

MEDIUM COMBUSTION PLANT DIRECTIVE PROPOSALS – SHOULD WE BE CONCERNED?

This proposed new directive is intended to cover, for the first time, emissions of NO_x, SO₂ and dust from medium-sized combustion plants (MCP) with a rated thermal input between 1 and 50 MW. The general approach that has been drafted over the last 12-18 months will provide a basis on which the Latvian Presidency of the Council will start negotiations with the European Parliament. The European Parliament's ENVI Committee is expected to vote on the proposal in April or May 2015.

So we will have some new rules for combustion plants across Europe that are intended to close a regulatory gap between the eco-design Directive, 2009/125/EC, and the Large Combustion Plant (LCP) Directive, part of IED 2010/75/EU. The EU recognises that emissions of pollutants to air have been reduced significantly over the past decades, but at the same time air pollution levels are still a problem in many parts of Europe, and citizens of the Union continue to be exposed to poor air quality, potentially compromising their health and wellbeing; agriculture and ecosystems are similarly affected.

There is no doubt about why this Directive is being proposed; scientific assessments show that the average lifetime loss for citizens of the Union due to air pollution is eight months. Emissions of pollutants from the combustion of fuel in medium combustion plants are generally not regulated at EU level although they contribute increasingly to air pollution, due in particular to an increase in the use of biomass as a fuel, driven by climate and energy policy.

But are we going to get a directive that works, or is it just a mixture of requirements from individual Member States that will allow some combustion plants to continue unabated and make life quite difficult for others?

Timescales

Let's start with when this all happens. If you currently operate combustion plants each with a rated thermal input of less than 5MW, nothing will happen until January 2030. You have 15 years to decide whether your plant is compliant, whether the plant is needed or not, whether it should be replaced with something less polluting, or whether you need to change your fuel or abate the emissions. You will be required to register the plant with an as yet unknown 'Competent Authority', and they will probably want a baseline emissions measurement to be recorded, but there's plenty of time.

If your existing combustion plant is over 5MW thermal input (and less than 50MW but not already an LCP) you have to be ready and register the plant five years earlier, with emission limits applying in Jan 2025; but that is 10 years away, so still plenty of time to make any decisions. Existing plants will be regulated individually; a combination of <5MW and >5MW plants on one site will be regulated at different times.

The situation is a little more pressing for new combustion plants. Dates are not yet finally agreed, but we believe that if you install and operate a new combustion plant from around Jan 2019 it will have to comply with tighter emission limits than existing plants. Alternatively, if you have a new installation permitted before that date and you put it into operation within one year, it is likely to be classed as an existing plant, otherwise it has to be operated as a new plant and meet new plant emission limits.

Aggregation

An added complication only for new plants is the 'aggregation clause'. No plants with a rated thermal input of less than 1MW each are included in this Directive, but if you have more than one new plant on your site and the total input of all the new plants is over 5MW, you will be treated as a >5MW site. If your one plant, or a combination of plants, is in total less than 5MW, you will be treated as a <5MW site and the <5MW new plants will be regulated individually. A similar calculation will be needed for plants that have different ELVs and monitoring regimes for >20MW plants.

The decision as to whether this aggregation clause applies will rest with the Competent Authority. If the new plants exhaust through a common stack or a number of stacks in a common windshield, or, in the opinion of the Competent Authority they technically and economically could do, the new plants are added together for the purposes of this directive.

The sizes of plants that are likely to be included in the directive are relatively modest. 1MW nett thermal input is roughly equivalent to making around 1.25 tonnes of steam per hour or generating 450kVA of electricity – not large plant by any standards.

Exclusions

A large number of combustion installations are excluded from the requirements of this directive.

