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## **Listing of actions to harmonise the legal frame for biomass gasification**

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## 1 Scope of the report

The Gasification Guide project deals with small and medium scale biomass gasification, which is an emerging technology for the efficient conversion of renewable energy sources into electricity and heat. Leading gasification experts from around the world have identified Health, Safety and Environment (HSE) issues as an important barrier to technology deployment and market uptake. From an engineering point of view, the legal HSE framework in Europe applicable to the design, manufacturing, putting into service and operation of biomass gasification plants has been perceived as non-uniform and even inconsistent in certain areas. A description of these areas can be found in deliverable D5 "Listing of gaps in legal frame between European level and national levels".

Discussions have been held within the project team and with stakeholders in order to identify actions which may be suitable to reduce the perceived inconsistencies in the legal framework. The underlying idea has been to minimise non-technical market access barriers for biomass gasification plants while maintaining a high level of health, safety, and environmental protection.

Suggestions for actions that have emerged from these discussions have been summarised in the present report. Where these suggestions would have to be put into practice by other bodies than by the Gasification Guide project team, competent bodies have been stated.

## 2 Actions aimed at the permitting process

### 2.1 Emission limit values for biomass gasification plants

As described in the draft Gasification Guide (deliverable D10), one problem with emission limits for biomass gasification plants in EU Member States (except for Denmark) is the general lacking of emission limits introduced specifically for gas engines which are operating on producer gas from biomass gasification. In many cases, limits for gaseous emissions have been imposed which have originally been defined *for other activities*, in particular for gas engine combustion of biogas, and which are based on the state of the art (or on best available techniques) with respect to these other activities.

It is questionable whether such emission values adequately reflect the state of the art (or best available techniques, BAT) *with respect to BGPs*.

It is worthwhile to note that emission limits may result from two different targets,

- "Protection against Harmful Effects on the Environment" (= immediate protection against hazardous immissions) and
- "Precautions against Harmful Effects on the Environment" (= minimising the environmental impact, irrespective of immediate hazards for persons or objects).

The first target results in mandatory requirements for the limitation of emissions from plants, irrespective of economic considerations.

The second target calls for a fair balance between environmental benefits, technical possibilities and economic constraints. Typically, emission limits associated with the second target for combustion installations will depend *inter alia* on the size of the installation (thermal rating), on the type of feedstock/fuel, and on the type of combustion device.

With regard to the application of BAT requirements to small and medium biomass gasification plants, the key questions have been found to be,

- Are small and medium BGPs in the scope of BAT requirements at all?
- If BAT requirements apply, which techniques can be regarded as "best available" for biomass gasification?
- Which emission limit values are associated with BAT in this case?

The analysis of the legal framework for the construction, putting into service, and operation of biomass gasification plants in the Gasification Guide project (Deliverable No. 4) has revealed that small and medium BGPs, while not in the scope of the IPPC directive, may still be covered by national regulations transposing the IPPC directive. As a result, the application of BAT will generally be required in those Member States where small and medium BGPs are subject to permit requirements derived from the IPPC directive. If a specific BGP activity is not in the scope of such regulations, there will generally be no requirements for that activity to meet BAT standards.

Due to the different transpositions of the IPPC directive into national law of the Member States, a certain type of BGP may need to fulfil BAT requirements in some Member States but not in others.

European Commission proposal COM(2007) 843 of December 2007 on a new IPPC directive, in its list of activities subject to an integrated permit procedure, specifies the activity "Gasification or liquefaction of fuels" without any reference to a threshold value regarding capacity. If this proposal passes the legislative process unchanged,

- this will in a few years subject all new BGPs in EU Member States to licensing under integrated permit procedures, and
- emission limit values (ELVs) for new BGPs will have to be based on best available techniques (BAT).

