

EU Emissions Update

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Agenda

- Stage V non-road
- Medium Combustion Plant Directive
- UK Specified generator legislation
- UK Low emission Zones (non-road)
- Gas Quality

Non-road Mobile Equipment Stage V

Organization of Legislation

- Made up of Four regulations
 - Main Regulation – (EU) 2016/1628
 - Contains ‘Essential items’
 - Delegated Regulation – (EU) 2017/654
 - Contains technical details on testing and administrative provisions
 - Implementing Regulation – (EU) 2017/656
 - Contains detail such as labelling requirements and forms
 - For political reasons also includes definition of family (would expect in DA)
 - Delegated Regulation – (EU) 2017/655
 - Contains In-Service Monitoring protocol
- These will never be consolidated into a single document by the EU

NRMM – constant speed ELV's

Constant speed engine

kW (hp)	NOx / THC / CO / PM (g/kWh) / [PM count/kWh]								(NOx+THC) / CO / PM (g/kWh) / [PM count/kWh]								A		
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025			
0-8 0-10									(7.5) / 8.0 / 0.40(0.6)								NRE-v-1, NRE-c-1	(1.10)	
8-19 11-24									(7.5) / 6.6 / 0.40								NRE-v-2, NRE-c-2	(1.10)	
19-36 24-48	(7.5) / 5.5 / 0.6																NRE-v-3, NRE-c-3	(1.10)	
37-55 49-74									(4.7) / 5.0 / 0.015 / [10 ¹²]								NRE-v-4, NRE-c-4		
56-74 75-99	(4.7) / 5.0 / 0.4																0.4 / 0.19 / 5.0 / 0.015 / [10 ¹²]	NRE-v-5, NRE-c-5	1.10
75-129 100-173	(4.0) / 5.0 / 0.3																0.4 / 0.19 / 3.5 / 0.015 / [10 ¹²]	NRE-v-6, NRE-c-6	1.10
130-560 174-751																	0.4 / 0.19 / 3.5 / 0.015 / [10 ¹²]	NRE-v-6, NRE-c-6	1.10
> 560 > 751 Not Gen																	3.5 / 0.19 / 3.5 / 0.045	NRE-v-7, NRE-c-7	6.00
> 560 > 751 Gen only																	0.67 / 0.19 / 3.5 / 0.035	NRG-v-1, NRG-c-1	6.00
	Stage II				Stage IIIA				Stage V										

- DPF forcing from 19-560 kW (due to particle number count)
- SCR forcing from 56 kW up
- Methane slip limit for gas engines

Transition programs

Highlights



- Flexibility program is completely removed
- A very limited pre-buy program is allowed
- There are restrictions on how long an engine can be held before it is installed in a machine and the machine placed on the market.
- Extended time line for very small manufacturers

Transition programs


Details



Most OEMs		Emissions change date			
-2 years	-1 year	+ 1 year	+2 years	+3 years	+4 years
Previous stage engine production		New stage engine production			
		Pre-built previous stage engine may be placed on market		Only new stage engines may be placed on the market	
		Machine production allowed with previous stage engine		Only new stage engines may be installed in machines	
		Machine with previous stage engine may be placed on market		Only machines with new stage engines may be placed on the market	

OEM with a total production (use of NRMM engine) of <100/year, mobile cranes

-2 years	-1 year	+ 1 year	+2 years	+3 years	+4 years
Previous stage engine production		New stage engine production			
		Pre-built previous stage engine may be placed on market		Only new stage engines may be placed on the market	
		Machine production allowed with previous stage engine		Only new stage engines may be installed in machines	
		Machine with previous stage engine may be placed on market		Only machines with new stage engines may be placed on the market	

 Although an engine manufacturer may supply an engine built before the emissions change during this period it has no value since it cannot be built into a machine in time to meeting the machine production date. It is only there for legal reasons to allow machines built outside the EU to be imported.

