

Ecodesign of Air conditioning and ventilation systems (ENTR-Lot 6)

Minutes of Second Stakeholder Meeting

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Centre Conference Albert Borschette

Attendants

Baert	Els	Daikin Europe NV
Baton	Marie	CLASP Europe
Beelaerts	Veerle	Daikin Europe NV
Bethlehem	Peter	Biddle bv
Biggs	Colin	Nuaire Ltd / TEHVA
Biermann	Tobias	EC-DGENTR
Bonvillain	Denis	EPEE
Brelih	Nejc	REHVA
Cornillon	Vincent	GDF SUEZ
Couch	Alan	WSP / Defra
de la Brousse	Maxime Charles	EVIA
Galsgaard	Christen	Dansk ventilation
Händel	Claus	EVIA
Haukås	Hans T.	HANS T. HAUKÅS AS / Norwegian Water Resources and Energy Directorate
Herten	Christian	GEA Air Treatment GmbH / Eurovent
Hoogkamer	Johannes	Eurovent
Ichihara	Kenichi	Fujitsu General Ltd.
Lichtenvort	Kerstin	EC-DGENTR
Iimura	Kazuyuki	Mitsubishi Electric Europe B.V.
Kaup	Christoph	HOWATHERM Klimatechnik GmbH / UCB / EVIA
Legay	Laurent	Carrier
Lowrie	Richard	Mitsubishi Electric Air Conditioning Systems Europe Ltd
Lönnerberg	Mikael	Systemair AB
Maratou	Alexandra	Shecco
McCarthy	Adam	Johnson Controls
Papazahariou	Christianna	LG Electronics
Pedersen	Per Henrik	DANISH TECHNOLOGICAL INSTITUTE
Permatz	Britta	Svensk Ventilation
Rateau	Fanny	European Heat Pump Association (EHPA)
Reintjes	Norbert	Ökopool GmbH
Roffé-Vidal	Michel	Airwell Deutschland GmbH
Scumpieru	Mihai	Mitsubishi Electric Europe B.V.
Sivitos	Stamatis	ECOS
Thie	Stefan	Fujitsu General (Euro) GmbH / EPEE
Thienpont	Caroline	Federal Public Service Health, Food chain safety and environment, Belgium
Tryjefaczka	Myriam	Camfil Farr
Van Haperen	Kees	Carrier Holland Heating
Verstaen	Lieven	Daikin Europe NV

Consultants

Greslou	Olivier	Armines
Kemna	René	van holsteijn en kemna BV
Rivière	Philippe	Armines
Van den Boorn	Roy	van holsteijn en kemna BV
Van Holsteijn	Rob	van holsteijn en kemna BV

Philippe Rivière (Armines) opened the meeting at 10.00.

Kerstin Lichtenvort (EC) introduced the Ecodesign Directive. The main new aspect of 2009/125/EC as compared to its former version 2005/32/EC is the extension from Energy Using Products (EuP) to Energy Related Products (ErP). The Directive is enacted through specific implementing measures or through self-regulation by industry. Kerstin Lichtenvort (EC) explained the process from the Preparatory Study to potential implementing measures. So far there have been twelve implementing measures including the recent fan regulation. Ten families of products are targeted for the period 2009-2011¹. Amongst them, another preparatory study, the ENER Lot 21 study on “Central heating products using hot air to distribute heat (other than CHP)” includes products that may be the same as in ENTR Lot 6 studied for their heating function. That is the reason why the two studies need to work in tandem, why intermediary meetings were planned this same week for both studies and that they will both run until next May. Kerstin Lichtenvort (EC) also highlighted the link with existing and planned regulations for residential air conditioning and ventilation products. If this appears as the best solution, larger air conditioning products could be considered in an amendment of the regulation for smaller air conditioners. Regarding ventilation, the Commission decided to wait the end of the ENTR Lot 6 study to have a single measure for both residential and non residential ventilation products. Kerstin Lichtenvort (EC) introduced Thomas Biermann (EC), who will be in charge for the follow-up of the ENTR Lot 6 study from mid October onwards.

