) cost savings. The EPBD and EED provide for energy efficiency neither classes nor testing and calculation methods for local space heaters. The EPBD and ESD also do not provide harmonised

[19] OJ L 309, 27.11.2009, p. 22.
[20] OJ L 88, 4.4.2011, p. 5.
[21] Article 2, item 1 of Regulation 305/2011/EU states: 'construction product' means any product or kit which is produced and placed on the market for incorporation in a permanent manner in construction works or parts thereof and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction works;
[22] OJ L 242, 10.9.2002, and Council document 109 17/06 of 26.6.2006

minimum performance requirements for local space heaters. Thus, a certain “minimum level” of improvements for local space heaters cannot be guaranteed by the existing regulations.

This is why a number of Member States have started to introduce maximum levels of certain pollutant emissions and minimum energy efficiency requirements for LSH. These products are regulated by Member States in different ways, not only in actual threshold levels but also in the way to establish these. Especially the solid fuel LSH may be regulated as regards efficiency and emissions to air during combustion. The preparatory studies describe legislation applicable to LSH in Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Poland, the Netherlands, the United Kingdom and Sweden. Not all regulations cover all aspects; some focus on emissions, others on energy efficiency and maximum emission limit values and measurement methods may differ per country.

Nevertheless, not all regulations cover all aspects, some focus on emissions while others address energy efficiency, in addition, the measurement methods might differ per country.

Although some industry actors have adapted their portfolio in order to meet the requirements set by Member States that already have regulated local space heaters, manufacturers of heating products have traditionally based their business on the domestic market; this is partly due to the different requirements in different Member States. As a consequence of this structure, only some international groups have emerged, whilst others remain quite regional.

Ultimately, this lack of harmonised specific regulation in Europe induces a risk that individual energy efficiency and requirements and emission limits set by Member States could hamper the functioning of the EU internal market.

Outside the EU there are minimum energy efficiency requirements applicable to LSH in the USA (ASHRAE standard 103), Canada, Australia, Russia and Japan.

Besides mandatory requirements, most of the countries mentioned above, within and outside the EU, also have introduced voluntary labelling.

The issue (the market failure) is the lack of Community incentives to reduce the energy consumption and the emissions to air of local space heaters during use. At the moment only some Member States address these issues but their national approaches are not harmonised, hampering the internal market for these products.

3.6. Baseline scenario: How will the issue evolve in absence of intervention?

3.6.1. Scope of appliances covered

The scope of this Impact Assessment covers local space heaters used for direct indoor space heating (including models that simultaneously provide heat to water, for indirect heating, hereafter referred to as a local space heater with an indirect heating functionality). The product comprises products using various heat sources and various heat emission principles. The scope covers:

- Solid fuel local space heaters up to 50 kW rated capacity (heat output);
- Gaseous/liquid fuel fired local space heaters for residential applications up to 70 kW rated capacity;
- Electric local space heaters up to 12 kW rated capacity (heat output);

- Gaseous fuel fired local space heaters for commercial applications (tube radiant and luminous radiant heaters) up to 120 kW input/output;

Other initiatives have covered heating products connected to a hydronic heat distribution. Nevertheless, local space heaters differ from such systems by its size, power output, installation requirements and patters of use.

The preparatory study Lot 20 on local room heating products also included in its analysis warm air units. However, the same warm air technology can also be applied in ducted systems, providing a form of central (air) heating. Some products even allow installation as local space heater or ducted heater, depending on the preferences of the user and installation requirements. In order to avoid confusion, it was decided to treat both types of products in a similar manner. As most of the warm air units are used in non-domestic applications, it was decided to transfer the group of local warm air heaters to the scope of the forthcoming Working Document of Central air heating systems.

The baseline does not model Member States' legislation explicitly because those policies are too diverse (type of measure, scope of products, type of requirements) but does so implicitly because these policies are already affecting developments in the market that are taken into account in the baseline.[23]

3.6.2. Sales and stock

The sales development has been estimated based on data from the preparatory study. Both, development of sales and stock assumed for this IA are shown in the following figures.

Figure 1: Development of sales 1990 – 2030

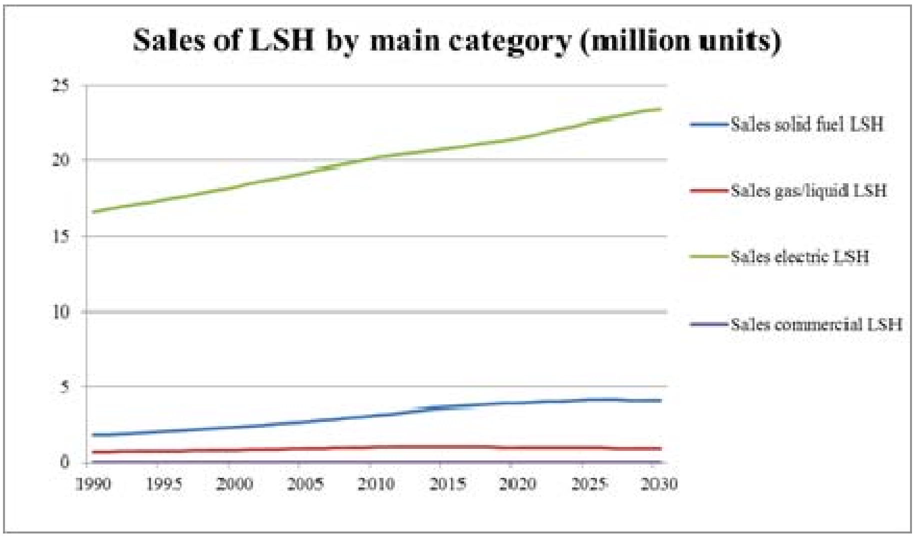


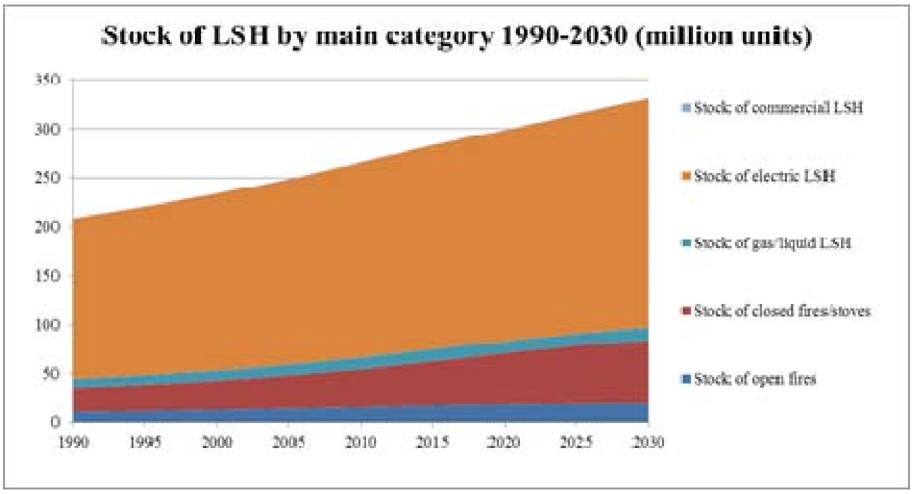
Table 1: Development of sales 1990 – 2030

Sales by LSH category [million/year]		1990	2000	2010	2020	2030
BAU	Solid fuel LSH	1,8	2,3	3,2	3,9	4,1
	Gas / liquid LSH	0,6	0,8	1,0	0,9	0,9

[23] Any future Member State policy is not considered in the baseline because they are not known and cannot be forecasted. If further national legislation would be introduced this would have negative effects on the internal market, in particular in terms of administrative burden for companies.

	Electric LSH	16,5	18,3	20,2	21,5	23,4
	Commercial LSH	0,04	0,04	0,05	0,05	0,05

Figure 2: Development of stock 1990 - 2030



The category of electric local space heaters includes electric underfloor heating of which sales are accounted by m^2. The assumed sales relate to 'units', based on m^2 sales of larger systems (15 m^2, 20% of sales) and smaller systems (4 m^2, 80% of sales), in analogy to the Lot 20 preparatory study.

Due to improvements in building shells following the recast of the Energy Performance of Buildings Directive (EPBD) and an increase in qualification of installers and respective improved design of appliances, it is assumed that typical usage hours per year and typical nominal heat output of appliances will decrease in the coming years. In the baseline, this is roughly approximated by a 1% decrease of annual equivalent full load operating hours on which the heat demand calculation is modelled. (since it is hardly possible, with the data basis available, to set specific assumptions for both development of usage hours and size).

Assumptions for product prices, installation and maintenance costs in the base year 2010 are derived from data collected in the preparatory studies. For this IA, it is assumed that the only price increase within the assessed timeframe is related to an increase in energy efficiency. The energy price assumptions of the analyses are presented in Annex 2.

Based on the preparatory study it is assumed that more than 50% of appliances is sold via wholesalers and building supply stores (electric heaters in particular), the others directly via installers (solid fuel heaters in particular). Based on this information and further data collected in the course of the impact assessment, the average composition of product price has been calculated (c.f. Annex 2). The combined turnover of industry, wholesalers / retailers and installers, calculated by using reported prices and the annual unit sales, is expected to be around 23 billion €/year for new installations sold in 2010 (excluding VAT).

Employment impacts have been roughly estimated by applying specific factors, which are based on a comprehensive data research based on annual reports of 25 market actors in the EU (c.f. Annex 2).

The sector of local space heaters is economically significant in the European Union. The annual sales of solid fuel LSH account for about 3 million products, sales of electric LSH are some 20 million products and sales of gaseous/liquid fuel fires LSH are around 1 million products (c.f. Annex 2).

The baseline assumes an overall increase in sales of solid fuel LSH to over 4 million products per year in 2030 (increase of closed fire heaters and pellet stoves), whereas sales of gas fired heaters and electric heaters are assumed to remain relatively constant (slight growth following demographic changes mainly).

The baseline assumes that current policy measures at Member State level will not change and no further action at EU level will be introduced. Thus, it assumes a continuation of existing tendencies regarding size, use, efficiency and specific emissions of appliances sold on the European market. For this development, "typical" product types and their properties have been defined in the preparatory study.

3.6.3. Energy consumption and emissions

The specific energy efficiency and emission values for the different LSH assumed in the baseline are given in Annex 2. For the calculation of the emission values, the basic emission values per fuel type are assumed according to Annex 2. No change in these specific efficiency and emission values per product type is assumed in the baseline.

The results for the baseline with regard to energy consumption and emissions in the assessed timeframe are given in the following Table 1. Assuming no change in current policy measures, the 2030 consumption is assumed to be 2420 PJ/year, resulting in some 94 kt of PM emissions.

Table 2: Baseline: Seasonal efficiency, energy consumption and emissions in 2010 and 2030

		Efficiency new products [%]		Energy consumption [PJ/year]		PM emissions [kt/year]	
		2010	2030	2010	2030	2010	2030
01_open fireplace	NCV	29,7%	32,7%	79	88	51	32
02_closed fireplace/inset	NCV	69,3%	76,3%	166	266	28	26
03_wood stove	NCV	69,3%	76,3%	156	159	28	15
04_coal stove	NCV	69,3%	76,3%	60	34	14	5
05_cooker	NCV	64,4%	70,9%	43	64	7	5
06_SHR stove	NCV	80,0%	80,0%	85	129	11	9
07_pellet stove	NCV	85,1%	90,0%	29	71	2	1
08_open fire gas	NCV	41,6%	45,8%	3	4		
09_closed fire gas	NCV	64,4%	70,9%	52	47		
10_flueless fuel heater	NCV	100,0%	100,0%	1	1		
11_elec.portable	SPB[24]	29,7%	32,7%	255	244		
12_elec.convector	SPB	29,7%	32,7%	1054	1011		
13_elec.storage	SPB	29,7%	32,7%	79	76		
14_elec.underfloor	SPB	29,7%	32,7%	157	153		
15_luminous heaters	S GCV[25]	73,3%	92,7%	22	17		
16_tube heaters	S GCV	64,4%	86,3%	49	38		
TOTAL				2291	2403	142	94

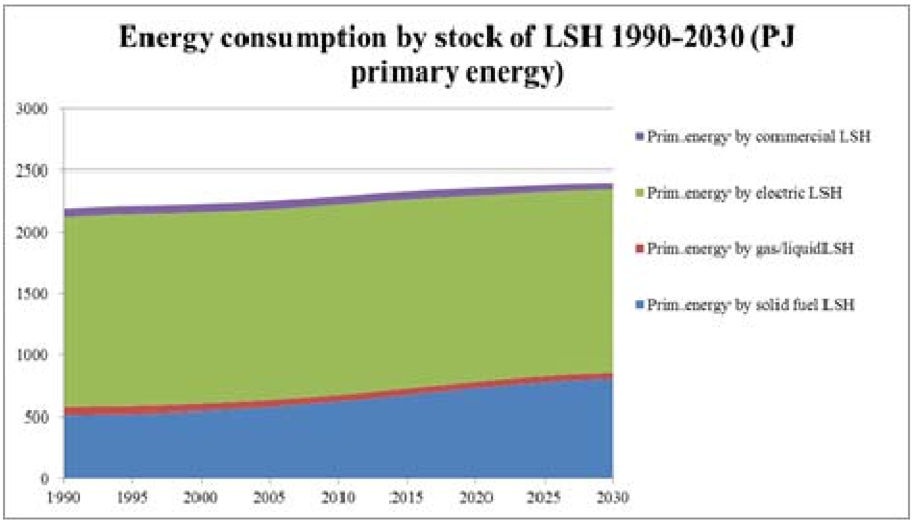
NCV means energy efficiency established at full load, expressed on basis of net calorific value of the fuel

Seasonal primary basis means energy efficiency corrected for various energy loss factors over the heating season, expressed in primary energy efficiency (CC=2.5)

Seasonal GCV means energy efficiency corrected for various loss factors over the heating season, expressed on basis of gross calorific value of the fuel

[24] SPB means seasonal primary basis
[25] S GCV means seasonal gross calorific value

Figure 3: Energy consumption by stock 1990 - 2030



Although there is a modest improvement in efficiency of certain basecase models the baseline development shows a slight increase in energy consumption for 2030 for the EU. The savings made possible by a shift in sales from less efficient products towards more efficient products is largely offset by an increase of the stock.

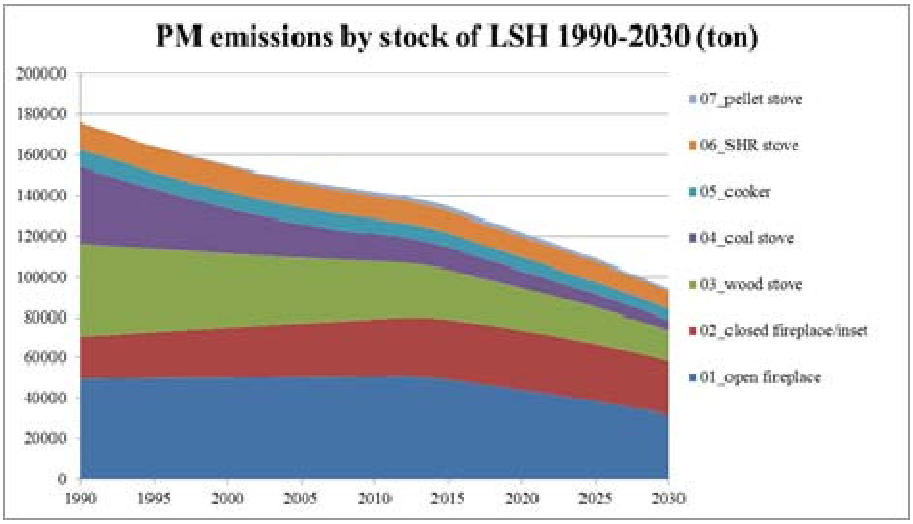
As regards emissions to air by solid fuel LSH the baseline shows a significant decline, mainly due to introduction of maximum emission limit values in major Member States (for example the BImSchV I in Germany and similar pieces of legislation in Austria, Sweden, Denmark, UK, etc.)[26]. Although the maximum emission limit values are not harmonised accross Member States there is a tendency of manufacturers to comply with the strictest values to allow sales of their models in other Member States as well. This may have lead to lower emissions of products also in countries with no emission limit values for these products, but this cannot be proven as data cannot be produced. Still, the emissions can be further reduced if the same stringent values are applied on the whole of the EU market.

The graph below shows the PM emissions of solid fuel operated LSH. The baseline emissions of other substances identfied as relevant (Carbonmonoxide, Organic Gaseous Compounds) are described in Section 6, Analysis of Impacts.

The PM emissions of non-solid fuel fired LSH are not zero ('0'), but they are not calculated as they did not form a relevant environmental impact.

[26] The emissions calculated for years 1990-2009 have been estimated on the basis of an annual decrease factor. See Annex 2 for more details.

Figure 4: PM emissions (t/year) by stock 1990 - 2030



Consequently, without taking additional specific action on LSH, the market transformation towards more efficient appliances will take place only very slowly and the negative impacts on environment and health will be present at a level higher than can be achieved cost-effectively.

3.6.4. Improvement potential

The preparatory studies have investigated the options for improvement of energy efficiency and for reduction of emissions (to air, during use). The overall conclusion is that the energy efficiency can be improved and the emissions can be reduced. Hence, the preparatory studies have recommended ecodesign and labelling requirements to unlock the existing saving potential.

Table 3: Baseline and Best Available Technology: Efficiency and emission typical values

		Efficiency new products [%]			PM emissions [kt/year]		
		2010	**BAT**	**Mean reduction factor**	**2010**	**BAT**	**Mean reduction factor**
01_open fireplace	NCV	29,7%	60%	43%	900	40	23
02_closed fireplace/inset	NCV	69,3%	80%	35%	200	40	5
03_wood stove	NCV	69,3%	80%	35%	200	40	5
04_coal stove	NCV	69,3%	80%	35%	200	40	5
05_cooker	NCV	64,4%	80%	44%	225	40	6
06_SHR stove	NCV	80,0%	85%	25%	150	40	4
07_pellet stove	NCV	85,1%	90%	33%	75	20	4

08_open fire gas	NCV	41,6%	80%	32%			
09_closed fire gas	NCV	64,4%	80%	44%			
10_flueless fuel heater	NCV	100,0%	100%	0%			
11_elec.portable	SPB	29,7%	40%	15%			
12_elec.convector	SPB	29,7%	40%	15%			
13_elec.storage	SPB	29,7%	40%	15%			
14_elec.underfloor	SPB	29,7%	40%	15%			
15_luminous heaters	S GCV	73,3%	89%	59%			
16_tube heaters	S GCV	64,4%	83%	52%			

The payback times calculated for specific options identified in the preparatory studies are on average less than product life.

3.7. Should the EU act?

Whether the EU should act is governed by Article 15 of the Directive 2009/125/EC which states that in case a product represents a significant volume of sales, has a significant environmental impact within the Community, presents a significant potential for improvement (without entailing excessive costs), while taking into account an absence of other relevant Community legislation or failure of market forces to address the issue properly and with a wide disparity in environmental performance of products with equivalent functionality, the product can be covered by an implementing measure or by self-regulation.

The sales volume is large enough to be significant, as is the environmental impact from energy consumption and emissions. The preparatory studies have established for the products within scope a significant potential for improvement which can be achieved without excessive costs. Furthermore the studies showed that there is no relevant Community legislation addressing the problems related to this product group, or adequate results form market forces to address the issue properly. The studies have also established a disparity in environmental performance of products with equivalent functionality, the range in disparity depending on the specific product category.

The preceding sections show that the current trend in sales and properties of models does not significantly reduce the energy consumption of these products. Emissions to air of solid fuel operated LSH are in decline, presumably through introduction of emission limit values in several Member States. These limit values are however not harmonised.

The preparatory studies have shown that a cost-effective room for improvement exists. The studies have established an efficiency which achieves the least life cycle costs and efficiency attainable by employing the best available technology.

There is consensus among most stakeholders that the issue of energy consumption and emissions by these products needs to be addressed.

Hence, further measures by the EU are necessary to deal with this development. The Ecodesign Directive (Article 16 in particular) and the Energy Label Directive (Article 1) provide the legal basis for the European Commission to adopt implementing measures reducing energy consumption and emissions of solid fuel boilers as well as guiding consumers towards the most efficient appliances.

4. POLICY OBJECTIVES

This impact assessment focusses on operational objectives since the general and specific objectives have already been set out in the impact assessments for the Ecodesign and Energy Labelling Directives.

4.1. General objectives

The preparatory study has confirmed an existing and cost-effective potential to reduce energy consumption and emissions. This potential is not sufficiently realised and the general objectives are therefore to develop a policy, which corrects the regulatory and market failures:

- Reduce fuel and electricity consumption and related CO_{2eq}, PM, OGC and CO emissions due to use of local space heaters following Community environmental priorities, such as those set out in Decision 1600/2002/EC or in the Commissions European Climate Change Programme.
- Promote energy efficiency as contribution to security of supply in the framework of the Community objective of saving 20% of the EU's energy consumption by 2020.
- Promote competitiveness of the LSH industry through the creation or expansion of the EU internal market for sustainable products.

4.2. Specific and operational objectives

- Promote market take-up of energy-efficient LSH with low PM, OGC and CO emissions (where relevant).
- Drive investments in R&D towards environmentally friendly products.
- Make sustainable products more affordable through mass production.
- No negative impact should arise in terms of functionality of the product, health, safety and environmental aspects, industry's competitiveness, imposing proprietary technology and excessive administrative burden (Article 15 (5) of the Ecodesign directive).

The necessary coherence with existing legislation leads to further operational objectives.

- Set requirements that are not less stringent than existing requirements in Member States.
- Consistency with ecodesign and energy labelling requirements for central space heaters.
- Consistency with the promotion of renewable energy under the Renewable Energy Directive.

The operational objectives are intended to create a level playing field for setting minimum performance requirements and the provision of easy-to-understand information on the efficiency and environmental performance of local space heaters.

5. Policy options

In order to address the issues identified in Section 3 and to meet the targets defined as policy objectives in Section 4, the following policy options are considered:

5.1. Option 1: No EU action (Baseline)

This option assumes continuation of current policy measures at Member State level, no further measures for LSH at EU level and thus continuation of existing trends regarding size, use, efficiency and specific emissions of appliances. This option would have the following implications:

- Energy consumption and emissions of LSH will remain at a level higher than the level that would realise the cost effective saving potential as established in the preparatory studies;
- Consumers would not be able to differentiate between high-efficient and low-/average-efficient appliances;
- No harmonisation of energy and emission requirements would occur; Member States would continue to develop their own national energy/emission limit values;

This option is included in the impact assessment as the baseline and serves as a reference to calculate the savings of the other policy options in Section 6.

The impact of this option is described more in detail in Section 3.6: In the absence of EU action, it is to be expected that Member States may continue to take individual (non-harmonised) action on LSH (solid fuel operated LSH, but also LSH using other fuels or electricity) to speed up the increase in energy efficiency and the reduction of emissions of appliances. Such action would hamper the functioning of the internal market and lead to high administrative burdens and costs for manufacturers, in contradiction to the goals of the Ecodesign Directive.

This option means that the problems described in chapter 2 would persist. Therefore this option is therefore to be discarded.

5.2. Option 2: Self regulation, "Voluntary agreement"

Self-regulation or voluntary agreements can have as benefits over legislative measures that the implementation may be much faster and at the same time offer more flexibility. For minimum standards, in order to be accepted as viable alternative to legislation, self-regulation initiatives have to comply with a stringent set of criteria defined by Annex VIII of Directive 2009/125/EC (openness for participation, added value, representativeness, quantified and staged objectives, involvement of civil society, monitoring and reporting, cost-effectiveness of administering a self-regulatory initiative, sustainability and incentive compatibility).

