DG ENER Lot 21: Central heating products using hot air to distribute heat (other than CHP)
Eco-design Preparatory Study
Minutes of the first stakeholder meeting – April 19th 2011

Study performed for: European Commission (DG ENER)
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Date: Tuesday 18th April 2011
10:00 – 17:00

Location: European Commission, Charlemagne Building
Room: Lord Jenkins
170, rue de la Loi
1040 Brussels, Belgium

Agenda

WELCOME & "TOUR DE TABLE"

After a short welcome, all participants introduced themselves in a "tour de table". See ANNEX A for a list of participants. The Policy Officer for the study, **Guido de Wilt (GdW)** welcomed everybody and introduced this stakeholder meeting as the first in a long process. He estimated implementing measures could be agreed upon by the beginning of 2013, but this is subject to change.

INTRODUCTION TO THE ECODESIGN DIRECTIVE

Benoît Tinetti (BT) introduced the Ecodesign Directive.

Mikael Rust (MR), Susa Klimat, asked whether ecodesign implementing measures would not be moving forward if the criteria for establishing them were not fulfilled.

GdW answered that although a product category is excluded from the scope of a preparatory study or implementing measure, this does not mean it will not be taken up at a later stage either in future lots or as separate legislation. The current Ecodesign lots have been formally established in the Ecodesign Working Plan 2009-2011 based on studies, priorities and resources. As a consequence, some (heating) products are split into different lots. Furthermore 200.000 is an indicative number for sales that is applicable to the entire number of products in the lot (and not just individual product categories within the lot). He further clarified that the scope of the study and implementing measures covers all manufacturers (big and small) regardless of the number of product units they sell each year, i.e. the Directive is still applicable even if individual manufacturers only sell one unit of the product each year.

INTERACTION WITH OTHER ECODESIGN LOTS

Alvaro de Prado Trigo (AdPT) presented an overview of other Ecodesign studies related to HVAC and the 'system approach' to assessing the heating system. **Adrian Tan (AT)**, BIO, clarified that the Ecodesign Directive and related preparatory studies consider the 'extended product'. For example in the case of a boiler the heat

generator, heat exchanger, pump, storage tank, controls, etc. are all considered. The Energy Performance of Buildings Directive (EPBD) is concerned with the building envelope and HVAC systems as parts of the same entity. The Ecodesign Directive does not address buildings, but it does take EPBD into consideration to ensure both Directives are complementary.

TASK 1.1 – PRODUCT DEFINITION AND DISCUSSION ON SCOPE

AdPT presented the findings from task 1.1 and initiated a discussion on the scope of the study.

Els Baert (EB), Daikin/EPEE, commented on the typical power output range for heat pumps. For single room modules the upper limit of 65 kW may hold true, but for combination of modules it can go up to 100 kW or even 400 kW. This should be noted in the report.

Laurent Legay (LL), Carrier, asked whether indirect systems, e.g. hot water systems, are excluded from the scope. He claimed that for air handling units (AHUs) the heating is provided by hot water and not by electricity or gas. **MR** could confirm that AHUs can use other sources of heat than hot water, although this is a small segment of the market. **AT** asked whether there were any clear definitions that could be used for AHUs based on whether the heating was provided by hot water or by other means. **MR** responded that the modules of AHUs form a complete system, but the individual heating modules could be seen as individual discrete components, which could be classified separately.

AT asked whether AHUs could actually heat a room or whether the heating function was rather for heating the incoming fresh air. **MR** answered AHUs can heat the room in a closed circuit in the building, but it is also possible to introduce as much fresh air into the room as you want. It could be either.

Johannes Hoogkamer (JH), Eurovent, asked if there are both gas and oil-driven AHUs. **John Dorsey (JD)**, Ambirad, answered that in the UK in the larger units 50% are gas coils. In smaller units it is hydronic coils.

Reginald Brown (RB), BSRIA/Defra, asked whether 'combined heat and power (CHP)' units were out of the scope, even if they were providing hot air, because the primary function was considered electricity generation.