Philippe Rivière (Armines) presented the findings of the revised draft reports for Tasks 1, 2 and 3 on air conditioning systems.

Vincent Cornillon GDF SUEZ asks whether gas engine and absorption units are included in the study and if legislation do exist for these products. Philippe Rivière (Armines) answers they are included and that legislation do exist abroad and in Europe. For absorption, performance requirements are low as compared to electric vapour compression machines' requirements as absorption chillers enable to recover waste heat.

Cristoph Kaup (EVIA) asks if this is correct air handling units will be considered only in the ventilation study of ENTR Lot 6 and whether it is planned to ask cooling products integrated into air handling units to fulfil the general requirements for air conditioning products. Philippe Rivière (Armines) answers that this is indeed what was meant. He adds that for cooling products in air handling units, this could be done with the existing standard EN14511. For air conditioning products with a ventilation function in addition to their cooling function, the ventilation function should also be evaluated.

Laurent Legay (Carrier/Eurovent) notices that regarding the fan coil definition in the draft report of Task 1, one of the criteria used in the classification is reversibility. He asks how is defined a “reversible fan coil”? Philippe Rivière (Armines) answers this is one of the criteria in the Eurovent Certification classification, 2 pipes cooling only, 2 pipes reversible. Laurent Legay (Carrier/Eurovent) highlights that whether the fan coil is used for cooling or for cooling and heating depends on the installation. Philippe Rivière (Armines) concludes that the efficiency distribution of both categories in the Eurovent Certification catalogue is similar so

¹ More detailed background is available on the EC web site:
http://ec.europa.eu/enterprise/eco_design/productgroups.htm

that it is unlikely this distinction be maintained, which is not the case for the ducted category, which electricity consumption is higher than the one of the non ducted one.

Claus Händel (EVIA) explains at the moment, the typical buildings in task 3, the ones used to define ventilation and air conditioning use, do not include industrial buildings (large halls of production plants for instance). These industrial buildings may have large ventilation flows and be air conditioned. René Kemna (VHK) confirms this was not considered in the 8 typical buildings but could be derived from these models or additionally modelled if required. Claus Händel (EVIA) adds the main impact would be on the temperature level for cooling as the indoor temperature may not be maintained as low as in commercial buildings (e.g. 30 °C in summertime instead of 24 °C); this appears to be an important market and should be taken into account; this potentially involves other cooling systems than for commercial buildings. Philippe Rivière (Armines) asks whether it is possible to be sent more information on this subject. He adds the study team has estimates of the share of industrial buildings that is ventilated but not any of the share that is cooled.

Els Baert (Daikin/EPEE): if industrial applications are to be included, this may mean different temperature levels to be considered at the end. As heat recovery between zones by the air conditioning system is not considered, this may not be necessary to add a supplementary temperature condition. This may create an unnecessary burden for manufacturers to add a supplementary temperature level for rating products at the end, although it could be evaluated in the study.

Els Baert (Daikin/EPEE) says EPEE fully agrees to go for seasonal performances based on the bin method and that it is indeed necessary to look at the bin weighting factors whether they fit with the non domestic applications. This is to be discussed next week in CEN TC 113 / WG 7 on prEN14825 and EPEE will send back available information from that CEN group. Els Baert (Daikin/EPEE) hopes this latter group may use data from ENTR Lot 6 study to make bins for larger than 12 kW products when possible. René Kemna (VHK) recalls that there is already a seasonal metrics in the regulation for air conditioners below 12 kW with 3 climate zones and wonders why in the comments received it is mentioned that “of course” the temperature bins should be revised for large air conditioners? Els Baert (Daikin/EPEE) confirms that it is intended to use the 3 climates already adopted for ENER Lot 1 and Lot 10. She adds what is at stake is the balance point of 16 °C, which could be lower for commercial buildings. Setting up the method should be done in the coming months as afterwards the industry still has to supply data for this. Following René Kemna’s (VHK) question, everybody agrees that the study should base upon these 3 climates.