The full list of exclusions must be taken from the text of the Directive as it is lengthy and detailed, but the most common exclusions are:

- combustion plants which are covered by Chapter III (LCPs) or Chapter IV (Waste plants) of Directive 2010/75/EU (IED);
- where products of combustion are used for direct heating, drying or any other treatment;
- plants designed to purify the waste gases from industrial processes by combustion and which are not operated as independent combustion plants;
- when used in the propulsion of a vehicle, ship or other watercraft or aircraft;
- facilities for the regeneration of catalytic cracking catalysts;
- facilities for the conversion of hydrogen sulphide into sulphur;
- reactors used in the chemical industry;
- coke battery furnaces;
- cowpers;
- crematoria;
- gas oil engines, gas turbines and gas engines used on offshore platforms, with the exception of new gas engines and new gas turbines which are used for mechanical drives;
- plants firing refinery fuels alone or with other fuels for the production of energy within mineral oil and gas refineries;
- recovery boilers in installations for the production of pulp;

- on-farm combustion plants with a total rated thermal input not exceeding 5 MW, which are exclusively using unprocessed poultry manure as a fuel;
- plants installed in non-road mobile machinery;
- research activities, development or testing of combustion plants.

The Directive also proposes special arrangements for off shore Mediterranean and Atlantic Islands, and throughout the emission limit tables there are special cases for many users including Small and Micro isolated Systems, coke oven and blast furnace gases, biogas, some solid biomass, District Heating Schemes and users of HFO.

The list of potentially excluded plants and special cases seems to represent some lengthy and detailed negotiation by many vested interests across the EU.

Exemptions and Derogations

In addition to the exclusions listed above, there are also two exemptions that have been included in the latest text of the directive.

If your medium combustion plant does not run for more than 1000 hours per annum it will have to be registered and the hours run must be recorded, but the emission limits do not apply (unless it is a solid fuel plant which must monitor dust). The 1000 hour limit is for existing and new plants, and is calculated on a 5 year rolling average; so it is likely that you could run for 5000 hours in one year and not at all in the next 4 years and be eligible for this exemption, although the precise method for calculating this is not yet decided.

We can therefore probably exclude many standby diesels from the emission limits, and some standby boiler plant, maybe even a 'summer boiler' if you have one for occasional use. It might even be possible for some sites with significant over capacity in their boiler house to run most, if not all, of their plant at less than 1000 hours per annum and not need to meet emission limits – 1000 hours is approximately a single shift 5 day operation for 20 weeks.

Recording the hours run and monitoring these plants will be onerous and potentially complex. Periods of start-up and shut-down of the plant are not counted in the operating hours calculation.

Another exemption is intended to apply to existing plants that are not going to be needed in the future because they are perhaps reaching the end of their useful life. This is known as the Limited Life Derogation, and it is for a maximum of either 5 years or 11,000 operating hours starting from the date from which you would be required to apply emission limits to that particular plant. So if your 4MW boiler is due to be replaced because it cannot meet the existing plant emission limits you have an extra 5 years (or 11,000 operating hours) from Jan 2030 to scrap the boiler.

Note that you must be planning to remove the plant item from your site – you cannot use this exemption to extend the compliance date for emissions, and the requirement to register the plant and report its running hours will remain.

Two further derogations are also included. The first is for cases where the plant operator is unable to comply with emission limit values for SO₂ because of an interruption in the supply of low-sulphur fuel resulting from a serious shortage; this is for a maximum of 6 months.

The second is for cases where a combustion plant using only gaseous fuel has to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas

and for this reason would need to be equipped with a secondary abatement equipment in order to meet emission limits. This derogation should not exceed 10 days.

Emission limits

The directive is at present only concerned with emissions of NO_x, SO₂ and dust. However, in order to ensure that the operation of medium combustion plants does not lead to a deterioration of air quality, measures taken to limit emissions of NO_x, SO₂ and dust into the air should not result in an increase of emissions of other pollutants, such as carbon monoxide. Further work, due to be completed by 2023, will advise on emission limits for additional pollutants being required for new plants – this work will not alter the ELVs for existing plants.

