Directive (EU) 2015/2193
of the European Parliament and of the Council of 25 November 2015
on the limitation of emissions of certain pollutants into the air
from medium combustion plants
(MCP Directive)

EUROPEAN
DATA CENTRE
ASSOCIATION

Medium Combustion Plant Directive

A White Paper prepared by the EUDCA Technical Committee

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Medium Combustion Plant Directive

1. Introduction

Air pollution levels are still problematic throughout the world and Europe. This issue is affecting the health of both the population and ecosystems. In an aim to combat this, many countries and governing bodies are implementing regulations limiting emissions from polluting sources.

In Europe, a number of schemes have been put in place relating to different sectors. Most recently, the European Union (EU) has introduced the Medium Combustion Plant (MCP) Directive. This aims to regulate the maximum emissions from medium-sized plant and came into force on 18 December 2015. Each Member State will be required to transpose the directive into domestic law by 19 December 2017.

The MCP Directive will have a direct impact on data centre design and operation, primarily in relation to standby or primary generator sets. Many data centre generators will be required to meet the Directive's local implementation requirements due to the typical capacities utilised in the industry. As a minimum, the Directive will require plant emissions to be monitored on a regular basis by the data centre operator and require existing equipment to be abated/modified where it is not meeting emission limits. This implementation will likely affect permitting, procurement and maintenance procedures for the new and existing data centres.

2. What is it and who does it apply to?

- The Medium Combustion Plant (MCP) Directive is EU legislation that is expected to be transposed into EU member country legislation. The Directive places emission limit values (ELVs) on nitrogen dioxide (NO_x), sulphur dioxide (SO_2) and dust from MCPs.
- The data centre industry will be directly affected by the Directive due to the typically significant standby power requirements.
- The Directive's applicability is based upon the thermal input of a given plant item. More specifically, it applies to plants rated at a fuel input of greater or equal to 1 MWth and less than 50 MWth. *For the purposes of this data centre-related document, capacities will be referred to herein as electrical outputs based upon a typical generator conversion factor of 0.3. Other equipment have differing conversion factors.*
  A typical 1MW IT load data centre will have a generator thermal capacity in the range of 4 to 6 MWth (taking into account PUE, standby capacity etc.).
- As illustrated in the figure below, the Directive applies to generators rated at greater or equal to 0.3 MW generator electrical output (MWe-gen) and less than 15 MWe-gen.

