



Grant Agreement Number: EIE/06/078/SI2.447511

Project acronym: **Gasification Guide**

Full title of the action: Guideline for safe and eco-friendly biomass gasification

Intelligent Energy – Europe (IEE)

Key action: ALTENER

Deliverable D7:

Legal frame of plant permission and operation

Final Version 09 December 2009

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The project is co-funded by the European Commission

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1 Introduction

Planning, building, commissioning, and operation of biomass gasification plants are activities that are subject to European and national regulations. In order to determine the relevant legal framework for small and medium biomass gasification plants, it is useful to draw a rough distinction between those requirements applying to the design and manufacturing of BGPs (as products that are to be placed on the European market) and those applying to ownership and operation; in simple terms, to distinguish between the manufacturer's and the operator's duties.

The underlying legal background is different for the two parties. While the legal framework with regard to the safety of products placed on the market is rather homogeneous throughout Europe, the legal framework for plant operation displays many variations across the European member states. The aim of this report is to give a general overview of the legal areas that apply to biomass gasification plants, both from the manufacturer's and the operator's point of view. The focus is on legal requirements towards health, safety and environment (HSE).

Hazard identification and risk assessment are among those legal HSE requirements that have to be met both by the manufacturer and the operator.

2 Manufacturing and placing on the market

The manufacturer's HSE duties related to biomass gasification plants arise from European directives according to Article 95 of the EC Treaty, which define essential health and safety requirements that have to be fulfilled by products intended for the European market. Directives that may be particularly relevant for BGPs are listed in Table 3.1.

Table 3.1: European Directives (providing for the CE marking) that may be applicable to biomass gasification plants or to parts thereof

Directive: Number, Scope	Examples of application (BGP equipment)
73/23/EEC: Low voltage equipment [2006/95/EC]	Electrical instruments, drives, control systems, generator
89/336/EEC: Electromagnetic compatibility [2004/108/EC]	Electrical instruments, drives, control systems
98/37/EC: Machinery [2006/42/EC]	Drives, pumps, blowers, moving mechanical parts, gas engine, fuel feeding system, ash removal system
94/9/EC: Equipment for use in potentially explosive atmospheres (ATEX directive)	Blowers, measuring devices, flame arrestors
97/23/EC: Pressure equipment	Heat exchangers/boilers, compressed air system
2000/14/EC: Noise emission by outdoor equipment	Conveyor belts

Common elements of these directives include the assessment of conformity with the essential health and safety requirements set out in the directives. Technical specifications of products meeting the essential requirements are laid down in harmonised standards. Application of harmonised or other standards remains voluntary, and the manufacturer may always apply other technical specifications to meet the requirements.

A comprehensive reference to New Approach directives and to harmonised standards can be found at the website below:

<<http://www.newapproach.org/Directives/DirectiveList.asp>>.

While manufacturers are required to assess and declare the conformity of their products, they may choose between different conformity assessment procedures provided for in the applicable directive(s).

It is evident that certain parts of a BGP will be in the scope of directives from Table 3.1. The question is sometimes raised as to whether a biomass gasification plant as a whole can be in the scope of any one of these directives, and therefore requires CE marking, conformity assessment and declaration of the entire plant. This issue is also treated in Deliverable D6 ("Listing of actions to harmonise the legal frame for biomass gasification"), which is available on the Gasification Guide website.

The following quotation from the European guide on New Approach directives may give some guidance on this matter:

"It is the responsibility of the manufacturer to verify whether or not the product is within the scope of a directive."

*A combination of products and parts, which each comply with applicable directives, does not always have to comply as a whole. ... The decision whether a combination of products and parts needs to be considered as one finished product has to be taken by the manufacturer on a case-by-case basis."*¹

A BGP manufacturer will have to identify those units or pieces of equipment in the biomass gasification plant that are devices or assemblies covered by New Approach Directives, and to supply the required CE marking and declarations of conformity (DoC) for these parts. The manufacturer may choose to install pieces of equipment from third-party suppliers that already bear CE marking and that come with declarations of conformity.