EB asked if air curtains were included in ENER Lot 20 and if there are any differences between air curtains in Lot 20 and 21. **AT** summarised the discussion of the previous day. Although some products could be seen in the scope of both lots 20 and 21, the project team would strive to analyse product types (from both a direct heating and central heating perspective) in only one lot. As a pragmatic approach, it would then be clear for all stakeholders which lot a product type was assigned to.

Peter Bethlehem (PB), Biddle, further clarified that the main function of air curtains is not to provide heating but to separate two different climate zones. His position was to leave them out of the scope of both lots. **Kerstin Lichtenvort (KL)**, DG ENTR, asked if cooling was also relevant for air curtains, and what the energy savings potential was for air curtains. **PB** responded that air curtains can reduce up to 70% of energy losses in a building. Regarding the efficiency of the product itself, there is potential to make the air flow across the door as uniform as possible. Air curtains should have enough impulse to reach the floor and cover the entire width of the opening. Over door heaters often are not able to do this and are therefore not effective in separating climate zones. **PB** also added that a standard for air curtains was under development. **JH** added that a position paper on air curtains had been prepared by Eurovent and sent to BIO. **AT** confirmed this and mentioned that this had already been forwarded to the Commission.

Jean Terrier (JT), GrDF, pointed out that gas-driven Variable Refrigerant Flow heat pumps also exist and should be described.

MR remarked that the mention of solid fuel as an energy source was not consistent in the report.

EB called for heat emitters to be excluded from the scope of the study as gas furnaces are not heat emitters, but heat generators. **KL** asked then why emitters were included in the study of cooling systems. **EB** explained that to compare cooling systems with each other it is necessary to include emitters, but if comparing heat pumps with furnaces, then emitters should not be included. In ENER Lot 1 heat pumps are seen as improvement options for gas boilers.

MR called for clear definitions for fan coils and AHUs. JH responded that Eurovent could provide this.

Jens Schubert (JS), Federal Environment Agency Germany, mentioned compact heating and ventilation devices as a product group of hot air central heating used in passive houses. **Gunnar Olsen (GO)**, INFORSE, asked for these 'mini AHUs' to be described and included in the scope of the study.

Christian Herten (CH), GEA Air Treatment, commented that with products that have integrated heating and cooling functions, it will be impossible to look at the separate functions in separate lots and then define minimum requirements. AHU's primary function is ventilation, but heating/cooling functions are only needed to adjust the temperature in the building. There exist some AHUs which actually do heat spaces, especially for air recirculation in industrial environments. He proposed to deal with the heating and cooling in just one lot.

KL made it clear that the split and scope of the Ecodesign preparatory studies, launched on the basis of the Ecodesign Working Plan 2009-2011, cannot be changed, but this does not mean that implementing measures need to be separated in the same manner. It is important all aspects of the HVAC products are analysed by the

consultants. For example BIO and ARMINES (consultants for ENTR Lot 6) are working together and have provided the Commission with a position paper on a common approach to AHUs.

Following a remark from **AT**, **MR** explained what 'mini ducts' are and how they can be seen as alternative distribution systems for hot air central heating.

TASK 1.2 – TEST STANDARDS & TASK 1.3 – EXISTING LEGISLATION

AdPT presented the findings of task 1.2 and 1.3. In addition to the test standards presented, **EB** mentioned two others: ASHRAE 24 and 15. **Tom Dee (TD)**, Johnson & Starley also added two other test standards for gas furnaces: EN 778 And EN 1319. **JS** asked the general question on how energy efficiency was defined in the study. **AT** called upon all stakeholders to provide suggestions for parameters to measure energy efficiency for the products they were most familiar with based on test standards. The approach to calculating energy efficiency should be respect former preparatory studies and be consistent with current studies. **GdW** added that ENER Lot 20 and 21 is part of the horizontal mandate that was given by the Commission to CEN/CENELEC.

Regarding voluntary labels, **Fanny Rateau**, EHPA, added that EHPA also had a quality label for heat pumps. Likewise **LL** added the EUROVENT certification for fan coils.

