

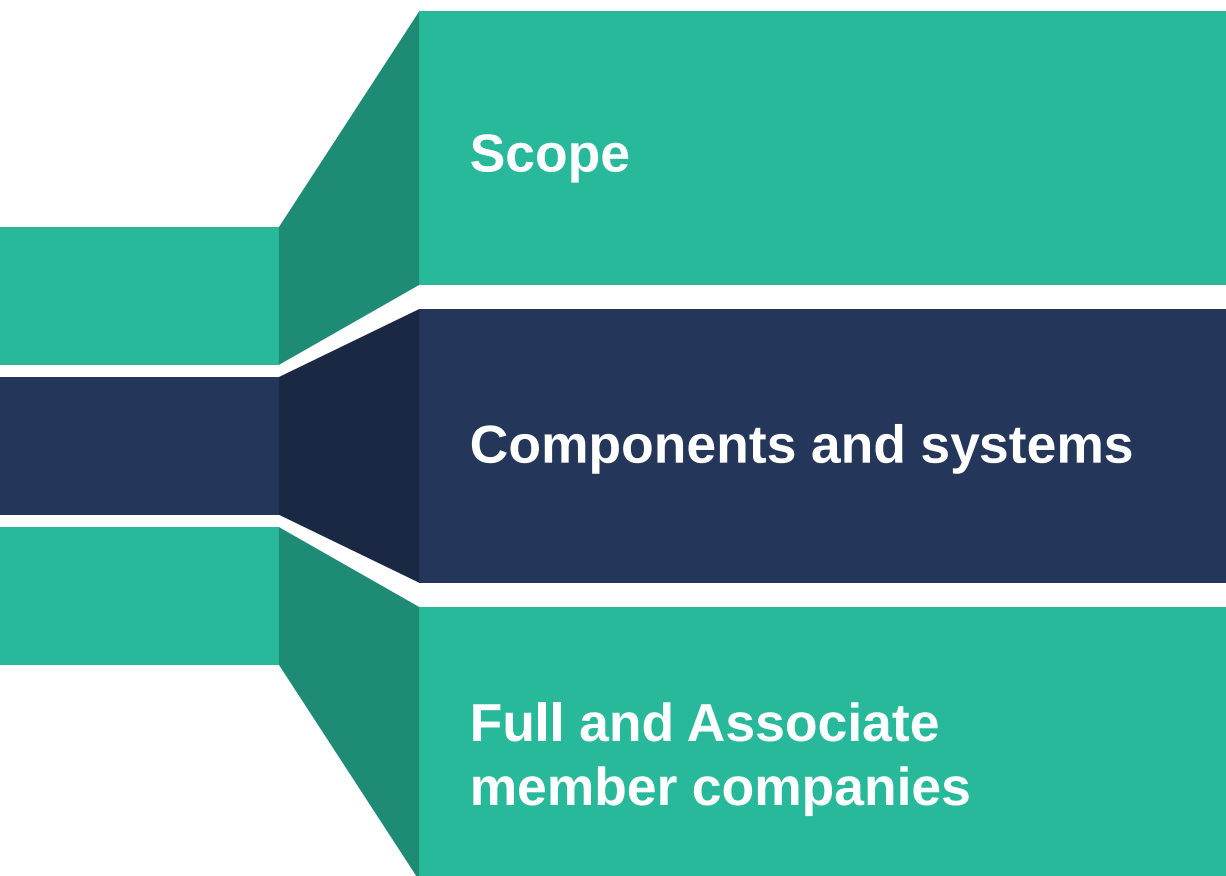


CONFIDENTIAL

NRMM and Stationary Legislation: Progress, Challenges, and Next Steps

**Off-Highway & Power Generation Europe 2026 •
22-23 September • Frankfurt**

AECC is the Association for Emissions Control and Climate



- Air quality and Climate requirements
 - Mobile and Stationary emissions sources
 - Sustainable components and systems
-
- Catalysts
 - Filters
 - Adsorbers
 - System integration
 - Fuel cells
 - Electrolysers



EU Transparency Register #78711786419-61, consultative status with the UN Economic and Social Council (ECOSOC)

