

## Supplementary material:

# Scenario Analysis of Air Quality Improvement in Warsaw, Poland, by the End of the Current Decade

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Supplementary material <https://dieselnet.com/standards/eu>

**Table S1.** Euro Norms for the gasoline cars.

emission	EURO 1 [1993]	EURO 2 [1997]	EURO 3 [2001]	EURO 4 [2006]	EURO 5 [2011]	EURO 6 [2015]
<a href="#">CO</a> [g/km]	2.72	2.2	2.3	1	1	1
<a href="#">HC</a> [g/km]	–	–	0.2	0.1	0.1	0.1
<a href="#">NOx</a> [g/km]	–	–	0.15	0.08	0.06	0.06
<a href="#">HC+NOx</a> [g/km]	0.97	0.5	–	–	–	–
<a href="#">PM</a> [g/km]	–	–	–	–	0.005*	0.005*
<a href="#">PN</a> [1/km]	–	–	–	–	–	6.0×10 <sup>11**</sup>

\* vehicles using DI engines; 0.0045 g/km using the PMP measurement procedure

\*\* vehicles using DI engines; 6.0×10<sup>12</sup> 1/km in first 3 years from Euro 6 effective dates

**Table S2.** Euro Norms for the diesel cars .

emission	EURO 1 [1992]	EURO 2 [1996]	EURO 3 [2001]	EURO 4 [2006]	EURO 5 [2011]	EURO 6 [2014]
<a href="#">CO</a> [g/km]	2.72	1	0.64	0.5	0.5	0.5
<a href="#">HC</a> [g/km]	–	–	–	–	–	–
<a href="#">NOx</a> [g/km]	–	–	0.5	0.25	0.18	0.08
<a href="#">HC+NOx</a> [g/km]	0.97	0.7	0.56	0.3	0.23	0.17
<a href="#">PM</a> [g/km]	0.14	0.08	0.05	0.025	0.005*	0.005*
<a href="#">PN</a> [1/km]	–	–	–	–	6.0×10 <sup>11**</sup>	6.0×10 <sup>11**</sup>

\* 0.0045 g/km using the PMP measurement procedure

\*\* vehicles using DI engines; 6.0×10<sup>12</sup> 1/km in first 3 years from Euro 6 effective dates

**Table S3. Euro Norms for HDV diesel cars.**

emission	EURO 1 [1992]	EURO 2 [1998]	EURO 3 [2000]	EURO 4 [2005]	EURO 5 [2008]	EURO 6 [2013]
<a href="#">CO</a> [g/kWh]	4.5	4.0	2.1	1.5	1.5	1.5
<a href="#">HC</a> [g/kWh]	1.1	1.1	0.66	0.46	0.46	0.13
<a href="#">NOx</a> [g/kWh]	8.0	7.0	5.0	3.5	2.0	0.4
<a href="#">HC+NOx</a> [g/kWh]	–	–	–	–	–	–
<a href="#">PM</a> [g/kWh]	0.612	0.25	0.10	0.02	0.02	0.01
<a href="#">PN</a> [1/kWh]	–	–	–	–	–	8.0×10 <sup>11</sup>

**Table S4. Limit emission norms for low-emission boilers.**

Limit emission values due to **PN-EN 303-5:2012**

Fuel feeding	Fuel type	Nominal thermal power kW	Emission limit values (mg/m <sup>3</sup> at 10 % O <sub>2</sub> )								
			CO			OGC (LZO)			PM		
			Klasa 3	Klasa 4	Klasa 5	Klasa 3	Klasa 4	Klasa 5	Klasa 3	Klasa 4	Klasa 5
Manual	Biogenic	≤ 50	5000			150			150		
		> 50 ≤ 150	2500			100			150		
		> 150 ≤ 500	1200	1200	700	100	50	30	150	75	60
	Fossil	≤ 50	5000			150			125		
		> 50 ≤ 150	2500			100			125		
		> 150 ≤ 500	1200			100			125		
Automatic	Biogenic	≤ 50	3000			100			150		
		> 50 ≤ 150	2500			80			150		
		> 150 ≤ 500	1200	1000	500	80	30	20	150	60	40
	Fossil	≤ 50	3000			100			125		
		> 50 ≤ 150	2500			80			125		
		> 150 ≤ 500	1200			80			125		

Limit emission values due to "Ecodesign" Directive

Fuel feeding	Fuel type	Nominal thermal power kW	Emission limit values (seasonal emission) (mg/m <sup>3</sup> at 10 % O <sub>2</sub> )			
			CO	OGC (LZO)	PM	NO <sub>x</sub>
Manual	Biogenic	≤ 500	700	30	60	200
	Fossil					350
Automatic	Biogenic	≤ 500	500	20	40	200
	Fossil					350

## Warszawa - Okęcie (106m)

diagram

Planista Podróży (Zalanyj Podróż)

Robot Klimatu

Analiza (miesiąc)

Analiza (rok)

start	koniec
styczeń ▾	2018 ▾
grudzień ▾	2018 ▾
<input type="button" value="idź"/>	

Wind-direction (styczeń 2018 - grudzień 2018)

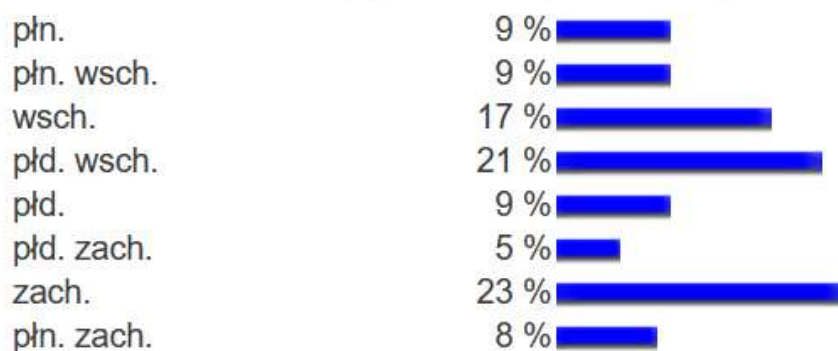


Figure S1. Wind Rose for Warsaw 2018

<https://www.weatheronline.pl/weather/maps>