There is no requirement for a manufacturer to deliver an all-inclusive declaration of conformity for an entire biomass gasification plant. Nevertheless, the manufacturer has to supply operating instructions, possibly in the form of an operating manual, which cover all hazards of the plant and all safeguards and precautions that are required for safe operation, including start-up, shut-down, and maintenance.

Discussion with experts from various European countries has revealed that different opinions exist concerning the application of some of the directives listed in Table 3.1 and on the consequences of their application.

With a view to the Machinery Directive, it has been argued that a biomass gasification plant as a whole should to be treated as an assembly of machines, resulting in a DoC according to the Machinery Directive for that assembly. A point in favour of that notion is the fact that risk assessment according to the Machinery Directive covers different types of hazards, including mechanical hazards as well as electricity, extreme temperatures, fire, explosion, noise, vibration, and emission of hazardous substances.

On the other hand, it has been argued that general product safety and liability requirements already demand a comprehensive hazard identification and risk assessment from the manufacturer, without any need to subject the entire product to a single New Approach directive. Furthermore, the official 'Comments on Directives 98/37/EC'² published by the European Commission state that "...there is no point, for example, in extending [the Machinery Directive] to complete industrial plants such as power stations...". Therefore, it may be regarded as a viable solution for biomass gasification plants to employ hazard assessment procedures related to machinery (e.g. according to European standards EN 1050/EN 14121-1), but without classifying

¹ Guide to the implementation of directives based on the New Approach and the Global Approach, European Commission, Luxembourg, 2000

² http://ec.europa.eu/enterprise/mechan_equipment/machinery/guide/guide_en.pdf

the entire BGP installation as machine (or assembly of machines) and without issuing a DoC related to the entire installation.

It has been a subject of discussion whether a piece of equipment (e.g. a gasification reactor) that could become pressurised to more than 0.5 bar only in case of an internal explosion should be regarded as pressure equipment in terms of the Pressure Equipment Directive (PED), combined with the question of which design specification should be used for such equipment³. This seems to be an issue that still needs to be resolved between competent bodies at European level. A more detailed discussion can be found in Deliverable D6 ("Listing of actions to harmonise the legal frame for biomass gasification"), which is available on the Gasification Guide website.

Biomass gasification plants in terms of this Guideline are supposed to be professional equipment, operated on a commercial scale. It cannot be precluded, however, that future development of small biomass gasifier plants may result in equipment that can be operated far more easily, turning such BGPs into an alternative for standard heating equipment which is made available to consumers.

Therefore, it may become necessary in future to apply directive 2001/95/EC on general product safety to BGPs if they are intended for, or likely to be used by, consumers. Health and safety requirements for consumer products are generally more demanding than those for commercially operated products.

³ For explosion resistant equipment, design and test principles based on explosion protection demands have been specified in EN 14460. This standard is in the list of harmonised standards to the ATEX Directive 94/9/EC, however, but not to the PED.

3 Construction and operation of biomass gasification plants

Construction and commercial operation of a biomass gasification plant are affected by various regulations that may have a direct impact on the design of the plant and its operation mode.

The areas that appear to be the most important in terms of environmental protection and occupational safety and health regulations have been compiled in Table 3.2 below.

