



**EUROPEAN COMMISSION**  
 DIRECTORATE-GENERAL JRC  
 JOINT RESEARCH CENTRE  
 Institute for Prospective Technological Studies (Seville)  
**Sustainable Production and Consumption**

## **Workshop for the Development of Criteria under the European Commission Green Public Procurement Scheme for Hydronic Central Heating Generators**

**Brussels, 17<sup>th</sup> January 2012**  
**Albert Borschette Conference Centre (CCAB), room AB-2A**  
**Rue Froissart 36, 1040 Brussels, Belgium**

### **Agenda**

<b>1.</b>	<b>Opening and welcome – Tour de table</b>  Brief introduction to the project background and political objectives of Green Public Procurement	<b>09:30 – 10:00</b>
<b>2.</b>	<b>Scope and GPP criteria areas for hydronic central heating generators – general overview</b>	<b>10:00 – 10:45</b>
<b>3.</b>	<b>Common benchmark criteria:</b> <b>Criterion 1 – Minimum energy efficiency</b>	<b>10:45 – 11:30</b>
<b>Coffee break</b>		<b>11:30 – 11:45</b>
<b>4.</b>	<b>Common benchmark criteria:</b> <b>Criterion 2 – Greenhouse gas emissions limit</b>	<b>11:45 – 12:30</b>
<b>5.</b>	<b>Criterion 3 – Refrigerant and secondary refrigerant</b>	<b>12:30 – 13:00</b>
<b>Lunch break</b>		<b>13:00 – 14:30</b>
<b>6.</b>	<b>Criteria 4 and 5 – Other air emissions</b>	<b>14:30 – 15:15</b>
<b>7.</b>	<b>Criteria 6, 7 and 8 – Other air emissions and noise</b>	<b>15:15 – 16:00</b>
<b>Coffee break</b>		<b>16:00 – 16:15</b>
<b>8.</b>	<b>Criteria 9 and 10 – Hazardous substances</b> <b>Criteria 11 – Plastic parts</b>	<b>16:15 – 17:00</b>
<b>7.</b>	<b>Criterion 12 – Product design for sustainability</b> <b>Criterion 13 – Installation and user information</b>	<b>17:00 – 17:30</b>
<b>8.</b>	<b>Conclusions and close of the workshop</b>	<b>17:30 – 18:00</b>

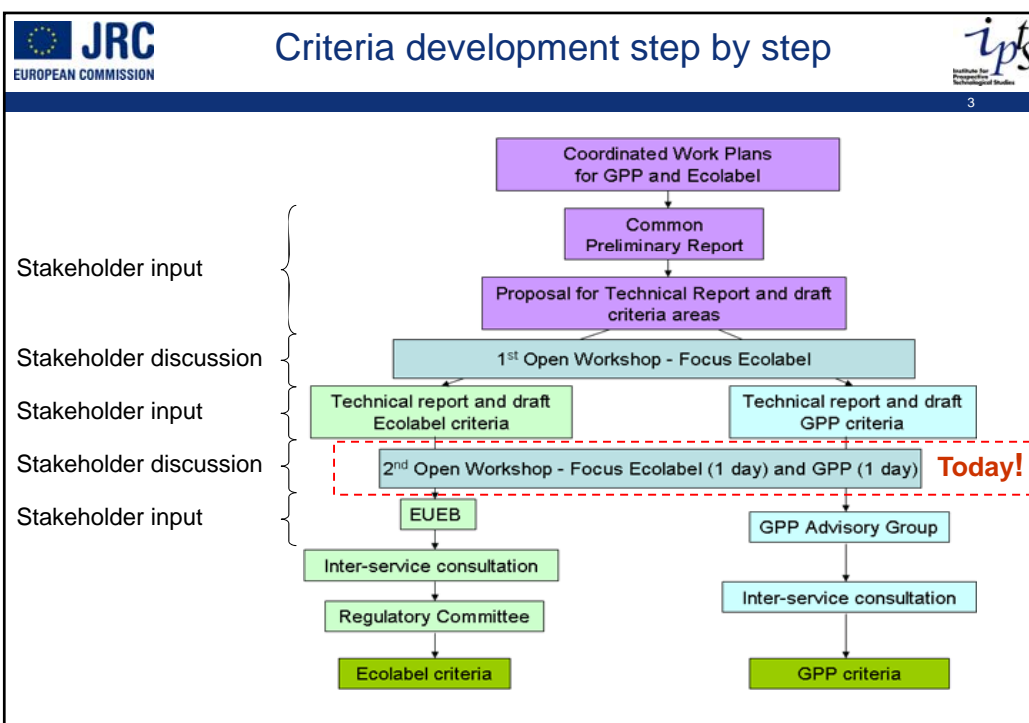
*Open Workshop on the  
Development of Green Public Procurement Criteria for  
**Hydronic Central Heating Generators***  
17<sup>th</sup> January 2012, Brussels



**EU Ecolabel and Green Public Procurement Criteria –  
Process Description**


European Commission  
Joint Research Centre (JRC)  
IPTS - Institute for Prospective Technological Studies

- Discuss GPP criteria one by one
- All issues might not be solved today!
- Final draft criteria based on today's discussion and written comments received after the meeting
- All documents published on the dedicated website:  
<http://susproc.jrc.ec.europa.eu/heating/>




- JRC** EUROPEAN COMMISSION **Timeline of criteria development for heating generators** *ipts*  
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- **Mid January 2011:** Deadline for stakeholder comments on EU Ecolabel criteria (Reminder)
  - **17<sup>th</sup> January 2012:** GPP workshop
  - **Mid February 2011:** Deadline for stakeholder comments on GPP criteria
  - **Spring 2012:** EU Ecolabel final draft criteria to be presented to EUEB
  - **End 2012:** Publication of EU Ecolabel and GPP criteria

Thank you for your attention



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## Joint Research Centre (JRC)


### Development of ecological criteria for Hydronic Central Heating Generators

### Scope and overview of criteria areas


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*Seville - Spain*

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## Content

- Green Public Procurement – approach
- Scope and product group definition
- Overview of criteria areas



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## Green Public Procurement – approach

- Voluntary instrument
- Types of criteria:
  - Core criteria – suitable for any contracting authority; address key environmental impacts
  - Comprehensive criteria – the best environmentally-performing products available on the market; may require added verification/cost
  - Award criteria – additional criteria on which the contracting authority will base decision; not pass/fail



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## Green Public Procurement – approach

- Market considerations
  - Public authorities spend 19% of EU GDP
  - Market dominated by gas boilers, followed by heat pumps and biomass boilers
- Cost considerations
  - Life-cycle cost analysis


## Scope and product group definition

The product group **“Hydronic Central Heating Generators”** shall comprise a group of products that are used to generate heat as part of a hydronic central heating system, where the heated water is distributed by means of circulators and heat emitters in order to reach and maintain the indoor temperature of an enclosed space such as a building, a dwelling, or a room, at a desired level. The operation of the heating generator can be based on a number of processes and technologies, such as:

- Combustion of gaseous or liquid fossil fuels
- Combustion of gaseous, liquid or solid biofuels
- Use of the Joule effect in electric resistance heating elements
- Capture of ambient heat from air, water or ground source, and/or waste heat
- Cogeneration (the simultaneous generation in one process of heat and electricity)
- Solar (auxiliary)
- Hybrid generators: certain combinations of the above




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- The maximum output power of the hydronic central heating generators shall be 400 kW
- Included in the scope are combination boilers (combi-boilers), provided that their primary function is to provide ambient heat
- Excluded from the scope of this product group are heating generators whose primary function is to provide sanitary hot water
- Although it is not explicitly stated in the definitions above, it may be that the circulator is an integral part of the heating generator. For larger heating generators the circulator is usually supplied separately, and therefore the circulator itself will be out of the scope



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## Overview of criteria areas







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	Type of GPP criteria	Gas/liquid fuel boiler	Biomass boiler	Gas-driven hydronic heat pump	Electrically-driven hydronic heat pump	Cogeneration
Min. energy eff.	Core Comprehensive	X	X	X	X	X
GHG emissions	Core Comprehensive	X	X	X	X	X
Refrigerant and sec. refrigerant	Core Comprehensive			X	X	
NOx emissions	Core Comprehensive	X	X	X		X
OGC emissions	Core Comprehensive		X			
CO emissions	Core Comprehensive	X	X	X		X
PM emissions	Core Comprehensive		X			X



 <b>JRC</b> EUROPEAN COMMISSION		<b>Overview of criteria areas</b>					 Institute for Prospective Technological Studies
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	Type of GPP criteria	Gas/liquid fuel boiler	Biomass boiler	Gas-driven hydronic heat pump	Electrically-driven hydronic heat pump	Cogeneration	
Sound power level	Award	X	X	X	X	X	
Hazardous substances and mixtures	Comprehensive	X	X	X	X	X	
Substances listed in accordance with Article 59(1) of Regulation (EC) 1907/2006	Comprehensive	X	X	X	X	X	
Plastic parts	Award	X	X	X	X	X	
Product design for sustainability	Award	X	X	X	X	X	
Installation and user information	Core Comprehensive	X	X	X	X	X	

