Emissions Legislation

Potential Impact of the Medium Combustion Plant Directive

The formation of NOx

Acid rain

- During the combustion of hydrocarbon fuels, NOx – Nitrogen oxides are formed due to the presence of nitrogen both within the combustion air and that organically bound within the fuel itself.

- NOx chemically NO (Nitric Oxide) + NO_2 (Nitrogen Dioxide), with NO being by far the larger component is, along with SOx (Sulphur Oxides) - the main contributor to **Acid Rain**.

- For this reason the LCPD was introduced and legislation is now being extended to Medium Combustion Plant.

- Choice of fuel is of major consideration; the air requirements for combustion are approximately equal for all fuels but the natural or organically bound nitrogen in the fuel varies from virtually zero in Natural gas, to a very small amount in Gas Oil, up to relatively large amounts in Heavy Fuel Oil and Coal.

NOx formation

Types of formation mechanisms

We differentiate between three types of nitrogen oxides according to their source and their formation mechanism:

- **Thermal NO**
  - Created by relatively high temperatures
- **Fuel NO**
  - Nitrogen content bound in the fuel
- **Prompt NO**
  - Hydrocarbon radicals -

    (NOx formation can exceed that produced from direct oxidation of nitrogen molecules – associated with by low temps, fuel rich conditions with short residence times)

Medium Combustion Plant

Directive (EU) 2015/2193

25th November 2015 –

“on the limitation of emissions of certain pollutants into the air from medium combustion plants”

Article 1

Subject matter

This Directive lays down rules to control emissions of sulphur dioxide (SO_2), nitrogen oxides (NO2) and dust into the air from medium combustion plants, and thereby reduce emissions to air and the potential risks to human health and the environment from such emissions”.

Article 2

Scope

This Directive shall apply to combustion plants with a rated thermal input equal to or greater than 1 MW and less than 50 MW (‘medium combustion plants’), irrespective of the type of fuel they use.

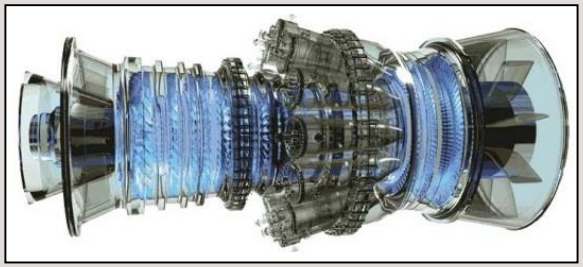
MCPD Background

Background and Scope

- Proposal originally published by the EU Commission in December 2013;
- Forms part of new Clean Air Package and will help Member States to reduce their emissions and meet revised ceilings being negotiated under the NEC Directive;
- Plugs the gap between plants covered by the IED and smaller appliances covered by Eco-design;
- Emission Limit Values (ELV's) for NOx, SOx and dust;
- Must also measure and report CO, (currently no limit values set);
- Exemptions – many listed including direct heating and drying, vehicles/ships/aircraft, offshore GT's and gas and diesel engines, crematoria, R&D and testing;
- Aggregation of new plant only;
- Low air quality zones.

MCPD Scope

- Estimated 30,000? plants in the UK to comply with ELVs;
- Estimated <75% in range 1-5MW;
- Types of plant:
  - Boilers (80%)
  - Engines and gas turbines



MCPD Timeline

Directive key dates

17 Dec 2017	Transposition completed in Member States
20 Dec 2018	New plant must be registered, test emissions and comply with Emission Limit Values (ELV's)
01/01/2024	Existing plant above 5MW must be registered and test emissions within four months of registration
01/01/2025	Existing plant above 5MW must comply with ELV's
01/01/2029	Existing plant 5MW and below must be registered and test emissions within four months of registration
01/01/2030	Existing plant 5MW and below must comply with ELV's

MCPD Emission Limit Values

at a temperature of 273,15 K, a pressure of 101,3 kPa and at a standardised O2 content of 6 % for solid fuels, 3 % for plants other than engines and gas turbines using liquid and gaseous fuels, and 15 % for engines and gas turbines.