The Energy Labelling Directive provides no specific framework for a voluntary approach. On the contrary, it reserves the use of the EU energy label for energy-related products that are covered by implementing regulations as otherwise it might result in confusion or even misinformation for end-users.

Self-regulation or voluntary agreements have not been tabled by the industry. This apparent lack of support for such an initiative makes meeting the requirements indicated before very unlikely.

The initial stakeholder consultations led to the conclusion that the relevant industry would support mandatory measures, given that already many mandatory requirements exist on national level and that EU level requirements would help to harmonise these requirements.

Further, a voluntary approach would not be consistent with the approach for other heating products.

For the above reasons, this option is therefore to be discarded.

5.3. Option 3: Ecodesign requirements only (ME&EPS[27])

This option considers the setting of ecodesign requirements on energy efficiency and emissions under the Ecodesign Directive without energy labelling scheme. This option would not allow the consumers to see the relative efficiency of products displayed at the point of sale, nor would it give an incentive to manufacturers to invest on more efficiency appliances.

In addition, this option would be incoherent with the approach chosen for other heating products, such as room air conditioners that provide, if reversible, local space heating and central heating boilers using gas, liquid or solid fuels which also provide in space heating.

No stakeholder has expressed support to this option.

This option is therefore to be discarded.

5.4. Option 4: Mandatory energy labelling scheme only

This option provides in mandatory energy labelling alone (without ecodesign requirements). A labelling scheme (as ‘pull’-effect) alone will be much less effective that the setting of ME&EPS requirements. The mandatory energy label will make the relative efficiency of products more transparent to consumers, and thus give incentives to manufacturers to compete on energy efficiency of products, but labelling alone cannot enforce upon the market the sales of more efficient products.

Moreover, a labelling scheme only could only work by jointly addressing energy efficiency and multiple types of emissions at the same time. It is not obvious how this could be done effectively with the current energy label and might require a completely new and different labelling approach.

No stakeholder has expressed support to this option.

This option is therefore to be discarded.

5.5. Option 5: Ecodesign requirements and energy labelling

This option considers the setting of Ecodesign requirements in combination with energy labelling as a combined market 'push and pull' effect. In order to analyse the impact of different levels of stringency, and different labelling schemes five sub-options (A-E) with varying parameters are analysed.

- Sub-option A. Based on working documents presented to the Consultation Forum. Three tiers for minimum energy efficiency requirements and maximum emission values. Energy labelling covering all LSH under one scale.
- Sub-option B. Based on comments received during the Consultation Forum meeting. Three tiers for minimum energy efficiency requirements and two tiers for maximum emission values. Exclusion of non-combustion LSH from the energy labelling scheme.
- Sub-option C. Minimum energy efficiency requirements and maximum emission values as in sub-option B. Development of a specific energy labelling scale for non-combustion LSH.

[27] Minimum Energy & Emission Performance Standards

- Sub-option D. Two tiers for minimum energy efficiency requirements and two tiers for maximum emission values. Energy labelling scheme as in sub-option C.
- Sub-option E. Only one tier for minimum energy efficiency requirements and maximum emission values. Energy labelling scheme as in sub-options C and D.

Table 4: Overview of evaluated sub-options

Sub-option	Energy efficiency	Emissions	Labelling
A	3 TIERS (2016/2018/2020)	3 TIERS (2016/2018/2020)	Single scale for all fuels
B	3 TIERS (2016/2018/2020)	2 TIERS (2016/2018)	Only Combustion LSH
C	3 TIERS (2016/2018/2020)	2 TIERS (2016/2018)	2 scales (combustion and non-combustion)
D	2 TIERS (2016/2018)	2 TIERS (2016/2018)	2 scales (combustion and non-combustion)
E	1 TIER (2018)	1 TIER (2018)	2 scales (combustion and non-combustion)

The specific minimum energy efficiency requirements, maximum emission values and labelling scales for each sub-option can be found on Annex 3.

The sub-options are based on the expected adoption of the measures by the end of 2013 (thus assuming the Regulations to be in place as of 1 January 2014 and, with requirements to apply as of 2016, allowing two years for preparation).

The additional option of indicating PM emissions on the label is also analysed. This indication is independent of the finally chosen option as it can be combined with anyone of the five proposed sub-options.

Both ecodesign and labelling will be based upon efficiencies as described in Annex 2.

Since this impact assessment covers products using biomass solid fuel, a renewable fuel, the question arises how to address solid fuel biomass LSH on the labelling scheme. For heaters using other renewables as input (solar, heat pumps) 'Lot 1' considers the renewable energy input as zero energy input and only the auxiliary energy (electricity in the case of heat pumps) is considered in determining the efficiency. Nullifying the renewable fuel input would for biomass LSH not achieve the objective of more efficient fuel consumption, since auxiliary power is minimal and all products would fall into the maximum energy efficiency class.

The alternative would be to base the efficiency used for the label rating on solid biomass fuel input versus heat output, as done for fossil fuel operated products. This would result in similar efficiency values for both biomass and fossil solid fuels, as the maximum efficiency to be achieved by both types of products is limited because of minimum flue gas temperatures to be achieved and technical constraints that make it difficult to allow condensing operation.

However, as the goals of the EU are to reduce greenhouse gas emissions, improve security of energy supply and diminish depletion of fossil fuel resources, the use of renewable fuels such as solid biomass are promoted.

Therefore, for all sub-options a 'biomass conversion factor' is introduced which multiplies the efficiency (calculated in a similar way as for fossil fuel) for the purposes of establishing the energy labelling class for biomass LSH by a factor of 1.2. Further detail on the level of this factor is provided in Annex 2.

5.5.1. *Sub-Option A: ME&EPS 2016/2018/2020 and energy labelling*

This sub-option considers ecodesign and energy labelling requirements corresponding to the proposals of the working document shared with the members of the Consultation Forum on 20 July 2012 and discussed on the Consultation Forum meeting of 20 September 2012. The document proposes 3 tiers (Tier 1: 2016, Tier 2: 2018, Tier 3: 2020) both for the minimum energy performance requirements and maximum emission values. This separation in three tiers allows a longer transitional period for the industry.

This sub-option was discussed during the Consultation Forum on 20th September 2012 but most stakeholders indicated that they did not prefer this option. They considered that the energy efficiency and emissions requirements were not sufficiently stringent and that the labelling scales (adopted from Lot 1 proposals) were inadequate to foster a market transformation as too many products were 'fixed' in single classes (electric products are confined to the bottom three classes, giving poor incentives to improve; gas fired heaters with flues are confined to a single class 'C' also giving poor incentives to improve) (see Annex 1).

The specific energy efficiency and emission requirements as well as the energy labelling scale can be found in Annex 3.

5.5.2. *Sub-Option B: ME 2016/2018/2020, EPS 2016/2018 and modified energy labelling (not for non-combustion LSH)*

This sub-option reflects the approach suggested by some Member State and stakeholder representatives during the Consultation Forum of 20 September 2012 (see Annex 1).

The energy efficiency requirements proposed for this sub-option are the same three tiers as in sub-option A.

For emission requirements an earlier implementation of more ambitious targets with only 2 tiers is proposed. The former Tier 1 on sub-option A is skipped and the requirements of the new Tier 1 correspond to the requirements of the former Tier 2 on sub-option A.

The energy labelling scheme on this sub-option excludes from its application non-combustion LSH but uses the same labelling scale as the one proposed on the working documents but only applied to combustion LSH.

The specific energy efficiency and emission requirements as well as the energy labelling scale can be found in Annex 3.

5.5.3. *Sub-option C. ME 2016/2018/2020, EPS 2016/2018 for energy efficiency of LSH and modified energy labelling (combustion and non-combustion products)*

This sub-option mirrors sub-option B but includes non-combustion products in the energy labelling scheme in order to evaluate the savings related to the energy labelling of non-combustion products.

This sub-option considers energy efficiency requirements for LSH in three tiers 2016/2018/2020 identical to sub-options A and B.

The requirements on emissions are identical to option B.

The energy labelling scheme for this sub-option which includes a labelling scale for non-combustion LSH and another labelling scale for combustion LSH.

As in option A and B the efficiency of biomass operated products is calculated using a biomass conversion coefficient 1.2. This means a biomass solid fuel heater with a net calorific efficiency of just beyond 90% would thus be in class A+ (beyond 108%). This value can only be achieved by BAT pellet stoves which are currently the technology with higher efficiency and lower emissions on the market. A class can be achieved by pellet LSH and BAT closed fires. B class can be achieved by BAT gas and liquid fuel LSH. . Gas and oil LSH will be usually ranked in classes A to G.

The different requisites for installing combustion and non-combustion LSH make it very difficult to compare them under the same labelling scheme as the combustion and non-combustion LSH, although performing the same basic function (heating a space) do not have the same patterns of use or infrastructure requirements. In practice, these products are not substitutes for consumers that will compare non-combustion LSH versus other non-combustion LSH and combustion LSH versus other combustion LSH.

In consequence, a specific labelling scheme is used for non-combustion LSH due to their different usage patterns and infrastructure requirements. Non-combustion LSH are able to populate all energy classes and only if using advanced controls are able to achieve A or B classes.

The specific energy efficiency and emission requirements as well as the energy labelling scale can be found in Annex 3.

5.5.4. Sub-option D. ME&EPS 2016/2018 for LSH and modified energy labelling (combustion and non-combustion LSH).

The main difference with the previous options is that this sub-option considers ecodesign energy efficiency requirements for LSH in two tiers 2016/2018. Therefore energy savings would be realised more quickly than under option A or B.

The requirements on emissions are identical to options B and C.

As in option C the energy labelling scheme for this sub-option is different for combustion and non-combustion LSH.

As in option A, B and C the efficiency of biomass operated products is calculated using a biomass conversion coefficient 1.2.

The specific energy efficiency and emission requirements as well as the energy labelling scale can be found in Annex 3.

5.5.5. Sub-option E. ME&EPS 2018 and modified energy labelling (combustion and non-combustion LSH).

The main difference with the previous options is that this sub-option considers ecodesign energy efficiency and emission requirements for LSH in only one tier, applicable as of 2018.

This option would avoid the need for notification procedures for Member States that already have legislation in place. Energy savings before 2018 can be realised through the energy labelling scheme.

As in option C and D the energy labelling scheme for this sub-option is different for combustion and non-combustion LSH.

As in option A, B and C the efficiency of biomass operated LSH is calculated using a biomass conversion coefficient 1.2.

The specific energy efficiency and emission requirements as well as the energy labelling scale can be found in Annex 3.

5.6. Indication of the PM emission level on the label

The indication of particulate matter (PM) on the label as suggested by Sweden and the environmental NGOs in their written contribution following the Consultation Forum meeting could be combined with any of the proposed sub-options (A-E). Of the emissions types for which ELVs are proposed, particulate matter is the most important in terms of impact on air quality and human health. The indication of PM emissions on the label could further reduce such emissions, as consumers may choose for LSH with lower emissions out of concern of local pollution and authorities might promote such LSH.

Nevertheless, different methods exist for measuring the PM emissions from solid fuel LSH, these methods are presented in CEN/TS 15883. These methods lead to different results. The repeatability and comparability needs to be ensured in order to provide accurate and relevant information to consumers.

The impact of this indication is not further analysed in detail, nevertheless the impacts of this sub-option are the same as the chosen sub-option with which it is combined except for PM emissions, where due to the higher level of information provided to consumers the emissions would be reduced to a higher extent. The specific impact depends on the assumptions made on consumer behaviour and no data on this matter is available.

Nevertheless, it is to be taken into account that all sub-options propose in any case very stringent requirements in their last tier for PM emissions. In consequence, as ecodesign requirements will be close to BAT technologies after 2, 4 or 6 years of the entering into force of the Regulation the reduction of PM emissions due to their indication on the label will be limited and will only have effect during a short period of time between the entering into force of the energy labelling Regulation (2016) and the entering into force of the most stringent requirements (2018 or 2020).

6. ANALYSIS OF IMPACTS

Please note that this Impact Assessment study is a proportionate analysis and only options that appear feasible have been assessed in more detail in the following section.

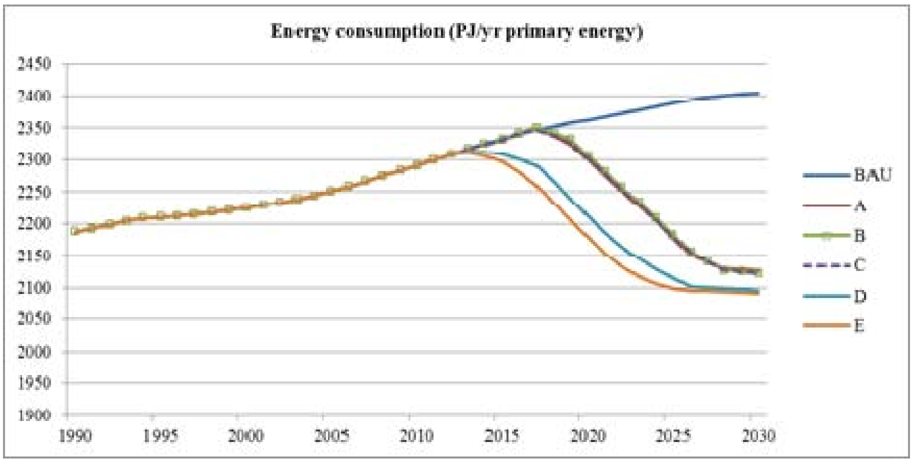
To analyse the full impact of a policy, it is important to consider a period, during which the whole stock of installed appliances will be replaced by new products purchased after the ME&EPS requirements and the labelling scheme have entered into force. Assuming that the Regulations may be adopted by the end of 2013 / beginning 2014, the specific Ecodesign and labelling requirements will apply as of beginning 2016.

6.1. Economic impact

6.1.1. Energy saving and security of supply

Due to the growing stock of LSH, energy consumption will increase in the future. In the baseline, the energy consumption of these appliances can rise to 2362 PJ/year (656.1 TWh/year) in 2020 and to 2404 PJ/year (667.7 TWh/year) in 2030.

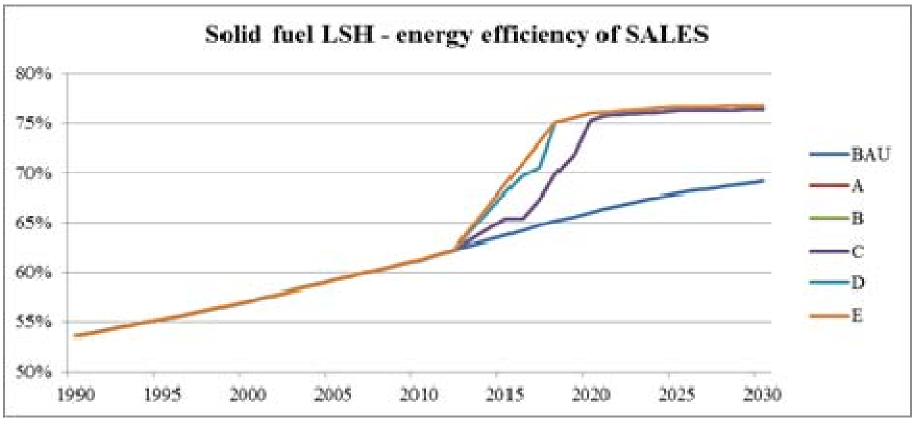
Figure 5: Development of energy consumption in the different policy options

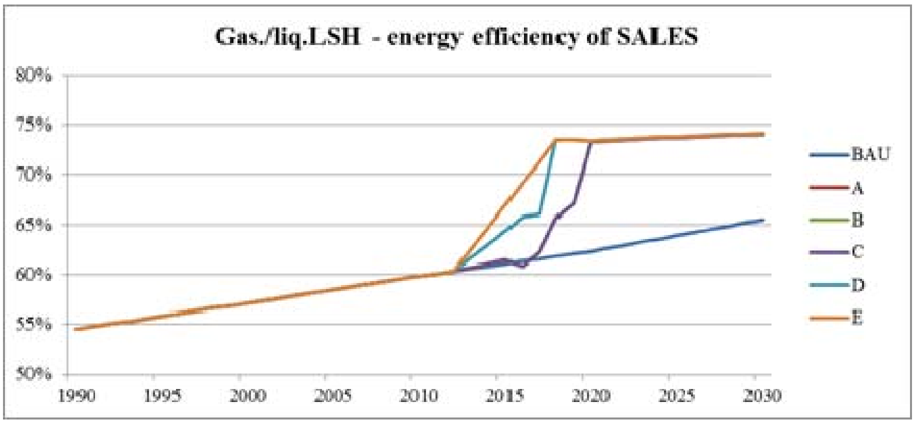


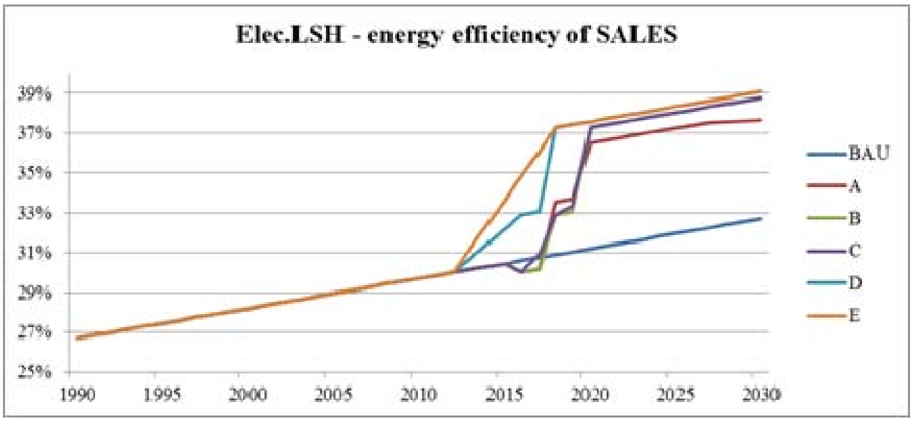
If no measures are taken, the energy consumption of LSH will increase by 3% in 2020 compared to 2010 values and by 5% in 2030.

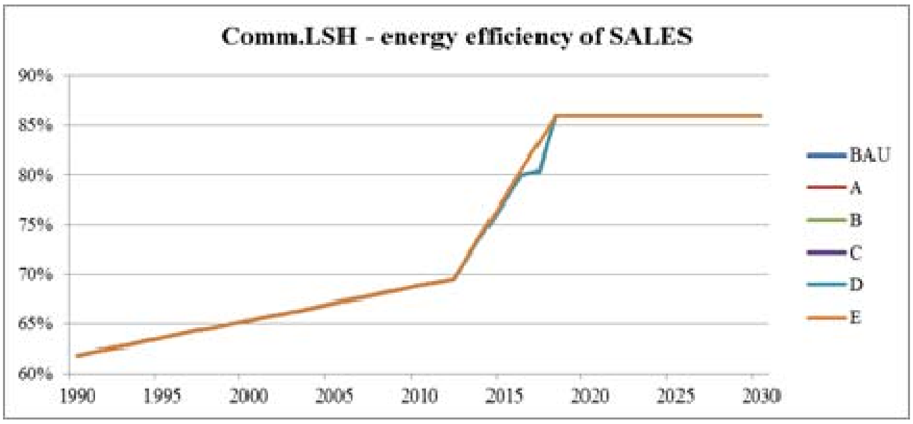
The efficiency will develop as shown below.

Figure 6: Development of weighted average efficiency for the different policy options









6.1.2. Competitiveness and internal market

The analysed policy options do not affect competitiveness of European industry. Exact figures are not available, but extra-EU imports are currently only very few percentages. Manufacturers expect them to increase but there is no difference between the baseline and the different options in terms of imports. In any case, development of innovative technology due to requirements set and additional policy implemented will increase competitiveness of European manufacturers in other markets. Moreover, regulation will foster competition between manufacturers within Europe, where markets seem to be not fully integrated yet.

The process for establishing ecodesign requirements has been fully transparent, and before adoption of the measures a notification under WTO-TBT will be issued. The EU has often been leading in standardisation and energy labelling and it is thus likely that other countries would follow the EU example. This will strengthen the global effort of fighting low-efficiency, high-emission local space heaters.

6.1.3. Territorial impact

Territorial impact assessment (TIA) is one of the possible elements of the impact assessments. As stated in a recent presentation of the Commission services[28], TIA is only required when the policy explicitly targets a (type) of region and/or the policy targets some regions or areas more than others. In this case, these conditions do not apply and thus the TIA is not required.

[28] European Commission, Impact Assessment Guidelines, SEC(2009)92

6.1.4. *Large and SME manufacturers in the EU*

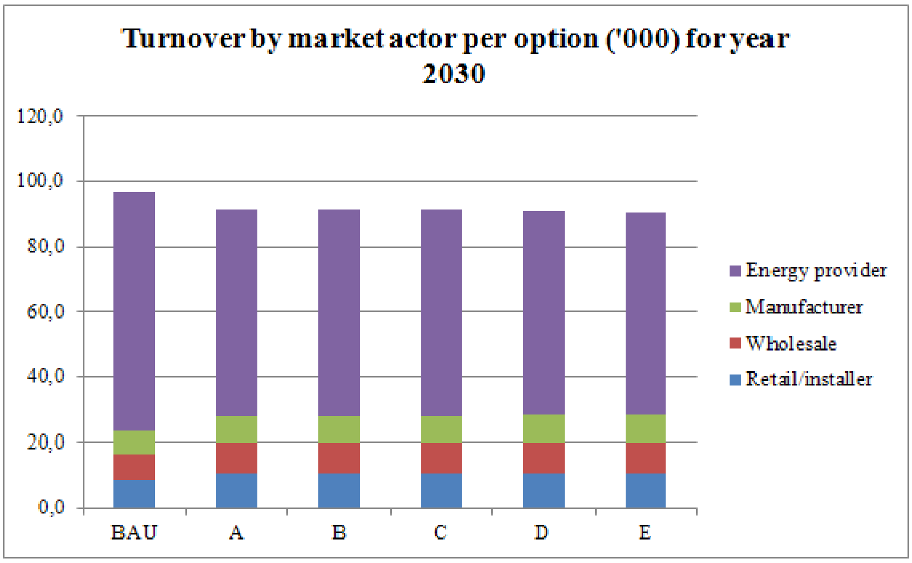
Regulations will not specifically affect larger or smaller manufacturers. In order to be present in the market of Member States where stringent energy efficiency and low-emission requirements have already been implemented, some manufacturers have adapted their portfolio accordingly. The Regulation will support those manufacturers of LSH that have already gained experiences with energy-efficient and low-emission technology.

It should be noted that Ecodesign regulations fall on the product, not on the producer. Therefore, it is not possible to reduce the impact of the regulations through exemptions or special regimes according to its size. Nevertheless, the impact on SMEs could be mitigated through several means, in particular a reasoned scheduling of the entry into force of the MEPS.

6.1.5. *Retailers and Installers*

The following figure visualises the distribution of total turnover of market activities related to LSH, their installation, maintenance and use by market actors for the different policy options in the assessed timeframe.

Figure 7: Distribution of total turnover by market actor in the different policy options



It shows the high share of the energy provider in total turnover, this turnover represents the turnover of suppliers of fuels and electricity.

All sub-options have almost the same total turnover, which is slightly lower than in the baseline (96.8 billion €/year) while the different sub-options are in the area of 91 billion €/year. Differences in the distribution are small between different sub-options. Sub-options D and E have the most stringent MEPS and therefore more efficient technologies are required, which have a positive impact on the manufacturer, wholesale and retail/installer turnover.

6.1.6. *Administrative burden*

The form of the legislation is a Regulation which is directly applicable in all Member States. This ensures no costs for national administrations for transposition of the implementing legislation into national legislation.

