# Key environmental Issues (KEI)

IED demands that BAT-AELs should be derived from data collection and not from legal limits. The results of the questionnaires are technical and analytical very unclear, to that the reported data on pollutant emission values cannot be used to fix any BAT-AEL. First of all an EU wide harmonized way to measure should be determined and the introduction of BAT-AELs postponed for the next BREF revision process. Additionally emissions limits will be set in Medium Combustion Plant (MCP) directive for all kind of fuels and gases and don’t have to be part WT-BREF only for biogas derived from wastes.

For the setting KEI it is of general importance if they can be determined for channeled emission from an abatement system (e.g. from reception building) and/or for diffuse emissions which have to be related to the complete treatment facility. AD plants feeding liquid wastes from the transport tank directly into the closed storage which are connected to the biogas system do not have an abatement system and therefore no channeled emissions. In this case only diffuse emissions can be measured.

Different aspects must be considered independently:

• General environment protection objectives like e.g. GHG emissions, potential impacts on ground and surface water: *general environmental indicator (G)*

• Nuisance related emissions: perception in the vicinity of the plant / complaints and specific health protection: *local perception /nuisance precaution (L)*

• Indicators for a best available performance of the plant: *key process parameter to be monitored (P)*

**Odour *(L)/(P):***

Compounds known as being odorous, such as NH3, H2S and other sulfur compounds or VOCs, are generated when applying biological waste treatment systems. Odorous emissions releases may be perceived by the population living in the vicinity of the installation and may cause nuisance and complaints, depending on the location of the treatment facility. This very much depends on the local meteorological conditions, the type of source, the odour type (waste, manure, forest, earth, etc.) the hedonic tone, the amount of odour emissions (odour emission rate), the techniques used to reduce odour and other parameters relevant for the individual case under investigation (operational conditions, kind of waste input material, etc.).

Measuring odour as an emission can be a key environmental issue parameter for describing the public acceptance of the plant e.g. if there are complaints from the neighborhood. Odour can arise as fugitive emissions from waste reception buildings, pressure relief valves and open storage tanks. Odour can also be measured at the biofilter (if there is one in place for channeled emissions) to check the performance of the biofilter, the abatement technique and the plant design. KEI on Odour measurement is a generic KEI for all biological treatment.

**Dust *(L)/(P):***

Dust screening should only be carried out in the case of odour problems and only on plants where a direct dust release is possible e.g. from plants where the digestate is composted. A control of dust emissions is not practicable for AD plants, because dust is no diffuse emission from closed systems. KEI on dust screening should be referred for post-composting in the composting section.

**Hydrogen Sulphide (HsS) *(L)/(P);***

Hydrogen sulphide originates from S-containing protein breakdown (like cysteine and methionine), but is in contradiction corrosive for engines and downstream machinery and extremely harmful or even deadly for human beings. H2S is also an odourous substance at a very low threshold.

Input feedstock and output digestate materials can produce these gases spontaneously when stored, mixed or handled in biogas systems. Sulphide volatilization at the anaerobic digester is a function of many operational parameters including pH value, sulphate loading rate, metal concentration and biogas production rate. There are other potential sources of fugitive emissions, including those from emergency vent valves, poorly sealed water traps, flanges and other unions within/between pipework and the reactor headspace and within the gas collection pipework. BAT is implementing a plan for the prevention, limiting, detection and control of unwanted chemical reactions (e.g. formation of H2S) and of fugitive releases in particular for waste storage, mixing and pre-treatment areas, biogas production and storage, etc. This can include an early warning system to detect gas emissions (e.g. using portable or fixed gas sensors). There are different methods available to avoid H2S forming in the digester (adding metal salts, internal biological oxidation) or to remove it from the biogas described (external biological oxidation, scrubbing biogas with adsorbents) which are also described in C4 and C5. In case of odour problem, H2S would be assessed (at emission / in the vicinity) to identify remedial measures.

**Ammonia (NH3) *(G), (P):***

Nitrogen-based compounds (protein, urea, uric acid, etc.) enter the process with the feed material. Although in the untreated raw waste the nitrogen is predominantly organically bound, subsequent degradation of these compounds, under both aerobic and anaerobic conditions, produces ammonium (NH4+) and ammonia (NH3). Process parameters such as pH, temperature or moisture content determine the NH3/NH4+ balance and hence the ammonia emission into air. Nitrogen losses from biologically treated material imply a poor agronomical quality of the final stabilized material and environmental pollution problems such as odor nuisance. Ammonia plays a key role for the neutralization of acidic gases and aerosol particles. The uptake of NH3 on aerosol particles influences the aerosol chemical composition and controls the acidity and nitrification of precipitation. Ammonia emissions are also associated to occupational risks and health risks for the general population living near to waste treatment facilities and, although exposure concentrations may not be of toxicological relevance, sensory irritation of such compounds should not be dismissed.

High ammonia is toxic for AD biology especially at high pH and temperatures.

The exhaust air emissions from waste treatment plants play a key role with regard to the acceptance by the population (odour problems) and the ecologic evaluation of the process (nutrient losses). Ammonia represents (together with volatile amines) the main nitrogen gas emitted from biological treatment activities. The exhaust air from the biofilter can be controlled on its ammonia concentration to decide if an ammonia washer before the biofilter could be necessary. KEI on ammonia control should be referred to the composting section.

**Methane (CH4) *(G):***

Biogas is a renewable energy source which can be used for the production of electricity, heat, biomethane and fuel. Dry biogas has a typical composition of 55 – 70 % methane. The biogas yield and the proportion of methane to carbon dioxide will vary with the feedstock and the temperature of the system. Methane is not toxic but extremely flammable and may form explosive mixtures with air (4.4 – 16.5 Vol. % methane content). As well methane is a greenhouse gas with a potential 25 times higher than carbondioxid (CO2) that is why the emission of methane into the atmosphere has to be avoided.

Fugitive methane emissions from the biogas system can appear - the same like H2S emissions - from emergency vent valves, poorly sealed water traps, flanges and other unions within/between pipework and the reactor headspace and within the gas collection pipework. BAT is implementing a biogas leakage-control system: In order to identify and reduce significant fugitive emissions pipe work (gas transmission), pressure relief valves, pumps, water traps, condensate systems etc. could be monitored for biogas leakage (e.g. with gas detectors).

**Noise *(L)***

Potential sources of noise at AD plants include the use of mobile plant on site, vehicle movements (i.e. reversing warnings) and CHP engines, for example. Noise can cause disturbance of local receptors which can result in complaints from residents. The level of noise disturbance from AD plants can be very limited, but this depends on the plant/machinery chosen, effectiveness of noise prevention/mitigation measures, prevailing wind direction and proximity of receptors.

In some circumstances, a noise management plan should be implemented to ensure effective noise management and prevent annoyance. Furthermore, in some cases noise modelling may be necessary as part of an Environmental Permit application but the requirement for this would be judged on a case by case basis.