Supplementary Materials
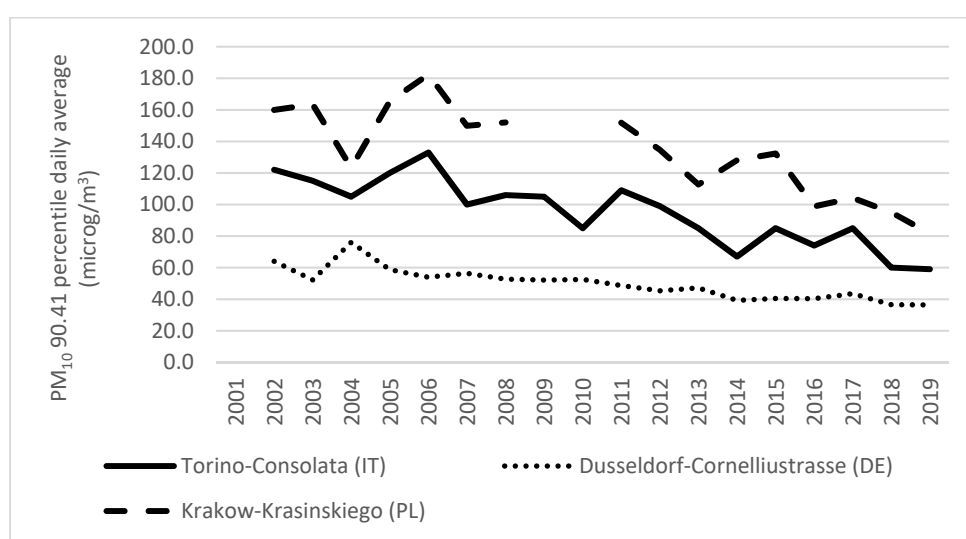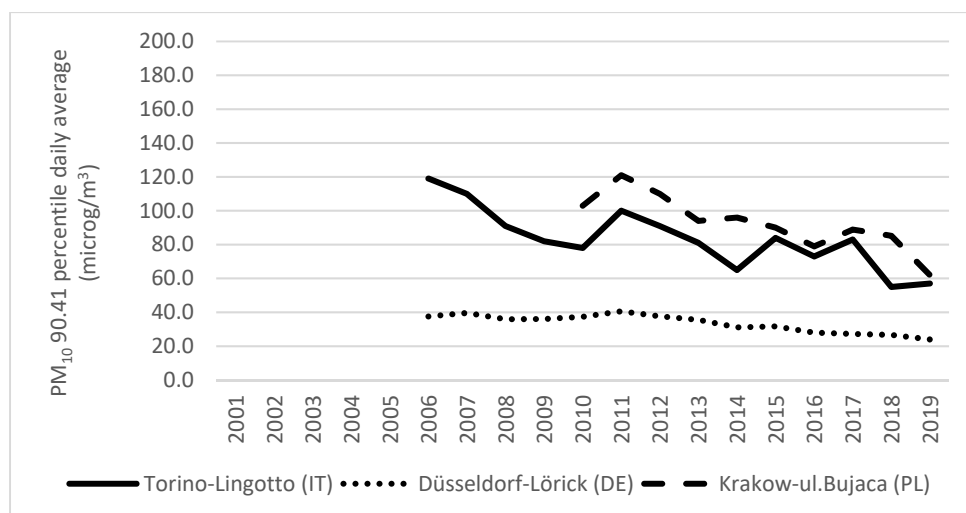
Improving Air Quality Standards in Europe: Comparative Analysis of Regional Differences, with a Focus on Northern Italy
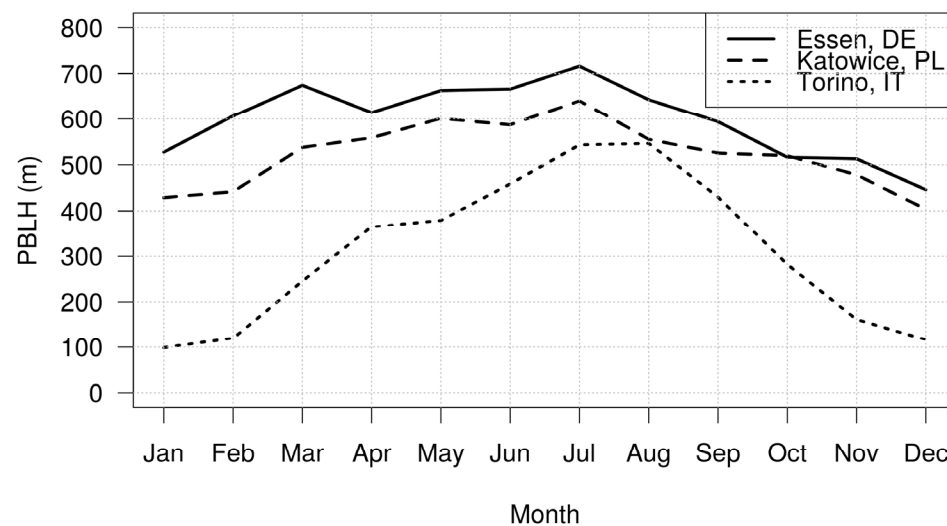
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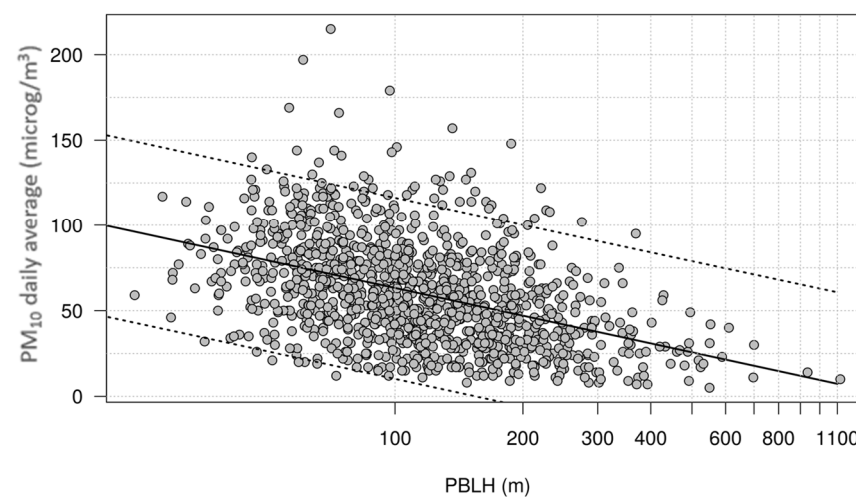