The Impact Assessment on the recast of the Energy Labelling Directive SEC(2008) 2862 calculates the administrative burden of introducing a new implementing Directive, similar to the proposed to the ecodesign implementing measure, in accordance with the EU Standard Cost Model.

It estimates the administrative cost of implementing measures in the form of a Directive at € 4.7 million of which € 720.000 for administrative work on the amendment/development of the new Directive and €4 million for transposition by Member States. It follows that the administrative cost of an implementing Regulation – as is currently proposed - would save € 4 million in avoiding the transposition cost.

Administrative costs of enforcing the Regulation are difficult to estimate. Enforcement could involve random spot-checks by the authorities, but from experience with other regulations of this type most spot-checks are not random but follow indications of competitors or third parties (e.g. industry or consumer associations). In those cases, the probability of not only recuperating testing costs and legal costs, but also of collecting fines is high. Therefore, no extra enforcement costs for Member States are anticipated from the measure.

The proposed Ecodesign measure includes requirements to provide information on the efficiency of the appliances as well as the measurement and calculation methods. The energy labelling measure includes the provision of an energy label and a technical fiche. The proposed measurement and calculation method requests additional information, but the administrative burden for manufacturers or retailers is limited.

6.1.7. *Compliance cost and timing*

Compliance costs include the costs for product testing as well as costs for market surveillance.

The cost of testing a solid fuel LSH is about 7,500 Euro. As appliance efficiency increases, appliances tend to become more sophisticated and it is foreseeable that testing requirements also become more expensive. In general, the impact of the need to test appliances due to any kind of regulation or labelling could be significant on manufacturers, especially SMEs who develop products and would then be required to pay testing facilities for (possibly several) tests to characterise their product. Testing requirements should therefore be a compromise between thoroughness of product performance evaluation and cost effectiveness. Nevertheless, test results should allow assessing the performance of the products under different operation conditions (e.g.: temperatures, part load).

The cost of testing liquid / gas and electric appliances is lower than the cost of testing solid fuel LSH, so the effect will have a similar form but lower amplitude.

Manufacturers need time to make the necessary investments in order to ensure that appliances comply with the legal requirements. According to stakeholder consultation, the design cycle to develop a completely new appliance, which is able to deal with the strictest requirements, is about 5 years, although this estimation is considered to be conservative. Manufacturers have already to have their products tested in the context of several European norms, additional testing costs are minimal or non-existent. In consequence, options allowing enough time for the entering into force of requirements have a negligible impact on (re)-design costs.[29]

Thereby, test capacity (laboratory time) may be also a limiting factor, meaning that a very quick introduction (< 1 year) of requirements is not feasible. Industry and other stakeholders have supported a 2 / 2 year period to prepare Tier 1 and Tier 2 requirements respectively.

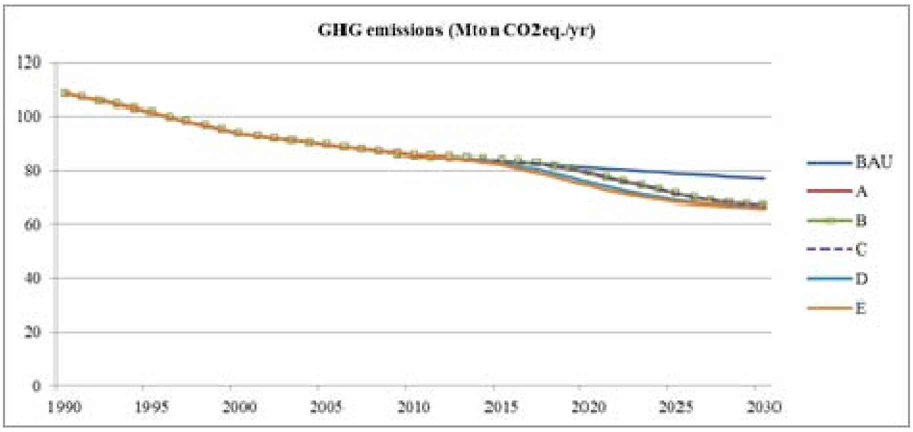
6.2. Environmental impact

6.2.1. Greenhouse gas emission reduction

Greenhouse gas (GHG) emissions are calculated based on the fuel or electricity consumption and the specific GHG emission of a fuel or unit of electricity. The specific emission values of fuels are based on data presented in the preparatory studies; those of electricity are based on the MEErP 2011 study.

GHG emissions will decrease from 85 Mt CO_{2eq} to 77 Mt CO_{2eq} in the baseline as an effect of ongoing improvement of energy efficiency. All policy options reduce GHG emissions compared to baseline to 66-67 Mt, a reduction of 13-14%.

Figure 8: Development of total GHG emissions in the different policy options

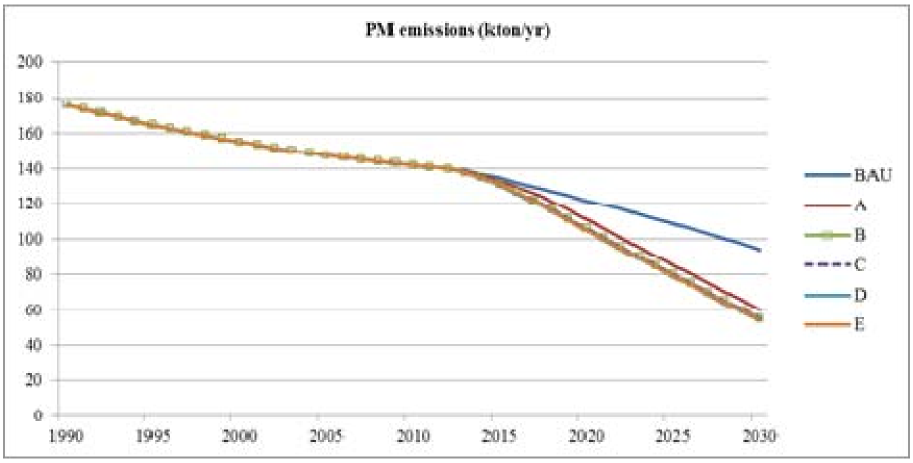


Reduction of other pollutants, particularly PM, OGC and CO

As explained before, reducing PM emissions should be the most important objective of policies and measures aiming at reducing emissions of solid fuel LSH. All policy options analysed in this IA will contribute to this and option. Without these policies and measures, such a decrease is not expected to happen.

[29] Further specification on administrative costs for business and authorities is provided in the impact assessment supporting ecodesign/energy labelling requirements for heaters.

Figure 9: Development of PM emissions in the different policy options



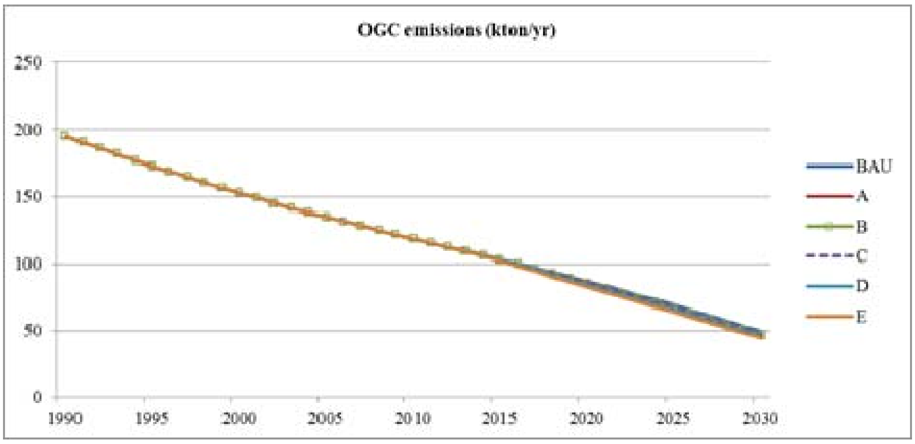
The current trend will reduce PM emissions in 20 kton/year in 2020 and in 61 kton/year in 2030 compared to 2010 values. These values could be increases up to 37 kton/year in 2020 and 88 kton/year for sub-options D and E.

The indication of the PM emissions on the label has also been analysed. The most optimistic but unrealistic scenario for PM reductions would mean that the indication of PM emissions on the label would lead all consumers to choose BAT products from the entering into force of the Labelling Regulation (2016), which would be equivalent to the entering into force of the most stringent emission requirements already in 2016.

This would save additional 3.3 kton/year of PM emissions for options B and C, 2.1 kton/year for option D and 2.4 kton/year for option E. Option A is not further analysed because emission requirements were considered no stringent enough by Consultation Forum Members (Annex 1) and it would be incoherent to combine soft requirements with the proposed labelling of PM emissions.

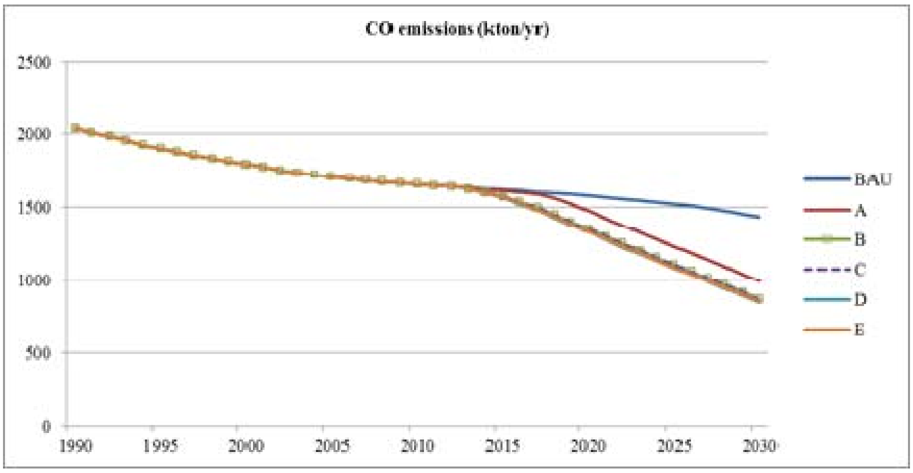
These positive reductions in PM emissions are however not feasible in practice as not all consumers will take into account PM emissions when making their purchasing decisions. A still optimistic estimation assuming that 10% of the consumers will choose products with the lowest PM emission values leads to additional reductions on PM emissions below 0.5 kton/year for all scenarios.

Figure 10: Development of OGC emissions in the different policy options



The current trend will reduce OGC emissions in 32 kton/year in 2020 and in 70 kton/year in 2030 compared to 2010 values. These values could be increased to 36 kton/year in 2020 and 75 kton/year in 2030 for sub-option E, similar values are found when analysing sub-option D.

Figure 11: Development of CO emissions in the different policy options



The current trend will reduce CO emissions by 78 kton/year in 2020 and by 225 kton/year in 2030 compared to 2010 values. These values could be increased to 330 kton/year in 2020 and 813 kton/year in 2030 for sub-option D, similar values are found when analysing sub-option E.

6.3. Social impact

6.3.1. Employment, training and certification of market actors

Employment impacts have been roughly estimated by applying specific factors, which are based on a comprehensive data research based on annual reports of 25 market actors in the EU (Annex 2).

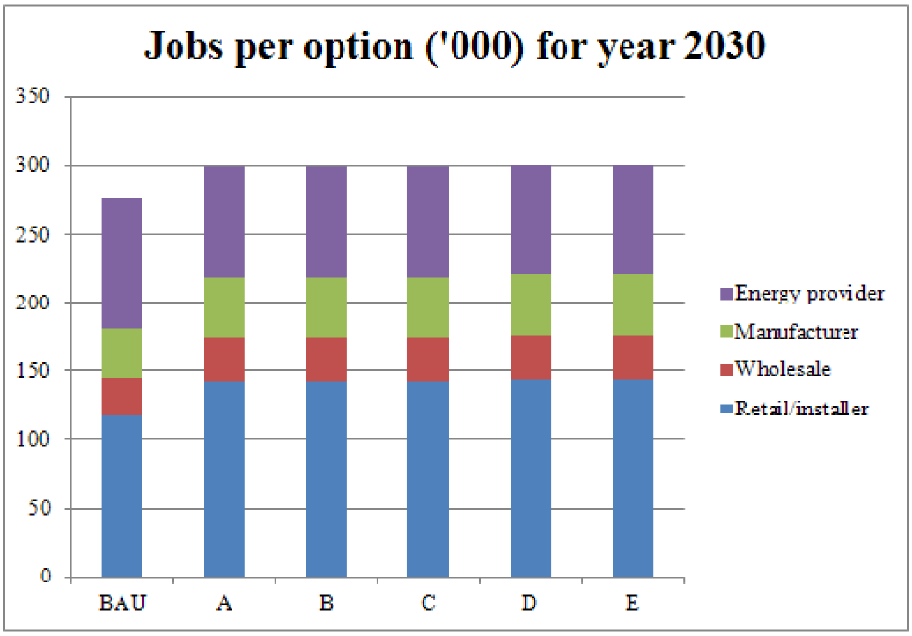
The comparison of gross direct and indirect employment effects in the following figure visualises the importance of installers of especially fuel fired LSH. The installation into the dwelling can be as influential on the system efficiency as the product itself. Therefore, improvements of existing or new systems must be accurately suited to their application with respect to sizing, frequency of use, fuel availability, condensation in the chimney and the potential for back draught.

Another important aspect is the limited ability of fuel fired LSH to modulate their power output. Modulating fuel supply is not always easy in solid fuel appliances and modulating air supply is not recommended for modulating power output. Consequently, the most suitable LSH should be chosen to ensure constant high efficiencies and low emission values.

Therefore, only properly trained and certified technicians should be charged with sizing and installing a heating system for safety reasons as well as for optimising the system performance. Further training of installers is needed in order to cope with the increasing degree of complexity to adjust the appliances.

Employment impacts outside the EU are primarily indirect ones. The analysis does not calculate net employment impacts, which would require applying complex economic modelling. This would have to take into account (among other aspects) direct and indirect impacts of substituting other heating systems and conventional energy supply by the increase in stock of solid fuel boilers.

Figure 12: Gross direct and indirect employment impacts in the different policy options



All policy options have a positive impact on employment, creating around 24000 jobs in the EU in year 2030; most of these jobs are to be created on the retailer/installer sector.

6.3.2. Consumer economics and affordability

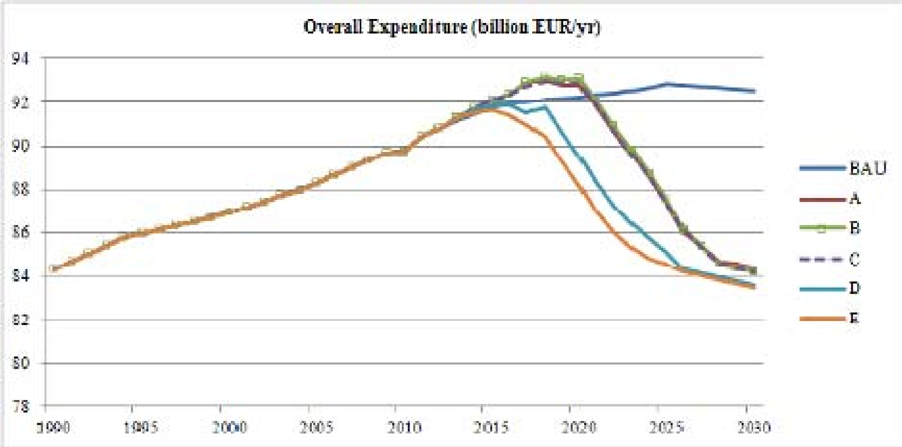
The costs referenced in this chapter are life cycle costs.

Payback periods for electric LSH are well below the average life time of the products; gas and liquid fuel LSH also have payback periods that are below the lifetime of the product.

For solid fuel local space heaters payback periods are in some cases above the average lifetime of the product, this is due to the low energy cost of biomass, which is less than 0.03 €/kWh when compared to 0.16 €/kWh for electricity or 0.067 €/kWh used for gas. Should the price of solid fuel increase, the payback periods will be reduced to a great extent. Payback time does not take into account other impacts such as the reduction of emissions and thus increase on air quality derived of these measures.

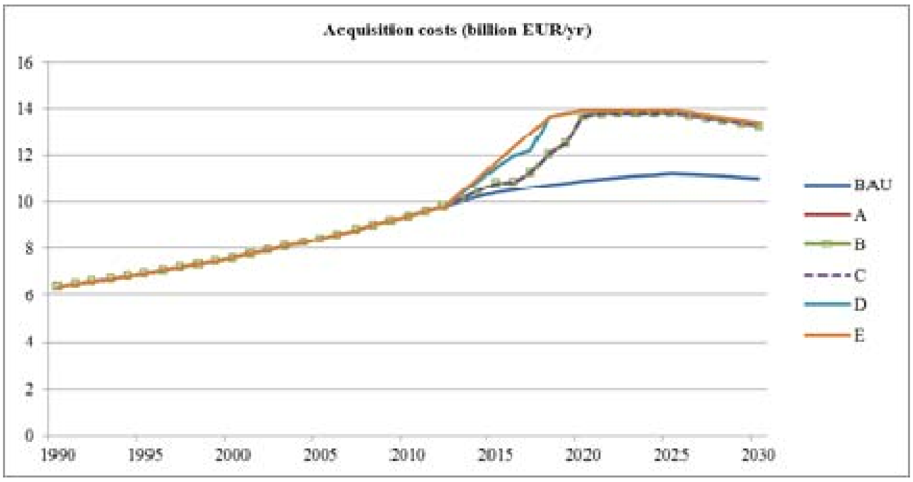
The options discussed will lead to a higher market share of innovative technology while not affecting the functionality of the products. In particular, this will be true for options combining market push and market pull measures.

Figure 13: Development of total expenditures in the different policy options



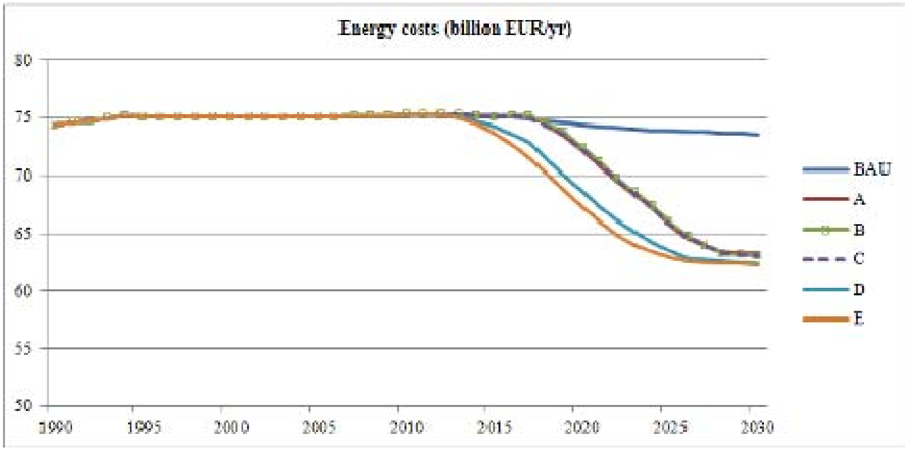
Total expenditure is foreseen to increase from 90 billion €/year in 2010 to 92 billion €/year in 2020 and 93 billion €/year in 2030 in the base case scenario.All proposed sub-options lead to an overall expenditure between 88 billion €/year and 93 billion €/year in 2020 and around 84 billion €/year in 2030.

Figure 14: Development of acquisition cost in the different policy options



As a result of the more stringent energy efficiency and emission limit requirements in the different policy options analysed, the acquisition costs are increased in relation the BAU scenario, the results are similar for all five analysed sub-options and lead to an increase from 9 billion €/year in 2010 to 14 billion €/year in 2020 and 13 billion €/year in 2030. Acquisition costs in the BAU scenario are 11 billion €/year both in 2020 and 2030.

Figure 15: Development of energy cost in the different policy options



Energy costs are reduced in all analysed policy options from 74 billion €/year in 2020 and 2030 for the base case scenario to between 67 billion €/year and 72 billion €/year in 2020 to around 63 billion €/year in 2030 for all policy options.

6.3.3. Health and safety aspects

Long-term exposure to PM is particularly damaging to human health, reduces life expectancy and consequently needs to be tackled as a priority. The burning of solid fuels in households is a major contributor in terms of total PM air pollution, so regulations for solid fuel small heating appliances can contribute to a substantial PM emission reduction. More information regarding pollutants derived from solid fuel combustion can be found in the Annexes.

With regard to safety aspects, it should also be noted that natural draught heating appliances depend on the draught of the appliances and the chimney to ensure effective removal of combustion flue gases. As the efficiency of heating appliances increases (indicatively beyond 80% NCV), the lower flue temperatures reduce the strength of the flue draught and therefore introduce the possibility of backdraught in the chimney and flue system. This is a safety concern, because toxic flue gases like CO can be emitted into the dwelling. Appliances operating at such high efficiencies, where also condensation is a concern, may require significant upgrading of the chimney to prevent health risks or damages to the flue gas system. This upgrading should only be done by a certified and trained technician.

6.4. Conclusion on economic, social and environmental impacts

The tables below give a comparative overview of the main impacts of the analysed policy options versus the objectives of Ecodesign measures following the criteria mentioned in Art. 15 of 2009/125/EC and an overview of fulfilment of boundary conditions according to sub 5 of this article. The complete summary table can be found in Annex 6.

Table 15: Overview of impacts of the different policy options for 2030

IMPACTS								
As per Article 15 4 (e), Directive 2009/125/EC								
SCENARIOS			BAU	A	B	C	D	E
ENVIRONMENT								
ENERGY		[PJ/a]	2404	2127	2122	2122	2095	2091
GHG		[Mt CO_{2eq}/a]	77	67	67	67	66	66
PM		[kton/a]	94	60	55	55	54	54
CO		[kton/a]	1433	993	868	868	845	853
OGC		[kton/a]	49	47	47	47	45	44
CONSUMER								
EU totals	expenditure	[billion €/a]	93	84	84	84	84	83
	purchase costs	[billion €/a]	11	13	13	13	13	13
	energy costs	[billion €/a]	74	63	63	63	62	62
per product	product price	[€]	389	468	468	468	473	473
	energy costs	[€ /a]	222	191	191	190	188	188
BUSINESS								
EU turnover	manufacturer	[billion €/a]	6,7	8,0	8,0	8,0	8,1	8,1
	wholesale	[billion €/a]	7,7	9,2	9,2	9,2	9,3	9,3
	retail/ installer	[billion €/a]	8,8	10,6	10,6	10,6	10,7	10,7
EMPLOYMENT								
Jobs	Retail/installer	'000	118	142	142	142	143	143
	Wholesale	'000	28	33	33	33	33	33
	Manufacturer	'000	36	44	44	44	44	44
	of which within EU	'000	34	42	42	42	42	42
	of which OEM	'000	4	4	4	4	4	4
	Energy providers	'000	94	81	81	81	80	80

Note: All economic amounts are expressed in 2010 € (inflation corrected)

Table 16: Fulfilment of boundary conditions in the different policy options

BOUNDARY CONDITIONS ("should be no negative impacts")						
No negative impacts (Article 15 5)	Options 2030					
IMPACTS	BAU	A	B	C	D	E
Functionality of product	ref	+	+	+	+	+
Health, safety and environment	ref	++	++	++	++	++
Affordability and life cycle costs	ref	/	/	/	/	/
Industry competitiveness	ref	/	/	/	/	/
No proprietary technology	ref	/	/	/	/	/
No excessive administrative burden	ref	/	/	/	/	/

Legend:

+: positive impact/condition met;

/: neutral impact.difference not significant;

-: condition not met.

7. COMPARISON OF POLICY OPTIONS

All policy options analysed in this IA contribute to an improvement of energy efficiency and therefore to a reduction in growth of solid fuel consumption and emissions compared to baseline development.

