EUROPEAN ENVIRONMENTAL CITIZENS ORGANISATION FOR STANDARDISATION

ECOS

ORGANISATION EUROPÉENNE ENVIRONNEMENTALE CITOYENNE POUR LA NORMALISATION

POSITION OF THE ENVIRONMENTAL NGOS ON THE STANDARDISATION OF RECOVERED FUELS

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July 2005

1. Background

In 2002, ECOS commissioned the consulting company *ÖKOPOL GmbH – Institute for Environmental Strategies* to participate as technical experts in the CEN European standards committee "TC 343: Solid Recovered Fuels".

ECOS, the European Environmental Citizens Organisation for Standardisation, is a non-profit-making organisation with a secretariat in Brussels, which was founded in 2002. ECOS members are environmental NGOs that work on a national or European level, such as the WWF, Birdlife, Danmarks Naturfredningsforening, Svenska Naturskyddsföreningen, Friends of the Earth Europe, BUND, DNR and the European Environmental Bureau (EEB). ECOS receives financial support from the European Commission. It is registered as an associate of the European Committee for Standardisation (CEN).

In a similar manner to the European organisation ECOS, the KNU, the German co-ordination centre for standardisation work, was founded by three large German environmental NGOs as far back as 1996, namely the German League for Nature Conservation and Environmental Protection (DNR), the German branch of Friends of the Earth (BUND), and the German Federal Association of Citizens' Initiatives on Environmental Protection (BBU). This coordination centre is based at the BUND offices in Berlin. The KNU participates in standardisation work within Germany at the German Institute for Standardisation (DIN) and the German Commission for Electrical, Electronic & Information Technologies of DIN and VDE (DKE). It is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

In addition to the key topic of waste management, the ÖKOPOL consulting firm commissioned by ECOS also conducts work on chemicals policy, product policy and corporate environmental protection. Its clients are primarily public institutions such as the EU Commission, the German Federal Environment Agency (UBA), and *Länder* ministries, as well as individual companies, industrial safety organisations and environmental protection NGOs.

2. Environmental Protection Objectives

2.1 General Objectives of the involvement in Standardisation Work by the Environmental NGOs

The objective of the involvement in standardisation work of the environmental NGOs is to reduce environmental pollution by increasing the integration of environmental protection aspects in standards.

To this end, the environmental NGO co-ordination centres commission environmental experts to participate in those working groups of standardisation bodies, which feature topics that are seen as being particularly relevant to the environment.

Another of the co-ordination centres' objectives is to circulate the information from the standardisation work among the relevant experts. The European co-ordination office ECOS also supports the work of environmental NGOs in the national standardisation bodies.
ECOS and KNU have a further shared objective, namely that of co-operating with the EU Commission, seeking exchanges with parliamentarians and lobby groups and informing these parties of their findings and demands.

2.2 General Guidelines on Standardisation Agreed by the EU Commission and CEN

In 2003, the EU Commission reached a joint agreement with CEN and other standards organisations relating to general guidelines for standardisation work (2003/C 91/04).
Standardisation should "play a role in the completion of the internal market, facilitating the free movement of goods and services, and ensure sustainable development, having a high level of safety and quality and taking into account all economic, social and environmental aspects".

Furthermore, the guidelines state that European standards "encourage environmentally sound development of products" and that standardisation should "help attain the goal of high environmental protection". These guidelines are being taken seriously by the environmental NGOs, who are calling for them to be observed in the standardisation process.

2.3 The Environmental NGOs' Waste Management Objectives

The primary objective of the environmental NGOs in the arena of waste management is to avoid the impacts of waste production and management, to avoid squandering resources in the form of waste to the greatest extent possible and to avoid the production and dispersion of pollutants (by avoiding their generation and conveying pollutants to a sink as effectively as possible). With the exception of pollutant 'extraction' these objectives are established in an important guiding principle in waste management - the "waste hierarchy", which, in addition to the primary goal of avoiding waste in the first place, emphasises the aim of using the resources contained in the waste as efficiently as possible. In this hierarchy, utilisation of nothing but the calorific value of the waste (i.e. energy recovery) represents the lowest hierarchical level.