AECC policy focus areas

On-road vehicles



Non-Road Mobile Machinery



Industrial and Stationary



H₂ production and utilisation



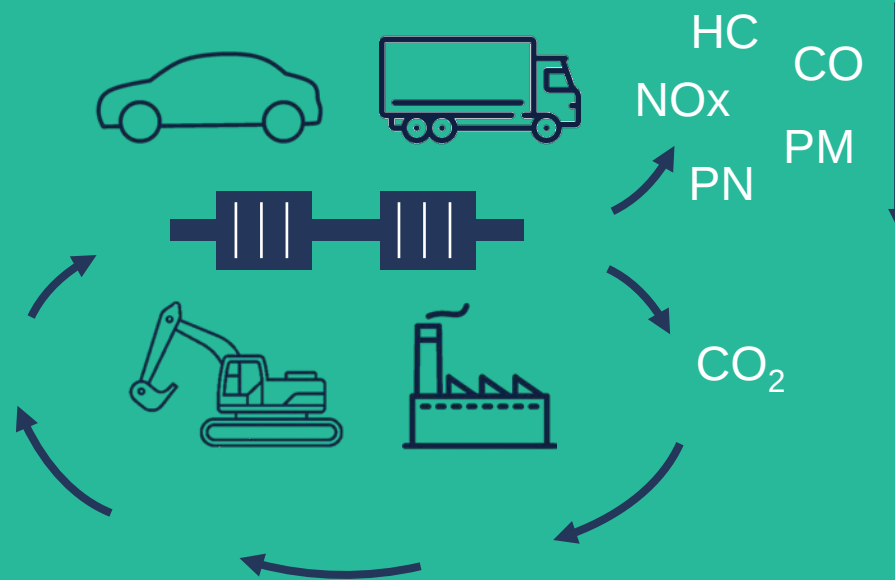
Life cycle assessment and circular economy



AECC works in partnership with EU policymakers on 2050 targets

**Zero-impact
pollutant
emissions**

**Net-zero
Greenhouse
gas emissions**



AECC member emission control systems ensure there's **no measurable negative impact** of these pollutants on the **environment or on public health**

AECC member emission control systems are compatible with **CO₂-neutral fuels** for a closed carbon cycle

Content

01

Non-Road Mobile Machinery

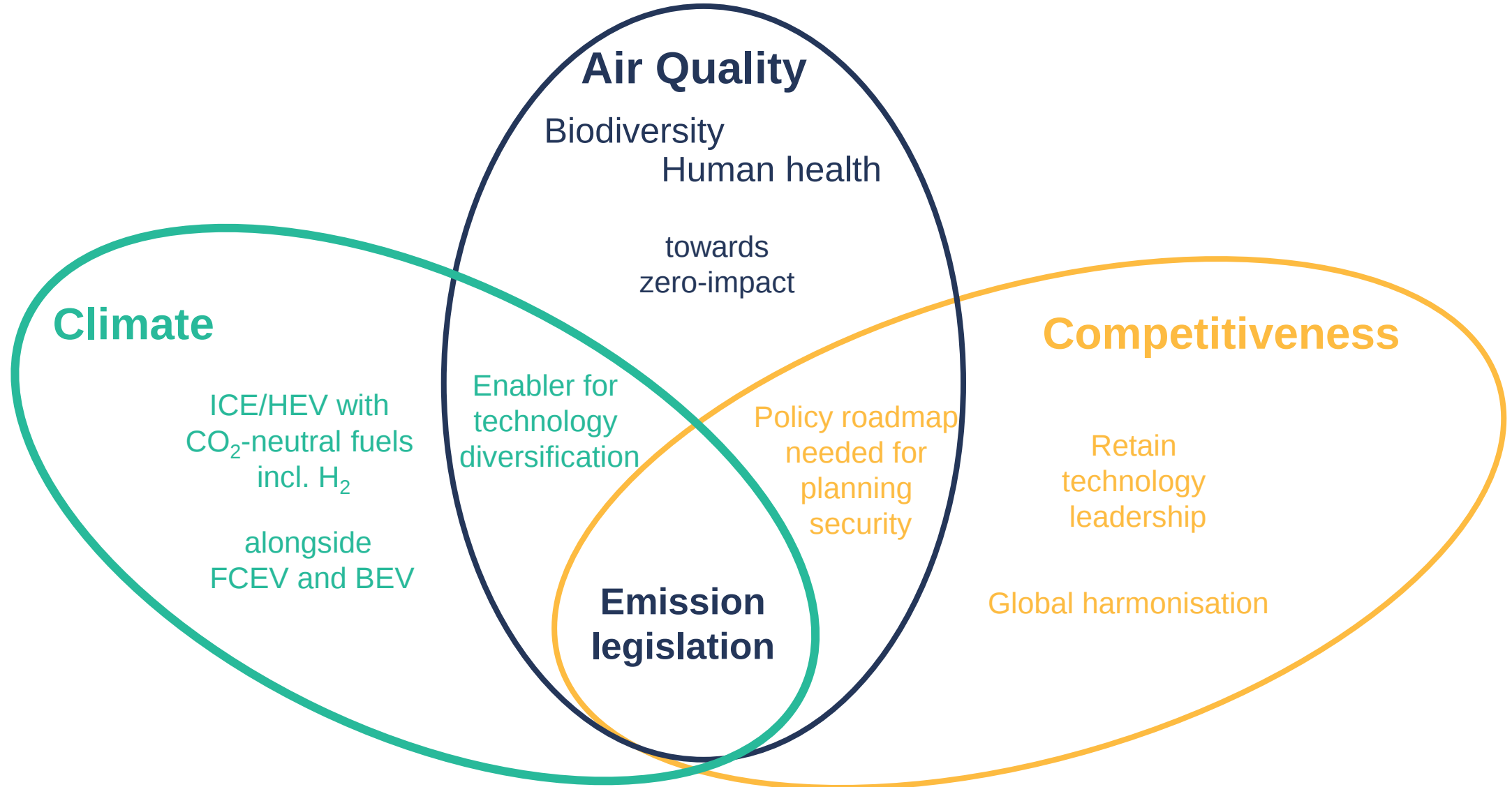
- Emission legislation as key NRMM pillar
- EU Stage V review
- AECC project data