Table 3.2: Legal areas that may be relevant for the construction, putting into service, and operation of biomass gasification plants

Main subject	Subject	Relevance for biomass gasification plants
Environmental impact	Permit requirements (Integrated pollution prevention and control)	Although BGPs are not in the scope of the IPPC directive, national regulations may require integrated permits or special permits, cf. table 3.3.
	Environmental impact assessment (EIA)	BGPs may be classified as a type of development that requires EIA screening.
	Emissions to atmosphere: gases, dust, smell	Emissions in normal operation from engines, flares, or from storage; start-up and shutdown may also cause relevant emissions
	Noise emission	Noise from equipment (gas engines, blowers, coolers), from material handling and vehicles
Environmental impact	Major Accident Hazards	Could become relevant if large amounts of hazardous substances are stored on site
	Waste production and treatment	Waste from plant operation may include ashes, tar, and contaminated cleaning fluids. Special considerations may be required if intermediates are recirculated (e.g. tar from the gas cleaning system)
	Waste water discharge	Process waste water may require special treatment to meet requirements for discharge to sewer
	Handling of substances hazardous to water / protection of water bodies	Tar, cleaning liquids, water treatment chemicals; use of cooling water
	Soil protection	Tar, cleaning liquids, water treatment chemicals
Occupational safety and health	Health and safety at work, general	Risk assessment, protective measures, operating instructions, personal protective equipment, emergency procedures
	Substances hazardous to health	Intermediates: producer gas (CO), tar; handling of chemicals used in the plant, e.g. cleaning liquids, water treatment chemicals, biological agents (storage of feedstock)
	Fire and explosion hazards; explosion protection	Flammable producer gas; special precautions for gasifier start-up and shutdown; assessment of areas at risk from hazardous explosive atmospheres (zone classification)

	Installations subject to monitoring	Special monitoring may be required for certain types of equipment and installations
	Pressure equipment	Requirements towards installation and maintenance, (regular) testing
	Electrical equipment	Requirements towards installation and maintenance, (regular) testing
	Machinery	Requirements towards installation and maintenance, (regular) testing
Other Regulations	Renewable energies and biomass	Possible effects of plant design, type of feedstock, and mode of operation: feed-in tariffs, combined heat and power, guarantee of origin (renewables) distinction: (natural) biomass / waste
	Energy feed-in	Requirements towards feeding electrical energy to the power grid
	Land use planning	Selection of appropriate site (industrial activity)
	Safety of buildings	Fire safety, building stability

Table 3.2 can be used as a checklist to determine the statutory obligations that may become relevant for a specific BGP installation in a European state. The regulations pertaining to the subjects from Table 3.2 need to be determined individually for BGP installations. It is recommended to consult the competent local authority or authorities at an early stage in order to identify the regulations and procedures that apply.

A basic question that needs to be answered at an early stage of planning concerns the type of permit(s) that will be required for an individual BGP installation. For small and medium BGPs, an environmental permit will be necessary in many cases, and limit values for emissions of noise and substances to the atmosphere and water will be fixed in the permit.

Classification criteria which have the most significant impact on legal requirements towards BGP construction and operation, including the decision on whether or not a permit is required and what type of permit is needed, are listed below:

- Type of gasifier feedstock: natural biomass or (biomass) waste;⁴
- Thermal input rating (thermal capacity) of the BGP with regard to gasifier feedstock;
- Thermal output rating (thermal capacity) of the BGP with regard to the produced gas;
- Is the BGP operated as a stand-alone unit or as part of a larger installation;

⁴ Gasification of waste within the scope of the Waste Incineration Directive 2000/76/EC is not considered in this guideline.

- Electrical rating of the CHP gas engine;
- Gas engine type (e.g. compression ignition, spark ignition);
- Operating time per year of the gas engine (peak load operation or continuous operation);
- Date of putting the plant into service;
- Properties of the site and its surroundings (e.g. industrial, commercial, agricultural, or residential area);
- Does the BGP require the discharge of waste water?

The above criteria apply to formal requirements (is a notification of the regulatory authority or an environmental permit required?) and to substantive requirements and consequences (emission limits, electricity feed-in tariff).

Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (the 'IPPC Directive') lays down measures designed to prevent or, where that is not practicable, reduce emissions in the air, water and land from certain industrial activities to achieve a high level of protection of the environment as a whole.

The situation of licensing (permit) requirements for biomass gasification plants resulting from national or regional legislation transposing the IPPC Directive and defining integrated permit procedures is given in Table 3.3 for a number of European countries.