It is important to note that the environmental NGO approach to incineration of any wastes, whether by dedicated waste incineration or by SRF users, is that such activities should at no time undermine the drive to the priority activities of waste prevention, reuse and material recycling. In other words such activities should be strictly residual, once all possible efforts have been made to ensure the priority activities are explored to the maximum possible extent. It is important to note that in particular collecting different forms of waste separately is considered to be an essential prerequisite for ensuring this approach and ensuring optimum exploitation of the resources' potential.

The environmental NGOs do not support the hope nurtured by industry representatives that standardised waste (subsequent to various ambitious forms of treatment) could be declared to be a fuel, released from the waste regime, and re-designated as a product. One consequence of this would be that the standards and limit values for co-incineration plants would no longer apply to the co-incineration of these particular materials (e.g. in power plants or cement plants).

Waste companies are also endeavouring to have standardised waste entered on the OECD Green List in order to facilitate exports and "reduce bureaucracy". The environmental NGOs are equally sceptical about these demands. Firstly, they fear that this could mark an increased pull away from higher-priority material recycling methods. Secondly, it is important to remember that "standardisation" does not necessarily result in limitations on pollutant content. Under no circumstances standardisation can be equated with the stripping out of pollutant contents to a degree that is acceptable from the perspective of waste export discussions. "Standardisation" first of all defines categories of pollutant contents. It does not provide an answer to the question as to which of the standardised recovered fuels are to be categorised as harmless from an export perspective, given there may be no guarantees as to the performance of the installations they are destined for.

On the other hand, recovered fuels that contain a defined content of renewable carbon replace fossil fuels, thereby contributing to climate protection. However, it is important that this argument, which is fully accepted by the environmental NGOs, is not misused to countenance the utilisation of high-pollutant waste in plants that do not reach BAT standard, simply because it contains some bio-mass. Moreover, at this stage, no method of determining bio-mass is known that is capable of putting a stop to false declarations concerning bio-mass content.

3. Waste Standardisation

The "TC343 Solid Recovered Fuels" standardisation body began work in 2002. The standards will only relate to waste categorised as "non-hazardous" in the European Waste List, to waste which is not composed exclusively of bio-mass (CEN has drafted the “TC 335 Biofuels” standard for waste composed of bio-mass) and to waste which can be considered to be "solid" (CEN intends to elaborate a separate standard for liquid and gaseous recovered fuels).
The work schedule in CEN TC 343 envisages the elaboration of quality guidelines for manufacturing processes, the definition of categories and specifications for waste, and the elaboration of sampling and measurement methods for physical, chemical and biological parameters. The work schedule is available from CEN’s website at

- http://www.cenorm.be/nr/cen/doc/PDF/407430.pdf

National quality criteria and official standards were already elaborated several years ago on a national level in Finland, Italy and Switzerland. In Germany, the waste producers that came together in 1996 to form the German Federal Quality Assurance Association for Solid Recovered Fuels (BGS) have played a particularly important role in driving forward the development of quality criteria. In 2001, they published the RAL-GZ 724 quality assurance mark for solid recovered fuels. The quality requirements and test specifications are available from the BGS website:

- http://www.bgs-ev.de

3.1 Official Objectives behind the Standardisation of Recovered Fuels

Prior to CEN TC 343, CEN Task Force 118 had produced a report that highlighted the economic and energy potential of recovered fuels.
The reasons cited in the report that demonstrated the need to standardise "solid recovered fuels" were the following:

- rationalisation of design criteria for combustion units and the cost savings for equipment manufacturers that go with it,
- access to permits for the use of recovered fuels[1],
- cost savings for co-incineration plants as a result of reduced measurements (e.g. for heavy metals),
- facilitation of trans-boundary shipments (in accordance with the European Regulation 259/93 and the OECD Green List or Appendix B of the Basel Treaty),
- guaranteeing the quality of fuel for energy producers.