The analysis shows that the policy options save between 62 and 183 PJ (17.2 and 50.8 TWh) in 2020, reduce PM emissions by between 9% and 14% in 2020, reduce OGC emissions by between 2% and 5% in 2020 and reduce CO emissions by between 7% and 16% in 2020.

The analysis indicates that the policy options save by between 207 and 313 PJ (57.5 and 86.9 TWh) in 2030, reduce PM emissions by between 36% and 42% in 2030, reduce OGC emissions between 5% and 11% in 2030 and reduce CO emissions by between 31% and 40% in 2030.

There will be a decrease of the overall expenditure between 8 and 9 billion € in 2030 and creating around 24000 jobs.

However, industry needs time to test new and retest existing appliances for which minimum energy performance requirements are set. As the analysis shows, the difference in timing does not affect significantly the level of savings. The option D and E have very similar postivie impacts on energy consumption and emissions of PM, OGC and CO. Option E guarantees that industry has enough time to prepare for the requirements and that Member States with already in place legislation can adapt themselves without needing notification procedures. It therefore seems to offer an appropriate combination of ambition and feasibility.

A comparison of sub-options B and C allows to evaluate the impact of two labelling approaches, having labelling for all LSH differentiated in two scales, one for combustion LSH and a different one for non-combustion LSH that would allow to take into account the specific characteristics of this products (different usage patterns). The analysis indicates that the energy savings achieved by the labelling scheme for non-combustion LSH are small, 5 PJ/year (1.4 TWh/year in 2020) and negligeable in 2030, this is due to the limited improvent potential of this products one stringent Ecodesign requirements have been set.

Table 17: Evaluation of policy options in terms of their impacts compared to the base line

	Sub-options				
	A	B	C	D	E
Promote energy efficiency hence contribute to security of supply	+	+	+	++	++
Reduce energy consumption and related CO_2 missions	+	+	+	+	+
Reduce PM, OGC and CO emissions	+	+	+	++	++
No significant negative impacts on the functionality of the product from the perspective of the user	+	+	+	+	+
Health, safety and the environment shall 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 of an ecodesign requirement shall not have the consequence of imposing proprietary technology on manufacturers	+	+	+	+	+
Impose no excessive administrative burden on manufacturers	+	+	+	+	+

Legend:

++: very positive impact

+: condition met;

-: condition not met.

The preferred sub-options are sub-options D or E[30] [31] and indication of particulate matter on the label could be added to that. Impacts on energy consumption and emissions are very similar for these sub-options, sub-option D achieves a European harmonisation of minimum requirements for placing LSH on the market earlier, while sub-option E avoids notification procedures for Member States that already have national legislation in place.

The energy labelling of local space heaters will provide relevant information to consumers when performing their purchasing decissions. For certain products, the improvement potentials are limited, in consequence, if stringent ecodesign requirements are set, the direct impact of the labelling scheme is reduced, this is specially relevant for non-combustion local space heaters. Nevertheless a labelling scheme will adequate room for differentiation of products has been proposed.

Due to lack of data regarding NO_x emissions from LSH in Europe, it was not possible to quantify the impacts of NO_x regulation. However, in order to prevent an increase of NO_x emissions due to new LSH technology it is recommended that a limit value for NO_x emissions from LSH is set in order to avoid the increase of this emissions in the future.

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30 The Ecodesign Regulatory Committee voted on 10 October 2013 on ecodesign requirements for local space heaters using gas, liquid fuels or electricity that closely resemble option E. Based on the analysis of the options in this impact assessment this is estimated to result in 2020 in energy savings of 157 PJ, together with related carbon dioxide emission reductions of approximately 6.7 Mt.

31 The Ecodesign Regulatory Committee voted on 14 October 2014 on ecodesign requirements for solid fuel local space heaters for year 2022 that closely resemble tier 3 of option A. Based on the analysis of the options in this impact assessment this is estimated to result in 2030 in energy savings of approximately 41 PJ, together with related carbon dioxide emission reductions of approximately 0.4 Mt and a reduction of 27 kton in particulate matter, 5 kton in organic gaseous compounds, and 399 kton in carbon monoxide.

For solid fuel LSH the limit regarding NO_x is set at 200 mg/Nm^3 (at 13% O_2) when measured according to the relevant methods indicated in CEN/TS 15883:2009, a level that is technically feasible based on analysis of recent LSH[32].

For gas and liquid fuel LSH it is proposed to set a limit value for NO_x emissions of 130 mg/kWh_{input} based on NCV. This value corresponds with the value used in 2002 Blue Angel RAL UZ 71.

For radiant and tube heaters the NO_x limit value is proposed to be set at 200 mg/kWh_{input} based on NCV. This value corresponds with the typical value identified in the lot 20 preparatory study.

In general, energy efficient LSH with low emissions of PM, OGC and CO, through the introduction of mandatory standards and a labelling scheme, will contribute to reach the 20% energy savings potential by the year 2020, identified in the Energy Efficiency Action Plan (COM(2006)545). Promotion of market take up of efficient LSH, especially if fired with biomass complies with the Lisbon and renewed Sustainable Development Strategy[33] as it will encourage investment in R&D and provide for a level playing field for all market actors in the different EU Member States. In addition, it belongs to one of the key objectives defined in the Community Lisbon Programme for 2008-2010 (COM(2007)804), i.e. the promotion of an "industrial policy geared towards more sustainable consumption and production" as further developed in the Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (COM(2008)397)[34]. The labelling of LSH will also play an important part in the objective of "empowering consumers" formulated in the EU Consumer Policy Strategy 2007-2013 (COM(2007)99) since it will provide consumers with the ability to make informed and better choices when buying solid fuel boilers.

8. MONITORING AND EVALUATION

The main monitoring element will be the tests carried out to verify correct energy efficiency, emission rating and labelling. The monitoring of the impacts should be done by market surveillance carried out by Member State authorities ensuring that requirements are met. An effective market shift towards upper labelling classes will be the main indicator of progress towards market take-up of more efficient LSH, i.e. the effectiveness of the measures will be monitored by assessing how the efficiencies and emission levels of local space heaters change over time. This information is available from the label and the product fiche. This is a monitoring task for the Commission with a view to the review of this specific regulation..

The appropriateness of scope, definitions, concept and possible trade-offs will be monitored through an on-going dialogue with stakeholders and Member States. The main issues for a possible revision of the proposed ecodesign and labelling scheme are:

- Improved standards (CEN/CENELEC), in particular regarding a harmonized European measurement standard for PM.
- Possible adverse impacts not foreseen at the time of conclusion of the Regulation.

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32 See BAT analysis in Lot15 Preparatory Study Task 6.

33 OJ L 242, 10.9.2002, and Council document 10917/06 of 26.6.2006

34 Published 16.07.2008

- Necessity to revise the ecodesign and labelling classification scheme according to technological improvements.

Revision and adaptation to technical progress (e.g. availability of suitable measurement or testing standards, upgrading of classes following market evolution, etc.) could be implemented through Comitology.

ANNEX 1: CONSULTATION

DRAFT MINUTES

Meeting of the Consultation Forum under Article 18 of Directive 2009/125/EC on energy-related products

Local Space Heaters (LSH)

Brussels, 20 September 2012 (10.00 - 15.30)

EC Participants: Ismo GRONROOS-SAIKKALA (Chairman), Marcos GONZALEZ ALVAREZ (ENER), Ewout DEURWAARDER (ENER), Tobias BIERMANN (ENTR), Davide MINOTTI (ENV), Manuel MUSELLA (ENV)

1. WELCOME AND PRESENTATION

The Chair welcomed the participants and recalled that the purpose of this meeting was to consult stakeholders, including Member States, on the development of possible implementing measures on ecodesign and energy labelling of local space heaters.

Before the adoption of the agenda, **DE** and **UK** asked about the procedure on Lot 1 and Lot 2. **DE** indicated that Ecodesign on Lot 1 and 2 should be adopted. **UK** indicated their concern about the postponement of the Regulatory Committee and asked for a new date to be provided. **BE** indicated also their concern, and urged for the adoption of and agenda on further developments on Lot 1 and 2 as soon as possible. **IT** shared also the concerns on the postponement of the Regulatory Committee and asked for date and specific date for it. **FR** and other Member State representatives supported these comments.

The Commission services explained that a stakeholder meeting had been conducted on specific matters related to the energy labelling of heaters to further clarify its potential market impacts and that the next steps will be taken as soon as possible.

TC180 did not receive documents or agenda.

The Commission services apologised for the omission and promised to add the TC in the distribution list.

This was followed by a **Commission services** presentation on the Commission proposal.

2. SCOPE AND DEFINITIONS

BE indicated that the definition of outdoor appliance is too complicated and could be simplified. They indicated that the definition of LSH with indirect heating functionality should also include those producing Domestic Hot Water (DHW). They also asked if appliances fitted into ventilation ducts are covered by this Lot.

The Commission services indicated that the definitions can be revised and that appliances fitted into ventilation ducts are not part of the scope of this Lot.

TC 295 indicated that the 6% value for distinguishing between direct and indirect heaters is within the experimental error. They also indicated that standards cover LSH with a rated output up to 50 kW.

ANEC pointed out that the extra ventilation needed in the case of use of flueless heaters has to be taken into account.

SE indicated that decorative heaters should be excluded from the labelling requirements; an information requirement should be set for these appliances indicating that they are not suitable for heating purposes. This proposal is supported by **DE**, **UK** and **NL**.

NL said that the distinction between products needs to be done based on functionality and not on fuel. The use of controls should be mandatory. This comment is supported by **ANEC**.

3. PRIMARY ENERGY CONVERSION FACTOR

BE said that it might be useful to refer to the primary energy conversion factor making a general statement instead of using the current value of 2.5 as this might change in the future; **SE** supported this comment as this could make the transition easier if the factor is modified.

The Commission services replied that there are no plans for modifying this factor for the moment and that such changes should be based on a broader legal basis.

4. BIOMASS CONVERSION COEFFICIENT (BCC)

UK supported the use of the BCC, nevertheless they indicated that this is a sensitive issue for Lots 15 and 20 and its exact value should be subject to further consideration.

For **DK**, the proposed value of 1.4 could have the unintended consequence of discouraging technical development of these products, the value should be reconsidered. This position was supported by **TC 46**.

TC 295 indicated that the use of the BCC leads to a loss of the scientific sense of the energy efficiency value.

INFORSE proposed to use a 1.15 BCC instead of the proposed 1.4 factor.

SE indicated that the use of this factor would mean that misleading data would be provided to the consumer; in consequence, the real efficiency of the product should be indicated on the label. The comment was supported by **INFORSE**.

TC 46 indicated that it might be useful to separate renewable and non-renewable products.

5. ECODESIGN REQUIREMENTS. ENERGY EFFICIENCY

UK and **NO** indicated that the minimum energy efficiency requirement for fixed electric heaters for TIER III would mean that they would be banned from the market.

The Commission services replied that the objective is not to ban these products and that the value can be reconsidered on the basis of further data.

TC 59 and **BE** made specific comments on the proposed formulas and correction factors, indicating that these correction factors have a very high impact on electric products, these comments were also supported by **SE**.

DE indicated that an on/off control can in some cases be good enough.

TC 180 indicated that some proposals are different from what was proposed during the preparatory study. In the case of warm air heaters it would be difficult to demonstrate compliance when the product is sold without controls.

CENELEC said that the use of internal or external controls has no impact on the product energy efficiency.

HKI pointed out that some proposed minimum seasonal efficiencies will cause major problems due to low temperatures in the chimney. They asked **the Commission services** to reconsider the efficiency requirements for closed fires in TIER III.

6. ECODESIGN REQUIREMENTS. EMISSIONS

INFORSE indicated that the level of ambition the first two TIERs is too low; they proposed to go directly to TIER III. They indicated that the patterns of use of wood stoves have an influence on the emissions and in consequence, advanced controls should have a bonus.

DE also called for more stringent emission requirements, starting from TIER II or TIER III, the proposal was supported by other Member States. The measurement method should take into account different emissions in real life operation and during tests.

NL supported ambitious requirements and indicated that the measurement method should be indicated in the next version of the document.

ECOS welcomed the use of 3 TIERs but indicated that the limits should be more ambitious. They also expressed concern about not having proposed emission limits for dioxins and furans.

DK indicated that the Nordic Ecolabel is already stricter than TIER III. They called for reference to measurement methods.

AT also called for more stringent requirements starting from TIER II.

SE indicated that according to their analysis TIER II is equivalent to the Nordic Ecolabel and TIER III is very ambitious and asked **the Commission services** to reconsider if TIER III will impose too high costs on manufacturers. They also indicated that the use of standard EN 13240 leads to different results depending on the testing laboratory.

HKI indicated that the test methods to be used need to be specified in the documents, and proposes to consult **TC 295**.

DE asked why there were no emission requirements for gas and liquid fuel LSH.

The Commission services indicated that this is due to a lack of necessary data and urged stakeholders to provide it.

The Commission services offered to organise a meeting to discuss the use of the existing different test methods and the specific requirements, and requested interested parties to express their interest in participating in such discussions.

7. LABELLING PROPOSALS

CECED did not support the use of a single label independent of the fuel. They considered the proposal not an energy efficiency label but a fuel label. Electric products would all be in the red area, this would mean that manufacturers wouldn't have incentives for improving the efficiency of their products and no incentives for substitution of old products with new ones would be given to consumers, resulting in a loss of economic recovery potential within the measure.

euHA indicated that the bandwidth of certain energy classes was not wide enough and indicated that the proposal would not lead to any transformation of the market.

INFORSE supported the use of a single label but the scale should be reconsidered.

IT indicated that they were not in favour of a single label for all products as this could be misleading. Sizes of products are very different and the replacement of an electric one with a non-electric one could result in oversizing.

ANEC indicated that studies have shown that the letter is more important that the colour and those investments are not endangered by the proposal.

euHA indicated that the proposed labelling system will not help transform the market.

NO indicated that the proposed energy classes have different widths and that they do not provide strong initiative for improvement. They added that there is no free choice of what product to buy due to external constraints. The proposal could lead to confusion among consumers.

SE pointed out that they support the idea of having a single label but showed concern about including electric heaters on the label.

NL indicated that it might not be necessary for have electric heaters on the label as long as ambitious ecodesign requirements are set to them.

BE, **SE**, **DK**, **PL**, **euHA**, **NO**, **FR**, **PT** supported the comments from **NL.**

INFORSE indicates that stationary heaters should be kept on the label.

ANEC was against the **NL** proposal as they considered that not labelling these products would have as consequence that no effect would be achieved on the market.

8. CONCLUSIONS

The **Chair** summed up as follows:

- There was a general consensus on the Commission proposal and on the need for setting Ecodesign and Energy Labelling requirements to products within the lot.

- Although the function of the appliance should remain the main aspect for the determination of the scope of the label, other considerations need to be taken into account (decorative use, usage patterns, need of extra ventilation, etc.).

- There was a general acknowledgment on the need for promotion of renewable energy sources. The exact value of the Biomass Conversion Coefficient (BCC) needs to be discussed.

- A meeting will be organised for discussing the test methods for emissions and the requirements, involving interested parties.

The Chair invited participants to provide written comments on the proposed implementing measures by 20 October 2012.

ANNEX 2: BASELINE DATA

The following data and values have been used for the baseline calculations.

1. SALES, PRODUCT LIFE AND STOCK

Table A2-1: Sales per year

Sales [units/year]	1990	2000	2010	2020	2030
01_open fireplace	514.312	621.075	750.000	760.000	750.000
02_closed fireplace/inset	314.628	517.140	850.000	1.047.000	1.074.000
03_wood stove	339.739	368.640	400.000	487.000	500.000
04_coal stove	155.000	130.000	120.000	100.000	50.000
05_cooker	248.936	352.800	500.000	708.000	744.000
06_SHR stove	214.918	253.920	300.000	445.000	550.000
07_pellet stove	0	80.000	230.000	350.000	400.000
08_open fire gas	63.088	77.647	90.000	110.000	110.000
09_closed fire gas	323.316	343.860	364.000	385.000	405.000
10_flueless fuel heater	248.936	352.800	500.000	450.000	350.000
11_elec.portable	5.900.720	6.518.066	7.200.000	7.656.585	8.348.544
12_elec.convector	9.310.025	10.284.060	11.360.000	12.080.390	13.172.148
13_elec.storage	270.450	298.745	330.000	350.927	382.642
14_elec.underfloor	1.065.408	1.176.873	1.300.000	1.382.439	1.507.376
15_luminous heaters	19.669	21.727	24.000	24.000	24.000
16_tube heaters	19.669	21.727	24.000	24.000	24.000
TOTALS (million units)	19.0	21.4	24.3	26.4	28.4

The sales have been based on market data as presented for the year 2010 in the preparatory studies Lot 15 (solid fuel local space heaters) and Lot 20 (gas fired and electric local space heaters). The sales for the historical years (before 2010) and projections (beyond 2010) are also based on information provided in these studies. It must be noted that as the Impact Assessment is based on parametric modelling and the preparatory studies only provided values "as is" the total of sales can be different.

Contrary to some products groups covered by the preparatory study, this Impact Assessment did not keep sales constant for certain product groups. Instead a gradual increase or decline for certain models was introduced to arrive at more plausible outcomes, also in relation to market trends identified in the same preparatory studies (where available).

As this Impact Assessment also covers products not analysed as base case in the preparatory studies (but which were needed in the Impact Assessment as requirements may or may not apply to these products) another difference to the data presented in the preparatory studies is introduced.

The link of sales to stock (installed base) is governed by the product life of products. These are based on information provided in preparatory studies.

Table A2-2: Product life

Product life [years]	
01_open fireplace	25
02_closed fireplace/inset	25
03_wood stove	25
04_coal stove	25
05_cooker	15
06_SHR stove	25
07_pellet stove	15
08_open fire gas	20
09_closed fire gas	20
10_flueless fuel heater	7
11_elec.portable	9
12_elec.convector	9
13_elec.storage	15
14_elec.underfloor	30
15_luminous heaters	15
16_tube heaters	20

The resulting stock has been calculated as shown below.

Table A2-3: Stock

Stock [million units]	1990	2000	2010	2020	2030
01_open fireplace	10,4	12,5	15,1	17,6	18,8
02_closed fireplace/inset	4,6	7,6	12,5	19,1	24,4
03_wood stove	7,7	8,4	9,1	10,2	11,5
04_coal stove	5,3	4,2	3,5	3,0	2,4
05_cooker	3,4	4,6	6,0	8,7	10,8
06_SHR stove	4,4	5,2	6,2	7,8	10,5
07_pellet stove	0,0	0,4	1,9	4,0	5,6
08_open fire gas	1,0	1,3	1,6	1,9	2,1
09_closed fire gas	6,1	6,5	6,9	7,3	7,7
10_flueless fuel heater	1,6	2,2	3,2	3,4	2,7
11_elec.portable	51,1	56,4	62,3	67,2	72,8
12_elec.convector	80,6	89,0	98,3	106,0	114,9
13_elec.storage	3,8	4,2	4,6	5,0	5,4
14_elec.underfloor	27,8	30,7	33,9	37,1	40,4
15_luminous heaters	0,3	0,3	0,3	0,4	0,4
16_tube heaters	0,4	0,4	0,4	0,5	0,5
TOTALS (millions)	208	234	266	299	331

There has been considerable debate during the preparatory studies and afterwards, during the preparation of this Impact Assessment as regards the actual number of sales and stock of these products.

Most stakeholders agreed that the number of sales of solid fuel fired products as presented in the preparatory study were too low (especially regarding solid fuel boilers, but these are covered by a different Impact Assessment study). During this Impact Assessment the historic sales have been set to such levels that the stock, as calculated by the parametric modelling underlying this Impact Assessment, closely matched the stock presented in the preparatory study for Lot 15.

During this Impact Assessment several plausibility checks have been performed: Looking forward to energy consumption it appeared that the consumption of energy by these products were within the range of what can be expected according the general overview of energy consumption by energy using products as presented in the MEErP 2011 reports.

Another check on presence of solid fuel heaters in households indicated that with the calculated stock some 26% of households would have owned a solid fuel local space heater. As this study does not include self-built open fireplaces the actual number of households with fireplaces may even be higher. There is however no data on how much of these are indeed functional and used on a regular basis. Therefore this Impact Assessment is based on the sales and stock numbers as presented in the preparatory studies as these have been scrutinised to some extent (with exceptions as indicated above).

2. ENERGY EFFICIENCY AND COSTS

As energy efficiency is a ratio between useful output (a heat demand) and energy input (fuel/electricity consumption) this section first describes the heat demand applicable to the various products. This heat demand is calculated as the heating capacity of the products (based on information from preparatory studies) multiplied by 'equivalent full load hours'. The outcome is the applicable heat demand. For most products the equivalent full load hours were calculated such that the resulting heat demand matched the values used in the preparatory studies. As this Impact Assessment must take into account existing legislation in its baseline assumptions, the equivalent full load hours change throughout time to account for on-going improvement of building stock resulting in less overall heat demand (effect of EPBD and various national measures relating to building energy use). This effect has been estimated to be 1% of reduction of full load hours per year. This effect however has not been applied to products for which the ambiance function is more prominent than its heating function, such as open fires (solid fuel and gas, including flueless products).

The heat demand as used in the model is shown below.

Table A2-4: Base heat demand for calculation

Heat demand calculation	1990	2000	2010	2020	2030
01_open fireplace	336	336	336	336	336
02_closed fireplace/inset	2351	2237	2.128	2024	1926
03_wood stove	2979	2834	2.696	2565	2440
04_coal stove	2979	2834	2.696	2565	2440
05_cooker	1237	1177	1.120	1066	1014
06_SHR stove	2979	2834	2.696	2565	2440
07_pellet stove	3562	3389	3.224	3067	2918
08_open fire gas	210	210	210	210	210
09_closed fire gas	1248	1188	1.130	1075	1023
10_flueless fuel heater	75	75	75	75	75
11_elec.portable	358	341	324	308	293
12_elec.convector	939	893	850	809	769
13_elec.storage	1458	1388	1.320	1256	1195
14_elec.underfloor	365	347	330	314	299
15_luminous heaters	13480	12824	12.200	11606	11042
16_tube heaters	20220	19236	18.300	17410	16563

The Impact Assessment is based on energy efficiency of products as identified in the preparatory studies. Keeping in mind the stakeholder comments on the basis for expressing energy efficiency (net calorific value of fuel, gross calorific value of fuel, seasonal (with corrections for various loss factors), based on primary energy or final energy) the efficiency values have been corrected. For product groups for which no identical base case was developed, an energy efficiency value has been extracted from available literature and other sources. Which basis for efficiencies is used has been indicated in the main text of this report.

As reference year for efficiencies the year 2012 has been selected as this was the year the study was finalised. These reference efficiencies are shown below.

Table A2-5: Typical efficiency

Efficiency	Basis	2012
01_open fireplace	NCV	30%
02_closed fireplace/inset	NCV	70%
03_wood stove	NCV	70%
04_coal stove	NCV	70%
05_cooker	NCV	65%
06_SHR stove	NCV	80%
07_pellet stove	NCV	86%
08_open fire gas	NCV	42%
09_closed fire gas	NCV	65%
10_flueless fuel heater	NCV	100%
11_elec.portable	SPB	30%
12_elec.convector	SPB	30%
13_elec.storage	SPB	30%
14_elec.underfloor	SPB	30%
15_luminous heaters	S GCV	74%
16_tube heaters	S GCV	65%

As with the heat demand calculation it is assumed that some incremental improvement of energy efficiency takes place (due to innovation, market transformation, etc.). This incremental improvement has been estimated to be 0.5% of the reference efficiency value (so 0.15% points/year for a reference value of 30%). This also means that for the years before 2012, the efficiencies are lower than for the reference year. The resulting efficiencies are shown below.