Therefore, it seems advisable to suggest the elaboration of a description of available techniques for the prevention and reduction of environmental impact of BGPs that can be used as a basis for emission limits. In the frame of the Gasification Guide project, the remaining case studies may provide an opportunity to collect relevant information for a preliminary description. It seems desirable to include emission data of plants in operation if such data become publicly available. This will, however, require the consent of plant owners/operators to publish emission data from their plants, if necessary in an anonymous form.

**Suggested action:**

Compile a preliminary description of techniques available for small and medium BGPs which are practically suitable to prevent or generally to reduce emissions and the impact on the environment as a whole.

Include this preliminary description in the final Gasification Guide document.

It will be important to find a way that the results of this compilation are recognized by licensing authorities who establish emission limit values in the written permits for operation.

If a BAT reference document (BREF) on gasification should have to be elaborated in future, the results from the Gasification Guide project should be made available for that elaboration process. This approach is in line with objectives of the European Commission to "provide fuller information on, and support for, emerging techniques ... [by ensuring] closer links between the BREF elaboration process, the European Research Framework Programme and the Competitiveness and Innovation Programme"<sup>1</sup>.

**Suggested action:**

Circulate the final Gasification Guide document among stakeholders who could be involved in the elaboration of a BAT reference document on gasification.

Annex I of the IPPC Directive<sup>2</sup> currently in force addresses activities that can have a significant impact on the environment, which is reflected *inter alia* in threshold values for some of these activities. Section 1 of that annex ("Energy industries") comprises four activities:

- 1.1 Combustion installations with a rated thermal input exceeding 50 MW
- 1.2 Mineral oil and gas refineries

<sup>1</sup> COM(2007) 843 "Towards an improved policy on industrial emissions", section 3.2, action 5

<sup>2</sup> Directive 2008/1/EC concerning integrated pollution prevention and control

### 1.3 Coke ovens

### 1.4 Coal gasification and liquefaction plants

It is evident that the activities 1.2 – 1.4 are performed at large industrial scale only (for economic reasons), and therefore there has been no need to define a threshold value for these activities.

In the December 2007 proposal for a new IPPC Directive, the definition of activity 1.4 has been changed from "Coal gasification and liquefaction plants" to "Gasification or liquefaction of fuels". It is highly probable that the European Commission, when drafting that proposal, has not been aware that gasification or liquefaction of fuels may be economically performed at a scale which is by orders of magnitude smaller than the scale for coal gasification or liquefaction. This applies in particular to renewable energy plants which utilise biomass in gasification or liquefaction processes, especially small and medium-scale biomass gasification plants.

The suggested new definition for activity 1.4 would subject a great number of small and medium-scale renewable energy plants to the new IPPC Directive, which (most probably) has never been intended. Therefore, it seems advisable to provide an indication to the European Commission about this (unwanted) result of the new definition and to suggest adding a threshold value to that definition, which could be similar to the new threshold value for combustion installations (20 MW). Such a more detailed definition would help to keep the requirements towards gasification activities appropriate to the potential environmental impact and save emerging renewable energy technologies from another non-technical market barrier.

#### **Suggested action:**

Provide an indication to the European Commission about the unwanted side-effect of the new definition of activity 1.4 in Annex I of the proposed new IPPC Directive. Include the suggestion to add a threshold value to this activity.

## **2.2 Checklist on permit procedures**

In the proposal for the Gasification Guide project, the development of a checklist for a possible permission procedure had been envisaged, to be based on the collected information about the legal framework as well as in strong cooperation with manufacturers, permitting authorities and operators.

A detailed analysis of permitting procedures for biomass gasification plants in Europe has revealed, however, that the permitting process and the required documents are subject to mandatory formal requirements from national law<sup>3</sup> which are different for all European countries. In most cases, the use of application forms is compulsory which may be differing even within a single Member State for different regions.

Considering this background, the approach has been chosen to provide practical support to operators who are seeking a permit for a BGP and to manufacturers who intend to provide their customers with relevant documents and information:

<sup>3</sup> These mandatory requirements apply to a wide range of activities subject to authorisation.