Figure S1. Air quality trends for PM_{10} (90.41 percentile daily average) measured at 3 urban-traffic stations in Torino (IT), Düsseldorf (DE) and Krakow (PL).

Figure S2. Air quality trends for PM_{10} (90.41 percentile daily average) measured at 3 urban-background stations in Torino (IT), Düsseldorf (DE) and Krakow (PL).

Figure S3. PBL height (monthly average) in Torino (IT), Essen (DE) and Katowice (PL), average values from 1979 to 2020.

Figure S4. Correlation between PBL height and PM_{10} daily averages measured in Torino (N-W Italy) in the period from 2011 to 2020.

November

December

January

February

Figure S5. Mean sea level pressure diurnal pattern in Torino (North Western Italy), Essen (North Western Germany) and Katowice (Southern Poland) during the cold season (average values from 1979 to 2020).

Table S1. Emission reduction of the main air pollutants by Member State from 2005 to 2019.

	NH₃	NMVOC	NOx	PM₂.₅	SOx	Average Reduction 2005-2019
Germany	3%	25%	31%	33%	45%	27%
France	5%	40%	48%	51%	78%	44%
Italy	15%	33%	51%	20%	74%	39%
Spain	2%	23%	52%	8%	88%	35%
Poland	6%	16%	23%	21%	62%	26%
Romania	17%	29%	34%	7%	84%	34%
Netherlands	19%	11%	43%	46%	66%	37%

Table S2. Emissions of main atmospheric pollutants in the Po Basin (Piedmont+Lombardy+Emilia Romagna+Veneto) and other European regions.

EU State	Region/State	Population	Surface (km²)	CO_{2eq} (kt/y)	NH_3 (t/y)	NOx (t/y)	PM_{10} (t/y)	$PM_{2.5}$ (t/y)	SO_2 (t/y)	Ref. Year
IT (NW)	Piedmont	4,273,210	25,402	40,547.9	40,007.6	72,945.8	16,911.9	12,680.1	8,374.8	2015
IT (NW)	Lombardy	9,964,993	23,844	76,970.1	97,114.0	111,474.6	17,822.9	15,040.1	11,179.8	2017
IT (NE)	Emilia Romagna	4,448,545	22,446	34,605.4	48,438.1	81,173.2	10,958.4	9,532.4	11,435.3	2017
IT (NE)	Veneto	4,841,175	18,345	33,794.0	51,854.6	61,450.7	13,904.5	12,703.9	5,003.3	2017
DE (NW)	North Rhine-Westphalia	17,925,570	34,084	276,099.3	91,402.9	265,536.9	18,952.3	/	83,277.7	2016
DE (SE)	Bavaria	13,124,737	70,550	110,053.7	86,048.0	168,763.0	16,172.0	/	25,740.0	2010
DE (SW)	Baden-Württemberg	11,100,394	35,751	83,266.9	54,404.8	112,147.3	13,331.0	/	12,801.6	2018
PL (S)	Lesser Poland	3,404,863	15,183	25,105.7	/	53,247.3	32,633.2	28,231.9	42,694.6	2018
PL (S)	Silesian	4,524,091	12,333	59,730.8	/	83,842.3	36,283.5	31,070.2	36,897.7	2018