ELVs differ for new and existing plant, different combinations of plant size, plant type and fuel type:

Plant size	Plant type	Fuel type
1-5MW	Engines	Solid biomass
5-50MW	Turbines	Other solid fuels
	Other	Gas Oil
Some 5-20MW		Other liquid fuels
		Natural gas
		Other gaseous fuels

MCPD Emission limit values

Existing burner/boilers 1-5MW – mg/Nm^3

FUEL	NOx	SO_2	DUST
NATURAL GAS	**250**		
GAS OIL	**200**		
OTHER GASES	**250**	**200** 400 for low cv coke ovens	
OTHER LIQUID FUELS	**650**	**350**	**50**
SOLID BIOMASS	**650**	**200** 300 for straw Does not apply for wood	**50**
OTHER SOLID FUELS	**650**	**1100**	**50**

MCPD Emission limit values

Existing burner/boilers 5-50MW – mg/Nm^3

FUEL	NOx	SO_2	DUST
NATURAL GAS	**200**		
GAS OIL	**200**		
OTHER GASES	**250**	**35** 400 for low cv coke ovens 200 for low cv blast furnaces 170 for biogas	
OTHER LIQUID FUELS	**650**	**350** 850 for HFO 5-20MW to 1/1/30	**30**
SOLID BIOMASS	**650**	**200** 300 for straw Does not apply for wood	**30**
OTHER SOLID FUELS	**650**	**400** 1100 for 5-20MW	**30** 50 for 5-20MW

MCPD Emission limit values

Existing engines and turbines 1-50MW – mg/Nm^3

FUEL	NOx	SO_2	DUST
NATURAL GAS ENGINES	**190** 380 if dual fuel in gas mode		
NATURAL GAS TURBINES ABOVE 70% LOAD	**150**		
GAS OIL ENGINES	**190** 250 for 1-5MW 1850 if built before 18/5/06 1850 if dual fuel in liquid mode		
GAS OIL TURBINES ABOVE 70% LOAD	**200**		
OTHER GASES IN ENGINES	**190** 380 if dual fuel in gas mode	**15** 60 for biogas 130 for low cv coke ovens 65 for low cv blast furnaces	
OTHER GASES IN TURBINES ABOVE 70% LOAD	**200**	**15**	
OTHER LIQUID FUELS IN ENGINES	**190** 250 for 1-5MW 225 for 5-20MW 1850 if built before 18/5/06 1850 if dual fuel in liquid mode	**120**	**10** 20 for 1-20MW
OTHER LIQUID FUELS IN TURBINES ABOVE 70% LOAD	**200**	**120**	**10** 20 for 1-20MW

MCPD Emission limit values

New burners/boilers 1-50MW – mg/Nm^3

FUEL	NOx	SO_2	DUST
NATURAL GAS	**100**		
GAS OIL	**200**		
OTHER GASES	**200**	**35** 100 for biogas 400 for low cv coke ovens 200 for low cv blast furnaces	
OTHER LIQUID FUELS	**300** See SIS/MIS exception	**350** See SIS/MIS exception	**20** 50 for 1-5MW
SOLID BIOMASS	**300** 500 for 1-5MW	**200** Does not apply for wood	**20** 50 for 1-5MW 30 for 5-20MW
OTHER SOLID FUELS	**300** 500 for 1-5MW	**400** 500 for 1-5MW	**20** 50 for 1-5MW 30 for 5-20MW

MCPD Emission limit values

New engines and turbines 1-50MW – mg/Nm^3

FUEL	NOx	SO_2	DUST
NATURAL GAS ENGINES	**95** 190 if dual fuel in gas mode		
NATURAL GAS TURBINES ABOVE 70% LOAD	**50**		
GAS OIL ENGINES	**190** 225 if dual fuel in liquid mode		
GAS OIL TURBINES ABOVE 70% LOAD	**75**		
OTHER GASES IN ENGINES	**190**	**15** 40 for biogas	
OTHER GASES IN TURBINES ABOVE 70% LOAD	**75**	**15** 40 for biogas	
OTHER LIQUID FUELS IN ENGINES	**190** 225 for 1-20MW <1200rpm 225 if dual fuel in liquid mode	**120** See SIS/MIS exception	**10** 20 for 1-20MW
OTHER LIQUID FUELS IN TURBINES ABOVE 70% LOAD	**75** See SIS/MIS exception	**120** See SIS/MIS exception	**10** 20 for 1-20MW See SIS/MIS exception

