Working document on possible Ecodesign Energy labelling and Installation requirements for Boilers and Water Heaters

1. Ecodesign requirements

1. The CH-Boilers, Water Heaters and CH Combis *regardless of the application for which they are intended*, shall meet the Ecodesign requirements set out in **Annex I**.

These requirements shall apply to the 'CE marked package' as supplied (placed on the market). If any item is not supplied, the default values defined in the 'Annex V' shall be used.

2. Energy Labelling requirements (Directive 92/75)

Apart from the Ecodesign information requirements (for all size classes) in Annex I the following appliances shall be subject to the Energy Labelling requirements as in **Annex II**:

- CH-Boilers of size class upto and including XL
- Water heaters of size class upto and including XL
- CH-Combis where either their CH Boiler or water heater size class is XL or less

Information requirements in Annex I are optional as from the entry in to force of the implementing measure. Information requirements in Annex I and Energy Labelling in Annex II will be compulsory as from 1.01.2010.

3. Installation Requirements

Annex III contains installation requirements intended to complement the Ecodesign and Labelling requirements. They would require "Co decision" measures to be adopted (for example in the planned revision of the Energy Performance of Buildings Directive 2002/91/EC[1](EPBD).

4. Comments - Recommendations

Annex IV contains comments and recommendations to Member states for complementary actions to support these measures.

[1] Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings *OJ L 1, 4.1.2003, p. 65–71*

5. Updating annex V

Annex V gives details of the calculation of 'specific efficiency' of CH Boilers, Water Heaters and CH Combis. Annex V may be extended or updated, in whole or in part by:

- Harmonized Standards
- Revisions to the implementing measure. As they such changes will not affect the 'essential requirements' of the measure, they can follow a simplified procedure.

However, as manufacturers will have invested substantial sums in developing products based on these calculations, care should be taken that any revisions do not have substantial negative effects for these stakeholders.

6. Significant environmental parameters for boilers and water heaters

6.1. The following environmental aspects are identified as significant:

(a) Energy in the use phase (see annex I.1.1-4)
(b) Emissions in use phase of
  i) NOx (see annex I.1.5)
  ii) CO
  iii) Hydrocarbons
  iv) Particulates
(c) GWP (Global Warming Potential) of refrigerant fluid used (in heat pumps)

6.2. Ecodesign parameters referred to in Annex I, Part 1 of Directive 2005/32/EC which are not considered as significant: All Ecodesign parameters not addressed by the requirements in the measure.

6.3. For emissions of CO, hydrocarbons and particulates current harmonised measurement standards should be improved as they currently only address steady state. Until such time that adequate (dynamic) harmonised test methods are available , no specific measures should be implemented, thus not restricting Member States in setting national measures in the interim.

6.4 For GWP (Global Warming Potential) of the refrigerant –if applicable—If the limit value for GWP-100 is over 2000 then the declared primary energy efficiency value of the Product shall be restricted to a maximum of 104%, independent of the actual established efficiency value. (see Annex I .3.1)

7. Definitions

- A *CH-Boiler* is a product that is equipped to generate heat and to transfer this heat to a heat transfer fluid (*CH-water*) circulating in a distribution system (*CH-distribution network*) to which at least one heat exchanging means is connected (*CH-emitter*) that is equipped to transfer the heating energy of the CH-water into space heating of (a part of) buildings.

- A *Water Heater* is a product that is connected to a given external supply of drinking water and is equipped to generate heat and transfer this drinking water to desired temperature levels and at desired quantities, flow rates and intervals.

- The *primary function* of a *CH-boiler* is the capability to reach and maintain the indoor climate of an enclosed space (building, dwelling, room) at a desired level under normal and extreme circumstances, in as much as is possible through heating, using hydronic heat emitters.

- The *primary function* of a *Water Heater* is the capability to reach and maintain the desired temperature levels at desired quantities, flow rates and intervals as mentioned in the product definition.

- A *CH-Combi* is a product with the functionality of both a *CH-Boiler* and a *Water Heater.*

- The *efficiency* of a CH Boiler or Water Heater shall be the ratio of the actual primary energy consumption required to fulfil the primary function to the theoretical minimum energy required to fulfil that primary function

- "The *primary function* of a CH-boiler is the capability to reach and maintain the indoor climate of an enclosed space (building, dwelling, room) at a desired level under normal and extreme circumstances, in as much as is possible through heating, using hydronic heat emitters."