Over two thirds of the plants across Europe that are likely to be affected by this directive are fired on natural gas. A significant further number are fired on gas oil, with a number being dual fuelled, including boilers, turbines and engines. The emission limits for natural gas and gas oil are proposed as follows:

ELVs for firing Natural gas and Gas oil only

| Type of plant | From Date | Nat gas NO_x mg/Nm³ | Gas oil NO_x mg/Nm³ |
|--|--------------------------------|---|---|
| Existing <5MW plant not an engine or turbine | 1/1/30 | 250 | 200 |
| Existing >5MW plant not an engine or turbine | 1/1/25 | 250 | 200 |
| Existing engine | <5MW – 1/1/30 >5MW – 1/1/25 | 190 | 190 |
| Existing turbine (only above 70% load) | <5MW – 1/1/30 >5MW – 1/1/25 | 150 | 200 |
| New plant all sizes not an engine or turbine | 1/1/19* | 100 | 200 |
| New engine | 1/1/19* | 95 | 190 |
| New turbine (only above 70% load) | 1/1/19* | 50 | 75 |

* - date subject to confirmation

There are some deviations from these ELVs in special cases, but the majority of industrial and commercial users who only use gas or gas oil will fall into the above categories. Some dual fuelled plant has less onerous limits when using the alternative fuel.

Different ELVs apply for other fuels, and proposed ELVs for a few of the more common plant types are tabulated below.

Multi-fuel users will have to calculate the fuel weighted average of the plant from operating hours on each fuel as compared to total run hours to reach a suitable ELV. Presumably, an aggregated new plant using different fuels or different technologies will require an ELV formula to be agreed with the Competent Authority.

As an example, a typical new small biomass and CHP scheme with a 4MW baseload wood pellet boiler, a 1MWe gas fired CHP engine and a pair of 3MW dual fuel gas/gas oil hot water 'peak lopping' boilers will need to keep very good records of hours run on each plant item and the relative percentage fuel used (or heat and electricity generated) for each unit.

Also, suddenly finding at the end of the year that one of the boilers is likely to be excluded because it ran less than 1000 hours is going to make the calculations quite complex – the 1000 hour exclusion is calculated on a 5 year rolling average so many years' of data needs to be kept!

Proposed ELVs for a few of the more common plant types

Heavy Fuel Oil boilers, (also any other liquid fuel other than gas oil) ELVs in mg/Nm³

| Size | NOx | SO ₂ | dust |
|------------------|--------------------|--------------------------------|------|
| Existing 1-5MW | 650 | 1700 until 1/1/35 350 after | 50 |
| Existing 5-20MW | 650 | 850 until 1/1/35 350 after | 30 |
| Existing 20-50MW | 650 | 350 | 30 |
| New 1-5MW | 300 | 350 ⁽¹⁾ | 50 |
| New 5-50MW | 300 ⁽²⁾ | 350 ⁽³⁾ | 20 |

¹ Until 01/01/2025, 1700 mg/Nm³ for plants part of Small Isolated Systems (SIS) and Micro Isolated Systems (MIS).

² Until 01/01/2025, 450 mg/Nm³ when firing heavy fuel oil containing between 0.2% and 0.3% N and 360 mg/Nm³ when firing heavy fuel oil containing less than 0.2 % N for plants being part of SIS and MIS as defined in Directive 2009/72/EC.

³ Until 01/01/2025, 1700 mg/Nm³ for plants being part of Small Isolated Systems (SIS) and Micro Isolated Systems (MIS) as defined in Directive 2009/72/EC.

Solid Biomass boilers, ELVs in mg/Nm³

| Size | NOx | SO ₂ | dust |
|------------------|-----|--------------------|------------------------------|
| Existing 1-5MW | 650 | 200 ⁽¹⁾ | 100 until 1/1/35 50 after |
| Existing 5-20MW | 650 | 200 ⁽¹⁾ | 50 |
| Existing 20-50MW | 650 | 200 ⁽¹⁾ | 30 |
| New 1-5MW | 500 | 200 ⁽²⁾ | 50 |
| New 5-20MW | 300 | 200 ⁽²⁾ | 30 |
| New 20-50MW | 300 | 200 ⁽²⁾ | 20 |

¹ The value does not apply in cases of plants firing exclusively woody solid biomass, and is 300 mg/Nm³ for plants firing straw.

² The value does not apply in cases of plants firing exclusively woody solid biomass.