EB thought that other EU legislation such as the Packaging and Packaging Waste Directive, Battery Waste Directive and the Ecodesign Implementing Measures for motors and fans should be added to the list of relevant legislation.

TASK 2 – ECONOMIC AND MARKET ANALYSIS

AdPT presented the findings of Task 2. The market analysis was lacking a lot of data which would make it difficult to calculate the energy and environmental impacts of the products later in the study. **Lieven Verstaen (LV)**, Daikin, called for clearer definitions as there was some confusion in the market data collected. **JD** commented on the estimates presented for furnaces, which he thought were doubtful as they seemed very high.

LL remarked that according to market estimates AHUs are mostly hydronic. **CH** added that the majority of the 240,000 AHUs are hydronic. When asked by **AT** for an estimate, **CH** thought the range of 95-99% was about right. **JH** asked that the market data for AHUs be clarified with ARMINES.

CH cautioned about using the market estimates from Italy to determine the size of the EU market. Italy is the largest market in Europe for AHUs. EUROVENT and BSRIA should be consulted for market data. **LL** commented that most fan coil units and AHUs in Italy

are for cooling. Four-pipe fan coil units are used for both heating and cooling, whereas two-pipe fan coil units provide only either heating or cooling.

CH pointed out that AHUs are complex products where consultants specify the design of the units together with the contractor according to the specifics of each project. Very few AHUs are sold directly to the 'customer'. **MR** elaborated that the installer is rather the 'end customer'. Smaller integrated fan coil units could however be sold directly to end customers.

RB suggested a practical distinction between AHUs and fan coil units. Fan coil units recirculate air, while AHUs bring in fresh air. **JH** pointed out that EUROVENT already provides definitions to distinguish AHUs and fan coil units.

JT corrected that the direct-fired gas furnaces price range is closer to 50 – 100 EUR/kW.

LV mentioned that the consumer expenditure for air-to-air heat pumps is representative for VRF systems, but the maintenance and repair costs seem high.

JD commented that part of the reason the market data still needs to be refined is that there is an issue with the different definitions of the products from the different country and association sources. The European Trade Organisation could be a good source to set ranges. **EB** called for clarification on the market and economic data.

TASK 3 – CONSUMER BEHAVIOUR AND LOCAL INFRASTRUCTURE

AdPT presented the findings of Task 3. **AT** suggested that since use patterns are dependent on applications that the project team will try to define typical building types and use patterns.

EB asked why six climate zones had been defined when other lots had only defined three. She called for a consistent approach for all lots regarding applications and climate zones. In response to a question on the adequacy of test standards, **EB** responded that as test standard EN 14825 is currently under review, it was difficult to say that this was the case.

CH commented that they as a manufacturer provide life cycle cost calculations when selling heating equipment. There are software tools which can be used to easily calculate this. **LV** mentioned that manufacturers do provide tools to customers to track their energy consumption, but these are not used so often.

NEXT STEPS: TASK 4, 5 AND 6 AND BASE CASES

AdPT presented the next tasks to be performed. **BIO** asked all stakeholders to provide their final comments and inputs to Task 1, 2 and 3 by May 20th 2011.

Based on a request from the Commission, **AT** suggested that the next stakeholder meeting be held around mid to end September 2011 for three consecutive days for ENER Lot 20, 21 and ENTR Lot 6.

Regarding base cases **MR** asked about solid fuel boilers, e.g. wood boilers that are common in Sweden. **AT** answered that these products have already been investigated in ENER Lot 15. **JD** remarked that electric AHUs have very small improvement potential and are mostly hot water based.

JS asked whether water-to-air and ground-to-air heat pumps were seen as improvement options for air-to-air heat pumps. **EB** reminded that in ENER Lot 1 heat pumps were seen as an improvement option to gas boilers.

GO suggested that base cases be determined on size/heating capacity. He also suggested that the source of hot air for AHUs should be separated in base cases.

JT mentioned that information on gas burners in AHUs could be provided.

RB asked whether renewable energy would be accounted for as a heat source. **AT** confirmed that this would be taken into consideration.