- "The *primary function* of a Water Heater is the capability to reach and maintain the desired temperature levels at desired quantities, flow rates and intervals as mentioned in the product definition under normal circumstances."

- The *'specific efficiency'* of a CH boiler or a Water Heater shall be the efficiency as calculated by the Annex V for a specific load profile.

- The definitions in Annex V .A shall apply.

Other expressions used in the implementing measure shall have the same meaning as in Directive 2005/32/EC.

8. Scope

All CH Boilers, Water Heaters and CH Combis which use one of the heat generation processes:

- combustion of gaseous and/or liquid fossil fuels
- use of the Joule effect in electric resistance heating elements
- capturing solar thermal energy
- capturing ambient heat, including but not limited to transformation processes to bring the heat to a higher energy level(e.g. heat pumps).

The following *Products* are explicitly not included in the scope:

- Space- and/or water heating devices that are within the scope of Directive 2001/80/EC on Large Combustion Plants (LCPD).
- Space- and/or water heating devices that produce a surplus of electricity, i.e. beyond what is needed for driving the electrical components within the system (a.k.a. *CHP*, Combined Heat and Power). **However these could also be included provided the electricity produced was accounted for simply (i.e. with a primary energy credit of 2.5)**
- Space- and/or water heating devices using solid fuels, including biomass, as an energy source.
- Space- and/or water heating devices driven by District Heating ("DH").
- Centralized and local space heating devices based on air heating (e.g. reversible room- or centralized air conditioners).
- Product components, i.e. devices that are not capable of performing the *primary function*. This includes but is not limited to burners, heat exchangers, storage tanks as well as controls or other provisions for heat generation technologies that are not part of the product offered for CE-marking.
- CH Boilers with a maximum output below 3.5 KW. **However, from 2011 any 'CH boiler' with a maximum input of more than 7 KW (primary), even at an output below 3,5 kW, shall be included.**
- Water Heaters that are incapable of fulfilling the demands of the smallest tapping cycle are excluded.

9. Size Categories

Manufacturers shall be free to declare the size category of a **'CH boiler'** within the limits set out below

Table Minimum heat output and maximum heat inputs of CH-boilers per load profile

Load profile	MinOut	MaxOut
	kW	kW
1 -XXS	3,6	70
2 -XS	5,1	70
3 -S	6,9	70
4 -M	7,7	70
5 -L	10,5	70
6 -XL	30,6	70
7 -XXL	46,4	
8 -3XL	107,0	
9 -4XL	350,0	

Manufacturers shall be free to declare the size category of a 'Water Heater' provided:

- They can fulfil the requirements of the relevant tapping cycle, and
- For categories XXS and XS, they have a storage volume of less than 15L and for S less than 36L.

10. Benchmarks for best environmental performance

The Benchmarks for the best environmental performance are:

- Energy efficiency – rating A+++ (see annex I.2.3&5)
- NOx Emissions – less than 20ppm (see annex I.1.5)

For other significant environmental parameters the lack of adequate test methods rules out the setting of benchmarks.

11. Location of the energy efficiency rating of CH boilers

The energy efficiency rating of CH boilers shall be placed on a clearly visible and accessible part of the product.

12. Conformity Assessment

A conformity assessment shall be carried out according to Council Decision 93/465/EEC[2], Module B (type approval) Article 8(2).

13. Amendments and repeals

Directive 1992/42/EC is repealed from 1/1/2011 and replaced by the provisions of the new IM.

14. Review

A review of the IM shall be presented to the Consultation Forum depending on technological progress and not later than 5 years after its entry into force

[2] 93/465/EEC: Council Decision of 22 July 1993 concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives *Official Journal L 220 , 30/08/1993 P. 0023 - 0039*

Annex I
Ecodesign requirements for 'CH Boilers' and Water Heaters

1. Eco design requirements

1.1 For smaller CH boilers (up to XL)

From 01/01/2011 'specific efficiency' shall be at least 56% (so that classes EF and G are banned – as in annex I.2.3)

From 01/01/2013 'specific efficiency' shall be at least 76% (so that classes ½B CDEF and G are banned– as in annex I.2.3)

1.2 For larger CH Boilers (XXL and Above)

From 01/01/2011 'Specific efficiency' shall be at least [56%]

From 01/01/2013 Either

'Specific efficiency' shall be at least 96%, **or**

The steady state efficiency of the heat generator shall be at least
96% (in terms of primary energy) @ 30°C return temperature and 30% load, and **88%**at full load.