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<h2>Updated life cycle analysis</h2> <ul style="list-style-type: none"> <li> <b>Aim of the technology analysis: To include a representative number of heating generator technologies. Number of base cases expanded to 12.</b> <ul style="list-style-type: none"> <li>Oil and gas boiler split into two base cases</li> <li>Added a hybrid boiler (gas boiler + electric heat pump)</li> <li>Added two more heat pumps</li> <li>Added a coal boiler</li> </ul> </li> <li> <b>If a specific heating generator is not included in the 12 base cases, it does not mean that it later cannot apply for a label</b> </li> </ul>		

## Updated life cycle analysis: 12 base cases

1. Oil boiler
2. Gas boiler
3. Gas hybrid: The gas boiler represents 50% of the total thermal demand (i.e., of the total heat output of the hybrid unit); the remaining 50% is an electric heat pump
4. Electrically-driven heat pump
5. Gas absorption heat pump
6. Gas ICE (internal combustion engine) heat pump
7. Coal boiler
8. Small/wood manual biomass boiler
9. Small/wood automatic biomass boiler
10. Small pellet biomass boiler
11. Large wood chips biomass boiler
12. Cogeneration

# Additional slides GPP Criteria Central Heating Heat Generators

17 January 2012

## GPP scenario's of share of sales

- According 'Ecolabel/GPP for buildings': 1% is non-residential
- According 'Lot 1': some 3-4% of boiler sales are non-residential (0,2-0,3 million)
- According background Energy Saving Action Plan: Some 12% of 'dwelling' floor space is non-residential
- According various sources: some 25-35% of workforce or tertiary buildings are for public administration

CHOICE: Three scenario's:

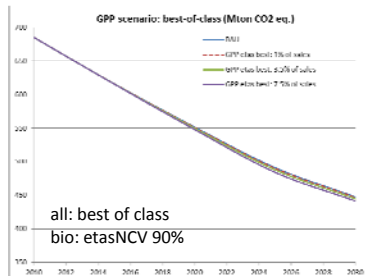
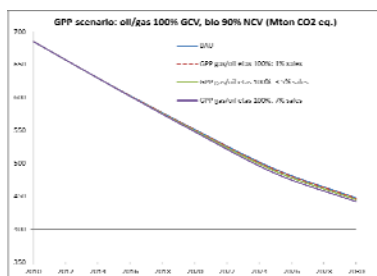
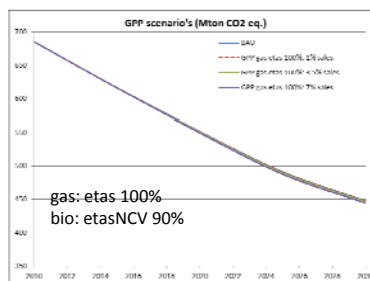
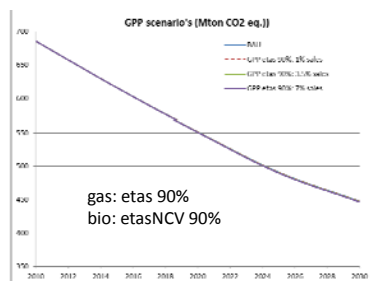
- Low: 1% of sales complies with GPP
- Middle: 3.5% of sales complies with GPP
- High: 7% of sales complies with GPP

Note: only applies to boilers not meeting minimum energy efficiency criterion mainly gas/oil/biomass), no change for heat pumps sales etc.

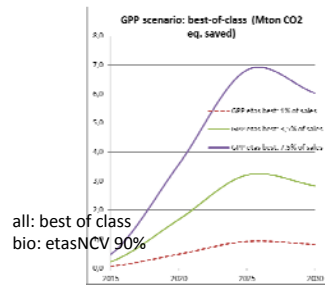
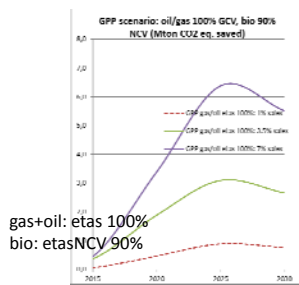
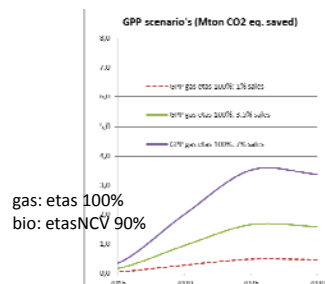
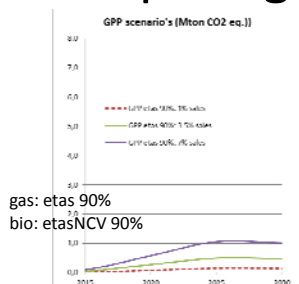
## Input values GPP scenario's

Efficiency NEW+GPP	"90% gas+bio"	"100% gas+bio"	"100% gas+oil+bio"	"best-of-class"
01_oil boiler	81%	81%	100%	100%
02_gas boiler	90%	100%	100%	100%
03_gas hybrid	122%	122%	122%	130%
04_elec.HP	140%	140%	140%	160% (SCOP 4,0)
05_gas abs. HP	140%	140%	140%	160%
06_gas ICE HP	140%	140%	140%	160%
07_coal boiler	64%	64%	64%	64%
08_small/wood manual	50%	50%	50%	70%
09_small/wood autom.	82%	82%	82%	82%
10_small/pellet	84%	84%	84%	84%
11_large/chips	75%	75%	75%	75%
12_cogeneration	67%	67%	67%	75% (incl 15% elec = 90%)



## Comparing GPP scenario's







# Comparing GPP scenario's

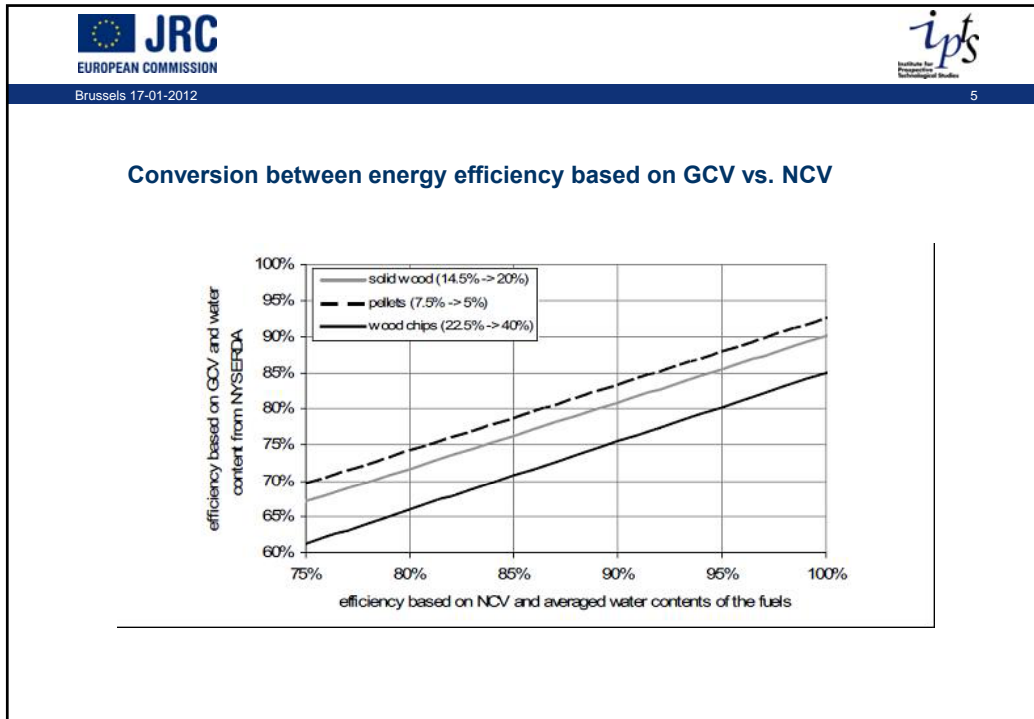


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Brussels 17-01-2012 <span style="float: right;">2</span>					
<h3>Criterion 1 – Minimum energy efficiency</h3>					
<h4><u>Formulation as core and comprehensive criterion:</u></h4>					
<p><b>The energy efficiency of the hydronic central heating generator shall at a minimum be 90%.</b></p>					
<table border="1"> <thead> <tr> <th data-bbox="407 1545 808 1619">Type of heating generator</th> <th data-bbox="813 1545 1230 1619">Minimum energy efficiency</th> </tr> </thead> <tbody> <tr> <td data-bbox="407 1625 808 1759">All types of hydronic central heating generators, regardless of technology</td> <td data-bbox="813 1625 1230 1759">90%</td> </tr> </tbody> </table>	Type of heating generator	Minimum energy efficiency	All types of hydronic central heating generators, regardless of technology	90%	
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<p><b>“Seasonal space heating energy efficiency” (<math>\eta_s</math>, "etas“)</b></p>	
<p>[To be used, except for biomass boilers]</p>	
<p>Defined as the ratio between the space heating demand pertaining to a designated heating season provided by a boiler, and the annual energy consumption required for its generation, expressed as percentage (energy consumption in primary energy units).</p>	
<p>According to the methodology developed in ED Lot 1, the "etas" shall be calculated as the seasonal steady-state space heating efficiency, corrected by contributions accounting for turndown ratio, temperature control, auxiliary electricity consumption, standby heat loss, ignition flame energy consumption, and in addition for cogeneration boilers the seasonal electric efficiency.</p>	

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<p><b>“Seasonal space heating energy efficiency” (<math>\eta_s</math>, "etas“)</b></p>	
<p>For heat pumps, the seasonal space heating efficiency (etas) is obtained through the seasonal coefficient of performance (SCOP) (and corrected by the primary energy factor 2.5 in order to convert to "etas"), and following the methodology developed in Ecodesign Lot 1 and described in the Draft Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for boilers.</p>	



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### Verification

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**Products holding a relevant Type 1 eco-label or that demonstrate compliance with relevant Type 1 eco-label criteria will be deemed to comply. Other appropriate means of proof will also be accepted.**



If following the EU Ecolabel for heating generators, the verification is as follows:

The applicant shall declare the product's compliance with the energy efficiency requirement and specify the minimum energy efficiency of at least 90% of the product submitted for labelling procedure together with the testing procedure indicated in respective EN standards or equivalent for the given kind of product.