Claus Händel (EVIA) asks whether latent cooling is considered in the study. Philippe Rivière (Armines) answers that it is taken into account and is presented in the slides for Tasks 4 and 5.

Philippe Rivière (Armines) presented the findings of the draft reports for Tasks 4 and 5 on air conditioning systems.

Per Henrik Pedersen (DTI) says that after the last meeting, Denmark complained natural refrigerants were not covered at all. Denmark has an extensive experience with chillers using natural refrigerant fluids, chillers with ammonia were installed for at least 30 years. All chillers in Denmark starting from a certain size that are installed now are with natural refrigerants since there is a ban on HFC machines with charges above 10 kg. Denmark will

send more information about its experience on ammonia, hydrocarbons, CO2 chillers. During the latest international refrigeration conference in Prague, it was presented water chillers could soon be introduced on the market. A new compressor was developed to that extent and the first demonstration plant should be installed next year.

Els Baert (Daikin/EPEE) gives comments on the base cases; for chillers, the approach to identify the base cases and the base cases are fine. For VRF, we clearly agree with the approach to use the UK ECA database and the selection of the 50 kW unit. However, it should be made clear that in the UK ECA database, at least for the VRF range, ratings are presented with a 15 % tolerance, because of the use of the EN14511 standard. We will provide you with information on the tolerances used in the different standards over the world, in Japan, Korea, in the USA or in China. In addition, it should be noticed that for VRF, there is an economic factor playing an important role: for a range of capacity, the same casing is used. This implies that for lower capacity products, you have a higher efficiency because of larger heat exchangers. This is the case for all manufacturers. This should be taken into account at the time of implementing measures. Regarding split systems, we understand the reasoning to define the base case but the EER/COP is too high. It would be adapted if the range was limited to the 20 – 25 kW range. But the problem is that the high capacity range is de facto banned from the market with this base case. Even if it is only 5 % of the market, it is dangerous to choose a base case that will ban all products in the upper capacity range. We should also understand that the 14 – 16 kW, chosen as base case, is the extension of the Lot 10 product range, for which the efficiency is quite high. But as soon as the capacity increases, products differ, they have different designs. One method to go ahead would be to use an average EER rather than a weighted average to define the base case in order to get a slightly lower value compatible with higher capacity units.

Reintjes Norbert (Ökopool): the Ecodesign directive is the best tool to make product specific vertical requirements and may be more precise than a horizontal measure. The preparatory study should deepen the improvement potential for alternative refrigerants. Philippe Rivière (Armines) says this is planned in Task 6.

Kerstin Lichtenvort (EC): the Ecodesign directive looks into all environmental impacts. The key question here is whether the refrigerant makes a significant environmental impact or not and what is the improvement potential. The Commission will decide if complementary measures over the regulation 2006/842/EC are necessary (e.g. a low GWP bonus as in the air conditioner regulation). The TEWI analysis and the technico-economic analysis to be led in Task 6 are basic materials required for such a decision.

Christen Galsgaard (Dansk ventilation) thinks this is a mistake to treat air handling units as planned. There is a standardisation underway and these products are very clearly specified in EN standards, like in EN1886. These products used to be tailor made but nowadays air handling units are standardised, mainly made from a bank of components. The definition is very clear and that includes also the cooling system. We need clean air for the people but also for the installation, especially when transporting cooled air. To this respect, there is a lack in the analysis to know what it costs in terms of energy consumption to filter the air. The other point is the duct system. Regarding losses for ducts, it is not only air which is leaking but also the energy required to cool or heat it. Eurovent proposes to make this study and would like it to be included in the ENTR Lot 6 report. Philippe Rivière (Armines) states that in the air conditioning part, the literature on the effect of duct leakage on the cooling energy

consumption increase has been gathered and adds supplementary information to complete the study is welcome.