Update

- FAQ sheet prepared by 6 Associations including EuropGen
 - Need to get link on Europgen website - **Action**
- An amending delegated act is being prepared to correct errors/omissions
 - Published Q2 18
 - Primarily affects engine manufactures certification process
- Amending/new delegated act to include constant speed (and all other) applications in in service monitoring.
 - Published late 2018?

MCPD

Emission limit values (mg/Nm³) for **existing** 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	-	15 ^{(1) (2)}
NO _x	Engines	190 ^{(3) (4)}	190 ^{(3) (5)}	190 ⁽⁶⁾	190 ⁽⁶⁾
	Gas turbines ⁽⁷⁾	200	200	150	200
Dust	Engines and gas turbines	-	10 ⁽⁸⁾	-	-

Note: corrected to 15% O₂

40 mg new engines

- (1) **60 mg/Nm³ in the case of biogas.** ←
- (2) **130 mg/Nm³ in the case of low calorific gases from coke ovens, and 65 mg/Nm³ in the case of low calorific gases from blast furnaces, in the iron and steel industry.**
- (3) 1850 mg/Nm³ in the following cases:
 - (i) for diesel engines the construction of which commenced before 18 May 2006;
 - (ii) for dual fuel engines in liquid mode.
- (4) **250 mg/Nm³ in the case of engines with a rated thermal input equal to or greater than 1 MW and less than or equal to 5 MW.**
- (5) **250 mg/Nm³ in the case of engines with a rated thermal input equal to or greater than 1 MW and less than or equal to 5 MW; 225 mg/Nm³ in the case of engines with a rated thermal input greater than 5 MW and less than or equal to 20 MW.**
- (6) 380 mg/Nm³ for dual fuel engines in gas mode.
- (7) Emission limit values are only applicable above 70 % load.
- (8) **20 mg/Nm³ in the case of plants with a rated thermal input equal to or greater than 1 MW and less than or equal to 20 MW.**

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
<u>Dust</u>	Engines and gas turbines	-	10 ⁽¹⁰⁾⁽¹¹⁾	-	-

Note: corrected to 15% O₂

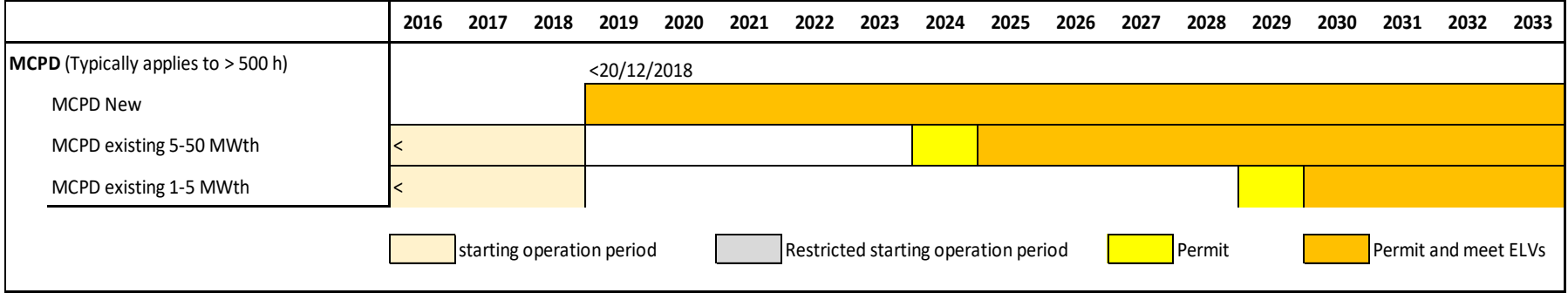
Different to existing engines

60 mg for existing engines

Not available to existing engines

- (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) *Until 1 January 2025 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 ≤ 1200 rpm with a total rated thermal input less than or equal to 20 MW and 1 850 mg/Nm³ for diesel engines with a total rated thermal input greater than 20 MW; 750 mg/Nm³ for diesel engines with > 1200 rpm.*
- (⁵) *225 mg/Nm³ for dual fuel engines in liquid mode.*
- (⁶) *225 mg/Nm³ for diesel engines with a total rated thermal input less than or equal to 20 MW with ≤ 1200 rpm.*
- (⁷) *190 mg/Nm³ for dual fuel engines in gas mode.*
- (⁸) *These emission limit values are only 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 5 MW.*