Table 3.3: National regulations transposing the IPPC Directive; pertaining permit requirements for small and medium BGPs using natural biomass

State	Regulation(s) transposing the IPPC directive	Permit requirements for biomass gasification plants
(Europe)	(Directive 96/61/EC concerning integrated pollution prevention and control – IPPC directive)	(According to Annex I, BGPs are not in the scope of the IPPC directive.)
Austria	Trade, Commerce and Industry Regulation Act 1994, last amended 2006 [Gewerbeordnung GewO 1994, zuletzt geändert 2006] Immission Protection Act - Air [IG-L Immissionsschutzgesetz - Luft]	Yes, but specific requirements for IPPC installations do not apply to BGPs Yes
Belgium (Example: Brussels)	Environmental Permit Order [Ordonnance du 5 juin 1997 relative aux permis d'environnement du Ministère de la Région de Bruxelles-Capitale] Schedule of classified installations [Arrêté du Gouvernement de la Région de Bruxelles-Capitale fixant la liste des installations de classe IB, II et III]	Yes, for gasification of carbonaceous material (< 500 t/d) (No. 39, class IB)
Bulgaria	Environmental Protection Act (SG 91/2002) [Закон за опазване на околната среда (ДВ 91/2002)] Regulation №5 on risk assessment (SG 47/1999) [Наредба №5 за оценка на риска (ДВ 47/1999)]	Yes
Denmark	Environmental Protection Act 2006	

	Statutory Order no. 1640 of 13 December 2006 from the Ministry of the Environment on Approval of Listed Activities (Approval Order) [BEK nr 1640 af 13/12/2006 (Godkendelsesbekendtgørelsen)]	Yes, if thermal rating is > 1 MW (Annex 2, G 202)
France	Environmental Act [Code de l'environnement] Schedule of classified installations [Nomenclature des installations classées pour la protection de l'environnement] [Arrêté du 2 février 1998 relatif aux prélèvements et à la consommation d'eau ainsi qu'aux émissions de toute nature des installations classées pour la protection de l'environnement soumises à autorisation]	Yes, for production of flammable gas (1410) and for combustion of non-standard fuel if thermal rating is > 0.1 MW (2910)
Germany	Federal Immission Control Act [Bundesimmissionsschutzgesetz, BImSchG] Ordinance on Installations Requiring a Permit [4. BImSchV]	Yes, if thermal rating of the produced gas is > 1 MW (Annex, No. 1.4 and 1.13)
Ireland	Protection of the Environment (PoE) Act 1992 and 2003	(BGPs not in the scope)
Italy	IPPC Act 2005 [Decreto Legislativo 18 febbraio 2005, n. 59 "Attuazione della direttiva 96/61/CE relativa alla prevenzione e riduzione integrate dell'inquinamento"] Environmental Protection Ordinance [Decreto Legislativo 152 del 3 aprile 2006 recante norme in materia ambientale]	(BGPs not in the scope) Yes (Art. 269)
Netherlands	Environmental Act [Wet milieubeheer, Wm] Ordinance on Installations and Permits [Inrichtingen- en vergunningenbesluit milieubeheer (Ivb)] Water Act [Wet verontreiniging oppervlaktewateren, Wvo]	Yes (internal combustion engines > 1.5 kW) (Cat. 1, 1.1b)
Spain	IPPC Act [Ley 16/2002 de 1 de julio de Prevención y Control Integrados de la Contaminación (Ley IPPC)] Air Quality Act [LEY 34/2007, de 15 de noviembre, de calidad del aire y protección de la atmósfera]	(BGPs not in the scope) Needs to be discussed with competent authority: dry distillation of wood (annex IV, 1.1.3, group A); conventional heat and power stations < 50 MW thermal (2.1.1, group B); gasifiers (3.1.2, group C)
Sweden	The Environmental Code [SFS 1998:808 Miljöbalk] Ordinance on environmentally hazardous activities [Förordning (1998:899) om miljöfarlig verksamhet och hälsoskydd]	No, for gasifiers and gas engines < 10 MW, but notification required (40-5 and 40.1-2) [from 01/01/2008: yes, if more than 150.000 m ³ flammable gas per year is produced – 40.10 (B)]
Switzerland	(No Swiss transposition of IPPC directive!) Environmental Protection Act [Bundesgesetz über den Umweltschutz]	Yes; building laws of the Swiss cantons determine the authorization