Michel Roffé-Vidal (Airwell) asks whether the Commission chose between a system or a product approach? Kerstin Lichtenvort (EC) says that Ecodesign is an internal market legislation addressing energy-related products. The question is how the product is placed on the market under the responsibility of a manufacturer and which products are or should be CE marked. What relates to the system falls under the EPBD umbrella, which is complementary to Ecodesign measures. The question what is product and what is system in ENTR Lot 6 should be discussed here and until next May. The products placed on the market should be well defined in order to prepare future measures. The Commission will then be able to take the good decisions. Cristoph Kaup (EVIA) says the answer is already known, the product approach should be pursued. In Germany for instance, there is no CE marking for air handling units on the system but only on the product. In addition, air handling units in Germany are not mass produced but tailor made because if the components are standardized, the design of an air handling unit has to be adapted for each installation. Regarding the ductwork of course this has an important impact. But the design of the air handling unit cannot influence the ductwork. For the air handling unit manufacturer, the static pressure, the air flow and the potential duct leakage are design parameters. René Kemna (VHK) adds that Cristoph Kaup (EVIA) is referring to Eurovent position to add ducts and filters as standalone products. Kerstin Lichtenvort (EC) insists that it is the time to define what is or should be CE marked under the Ecodesign directive. The interesting output of the discussion is whether ducts and filters are part of the air handling unit or are standalone products. At the moment it seems that air handling units should be looked by themselves and that filters and ducts do not influence their design. So the question is rather to know whether filters and ducts have a significant environmental impact and improvement potential, attributable to the filter or the duct. Michel Roffé-Vidal (Airwell) says the considerations could extend to distribution and emission products. Kerstin Lichtenvort (EC) adds the first question is to know whether there are manufacturers behind those products who could be made responsible? Michel Roffé-Vidal (Airwell) says in that case the manufacturer is the installer. Cristoph Kaup (EVIA) adds that the manufacturer should be responsible for anything he can change, define or rebuild. For instance, the manufacturer is responsible for the filters he includes in its air handling unit. But he is not responsible for the ductwork. Christian Herten (GEA Air Treatment GmbH / Eurovent) adds air handling unit manufacturers can only be made responsible of the first filter supply as they do not know by which product it will be replaced after the delivery of the unit, although it matters for energy efficiency. That is why air handling manufacturers support the idea to study them as a standalone product. This could help ensuring the efficiency of filters put on the market in the long term. Cristoph Kaup (EVIA) adds it would be a situation parallel to the one of fans, whose efficiency is already regulated. Christian Herten (GEA Air Treatment GmbH / Eurovent) says for ductwork too a dedicated study is required. Looking at the air handling unit alone does not ensure to get the higher efficient systems. The situation could even worsen in the future if ducts are not looked at. Michel Roffé-Vidal (Airwell) says this confirms there is a need for a lot dedicated to distribution and emission within the building to bring ventilation and comfort.

Christen Galsgaard (Dansk ventilation) agrees. In addition, it really highlights the necessity of having a commissioning type of inspection because a faulty installation can completely spoil an efficient new product. The question is where does this have to be done, under the frame

of the Energy Performance of Building directive or under Ecodesign? Kerstin Lichtenvort (EC) responds that inspection of air-conditioning and ventilation systems is a part of the Energy Performance of Building directive. Ecodesign is not addressing the inspection. The installer can ensure the product placed on the market is maintained.

Reintjes Norbert (Ökopol) points out the installer can spoil the efficiency of the product with a poor installation and adds that if the manufacturer cannot be made responsible for that, he can however provide information, technical guidance for the installation, maintenance, and how the user should interact with the product. This is still in the hands of the manufacturer. This can be made within the Ecodesign regulations. Kerstin Lichtenvort (EC) confirms this is correct, and could be implemented in the Ecodesign measures.

René Kemna (VHK) presented the findings of the revised draft reports for Tasks 1, 2 and 3 on ventilation systems.

Christian Herten (GEA Air Treatment GmbH / Eurovent) asks whether energy saving potential with free cooling based on air is considered for air handling units. Philippe Rivière (Armines) says this appears as a very good option at system level, that it is even sometimes made mandatory in the national regulations under EPBD, but that it is difficult to be implemented in product legislation, especially as it is very climate sensitive and dependent upon the energy consumption of the base case solution. René Kemna (VHK) adds a possible measure for air handling units could be to impose a bypass in the balanced air handling units in order to allow free cooling in all cases.