02

Industrial & Stationary

- Data centre back-up power
- EU legislative initiatives
 - Medium Combustion Plant Directive
 - Environment Omnibus
- Similar debate ongoing in US

Key pillars for NRMM compatibility with 2050 targets

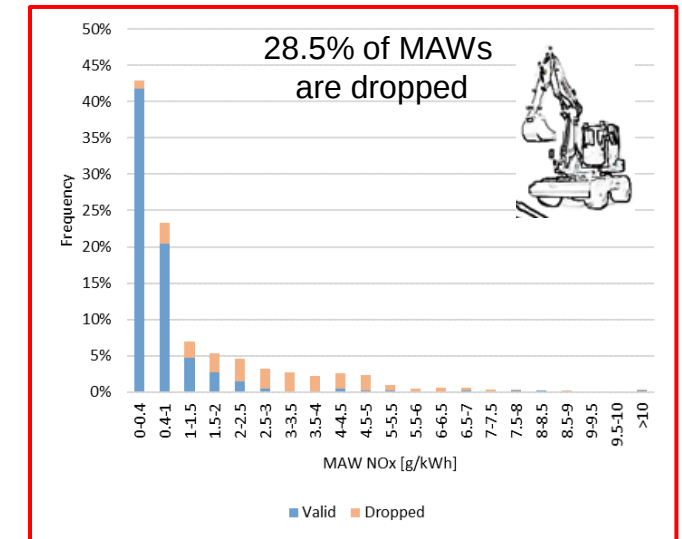
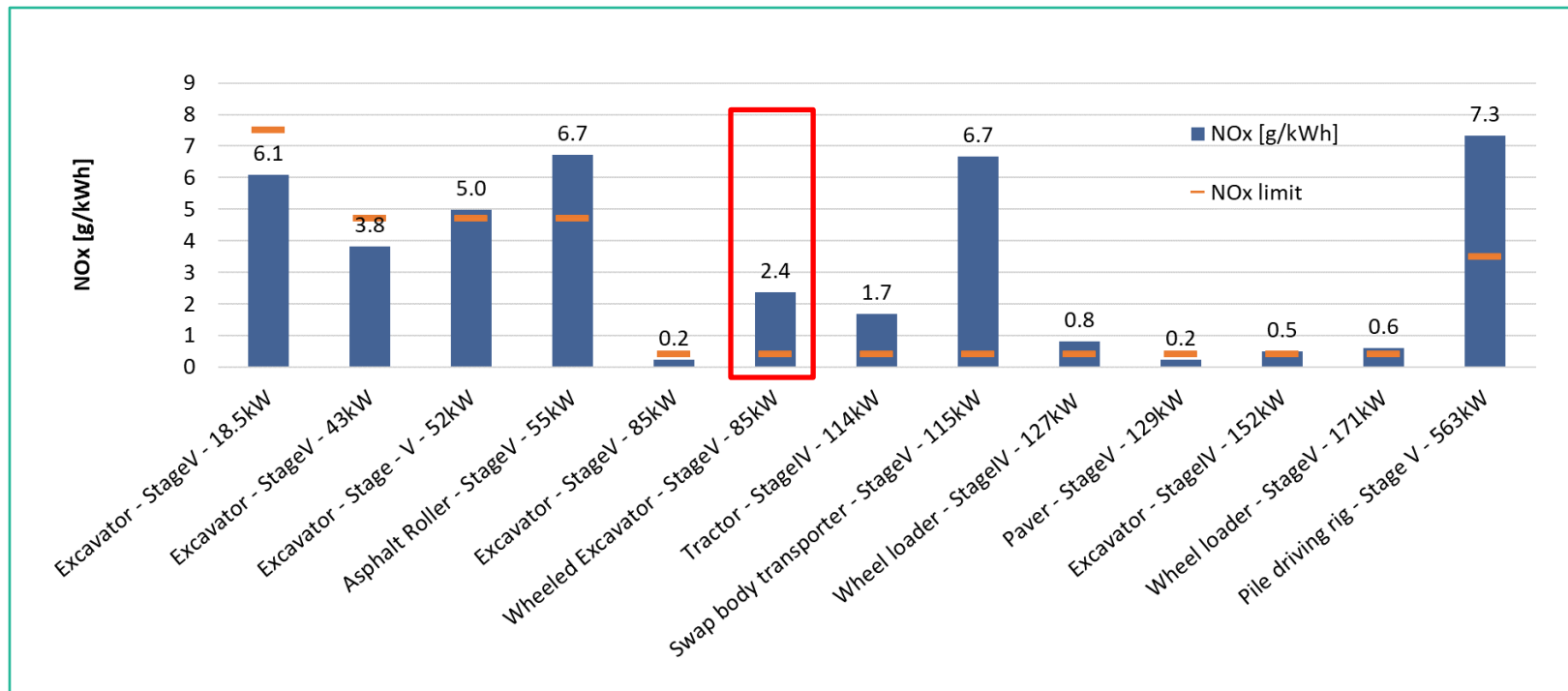