3.2 The Environmental NGOs' Objectives in the Recovered Fuel Standardisation Process

3.2.1 Energy Contribution in the Combustion Process

One of the main objectives behind applying standards to waste used as fuel sounds almost self-evident: the standardised material should make a positive energy contribution within the chosen combustion process. The current CEN "TC343 Solid Recovered Fuel" draft standard (see below) reveals that this is not necessarily as self-evident as one might suppose.

3.2.2 Guaranteed Fuel Quality

The primary objective of the environmental NGOs in the standardisation of waste used as fuel is to ensure a guaranteed and precautionary level of waste fuel quality. This is where the requirements of the potential users and those of the environmental NGOs coincide. The best way to illustrate what is generally associated with such a requirement is to look at the ISO definition of "quality".

Quality as defined as "the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs". Put simply, achievement of a certain level of quality should ensure that the product reliably fulfils the desired use.

From the environmental NGOs' perspective, satisfying the desired use is a matter of priority: standardisation should guarantee high fuel quality, e.g. maximum values for pollutants, or minimum values for calorific value. The fuel quality specified in the standard must take into account environmentally relevant parameters and provide adequate, reliable information on the classification and specification of fuels, thereby enabling both the user and the licensing authority to prevent any increase in the propagation of pollutants. Trust may be good, but, in view of a situation involving 25 EU member states with supervisory bodies that differ greatly in terms of their effectiveness, proper checks are advisable. That is why the only acceptable proof of adherence to the quality parameters is an externally certified quality management system applied by the standardised fuel producer.

[1] a standardized waste shall create confidence with authorities

3.2.3 No Increase in Air Pollutant Emissions

To minimise the propagation of pollutants, not only is it necessary to observe legally binding waste gas emission standards (Waste Incineration Directive 2000/76, or national laws such as 17th German Federal Emission Control Ordinance (17.BImSchV)), but also to ensure that standardisation does not lead to any hidden increase in overall emissions through the utilisation of recovered fuels.

This is difficult to verify if the measurement relates to utilisation of, for example, a share of just 2 - 20% of standardised waste fuel in a power plant, a figure which has been typical up to now. In this case the waste gas volumes of the cement and power plants, dilution effects are naturally so high that watertight evidence regarding a possible increase in air pollutant emissions can only be obtained if this is verified in a large-scale test with 100% waste utilisation. Within the framework of validating the CEN TC 343 standard, a test of this nature was proposed by the EU Joint Research Centre in Ispra, but this was disregarded by the validation consortium in the subsequent project planning process.

3.2.4 No Increase in Pollutants in Products

In addition to restrictions on air-pollutant emissions, the EU member states are also required to ensure that the products generated in co-incineration plants are designed “to make no contribution or to make the smallest possible contribution, by the nature of their manufacture, use or final disposal, to increasing the amount or harmfulness of waste and pollution hazards” (Council Directive on Waste 75/442). This applies, above all, to the following (by-) products of co-incineration plants: fly ash, bottom ash, clinker and cement.

Since the statutory requirements for these products currently only comprise requirements on Chromium VI levels in cement (26th amendment of Council Directive 76/769/EEC), there is an opportunity to make provisions through the voluntary sector of standardisation. It could help to prevent the propagation of pollutants, to the extent that this is technically feasible and economically reasonable. This would fall within the meaning of the general guidelines agreed by the EU Commission and CEN (see above), which envisage that standardisation should “help attain the goal of high environmental protection”.

4. A Critical Examination of Existing Standards

4.1 The RAL Quality Mark for Recovered Fuels

The RAL quality mark for recovered fuels fulfils several key requirements from the environmental NGOs' perspective:

- External verification of quality management in the manufacturing process,
- Fundamental limitations on waste allowed as raw material for SRF by using a positive listing,
- Preparation of composite samples on the basis of acceptable total quantities (250 - 500 t),
- Limitations on heavy metal contents:

Parameter	Unit	Heavy Metal Content [4]			
		Median		80th Percentile Value	
Cadmium	mg/kg dry	4		9	
Mercury	mg/kg dry	0.6		1.2	
Thallium	mg/kg dry	1		2	
Arsenic	mg/kg dry	5		13	
Cobalt	mg/kg dry	6		12	
Nickel	mg/kg dry	25 [1]	80 [2]	50 [1]	160 [2]
Selenium	mg/kg dry	3		5	
Tellurium	mg/kg dry	3		5	
Antimony	mg/kg dry	25		60	
Lead	mg/kg dry	70 [1]	190 [2]	200 [1]	- [3]
Chromium	mg/kg dry	40 [1]	125 [2]	120 [1]	250 [2]
Copper	mg/kg dry	120 [1]	350 [2]	- [3]	- [3]
Manganese	mg/kg dry	50 [1]	250 [2]	100 [1]	500 [2]
Vanadium	mg/kg dry	10		25	
Tin	mg/kg dry	30		70	
Beryllium	mg/kg dry	0.5		2	

1) for recovered fuel from process waste
2) for recovered fuel from the high-calorific-value fractions of municipal solid waste
3) can only be ascertained when a valid data basis has been obtained from the recovered fuel treatment process
4) the heavy metal contents shown above apply from a net calorific value of ≥ 16 MJ/kg dry for high-calorific-value fractions of solid municipal waste and from a net calorific value of ≥ 20 MJ/kg dry for process waste. In the event that the actual figure falls below these stated calorific values, then the values shown in the table above shall be reduced accordingly in line with this. Increases are not permitted.

However the RAL standard still has several shortcomings from the perspective of the environmental NGOs:

1) The need for the immediate finalisation of the missing heavy metal limits for the copper and lead parameters.

2) The levels of heavy metal content are not yet oriented to principles of prevention or foresight. Some individual limit values can be achieved by untreated municipal waste – ie they are not strict enough. The German Federal Quality Assurance Association (BGS) should therefore conduct further evaluation of the technical and economic options, in order to achieve the maximum extraction of heavy metals. Alongside the high-tech precautions of separation technologies such as optical NIR (near infrared) recognition, methods to achieve this also include comparatively simple optimisation efforts, such as even distribution of materials on the conveyor belt to the metal extractor, and a belt speed and material loading process that are not only oriented towards economic criteria.

3) The BGS has related the limitations on heavy metal content to the median and the 80th percentile value. That means that both, the mean of the analysis values and the fourth highest of five values, are incorporated into the evaluation. Thus, the highest analysis value is seen as an “outlier” and viewed as not being representative of the overall quantity (as opposed to the result you would get by forming an average from all the measured values).

Initial investigations by the Institute for Waste, Waste Water and Infrastructure Management (INFA), Münster, on the evidential value of median and 80th percentile values have drawn some positive conclusions supporting use of “4 of 5” method, which also features in the German Waste Water Charges Act (AbwAG). However, taking the mean in the case of heavy metal analysis values, which are predominantly very low, would lead to an over-proportional impact of the "outlier" values on the mean. It is important to have further verification as to whether these statistical means are suitable for determining (with comparatively few measurement values) the heavy metal contents of such an inhomogeneous material such as these.

A important positive point of the RAL standard is the proportional reduction in the limit values for heavy metals as soon as the calorific value drops below 16 MJ/kg (municipal waste) or 20 MJ/kg (process waste), respectively. This ensures that using higher quantities of lower calorific value fuels will not inadvertently increase the pollutant burden.

4.2 Drafts of CEN Standards for "Solid Recovered Fuels"

The drafts of the standards for solid recovered fuels elaborated in CEN TC 343 have so far primarily only been subject to internal harmonisation and should be submitted to the national mirror committees for approval over the course of 2005.

Developments within CEN TC 343 have been led by the Finnish Standards Association, the Chairman of which is Mr. Frankenhaeuser, who is employed by the Finnish polymer manufacturer Borealis. The work sessions are mainly dominated by experts from waste management companies. Some of the other participants are commissioned to take part by power plants and cement plants, while a few work for research institutes and for lobbying organisations such as the cement industry, paper manufacturers and waste incineration plants.