For all types of heating generators – except for biomass boilers - the testing shall be conducted following the methodology of seasonal space heating efficiency of Ecodesign Lot 1 and the corresponding testing standard. For example, gas/liquid fuel boilers are tested at two loads, 100% and 30%; air-source heat pumps are tested at 6-8 points, and water-or brine-source heat pumps at 4-5 points.





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<p>A mean value of three energy efficiency measurements shall not exceed the respective minimum efficiency established by this criterion, irrespective of heating generator technology.</p> <p>The testing shall be performed by laboratories that meet the general requirements of EN ISO 17025 or equivalent.</p> <p>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</p>		



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<h3>EN standards for energy efficiency relevant for the product group "hydronic central heating generators"</h3>																										
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### Criteria related to energy efficiency – – Points for discussion

- Do you agree with the approach for core/comprehensive criteria and the proposed value of the minimum energy efficiency set at 90%, justified by the reasons given above (related to the market coverage and the estimated environmental improvement potential that such a benchmark will bring, and comparison with other ecolabels, GPP, and product policy schemes)?
- Which methods in the stakeholder's opinion can suit best for measuring the energy efficiency of a heating generator?
- For biomass boilers, should there be also an additional criterion on quality of the biomass fuel, which is a key factor influencing efficiency? Should it be added as a soft criterion (e.g. information to consumers)?

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<h2>Criterion 2 – Greenhouse gas emissions (GHG) limit</h2>	
<p><u>Formulation as core/comprehensive criterion:</u></p>	
<p>The applicant shall demonstrate that the greenhouse gas emissions, expressed in grams of CO<sub>2</sub> – equivalents per kWh of heating output calculated using the Total Equivalent Warming Impact (TEWI) formulas defined below, shall not exceed the value(s) established in this criterion. Two options are proposed for discussion.</p>	

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## Option 1


<b>Type of heating generator</b>	<b>Max. greenhouse gas emissions (g CO<sub>2</sub>-equivalents per kWh of heating output)</b>
All types of hydronic central heating generators, regardless of technology, except biomass boilers	220 g CO <sub>2</sub> -equivalents per kWh of heating output
<p><u>Notes:</u></p> <p>Results from the technical analysis indicate that all biomass boilers emit much lower GHG emissions and therefore a limit is not needed.</p>	


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## Option 2

<b>Type of heating generator</b>	<b>Max. greenhouse gas emissions (g CO<sub>2</sub>-equivalents per kWh of heating output)</b>
<u>Gas/liquid fuel</u> boiler and gas-driven hydronic heat pumps	220 g CO <sub>2</sub> -equivalents per kWh of heating output
Electrically-driven hydronic heat pump	180 g CO <sub>2</sub> -equivalents per kWh of heating output
Cogeneration	220 g CO <sub>2</sub> -equivalents per kWh of heating output
<p><u>Notes:</u></p> <p>Results from the technical analysis indicate that all biomass boilers emit much lower GHG emissions and therefore a limit is not needed.</p>	



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## TEWI formulas

$$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\beta_{\text{gas}}}{\eta_s}$$

$$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\beta_{\text{oil}}}{\eta_s}$$

$$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\beta_{\text{elec}}}{2.5 \eta_s} + \frac{\text{GWP}_{100} \cdot m \cdot (\text{ER} \cdot n + \alpha)}{P \cdot h \cdot n}$$


$$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\beta_{\text{gas}}}{\eta_s} + \frac{\text{GWP}_{100} \cdot m \cdot (\text{ER} \cdot n + \alpha)}{P \cdot h \cdot n}$$

**gas  
boilers**


**oil boilers**

**for electrically-  
driven heat  
pumps**

**for gas-driven  
heat pumps**



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## Parameters in TEWI formulas

Parameter	Description of parameter	Units	Constant value or test to be performed in order to obtain the parameter
$\beta_{\text{elec}}$	Carbon emissions of electricity	[g CO <sub>2</sub> -equiv./kWh <sub>elec</sub> .]	384
$\beta_{\text{gas}}$	Carbon emissions of gas	[g CO <sub>2</sub> -equiv./kWh <sub>gas</sub> .]	202
$\eta_s$	Seasonal space heating efficiency	[-]	To be tested and declared by the applicant (Criterion 1)
GWP <sub>100</sub>	Global warming potential (effect over 100 years)	[-]	According to Annex I of the F-gas regulation
m	Refrigerant mass	[g]	To be declared by the applicant

			
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<b>Parameters in TEWI formulas (cont.)</b>			
ER	Refrigerant loss per year	[%/yr]	A value of ER = 2.5%/yr shall be used.
n	Lifetime	[yr]	A value of n = 15 shall be used.
$\alpha$	Refrigerant loss at end of life (disposal loss)	[%]	A value of $\alpha$ = 5% shall be used.
P	Design load	[kW]	To be tested and declared by the applicant.
h	Full load operating hours	[h/yr]	2000

			
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<b>TEWI formulas (cont.)</b>			
$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\beta_{\text{gas}}}{\eta_{\text{thermal}}} + \frac{\eta_{\text{cogen}} * \beta_{\text{elec}}}{\eta_{\text{thermal}} * 2.5}$ <p style="text-align: center;"><b>for cogeneration units</b></p>			
<p><b>In the formula for cogeneration units, the <math>\eta_{\text{cogen}}</math> and <math>\eta_{\text{thermal}}</math> are obtained as:</b></p> <p><b>= etason - F(1-5)</b></p> <p><b>= F(6), where F(6) is a negative value</b></p>			

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## TEWI formulas (cont.)


$$\frac{\text{TEWI}}{\text{kWh heat output}} \left( \frac{\text{gCO}_2 - \text{equiv.}}{\text{kWh heat output}} \right) = \frac{\%gb * \beta_{\text{gas}}}{\eta_{\text{gb}}} + \frac{(1 - \%gb) * \beta_{\text{elec}}}{\eta_{\text{hp}} * 2.5} + \text{GHG}_{\text{direct}}$$


**for hybrid units**

**In the formula for cogeneration units, the  $\eta_{\text{cogen}}$  and  $\eta_{\text{thermal}}$  are obtained as:**

**= etason - F(1-5)**

**= F(6), where F(6) is a negative value**



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## Parameters in TEWI formulas (cont.)

Parameter	Description of parameter	Units	Constant value or test to be performed in order to obtain the parameter
%gb	The share of gas boiler of the total heat output (fraction with no units)	[-]	Declared by the applicant
$\beta_{\text{elec}}$	Carbon emissions of electricity, corresponding to the electrically-driven heat pump part	[g CO <sub>2</sub> -equiv./kWh <sub>elec</sub> ]	384
$\beta_{\text{gas}}$	Carbon emissions of gas, corresponding to the gas boiler part	[g CO <sub>2</sub> -equiv./kWh <sub>gas</sub> ]	202

			
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<b>Parameters in TEWI formulas (cont.)</b>			
$\eta_{gb}$	Seasonal space heating efficiency of the gas boiler part for the typical operating conditions (outside temperature below +3°C)	[-]	To be tested and declared by the applicant (Criterion 1)
$\eta_{hp}$	Seasonal space heating efficiency (in primary energy, hence the correction by 2.5 to secondary) of the heat pump part for the typical operating conditions (outside temperature above +3°C)	[-]	To be tested and declared by the applicant (Criterion 1)
$GHG_{direct}$	Contribution of direct emissions (annual plus end-of-life refrigerant leakage) from the heat pump part	[kg.CO <sub>2</sub> eq./kWh heat output]	According to Annex I of the F-gas regulation