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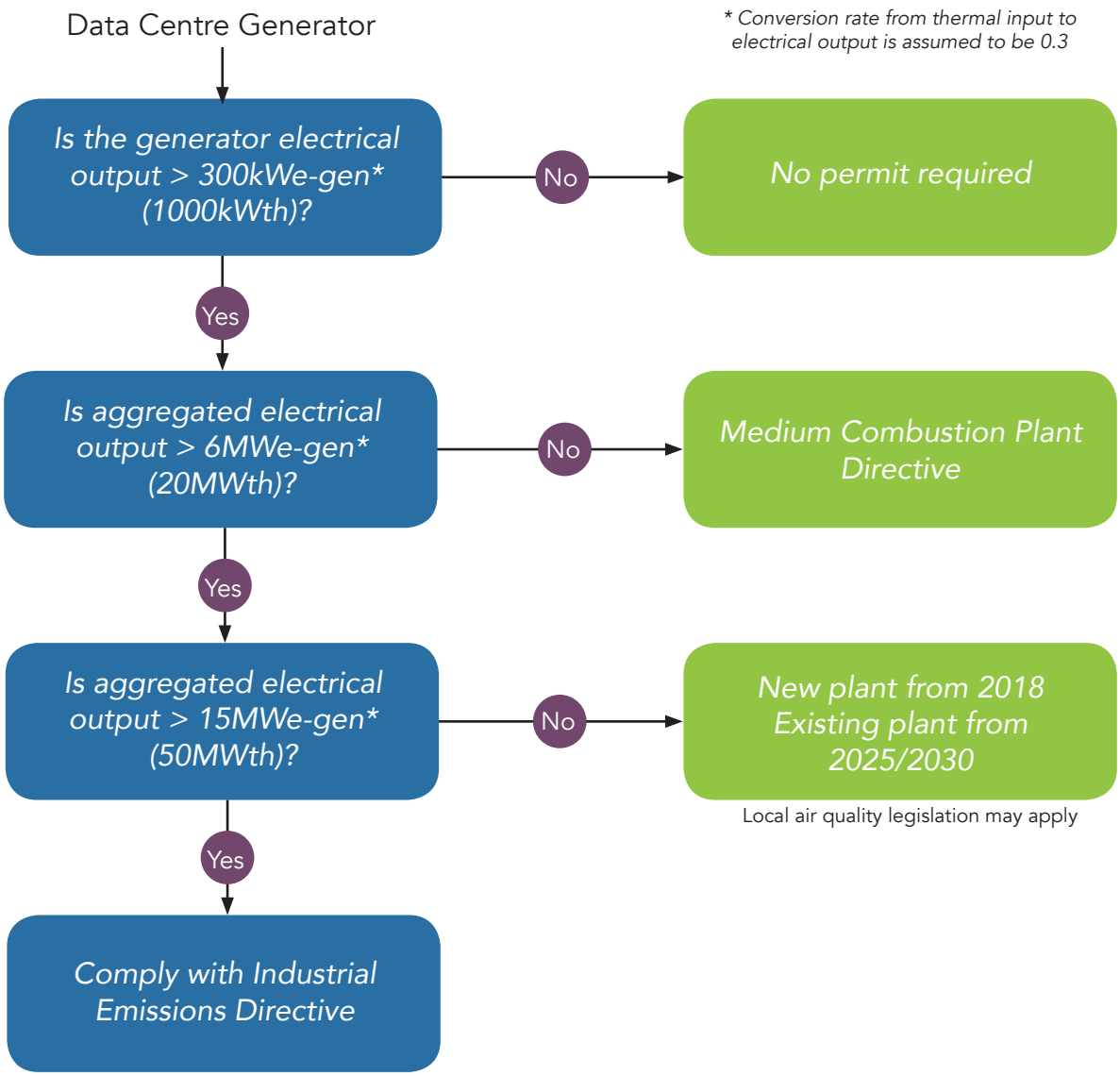
- The emissions limit values are shown in the Annex II of the Directive and are based on:
  - 15% O_2 for gas engines/ turbines; 6% O_2 for solid fuel combustion plants; 3% O_2 for medium combustion plants other than gas engines/turbines;
  - A temperature of 273.15 Kelvin (0°C) and pressure of 101.3 kPa (absolute).
- Aggregation also applies to combustion plants which are one of the following:
  - Formed by two or more new medium combustion plants greater than 0.3 MWe-gen and where they are discharged into a single, common stack.
  - Formed by two or more combustion plants and are greater than 15 MWe-gen and discharged to a single, common stack. In this case, the "single stack" aggregation of the Industrial Emissions Directive (IED) could lead to complex cases of plants having to comply both with the MCP and IED.



3. Implications

3.1 New Plant

- The Directive shall enter into force on the 20th day following that of its publication in the Official Journal of the European Union (25th November 2015) which occurred on the 15th December 2015.
- Similar to other air emission directives such as the Industrial Emissions Directive, there will be a transitional period. The MCP Directive allows member states up to two years to transpose the Directive into national legislation from the date the MCP enters into force (refer Article 17);
- This transitional period provides combustion plants currently not operating, an ability to be defined as an existing combustion plant (with less stringent ELV limits) up to three years from when the Directive enters into force; two years to transpose the Directive into national legislation; and then one year from the transposition of the Directive into national legislation).
- The new Directive (EU) 2015/2019 defines an "existing combustion plant" as "a plant being put into operation before 20th December 2018 or for which a permit was granted before 19th December 2017 pursuant to national legislation provided that the plant is put in operation no later than 20th December 2018."