Cristoph Kaup (EVIA) says regarding Specific Power Input SPI (residential) and Specific Fan Power SFP (non-residential) that any of these values can describe an air handling unit as these indices highly depend on the external pressure. For an air handling manufacturer, there is no opportunity to change the external pressure, which is an external constraint to the air handling unit. In addition, the SFP factor is influenced by the total pressure drop. So if there are a lot of components, it is higher. This means this value is dependent on the application. It is very easy to build a very good unit judging of its SFP factor, like an exhaust unit with a SFP close to 1. On the other hand, for a unit equipped with high efficiency filters as for hospitals, it may be impossible to reach a SFP factor of even 3. SFP is the perfect value for the system but not for the product. The same applies for the SPI. Cristoph Kaup (EVIA) also notices a mistake in the presentation (slide 10) as for heat recovery systems, in non residential units, the electricity consumption due to the heat recovery exchanger pressure drop is subtracted from the electricity consumption so that a net efficiency is calculated. For residential units, heat recovery efficiencies are very high because of the integration of the fan and motor heat released on the air stream. It should be noticed that in the draft report of Task 1 on ventilation systems, when looking at page 25 or 51, very high efficiency values for the heat recovery can be found for residential units and much lower for non residential. These values cannot be compared because of the two different standards.

René Kemna (VHK) asks if someone can help finding a solution on these issues. Denmark had a proposal to compare SFP of the non residential units at a standardized value of 230 Pa external pressure, and residential units using 70 Pa instead. However in practice, the pressure drop varies and for products designed to work with higher available pressure, this proposal could be largely detrimental. Claus Händel (EVIA) thinks that for non residential units, the efficiency can be supposed to be independent of the external pressure, as the pressure range variation is small.

Cristoph Kaup (EVIA) presents an EVIA proposal based on three indices, 1. the face velocity inside the air handling unit, as this is the key parameter to reduce the pressure drop, 2. the efficiency of the fan plus motor assembly, 3. the heat recovery efficiency, based on the climate where the unit is installed. It should be kept in mind also that non residential units may have very different applications (swimming halls, industry halls ..) and this may have a very high impact on the heat recovered. There is a huge range of conditions some of them being very different from the residential application. René Kemna (VHK) says the proposal should be sent to the study team. He adds the study team also received a paper from Eurovent which was not conclusive on the pressure issue. He adds this is very important all parties seat together to find a compromise. We are fully open to any working solutions. The pressure problem for rating is a top priority. This is much easier for the heat recovery efficiency even if the transition may be difficult for the residential sector. Regarding the temperature difference for measuring the heat recovery efficiency 13 K used in the standards is compatible with the average climate; the average outdoor temperature is 6 or 6.5 °C in Strasbourg (the average climate), and with 20 °C indoor this leads to a 13 K difference in average. 20 K would be appropriate for the cold climate (Helsinki), and it would be a smaller difference for Athens for the third climate.

René Kemna (VHK) asks if someone wants to comment on the idea to use the face velocity? Kees Van Haperen (Carrier Holland Heating / Eurovent) says Eurovent is working on it. We will use the Eurovent calculation method but we will have to add the three climate zones and the impact of the cooling energy and of the heat recovery system. We will focus on that in the next meeting coming in October. René Kemna (VHK) says the study team first needs to look at what is the right way to deal with pressure losses, internally, externally, find a harmonized way to look at the system efficiency. This is the main problem.

Cristoph Kaup (EVIA) adds that if we have to add the efficiency of the fan, it makes sense to take the P classes of the EN standard 13053 because the SFP is mainly influenced by the pressure drop. The efficiency has not a so high influence as the pressure drop on the SFP. The SFP is nothing else that the absorbed motor power divided by the air flow so at the end it is DP divided by efficiency. He adds it makes no sense to define the maximum pressure drop of components. For instance, a very low cooler size and pressure drop is required in Northern climate and a large one with important pressure difference in Spain. Velocity makes sense because this is the main influence factor to reduce the pressure drop of all components.