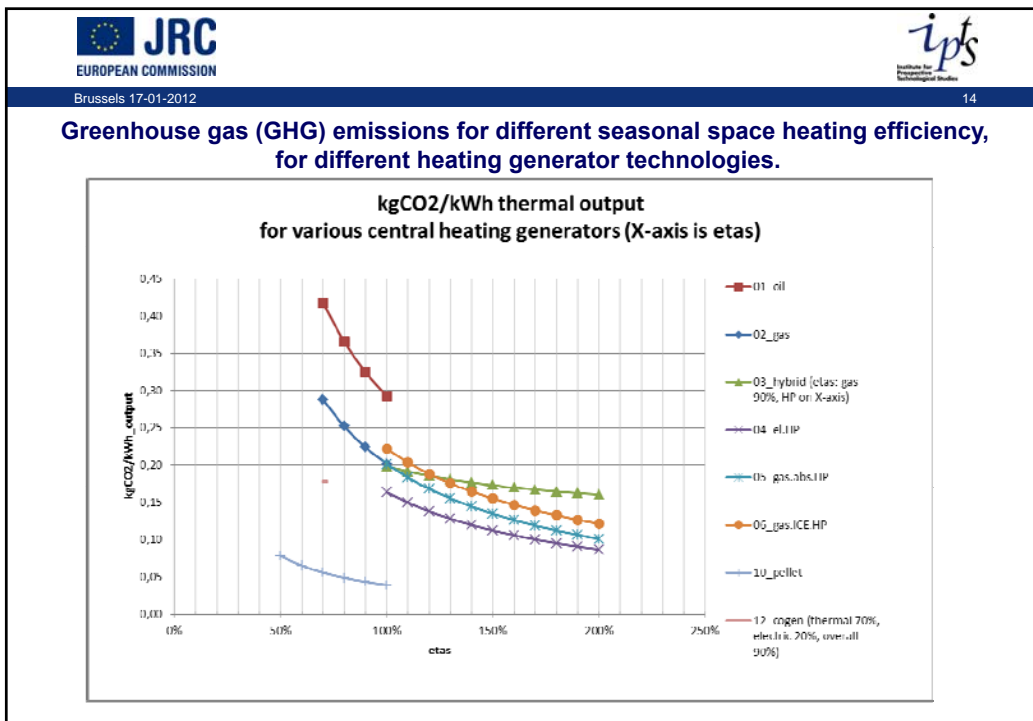
			
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<b>Verification</b>			
<p>The applicant shall provide the calculated GHG emissions following the proposed TEWI formulas above. A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</p>			



**Verification**

The applicant's statement shall include the following information:

- Type of refrigerant and its global warming potential value,  $GWP_{100}$ .
- Nominal filling quantity of the refrigerant, grams.
- Calculation of grams of  $CO_2$ -equivalent in grams/kWh of heat output, following the TEWI formulas provided.
- Calculation and verification data with respect to the seasonal space heating efficiency, as provided in Criterion 1.



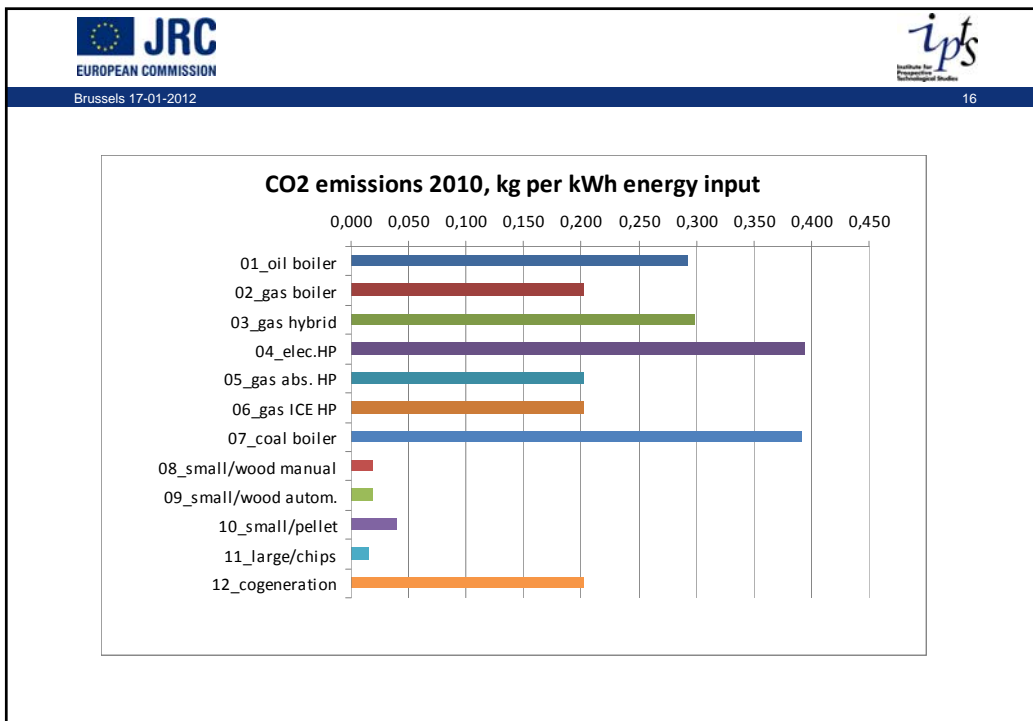
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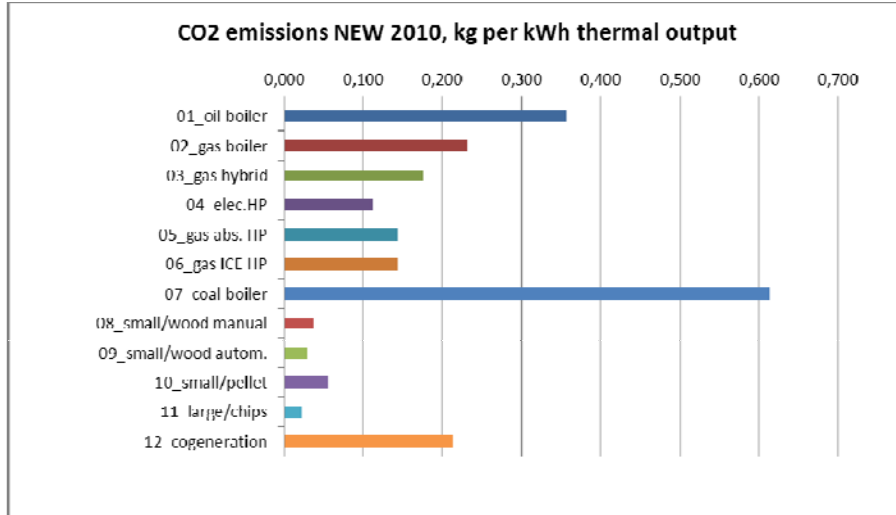
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### Criteria related to GHG emissions – – Points for discussion



- Do you agree with the proposed limit for greenhouse gas emissions as core/comprehensive, calculated following the TEWI approach, similar to the methodology developed by the Blauer Engel label?
- Do you have comments regarding the suitability of the assumed leakage rates for the refrigerant (annual and end-of-life)?
- What option is preferable (Option 1 or 2)?









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Brussels 17-01-2012 <span style="float: right;">1</span>	
<h2 style="text-align: center;">Joint Research Centre (JRC)</h2>	
<h3>Development of ecological criteria for Hydronic Central Heating Generators</h3>	
<h3>Additional criteria – Refrigerant</h3>	
<h3>IPTS - Institute for Prospective Technological Studies</h3>	
<p><i>Seville - Spain</i></p>	
<p><a href="http://ipts.jrc.ec.europa.eu/">http://ipts.jrc.ec.europa.eu/</a></p>	
<p><a href="http://www.jrc.ec.europa.eu/">http://www.jrc.ec.europa.eu/</a></p>	

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Brussels 17-01-2012 <span style="float: right;">2</span>	
<h3 style="text-align: center;">Criterion 3 – Refrigerant and secondary refrigerant</h3>	
<h4><u>Formulation as core/comprehensive criterion:</u></h4>	
<h4><u>Refrigerant</u></h4>	
<p>The global warming potential (GWP<sub>100</sub>) of the refrigerant shall not exceed a GWP<sub>100</sub> value of 2000 over a 100 year period.</p>	
<h4>Notes:</h4>	
<ul style="list-style-type: none"> <li>•Global warming potential (GWP<sub>100</sub>) means the measure of how much 1 kg of the refrigerant applied in the vapour compression cycle is estimated to contribute to global warming, expressed in kg CO<sub>2</sub> equivalents over a 100 year time horizon.</li> </ul>	
<ul style="list-style-type: none"> <li>•GWP<sub>100</sub> values considered will be those set out in Annex I of Regulation (EC) No 842/2006 of the European Parliament and the Council</li> </ul>	

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<h3>Criterion 3 – Refrigerant and secondary refrigerant (cont.)</h3>	
<p><b><u>Secondary refrigerant</u></b></p>	
<p>(Note: Not applicable to all types of heat pumps within this product group)</p>	
<p>The secondary refrigerant, brine or additives must not be substances classified as environmentally hazardous or constituting a health hazard as defined by Council Directive 67/548/EEC concerning environmental hazard and its subsequent amendments.</p>	

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<h3>Assessment and verification</h3>	
<p>The names of refrigerant(s) used in the product shall be submitted with the application, along with their GWP<sub>100</sub> values according to the Regulation above. The GWP<sub>100</sub> values of refrigerants shall be calculated in terms of the 100-year warming potential of one kilogram of a gas relative to one kilogram of CO<sub>2</sub>.</p>	
<p>The GWP<sub>100</sub> values for the refrigerants shall be taken from the following sources:</p>	
<ul style="list-style-type: none"> <li>•GWP values considered will be those set out in Annex 1 of Regulation (EC) No 842/2006 of the European Parliament and of the Council</li> </ul>	


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- For fluorinated refrigerants, the GWP values shall be those published in the third assessment report (TAR) adopted by the Intergovernmental Panel on Climate Change (2001 IPCC GWP values for a 100 year period).
- For non-fluorinated gases, the GWP values are those published in the First IPCC assessment over a 100 year period.
- For refrigerants not included in the above references, the IPCC UNEP 2010 report on Refrigeration, Air Conditioning and Heat Pumps, dated February 2011, or newer, shall be used as a reference.
- GWP<sub>100</sub> values for mixtures of refrigerants shall be based on the formula stated in Annex I of the Regulation 842/2006.