	(Umweltschutzgesetz, USG)]	procedure
United Kingdom (England and Wales)	The Environmental Permitting (England and Wales) Regulations 2007	Needs to be discussed with the Environment Agency, cf. Part 2 (Activities) / Chapter 1 (Energy activities) / Section 1.1 (Combustion Activities) and Section 1.2 (Gasification, Liquefaction and Refining Activities)

In some European states, Annex 1 of the European IPPC Directive (categories of industrial activities) has been transposed into national law on a 1:1 basis, which means that BGPs are not in the scope of these national regulations. Other European states have combined the obligations from the IPPC Directive with their national schedules for plants and activities subject to licensing.

Even if a BGP is not in the scope of national regulations transposing the IPPC Directive, individual permits for construction and operation (e.g. building permits) or notification of regulatory authorities may still be required due to other national or regional regulations.

Therefore, when planning to build and operate a biomass gasification plant, it is recommended that discussions are held with the local regulator at an early stage and advice is sought on the specific statutory regulations.

National regulations on occupational safety and health (for the subjects listed in Table 3.2) require the employer to prevent or minimise occupational risks, to provide information and training, and to provide the necessary organisation and means. To this end, the employer needs to perform hazard identification and risk assessment, and draw up documents on the results of this assessment and on the protective measures and safeguards that need to be used.

With regard to biomass gasification plants, these documents have to include:

- a registry of hazardous substances used on the premises;
- an explosion protection document; and
- written company-specific operating instructions.

In addition to statutory regulations, it is necessary to take account of HSE requirements set out by insurers in order to obtain liability or damage insurance for a biomass gasification plant.

4 Permit procedures for biomass gasification plants

If a permit is required for the construction and operation of a biomass gasification plant, the applicant has to provide detailed information on the planned activity. The procedures are country-specific e.g. in terms of

- the competent authorities;
- the information that has to be provided in the written application for permit;
- application forms to be used; and
- the number of copies to be provided by the applicant.

In Table 3.4, official sources of information (web_links) and search strategies for relevant official information on permit procedures and application forms have been compiled for a number of European states.

Table 3.4: Overview of sources of information concerning the required specifications in applications for permits

State	Scope / type of installation; source of information regarding application for (environmental) permit
Austria	<p>Commercially operated BGP installations: Sections 353 and 353a of the Trade, Commerce and Industry Regulation Act (GewO 1994): http://www.ris2.bka.gv.at/Bundesrecht/</p> <p>Detailed information on permit procedures has been compiled in the Austrian "Guideline on safety and authorisation of biomass gasification plants" [Leitfaden - Anlagensicherheit und Genehmigung von Biomassevergasungsanlagen]: http://www.nachhaltigwirtschaften.at/edz_pdf/leitfaden_biomassevergasungsanlagen.pdf</p>
Belgium (Example: Brussels)	<p>Permit procedures for classified installations: http://www.ibgebim.be/Templates/Professionnels/Informer.aspx?id=1210&langtype=2060</p>
Denmark	<p>Heat and power plant, gas turbine or gas engine installation in the 1–5 MW (thermal) range: Annex 5 Section 3 of the Approval Order (BEK No. 1640 of 13/12/2006) https://www.retsinformation.dk/Forms/R0710.aspx?id=13040</p>
France	<p>Permit procedures for classified installations: http://installationsclassees.ecologie.gouv.fr/-Regime-d-autorisation-.html</p> <p>Information on details required in the permit application: http://installationsclassees.ecologie.gouv.fr/Comment-constituer-le-dossier-de.html</p>
Germany	<p>Gasifiers and gas engines > 1 MW (thermal): Ordinance on Permit Procedures (9. BImSchV), Sections 3, 4 and 4a) to 4e) http://bundesrecht.juris.de/bundesrecht/bimschv_9</p> <p>Additional information and application forms can be found on the websites of <i>Laender</i> Environmental Ministries. (Search keywords: "Antrag Genehmigung Immissionsschutz <Land>") e.g. for Northrhine-Westphalia: http://www.umwelt.nrw.de/umwelt/immissionsschutz/genuehmigungsverfahren/index.php</p>
Ireland	<p>General information on licensing: Environmental Protection Agency (Ireland) http://www.epa.ie/downloads/advice/</p>