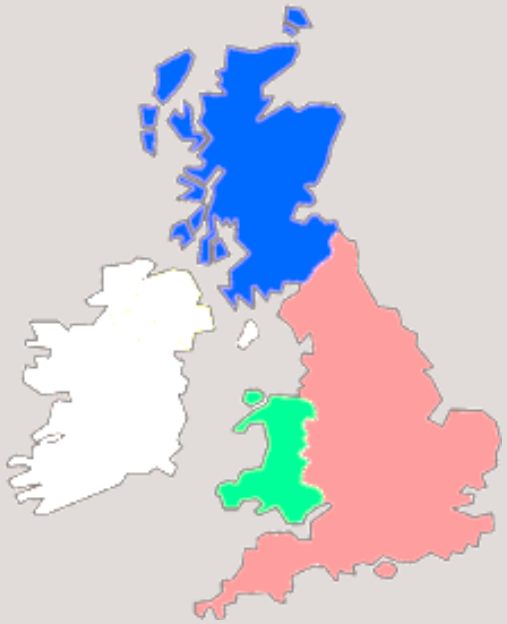
Note – see special exemptions for low hours (500 – 1500) and SIS/MIS in all engine NOx figures.

MCPD Domestic legislation

Current position

Defra have transposed the Directive in England and Wales via changes to the Environmental Permitting Regulations (EPR) - The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 (UK SI 2018/110)

- Scotland and Northern Ireland have confirmed that they will lay their own legislation
- Defra will work closely with the Devolved Administrations during transposition to promote consistency



MCPD Main obligations

Plant Operators

- Register/ obtain permit for plant as required and update as required;
- Ensure plant meets ELV's and monitor regularly;
- Take measures to ensure non compliance kept to a minimum;
- Record information regarding operation of plant;
- Keep information proving the effective continuous operation of secondary abatement if fitted;
- Report changes or upgrades to plant which would affect applicable ELV's;
- Assist regulators during inspections to ensure compliance with the MCPD;
- Keep periods of start up or shut down periods as short as possible.

MCPD Main obligations

Regulators

- Judge whether multiple plants on an installation should be aggregated.
- Manage system for registration and/or permitting (including updates).
- Deal effectively with non compliance.
- Make available to the public a register with information on combustion plant (including via the web) .
- Report data to Defra as required and to enable meeting reporting requirements to the Commission.
- Assess need to apply stricter ELV's in zones or part of zones not compliant with AQ limits.
- Report MCPD emissions in 2021, 2026 and 2031.

MCPD

Flexibilities for Member States

- Nomination of Competent Authority
- Establishing system for registration and/or permitting.
- How to apply optional exemptions/flexibilities in a pragmatic way.
- Data management: public information and reporting to the Commission.
- Establishing systems to ensure compliance.
- Dealing with non-compliance.
- Set requirements for emission monitoring.

The following slides are thoughts discussed at stakeholder workshops.

They do not currently represent Government policy.

MCPD
Uncertainties

1. Member States are required to nominate the Competent Authority, responsible for enforcement -

- EA responsible for all enforcement

2. System for registration/permitting –

Possible approaches:

- Very simple procedure for registration of low risk plant and more involved for complex plant/installations.
- For plant already part of a permit, the conditions will simply be amended to reflect MCPD.
- Spreading out registration of existing plant to avoid very large number of registration and emissions monitoring at key deadlines.

MCPD
Uncertainties

3. It is Government policy to apply optional exemptions and flexibilities but will need to assess their impacts.

4. Data management: public information and reporting - Directive requires the competent authority to establish a register of information about each plant. Possible approaches:
   - Centralised database
   - Access and updating
   - Costs of administration

5. Member States are required to set up an effective system, based on either environmental inspections or other measures, to check compliance. Possible approaches:
   Risk based approach largely based around emission tests for low risk plant
   Supplemented with audits and inspections where necessary
   Financial incentives to promote early compliance

BIOMASS

BACKUP GENERATORS

DISTRICT HEATING

MCPD
Uncertainties

6. Dealing with non-compliance: Rules are to be set for the type, frequency and format of non-compliance information to be provided by operators. Possible approaches:

- Reporting not required if compliance restored within certain deadline; after that need to report and agree plan with Competent Authority.
- Operators must report data to demonstrate compliance has been restored.