René Kemna (VHK) asks whether it would be possible to have a technical meeting with experts to make a proposal within a short period of time, given the contractual horizon. Britta Permats (Svensk Ventilation) says Nordic countries would be interested to join this meeting, Eurovent and EVIA also.

Mikael Lönnberg (Systemair AB) says they manufacture both residential and non residential units. Face velocity is a problem. It is a bit far away from the target to use less energy. For small units, it is not really easy to say what is the area. The area is changing along the air path. For smaller units, this is not a problem to use the SFP as far as the pressure is realistic. René Kemna (VHK) says there could be a cut off point for residential / non residential systems, 70 or 100 Pa. However, the solution should be fair for bigger units. We need to find a solution that is workable for the regulator. Cristoph Kaup (EVIA) says that the reason why residential and non residential should be separated is that for residential buildings the external pressure, about 100 Pa, is known. The components for the heat recovery units are

similar, a fan, a heat exchanger and a filter. But for non residential units, there is a lot of different components which may lead to large variations in terms of internal pressure drop, between 300 and 1000 Pa, and also very different external pressure, between 50 and 2500 Pa. Stating an average pressure drop could not be fair. We have to deal with all these applications. This is not correct to use average values: this is likely to be wrong for everything. Claus Händel (EVIA) thinks the problem can be solved with air velocity. It should be possible to explicit where in the AHU to define the air velocity. Cristoph Kaup (EVIA) air velocity is already defined in EN13053². Claus Händel (EVIA) says this definition could be adapted for industrial units.

René Kemna (VHK) presented the findings of the draft reports for Tasks 4 and 5 on ventilation systems.

Claus Händel (EVIA) mentions that the reduction of the thermal losses by insulation of the casing should be added to the BAT. Regarding occupancy sensors, it should be noticed that for non residential units these are part of the system, not of the unit. Manufacturers should specify the control interface. For all BAT, it should also be taken into account that a huge part of the market is for refurbishment, where it is not possible to change the size of the unit ; this will depend on the space left by the older product. René Kemna (VHK) says it is one thing to notice that and the other one is to find a solution to take into account size constraints and the controls issue.

René Kemna (VHK) shows one complete system for small office places, sold with controls and put on the market as a complete system. In that case controls are part of the package and should be evaluated. This is not the case for a large air handling unit for which controls are not delivered. Only the possibility to control the unit is delivered. The external signal is missing. This means also that the unit without the control would have a smaller CPU and would be cheaper. We need to find a way to compare both cases: complete systems with controls and systems without the sensors. If this has to be part of the legislation we have to find a way to evaluate this inside the legislation.

Cristoph Kaup (EVIA) says this can be done by imposing the possibility of speed control inside the unit. It makes no sense to impose to have the control system. Manufacturers have to deliver the units with a frequency inverter or with an equivalent system.

Claus Händel (EVIA) remarks, regarding controls, that there are systems on the market but they are designed for residential or office places. He explains that a pressure sensor would work perfectly for a single room because it is easy to know the number of people inside the ventilated zone. The application is changing how the unit is used. It means that for regulation it is useless to define this because this is connected to the use. For office it would be better to have a CO2 control and maybe a VOC sensor for restaurants. Nevertheless it is the same air handling unit. Demand control strategies would then not be solvable in legislation. It means that for non residential application the product must allow flexibility to the demand of the building.

René Kemna (VHK) asks whether it means the complete residential system should not be rewarded. Claus Händel (EVIA) says speed control is the minimum level to be defined for

² EN 13053 – 2011, page 28: “The velocity is based on the square area of filter section of a unit, or if no filter is installed, it is based on the square area of the fan section.”

future legislation. To go further the intended use, the profile, has to be defined. It is necessary to care about the very large range of applications. To find a solution for all is too technical and would never fit in a legislation.