In the latter case the CH Boiler shall be supplied with the following message:

"**Warning** this 'CH boiler package' should only be installed if the heating system also includes controls and other components which bring the overall energy heating system efficiency rating above 96%."

1.2.1 Monitoring

From 01/01/2013
Larger CH boilers must include monitoring equipment (including data recording) allowing real life efficiency (and emissions) to be estimated.
Recording:

- Waterfeed and return temperatures,
- water flow rates (pump settings),
- energy input(from burner settings)
- Flue gas monitoring ($CO/CO^2/O^2$+temperature etc.)

Should include suitable interface (e.g. GSM protocol) allowing equipment owner, enforcement authorities, etc. to download data periodically
Details to be worked out with industry and other stakeholders.

1.3 For Water Heaters

From 01/01/2011

'Energy Efficiency Rating' shall be at least E (classes F and G banned)

From 01/01/2013

'Energy Efficiency Rating' shall be at least:

- C, for size classes XXS to S (thus classes DEF and G banned)
- B, for size classes M to 3XL (thus classes CDEF and G banned)
- A, for size class 4XL (thus classes BCDEF and G banned)

(Energy efficiency ratings are defined in annex I.2.5)

However, water heaters of size class S, and efficiency rating C, with a storage capacity of over 20 l and under 36 l may only be placed on the market, if they are accompanied by the following warning:

'NB To install this product you may require prior authorization.'

1.4 For CH-Combis

A CH-Combi shall be subject to the requirements of

- a CH boiler of it's CH boiler size class, and
- a Water Heater of it's Water Heater size class.

1.5 Emissions in use phase

From 01/01/2013 Emissions of NOx from CH Boilers, Water heaters and CH Combis shall be subject to the following limit (where applicable):

NOx; 20 ppm, except 40ppm for products with at least 30% renewable input. This limit shall be after allowing for nitrogen already in the fuel (or when tested with nitrogen free fuel).

2 Product information requirements

Information requirements are optional as from the entry in to force of the implementing measure; and compulsory for CH Boilers, Water Heaters and CH Combis placed on the market from 1.01.2010.

2.1 For smaller CH boilers (up to XL)

Manufacturers shall supply the following information: Copies of:

1) The label (with energy efficiency Rating)
2) The information Fiche /Technical input sheet form (Data report CH-Boilers & Water Heaters from annex B1. general of the Annex V)
3) NOx ratings

(This will be complemented with an energy labelling Implementing Directive with the label as item 1 and the fiche as items 2 and 3)

2.2 For larger CH Boilers (XXL and above)

Manufacturers shall supply the following information: Copies of:

1. The label (with energy efficiency Rating) for the CH boiler package as supplied,
2. The *specific efficiency* of the CH boiler package as
   i. Supplied
   ii. Determined for an 'agreed load profile', where the CH boiler is designed and designated by the manufacturer, for a use with this 'agreed load profile',
   iii. Optionally under other configurations defined by the manufacturer.
3. The information Fiche /Technical input sheet form (Data report CH-Boilers & Water Heaters from annex B1. general of the Annex V)
4. NOx ratings

2.3 CH Boilers Energy Efficiency Rating Scale

"specific efficiency' of CH Boiler 'I'	energy efficiency Rating	
	Smaller CH Boilers	Larger CH Boilers
I ≥120%	A+++	A+++
120%> I ≥ 104%	A++	A++
104%> I ≥ 88%	A+	A+
88%> I ≥ 80%	A	A
80%> I ≥ 72%	B	B
72%> I ≥ 64%	C	C
64%> I ≥ 56%	D	D
56%> I ≥ 48%	E	E
48%> I ≥ 40%	F	F
40%> I	G	G

NB. The names of the scale are without prejudice to horizontal discussions concerning the revised appearance of the energy efficiency label.