MCPD
Uncertainties

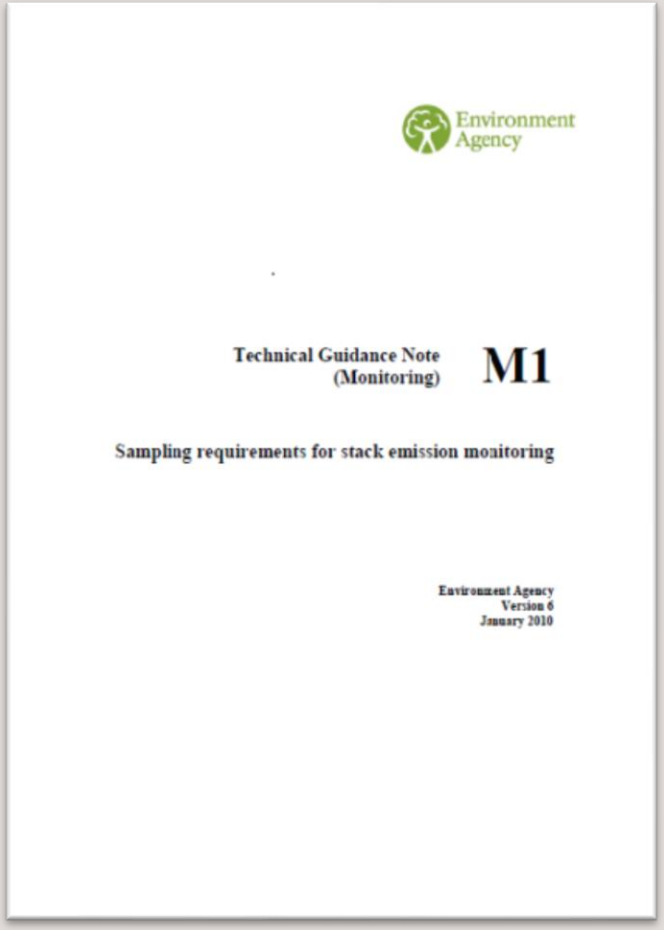
7. Need to set requirements for monitoring, based on methods enabling reliable, representative and comparable results. Possible approaches:

   - Suggestions for mandatory MCERTS accreditation but considering if there are alternatives that could reduce burden to operators – risk based approach;
   - Suggestion of an MCERTS-Light system allowing reputable service organisations to continue with routine testing (+ particulates);

8. Costs to Plant Operator:
   - Annual administration charge
   - One off permitting/registration charge

   *Minority of higher risk plants

Message – polluter pays!


Environment Agency

Technical Guidance Note (Monitoring) **M1**

Sampling requirements for stack emission monitoring

Environment Agency
Version 6
January 2010

MCPD

Headline issues not yet resolved

- How are all owner/operators informed and all the plants found?
- Complexity of registration;
- Registering and reporting through a central portal;
- Challenges to implementing an effective reporting system;
- ELV's – realistic or unworkable?
- Non-compliance and penalties?
- Exemptions and flexibilities (500 hour running etc.)?
- Definitions to be clarified (e.g. when is an existing plant a new plant?);
- Cold weather event; Aggregation rules; Mobile plant;
- Monitoring standards to be developed?
- Who produces test results – is this MCERTS, or is that too expensive for the risks?

Recommendations

Future proof your plant

- Review policy to burn high sulphur content liquid or solid fuels and plan to change to another fuel;
- Obtain frequent fuel specifications from your fuel provider;
- Obtain emission test data to determine if existing plant is likely to be compliant;
- Consider modernisation/optimisation of existing burner & controls and fit energy saving equipment;
- Consider emission optimisation and testing by combustion equipment manufacturer;
- Ensure all emission tests use approved calibrated instruments and retain records;
- Check accessibility of sampling points to comply with MCPD;
- Check MCPD compliance prior to ordering new burners, boilers, turbines or engines.

SAACKE

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