René Kemna (VHK) does someone want to comment, for instance people having made the standards on control, which enable to compare gas sensors, humidity versus on/off sensors and so on. Claus Händel (EVIA) adds that indeed these standards exist. But there is not a standard to fit sensors with intended uses. This is an important issue. If one type of sensor is proved to be best for one application then it is possible to go ahead. But even though, it would remain difficult. The standardisation process has started but it is complicated enough.

René Kemna (VHK) adds controls could deliver 80 % savings. We need to be sure it cannot be included in measures. Maybe we should ask this to residential manufacturers, presently dealing with this issue.

Cristoph Kaup (EVIA) says this is the same question as for the ductwork. When delivering the control system, it is also necessary to supply the software and how to control the unit. If not, the manufacturer is not responsible for it and is only able to deliver a unit with a variable speed drive and that is the best thing he can do. He makes the unit able to be controlled by an external control system. In Germany, for instance, 90 % of the units are not installed with the control system and maybe 10 % are. Claus Händel (EVIA) and this does not mean that the unit includes the control of the room but just the one of the unit. But if we talk about demand controlled ventilation, it must control the room.

Rob Van Holsteijn (VHK): so a product including controls should be rated the same way as a product that does not but still have the possibility to be controlled? And the extra effort the manufacturer makes to ensure it works correctly should not be rewarded?

Claus Händel (EVIA) this is the distribution in the room, it is far away from the air handling unit. For a thermal control for instance by the chilled beams, there are little savings, but for presence occupancy sensor it can be very high. Demand control does not only include the ventilation but also the thermal part.

Cristoph Kaup (EVIA) it is not the question of the effort of the air handling unit manufacturer, it is the question of the wish of the customer. For a project with one AHU, maybe the customer would prefer the unit to be delivered with the control system. All manufacturers have the possibility to include controls. But in bigger projects with 20 units, then he will separate the AHU and the controls made for the total project.

Michel Roffé-Vidal (Airwell) confirms that the consulting engineer will specify the controls of big projects. He will decide what the manufacturer installs in its product.

Hans T. Haukås (HANS T. HAUKÅS AS / Norwegian Water Resources and Energy Directorate) says that potentially the answer is the technical documentation where can be detailed how the speed can be controlled depending on a given variable. This would make it easy for consulting engineers to use the facility offered.

René Kemna (VHK) is there a bus protocol that could be standardised? Normally one can find 2 or 3 in a single country. Is there a point in rewarding standardization of such a protocol, this was a point raised in the ENER Lot 1 study?

Claus Händel (EVIA) says demand control may be the most important point for efficiency but has nothing to do with the product. This is a discussion for EPBD or another lot for distribution and terminals ... This is a system approach.

Rob Van Holsteijn (VHK) you mentioned the heating boiler, efficiency is determined by the controls. Claus Händel (EVIA) says this may be the case in residential application but in non residential application the boiler is controlled by the building automation system.

Michel Roffé-Vidal (Airwell) says generators could be evaluated here as products (cooling generator, air handling unit) but that different product labels for the control, emission and distribution are required.

Els Baert says that controls are included in air conditioning applications, at least for VRF systems. So, how to make a different lot on controls? This would make it very complicated for those products with integrated controls.

Claus Händel (EVIA) says that if the control is part of the product, product and system are identical. If the system comes as a product then it must be included.

Els Baert: this may be a problem if a product with intelligent control can be judged of lower performances than a less intelligent product. Then, she agrees with Mr Kemna, and wonders how to deal with these controls?

Cristoph Kaup (EVIA) adds the efficiency of the unit has nothing to do with these controls. What we are talking about is the possibility of reducing the speed to reduce power consumption. But this has nothing to do with an internal control of the air handling unit. The control efficiency is dictated by the external conditions linked to the application. A supervisor gives the input and fixes the operation of the product.

René Kemna (VHK) some units are sold with a wireless transmitter and the same manufacturer also sells receiver units. The transmitter has nothing to do with the product. But all the intelligence is in the unit. It can take up to 24 sensors. Is this wrong, we should not be doing that? It should be rewarded with the same efficiency value as for other products? I think we cannot solve it today. But this is something that needs to be solved soon or at least a number of options should be presented to the Commission. One solution could be to make a split that can be handled in a legal context, which is not the case for residential and non residential ; it should be based on opposable values (air flow, power ...). René Kemna (VHK) hopes to get feedback from stakeholders on this issue.