2.4 For Water Heaters

Manufacturers shall supply the following information: Copies of:

1) The label (with energy efficiency Rating)
2) The information Fiche /Technical input sheet form (Data report CH-Boilers & Water Heaters from annex B1. general of the Annex V)
3) NOx rating

(This will be complemented with an energy labelling Implementing Directive with the label as item 1 and the fiche as items 2 and 3)

2.5 Energy Efficiency Rating Scale

size class	XXS	XS	S	M	L	XL	2XL	3XL	4XL
Energy efficiency Rating	**"specific efficiency'** of Water Heater ≥								
A+++	52	62	72	86	98	112	128	140	152
A++	44	52	60	72	82	94	108	118	128
A+	36	42	48	58	66	76	88	96	104
A	32	37	42	51	58	67	78	85	92
B	28	32	36	44	50	58	68	74	80
C	24	27	30	37	42	49	58	63	68
D	20	22	24	30	34	40	48	52	56
E	16	17	18	23	26	31	38	41	44
F	12	12	12	16	18	22	28	30	32
G									

NB. The names of the scale are without prejudice to horizontal discussions concerning the revised appearance of the energy efficiency label.

2.6 For CH-Combis

A CH-Combi shall be subject to the requirements of

- a CH boiler of it's CH boiler size class, and
- a Water Heater of it's Water Heater size class.

3. Verification procedure for market surveillance purposes

3.1 Test methods

When testing CH Boilers, Water Heaters and CH Combis for market surveillance purposes, Member State authorities shall use:

For Specific efficiency, Energy efficiency rating, and input data in information Fiche /Technical input sheet form

- The test methods defined in the Annex V.

For NOx emissions test methods shall be:

- Gas Boiler: from 4 to 400 kW: EN 483 - EN 656
- Oil Boiler: EN 267 – EN 303-2
- GIWH – Reference standard is EN26 with weighted values

NB values quoted exclude the effect of nitrogen in the fuel (e.g. by testing with very low nitrogen heating oil.)

For GWP (Global Warming Potential) of the refrigerant –if applicable—the declared value shall be based on GWP100-values according to the IPCC[3], as declared in directive 2002/358/CE.[4] If the limit value for GWP-100 is over 2000 then the declared primary energy efficiency value of the Product shall be restricted to a maximum of 104%, independent of the actual established efficiency value.

For CO, hydrocarbons and particulates appropriate (dynamic) test methods shall be developed.

[3] Intergovernemental Panel on Climate Change

[4] Council Decision 2002/358/EC of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder.

3.2 Principal Parameters

The following principal parameters:

1) The Specific Efficiency, and
2) NOx rating (where applicable)

of a CH Boiler, Water Heater or CH Combi, shall be considered to be the maximum/minimum value to which all production of a model is expected to comply in accordance with the following table. Manufacturers shall be responsible for their own tolerances (production variances).

A maximum (minimum) value will only be considered to be incorrect (and the model will not comply in respect of that parameter) if:

- 1 model has been tested and the test result is more than [1] standard deviation more(less) than the declared maximum value. And then
- 3 models have been tested and the test result is more than [1] standard deviation (for a single test) more (less) than the declared maximum value.

The default standard deviation for a competent lab shall be as in the following table, unless there is good evidence that another value should apply. For example estimated values derived from

- test labs participation in recent round robin test,
- relevant EN standard covering this estimation,
- Other relevant sources.

Table of Standard Deviations

	Maximum	Minimum	Default Standard Deviation σ	Allowed production tolerance
The specific efficiency of a CH Boiler		✓	**2.5%**	
The specific efficiency of a Water Heater		✓	**4%**	
NOx rating	✓		**4%**	
Input values	✓	✓	**10%**	**10%**

3.3 Input Data

For the other *quantitative input* values declared in the information Fiche /Technical input sheet form (Data report CH-Boilers & Water Heaters from annex B1. general of Annex V) except that the value may be within 10% of the declared value (to allow for production tolerances).

A *logical value* (for example type of control, etc.) will only be considered to be incorrect (and the model will not comply in respect of that parameter) if:

- 1 model has been tested and found not to comply. And then
- 3 models have been tested and at least 1 has been found not to comply.

* * *

There shall be no need to test for all values to prove any individual value does not comply.

Annex II

Energy Labelling requirements (Directive 92/75)

1 Scope

In addition to the Ecodesign requirements set out in Annex I (in particular the information requirements), 'household' CH Boilers, Water Heaters and CH Combis shall be subject to an Energy Labelling Implementing Directive. Such products shall be considered household appliances unless both their CH boiler and Water heater size category is 2XL or above.