Table A2-6: Efficiency development

Efficiencies	Basis	1990	2000	2010	2020	2030
01_open fireplace	NCV	26,7%	28,2%	29,7%	31,2%	32,7%
02_closed fireplace/inset	NCV	62,3%	65,8%	69,3%	72,8%	76,3%
03_wood stove	NCV	62,3%	65,8%	69,3%	72,8%	76,3%
04_coal stove	NCV	62,3%	65,8%	69,3%	72,8%	76,3%
05_cooker	NCV	57,9%	61,1%	64,4%	67,6%	70,9%
06_SHR stove	NCV	80,0%	80,0%	80,0%	80,0%	80,0%
07_pellet stove	NCV	76,5%	80,8%	85,1%	89,4%	90,0%
08_open fire gas	NCV	37,4%	39,5%	41,6%	43,7%	45,8%
09_closed fire gas	NCV	57,9%	61,1%	64,4%	67,6%	70,9%
10_flueless fuel heater	NCV	100,0%	100,0%	100,0%	100,0%	100,0%
11_elec.portable	SPB	26,7%	28,2%	29,7%	31,2%	32,7%
12_elec.convector	SPB	26,7%	28,2%	29,7%	31,2%	32,7%
13_elec.storage	SPB	26,7%	28,2%	29,7%	31,2%	32,7%
14_elec.underfloor	SPB	26,7%	28,2%	29,7%	31,2%	32,7%
15_luminous heaters	S GCV	65,9%	69,6%	73,3%	89,0%	89,0%
16_tube heaters	S GCV	57,9%	61,1%	64,4%	83,0%	83,0%

The efficiencies of the existing models already placed on the market are naturally lower and depend on the historic sales and product lives. It can be assumed that (if the sales are relatively constant) the efficiency of the installed base or stock is about identical to that of a new appliance placed on the market half a product life ago.

This Impact Assessment however used parametric modelling to calculation the average efficiencies of products in stock by summing the sales for each year, with their respective efficiencies and dividing this by the stock.

The actual energy consumption by each product category is then calculated as the efficiency of the stock appliance and the heat demand for that base year. The energy consumption per unit is presented below.

Table A2-7: Energy consumption per unit

Energy consumption per unit [kWh/year]	Basis	1990	2000	2010	2020	2030
01_open fireplace	NCV	1681	1563	1461	1374	1299
02_closed fireplace/inset	NCV	4586	4096	3672	3322	3033
03_wood stove	NCV	5954	5313	4759	4266	3849
04_coal stove	NCV	6067	5409	4821	4326	3938
05_cooker	NCV	2556	2273	2021	1818	1650
06_SHR stove	NCV	4201	3997	3802	3608	3428
07_pellet stove	NCV	N/A	4610	4244	3868	3568
08_open fire gas	NCV	648	644	606	571	541
09_closed fire gas	NCV	2516	2350	2106	1894	1709
10_flueless fuel heater	NCV	75	75	75	75	75
11_elec.portable	SPB	1399	1259	1136	1028	932
12_elec.convector	SPB	3670	3302	2979	2696	2445
13_elec.storage	SPB	5885	5289	4768	4313	3907
14_elec.underfloor	SPB	1378	1429	1286	1161	1051
15_luminous heaters	S GCV	22049	19816	17865	15446	12997
16_tube heaters	S GCV	38674	34728	31284	26811	22204

Table A2-8: Energy consumption of total stock

Energy consumption of total stock [PJ/year])	Basis	1990	2000	2010	2020	2030
01_open fireplace	NCV	63	70	79	87	88
02_closed fireplace/inset	NCV	77	112	166	228	266
03_wood stove	NCV	165	160	156	156	159
04_coal stove	NCV	115	82	60	47	34
05_cooker	NCV	31	38	43	57	64
06_SHR stove	NCV	67	75	85	101	129
07_pellet stove	NCV	0	7	29	56	71
08_open fire gas	NCV	2	3	3	4	4
09_closed fire gas	NCV	55	55	52	50	47
10_flueless fuel heater	NCV	0	1	1	1	1
11_elec.portable	SPB	257	256	255	249	244
12_elec.convector	SPB	1064	1058	1054	1029	1011
13_elec.storage	SPB	80	80	79	78	76
14_elec.underfloor	SPB	138	158	157	155	153
15_luminous heaters	S GCV	22	22	22	20	17
16_tube heaters	S GCV	50	50	49	45	38
TOTAL [PJ/year]		2187	2225	2291	2362	2404

The policy options presented in this document propose energy labelling of local space heaters, including labelling of solid fuel local space heaters.

As solid fuel from biomass is believed to contribute positively to Community goals as regards reduction of greenhouse gas emissions, improving of security of energy supply, reducing the dependence on fossil fuel imports, and lowering of fuel costs.

When evaluated on the basis of the net calorific energy content of the fuel only, the efficiencies of solid fuel fired and fossil fuel fired local space heaters are rather comparable (most stoves/heaters are in the range of 70-80%) and therefore a simple energy label would not make visible the contribution of biomass fuels to the abovementioned goals.

For similar reasons (to allow biomass products to achieve a better energy label rating) a biomass conversion coefficient (BCC) was introduced in the working documents for solid fuel boilers (presented to the Ecodesign Consultation Forum on 12-7-2012). This BCC factor increases the label efficiency value for biomass products. For the biomass solid fuel heaters it is proposed to use the same BCC as in Lot 15 solid fuel boilers.

3. GREENHOUSE GAS EMISSIONS

The greenhouse gas emissions have been calculated on the basis of the stock energy consumption and thus only relate to the use phase of products as this was indicated to be the most significant life cycle phase for this impact.

As inputs the Impact Assessment calculation assumed the following specific emission factors for solid fuels, gas and electricity. Liquid fuels have not been assessed as no data existed to identify the number of liquid fuel fired local space heaters in the sales or stock.

Table A2-9: CO_2 emissions from fuel in year 2010

CO_2 emissions from fuel [Mton CO_{2eq}] year 2010	kgCO_2/GJ energy input
01_open fireplace	6
02_closed fireplace/inset	6
03_wood stove	6
04_coal stove	109
05_cooker	6
06_SHR stove	6
07_pellet stove	11
08_open fire gas	60
09_closed fire gas	60
10_flueless fuel heater	60
11_elec.portable	44
12_elec.convector	44
13_elec.storage	44
14_elec.underfloor	44
15_luminous heaters	60
16_tube heaters	60

For electric products a time-dependent specific emission was applied:

Table A2-10: Specific GHG emissions per year

Specific GHG emissions	1990	2000	2010	2020	2030
kg CO_2/kWh_{elec}	0,500	0,430	0,394	0,384	0,374
kgCO_2/GJ primary energy	56	48	44	43	42

3.1. Particulate emissions

Particulate matter (PM) emissions have been based on PM emissions established by the DIN+ method (no dilution). Similar to the calculation of energy consumption first the emissions of new products placed on the market have been established followed by a calculation of emissions by the installed base / stock of products.

These emissions have been calculated for solid fuel appliances only, as for these products this parameters has been identified as significant.

New products on the market have PM emissions as shown below. These values are the base case emission values as identified in the preparatory studies.

Table A2-11: BAU PM emissions

BAU PM emissions [mg/Nm^3]	2012
01_open fireplace	900
02_closed fireplace/inset	200
03_wood stove	200
04_coal stove	200
05_cooker	225
06_SHR stove	150
07_pellet stove	75

As several Member States have regulations or measures in place that reduce emissions by these products, the baseline assumes that as of 2016 the overall emissions have been reduced to a level attainable by current state-of-art (not BAT!).

Also an incremental reduction of reference emissions has been applied in the baseline calculations to give an indication of historic emission levels. The incremental improvement has been assessed to be some -5 mg/Nm3 per year.

The above corrections apply to all products placed in the EU and therefore do not reflect the reduction of emissions by products sold in an individual Member State. The resulting emission by products are shown below.

Table A2-12: Lowest PM emissions

Lowest PM emissions [mg/Nm^3]	1990	2000	2010	2020	2030
01_open fireplace	1010	960	910	450	450
02_closed fireplace/inset	310	260	210	150	110
03_wood stove	310	260	210	150	110
04_coal stove	310	260	210	150	110
05_cooker	335	285	235	150	135
06_SHR stove	260	210	160	110	60
07_pellet stove	185	135	85	35	15

These emissions values have been converted to emissions of gram per MJ of fuel combusted, by applying a correction by the stock of products have been converted according the factors shown below.

Table A2-13: BAU/MEPS PM emissions

BAU/MEPS PM emissions [mg/Nm^3]	NCV [MJ/kg]	Dry flue gas volume [m3/kg @ 13% O_2]	m^3 to MJ	g/GJ for reference year
01_open fireplace	16,0	11	0,69	563
02_closed fireplace/inset	16,0	11	0,69	130
03_wood stove	16,0	11	0,69	130
04_coal stove	25,0	20	0,80	151
05_cooker	16,0	11	0,69	145
06_SHR stove	16,0	11	0,69	99
07_pellet stove	16,0	11	0,69	53

The resulting emissions by the stock are shown below.

Table A2-14: PM emissions of all stock

PM emissions of all STOCK [ton] - based on sales PM	1990	2000	2010	2020	2030
01_open fireplace	49930	50416	50897	44069	32289
02_closed fireplace/inset	20426	24436	28438	29389	25786
03_wood stove	45865	36482	28166	21062	15482
04_coal stove	38178	22390	13882	8522	5072
05_cooker	8580	8361	7274	6571	5476
06_SHR stove	13149	12448	11281	10200	8929
07_pellet stove	N/A	689	1965	2148	1097
TOTALS (kton)	176	155	142	122	94

3.2. CO emissions

Carbon monoxide (CO) emissions have been based on CO emissions established according CEN/TS 15883. The calculation is similar to that of PM emissions.

New products on the market have CO emissions as shown below. These values are the base case emission values as identified in the preparatory studies.

Table A2-15: BAU CO emissions

BAU CO emissions [mg/Nm^3]	2012
01_open fireplace	3500
02_closed fireplace/inset	3500
03_wood stove	3500
04_coal stove	3500
05_cooker	3500
06_SHR stove	3500
07_pellet stove	500

As several Member States have regulations or measures in place that reduce emissions by these products, the baseline assumes that as of 2016 the overall emissions have been reduced to a level attainable by current state-of-art (not BAT!).

Also an incremental reduction of reference emissions has been applied in the baseline calculations to give an indication of historic emission levels. The incremental improvement has been assessed to be some -50 mg/Nm3 per year.

The above corrections apply to all products placed in the EU and therefore do not reflect the reduction of emissions by products sold in an individual Member State. The resulting emission by products are shown below.

Table A2-16: Lowest CO emissions

Lowest CO emissions [mg/Nm^3]	1990	2000	2010	2020	2030
01_open fireplace	4600	4100	3600	3100	2600
02_closed fireplace/inset	4600	4100	3600	3100	2600
03_wood stove	4600	4100	3600	3100	2600
04_coal stove	4600	4100	3600	3100	2600
05_cooker	4600	4100	3600	3100	2600
06_SHR stove	4600	4100	3600	3100	2600
07_pellet stove	1600	1100	600	150	150

These emissions values have been converted to emissions of gram per MJ of fuel combusted, by applying a correction by the stock of products have been converted according the factors shown below.

Table A2-17: BAU/MEPS CO emissions

BAU/MEPS CO emissions [mg/Nm^3]	NCV [MJ/kg]	Dry flue gas volume [m3/kg @ 13% O_2]	m^3 to MJ	g/GJ for reference year
01_open fireplace	16,0	11	0,69	563
02_closed fireplace/inset	16,0	11	0,69	130
03_wood stove	16,0	11	0,69	130
04_coal stove	25,0	20,0	0,80	151
05_cooker	16,0	11	0,69	145
06_SHR stove	16,0	11	0,69	99
07_pellet stove	16,0	11	0,69	53

The resulting emissions by the stock are shown below.

Table A2-18: CO emissions of all stock based on sales

CO emissions of all STOCK [ton] - based on sales PM	1990	2000	2010	2020	2030
01_open fireplace	241681	231921	219887	200816	168241
02_closed fireplace/inset	289422	361958	447482	516308	504303
03_wood stove	644894	534550	436846	363141	301673
04_coal stove	533898	325562	215185	144469	94459
05_cooker	113560	115981	106498	115623	109291
06_SHR stove	214456	217733	216509	225972	247924
07_pellet stove	N/A	5738	15312	13486	7020
TOTALS (kton)	2038	1793	1658	1580	1433

3.3. OGC emissions

Organic Gaseous Compounds (OGC) emissions have been based on OGC emissions established according CEN/TS 15883. The calculation is similar to that of PM emissions.

New products on the market have OGC emissions as shown below. These values are the base case emission values as identified in the preparatory studies.

Table A2-19: BAU OGC emissions

BAU OGC emissions [mg/Nm^3]	2012
01_open fireplace	160
02_closed fireplace/inset	160
03_wood stove	160
04_coal stove	160
05_cooker	160
06_SHR stove	160
07_pellet stove	100

As several Member States have regulations or measures in place that reduce emissions by these products, the baseline assumes that as of 2016 the overall emissions have been reduced to a level attainable by current state-of-art (not BAT!).

Also an incremental reduction of reference emissions has been applied in the baseline calculations to give an indication of historic emission levels. The incremental improvement has been assessed to be some -10 mg/Nm3 per year.

The above corrections apply to all products placed in the EU and therefore do not reflect the reduction of emissions by products sold in an individual Member State. The resulting emissions by products are shown below.

Table A2-20: Sales OGC emissions

SALES OGC emissions [mg/Nm^3]	1990	2000	2010	2020	2030
01_open fireplace	380	280	180	80	-20
02_closed fireplace/inset	380	280	180	80	-20
03_wood stove	380	280	180	80	-20
04_coal stove	380	280	180	80	-20
05_cooker	380	280	180	80	-20
06_SHR stove	380	280	180	80	-20
07_pellet stove	320	220	150	150	150

These emissions values have been converted to emissionsof gram per MJ of fuel combusted, by applying a correction by the stock of products have been converted according the factors shown below.

Table A2-21: BAU/MEPS OGC emissions

BAU/MEPS OGC emissions [mg/Nm^3]	NCV [MJ/kg]	Dry flue gas volume [m3/kg @ 13% O_2]	m^3 to MJ	g/GJ for reference year
01_open fireplace	16,0	11	0,69	563
02_closed fireplace/inset	16,0	11	0,69	130
03_wood stove	16,0	11	0,69	130
04_coal stove	25,0	20,0	0,80	151
05_cooker	16,0	11	0,69	145
06_SHR stove	16,0	11	0,69	99
07_pellet stove	16,0	11	0,69	53

The resulting emissions by the stock are shown below.

Table A2-22: OGC emissions of all stock

OGC emissions of all STOCK [ton] - based on sales PM	1990	2000	2010	2020	2030
01_open fireplace	23043	19655	15594	10834	5481
02_closed fireplace/inset	27226	30057	30780	26687	15755
03_wood stove	61931	45807	31501	19745	9560
04_coal stove	52015	28515	15544	8114	3708
05_cooker	10450	9213	6716	4900	1895
06_SHR stove	20490	18368	15304	11721	6754
07_pellet stove	-	1148	3087	4836	6254
TOTALS (kton)	195	153	119	87	49

4. PURCHASE COSTS AND OTHER ECONOMIC INPUTS

The data used for the cost and benefit analysis, in terms of purchase cost and its increase if ecodesign options resulting in higher energy efficiency are applied, energy costs and installation and maintenance were discussed with stakeholders during the preparatory phase.

The Impact Assessment however does not describe policy options that impose a certain specific set of ecodesign options. Instead the options refer to a generic improvement of representative energy efficiency.

For this reason a parametric modelling of the price elasticity has been applied that calculates the purchase price increase as an effect of improved efficiency. This effect has been described as an exponential function. The parameters for the exponential function have been tuned to result in purchase prices that match those of the preparatory studies for base case products and improved products. Note: this approach is an acceptable way of dealing with incremental changes in efficiency and product price but do not necessarily result in outcomes identical to those in the preparatory studies.

In addition, an annual price decrease has also been applied as a result of ongoing reductions in purchase prices due to improved efficiency of production, lower manufacturing costs (for instance through moving production to low wage countries), etc. This effect has been set at 1% per year.

The purchase costs inputs are shown below. The values in bold correspond to base case purchase prices.

Table A2-23: Purchase costs

a EXP(b*efficiency)				Efficiency							
Purchase price elasticity	**Price reduction**	**a'**	**b'**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
01_open fireplace	1,01	800	3	1968	2656	3585	4840	6533	8819	11904	16068
02_closed fireplace/inset	1,01	300	2,75	685	901	1187	1562	2057	2708	3565	4693
03_wood stove	1,01	300	2,75	685	901	1187	1562	2057	2708	3565	4693
04_coal stove	1,01	200	2,75	456	601	791	1041	1371	1805	2376	3129
05_cooker	1,01	400	2,75	913	1202	1582	2083	2742	3610	4753	6257
06_SHR stove	1,01	400	2,5	847	1087	1396	1793	2302	2956	3795	4873
07_pellet stove	1,01	800	1,5	1255	1458	1694	1968	2286	2656	3086	3585
08_open fire gas	1,01	400	1	540	597	659	729	806	890	984	1087
09_closed fire gas	1,01	300	1	405	448	495	547	604	668	738	815
10_flueless fuel heater	1,01	100	1	135	149	165	182	201	223	246	272
11_elec.portable	1,01	20	1	27	30	33	36	40	45	49	54
12_elec.convector	1,01	100	0,75	125	135	145	157	169	182	196	212
13_elec.storage	1,01	150	4	498	743	1108	1653	2467	3680	5490	8190
14_elec.underfloor	1,01	125	2	228	278	340	415	507	619	756	924
15_luminous heaters	1,01	100	3,2	261	360	495	682	939	1294	1781	2453
16_tube heaters	1,01	150	3	369	498	672	907	1225	1653	2232	3013

Energy costs have been assessed following fuel/electricity costs as shown below. Note that the energy price increase is compensated by the discount factor in which case there is no need to increase the energy prices for future years.

Table A2-24: Energy costs per unit

			FUELS	ELECTRICITY
Energy costs per unit [Billion EUR / year]		**[euro/GJ]**	**[euro/kWh]**	**[euro/kWh]**
01_open fireplace	Open fireplace	6,5	0,0234	
02_closed fireplace/inset	Closed fireplace, insert	6,5	0,0234	
03_wood stove	Wood stove	6,5	0,0234	
04_coal stove	Coal stove	8	0,0288	
05_cooker	Cooker	6,5	0,0234	
06_SHR stove	Slow heat rel. stove	6,5	0,0234	
07_pellet stove	Pellet stove	10	0,036	
08_open fire gas			0,067	
09_closed fire gas			0,067	
10_flueless fuel heater			0,135	
11_elec.portable				0,16
12_elec.convector				0,16
13_elec.storage				0,16
14_elec.underfloor				0,16
15_luminous heaters			0,067	
16_tube heaters			0,067	

Total expenditure is also determined by additional costs for installation and maintenance. These values are copied without modification from the preparatory studies.

Table A2-25: Total expenditure

Total expenditure (purchase / install / energy / maintenance)	Installation costs per unit (euro over product life)	Maintenance costs per unit (euro per product life)
01_open fireplace	700	419
02_closed fireplace/inset	700	468
03_wood stove	500	402
04_coal stove	500	402
05_cooker	500	852
06_SHR stove	5000	381
07_pellet stove	500	495
08_open fire gas	250	430
09_closed fire gas	250	430
10_flueless fuel heater	0	0
11_elec.portable	0	0
12_elec.convector	30	0
13_elec.storage	80	0
14_elec.underfloor	155	0
15_luminous heaters	250	1520
16_tube heaters	250	1520

5. ECONOMICS

The turnover and number of jobs associated with each sector are determined by the values shown below.

Table A2-26: Data for calculation of market actor turnover

Market actor turnover [billion EUR]		
VAT	20%	VAT
Retail turnover (purchase prices)	115%	retail markup
Wholesale turnover	115%	wholesale markup
Manufacturer turnover	determined by purchase costs minus VAT and retail/installer plus wholesale markup	
Energy turnover	(is determined by energy costs)	

Table A2-27: Jobs

Jobs ('000)		
Retail	0,075	Retail turnover per employee
Wholesale	0,279	Wholesale turnover per employee (million/employee)
Manufacturer jobs	0,184	Manufacturer turnover per employee (million/employee)
within EU jobs	95%	Manufacturer within EU
which are OEM jobs	10%	OEM share of manufacturer
Energy Jobs	0,782	Energy turnover/employee (million/employee)

The above provided values result in the following turnover and jobs by sector.

Table A2-28: Market actor turnover per year

Market actor turnover [billion EUR]	1990	2000	2010	2020	2030
VAT	1,3	1,5	1,9	2,2	2,2
Retail turnover excl.VAT (purchase prices)	5,1	6,1	7,5	8,7	8,8
Wholesale turnover	4,5	5,3	6,5	7,6	7,7
Manufacturer turnover	3,9	4,6	5,7	6,6	6,7
Energy turnover	74,4	75,1	75,3	74,4	73,6
Jobs ('000)					
Retail	68	81	100	116	118
Wholesale	16	19	23	27	28
Manufacturer jobs	21	25	31	36	36,3
within EU jobs	20	24	29	34	34,5
which are OEM jobs	2	2	3	4	3,6
Energy Jobs	95	96	96	95	94

ANNEX 3: ECODESIGN REQUIREMENTS, EMISSION LIMIT VALUES AND LABELLING SCALES

1. ECODESIGN MINIMUM ENERGY EFFICIENCY REQUIREMENTS

The minimum energy efficiency requirements for the different sub-options are presented in the following tables.

The efficiency values as presented in the Working Document discussed on the 20 September Consultation Forum meeting were calculated on the basis of the gross calorific value of the fuel 'as received' (with consideration of the moisture content of the fuel) and followed a seasonal approach which included consideration of various energy loss factors. The values presented in this document are the corresponding efficiencies based on the net calorific value of the fuel only. This allows an easier comparison with efficiencies required under other options and is easier to interpret by market actors.

Table A3-1: Ecodesign minimum energy efficiency requirements for sub-option A, B and C.

			TIER I	TIER II	TIER III
Solid fuel LSH	Open fire	NCV	41%	47%	52%
	Closed fire		70%	75%	80%
	Cookers		65%	70%	80%
	Pellet LSH		86%	86%	89%
Electric LSH	Portable	SPB	30%	31%	32%
	Fixed		30%	35%	39%
Gas or liquid fuel LSH	Open fire		45%	50%	50%
	Closed fire		65%	70%	80%
Non-residential LSH	Luminous heaters	S GCV	82%	89%	89%
	Tube heaters		78%	83%	83%

Table A3-2: Ecodesign minimum energy efficiency requirements for sub-option D.

			TIER I	TIER II
Solid fuel LSH	Open fire	NCV	47%	52%
	Closed fire		75%	80%
	Cookers		70%	80%
	Pellet LSH		86%	89%
Electric LSH	Portable	SPB	31%	36%
	Fixed		34%	38%
Gas or liquid fuel LSH	Open fire		50%	50%
	Closed fire		70%	80%
Non-residential LSH	Luminous heaters	S GCV	82%	89%
	Tube heaters		78%	83%

Table A3-3: Ecodesign minimum energy efficiency requirements for sub-option E.

			TIER I
Solid fuel LSH	Open fire	NCV	52%
	Closed fire		80%
	Cookers		80%
	Pellet LSH		89%
Electric LSH	Portable	SPB	36%
	Fixed		38%
Gas or liquid fuel LSH	Open fire		50%
	Closed fire		80%
Non-residential LSH	Luminous heaters	S GCV	89%
	Tube heaters		83%

2. ECODESIGN MAXIMUM EMISSION VALUES

The maximum emission values for the different sub-options are presented in the following tables.