In section 3.4 of the draft Gasification Guide (deliverable D10), an overview of information sources (internet links) for country-specific permit procedures and of (internet) search strategies for region-specific application forms and guidelines has been compiled and made available.

A checklist on information and on documents typically required in permit procedures may nevertheless provide a rough outline for manufacturers and for prospective operators of biomass gasification plants. Therefore, in chapter 3 of the Gasification Guide, the concise overview of official and country-specific information on permit procedures should be supplemented with a general, non-binding checklist. The purely informative character of this checklist must be clearly indicated.

**Suggested action:**

Include an informative, non-binding checklist on documents typically required for BGP permit procedures in the final Gasification Guide document and circulate it among stakeholders.

### 3 Actions aimed at harmonising conformity issues

#### 3.1 Consideration of process plants

Discussion with biomass gasification plant manufacturers and operators in various European countries has revealed that there is considerable uncertainty about the application of some European Directives according to Article 95 of the EC Treaty to biomass gasification plants. The situation has been elucidated in deliverable D5.

One issue concerns complex products in general, particularly process plants, placed on the market as independent products which are *installations* that comprise *equipment* in the scope of Art. 95 Directives (e.g. machinery, low-voltage equipment, pressure equipment), whereas some parts of the product (and hence the product as a whole) are excluded from the scope.

Some of the consequences of this situation are:

- It is legally not possible for a manufacturer to declare conformity with EC Directives for the process plant as a whole (but only for parts of the plant).
- Placing on the market and putting into service of such process plants may be restricted or impeded with reference to national provisions regarding the protection of workers or others. These provisions may lead to the requirement to modify the product (process plant) before putting into service.

As there is still some uncertainty about the correct interpretation of European Directives based on Article 95 of the EC Treaty with regard to complex products like process plants, an official Guideline on this topic issued by a competent European body would be helpful.

#### **Suggested action:**

Issue a guidance document on the application of New Approach Directives to complex products, or supplement the official European Guide<sup>4</sup> accordingly.

Competent body for this action would be the European Commission, DG Enterprise.

It could be worthwhile to investigate at European level

- whether the scope of existing New Approach Directives, e.g. the Machinery Directive 2006/42/EC, can be extended to comprise process plants as a whole, which are currently excluded from the scope, or
- whether a new Directive aiming in particular at complex products like process plants would be a reasonable means to fill this gap.

<sup>4</sup> Guide to the implementation of directives based on the New Approach and the Global Approach, 2000

**Suggested action:**

Initiate an investigation on the demand and on suitable means to extend the application of New Approach Directives based on Article 95 of the EC Treaty to complex products like process plants which are placed on the market as independent products.

Competent body for this action would be the European Commission, DG Enterprise.

### 3.2 Consideration of environmental requirements

As has been elucidated in deliverable D5, free market access in EU Member States is guaranteed for products that comply with essential requirements set out in Article 95 directives (provided the entire product is in the scope of such directives, cf. section 3.1).

Putting into service and operation of products, however, may be subject to additional national provisions regarding environmental protection (emissions to atmosphere, waste water, noise etc.) if harmonized European requirements with regard to these environmental issues have not been established for that type of product.

As a result, the manufacturer of a biomass gasification plant could end up with a unit that can legally be placed on the market in all EU Member States, but that will need adaptation of emission reduction techniques to each individual location before putting the plant into service.

In addition to the discussion on emission limits presented in section 2.1, options have been examined for the inclusion of environmental requirements towards biomass gasification plants in one or more European Directive(s) based on Article 95, warranting free market access for products that are in the scope of and complying with that directive(s).

Several Article 95 Directives exist which include environmental protection aspects in their essential requirements. Some have been focused on specific emissions (e.g. noise emission in the environment<sup>5</sup>), others have been directed at specific groups of products (e.g. motor vehicles).