Time line



- Member states may exempt engines operating < 500 hrs/year (some averaging allowed) from Emission Limit Values
- Still need registration/permit

Update

- EUROMOT has written to all member states where an address could be established (except UK) requesting:
 - Consistent application of limit values
 - Exclusion of emergency engines from limit values
 - Information on registration/permitting scheme
- Only response was Ireland, point out their consultation.

What we know so far...

- 15 member states (or areas) have notified transposition

Belgium	Estonia	Latvia	Slovakia
Bulgaria	Hungary	Lithuania	Spain
Croatia	Ireland	Netherlands	Scotland
Denmark	Italy	Poland	

- Austria is going beyond the MCPD
- Germany is delayed but will likely go beyond MCPD
- France is processing
- The UK (England & Wales) transpose slightly delayed

UK Specified generator legislation

Background

- The UK has seen a rapid rise in the number of, and operating hours of, diesel gen-sets in response to demand created by the 'balancing services' market.
- Many of these gen-set are of older design vintage
- There is concern for local air quality and using up NEC directive NOx allowance
- Additional controls over and above the MCPD are being applied to 'specified generators'
- MCPD requirements also apply (however, many of these generators would fall out of MCPD due to low hours)

Included generators

- Any generator or group of generators (not excluded) from 1 – 50 MWth
- Any generator or group of generators (not excluded) providing balancing services <50 MWth (no lower limit)
- A group of generators are considered a generator if:
 - on the same site, and;
 - operated by the same operator, and;
 - for the same purpose,

Excluded from 'specified generators'

- Back-up (stand-by) generators operated for the purpose of testing for no more than 50 hours per year. Cannot have any other function.
- Back-up (stand-by) generator that has demonstrated a genuine need to test for more than 50 hours per year (needs special approval confirming no air quality exceedance)
- Mobile generator unless connected to
 - an electricity transmission system or distribution system, or;
 - other apparatus, equipment or appliances at a site, if these are part of the complete infrastructure of the site.
- Generator used at a site which it is not reasonably practicable to connect to the distribution system (needs special approval confirming no air quality exceedance)
- Generators subject to the IED (chapter II or III)
- generators operating with a defined nuclear safety role
- generators installed on an offshore platforms
- generators installed on a gas storage or unloading platform

Tranche A generator

- Tranche A generators are subject to transition arrangements
- The principle behind a Tranche A generator (or group of generators) is that the operator could not reasonably have foreseen the emissions regulation when putting the plant into operation or entering into a balancing services contract.
- The inclusion of generators of less than one megawatt was at a later date and therefore a slightly different definition and timings.

Tranche A generator - > 1 MWth AMPS

- with a rated thermal input equal to or greater than 1 megawatt and less than 50 megawatts—
 - which came into operation before 1st December 2016, or
 - which is the subject of a capacity agreement arising from the 2014 or 2015 capacity auctions (whether or not the generator came into operation before 1st December 2016), or
 - for which a Feed-in Tariff preliminary accreditation application was received by the Gas and Electricity Markets Authority(a) before 1st December 2016;
 - A Tranche A generator becomes a Tranche B generator when that agreement expires (or applicable date if that is later).
 - A Tranche A generator that signs up to a newer agreement become a Tranche B generator