Italy	<p><u>Installations subject to environmental permits:</u> Environmental Agencies of the provinces (Search keywords: "autorizzazione ambiente <province>")</p>
Netherlands	<p><u>Installations subject to environmental permits:</u> Application forms for environmental permits can be downloaded from community websites in the Netherlands. (Search keywords: "aanvraag vergunning milieubeheer <community>")</p>
Spain	<p><u>General information: Spanish Ministry of the Environment:</u> http://www.mma.es/portal/secciones/ (New authorisation requirements have been imposed by the Air Quality Act of 15/11/2007.)</p>
Sweden	<p><u>Installations subject to environmental permits:</u> General information on permit procedures can be downloaded from the Swedish Environmental Ministry website http://www.naturvardsverket.se/sv/Verksamheter-med-miljopaverkan/Tillstand-och-anmalan-for-miljofarlig-verksamhet/ Additional information and application forms can be found on the websites of county administrative boards [länsstyrelsen]. (Search keywords: "tillstånd miljöfarlig verksamhet <county>")</p>
Switzerland	<p><u>Industrial installations:</u> Building permits, declarations on emissions, permits for industrial installations: Special application forms and guidelines can be found on the websites of the Swiss cantons. (Search keywords: "Baugesuch Industrie <canton>"; "Plangenehmigung Betriebsbewilligung <canton>")</p>
United Kingdom (England and Wales)	<p><u>Planning process for renewable energy:</u> http://www.berr.gov.uk/energy/sources/renewables/planning/process/page18680.html <u>Energy from solid biomass plants (background document):</u> http://publications.environment-agency.gov.uk/pdf/GEHO0706BLBH-e-e.pdf?lang=_e Understanding the meaning of regulated facility: http://www.environment-agency.gov.uk/static/documents/Business/epr2_v1.0_2000543.pdf How to comply with your environmental permit, Additional guidance for Combustion Activities: http://publications.environment-agency.gov.uk/pdf/GEHO0209BPIN-e-e.pdf</p>

Typically, the application for a permit to construct and operate a biomass gasification plant will have to include the items listed below:

- information on the applicant (name, address),
- specific reference to the relevant regulations, e.g. classification of the installation and of the type of industrial activity according to national schedules,
- description of the plant location, supplemented with maps and site plans in different scales,
- description of plant layout and plant operation (text, flowsheets, equipment lists, layout plans),
- mass and energy balances of the entire plant (feedstock, emissions, waste, auxiliary materials, energies that are used and delivered), demonstrating that all emission streams have been considered,
- description of general occupational safety measures,
- description of special hazards (fire, explosion, hazardous substances) and precautionary measures,

- description and assessment of potential effects on the environment (e.g. noise emissions, emissions to atmosphere),
- description of waste and waste-water management.

Occasionally, additional third-party certificates and expert opinions may be required, e.g. on noise emissions and on fire and explosion protection.