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## Verification

- For fluorinated refrigerants, the GWP values shall be those published in the third assessment report (TAR) adopted by the Intergovernmental Panel on Climate Change (2001 IPCC GWP values for a 100 year period).
- For non-fluorinated gases, the GWP values are those published in the First IPCC assessment over a 100 year period.
- For refrigerants not included in the above references, the IPCC UNEP 2010 report on Refrigeration, Air Conditioning and Heat Pumps, dated February 2011, or newer, shall be used as a reference.
- GWP<sub>100</sub> values for mixtures of refrigerants shall be based on the formula stated in Annex I of the Regulation 842/2006.

### **Criteria related to refrigerants – – Points for discussion**

- Do you agree with introducing the core/comprehensive GPP criterion setting a limit for  $\text{GWP}_{100}$  of 2000 for the refrigerant in the heat pump?



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## Joint Research Centre (JRC)


### Development of ecological criteria for Hydronic Central Heating Generators

#### Additional criteria areas – Other air emissions (Part I)


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## Criterion 4 – Nitrogen oxides (NOx) emissions limit

Formulation as core/comprehensive criterion:

The content of nitrogen oxides (NOx) in the exhaust gas must not exceed the limit values indicated in the following table, for each of the heating technologies. The units shall be given in mg/kWh of energy input or in mg/m<sub>N</sub><sup>3</sup>.



 	
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<b>Criterion on nitrogen oxides (NOx) emissions limit.</b>	
Heating generator technology	NOx emissions
Gas/liquid fuel boiler	45 mg/kWh of heat input
Biomass boiler	Pellet/wood-log boilers: 150 mg/m <sub>N</sub> <sup>3</sup> Wood chip boilers: 190 mg/m <sub>N</sub> <sup>3</sup>
Gas-driven hydronic heat pump	110 mg/kWh of heat input
Sorption (absorption and adsorption) hydronic heat pump	45 mg/kWh of heat input
Electrically-driven hydronic heat pump	No limit
Cogeneration	120 mg/kWh (gas) 500 mg/kWh (liquid; internal combustion or Stirling)

 	
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<b>Verification</b>	
<p>Products holding a relevant Type I eco-label or that demonstrate compliance with relevant Type I eco-label criteria will be deemed to comply. Other appropriate means of proof will also be accepted.</p>	
<p>If following the EU Ecolabel for heating generators, the verification is as follows:</p>	
<p>The NOx emission data – related to dry exhaust gas – are to be determined as standard emission factors according to the international standards included in the following Table.</p>	
<p>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</p>	



Number	Title
<b>Gas boilers</b>	
FprEN 15502-1: July 2010	Gas-fired heating boilers – Part 1: General requirements and tests (CEN) §8.13. NOx (classification, test and calculation methods)
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking
<b>Gas-driven heat pumps</b>	
prEN 12309 – 2: 2000	Gas-fired absorption and adsorption air-conditioning and/or heat pump appliances with a net heat input not exceeding 70 kW
DIN 4702, Part 8	Central heating boiler; determination of the standard efficiency and the standard emissivity
<b>Electrically-driven heat pumps</b>	
prEN 14825: June 2010	Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance.
EN 14511: 2007	Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling.
<b>Cogeneration</b>	
prEN 50465: 2010 Draft ed. 2.	Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW (CEN)



Number	Title
<b>Gas boilers</b>	
FprEN 15502-1: July 2010	Gas-fired heating boilers – Part 1: General requirements and tests (CEN) §8.13. NOx (classification, test and calculation methods)
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking
<b>Gas-driven heat pumps</b>	
prEN 12309 – 2: 2000	Gas-fired absorption and adsorption air-conditioning and/or heat pump appliances with a net heat input not exceeding 70 kW
DIN 4702, Part 8	Central heating boiler; determination of the standard efficiency and the standard emissivity
<b>Electrically-driven heat pumps</b>	
prEN 14825: June 2010	Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance.
EN 14511: 2007	Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling.
<b>Cogeneration</b>	
prEN 50465: 2010 Draft ed. 2.	Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW (CEN)


## Criterion 5 – Organic carbon (OGC) emissions limit


### Formulation as core/comprehensive criterion:

The organic substance content of the exhaust gas given as total organic carbon (OGC) must not exceed the limit values indicated in the following table (this air emissions parameter is only applicable to biomass boilers). The unit of measurement is mg/m<sup>3</sup> of dry gas at 10% O<sub>2</sub> at normal conditions (1 atm, 0 °C).

 	
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<b>Table. Criterion on organic carbon (OGC) emissions limit</b>	
<b>Heating generator technology</b>	<b>Organic carbon (OGC) emissions (mg/m<sup>3</sup>, or mg/kWh)</b>
Biomass boilers	5 mg/m <sub>N</sub> <sup>3</sup> (10% O <sub>2</sub> )

 	
EUROPEAN COMMISSION <span style="float: right;">8</span>	
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<b>Verification</b>	
<p>Products holding a relevant Type I eco-label or that demonstrate compliance with relevant Type I eco-label criteria will be deemed to comply. Other appropriate means of proof will also be accepted.</p>	
<p>If following the EU Ecolabel for heating generators, the verification is as follows:</p>	
<p>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</p>	
<p>The verification will be done following the standard specified in the following table, <u>or equivalent</u>.</p>	


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**EN-standard for organic carbon (OGC) emissions relevant for the product group “hydronic central heating generators”.**