Tranche A generator - < 1 MWth AMPS

- with a rated thermal input of less than 1 megawatt—
 - which is the subject of a capacity agreement arising from the 2014, 2015 or 2016 capacity auctions (whether or not the generator came into operation before 1st December 2016), or
 - for which a Feed-in Tariff preliminary accreditation application was received by the Gas and Electricity Markets Authority before 1st December 2017; or
 - which is the subject of an agreement to provide balancing services entered into before 31st October 2017;
 - A Tranche A generator becomes a Tranche B generator when that agreement expires (or applicable date if that is later).
 - A Tranche A generator that signs up to a newer agreement become a Tranche B generator

Tranche B generator

- A tranche B generator is any other generator (other than an excluded generator) or a tranche A generator that has lost its entitlement to be tranche A.
- A Tranche B generator must fully meet the emission and administrative requirements of a ‘specified generator’

Emission Limit Values

- The NO_x limit value is 190 mg/Nm³ @ 15% O₂
 - Same as MCPD for diesel and existing gas engines
 - Needs SCR for diesel engine
 - Needs three way catalyst for rich burn gas engine
 - Achievable with lean burn gas engine
- Where secondary abatement is used emission values must be met within:
 - 20 minutes of commencing operation for a Tranche A or ex. Tranche A engine
 - 10 minutes of commencing operation for a Tranche B engine
- There must be no persistent visible dark smoke
- Stricter standards may be applied where required by air quality standards

Monitoring

- Monitoring is required every three years

Time line



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
MCPD				<18/12/2018															
MCPD New				Typically ELVs do not apply < 500 h/y															
MCPD existing 5-50 MWth	<																		
MCPD existing 1-5 MWth	<																		
Specified Generator																			
Tranche A		<01/12/2016		<01/10/2019															
5 - 50 MWth, >500 mg, > 50 h/y	<																		
5 - 50 MWth, <500 mg	<																		
5 - 50 MWth, < 50 h/y	<																		
1 - 5MWth	<																		
< 1 MWth																			
Tranche B																			
1 - 50 MWth				<01/01/2019															
< 1 MWth not providing balancing services																			
< 1 MWth providing balancing services																			

starting operation period
 Restricted starting operation period
 Permit
 Permit and meet ELVs

Research Development & Testing

- RD&T is excluded from the MCPD but not the ‘specified generator rule’
- DEFRA have stated (verbally and in an Email) that it is not the intension to include RD&T, but too late to change legislation
- Have requested clarification in guidance.

UK Low Emission Zones

London SPG



- Operated by GLA
- Requires stage IIIA for greater London and stage IIIB for central area and Canary Wharf construction sites.
- From Sept 2020 IIIB for greater London and stage IV for central area and Canary Wharf
- Block exemption obtained for Generator sets from stage IIIB until September 2018
- New Mayor is very focused on air quality. Continuing block exemption until stage V product is widely available will be challenging
- Next consultation 22th Jan.

London Air quality

- London Mayor is consulting on air quality
 - Wants to go further than DEFRA to discourage use of emergency generators in balancing market
 - Considering aftertreatment on emergency generators
 - Further restrictions on mobile generators

Gas Quality

Background

- There is a push in Europe to create a European wide gas standard
- This is to allow trading across the continent
- It necessitates setting parameters to a wide range
- Engines built and tuned to the worst case will have poor power output and efficiency compared to one optimised for a better gas
- In many cases the actual gas will be better
- Potential hydrogen injection make the situation worse
- Modern engines have a limited ability to self adapt and can protect themselves (reduce power, shut down)
- Older engines may be damaged

UK Situation

- IGEM (Institution of gas engineers and managers) have a gas quality working group
- Reviewing the same widening of gas standard
- Put out a consultation to end users
- AMPS only became aware on the last day
- Sent in a holding response with EUROMOT position
- Will work with ADE to provide input to IGEM on challenge for engines

Actions

- EUROMOT are lobbying for a tighter range
- Not being very successful