GO asked whether ducts were part of the study. **AT** answered that these would probably be considered in future Ecodesign lots. **JH** supported that it would be better if these were considered separately.

CONCLUSION AND WRAP-UP

AT finally mentioned that the final decision of scope is up to the Commission to make after hearing the various arguments and points of view from all stakeholders.

AT summed up the day and thanked all stakeholders for the numerous turnover and good comments provided. **Final inputs for Task 1, 2 and 3 are due 20th May 2011**. The project team will be contacting stakeholders for their inputs on Task 4, 5 and 6 in the coming weeks.

JH expressed that he was happy that the preparatory studies for ENER Lot 21 and ENTR Lot 6 were coordinated. **GdW** mentioned that he too was happy with the input and participation of the stakeholders during the day. He thanked all for coming and wished for a continued good progress in the study.

ANNEX A

LIST OF PARTICIPANTS

European Commission:

- Guido de Wilt **(GdW)**, DG ENER - Lot 20 & 21
- Kerstin Lichtenvort **(KL)**, DG ENTR – Lot 6

Project team:

- Adrian Tan **(AT)**, BIO Intelligence Service
- Alvaro de Prado Trigo **(AdPT)**, BIO Intelligence Service
- Benoît Tinetti **(BT)**, BIO Intelligence Service
- Jens Helpenstell, TÜV Rheinland Energie und Umwelt GmbH

Registered stakeholders:

- Rodney Ayre, Mitsubishi Electric
- Els Baert **(EB)**, Daikin Europe nv
- Marie-Josephine Beguin, Carver Climate Systems
- Anja Behnke **(AB)**, Federal Environment Agency, Germany
- Peter Bethlehem **(PB)**, Biddle bv
- Denis Bonvillain, EPEE
- Reginald Brown **(RB)**, BSRIA/Defra
- Vincent Cornillon, GDF SUEZ
- Tom Dee **(TD)**, Johnson & Starley
- JohnDorsey **(JD)**, Ambi Rad Group Ltd
- Andreas Helm, HKI Industrieverband
- Christian Herten **(CH)**, GEA Air Treatment GmbH
- Johannes Hoogkamer **(JH)**, Eurovent
- David Hughes, ICOM Energy Association
- Kenichi Ichihara, Fujitsu General EURO GmbH
- Kazuyuki Iimura, Mitsubishi Electric
- Osami Kataoka, JRAIA
- Laurent Legay **(LL)**, Carrier HVAC EMEA
- Martina Loibl, Toshiba Carrier
- Richard Lowrie, Mitsubishi Electric

- Darcy Nicolle, United Technologies Corp
- Hayashida Noriaki, Mitsubishi Electric Europe B.V.
- Gunnar Boye Olesen **(GO)**, INFORSE-Europe
- Christianna Papazahariou, shecco
- Walter Giuseppe Pennati, CoAer/Anima
- Pia Rasmussen, Danish Energy Agency / Danish Technological Institute
- Fanny Rateau, European Heat Pump Association (EHPA)
- Mikael Rust **(MR)**, Susa Klimat AB
- Mats Sandor, Systemair AB
- Jens Schuberth **(JS)**, Federal Environment Agency, Germany
- Bram Soenen, Federal Public Service Health, Food chain Safety and Environment
- Klaas ter Horst, Brink Climate Systems
- Jean TERRIER **(JT)**, GrDF
- Stefan Thie, Fujitsu General Euro GmbH
- Jun Toutain, Norwegian Water Resources and Energy Directorate
- Felix Van Eyken, EHI
- Lieven Verstaen **(LV)**, Daikin Europe
- Frédéric Wuhrlin, SANYO
- Chris Yates, Heating & Hotwater Industry Council

ANNEX B

EXAMPLE OF BASE CASES, BAT AND IMPROVEMENT OPTIONS

The following provides examples of how base cases were developed in the ENER Lot 15 Ecodesign preparatory study on solid fuel small combustion installations[1]. This information is merely illustrative to give stakeholders of ENER Lot 21 an idea of how base cases are selected in the MEEuP approach.