Evolution of NRMM Stage V legislation is expected

- NRMM legislation is several steps behind on-road HDV legislation
 - PEMS monitoring instead of In-Service Conformity (ISC) and Real-Driving Emissions (RDE)
 - More data exclusions
 - Higher limits than Euro 7
- Global initiatives ongoing, but with some delay compared to original timelines
 - European Commission is preparing Stage V review
 - Report of Stage V PEMS monitoring data was originally expected end of 2025
 - EC DG-JRC needed more time due to data collection and quality issues
 - Internal review of report is ongoing, presentation expected at GEME expert working group on 5 November 2026
 - US CARB [Tier 5 proposal](#) includes 2-year delay, now for MY2031+
 - China is internally reviewing NRMM Stage V proposal, publication was expected mid-2026

A large variation is observed in real-world NOx emissions

- Depending on the use case and applicable limit as tested by TNO
- NRMM regulation does not consider a substantial share of the real working conditions



MAW: Moving Average Window

R. Vermeulen, et al.; *"Real-World NOx emissions of Stage V NRMM"*, Transport and Air Pollution Conference, 2023

NRMM project demonstrated future-proof ICE concepts

- NRMM engine

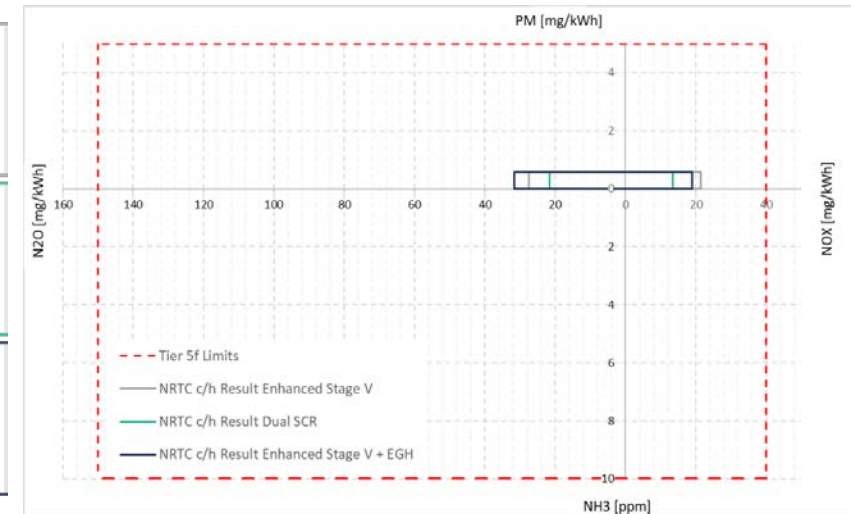
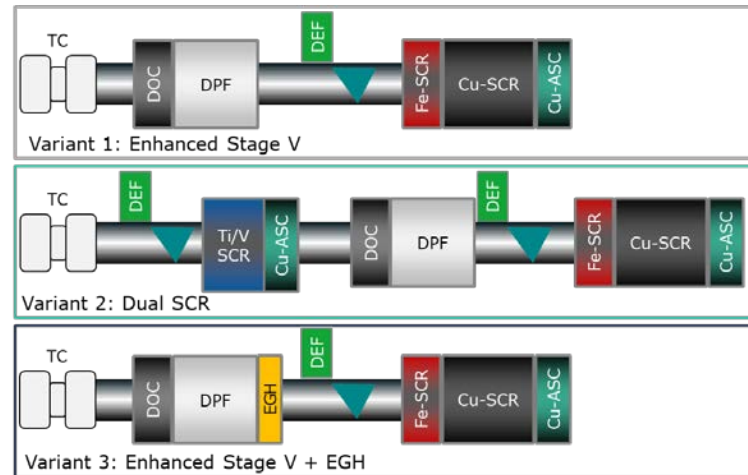
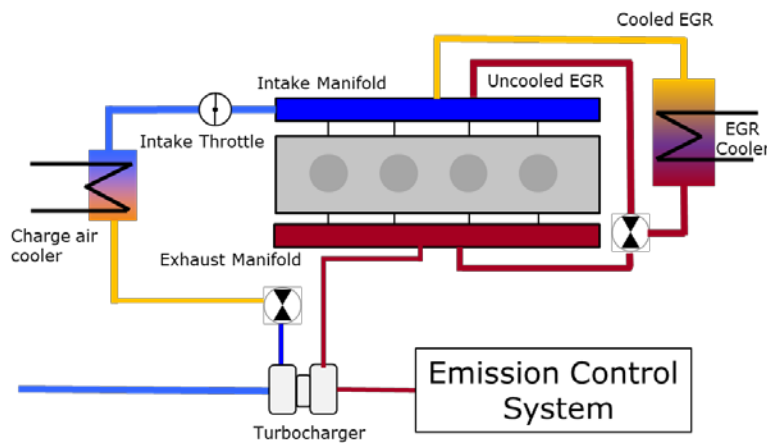
- 4l class
- ~ 100 kW rated power
- Cooled HP-EGR
 - ~ 4 g/kWh engine-out NO_x
- Uncooled EGR in low load