National or European government representatives are seldom represented, which means that it is generally left to the representative of the environmental NGOs to introduce any environmentally relevant aspects that are not linked to economic interests in a group generally composed of around 10-20 further special interest representatives.

ÖKOPOL was primarily commissioned by ECOS to represent the environmental NGOs in the activities of working group 2 relating to specifications and classes, but has also kept tabs on the work conducted by working group 1 on quality assurance and by working group 3 on defining methods for determining the bio-mass content in waste.

It is clear from the draft CEN standards that some of the environmental NGOs’ key demands have **not** been met:

- No external verification of quality management in the manufacturing process
- No fundamental limitations on the waste allowed as raw material for SRF (not using a positive listing)
- Preparation of composite samples on the basis of unacceptable total quantities (only one tenth of a 12 months rolling period of production of the fuel to be classified.)
- Limitations on heavy metal contents only in relation to mercury, with upper limits that lie within the region of hazardous waste
- Acceptance of waste with low calorific values down to 3 MJ/kg, which fall below the region of autothermic combustion and which cannot therefore make any positive energy contribution in the overall process
- Acceptance of waste with a high chlorine content of up to 3%

Draft Standard TC343 – WG 2: Classes of Solid Recovered Fuels							
Classification Parameter	Abbr.	Unit	**Calorific Value Classes**				
			1	2	3	4	5
Calorific Value	NCV	MJ/kg wet product	≥25	≥20	≥15	≥10	≥3
			Chlorine Classes				
			1	2	3	4	5
Chlorine	Cl	% wet median	≤ 0.2	≤ 0.6	≤ 1.0	≤ 1.5	≤ 3.0
			Mercury Classes				
			1	2	3	4	5
Mercury*	Hg	mg/MJ median mg/MJ 80th percentile	<0.02 <0.04	<0.03 <0.06	<0.08 <0.16	<0.15 <0.30	<0.5 <1.0
The lot size for classification shall be one tenth of a 12 months rolling period of production of the fuel to be classified. For each lot, at least one measurement of each property shall be performed. However, for Hg three measurements per lot are required on the basis of the same general sample. An additional laboratory sample shall be taken for cross check when needed.							

[Source: CEN TC343 WG2 N092 Final Draft 2005-06-08]

The drafts elaborated so far are not suited to inspiring confidence among government authorities and the public. In particular, the lack of a commitment to external verification of quality management is a significant shortcoming, which will also do little to inspire confidence among the fuel's potential users.

The drafts fail to exclude sludges with high water content and correspondingly low calorific values of as little as 3 MJ/kg. Even though the cement industry emphasised that these fractions are to be employed more for the purpose of substituting raw materials than for harnessing energy, there was actually significant apprehension that any exclusion could lead to subsequent restrictions by licensing authorities. A provision of this kind does not satisfy one of the key requirements made on recovered fuels, namely that these should supply a net energy contribution in the combustion process.

Rather than the stipulated mercury classes being geared towards prevention, they are instead guided by how much can be retained in individual plants using a particular notional air-pollution control system. The classification is based on calculations of the maximum mercury content to be recovered in the waste gas if a given transfer factor is assumed for a given combustion technology. The aim of linking these points is to ensure that particular fuel classes are employed in such a way that the limit values of the Waste Incineration Directive are just about observed. The calculations were performed under the assumption that 100% recovered fuel is used.

Rather than corresponding to the concept of minimising pollutants, the method instead merely exploits the permissible limits in the waste gas to the greatest possible extent. The spectrum of classes covers all conceivable levels of mercury content that can be found in the arena of waste rated as "non-hazardous". It is important to take into consideration in particular cases that the transfer factors for mercury and other harmful substances only apply for a defined set of basic conditions. If these change, then so too do the transfer factors [see Stoffflussanalyse als Planungsinstrument für den Einsatz von Ersatzbrennstoffen (*Material Flow Analysis as a Planning Instrument for the Use of Solid Recovered Fuels*), B.Zeschmar-Lahl, 2004].