All limit values presented in this document for emission from solid fuel LSH are based in the heated filter method described in Annex A.1 of CEN/TS 15883.

Table A3-4: Ecodesign maximum emission requirements for sub-option A[35].

Solid fuel LSH only	TIER I	TIER II	TIER III
Carbon monoxide (CO)			
Open fire	3500	2000	1500
Closed fire	3500	2000	1250
if using Pellets	500	400	250
Cooker	4500	3500	1500
Organic gaseous compounds (OGC)			
Open fire	160	120	80
Closed fire	160	120	80
if using Pellets	100	60	40
Cooker	160	120	80
Particulate matter (PM)			
Open fire	150	75	40
Closed fire	150	75	40
if using Pellets	100	50	30
Cooker	150	75	40

35 In all cases values are given in mg/m^3 @ 13% O_2, referring to dry exit flue gas, 0°C, 1013 mbar: PM does not include condensable organic compounds which may form additional particulate matter when the flue gas is mixed with ambient air

Table A3-5: Ecodesign maximum emission requirements for sub-option B, C and D.

Solid fuel LSH only	TIER I	TIER II
Carbon monoxide (CO)		
Open fire	2500	1500
Closed fire	1500	1250
if using Pellets	500	250
Cooker	3000	1500
Organic gaseous compounds (OGC)		
Open fire	120	80
Closed fire	120	80
if using Pellets	60	40
Cooker	120	80
Particulate matter (PM)		
Open fire	200	40
Closed fire	75	40
if using Pellets	50	20
Cooker	100	40

Table A3-6: Ecodesign maximum emission requirements for sub-option E.

Solid fuel LSH only	TIER I
Carbon monoxide (CO)	
Open fire	1500
Closed fire	1250
if using Pellets	250
Cooker	1500
Organic gaseous compounds (OGC)	
Open fire	80
Closed fire	80
if using Pellets	40
Cooker	80
Particulate matter (PM)	
Open fire	40
Closed fire	40
if using Pellets	20
Cooker	40

3. LABELLING SCALES

The labelling scales for the different sub-options are presented in the following tables.

Table A3-7: Energy labelling scale for sub-option A.

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency, in %
A+++	$\eta_S \geq 150$
A++	$125 \leq \eta_S < 150$
A+	$98 \leq \eta_S < 125$
A	$90 \leq \eta_S < 98$
B	$82 \leq \eta_S < 90$
C	$75 \leq \eta_S < 82$
D	$36 \leq \eta_S < 75$
E	$34 \leq \eta_S < 36$
F	$30 \leq \eta_S < 34$
G	$\eta_S < 30$

The labelling scheme used for sub-option A uses the energy labelling scale developed for 'Lot 1' and compares all LSH in the same labelling scheme independently without taking into account their specific characteristics such as power output, usage patterns or required additional installations (flues, etc.).

Table A3-8: Energy efficiency labelling for combustion local space heaters for sub-option B.

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency, in %
A^{+++}	$\eta_S \geq 150$
A^{++}	$125 \leq \eta_S < 150$
A^{+}	$98 \leq \eta_S < 125$
A	$90 \leq \eta_S < 98$
B	$82 \leq \eta_S < 90$
C	$75 \leq \eta_S < 82$
D	$36 \leq \eta_S < 75$
E	$34 \leq \eta_S < 36$
F	$30 \leq \eta_S < 34$
G	$\eta_S < 30$

Table A3-9: Energy efficiency labelling for combustion LSH for sub-option C, D and E.

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency, in %
A^{+}	$\eta_S \geq 108$
A	$95 \leq \eta_S < 108$
B	$82 \leq \eta_S < 95$
C	$76 \leq \eta_S < 82$
D	$70 \leq \eta_S < 76$
E	$65 \leq \eta_S < 70$
F	$60 \leq \eta_S < 65$
G	$\eta_S < 60$

Table A3-10: Energy efficiency labelling for non-combustion LSH for sub-options C, D and E

Seasonal space heating energy efficiency class	Seasonal space heating energy efficiency, in %
A	$\eta_S \geq 40$
B	$38 \leq \eta_S < 40$
C	$36 \leq \eta_S < 38$
D	$34 \leq \eta_S < 36$
E	$32 \leq \eta_S < 34$
F	$30 \leq \eta_S < 32$
G	$\eta_S < 30$

ANNEX 4: VALUES USED IN THE MODELLING

1. ECODESIGN ENERGY EFFICIENCY REQUIREMENTS (LABELLING EFFECT AS USED IN MODELLING)

Table A4-1: BAU. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**BAU**				**Label-parameters**
Energy target years/values		**2012**	**2016**	**2018**	**2020**	**2100**
solid fuel / open fire	01_open fireplace	30%	30%	30%	30%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	70%	70%	70%	70%	2,10%
	03_wood stove	70%	70%	70%	70%	2,10%
	04_coal stove	70%	70%	70%	70%	2,10%
solid fuel / cooker	05_cooker	65%	65%	65%	65%	1,95%
solid fuel / closed fire	06_SHR stove	80%	80%	80%	80%	2,40%
solid fule / closed-pellet	07_pellet stove	86%	86%	86%	86%	2,58%
gas-liq. / open fire	08_open fire gas	42%	42%	42%	42%	1,26%
gas-liq. / closed fire	09_closed fire gas	65%	65%	65%	65%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	100%	100%	100%	0,00%
elec. / portable	11_elec.portable	30%	30%	30%	30%	0,00%
elec. / fixed	12_elec.convector	30%	30%	30%	30%	0,00%
elec. / storage	13_elec.storage	30%	30%	30%	30%	0,00%
elec. / underfloor	14_elec.underfloor	30%	30%	30%	30%	0,00%
gas / luminous	15_luminous heaters	74%	82%	89%	89%	0,00%
gas / tube	16_tube heaters	65%	78%	83%	83%	0,00%

Table A4-2: Sub-option A. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**1st tier**	**2nd tier**	**3rd tier**	**Label-parameters**
Energy target years/values		**2012**	**2016**	**2018**	**2016**
solid fuel / open fire	01_open fireplace	41%	47%	52%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	70%	75%	80%	2,10%
	03_wood stove	70%	75%	80%	2,10%
	04_coal stove	70%	75%	80%	2,10%
solid fuel / cooker	05_cooker	65%	70%	80%	1,95%
solid fuel / closed fire	06_SHR stove	80%	80%	80%	2,40%
solid fule / closed-pellet	07_pellet stove	86%	86%	89%	2,58%
gas-liq. / open fire	08_open fire gas	45%	50%	50%	1,26%
gas-liq. / closed fire	09_closed fire gas	65%	70%	80%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	100%	100%	0,00%
elec. / portable	11_elec.portable	30%	31%	32%	0,00%
elec. / fixed	12_elec.convector	30%	35%	39%	0,00%
elec. / storage	13_elec.storage	30%	35%	39%	0,00%
elec. / underfloor	14_elec.underfloor	30%	35%	39%	0,00%
gas / luminous	15_luminous heaters	82%	89%	89%	0,00%
gas / tube	16_tube heaters	78%	83%	83%	0,00%

Table A4-3: Sub-option B. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**1st tier**	**2nd tier**	**3rd tier**	**Label-parameters**
Energy target years/values		**2012**	**2016**	**2018**	**2016**
solid fuel / open fire	01_open fireplace	41%	47%	52%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	70%	75%	80%	2,10%
	03_wood stove	70%	75%	80%	2,10%
	04_coal stove	70%	75%	80%	2,10%
solid fuel / cooker	05_cooker	65%	70%	80%	1,95%
solid fuel / closed fire	06_SHR stove	80%	80%	80%	2,40%
solid fule / closed-pellet	07_pellet stove	86%	86%	89%	2,58%
gas-liq. / open fire	08_open fire gas	45%	50%	50%	1,26%
gas-liq. / closed fire	09_closed fire gas	65%	70%	80%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	100%	100%	0,00%
elec. / portable	11_elec.portable	30%	31%	36%	0,00%
elec. / fixed	12_elec.convector	30%	34%	38%	0,00%
elec. / storage	13_elec.storage	30%	32%	38%	0,00%
elec. / underfloor	14_elec.underfloor	30%	34%	38%	0,00%
gas / luminous	15_luminous heaters	82%	89%	89%	0,00%
gas / tube	16_tube heaters	78%	83%	83%	0,00%

Table A4-4: Sub-option C. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**1st tier**	**2nd tier**	**3rd tier**	**Label-parameters**
Energy target years/values		**2012**	**2016**	**2018**	**2016**
solid fuel / open fire	01_open fireplace	41%	47%	52%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	70%	75%	80%	2,10%
	03_wood stove	70%	75%	80%	2,10%
	04_coal stove	70%	75%	80%	2,10%
solid fuel / cooker	05_cooker	65%	70%	80%	1,95%
solid fuel / closed fire	06_SHR stove	80%	80%	80%	2,40%
solid fule / closed-pellet	07_pellet stove	86%	86%	89%	2,58%
gas-liq. / open fire	08_open fire gas	45%	50%	50%	1,26%
gas-liq. / closed fire	09_closed fire gas	65%	70%	80%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	100%	100%	0,00%
elec. / portable	11_elec.portable	30%	31%	36%	0,00%
elec. / fixed	12_elec.convector	30%	34%	38%	0,00%
elec. / storage	13_elec.storage	30%	32%	38%	0,00%
elec. / underfloor	14_elec.underfloor	30%	34%	38%	0,00%
gas / luminous	15_luminous heaters	82%	89%	89%	0,00%
gas / tube	16_tube heaters	78%	83%	83%	0,00%

Table A4-5: Sub-option D. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**1st tier**	**2nd tier**	**Label-parameters**
Energy target years/values		**2012**	**2016**	**2016**
solid fuel / open fire	01_open fireplace	47%	52%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	75%	80%	2,10%
	03_wood stove	75%	80%	2,10%
	04_coal stove	75%	80%	2,10%
solid fuel / cooker	05_cooker	70%	80%	1,95%
solid fuel / closed fire	06_SHR stove	80%	80%	2,40%
solid fule / closed-pellet	07_pellet stove	86%	89%	2,58%
gas-liq. / open fire	08_open fire gas	50%	50%	1,26%
gas-liq. / closed fire	09_closed fire gas	70%	80%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	100%	0,00%
elec. / portable	11_elec.portable	31%	36%	0,00%
elec. / fixed	12_elec.convector	34%	38%	0,00%
elec. / storage	13_elec.storage	32%	38%	0,00%
elec. / underfloor	14_elec.underfloor	34%	38%	0,00%
gas / luminous	15_luminous heaters	82%	89%	0,00%
gas / tube	16_tube heaters	78%	83%	0,00%

Table A4-6: Sub-option E. Minimum energy efficiency values per year and labelling parameters

Energy efficiency		**1st tier**	**Label-parameters**
Energy target years/values		**2016**	**2016**
solid fuel / open fire	01_open fireplace	52%	0,90%
solid fuel / closed fire	02_closed fireplace/inset	80%	2,10%
	03_wood stove	80%	2,10%
	04_coal stove	80%	2,10%
solid fuel / cooker	05_cooker	80%	1,95%
solid fuel / closed fire	06_SHR stove	80%	2,40%
solid fule / closed-pellet	07_pellet stove	89%	2,58%
gas-liq. / open fire	08_open fire gas	50%	1,26%
gas-liq. / closed fire	09_closed fire gas	80%	1,95%
gas-liq. / flueless	10_flueless fuel heater	100%	0,00%
elec. / portable	11_elec.portable	36%	0,00%
elec. / fixed	12_elec.convector	38%	0,00%
elec. / storage	13_elec.storage	38%	0,00%
elec. / underfloor	14_elec.underfloor	38%	0,00%
gas / luminous	15_luminous heaters	89%	0,00%
gas / tube	16_tube heaters	65%	0,00%

2. Emission limit values

Table A4-7: BAU. PM Emission Limit Values

PM emissions						
Option		**BAU**	**1st tier**	**2nd tier**	**3rd tier**
Emission target years/values		**2012**	**2016**	**2018**	**2020**
solid fuel / open fire	01_open fireplace	900	450	450	450
solid fuel / closed fire	02_closed fireplace/inset	200	150	150	150
	03_wood stove	200	150	150	150
	04_coal stove	200	150	150	150
solid fuel / cooker	05_cooker	225	150	150	150
solid fuel / closed fire	06_SHR stove	150	150	150	150
solid fule / closed-pellet	07_pellet stove	75	75	75	75

Table A4-8: Sub-option A. PM Emission Limit Values

As in Working Document July 2012				
	A	**1st tier**	**2nd tier**	**3rd tier**
	2012	**2016**	**2018**	**2020**
01_open fireplace	900	150	75	40
02_closed fireplace/inset	200	150	75	40
03_wood stove	200	150	75	40
04_coal stove	200	150	75	40
05_cooker	225	150	75	40
06_SHR stove	150	150	75	40
07_pellet stove	75	100	50	30

Table A4-9: Sub-options B/C/D. PM Emission Limit Values

Following Consultation Forum comments Sep 2012. PM values are 2nd and 3rd tier as proposed by CEFACD			
	B/C/D	**1st tier**	**2nd tier**
	2012	**2016**	**2018**
01_open fireplace	900	200	40
02_closed fireplace/inset	200	75	40
03_wood stove	200	75	40
04_coal stove	200	75	40
05_cooker	225	100	40
06_SHR stove	150	75	40
07_pellet stove	75	50	20

Table A4-10: Sub-option E. PM Emission Limit Values

One stringent tier giving Member States enough time for adapting national legislations		
	E	1st tier
	2012	2018
01_open fireplace	900	40
02_closed fireplace/inset	200	40
03_wood stove	200	40
04_coal stove	200	40
05_cooker	225	40
06_SHR stove	150	40
07_pellet stove	75	20

Table A4-11: BAU. CO Emission Limit Values

CO emissions					
Option		**BAU**	**1st tier**	**2nd tier**	**3rd tier**
Emission target years/values		**2012**	**2016**	**2018**	**2020**
solid fuel / open fire	01_open fireplace	3500	3500	3500	3500
solid fuel / closed fire	02_closed fireplace/inset	3500	3500	3500	3500
	03_wood stove	3500	3500	3500	3500
	04_coal stove	3500	3500	3500	3500
solid fuel / cooker	05_cooker	3500	3500	3500	3500
solid fuel / closed fire	06_SHR stove	3500	3500	3500	3500
solid fule / closed-pellet	07_pellet stove	500	500	500	500

Table A4-12: Sub-option A. CO Emission Limit Values

	A	1st tier	2nd tier	3rd tier
	2012	2016	2018	2020
01_open fireplace	3500	3500	2000	1500
02_closed fireplace/inset	3500	3500	2000	1250
03_wood stove	3500	3500	2000	1250
04_coal stove	3500	3500	2000	1250
05_cooker	3500	4500	3500	1500
06_SHR stove	3500	3500	2000	1250
07_pellet stove	500	500	400	250

Table A4-13: Sub-options B/C/D. CO Emission Limit Values

	B/C/D	1st tier	2nd tier
	2012	2016	2018
01_open fireplace	3500	2500	1500
02_closed fireplace/inset	3500	1500	1250
03_wood stove	3500	1500	1250
04_coal stove	3500	1500	1250
05_cooker	3500	3000	1500
06_SHR stove	3500	1500	1250
07_pellet stove	500	500	250

Table A4-14: Sub-option E. CO Emission Limit Values

	E	1st tier
	2012	**2018**
01_open fireplace	3500	1500
02_closed fireplace/inset	3500	1250
03_wood stove	3500	1250
04_coal stove	3500	1250
05_cooker	3500	1500
06_SHR stove	3500	1250
07_pellet stove	500	250

Table A4-15: BAU. OGC Emission Limit Values

OGC emissions					
Option		**BAU**	**1st tier**	**2nd tier**	**3rd tier**
Emission target years/values		**2012**	**2016**	**2018**	**2020**
solid fuel / open fire	01_open fireplace	160	160	120	80
solid fuel / closed fire	02_closed fireplace/inset	160	160	120	80
	03_wood stove	160	160	120	80
	04_coal stove	160	160	120	80
solid fuel / cooker	05_cooker	160	160	120	80
solid fuel / closed fire	06_SHR stove	160	160	120	80
solid fusl / closed-pellet	07_pellet stove	100	100	60	40

Table A4-16: Sub-option A. OGC Emission Limit Values

	A	1st tier	2nd tier	3rd tier
	2012	**2016**	**2018**	**2020**
01_open fireplace	160	160	120	80
02_closed fireplace/inset	160	160	120	80
03_wood stove	160	160	120	80
04_coal stove	160	160	120	80
05_cooker	160	160	120	80
06_SHR stove	160	160	120	80
07_pellet stove	100	100	60	40

Table A4-17: Sub-options B/C/D. OGC Emission Limit Values

	B/C/D	1st tier	2nd tier
	2012	**2016**	**2018**
01_open fireplace	160	120	80
02_closed fireplace/inset	160	120	80
03_wood stove	160	120	80
04_coal stove	160	120	80
05_cooker	160	120	80
06_SHR stove	160	120	80
07_pellet stove	100	60	40

Table A4-18: Sub-option E. OGC Emission Limit Values

	E	1st tier
	2012	2018
01_open fireplace	160	80
02_closed fireplace/inset	160	80
03_wood stove	160	80
04_coal stove	160	80
05_cooker	160	80
06_SHR stove	160	80
07_pellet stove	100	40

ANNEX 5: MEASUREMENT AND CALCULATION METHODS

The following measurement and calculation methods have been the basis for establishing the maximum emission values and energy efficiency values proposed as specific ecodesign requirements and used for energy labelling.

1. EMISSIONS

1.1. PM emissions

The maximum emission values for Particulate Matter (PM) emissions are based on the DIN+ method as described in CEN/TS 15883 (Annex A.1, German method).

1.2. CO emissions

The maximum emission values for Carbon monoxide are based on the method described for CO measurement in the following standards that apply to solid fuel operated local space heaters:

- Open fire: EN 13229.
- Closed fire: EN13240
  - Slow heat release: EN 15250
  - With indirect heating functionality: EN 12809
  - If operated with pellets: EN 14785.
- Cookers: EN 12815.

1.3. OGC emissions

The maximum emission values for Particulate Matter (PM) emissions are measured as described in CEN/TS 15883.

2. ENERGY EFFICIENCY

2.1. Sub-option A

The energy efficiency of all fuel fired products is measured according the applicable EN standards, which result in an energy efficiency on net calorific basis (for solid fuels, the moist fuel 'as received').

For option A the energy efficiency of fuel fired products is recalculated into a value based on the gross calorific value of the fuel (for solid fuels: as received) in order to be in line with the methods applied/proposed of other heating products (Lot 1, Lot 15 boilers). This is the useful efficiency.

For all products within scope the useful efficiency is then recalculated into an act*ive mode efficiency* which is corrected by loss factors F(i) to arrive at a seasonal energy efficiency.

Calculations for Seasonal Energy efficiency

The seasonal energy efficiency of LSH η_s is defined as:

$$\eta_s[\%] = (\eta_{son} \cdot BCC) - \sum F(i)$$

- η_{son} is the *active mode efficiency*
- BCC is the Biomass Conversion Coefficient (1.4 for solid biomass fuel, 1.0 for other fuels) and is only used for the calculation of efficiency on the energy label (not for ecodesign requirements).

$$\sum F(i) = F(1) + F(2) + F(3) + F(4)$$

Solid fuel fired LSH

- η_{son} is the *useful efficiency* at rated heat output η_{rated}, using the GCVar of the fuel, in [%]

Gaseous and liquid fuel fired LSH (except warm air, luminous and radiant heaters)

- η_{son} is the *useful efficiency* at rated heat output η_{rated}, using the GCV of the fuel, in [%]

Electric LSH

- η_{son} is 40, in [%]

The energy efficiency for electric heated products is set at a default value of 100% on final energy (kWh electricity input). When corrected for losses in production and distribution the factor CC applies and the primary energy efficiency is maximum 40%.

Luminous and tube heaters

- $\eta_{son}[\%] = 0.2 \cdot \eta_{rated} + 0.8 \cdot \eta_{part} \cdot \frac{(0.94 \cdot RF) + 0.19}{(0.46 \cdot RF) + 0.45}$
  - η_{rated} is the *useful efficiency* at rated heat output, using the GCV of the fuel [%]
  - η_{part} is the *useful efficiency* at a part load heat output of 50%, using the GCV of the fuel [%]
  - RF is the *Radiant Factor* of the product, dimensionless [-]

Correction factors

Note that $F(i)$ is deducted from η_{son}, which means a positive value will reduce the η_s.

Factors F(1) and F(2) combined give an indication of the product's abilities to meet the actual heat demand, whereby F(1) addresses the possibility for part load operation and F(2) the control over the actual indoor heating comfort provided.

F(1) addresses the capacity of the product to adapt its heat output to the heat output actually needed . A default correction of 5% applies, which can be recuperated partly or in total if the control options below are applied.

Table A5-1 Correction factor (F1)

F(1) = A + B	Correction on control over the heat output
	A = 5%
	B =
For *fuel fired heaters* and *electric heaters* except *electric storage heaters* equipped with:	
1 single stage output	- 0%
2 two-stage output	- 2.5%
3 variable output	- 5%
Electric storage heater equipped with:	
1 no automated charge control (e.g. manual on/off)	- 0%
2 medium automated charge which takes into account residual charge (e.g. charge thermostat)	- 2.5%
3 full automated charge control which takes into account the residual charge combined with automated charging according outdoor temperature and/or fan assisted heat output	- 5%

F(2) addresses how well the heat output of the product is controlled with respect to required levels of indoor heating comfort. A default correction of 5% applies, which can be recuperated partly or in total if the control options below are applied.

Table A5-2 Correction factor F(2)

F(2) = A + B + C	Correction on temperature control
For all heaters within scope:	A = 5%
If the heaters is equipped with:	
1 manual control of heat output (includes remote control)	B =- 0%
2 product thermostat	B = -0.5%
3 on/off room thermostat	B = - 1%
4 modulating room thermostat (can only be applied if F(1) is "variable output" or "full automated charge")	B = - 2.5%
5. if either option 2 to 4 is combined with a 'programmable timer'	C = - 2.5%
6. if the unit provides 'distance control'	C= - 2.5%

F(3) is the correction on auxiliary electricity use and applies to fuel fired LSH only.

$$F(3) = 2.5 \cdot \frac{0.2 \cdot el_{max} + 0.8 \cdot el_{min} + 1.3 \cdot el_{sb}}{0.2 \cdot P_{rated} + 0.8 \cdot P_{part}}$$

- el_{max} is the maximum electric power consumption, in [kW]. For electric LSH el_{max} is 0 kW by default.
- el_{min} is the minimum electric power consumption, in [kW]. For electric LSH el_{min} is 0 kW by default.
- el_{sb} is the standby electric power consumption, in [kW]
- P_{rated} is the rated heat output of the product, in [kW]
- P_{part} is the heat output of the product at a part load of 50%, in [kW]. For electric LSH P_{part} is the 50% value of P_{rated} by default.

F(4) is the correction on power consumption of ignition features and applies to fuel fired LSH only.

Table A5-3 Correction factor (F4)

F(4)	Correction
Correction on pilot flame losses (fuel fired heaters only)	
1 if pilot flame fuel consumption not equal to zero	- 1%
2 if pilot flame fuel consumption equal to zero	+ 0%

$$F(4) = 0.5 \cdot \frac{P_{pilot}}{P_{rated}}$$

- P_{pilot} is the pilot flame fuel consumption, in [kW].
- P_{nom} is the rated heat output of the product, in [kW]

In order to provide an even basis for assessment of options and to improve the comparability of the various policy options presented in this document, the values that are presented in Annex 2 of this document relate to the useful efficiency (NCV) of solid fuel and gas fired local space heaters only. The corresponding seasonal efficiencies calculated for the solid fuel and gas/liquid fired space heaters are to be found in the Working Document presented to the Consultation Forum.