- Emission control systems

- Oven aged substrates (Hydrothermal)
- Modular approach to test 3 different variants

- Results

- Tier 5/Euro 7 emission level demonstrated on legislative cycles (NRTC c/h, RMC, LLC)
- Euro 7 emission level demonstrated on variety of in-use profiles



J. Demuyne, et al.; "Potential for Reduction in NRMM Real-World Emissions", 13th International engine congress, Baden-Baden, February 2026

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Rising concerns about data centre expansion

Focusing on energy & grid, noise, water, ...



dpa Follow

UN: AI data centres pose growing threat to electricity systems

DPA
Wed, September 9, 2026 at 4:18 PM GMT+2
2 min read

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Europe must choose between AI and climate goals, data center lobby says

Tech sector says only carbon-emitting gas plants are reliable enough today to power the EU's AI goals.

NEWS > ENERGY AND CLIMATE POLITICO

Ribera says EU data centers should build their own clean energy supply

Rising power demand for AI risks creating fierce competition for energy and driving up bills, the Commission's green transition chief said.

We track the growing opposition to data centre development across Europe

Moratoriums, rejections, water disputes, and green-belt battles — monitored country by country.

Tracked opposition cases per country — bubble size scales with case count. Last updated 2026-07-29

Get the Q2 2026 report Latest briefings

PRO AGRIFOOD

Europe's thirst for AI runs into local water worries

The EU hopes to triple its data centre capacity by 2032 and that's going to need a lot of water

Claudie Moreau Euractiv

EURACTIV

Rising concerns about data centre expansion

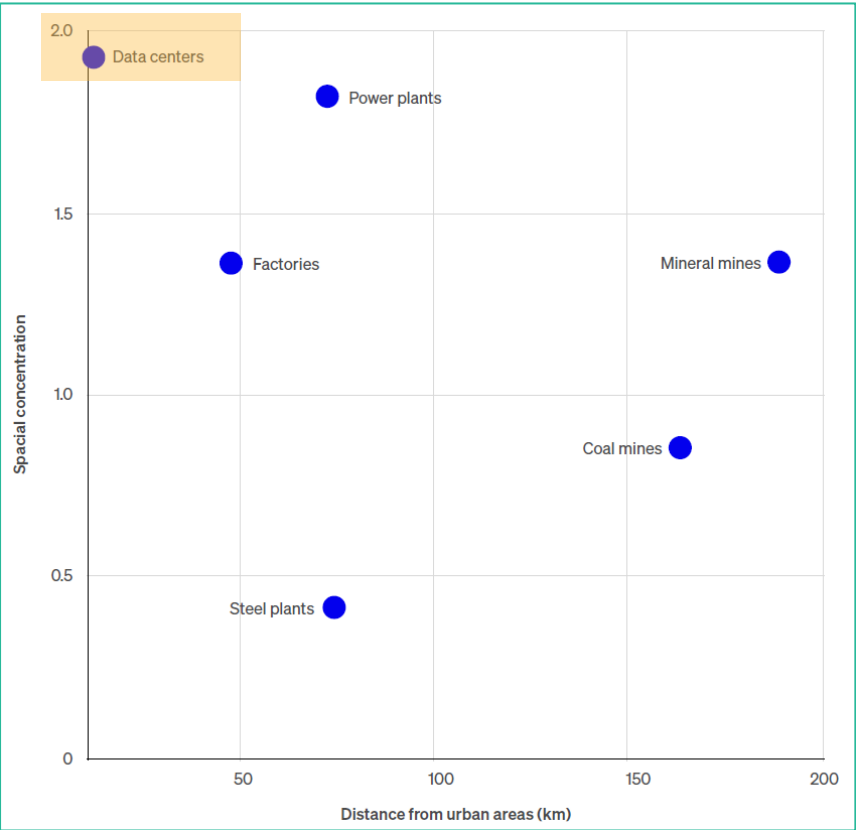
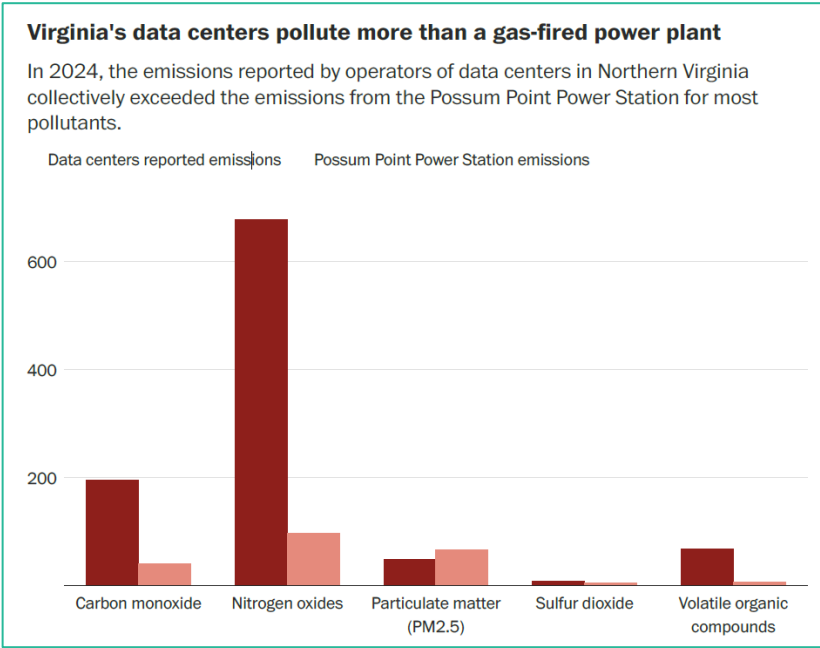
Pollutant emissions start to be noted ... affecting urban air quality