Technology Requirements

- Gas engines will have to comply with 250 mg/Nm^3 (at 5% O_2) requiring "advanced" lean burn concepts to comply with the 100 mg/Nm^3 (at 15% O_2). This should be available for all manufacturers but will mean a reduction in efficiency (1-2%).
- Solid fuel plants will be required to comply with 20 mg/Nm^3 to 50 mg/Nm^3 for dust, meaning electrostatic precipitators or fabric filters will be required. Depending on particulate loading, cyclones and electrostatic precipitators may be required for biomass plant

3.2 Existing Plant

- For those plants that can be defined as existing, the MCP Directive allows the following waiting periods in which to comply with the ELV requirements of the legislation:
  - Existing combustions plants >1.5 MWe-gen: From 1 January 2025
  - Existing combustions plants <= 1.5 MWe-gen: From 1 January 2030.

Technology Requirements

- Gas engines to comply with the requirements of 200 mg/Nm^3 (at 15% O_2) of NOX will need to be fitted with lean burn (500 mg/Nm^3 at 5% O_2). This is already available for all engine manufacturers.

- Solid fuel plants are required to meet 30 mg/Nm^3 or 50 mg/Nm^3 for dust. This will ultimately mean a requirement for electrostatic precipitators or fabric filters. Cyclones will not be sufficient for meeting the Directive even for low particulate matter fuels such as wood pellet, unless the boilers supply 50% of their useful heat for district heating or they are situated in zones where under Directive 2008/50/EC. This ensures air quality compliance where they need to meet 150 mg/Nm^3.
- Heavy fuel oil plants to comply with NO_x and SO_x will likely need to convert to distillate / diesel/ light fuel oil/ gas oil. The resulting impact will be greater fuel costs.

3.3 Emissions Monitoring

Periodic monitoring by the operator of ELV pollutants is a requirement for SO_2, NO_x, dust and CO. Key requirements for monitoring are as follows:

- 0.3 - 6 MWe-gen plant emissions are required to be monitored every 3 years.
- Plants greater than 6 MWe-gen are required to be monitored annually.
- Initial monitoring is required within four months of plant being permitted/registered (for existing plant) or prior to starting operation (for new plant).
- Reduced frequency of monitoring allowed if plant operates less than 1000 h/year.
- Alternative monitoring requirements are allowed for SO_2, subject to local implementation.
- Monitoring shall be assessed based upon stable conditions only.
- Local authorities may specify continuous monitoring as an alternative to periodic monitoring if preferred.

4. Exclusions/Exemptions

Whilst the Directive allows Member States a number of exemptions, it is ultimately up to each Member State to decide whether these exemptions can be put into place. This adds further complexity to the local implementation process. In some countries, these opportunities for flexibility have been brought forward for public consultation.

A sample of some of the exclusions allowable by the MCP Directive are outlined below:

- Plants governed under the Industrial Emissions Directive (IED) (2010/75/EU) e.g. those which are over 15 MWe-gen.
- Member states can exempt medium combustion plants used for emergency and operated during limited time periods. In particular, the MCP (similar to the IED) states that medium combustion plants can be exempted for meeting the emission limit values, if they are:
  - Existing combustion plants that operate less than 500 each year (excluding start-up and shutdown periods), over a rolling five-year period.
  - New combustion plants that operate less than 500 each year (excluding start-up and shutdown periods), over a rolling three-year period, provided the plants comply with a dust level of 100 mg/Nm^3 if burning solid fuel.

5. Associated Regulations and Schemes

As mentioned above, a number of existing areas of legislation and schemes relate to the new Directive. These will require updates in order to take the new ELV requirements into account. A sample of European, national and local examples have been included below, some of which have crossover/conflicts with the newly required emission levels:

- 2010/75/EU Directive on industrial emissions (integrated pollution prevention and control) – IED
- EU Emissions Trading Scheme – EU
- EU The Sulphur Content of Liquid Fuels Regulations (SCoLF)
- EU Clean Air Policy Package
- Various national Environmental Permitting Regulations & Pollution Prevention and Control Regulations

Local Implementation and Permitting

As the deadline for local implementation has not yet arrived, there remains a lot of uncertainty in the exact process that each Member State will employ. It is for this reason that this section should be treated as live. Currently, there is insufficient information available to ascertain who the governing bodies in every country might be. It would be expected that the implementation would be handled by national environmental and planning agencies but there may also be some crossover with other sectors, e.g. building energy regulators.