Directive 97/68/EC (on internal combustion engines for non-road mobile machinery) is an example<sup>6</sup> of the latter type. It includes requirements towards *emission standards* and *type-approval* of internal combustion engines. Type-approved products in the scope of and complying with that directive can be placed on the market in EU Member States and must not be subject to any other national emission requirement.

Discussion in the Gasification Guide project group and with external experts has shown that it does not seem appropriate, at the present stage of development, to

<sup>5</sup> Directive 2000/14/EC

<sup>6</sup> Reference to Directive 97/68/EC is made in order to illustrate the principle of establishing emission requirements in an Article 95 directive. BGPs or gas engines used in BGPs are not in the scope of that directive.

suggest drafting a specific directive for biomass gasification plants similar to Directive 97/68/EC.

The basic reasons can be summarised as follows:

- Biomass gasification plants utilize a wide variety of techniques for gasification, for gas cleaning and for CHP gas use, all of which result in different emission characteristics.
- The type-approval approach is feasible for products which are produced in large numbers without modification. BGPs do not fall in this category at present.
- The small number and the extremely small contribution of BGPs to emissions from industrial activities would not justify such a legislative effort.
- Biomass gasification technology still needs to develop and commercialise before emission standards can be established drawing on practical experience with commercially operated units.

Therefore, no action in this direction can be suggested at present.

### **3.3 Explosion pressure resistant design**

A specific technical issue with biomass gasification plants concerns the design and testing of equipment which can be pressurised to more than 0.5 bar (g) only in the (rare) case of an unwanted internal explosion. Typically, biomass gasification plants will contain such equipment, in particular the gas cleaning section with large gas-holding vessels, the gasification reactor and the start-up flare (if present).

Note: In the gas engine, as an internal combustion engine, the principle of controlled internal explosions is deliberately made use of. When designing this piece of equipment, the load from internal explosions must therefore be taken into account according to requirements set out in the Machinery Directive. For this reason, the gas engine is not an item of the subsequent discussion.

Essentially, two European Directives according to Art. 95 of the EC Treaty could become relevant for equipment that may occasionally be exposed to pressure from internal explosions,

- the Pressure Equipment Directive 97/23/EC and
- the ATEX Directive 94/9/EC.

The ATEX Directive applies to equipment and protective systems intended for use in potentially explosive atmospheres. The basic principles covered by this Directive are the prevention of ignition of explosive atmospheres and the mitigation of explosion effects (e.g. by halting incipient explosions or by limiting the effective range of an explosion), provided the latter is accomplished by autonomous systems.

Equipment which is simply designed to withstand the effects of internal explosions, however, is not formally in the scope of the ATEX Directive.

The Pressure Equipment Directive (PED) applies to equipment which can become pressurised to more than 0.5 bar (g). While all "reasonably foreseeable operating conditions" of equipment must be taken into account in the design for adequate

strength<sup>7</sup>, it remains open to question<sup>8</sup> how the maximum pressure from an internal explosion should be related to the "maximum allowable pressure" PS.

European standard EN 14460 describes principles for the design and testing of explosion pressure-proof equipment. In case of pressure shock resistant design, even permanent deformation of the equipment as the result of an internal explosion is deemed acceptable. EN 14460 has been adopted as a harmonised standard *to the ATEX Directive*, however, and not as a harmonised standard to the PED. Therefore, it is unclear whether conformity with the PED can be assumed if a piece of equipment has been designed according to that standard.

**Suggested action:**

Seek official agreement on how to deal with equipment that may become pressurized to more than 0.5 bar (g) in case of internal explosions only.

Bodies potentially competent for this action could be

- the ATEX and PED standing committees,
- the CEN Technical Board, and
- the European Forum for Conformity Assessment.

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<sup>7</sup> cf. Annex I No. 2.2 of Directive 97/23/EC

<sup>8</sup> cf. PED Guideline 1/48: "PS is not necessarily the explosion pressure"