See where diesel-powered data center generators are polluting Virginia

Pollution from generators at data centers could cause respiratory symptoms and deaths in the region, an analysis for The Washington Post found.

May 28, 2026

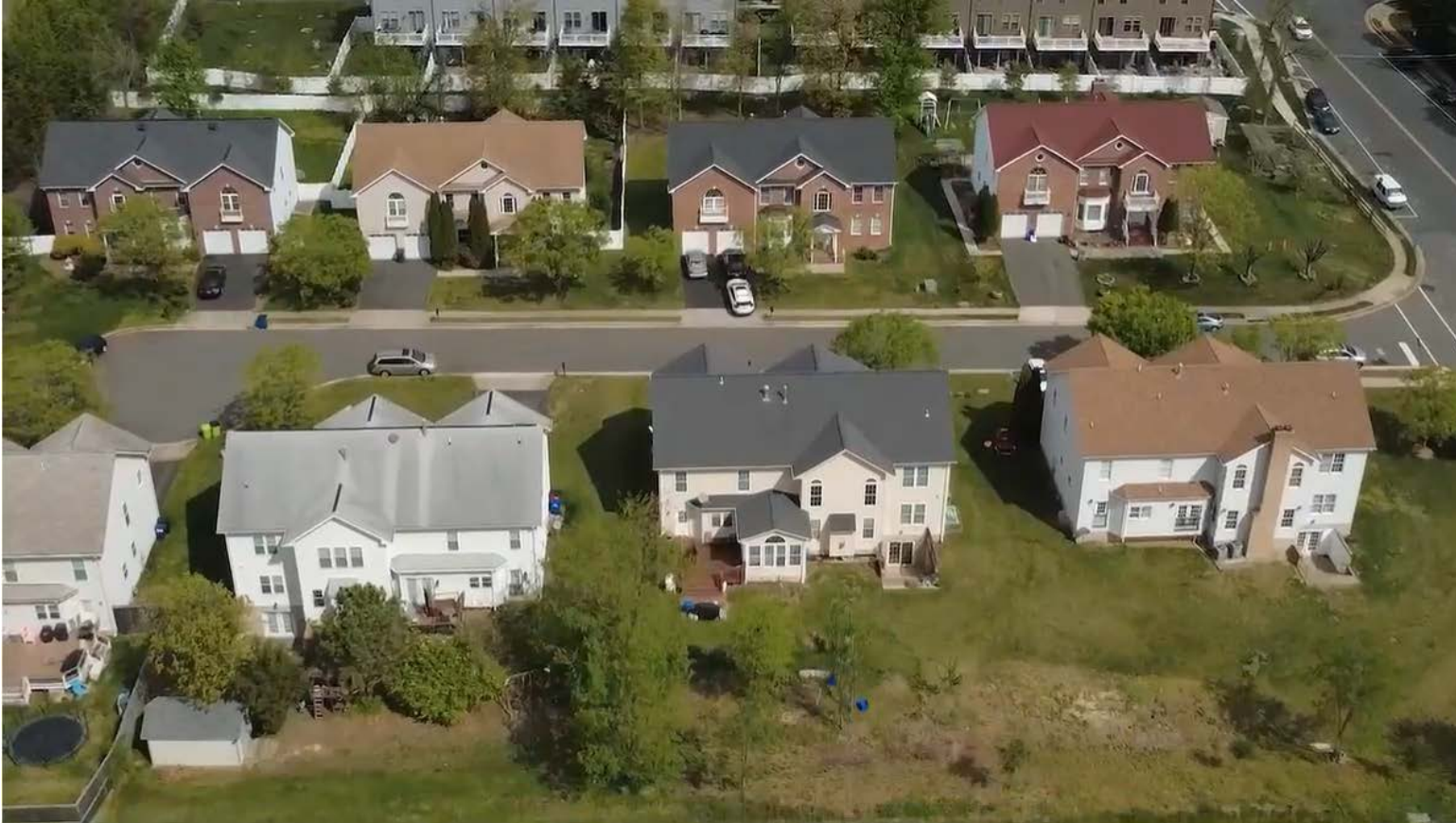
The Washington Post



Source: IEA, 2025 as reported by Politico

Rising concerns about data centre expansion

Pollutant emissions start to be noted ... affecting urban air quality



Source: Washington Post, May 2026

Rising concerns about data centre expansion

Pollutant emissions start to be noted ... affecting urban air quality



Source: "[Internet, un géant très vulnérable](#)" (26:10-26:43), arte, 2025

EU data centre permit examples

Illustrating market fragmentation for available emission control technologies

• Location	Berlin	Frankfurt	Frankfurt
• Permit issued	<u>2021</u>	<u>2024</u>	<u>2024</u>
• Limits			
• NOx	1700 mg/Nm ³	1000 mg/Nm ³	200 mg/Nm ³
• CO	265 mg/Nm ³	650 mg/Nm ³	100 mg/Nm ³
• Dust	-	50 mg/Nm ³	50 mg/Nm ³
• Back-up gensets			
• Total Power	180 MW	170 MW	140 MW
• Engine Power	32x 6.5 MW	23x 7.2 MW	19x 7.7 MW
• Emission controls	DPF	SCR	DOC + SCR

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Medium Combustion Plant Directive (EU) 2015/2193