For electric local space heaters and commercial space heaters the efficiencies relate to a seasonal efficiency as the differences in measurement/calculation methods for the other policy options are minor or are without differences at all.

2.2. Option B/C/D and E

For option B/C/D and E the energy efficiency of fuel fired products is based on the net calorific value of the fuel (for solid fuels: as received) as measured using the harmonised standards. As there are virtually no solid fuel or gas/liquid fuel fired local space heaters that allow condensing operation, the latent energy of fuels will normally not be used and the net calorific values of the fuel can be used as basis for energy efficiency measurement. This is the useful efficiency.

Only for commercial local space heaters the useful efficiency is still expressed using the GCV of the fuel, as some condensing operation (tube heaters) can be achieved.

For all products within scope the useful efficiency is then recalculated into an act*ive mode efficiency* which is for certain appliances corrected by loss factors F(i) to arrive at a seasonal energy efficiency.

Calculations for Seasonal Energy efficiency

The seasonal energy efficiency of LSH η_s is defined as:

$$\eta_s[\%] = (\eta_{son} \cdot BLC) - \sum F(i)$$

- η_{son} is the *active mode efficiency*
- BLC is the Biomass Labelling Coefficient (1.2 for solid biomass fuel, 1.0 for other fuels) and is only used for the calculation of efficiency on the energy label (not for ecodesign requirements).

$$\sum F(i) = F(1..i)$$

Solid fuel fired LSH

- η_{son} is the *useful efficiency* at rated heat output η_{rated}, using the NCVar of the fuel, in [%]

Gaseous and liquid fuel fired LSH (except warm air, luminous and radiant heaters)

- η_{son} is the *useful efficiency* at rated heat output η_{rated}, using the NCV of the fuel, in [%]

Electric LSH

- η_{son} is 40, in [%]

Luminous and tube heaters

$$\eta_{son}[\%] = 0.2 \cdot \eta_{rated} + 0.8 \cdot \eta_{part} \cdot \frac{(0.94 \cdot RF) + 0.19}{(0.46 \cdot RF) + 0.45}$$

- o η_{rated} is the *useful efficiency* at rated heat output, using the GCV of the fuel [%]
- o η_{part} is the *useful efficiency* at a part load heat output of 50%, using the GCV of the fuel [%]
- o RF is the *Radiant Factor* of the product, dimensionless [-]

Correction factors

The correction factors vay per type of product and have been established for Combustion LSH, non-combustion LSH and commercial LSH

Combustion local space heaters

For domestic combustion heaters (solid fuel, gaseous and liquid fuel fired heaters) no correction factors apply.

$$F(i) = 0$$

Non-combustion local space heaters

For domestic products that do not use combustion of fuels (electric local space heaters) the following correction factors apply.

Note that $F(i)$ is deducted from η_{son}, which means a positive value will reduce the η_s.

Correction factor over heat output and temperature control

Table A5-4 Correction factor (F1) and (F2) for portable LSH

F(1) = A + B + C		
For electric heaters within scope:		A = 0%
F(2) = A + B + C + D		
For all electric heaters within scope:		A = 10%
	If the heater is equipped with:	
1	two or multiple - stage output - no thermostat	B = -1%
2a	Automatic temperature regulator (thermostat) for output control	B = -7.5%
2b	integrated or external electronic thermostat	B = -7%
3	if either option 2a to 2b is combined with a 'programmable timer' 24h	C = - 1%
4	if either option 2a to 2b is combined with a 'programmable timer' week	C = - 2%
5a	if either option 2a to 2b is combined with an additional feature like presence detection	C = - 3%
5b	if either option 2a to 2b is combined with an additional feature like presence detection or open window detection	n.a.
6	if the unit provides 'distance control'	n.a.
7	adaptive start control	n.a.

Table A5-5: Correction factor (F1) and (F2) for fixed LSH

F(1) = A + B + C		
For electric heaters within scope:		A = 0%
Alternative/additive proposals		
1	Manual charge control - by integrated thermostat for charge control	n.a
2	For static el. storage heaters: Manual charge control with RT- feedback	n.a
3	For dynamic storage heaters: Manual charge control with fan controlled heat output	n.a
4	Automated charge control according to outdoor temperature and control of heat output by fan	n.a
5	Remote control option for smart grid application- depending on charging capacity /flexibility of heater	C = - 0.8%
F(2) = A + B + C + D		
For all electric heaters within scope:		A = 10%
	If the heaters is equipped with:	
1	two or multiple - stage output - no thermostat	B = 0,0%
2a	Automatic temperature regulator (thermostat) for output control	B = -1%
2b	integrated or external electronic thermostat	B = - 3%
3	if either option 2a to 2b is combined with a 'programmable timer' 24h	C = - 5%
4	if either option 2a to 2b is combined with a 'programmable timer' week	C = - 6%
5a	if either option 2a to 2b is combined with an additional feature like presence detection	
5b	if either option 2a to 2b is combined with an additional feature like presence or open window detection	D = - 1%
6	if the unit provides 'distance control'	D = - 1%
7	adaptive start control	D = - 1%

Table A5-6: Correction factor (F1) and (F2) for storage LSH

F(1) = A + B + C		
For electric heaters within scope:		A = 0%
Alternative/additive proposals		
1	Manual charge control - by integrated thermostat for charge control	n.a
2	For static el. storage heaters: Manual charge control with RT- feedback	n.a
3	For dynamic storage heaters: Manual charge control with fan controlled heat output	n.a
4	Automated charge control according to outdoor temperature and control of heat output by fan	n.a
5	Remote control option for smart grid application- depending on charging capacity /flexibility of heater	C = - 0.8%
F(2) = A + B + C + D		
For all electric heaters within scope:		A = 10%
	If the heaters is equipped with:	
1	two or multiple - stage output - no thermostat	B = 0,0%
2a	Automatic temperature regulator (thermostat) for output control	B = -1%
2b	integrated or external electronic thermostat	B = - 3%
3	if either option 2a to 2b is combined with a 'programmable timer' 24h	C = - 5%
4	if either option 2a to 2b is combined with a 'programmable timer' week	C = - 6%
5a	if either option 2a to 2b is combined with an additional feature like presence detection	
5b	if either option 2a to 2b is combined with an additional feature like presence or open window detection	D = - 1%
6	if the unit provides 'distance control'	D = - 1%
7	adaptive start control	D = - 1%

Table A5-7: Correction factor (F1) and (F2) for electric underfloor LSH

F(1) = A + B + C		
For electric heaters within scope:		A = 0%
Alternative/additive proposals		
1	Manual charge control - by integrated thermostat for charge control	n.a
2	For static el. storage heaters: Manual charge control with RT- feedback	n.a
3	For dynamic storage heaters: Manual charge control with fan controlled heat output	n.a
4	automated charge control according to outdoor temperature and control of heat output by fan	n.a
5	Remote control option for smart grid application - depending on charging capacity /flexibility of heater	C = - 1.6%
F(2) = A + B + C + D		
For all electric heaters within scope:		A = 10%
	If the heaters is equipped with:	
1	two or multiple - stage output - no thermostat	B = 0,0%
2a	Automatic temperature regulator (thermostat) for output control	B = -1%
2b	integrated or external electronic thermostat	B = - 3%
3	if either option 2a to 2b is combined with a 'programmable timer' 24h	C = - 5%
4	if either option 2a to 2b is combined with a 'programmable timer' week	C = - 6%
5a	if either option 2a to 2b is combined with an additional feature like presence detection	
5b	if either option 2a to 2b is combined with an additional feature like presence detection or open window detection	D = - 1%
6	if the unit provides 'distance control'	D = - 15%
7	adaptive start control	D = - 1%

Correction factor on electricity consumption during stand-by

F(3) Electricity consumption during standby

The standby loss F(3) factors is to be calculated as:

$$F(3) = \left(\frac{a \times el_{sb}}{P_{rated}}\right) \times 100[\%]$$

Where:

1. If unit complies with standby regulation limits:
   a. Standby consumption with display ≤ 1 Watt
   b. Off mode of standby without display ≤ 0,5 Watt

   c. *a*=0; F(3)= 0, no effect

2. If unit does not comply with standby regulation limits:
   a. Standby consumption with display > 1 Watt
   b. Off mode of standby without display > 0,5 Watt

   c. *a*=0,5 - F(3) determining factor to reach Ecodesign requirements

Commercial local space heaters

The measurement and calculation method is as proposed in the working documents discussed on the Consultation Forum.

3. BIOMASS LABELLING COEFFICIENT (BLC)

In order to be consistent with Lots 1, 2 and 15 it is necessary to introduce a biomass label coefficient (BLC), because the approaches applied to other renewable energy technologies under Lots 1 and 2 would not promote efficient use of biomass and using the approach applied to fossil energy technologies, would mean all biomass boilers would be ranked lower in a lower energy efficiency class than boilers using oil or natural gas. The latter would compromise the objectives of the 'Renewable Energy Directive'.

The BLC will multiply the energy efficiency of the biomass LSH for the purposes of determining the energy labelling class.

The question arises at what level to set the coefficient. When a consumer sees a product in a higher label class to an otherwise identical product, she/he is likely to assume that the better-labelled product has

- Lower environmental impacts; and
- Lower life cycle costs

The BLC should, as far as possible, be set at a value, which ensures that these assumptions hold true for the consumer.

Concerning lower environmental impacts, this holds true as biomass is a renewable energy source. On labelling measures for 'Lot 1' heaters, new and renewable heating technologies are able to reach the top classes A+ to A+++. Population of classes lower than those for biomass BAT LSH would discourage the use of biomass in favour of fossil fuels.

Concerning lower life cycle costs, the preparatory study analysed the two elements that constitute life cycle costs: purchase cost and running cost. Purchase cost for solid fuel LSH (average 2000 €) is slightly higher than to that of gas and oil LSH (average 600 euro).

Fuel costs vary widely over time for both solid fuels and gas and oil and fuel prices also differ from country to country. While the preparatory indicated that biomass fuel costs are on average lower than fuel cost for gas, oil and coal, this is not necessarily the case for every individual situation. Therefore, the difference on the label between biomass boilers and fossil fuel boilers of comparable technology status cannot be too large.

Table A5-8: Energy class of solid fuel LSH in relation with BLC

			BLC							
	Typical	**BAT**	**1.1**		**1.2**		**1.3**		**1.4**	
01_open fireplace	30%	52%	33% G	57% G	36% G	62% F	39% G	68% E	42% G	73% D
02_closed fireplace/inset	70%	80%	77% C	88% B	84% B	96% A	91% B	104% A+	98% A	112% A+
03_wood stove	70%	80%	77% C	88% B	84% B	96% A	91% B	104% A	98% A	112% A+
05_cooker	65%	80%	72% D	88% B	78% C	96% A	85% B	104% A	91% B	112% A+
06_SHR stove	80%	85%	88% B	94% B	96% A	102% A	104% A	110% A+	112% A+	122% A+
07_pellet stove	86%	90%	95% A	99% A	103% A%	108% A+	112% A+	117% A+	120% A+	126% A+
04_coal stove	70%	80%	Not applied, between E and C							
08_open fire gas	42%	60%	Not applied, between G and F							
09_closed fire gas	65%	80%	Not applied, between E and C							

- Biomass LSH can reach one of the classes (A+) that are available for other renewable energy technologies under related lots (A+ to A+++).
- Biomass fuel BAT LSH will get a higher efficiency class on the label (A+) than those of gas or oil BAT boilers of Lot 1 (A). Gas and oil LSH will get a efficiency class between E and C (they could achieve B class with technological development).
- Current biomass LSH populate a wide range of classes.

ANNEX 6: OVERVIEW TABLES OF ENERGY, EMISSIONS AND COSTS

The following tables present a summarised overview of the calculations regarding energy consumption and emissions of local space heater products. Positive values signify an increase of the parameter.

Table A6-1: LSH sales and stock

Sales by LSH category		1990	2000	2010	2020	2030	Units
BAU	solid fuel LSH	1,8	2,3	3,2	3,9	4,1	million/yr
	gas/liq. LSH	0,6	0,8	1,0	0,9	0,9	million/yr
	elec. LSH	16,5	18,3	20,2	21,5	23,4	million/yr
	comm. LSH	0,04	0,04	0,05	0,05	0,05	million/yr
Stock by LSH category		**1990**	**2000**	**2010**	**2020**	**2030**	**Units**
BAU	solid fuel LSH	35,8	43,0	54,2	70,3	83,9	million/yr
	gas/liq. LSH	8,6	10,0	11,6	12,5	12,5	million/yr
	elec. LSH	163,2	180,3	199,1	215,3	233,6	million/yr
	comm. LSH	0,6	0,7	0,8	0,8	0,8	million/yr

Table A6-2: LSH energy consumption and reductions by policy option

	Energy consumption [PJ/year]					Energy reductions [absolute]					Energy reductions [relative to BAU]	
	1990	2000	2010	2020	2030	1990	2000	2010	2020	2030	2020	2030
BAU	2187	2225	2291	2362	2404	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	2187	2225	2291	2300	2127	0,0	0,0	0,0	-62,0	-277,6	-3%	-12%
B	2187	2225	2291	2307	2122	0,0	0,0	0,0	-55,4	-281,8	-2%	-12%
C	2187	2225	2291	2302	2122	0,0	0,0	0,0	-59,9	-282,1	-3%	-12%
D	2187	2225	2291	2212	2095	0,0	0,0	0,0	-150,3	-308,9	-6%	-13%
E	2187	2225	2291	2179	2091	0,0	0,0	0,0	-182,9	-313,6	-8%	-13%

Table A6-3: LSH energy consumption and reductions by main LSH category

		Energy consumption by LSH category					Reduction [PJ/year]	
		1990	200	2010	2020	2030	2020	2030
solid fuel LSH	BAU	518	545	618	732	812	(ref)	(ref)
	A	518	545	618	719	763	-13	-49
	B	518	545	618	719	763	-13	-49
	C	518	545	618	719	763	-13	-49
	D	518	545	618	709	751	-23	-61
	E	518	545	618	706	749	-26	-63
gas/liq. LSH	BAU	58	58	57	55	52	(ref)	(ref)
	A	58	58	57	54	48	-1	-4
	B	58	58	57	54	48	-1	-4
	C	58	58	57	54	48	-1	-4
	D	58	58	57	53	47	-2	-6
	E	58	58	57	52	46	-3	-6
electric LSH	BAU	1540	1551	1545	1510	1485	(ref)	(ref)
	A	1540	1551	1545	1462	1260	-48	-225
	B	1540	1551	1545	1469	1256	-42	-229
	C	1540	1551	1545	1464	1256	-46	-229
	D	1540	1551	1545	1385	1242	-125	-243

	E	1540	1551	1545	1356	1240	-154	-245
comm. LSH	BAU	72	71	71	65	55	(ref)	(ref)
	A	72	71	71	65	55	0	0
	B	72	71	71	65	55	0	0
	C	72	71	71	65	55	0	0
	D	72	71	71	65	55	0	0
	E	72	71	71	65	55	0	0
COMBINED savings	BAU=ref.							
	A	0,0	0,0	0,0	-62,0	-277,6		
	B	0,0	0,0	0,0	-55,4	-281,8		
	C	0,0	0,0	0,0	-59,9	-282,1		
	D	0,0	0,0	0,0	-150,3	-308,9		
	E	0,0	0,0	0,0	-182,9	-313,6		

Table A6-4: Energy reductions as % of total reduction or per main product category reduction

Reductions as % of total reductions per option				Reductions as % of LSH category reductions per option			
Product	**Scenario**	**2020**	**2030**	**Product**	**Scenario**	**2020**	**2030**
solid fuel LSH	BAU	(ref)	(ref)	solid fuel LSH	BAU	(ref)	(ref)
	A	21%	17%		A	-2%	-6%
	B	23%	17%		B	-2%	-6%
	C	22%	17%		C	-2%	-6%
	D	15%	20%		D	-3%	-7%
	E	14%	20%		E	-4%	-8%
gas/liq. LSH	BAU	(ref)	(ref)	gas/liq. LSH	BAU	(ref)	(ref)
	A	1%	2%		A	-1%	-8%
	B	1%	2%		B	-1%	-8%
	C	1%	2%		C	-1%	-8%
	D	1%	2%		D	-4%	-11%
	E	1%	2%		E	-5%	-12%
electric LSH	BAU	(ref)	(ref)	electric LSH	BAU	(ref)	(ref)
	A	78%	81%		A	-3%	-15%
	B	75%	81%		B	-3%	-15%
	C	77%	81%		C	-3%	-15%
	D	83%	79%		D	-8%	-16%
	E	84%	78%		E	-10%	-16%
comm. LSH	BAU	(ref)	(ref)	comm. LSH	BAU	(ref)	(ref)
	A	0%	0%		A	0%	0%
	B	0%	0%		B	0%	0%
	C	0%	0%		C	0%	0%
	D	0%	0%		D	0%	0%
	E	0%	0%		E	0%	0%

Table A6-5: GHG emissions and reductions

	GHG emissions [Mton/year]					GHG reduction [absolute]					GHG reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	108	94	85	81	77	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	108	94	85	79	67	0,0	0,0	0,0	-2,2	-9,9	-3%	-13%
B	108	94	85	79	67	0,0	0,0	0,0	-1,9	-10,1	-2%	-13%
C	108	94	85	79	67	0,0	0,0	0,0	-2,1	-10,1	-3%	-13%
D	108	94	85	76	66	0,0	0,0	0,0	-5,6	-10,9	-7%	-14%
E	108	94	85	74	66	0,0	0,0	0,0	-6,9	-11,0	-9%	-14%

Table A6-6: PM emissions and reductions

	PM emissions [kton/year]					PM reduction [absolute]					PM reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	176	155	142	122	94	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	176	155	142	111	60	-0,1	0,0	0,0	-10,7	-33,9	-9%	-36%
B	176	155	142	106	55	-0,1	0,0	0,0	-15,9	-39,0	-13%	-41%
C	176	155	142	106	55	-0,1	0,0	0,0	-15,9	-39,0	-13%	-41%
D	176	155	142	105	54	-0,1	0,0	0,0	-17,1	-40,3	-14%	-43%
E	176	155	142	105	54	-0,1	0,0	0,0	-16,8	-39,8	-14%	-42%

Table A6-7: CO emissions and reductions

	CO emissions [kton/year]					CO reduction [absolute]					CO reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	2038	1793	1658	1580	1433	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	2038	1793	1658	1475	993	0,0	0,0	0,0	-105,2	-440,3	-7%	-31%
B	2038	1793	1658	1348	868	0,0	0,0	0,0	-231,3	-565,4	-15%	-39%
C	2038	1793	1658	1348	868	0,0	0,0	0,0	-231,3	-565,4	-15%	-39%
D	2038	1793	1658	1328	845	0,0	0,0	0,0	-252,3	-588,0	-16%	-41%
E	2038	1793	1658	1331	853	0,0	0,0	0,0	-248,6	-580,0	-16%	-40%

Table A6-8: OGC emissions and reductions

	OGC emissions [kton/year]					OGC reduction [absolute]					OGC reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	195	153	119	87	49	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	195	153	119	86	47	0,0	0,0	0,0	-1,3	-2,4	-2%	-5%
B	195	153	119	85	47	0,0	0,0	0,0	-1,8	-2,9	-2%	-6%
C	195	153	119	85	47	0,0	0,0	0,0	-1,8	-2,9	-2%	-6%
D	195	153	119	84	45	0,0	0,0	0,0	-3,1	-4,1	-4%	-8%
E	195	153	119	83	44	0,0	0,0	0,0	-4,3	-5,2	-5%	-11%

Table A6-9: Acquisition costs and reductions

	Acquisition costs [billion/year]					Acquisition cost reduction [absolute]					Acquisition cost reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	6	8	9	11	11	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	6	8	9	14	13	0,0	0,0	0,0	2,8	2,3	26%	20%
B	6	8	9	14	13	0,0	0,0	0,0	2,8	2,3	26%	20%
C	6	8	9	14	13	0,0	0,0	0,0	2,8	2,3	26%	20%
D	6	8	9	14	13	0,0	0,0	0,0	3,0	2,4	27%	22%
E	6	8	9	14	13	0,0	0,0	0,0	3,0	2,4	27%	22%

Table A6-10: Energy costs and reductions

	Energy costs [billion/year]					Energy cost reduction [absolute]					Energy cost reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	74	75	75	74	74	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	74	75	75	72	63	0,0	0,0	0,0	-2,2	-10,4	-3%	-14%
B	74	75	75	72	63	0,0	0,0	0,0	-1,9	-10,6	-3%	-14%
C	74	75	75	72	63	0,0	0,0	0,0	-2,1	-10,6	-3%	-14%
D	74	75	75	69	62	0,0	0,0	0,0	-5,7	-11,3	-8%	-15%
E	74	75	75	67	62	0,0	0,0	0,0	-7,1	-11,4	-10%	-15%

Table A6-11: Expenditure costs and reductions

	Total expenditure [billion €/year]					Expenditure cost reduction [absolute]					Expenditure cost reduction [relative to BAU]	
Scenario	**1990**	**2000**	**2010**	**2020**	**2030**	**1990**	**2000**	**2010**	**2020**	**2030**	**2020**	**2030**
BAU	84	87	90	92	93	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)	(ref)
A	84	87	90	93	84	0,0	0,0	0,0	0,5	-8,2	1%	-9%
B	84	87	90	93	84	0,0	0,0	0,0	0,8	-8,4	1%	-9%
C	84	87	90	93	84	0,0	0,0	0,0	0,6	-8,4	1%	-9%
D	84	87	90	89	84	0,0	0,0	0,0	-2,8	-8,9	-3%	-10%
E	84	87	90	88	83	0,0	0,0	0,0	-4,1	-9,1	-4%	-10%

ANNEX 7: POLLUTANTS LINKED TO SOLID FUEL COMBUSTION

In any type of combustion process airborne pollutants are formed, but their amount differs depending on fuel, appliance type and operational mode. In the following the characteristics of the most important pollutants specifically linked to solid fuel combustion are discussed.

1. PARTICULATE MATTER (PM)

Particulate Matter (PM) in flue gases from solid fuel combustion can be described as carbon, smoke, soot, stack solid or fly ash. Thereby, particulate matter can be differentiated in three major groups of fuel combustion products.

The first group of particulate matter is formed via gaseous phase combustion or pyrolysis because of the incomplete combustion of fuels (Products of Incomplete Combustion or PICs). Soot and organic carbon particles (OC) are formed during combustion as well as from gaseous precursors through nucleation and condensation processes (secondary organic carbon). These precursors occur as a product of chemical radicals' reactions in the presence of hydrogen and oxygenated species within a flame. Condensed heavy hydrocarbons (tar substances) are an important, and in some cases, the main contributor to the total level of particles emission, especially in small-scale manual solid fuels combustion appliances. The second and third groups of PM may contain ash particles that are largely produced from mineral matter in the fuel. They contain heavy metals, oxides and salts (S and Cl) of Ca, Mg, Si, Fe, K, Na, P as well as unburned carbon as a result of incomplete combustion of carbonaceous material (Also called "black carbon / elemental carbon" or "carbon-in-ash / loss on ignition"[36]).

Particulate matter emission from SCIs is typically combined with PICs associated and/or adsorbed onto particulate surfaces. Size distribution depends on combustion conditions. Optimisation of the solid fuel combustion process (for example by introduction of continuously controlled conditions such as automatic fuel feeding and distribution of combustion air) leads to a decrease of emissions and to a change of PM distribution. Several studies have shown that the particulate emissions from modern and 'low-emitting' residential biomass combustion technologies are dominated by submicron particles (< 1µm) and the proportion[37] of the mass concentration of particles larger than 10 µm is normally < 10 % for SCIs.