Implementation of the Directive continues to be challenging for the reasons below:

- Complex regulatory controls
- Different national and international regulatory controls – similar but varied focus.
  - Air Quality and /or holistic focusses.
  - Guidance
- Exemption schemes.
- Various regulators involved.
- New legislation.
- Guidelines slow to be developed/updated – regulator uncertainty

Existing ELV Limitations

Lower ELVs than those proposed in the Directive are already in effect, for certain classes of Combustion Plant, in a number of European countries and elsewhere. The table below indicates a grab sample of existing national ELV limits.

Country/Region	Gas (mg/Nm^3)	Oil (mg/Nm^3)
Switzerland	80	120
Denmark	106	200
Austria	80	150
Germany	100	200
Beijing	30	150
Rest of China	100	200

6. Next Steps

The main impact of the MCP on Data Centre design and operation will relate to generators. This will likely necessitate additional permitting requirements and ongoing emission monitoring. There may be an exemption if the plant is utilised for emergency purposes only (not power sharing). Allowance of this exemption will be decided upon at a local level and this will become clearer as local implementation is finalised.

As described above, local implementation and understanding of the Directive will be challenging. Legislation is still emerging therefore it is important that data centre operators understand their localised requirements. There is still a lack of information available on the directive's procedural impacts at this late stage however some initial guidelines are outlined below:

1. Ascertain whether the proposed plant will be of a capacity which requires compliance with the directive. The graphic outlined in Section 2 should assist with this exercise.
2. Ascertain the anticipated running time of the proposed plant and cross check against the directive's exemptions. Note that these exceptions may not be applicable/legal on a national level.
3. Seek local clarification from government body (environmental agency, planning authority or other relevant party) on the local implementation of the directive. At a minimum, operators will be required to meet the limits listed in the directive, if not higher.
4. Investigate precedent projects in liaison with government body to better understand the process to compliance.
5. Update the operator's standard technical specifications relating to any new medium combustion plant, e.g. standby generators. This may lead to an uplift in unit price and reduction in generator efficiency (refer to Technology Requirements section above).
6. Update the emission monitoring procedure to meet the local implementation requirements and apply to existing sites as applicable.
7. Ascertain whether existing medium combustion plant will need to be upgraded or replaced and the timing of such remedial works (refer to Technology Requirements section above).

7. Emission Limit Value Tables

The following tables are taken from the MCP Directive and shall be used for reference.

Table 1 Emission Limit Values - new MCP

Emission limit values (mg/Nm^3) for new medium combustion plants other than engines and gas turbines

Pollutant	Solid biomass	Other solid fuels	Gas oil	Liquid fuels other than gas oil	Natural gas	Gaseous fuels other than natural gas
SO_2	200 (1)	400	-	350 (2)	-	35 (3) (4)
NO_x	300 (5)	300 (5)	200	300 (6)	100	200
Dust	20 (7)	20 (7)	-	20 (8)	-	-

(1) The value does not apply in the case of plants firing exclusively woody solid biomass
(2) Until 1 January 2025, 1 700 mg/Nm^3 in the case of plants which are part of SIS or MIS
(3) 400 mg/Nm^3 in the case of low calorific gases from coke ovens, and 200 mg/Nm^3 in the casxe of low calorific gases from blast furnaces, in the iron and steel industry
(4) 100 mg/Nm^3 in the case of biogas
(5) 500 mg/Nm^3 in the case of plants with a total rated thermal input equal to or greater than 1MW and less than or equal to 5MW
(6) Until 1 January 2025, 450 mg/Nm^3 when firing heavy fuel oil containing between 0,2% and 0,3% N and 360 mg/Nm^3 when firing heavy fuel oil containing less than 0,2% N in the case of plants which are part of SIS or MIS
(7) 50 mg/Nm^3 in the case of plants with a total rated thermal input equal to or greater than 1MW and less than or equal to 5MW, 30 mg/Nm^3 in the case of plants with a total rated thermal input greater than 5MW and less than or equal to 20MW
(8) 50 mg/Nm^3 in the case of plants with a total rated thermal input equal to or greater than 1MW and less than or equal to 5MW

Table 1 Emission Limit Values - existing MCP

Emission limit values (mg/Nm^3) for existing medium combustion plants with a rated thermal input equal to or greater than 1MW and less than or equal to 5MW, other than engines and gas turbines.