- Scope
 - Combustion plants of 1 MW to < 50 MW
 - Includes boilers, engines, gas turbines and CHP units (CHP: Combined Heat and Power)
- Pollutants
 - Emission Limit Values for SO₂, NO_x & Dust depending on fuel type, technology, size, new/existing
 - Monitoring requirement for CO
 - Back-up power derogation: no limits < 500 h / year
 - Member State or local authorities might add requirements
- Implementation timeline

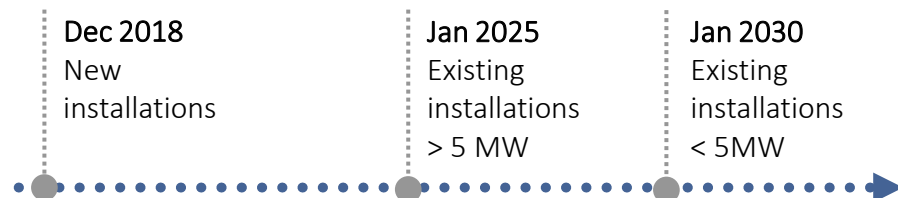


Table 1

Emission limit values (mg/Nm³) 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⁾	—	—

Table 2

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⁾	—	—

Medium Combustion Plant Directive (EU) 2015/2193

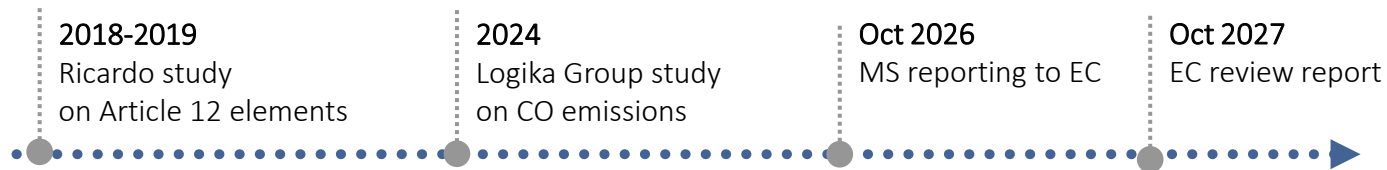
- Reporting

- Member States to report on CO emissions by January 2021
- Member States to report on MCPD implementation by 1 October 2026 and 2031
- European Commission to report about this within 12 months

- Review by European Commission

- By January 2020 on energy efficiency
- By January 2023 on need to regulate CO emissions (among other items)
- Thereafter, a review shall take place every 10 years on need for stricter limits