Coal fired boilers, (also any other solid fuel other than biomass) ELVs in mg/Nm³

| Size | NOx | SO ₂ | dust |
|------------------|-----|-----------------|------------------------------|
| Existing 1-5MW | 650 | 1100 | 100 until 1/1/35 50 after |
| Existing 5-20MW | 650 | 1100 | 50 |
| Existing 20-50MW | 650 | 400 | 30 |
| New 1-5MW | 500 | 1100 | 50 |
| New 5-20MW | 300 | 1100 | 30 |
| New 20-50MW | 300 | 400 | 20 |

Biogas fired boilers, (also any other gas fuel other than natural gas) ELVs in mg/Nm³

| Size | NOx | SO ₂ | dust |
|-----------------|-----|--------------------|------|
| Existing 1-5MW | 250 | 200 ⁽¹⁾ | - |
| Existing 5-50MW | 250 | 35 ⁽²⁾ | - |
| New 1-5MW | 200 | 110 ⁽³⁾ | - |
| New 5-50MW | 200 | 35 ⁽⁴⁾ | - |

¹ 400 mg/Nm³ for low calorific gases from coke ovens.

² 400 mg/Nm³ for low calorific gases from coke ovens, 200 mg/Nm³ for low calorific gases from blast furnaces, and 170 mg/Nm³ for biogas.

³ 400 mg/Nm³ for low calorific gases from coke ovens and 200 mg/Nm³ for low calorific gases from blast furnaces.

⁴ 400 mg/Nm³ for low calorific gases from coke ovens, 200 mg/Nm³ for low calorific gases from blast furnaces, and 100 mg/Nm³ for biogas.

Monitoring and reporting

It will be up to the Competent Authority in each Member State to agree a registration scheme for medium combustion plants and decide on all the necessary administrative means to ensure full implementation in their country. The Competent Authority for the UK is not yet decided – it could be the Environment Agency (including their colleagues in SEPA and NIHES), or maybe Local Authorities.

Whatever happens, there will have to be a rigorous process for:

- Deciding on the means of registration and the information required;

- Registering all plants that come under the directive;
- Dealing with exclusions;
- Dealing with exemptions;
- Dealing with derogations;
- Making rules for measurement procedures;
- Assessing measurements for compliance;
- Dealing with non-compliance;
- Reporting back to the EU on progress in implementation and compliance; and many other features.

In general terms, periodic measurements of SO₂, NO_x and dust shall be required at least every three years or, as an alternative, after a maximum of 4500 operating hours, for plants with a rated thermal input greater than 1 MW and less than 20 MW, and at least annually or, as an alternative, after a maximum of 1500 operating hours, for combustion plants with a rated thermal input equal to or greater than 20 MW but less than 50 MW. The aggregation clause will apply to >20MW plants to require annual measurement.

Measurements are only required for pollutants for which an emission limit value is laid down for the plant concerned. The first measurements must be carried out within six months following the permitting or registration of the plant or the date of start of the operation, whichever is the latest. A rush to register and measure all MCP emissions is predicted to occur as soon as the directive is transposed into UK law. As an alternative to the periodic measurements, Member States may require continuous measurements. In this case, the automated measuring systems shall be validated by means of parallel measurements at least once per year.

Summary

So is the air quality in Europe really going to be better in 2030 as a result of managing emissions from medium combustion plants? It does seem like a very long time to wait, and when it comes it will probably seem like a fairly easy target for most operators. The main issues will be the burden of measurement for operators and administration of the process by the Competent Authority.

It has been said that the directive has been watered down quite considerably from the original proposal. When we started just over 12 months ago we had no aggregation, no limited life derogation, a stricter regime for poor air quality zones, some quite tight ELVs, few special cases for different fuels, no differentiation between <5MW plants and >5MW plants, a 300 hour exclusion operating limit, and a very limited list of excluded plants.

Many in the industry will say that the ELVs for natural gas fired plants are far too loose for most applications, and this is where the majority of the NO_x will come from. Conversely, some biomass installations and many heavy oil installations may be quite badly hit, and solid fuel plants will probably be very difficult to operate without abatement. To counter this, we have until 2025 or 2030 (maybe longer) to sort everything out, and even then there are the options of limited annual running hours or a limited life derogation to extend the deadlines. Let's wait and see!