Number	Title
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking

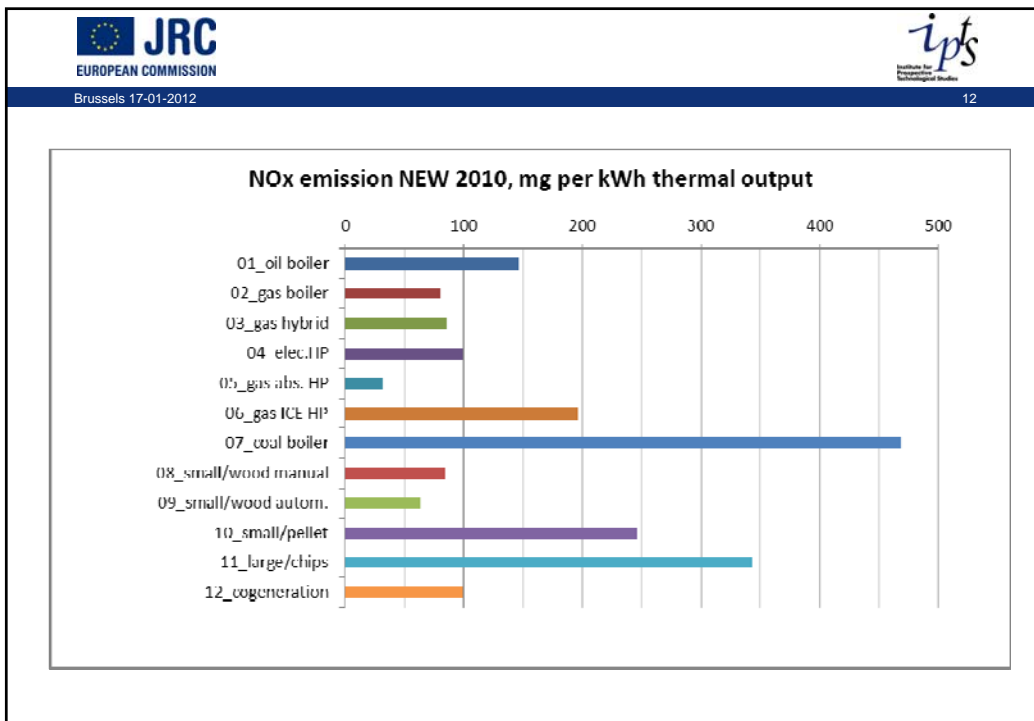
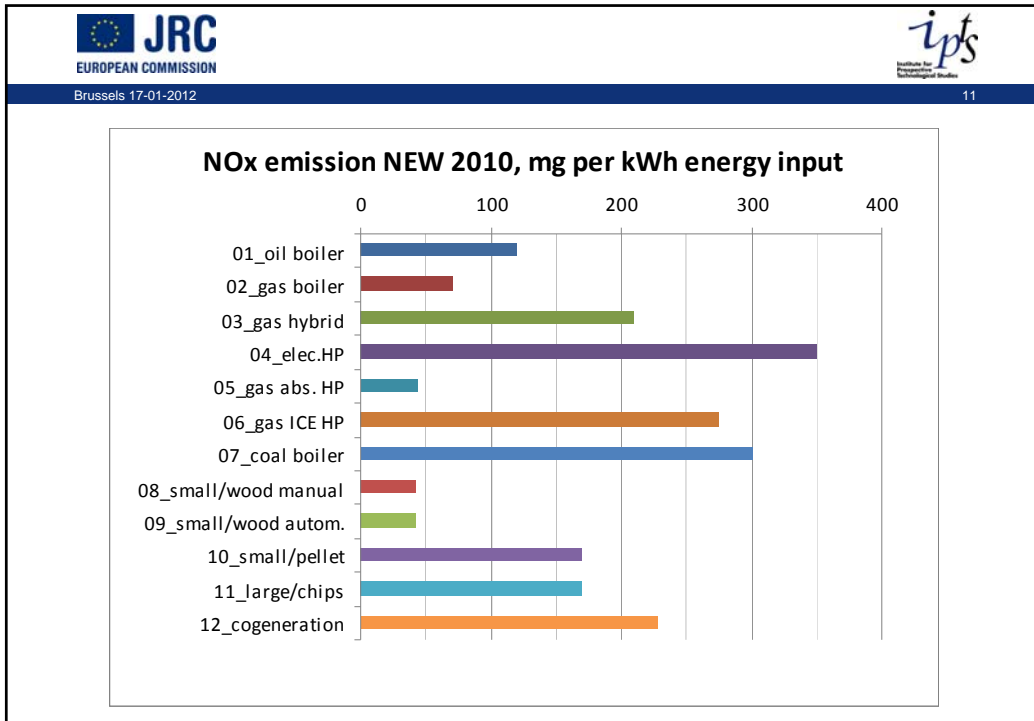
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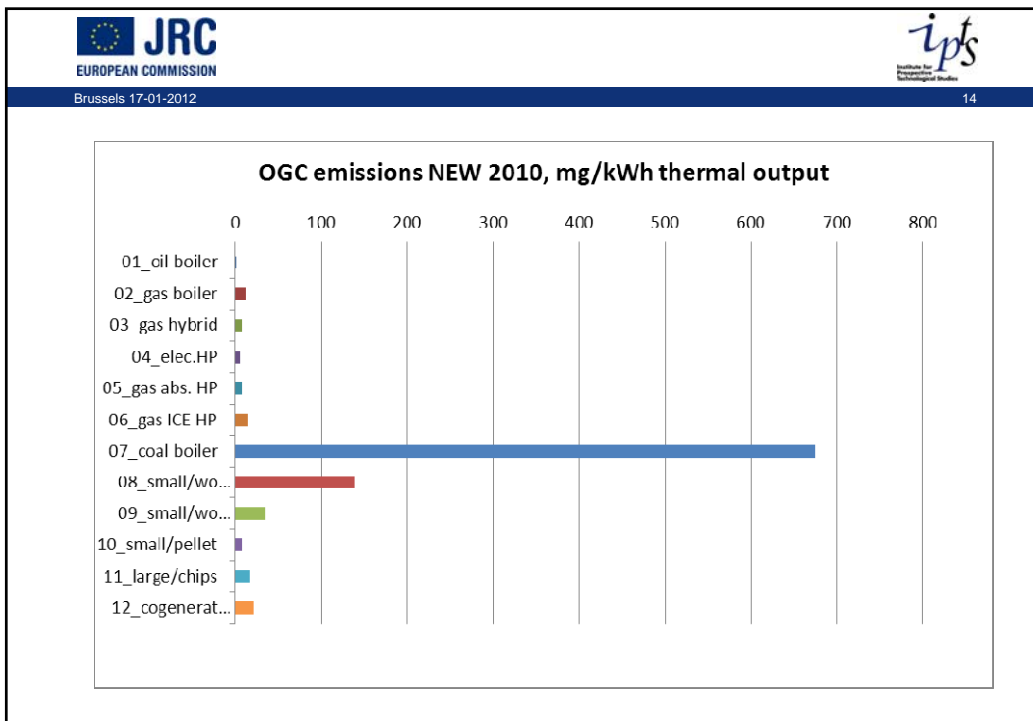
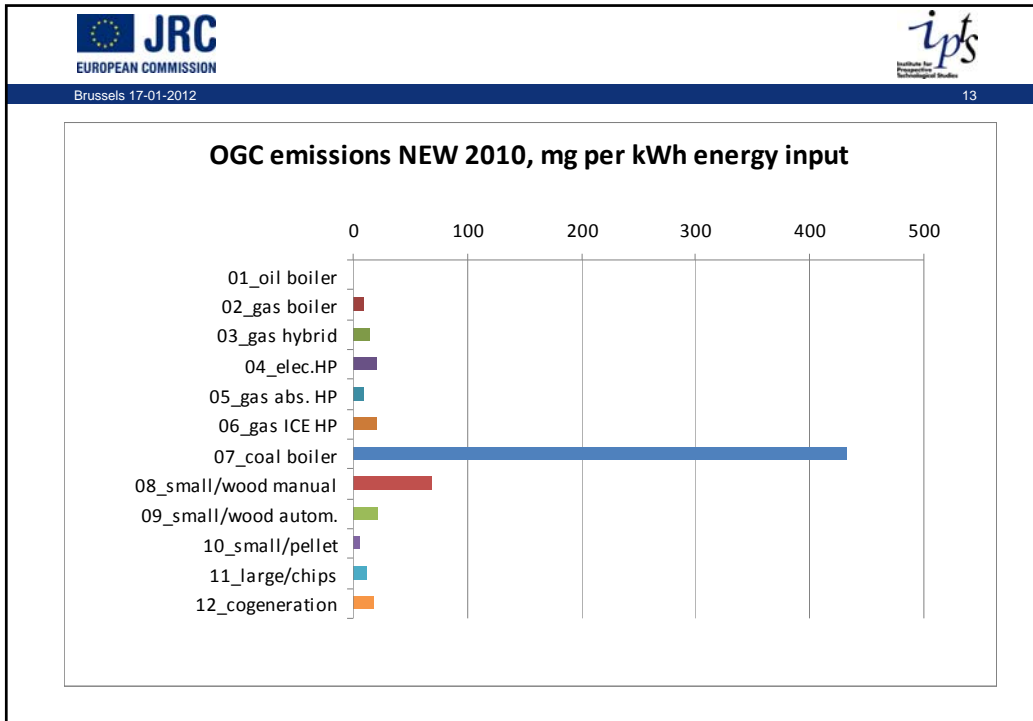
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**Criteria related to air pollution emissions  
– Points for discussion**

- Which methods can suit best for measuring air pollution emissions?
- Is it necessary to conduct testing by a third party (accredited laboratory) or should the compliance with the Ecolabel requirement should be confirmed by a producer's 'Declaration of Compliance' supported by results of tests conducted within a company?








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## Joint Research Centre (JRC)





### Development of ecological criteria for Hydronic Central Heating Generators

#### Additional criteria areas – Other air emissions (Part II) and noise

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## Criterion 6 – Carbon monoxide (CO) emissions limit



Formulation as core/comprehensive criterion:



The carbon monoxide (CO) content in the exhaust gas must not exceed the values indicated in the following table. The units shall be given in mg/kWh of energy input or in mg/m<sub>N</sub><sup>3</sup>.



 	
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<b>Criterion on carbon monoxide (CO) emissions limit</b>	
Heating generator technology	CO emissions
Gas/liquid fuel boiler	25 mg/kWh
Biomass boiler	200 mg/m <sup>3</sup> (13% O <sub>2</sub> )
Gas-driven hydronic heat pump	No limit
Sorption (absorption and adsorption) hydronic heat pump	25 mg/kWh (gas)
Electrically-driven hydronic heat pump	No limit
Cogeneration	100 mg/m <sup>3</sup> (5% O <sub>2</sub> ) (Internal combustion engine, gas) 200 mg/m <sup>3</sup> (5% O <sub>2</sub> ) (Internal combustion engine, liq)



 	
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<b>Verification</b>	
<p><b>Products holding a relevant Type I eco-label or that demonstrate compliance with relevant Type I eco-label criteria will be deemed to comply. Other appropriate means of proof will also be accepted.</b></p>	
<p><b>If following the EU Ecolabel for heating generators, the verification is as follows:</b></p>	
<p><b>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</b></p>	
<p><b>The verification will be done following the standard specified in the following <u>table or equivalent</u>.</b></p>	



 	
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<b>EN-standards for carbon monoxide (CO) emissions relevant for the product group "hydronic central heating generators".</b>	
<b>Number</b>	<b>Title</b>
<b>Gas boilers</b>	
FprEN 15502-1: July 2010	Gas-fired heating boilers – Part 1: General requirements and tests (CEN)
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking

 	
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Brussels 17-01-2012 <span style="float: right;">6</span>	
<b>Criterion 7 – Particulate matter (PM) emissions limit</b>	
<b><u>Formulation as core/comprehensive criterion:</u></b>	
<b>The particle matter (PM) content in the exhaust gas must not exceed the values indicated in the following table. The units shall be given mg/m<sub>N</sub><sup>3</sup>.</b>	

 	
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<b>Criterion on particulate matter (PM) emissions limit</b>	
Heating generator technology	Particle matter (PM)
Gas/liquid fuel boiler	No limit
Biomass boiler	20 mg/m <sub>N</sub> <sup>3</sup> (13% O <sub>2</sub> ) (pellet and wood log boilers)
	30 mg/m <sub>N</sub> <sup>3</sup> (13% O <sub>2</sub> ) (wood chips boilers)
Gas-driven hydronic heat pump	No limit
Electrically-driven hydronic heat pump	No limit
Cogeneration	1 mg/m <sub>N</sub> <sup>3</sup> (5% O <sub>2</sub> ) for internal combustion engines using liquid fuels

 	
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<b>Verification</b>	
<p>Products holding a relevant Type I eco-label or that demonstrate compliance with relevant Type I eco-label criteria will be deemed to comply. Other appropriate means of proof will also be accepted.</p>	
<p>If following the EU Ecolabel for heating generators, the verification is as follows:</p>	
<p>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.</p>	
<p>The assessment and verification will be done following the standard specified in the following table, <u>or equivalent</u>.</p>	