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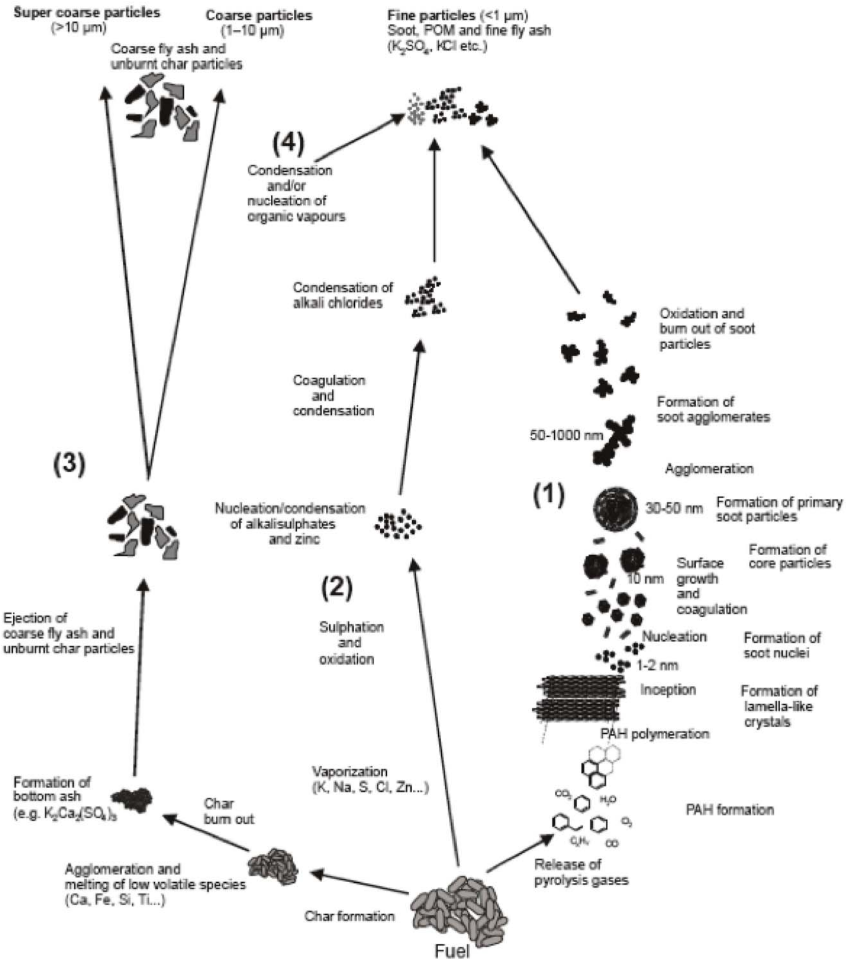
[36] Kupiainen, K., Klimont, Z., (2004); "Primary Emissions of Submicron and Carbonaceous Particles in Europe and the Potential for their Control"; IIASA IR 04-079, http://www.iiasa.ac.at/rains/reports.html

[37] Boman Ch., Nordin A., Boström D., and Öhman M. (2004); "Characterisation of Inorganic Particulate Matter from Residential Combustion of Pelletized Biomass Fuels"; Energy&Fuels 18, pp. 338-348, 2004

Figure 9: Illustration of the soot formation process (1), fine ash (2), coarse particles (3), particle organic matter (4), during residential wood combustion[38]



It must be stressed that PM values arising from solid fuel combustion differ significantly according to the measurement method used. Commonly used methods are:

- Gravimetric method, in stack (VDI)
- Gravimetric method with dilution tunnel (Norwegian method)

Currently, research is being carried out to compare the PM measurements obtained with different test methods. Intense work is also on-going to develop a new unified measurement method across the Europe[39].

For the future, further studies are needed to analyse the differences of the three groups of particulate matter and their specific impacts on health. Based on this, there might be a need to revise and differentiate the PM emissions limits proposed in the different options presented in this impact assessment study as well as to further develop a harmonized European PM measurement methodology.

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[38] Tissari J., 2008, Fine particle emissions from residential wood combustion, PhD Thesis University of Kuopio (FI)

[39] HKI Position paper on new measurement method for dust emission

2. OGC

OGC is defined as "organic gaseous carbon" in EN303-5 and is essentially equivalent to a VOC ("Volatile organic compound") emission. VOC is a generic term for a large variety of chemically different compounds, like for example, benzene, ethanol, formaldehyde, cyclohexane, 1,1,1-trichloroethane or acetone. Furthermore, NMVOCs are identical to VOCs, but with methane excluded. They are intermediates in the thermal conversion of fuel to CO2 and H2O. As for CO, emission of NMVOC is a result of too low temperature, too short residence time in oxidation zone, and/or insufficient oxygen availability. The NMVOC/CH4 emissions from combustion processes are often reported together as VOC. Emission of VOC has tendency to decrease as the capacity of the combustion installation increases, due to application of advanced or controlled combustion techniques.

3. NOX

'Oxides of nitrogen', expressed as NO_2 (general convention for reporting NO_x emissions), include the sum of nitric oxide (NO) emissions (>90% of the NO_x emission) and nitrogen dioxide (NO_2, typically <10% of the NO_x) emissions. Nitrogen emissions are the result of the partial oxidation of fuel nitrogen. The emissions of NO_x increase with increasing nitrogen contents in the fuel, as well as with increasing excess air ratio and higher combustion temperature. Nitrogen content in fuels varies both among and within fuel types: coals contain nitrogen mainly in N-organic form (0.5% to 2.9% daf, average about 1.4%). Biomass fuels contain N in N-organic form (0.05% to 0.8% daf) for coke the N-contents is between 0.6 to 1.55% (daf), for peat between 0.7 and 4.4 % (daf). NO_x emissions may be reduced by both primary and secondary measures aiming at emission reduction, but secondary measures are not applied in small installations due to economic factors.

Additional NO_x may be formed from nitrogen in the air under certain conditions, as "thermal NO_x" and as "prompt-NO_x". Thermal and prompt NO_x are generated by the flames surrounding individual particles, through free radical reactions. Nitrogen in the air starts to react with O-radicals and forms NO_x at temperatures above approximately 1300°C and its amount is depending on O_2 concentration and residence time. However, the combustion temperatures in boilers, in general, are lower than 1300°C and hence thermal NO_x formation is usually not important. However, most of the thermal NO_x is formed in the post-flame gases (after the main combustion process), and due to development of advanced small boilers designs, the significance of such emissions may be increasing.

4. DIOXINS / FURANS (PCDD/F)

The emissions of dioxins and furans are highly dependent on the conditions under which cooling of the combustion and exhaust gases is carried out. Carbon, chlorine, a catalyst and oxygen excess are necessary for the formation of PCDD/F (Polychlorinated dibenzodioxins / -furans). Coal fired appliances in particular have been reported to release very high levels of PCDD/F when using certain kinds of coal. The emission of PCDD/F is also significantly increased when plastic waste is co-combusted in (typically manually stoked) residential appliances or when contaminated/treated wood is used. The emissions of PCDD/F can be reduced by introduction of advanced combustion techniques of solid fuels.

ANNEX 8: LEGISLATION AND INITIATIVES RELEVANT FOR LOCAL SPACE HEATERS

At Community level:

EPBD

At Community level the Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings[40] ("EPBD") requires Member States, amongst others, to apply minimum requirements to the energy performance of new and certain existing buildings, and technical building systems.

According to Recital (12) of the EPBD Member States should use, where available and appropriate, harmonised instruments, in particular testing and calculation methods and energy efficiency classes developed under the Ecodesign and Energy Labelling Directives when setting energy performance requirements for technical building systems [41].

The energy performance certificates for buildings required by the EPBD aim to provide information to buyers and sellers as regards the energy performance of the building and building units as well as to provide incentives for owners and sellers to invest in energy-efficient installations. The requirements on technical building systems aim at optimising the energy use of such systems, in particular if installed in existing buildings. Emissions (to air) of such equipment are not addressed by the EPBD.

NECD

The Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants[42] (in the following abbreviated as "NECD") requires Member States to reduce emissions of such substances and as such may be relevant for especially solid fuel local space heaters. The Directive itself sets no limits as regards the maximum emissions of such products, but the implementation on Member State level, may result in emission limits. The chosen approach for limiting the relevant emissions from heaters varies per Member State.

ESD

The Directive 2006/32/EC[43] of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (in the following abbreviated as "ESD") provides energy savings targets for Member States and creates the conditions for the development and promotion of the market for energy services, including measures improving the energy efficiency of (local) space heaters. However, it is up to the Member States to select the concrete measures to achieve the energy savings targets, and no harmonised measures specifically targeted at improving the environmental performance of boilers are provided for.

Summary

The current initiatives at EU and Member State level address only parts of the existing market failures. The EPBD, ESD and financial instruments at EU and Member State level address

[40] OJ L 1, 4.1.2003, p.65

[41] The interrelation between requirements on technical building systems and Ecodesign requirements for the placing on the market of products is further explained in the "Commission non-paper on the interaction between Ecodesign Directive and Energy Performance of Buildings Directive".

[42] OJ L 309, 27.11.2001, p. 22.

[43] OJ L 114, 27.4.2006, p. 64.

market failures related to lack of incentives and financial capacities for investments. The emission of air borne pollutants is only addressed by the NECD, which provides neither emission limit values nor testing and calculation methods for boilers. NECD is expected to contribute to a general, but unspecific reduction of emissions in the residential sector.

However, the EPBD, the ESD and the NECD alone are not expected to correct the market failures related to incomplete information, lack of awareness for (running) cost savings. The EPBD and ESD provide for energy efficiency neither classes nor testing and calculation methods for boilers. The EPBD and ESD also do not provide harmonised minimum performance requirements for the crucial main parts of the technical building and hot water system like the heat generator or other related parts such as controls. Thus, a certain "minimum level" of improvements cannot be guaranteed. Therefore, there is also a risk that individual energy efficiency requirements and emission limits by Member States could hamper the functioning of the EU internal market.

RoHS and WEEE

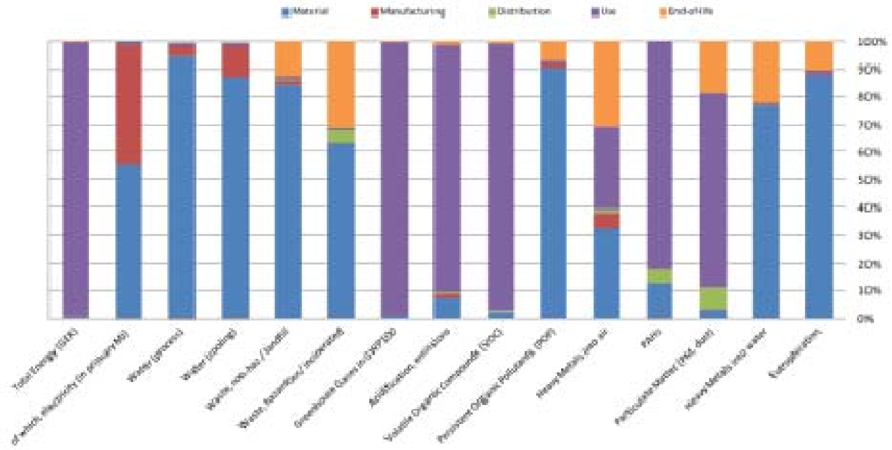
Fuel fired (solid, gaseous and liquid fuels) local space heaters are not subject to the RoHS nor WEEE legislation as they are not listed in WEEE Annex II. Electric local space heaters are covered by the RoHS and WEEE Directive.

It can be expected however that electronic parts incorporated in fuel fired LSH may also comply to the RoHS and WEEE stipulations, as a spillover effect from the requirements for electric products.

ANNEX 9: ENVIRONMENTAL IMPACTS OF LSH OVER PRODUCT LIFE CYCLE

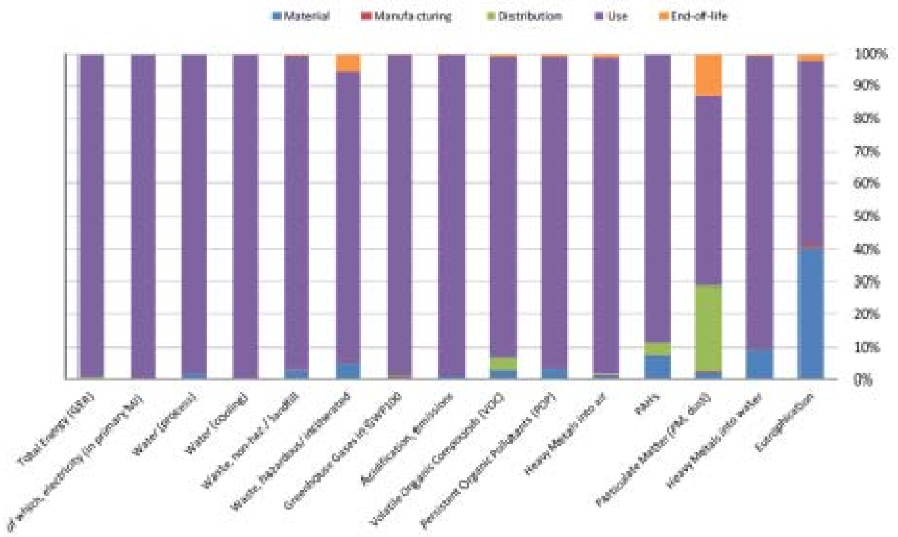
The Life cycle impacts Lot 20 products are shown below (all data excerpts from the relevant preparatory studies).

Figure A9-1. Life cycle impacts of a Gas heater



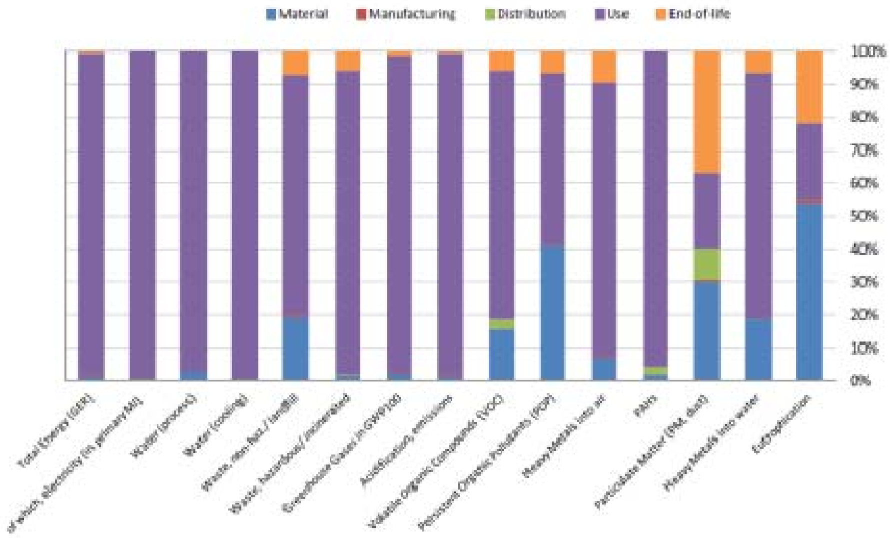
Life cycle impacts of gas fire are rather similar in profile.

Figure A9-2. Life cycle impacts of an Electric portable heater



Life cycle impacts of an electric stationary are rather similar in profile.

Figure A9-3. Life cycle impacts of an Electric dynamic storage heater



The life cycle impacts of the static storage heater are rather similar.

The use phase contributes on average the most to impacts as regards energy consumption, greenhouse gas emissions and acidification. The production phase contributes on average the most to impacts related to waste, POP and PAH (from paints)

The life cycle analysis of Lot 15 direct heaters (solid fuel local space heaters) also shows the major relevance of the use-phase in environmental impacts. The figures below show for the wood stove and pellet stoves the life cycle impacts. The impacts for open fireplaces, closed fireplaces and coal stove and SHR stove are rather similar. Solid fuel cookers do show more production related impacts.

For all products the use phase contributes on average the most to impact as regards energy consumption, greenhouse gas emissions, acidification,

The production phase contributes on average the most to impacts related to waste, POP and PAH (from paints)

Figure A9-4. Life cycle impacts of a wood stove

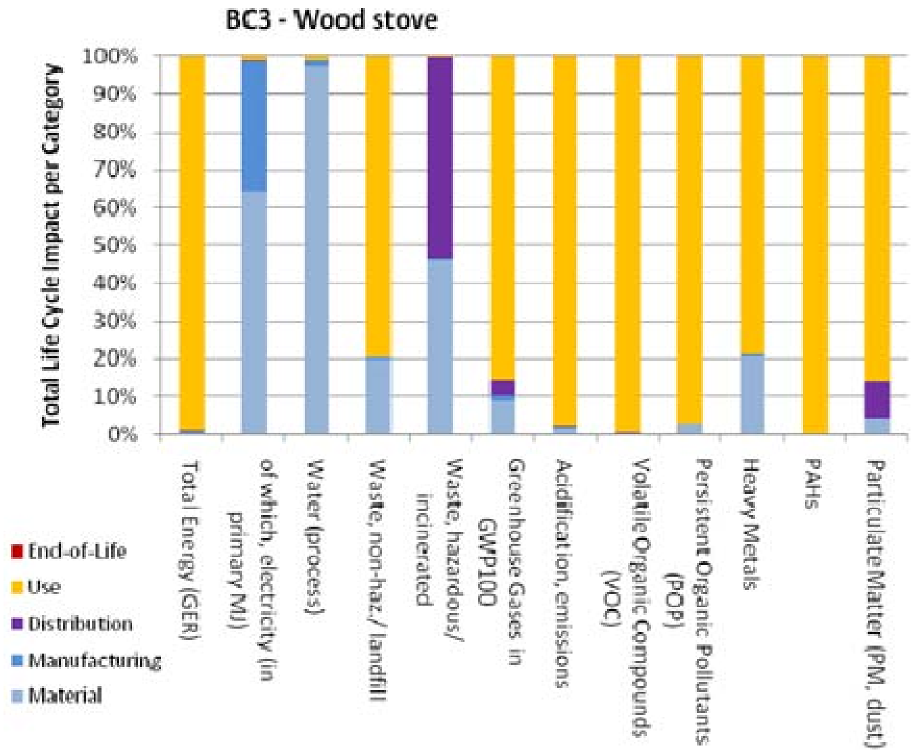
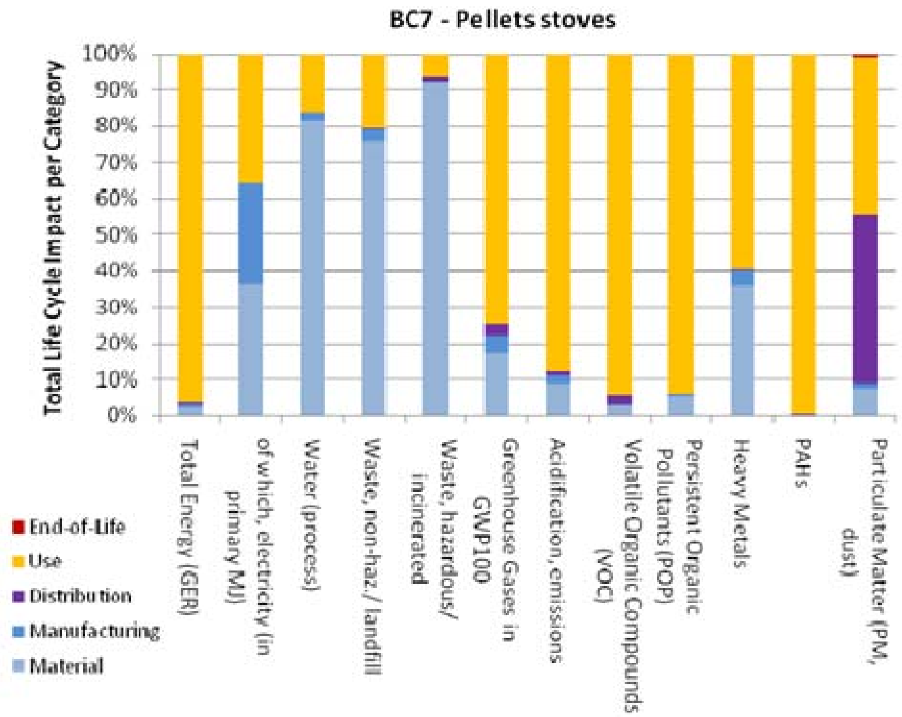


Figure A9-5. Life cycle impacts of a pellet stove



The pellet stove is the most efficient stove and thus shows a higher impact of production-related impacts.

ANNEX 10: NON-EXHAUSTIVE LIST OF RELEVANT COMPANIES

The relevant preparatory studies identified the following manufacturers.

Figure A10-1. Main manufacturers of solid fuel local space heaters

Product category	Manufacturer's name
Open and closed fire local space heaters	Aduro, Attika, Austro Flamm, Kaschütz, Bernhard Kaschütz, Bodart & Gonay, Bosch, BoschMarín, Brisach, Brunner, Caminos, Carbel, Chazelles, Dovre, Droff Kaminöfen, Edilkamin, Eurimex, Faber, Ferlux, Fireplace, Firetube, Ganz Baukeramik, Gerco, GKT, Haas + Sohn, Hark, Hase Hergom, Heta, Hwam, Interfocos, Josper, Jøtul, Jydepejsen, Kal-fire, Kaminofenbau , Koppe, KSW, Lacunza, LEDA, Lincar, Lohberger, Lotus, Max, MCZ, Blank, Meteor, Milan Blagojević, Montegrappa, Morsø Jernstøberi, Nibe, Nordica, Northstar, Olsberg, Oranier, Palazzetti, Panadero, Piazzetta, RIKA, Rocal, Rüegg, Salgueda, SCAN, Schmid, Skantherm, Spartherm, Stovax, Stûv, Supra, Terma Tech, Thorma, Torwerk, Traforart, Tulikivi, Varde Ovne, Wamsler, Westfeurer, Westfire, Eisenwerk, Willach, Wodtke
Cookers	Haas + Sohn, Hergom, Lacunza, Lohberger, Wamsler

Figure A10-2. Main manufacturers of gas and liquid fuel local space heaters

Product category	Manufacturer's name
Flued heaters	Baxi Group, Bellfires, Be Modern, BFM Europe, Burley Appliances, Charlton & Jenrick, Crosslee, Dimplex, DRU/Drugasar, GAZCO, Focal Point, Italkero, Fondital, Rinnai, Legend, Oranier, Robinson Wiley, Robur Group, Widney Leisure
Flueless heaters	Delonghi, Focal Point
Kerosene heaters	Zibro
Ethanol heaters	CVO Fire, Gel Fireplaced Ltd

Figure A10-3. Main manufacturers of electric local space heaters

Product category	Manufacturer's name
Fixed electric heaters	Atlantic Group, Biddle Air Systems, Glen Dimplex, Muller Group, Rettig, Stiebel, Eltron, Vent-Axia, Zenhder
Portable electric heaters	Dimplex, Delonghi, Honeywell, Bionaire, Groupe Seb, Vent-Axia
Storage heaters	Glen Dimplex, Elnur, EV, Muller Group, Steible Electron, Vent-Axia
Electric underfloor heating systems	AEG, Atlantic Group, Devi, Elektra, Fenix, Nexans, Rettig, Tyco, Warmup

Figure A10-4. Main manufacturers of commercial local space heaters

Product category	Manufacturer's name
Radiant and tube heaters	Ambirad, Colt, Gax Industrie, Generfeu, Gewea, Gogas, Italkero, Mark, Roberts Gordon, SBM, Schwank, Solaronics, Reznor