The fact that the CEN TC 343 draft standard does not place limitations on any further heavy metals (apart from mercury) means that there is no incentive whatsoever to strip out these other harmful substances. Thus, drastically raised antimony (Sb) contents stemming from the increasing proportion of unsorted PET bottles will not result in political pressure being put on manufacturers to switch to alternative, antimony-free catalytic solutions, since even standardised waste fuels are not being subjected to any bounds in this area.

The limitations on cadmium content in waste gas specified in the Waste Incineration Directive have unfortunately not led to a classification according to this parameter in the draft standard of CEN TC 343. The reason is that initial data evaluations had shown that the mercury concentrations correlated with the cadmium concentrations in some types of waste. As to whether this estimate applies to the total quantity of the waste fractions to be used as raw material of solid recovered fuels, this is merely a supposition, and has not been proven. Grouping by heavy metal classes would have had the advantage of creating an incentive to strip out harmful substances and would have made it easier for the authorities and the public to identify low-pollutant waste.

With regard to determining bio-mass, the criticism can be raised that WG3 of CEN TC 343 has, in the majority, hitherto focused far too much on the selective dissolution method (SDM). The representative of the environmental NGOs has long pointed out the serious deficiencies inherent in this method:

- For example, lignite is almost quantitatively identified as "bio-mass", and even hard coal, nylon and polyurethane are predominantly identified as such.
- In contrast, only a small proportion of bio-mass products such as wool or viscose is detected as bio-mass by the method.

Only thanks to constant efforts on the part of the environmental NGOs were they recently able to finally get the promising and eminently suitable development of the C14 method incorporated in the technical standard for determining biomass.

5. Conclusions

Producing fuels from waste and employing them in cement and power plants is an idea that has long been discussed in the waste management arena. The fear that this leads to increased discharge of harmful substances is currently countered by two arguments: firstly, that co-incineration is subject to strict requirements regarding air-pollutant emissions and, secondly, that the technical means available are up to the task of extracting pollutants from waste.

However, it is not only the environmental NGOs that are sceptical as to the negative effects of waste incineration; it is also the potential users, above all the power plant operators due to fears of corrosion problems that have already been observed on multiple occasions. Nevertheless, in principle, the idea that standardisation of recovered fuels could inspire confidence among both users and environmental NGOs is certainly a sound one.

The fundamental prerequisite for establishing such confidence is the participation of representatives from the environmental NGOs in the standardisation process. This prerequisite has been satisfied both in the establishment of the German RAL quality criteria and in the elaboration of European standards for "Solid Recovered Fuels".

A further, fundamental prerequisite for establishing confidence in the material produced is independent verification of the quality of the manufacturing process by external parties. Although this principle was taken into account in the RAL quality mark, the European CEN draft standards, in contrast, do not require any external validation of the quality management process and are therefore unacceptable to the environmental NGOs in this form.

It is imperative that a watertight method be found to determine the bio-mass content of waste fuels. Even more, if this is to be used as a basis for compensating the supply of renewable energy. Methods that are tainted by significant weaknesses and open to abuse (as drafted by CEN) will not inspire confidence among the environmental NGOs and/or the public. That is why the environmental NGOs feel that external verification is also essential in this area.

CEN has reached agreement with the European Commission that standardisation should make a contribution towards attaining the goal of high environmental protection. This aim, which accords with the primary objective of the environmental NGOs, has so far been disregarded in the elaboration of the CEN draft standards. The draft standard essentially allows any waste classified as *non-hazardous* to be used as "fuel", even if it features a calorific value as low as 3 MJ/kg and high levels of heavy metal concentrations. Waste with a median mercury content of up to 0.5 mg/MJ and up to 3% chlorine content still falls within the standardised fuel classes.

The waste producers argue that many fuels derived from waste may already feature lower heavy metal concentrations than the raw materials and coal normally used in cement and power plants. However, this argument if anything serves to demonstrate just how little attention has so far been paid to heavy metal emissions, such as those stemming from coal combustion, for example. It certainly does not release the waste management industry from their fundamental obligation to strip out harmful substances to the greatest extent possible.