Number	Title
<b>Gas boilers</b>	
FprEN 15502-1: July 2010	Gas-fired heating boilers – Part 1: General requirements and tests (CEN)
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking
<b>Gas-driven heat pumps</b>	
prEN 12309 – 2: 2000	Gas-fired absorption and adsorption air-conditioning and/or heat pump appliances with a net heat input not exceeding 70 kW
<b>Cogeneration</b>	
prEN 50465: 2010 Draft ed. 2.	Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW (CEN)

Number	Title
<b>Gas boilers</b>	
FprEN 15502-1: July 2010	Gas-fired heating boilers – Part 1: General requirements and tests (CEN)
<b>Biomass boilers</b>	
EN 303-5	Heating boilers - Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW - Terminology, requirements, testing and marking
<b>Gas-driven heat pumps</b>	
prEN 12309 – 2: 2000	Gas-fired absorption and adsorption air-conditioning and/or heat pump appliances with a net heat input not exceeding 70 kW
<b>Cogeneration</b>	
prEN 50465: 2010 Draft ed. 2.	Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW (CEN)



## Criterion 8 – Sound power level



### Formulation as award:



**Additional points will be awarded for:**



**Declaration of sound power level. The tenderer should declare the sound power level of the heating generator unit. The sound power level shall be tested and stated in dB(A).**

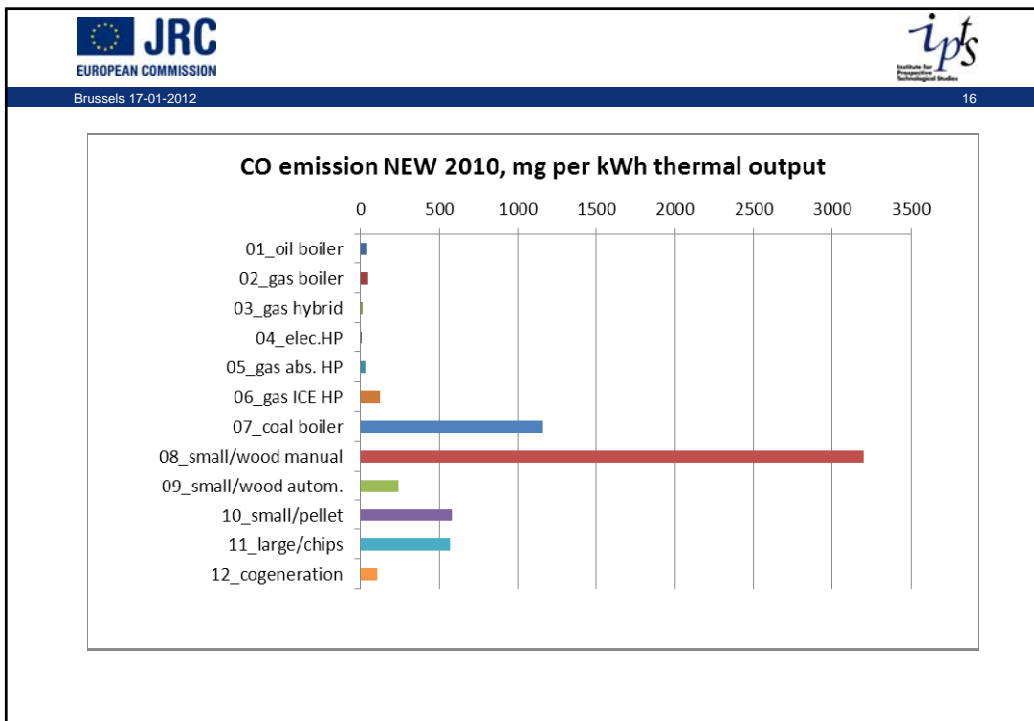
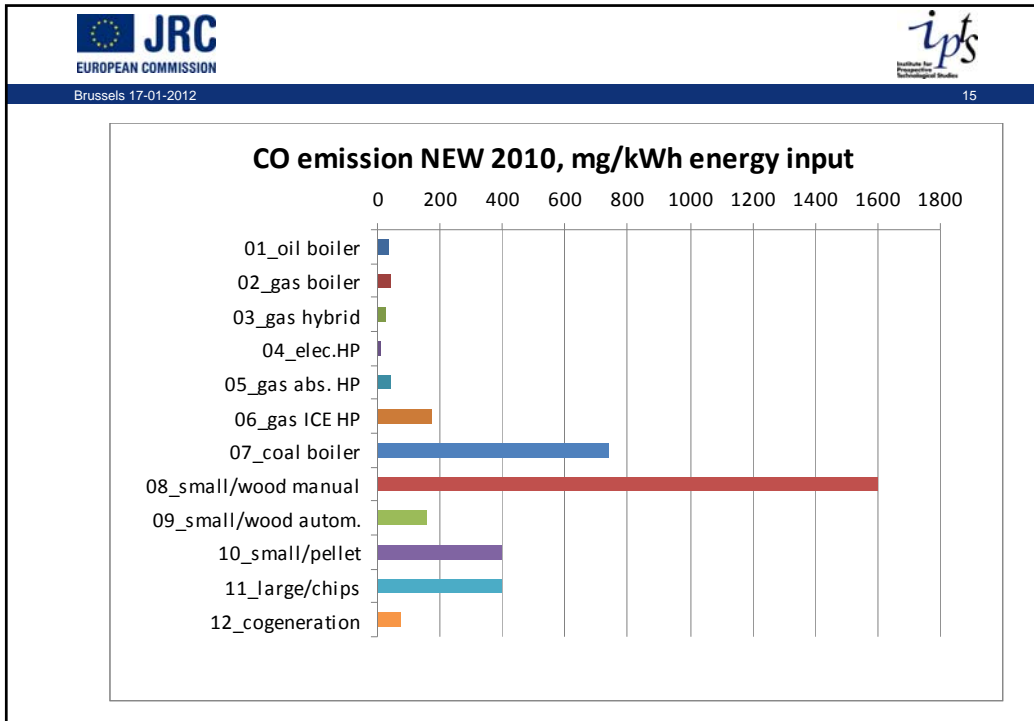
**Additional points will be awarded if the sound power level is below limits established by the following formulas.**

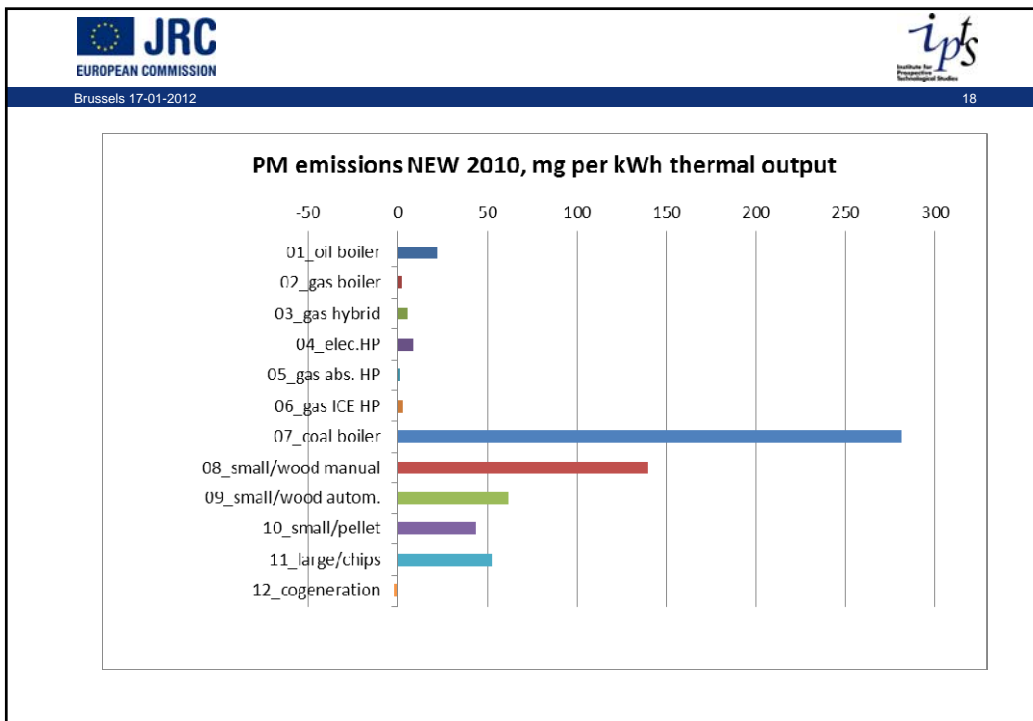
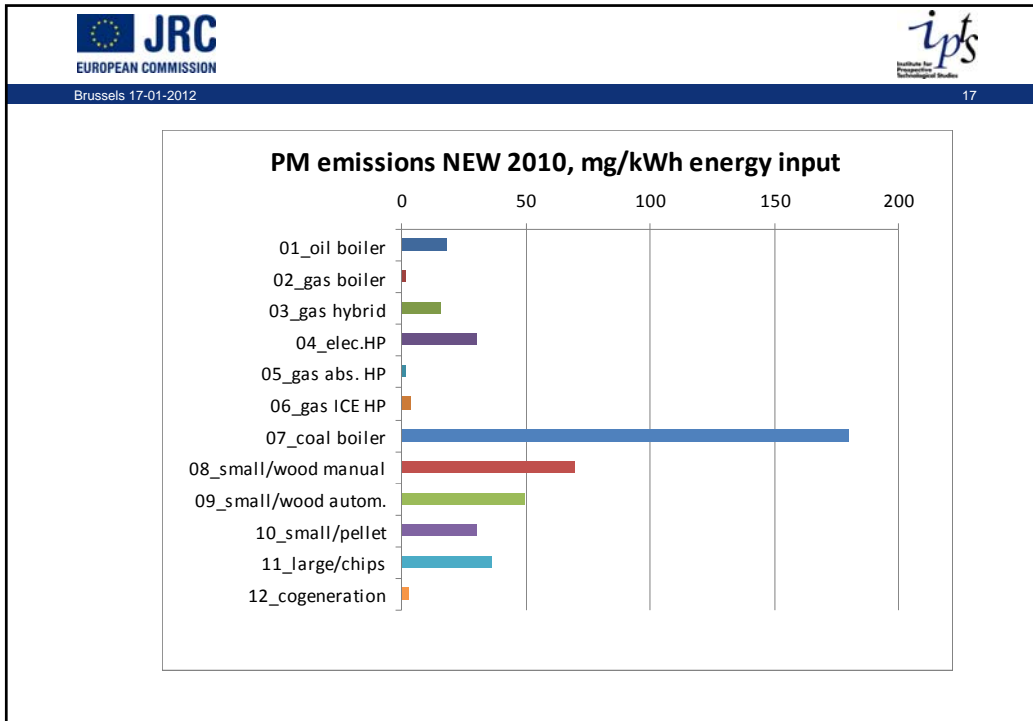
 	