5 Special aspects of permit procedures for biomass gasification plants in European states

Austria

A detailed presentation of the legal framework for construction and operation of biomass gasification plants in Austria, of the documents required for the permit procedures and of the competent authorities can be found in chapter 4 of the "Guideline on safety and authorisation of biomass gasification plants" (Leitfaden - Anlagensicherheit und Genehmigung von Biomassevergasungs-anlagen), cf. table 3.4. Small BGPs operated on a commercial basis will be covered by the Trade, Commerce and Industry Regulation Act [Gewerbeordnung]. Production of electricity is subject to Austrian electricity law.

Denmark

Permit procedure requirements for BGPs in the 1 – 5 MW thermal range are detailed in Annex 5 Section 3 of the Approval Order (BEK No. 1640 of 13/12/2006). This order contains a detailed description of the information that needs to be presented when applying for a permit.

Germany

For BGPs with less than 1 MW thermal rating of the produced gas and/or the CHP engine, only a building permit from the local building authority will be required. For larger plants or if an environmental impact assessment is necessary (for site-specific reasons), the activity will be subject to an environmental permit procedure, which will include other relevant permits. Noise emission from BGP operation can be an important factor for the choice of a suitable site for the plant.

Netherlands

Permits for small-scale biomass plants are issued by local government, mostly the municipality or province. Building permit includes the need for a declaration of clean soil as it is prohibited to build on polluted soil.

Municipality and municipal Fire department evaluate proposed fire protection and safety measures, as stipulated in the Building Decree.

BAT is important to obtain environmental and building permit.

Switzerland

Issues of environmental protection (emissions, waste) and occupational safety are treated as part of building permit procedures. The application for a building permit [Baugesuch] must include a declaration on emissions [Emissionserklärung] and an application for permits according to occupational law for planning and operation of an industrial installation [Plangenehmigung, Betriebsbewilligung].

Building authorities of the "cantons" are the competent authorities for building permit procedures.

Fire safety of the installation has to be described when applying for fire insurance at the building insurance of the canton [Kantonale Gebäudeversicherung], which is compulsory.

6 Legal background of "best available techniques" requirements

According to Article 2 of the IPPC Directive, "best available techniques" (BAT) shall mean the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole:

- 'techniques' shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;
- 'available' techniques shall mean those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the member state in question, as long as they are reasonably accessible to the operator;
- 'best' shall mean most effective in achieving a high general level of protection of the environment as a whole.

Article 9 of the IPPC Directive requires that emission limit values (or equivalent parameters and technical measures) for activities in the scope of that directive shall be based on the "best available techniques", without prescribing the use of any technique or specific technology, but taking into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions.

Due to the thermal rating and to the type of feedstock used, biomass gasification plants as considered in this project are clearly not in the scope of Annex I, Category 1 (Energy Industries) of the IPPC Directive. Neither can these BGPs be classified as any of the "Other activities" listed in Category 6 of Annex I to the IPPC Directive. Therefore, there is currently no requirement at the European level from the IPPC directive to apply emission limit values or emission abatement requirements based on BAT. As has been pointed out in chapter 3.2, however, small and medium BGPs are in the permit scope of some national regulations transposing the IPPC Directive. Therefore, some national permit procedures for BGPs include the requirement that emission limit values (or equivalent parameters and technical measures) shall be based on BAT.

In the BREF document of July 2006 on large combustion plants, for example, gasification of biomass is described as an 'emerging technique' that is currently performed in demonstration units only. This is an indicator that the techniques for exhaust gas cleaning of biomass gasification plants, large-scale or small-scale, are in the stage of development, too. The questions

- which emission abatement techniques from standard combustion applications can be successfully transferred to small biomass gasification plants; and
 - which emission values can thus be achieved,
- still need to be answered, taking both environmental and economic considerations into account.

A brief description of techniques for emission abatement that are currently used in small-scale biomass gasification plants is presented in chapter 6 of this Guide.

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