Kees Van Haperen (Carrier Holland Heating / Eurovent) says there has been a lot of confusion on the definition of electrostatic filters and asks the study report be made clearer on that in the next version. René Kemna (VHK) says the problem is that there is a test standard beginning by discharging the electrostatic filter before testing it. Clearly this is not favourable for an electrostatic filter. Being pragmatic, if all the filter manufacturers agree to such a test standard, including those who are making electrostatic filters, then there is not an issue. He also adds that from the beginning, the pressure drop of the filter has been included as an issue to be studied. There may be an issue with the proposal received to require a F7 filter for both supply and exhaust air streams. This would have heavy consequences for the energy consumption. Cristoph Kaup (EVIA) thinks the functionality and quality of filter status is already ensured in the EN standard. G3 filter makes no sense because a lot of dust enters the AHU with higher maintenance required. This was the reason to use a F7 filter at the entrance and at the end because it has the same efficiency that a F5/F9 combination but with lower pressure drops. This is the reason for this recommendation. This is not a requirement. René Kemna (VHK) adds making it a requirement could be a really big step which needs to be figured. Myriam Tryjefaczka (Camfil Farr) wants to clarify one thing about what was said regarding the filter standard not

favourable to electrostatic filter: real life is even worse than the standard. The aerosol used for tests does not reach the real air impact in city environment. Studies made by VTT in Finland show that when a synthetic based filter is exposed to such air, the capacity of absorbing the dust is destroyed even more rapidly and the filter does not have any longer the capacity promised by the manufacturer. The iso-propanol used for the tests may be less detrimental to electrostatic filters than real life air which may contain diesel fuel aerosols in the cities. Tests have been made to use these aerosols but they are not stable in time and the size of the particle is difficult to control. That is why the isopropanol is used. That is the state of the art. The En 799 standard on filters will be used for the Eurovent classification of efficiency of filters. Industry put a lot of efforts to make this new EN 799 standard. René Kemna (VHK) says there have been also laboratory tests from A Ginestet (CETIAT) showing that in real installations, the efficiency of electrostatic filters was comparable to the efficiency of the mechanical filters, better at start and lower after a while. René Kemna (VHK) also mentions tests made when setting up the EN 799 standard which did not exhibit large differences and concludes that if all manufacturers are happy with the test standard then it is probably not a problem.

Johannes Hoogkamer (Eurovent) adds the product group working on filters is meeting in Sweden and this was put to the agenda. At the end of October, Eurovent should come with an improved text regarding the filter part in Eurovent comments.

Cristoph Kaup (EVIA) in the 70s in Germany, there was a fashion of electro-filters but they disappeared quite quickly. And now in Germany nobody uses electrostatic filters in AHUs anymore. Kees Van Haperen (Carrier Holland Heating / Eurovent) says there may be a confusion on the definition. With electrostatic do you mean with a power supply? René Kemna (VHK) says in the study, it was never meant filters requiring electric power supply, which can be named electrofilters but charged synthetic filters. Cristoph Kaup (EVIA) confirms he was speaking of charged synthetic filters.

The next steps of the project were indicated by Philippe Rivière (Armines):

- Comments on the draft reports are welcome until October 31st 2011.
- The last stakeholder meeting is planned at the beginning of 2012.
- The publication of draft final reports for Task 6 and 7 should be at least 3 weeks before the stakeholder meeting.

Kerstin Lichtenvort thanked the participants and closed the meeting at 16.00; she added:

- The Commission is waiting comments / feedback on the air handling unit briefing.
- There is a need to link this ENTR Lot 6 study with ENER Lot 10 and ENER Lot 21. There were already informal meetings to ensure the coordination between ENTR Lot 6 and ENER Lot 21. These interactions could be made via working groups of technical experts. It is the right time to think about who could be the experts to discuss the technical issues. Interested parts should address to the coordinator.