Pollutant	Solid biomass	Other solid fuels	Gas oil	Liquid fuels other than gas oil	Natural gas	Gaseous fuels other than natural gas
SO_2	200 (1) (2)	1 100	-	350	-	200 (3)
NO_x	650	650	200	650	250	250
Dust	50	50	-	50	-	-

(1) The value does not apply in the case of plants firing exclusively woody solid biomass
(2) 300 mg/Nm^3 in the case of plants firing straw
(3) 400 mg/Nm^3 in the case of low calorific gases from coke ovens in the iron and steel industry

Table 2 Emission Limit Values - new MCP

Emission limit values (mg/Nm³) for new engines and gas turbines

Pollutant	Type of medium combustion plant	Gas oil	Liquid fuels other than gas oil	Natural gas	Gaseous fuels other than natural gas
SO_2	Engines and gas turbines	-	120 (1)	-	15 (2)
NO_x	Engines (3) (4)	190 (5)	190 (5) (6)	95 (7)	190
	Gas turbines (8)	75	75 (9)	50	75
Dust	Engines and gas turbines	-	10 (10) (11)	-	-

(1) Until 1 January 2025, 590 mg/Nm³ for diesel engines which are part of SIS or MIS
(2) 40 mg/Nm³ in the case of biogas
(3) Engines running between 500 and 1 500 hours per year may be exempted from compliance with those emission limit values if they are applying primary measures to limit NO_x emissions and meet the emission limit values set out in footnote (4)
(4) Untiil 1 January 2015 in SIS and MIS, 1 850 mg/Nm³ for dual fuel engines in liquid mode and 380 mg/Nm³ in gas mode, 1 300 mg/Nm³ for diesel engines with ≤ 1 200 rpm with a total rated thermal input less than or equal to 20MW and 1 850 mg/Nm³ for diesel engines with a total rated theremal input greater than 20MW, 750 mg/Nm³ for diesel engines with > 1 200 rpm
(5) 225 mg/Nm³ for dual fuel engines in liquid mode
(6) 225 mg/Nm³ for diesel engines with a total rated thermal output less than or equal to 20MW with ≤ 1 200 rpm
(7) 190 mg/Nm³ for dual fuel engines in gas mode
(8) These emission limit values are onlu applicable above 70% load
(9) Until 1 January 2025, 550 mg/Nm³ for plants which are part of SIS or MIS
(10) Until 1 January 2025, 75 mg/Nm³ for diesel engines which are part of SIS or MIS
(11) 20 mg/Nm³ in the case of plants with a total rated thermal input equal to or greater than 1 MW and less than or equal to 5MW

Table 2 Emission Limit Values - existing MCP

Emission limit values (mg/Nm³) for existing medium combustion plants with a rated thermal input greater than 5MW, other than engines and gas turbines.

Pollutant	Solid biomass	Other solid fuels	Gas oil	Liquid fuels other than gas oil	Natural gas	Gaseous fuels other than natural gas
SO_2	200 (1) (2)	400(3)	-	350 (4)	-	35 (5) (6)
NO_x	650	650	200	650	200	250
Dust	30 (7)	30 (7)	-	30	-	-

(1) The value does not apply in the case of plants firing exclusively woody solid biomass
(2) 300 mg/Nm³ in the case of plants firing straw
(3) 1 100 mg/Nm³ in the case of plants with a rated thermal input greater than 5MW and less than or equal to 20MW
(4) Until 1 January 2030, 850 mg/Nm³ in the case of plants with a rated thermal input greater than 5MW and less than or equal to 20MW firing heavy fuel oil
(5) 400 mg/Nm³ in the case of low calorific gases from coke ovens, and 200 mg/Nm³ in the case of low calorific gases from blas furnaces, in the iron and steel industry
(6) 170 mg/Nm³ in the case of biogas
(7) 50 mg/Nm³ in the case of plants with a rated thermal input greater than 5MW and less than or equal to 20MWr equal to 5MW

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http://www.eudca.org

40 Square de Meeûs - 1000 Bruxelles - Belgique

No. D'immatriculation Association 0847 628 857