- AECC understanding of the actual reporting/review timeline



Environment Omnibus

- Within series of >15 other Omnibus proposals to
 - Simplify EU rules
 - Reduce administrative burdens
 - Boost competitiveness and investment
- EU Commission proposal
 - Presented on 10 December 2025
 - Industrial Emissions Directive (IED)
 - Simplification of Environmental Management Systems (EMS)
 - Transformation plan requirement is repealed
 - Medium Combustion Plant Directive
 - **Back-up generators** of large data centres (> 20 MW)
 - Reduced monitoring frequency in case of **NRMM Stage V compliance**
 - Both: easier permitting of hydrogen/oxy-fuel projects



Table II-2: Stage V emission limits for engine category NRG defined in point (2) of Article 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN
		kW		g/kWh	g/kWh	g/kWh	g/kWh	#/kWh
Stage V	NRG-v-1 NRG-c-1	P > 560	all	3,50	0,19	0,67	0,035	—

Environment Omnibus

- Ongoing Ordinary Legislative Procedure
 - **European Parliament** 
 - ENVI committee is responsible for IED/MCPD elements
 - Draft report by rapporteur MEP Solis Perez (ES, EPP) published 19 June 2026
 - Amendments to the draft report were published in August 2026
 - Expected timeline
 - ENVI committee vote expected 4 November 2026
 - Plenary vote expected 11 November 2026
 - **Council of the European Union** 
 - Debates held in 'Antici Group' on simplification
 - General Approach was reached in Environment Council on 25 June 2026
 - **Trilogue** negotiations to start towards December 2026

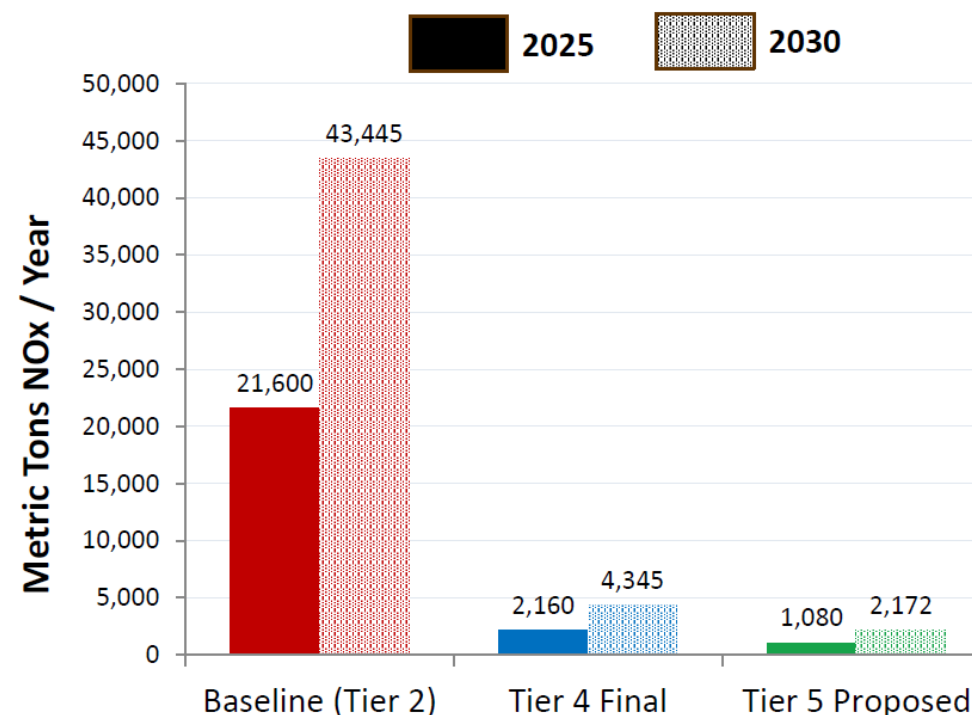


Similar debate ongoing in US

Replacing Tier 2 gensets with Tier 4 can save up to ~ 20,000 tons of NOx in VA

Further savings as market grows, and with introduction of Tier 5

Parameter	2025	2030
Total Genset Capacity	27 GW	54.3 GW (15% CAGR)
Annual Operating Hours	100 hrs	
Baseline NOx (Tier 2)	8.0 g/kWh	
Tier 4 Final NOx	0.8 g/kWh	
Tier 5 Proposed NOx	0.4 g/kWh	



Source: "A review of emissions from gensets for data center applications", Ameya Joshi, Off-highway & Power Generation USA, May 2026

Summary

- Non-Road Mobile Machinery
 - Stage V evolution is expected and review is progressing
 - A large variation is observed in real-world NO_x emissions
 - Emission control technologies are available to achieve **low NRMM pollutant emissions**
 - Together with operation on **CO₂-neutral fuels** the ICE is a future-proof NRMM powertrain option
- Stationary - Data centres
 - Rising concerns about rapid expansion incl. urban air quality impact
 - Existing permitting requirements vary significantly across EU, creating **market fragmentation**
 - Environment Omnibus provides first elements which are to be further discussed under upcoming MCPD review
 - Emission control technologies are available to achieve **low back-up power pollutant emissions**



THANK YOU!

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