Table 1: The evolution of product scope from Task 1 to Task 5 base case definition for ENER Lot 15 (solid fuel small combustion installations)

Task 1	Task 2 Task 3	Task 4	Task 5 Base Case
Fireplace	Open fireplace	Open fireplace	BC1
	Insert / closed fireplace	Insert	BC2
		Insert + II^{ary} *air	BC2
		Closed fireplace	BC2
		Closed fireplace + II^{ary} air	BC2
Stoves	Roomheater Stove	Traditional stove	BC3/4
		Modern stove	BC3/4
		Continuous burning stove	
		Advanced stove	
	Slow heat release	Kachelofen	BC6
		Slow heat release stove	BC6
	Pellet	Pellet stove	BC7
Cooker	Cooker	Traditional cooker	BC5
		Advanced cooker	
Boilers <50kW	Hand fuelled	Conventional, overfeed	BC8
		Conventional, I^{ary} air control, natural, overfire	BC8
		Conventional, II^{ary} air control, forced, overfire	
		Conventional, II^{ary} air control, forced, upperfire	
		Advanced, gravity fed, natural, underfire	
		Advanced, gravity fed, forced, underfire	
		Downdraught (gasifying), underfire, forced	BC9
	Automatically fuelled	Stoker, upperfire, forced	BC10
		Push-down, upperfire, forced	BC10
		Pellet, upperfire, forced	
Boilers 50-500kW	Hand fuelled	Advanced, gravity fed, underfire, natural	
		Advanced, gravity feed, upperfire, forced	
		Conventional, II^{ary}, upperfire, forced	
		Downdraught (gasifying), underfire, forced	
	Automatically fuelled	Stoker, underfeed, forced	

[1] Project website: www.ecosolidfuel.org

Task 1	Task 2 Task 3	Task 4	Task 5 Base Case
		Pellet boiler, upperfire, forced	BC11
		Moving grate, overfeed stoker, forced	BC12
		Underfeed rotating grate, forced	

Compared to other Ecodesign preparatory studies, ENER Lot 15 had exceptionally many base cases to the broad range of solid fuel combustion installations. These were split into two groups: 'direct heating' and 'indirect heating' base cases (Table 2 and Table 3).

Table 2: Overview and description of direct heating base cases for ENER Lot 15 (solid fuel small combustion installations)

NAME	Base Case	Description of products represented	Fuel	Power [kW]	Test Standard Efficiency [NCV %]	Estimated Real Life Efficiency [NCV %]	Applicable Standard
OPEN FIREPLACE	BC 1	Inset direct heating appliances, <15kW power output, unenclosed firebed, mostly masonry material, manual fuel feeding, no boiler function	Wood	9	30	25	EN 13229
CLOSED FIREPLACE, INSERT	BC 2	Inset direct heating appliances with fully enclosed combustion zones, <15kW power output, efficiency between 50-85%, mostly ferrous material, manual fuel feeding, no boiler function	Wood	8	70	65	EN13229
WOOD STOVE	BC 3	Freestanding direct heating appliances <15kW power output, efficiency between 50-85%, enclosed firebed, mostly ferrous material, manual fuel feeding, no boiler function	Wood	7	70	65	EN13240
COAL STOVE	BC 4	Freestanding direct heating appliances <15kW power output, efficiency between 50-85%, enclosed firebed, mostly ferrous material, manual fuel feeding, no boiler function	Hard Coal	7	70	65	EN 13240
COOKER	BC 5	Freestanding direct heating appliances <15kW power output with cooking function, efficiency between 45-85%, enclosed firebed, mostly ferrous material, manual fuel feeding, no boiler function	Wood	9	65	60	EN 12815
SHR STOVE	BC 6	Direct heating appliances , <30kW flame power output (<6kW output from thermal mass - long duration), efficiency between 70-85%, enclosed firebed, mostly ceramics and masonry material, manual fuel feeding	Wood	15 (3 kW- long duration)	80	75	EN 15250