2 Structure of Implementing Directive

2.1 The Label (see attached illustration) shall include the following information:

1) Manufacturer
2) Model identification
3) Energy efficiency Rating
4) Function (CH Boiler, Water Heater or both for CH Combi)
5) Size category

2.2 The Fiche shall include the following information:

1) The label (with energy efficiency Rating)
2) The information Fiche /Technical input sheet form (Data report CH-Boilers & Water Heaters from annex B1. general of the Annex V)
3) NOx rating

2.3 Installers, mail order catalogues and internet sellers shall provide the fiche information with their offer.

Annex III

Installation Requirements (from 1/1/2013)
(To be included in (revised) EPBD)

1 For smaller CH boilers (up to XL)

Overall **specific efficiency** shall be at least 76%. Can be demonstrated by installation of CH boiler of appropriate size with at least the required rating**,** combined with check that other elements at least meet default requirements.

2 For larger CH Boilers (XXL and Above)

Overall specific efficiency shall be at least 96%. Can be demonstrated by

A Either

i installation of CH Boiler with at least the required rating**,** combined with check that

- CH-Boiler is of appropriate size for installation;
- 'defined' components not delivered with the package, are installed, and
- other system components at least meet default requirements;

or

ii EPBD assessment of heating system (for location, heat load etc.),

And

B Monitoring to demonstrate result to system owner, user, buyer and those responsible for paying the fuel bills)(data to be kept available for MS to check). (**to do** model to convert monitoring results into efficiency data.)

3 For Water Heaters

3.1 An "appropriate" size rating shall be defined for the installation.

The table shows possible ranges of demand for the size categories of Water Heaters

Table (illustrative)

Size Category	Range of 'Specified Demand' (Litres per day @ 60°C
XXS	Single point – not shower <20l
XS	Single point, including shower <50l
S	< 80l
M	35- 150
L	70 – 300
XL	120 - 500
XXL	150 - 650
3XL	280 - 15000
4XL	550 -

3.2 Then specific efficiency measured as if the water heater were of the "appropriate size" shall be at least at the level required for the Ecodesign minimum efficiency standard (i.e.

- C, for size classes XXS to S (classes DEF and G banned)
- B, for size classes M to 3XL (classes CDEF and G banned)
- A, for size class 4XL (classes BCDEF and G banned))

Furthermore, extra energy losses should be taken into account in case of

- centralized/ collective distribution (extra losses for distribution pipes outside the habitable (heated) volume
- centralized/ collective circulation systems (pump energy plus extra distribution losses)
- specific thermal disinfection components (e.g. ribbon heaters)

In general, this can be demonstrated by installation of a Water Heater whose product information fiche shows that it meets this requirement, or by an individual assessment of the installation. However, where applicable the extra energy losses mentioned above must be taken into account.

3.3 Exception

However, water heaters which under Annex I section 1.3 must carry a *warning* (size category S, and efficiency rating C, with a storage capacity of 20 l to 36 l) may only be installed with special permission from the local building authorities.

Note: such a permission could be truly ‘local’, e.g. a 'per site'/ individual assessment, or –as a transitory measure—based on regional or national (e.g. EPBD) regulation describing circumstances where these appliances may be allowed.

4 For CH-Combis

A CH-Combi shall be subject to the requirements of

- a CH boiler of it's CH boiler size class, and
- a Water Heater of it's Water Heater size class.

Annex IV

Comments - Recommendations

1. MS could consider introduction of subsidies, tax reductions etc. (Initially for class A products) At 20€/tCO² saved this might amount to 250€ for an A class M sized CH boiler. 'early replacement' schemes may be particularly useful, in particular in respect of boilers with cast iron heat exchangers.

MS could consider incentives (such as tax credits) for manufacturers introducing new highly efficient models.

2. Smaller CH boilers (up to XL)

Introduce Chimney measures along lines recommended in report. If this is not done, we would have to consider lower Ecodesign requirements for boilers up to size class S (limit on max input power of +- 10KW), but with installation requirements maintained except for exemption for buildings with chimney problems.

3. Larger CH Boilers (XXL and above)

Consider subsidies for replacement of inefficient systems and/or programme in (semi) public buildings.

4 Water Heaters

Some of the subsidies could target any installation problems for example for exhaust air heat pumps. (i.e. subsidies for installation work in 'difficult' situations).