Brussels 17-01-2012 <span style="float: right;">11</span>	
<b>Formulas for sound power level</b>	
Heating generator technology	Sound power level, in dB(A)
Air-to-water heat pumps	Sound power level: $L_{WA,d} \leq 17 + 36 * \lg (P_N + 10) \text{ dB(A)}$ $P_N$ is the design load  <u>Note:</u> This formula allows also larger heat pumps to comply with these limits.
Cogeneration	Sound power level: $L_{pAd,lim} \leq [25 + 20 * \lg (P_{el} + 15)] \text{ dB(A)}$ $L_{pCd} \leq L_{pAd,lim} + 20 \text{ dB(C)}$

 	
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<b>Implementation note</b>	
<p><b><u>Award criteria:</u></b> Contracting authorities will have to indicate in the contract notice and tender documents how many additional points will be awarded for each award criterion. Environmental award criteria should, altogether, account for at least 10 to 15% of the total points available.</p> <p>Where the award criterion is formulated in terms of “better performance as compared to the minimum requirements included in the technical specifications”, points will be awarded in proportion to the improved performance.</p>	



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<h3>Verification</h3>	
<p><b>A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted as part of the tender <del>to the awarding competent body</del>, together with the relevant documentation.</b></p>	
<p><b>Testing shall be performed in accordance with EN 12102 <u>or equivalent</u>. The test report shall be submitted with the application.</b></p>	

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<h3>Criteria related to sound power level – Points for discussion</h3>	
<ul style="list-style-type: none"><li>▪ We would like to invite the stakeholders to comment if they consider the issue of sound power level an appropriate criteria area for award points.</li><li>▪ Given the scarce data on sound power level, is it reasonable to require only reporting of the sound power level as the GPP criterion, without the requirement to comply with a maximum quantitative value?</li></ul>	







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<h2>Joint Research Centre (JRC)</h2>	
<h3>Additional criteria areas - Criteria related to materials</h3>	
<h3>IPTS - Institute for Prospective Technological Studies</h3> <p><i>Seville - Spain</i></p> <p><a href="http://ipts.jrc.ec.europa.eu/">http://ipts.jrc.ec.europa.eu/</a> <a href="http://www.jrc.ec.europa.eu/">http://www.jrc.ec.europa.eu/</a></p>	

 EUROPEAN COMMISSION	 Institute for Prospective Technological Studies
Brussels 17-01-2012	
<h2>Criterion 9 – Hazardous substances and mixtures</h2>	
<p><u>Formulation as comprehensive criterion</u></p> <p>In accordance with Article 6(6) of Regulation (EC) No 66/2010, the product or any article of it shall not contain substances referred to in Article 57 of Regulation (EC) No 1907/2006 nor substances or mixtures meeting the criteria for classification in the following hazard classes or categories in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council</p> <p>[List of hazard statements and risk phrases]</p>	





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**The use of substances or mixtures in the final product which upon processing change their properties in a way that the identified hazard no longer applies is exempted from the above requirement.**

**Concentration limits for substances or mixtures meeting the criterion for classification in the hazard classes or categories listed in the table above, and for substances meeting the criterion of Article 57 (a), (b) or (c) of Regulation (EC) No 1907/2006, shall not exceed the generic or specific concentration limits determined in accordance with the Article 10 of Regulation (EC) No1272/2008. Where specific concentration limits are determined, they shall prevail against the generic ones.**



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**Concentration limits for substances meeting criteria of Article 57 (d), (e) or (f) of Regulation (EC) No 1907/2006 shall not exceed 0.1 % weight by weight.**



**Derogations: The following substances or mixtures are specifically exempted from this requirement:**



Articles with weight below 50 g	All hazard statements and risk phrases
Homogeneous parts of complex articles with weight below 50 g	All hazard statements and risk phrases
Nickel in stainless steel	All hazard statements and risk phrases



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<h3>Verification</h3>	
<p>For each article and/or homogeneous part of complex articles with weight over 50 g the applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the suppliers of substances and copies of relevant Safety Data Sheets in accordance with Annex II to Regulation (EC) No 1907/2006 for substances or mixtures. Concentration limits shall be specified in the Safety Data Sheets in accordance with Article 31 of Regulation (EC) No 1907/2006 for substances and mixtures.</p>	



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<h3>Criterion on hazardous substances and mixtures – Points for discussion</h3>	
<p>The approach of addressing hazardous substances and mixtures by referring to general hazard statements and risk phrases derives from the Ecolabel Regulation.</p>	
<p>We welcome comments regarding possible derogations of the mentioned or additional substances.</p>	

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<b>Criterion 10 – Substances listed in accordance with Article 59(1) of Regulation (EC) 1907/2006</b>	
<p>No derogation from the exclusion in Article 6(6) may be given concerning substances identified as substances of very high concern and included in the list foreseen in Article 59 of Regulation (EC) No 1907/2006, present in mixtures, in an article or in any homogenous part of a complex article in concentrations higher than 0.1% w/w. Specific concentration limits determined in accordance with Article 10 of Regulation (EC) No1272/2008 shall apply in case it is lower than 0,1% w/w.</p>	

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<b>Assessment and verification</b>	
<p>The list of substances identified as substances of very high concern and included in the candidate list in accordance with Article 59 of Regulation (EC) No 1907/2006 can be found here:</p> <p><a href="http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp">http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp</a></p> <p>Reference to the list shall be made on the date of application.</p> <p>The applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the suppliers of substances and copies of relevant Safety Data Sheets in accordance with Annex II to Regulation (EC) No 1907/2006 for substances or mixtures. Concentration limits shall be specified in the Safety Data Sheets in accordance with Article 31 of Regulation (EC) No 1907/2006 for substances and mixtures.</p>	

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<b>Criterion 11 – Plastic parts</b>	
<p>a) If any plasticiser substance in the manufacturing process is applied, it must comply with the requirements on hazardous substances set out in Criteria 9 and 10.</p> <p>b) Plastic parts of articles or homogeneous parts of complex articles with weight 50 g or more shall not contain a chlorine content greater than 50 % by weight.</p> <p>c) Plastic parts with weight 50 g or more shall be labelled according to ISO 11469, in order to facilitate recycling.</p>	

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<b>Verification</b>	
<p>The applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the suppliers of substances and copies of relevant Safety Data Sheets. The applicant shall provide information on the plasticisers used in the product. The applicant shall provide information on the maximum chlorine content of the plastic parts. A declaration of compliance signed by the plastic and biocides suppliers and copies of relevant safety data sheets about materials and substances shall also be provided to the awarding competent body. All biocides used shall be clearly indicated. The applicant shall provide information on the intentionally added substances used as flame retardants.</p>	

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<h2>Joint Research Centre (JRC)</h2>	
<h3>Development of ecological criteria for Hydronic Central Heating Generators</h3>	
<h3>Additional criteria areas – Design for sustainability, and criteria on information provision</h3>	
<h4>IPTS - Institute for Prospective Technological Studies</h4>	
<p><i>Seville - Spain</i></p>	
<p><a href="http://ipts.jrc.ec.europa.eu/">http://ipts.jrc.ec.europa.eu/</a>  <a href="http://www.jrc.ec.europa.eu/">http://www.jrc.ec.europa.eu/</a></p>	

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<h2>Criterion 12 – Product design for sustainability</h2>	
<p><b>The criterion will consist of two parts:</b></p>	
<ul style="list-style-type: none"> <li>• <b>Promotion of reuse, recycling and generally sound end-of-life management</b></li> <li>• <b>Product quality/usability and lifetime extension</b></li> </ul>	


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## Verification

**A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.**

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## Criterion 13 – Installation and user information

**The following issues shall appear on the packaging, a leaflet attached to the product, or on a companion website:**

- **correct installation instruction,**
- **correct operation instruction,**
- **information concerning appropriate disposal at end-of life,**
- **information on appropriate dimensions of heating generators for different building characteristics/size.**

## Verification

**Copies of the relevant document and/or website links shall be submitted with the tender.**

**~~A certificate signed by the manufacturer declaring compliance with these requirements shall be submitted to the awarding competent body, together with the relevant documentation.~~**