NAME	Base Case	Description of products represented	Fuel	Power [kW]	Test Standard Efficiency [NCV %]	Estimated Real Life Efficiency [NCV %]	Applicable Standard
PELLET STOVE	BC 7	Freestanding direct heating appliances, <15kW power output, efficiency between 75-95%, enclosed firebed, mostly ferrous material, automatic fuel feeding, no boiler function	Pellets	9	88	83	EN 14785

Table 3: Overview and description of indirect heating base cases for ENER Lot 15 (solid fuel small combustion installations)

NAME	Base Case	Description of products represented	Fuel	Power [kW]	Test Standard Efficiency [NCV %]	Estimated Real Life Efficiency [NCV %]	Applicable Standard
DOM. CONV. BOILER	BC 8	Indirect heating appliances, efficiency between 47-75%, natural draught, upperfire technology, mostly ferrous materials, natural draft, manual fuel batch feeding, no modulation	Wood	18	66	50	EN 303-5
DOM. DD. GAS. BOILER	BC 9	Indirect heating appliances, gasifying downburning technology efficiency between 75-90%, mostly ferrous materials, forced draft, fuel 'semi automatic' gravity feed, modulation: 100-50%	Wood	20	88	66	EN 303-5
RETORT COAL BOILER	BC 10	Indirect heating appliances, efficiency between 75-90%, mostly ferrous materials, forced draft, retort auto fuel feeding, modulation: 100-30%	Hard Coal	25	82	64	EN 303-5
PELLET BOILER	BC 11	Indirect heating appliances, efficiency between 75-90%, mostly ferrous materials, forced or natural draft, auto fuel feeding, modulation: 100-30%	Pellets	25	88	69	EN 303-5
NON DOMESTIC CHIP BOILER	BC 12	Indirect heating appliances, <500kW power output, efficiency between 75-90%, mostly ferrous materials, forced or natural draft, auto fuel feeing, modulation: 100-20%	Chips	160	88	70	EN 303-5

Improvement options for design were investigated at both a component and product level (see Table 4 and Table 5).

Table 4: Overview of component improvement options for base cases in ENER Lot 15 (solid fuel small combustion installations)

BASE CASE		Component			
		Boiler/heat storage	Lambda probe control	Electrostatic precipitator (ESP) *	Condensation heat recovery
BC 1	OPEN FIREPLACE				
BC 2	CLOSED FIREPLACE / INSERT	✓		✓	
BC 3	WOOD STOVE	✓		✓	
BC 4	COAL STOVE	✓		✓	
BC 5	COOKER	✓		✓	
BC 6	SHR STOVE	-		✓	
BC 7	PELLET STOVE	✓		✓	
BC 8	DOM. BOILER - UPPERFIRE	-	✓	✓	
BC 9	DOM. BOILER - DOWNDRAUGHT	-	✓	✓	✓
BC 10	COAL BOILER	-	✓	✓	
BC 11	PELLET BOILER	-	✓	✓	✓
BC 12	CHIP BOILER	-	✓	✓	✓

'-' signifies the base case is assumed to already include this design option

* ESP is available as a retrofit option for stock also

Table 5: Overview of Best Available Technologies (BAT) as design improvement options for base cases in ENER Lot 15 (solid fuel small combustion installations)

	Best Available Technologies	BAT 1	BAT 2	BAT 3	BAT 4	BAT 5	BAT 6	BAT 7	BAT 8	BAT 9
		Closed fireplace, fireplace insert	Advanced stove	Advanced cooker	Slow heat release stove	Pellet stove	Pellet boiler	Downdraught gasifying boiler	Stoker boiler, coal	Chips boiler
BC 1	OPEN FP	✓								
BC 2	CL FP/ INSERT	✓								
BC 3	WOOD STOVE		✓							
BC 4	COAL STOVE									
BC 5	COOKER			✓						
BC 6	SHR STOVE				✓					
BC 7	PELLET STOVE					✓				
BC 8	DOM. BOILER CONV							✓		
BC 9	DOM. BOILER DD GSFY.							✓		
BC 10	COAL BOILER								✓	
BC 11	PELLET BOILER						✓			
BC 12	CHIP BOILER									✓