

Air quality in regions

Air quality has a major impact on health, the environment, and the overall well-being of people. Two indicators are used to monitor air quality: Concentrations of fine particles in the air (particulate matter PM), and nitrogen dioxide (NO₂). Both are considered by the World Health Organization (WHO) as major air pollutants with significant negative effects on respiratory and cardiovascular systems. Recent PM₁₀ data for Europe show that across Eastern European countries, as well as Belgium, Greece, the Netherlands and Italy, a large share of population is exposed to elevated values of particulate matter above an annual average concentration of 20 µg³. According to the WHO guidelines, the risk of adverse effects on health is very high above this threshold of annual average exposure (Figure 5.1).

NO₂ concentrations across all OECD countries were computed for 2011-12 since PM₁₀ data were not available on a global scale after the year 2006. An annual average exposure to NO₂ values above 10⁹ molec/cm² is considered elevated, and critical above 10¹⁵ molec/cm². Regional NO₂ emission ranges clearly show that for the most part OECD regions are not exposed to health-concerning levels of NO₂ (Figure 5.2).

Definition

PM₁₀ are fine particles smaller than 10 micrometres that float in the air and access the respiratory system. NO₂ is one of the main sources of nitrate aerosols, which form an important fraction of PM_{2.5}, and of ozone when exposed to ultraviolet light. Main sources of PM and anthropogenic NO₂ emissions are fossil fuel based combustion processes.

NO₂ regional emissions are extracted from global monthly average NO₂ emission raster data based on 0.25 degree grid cell size. Monthly average NO₂ rasters for the months January 2011 to December 2012 have been assembled and the average values for the 24 month period have been calculated. For a detailed description of the method see Annex B.

However, annual average values are critically high in some regions, particularly large areas of eastern China as well as in some areas of Europe and North America.

The percentage of population that lives in regions with elevated and critical NO₂ concentration is relatively low (Figure 5.3). However, the values express average emissions within a two-year time frame in which emissions fluctuate and can reach concentrations significantly above the WHO threshold for shorter periods in time. Therefore, the share of population exposed to health-concerning NO₂ concentration can be considerably higher over a shorter time period.

With combustion processes from engines being a significant emitter of air pollutants, the number of cars on the road has a considerable impact on regional air quality, and fossil-fueled vehicle emissions directly impact the amount of NO₂ and particulate matter in the air. Significant regional differences between the lowest and the highest per capita car ownership exist in the United Kingdom, Austria, Turkey and Poland (Figure 5.4).

Source

NO₂ emissions: Tropospheric Emission Monitoring Internet Service (TEMIS), www.temis.nl/index.php.

PM₁₀: European Environmental Agency (EEA), www.eea.europa.eu/data-and-maps.

Landscan 2009 for population estimates.

See Annex B for data sources and country-related metadata.

Reference years and territorial level

NO₂ average 2011-12; TL3 for OECD countries, TL2 for Brazil, China, India, the Russian Federation and South Africa.

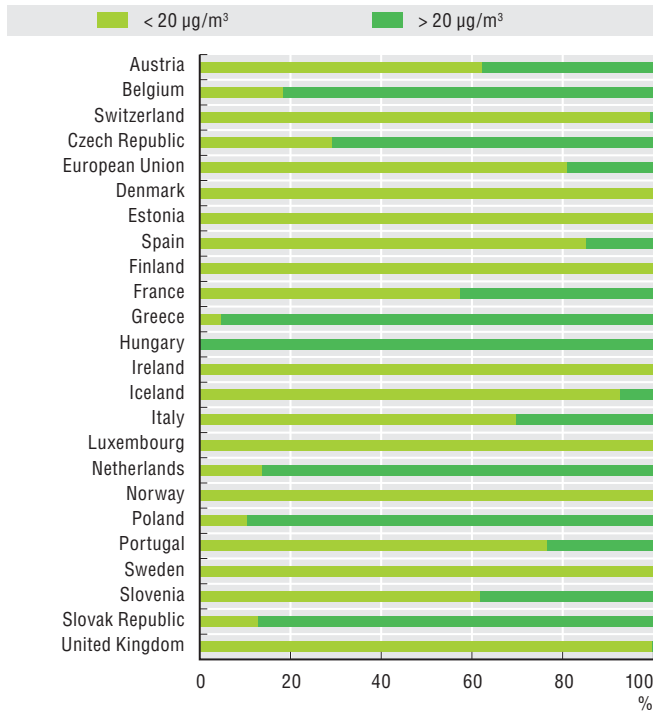
PM₁₀ 2010; TL3 European countries.

Number of cars 2011; TL3. for Australia, Austria, Canada, Chile, Greece, Japan, Netherlands and United States TL2.

Figure notes

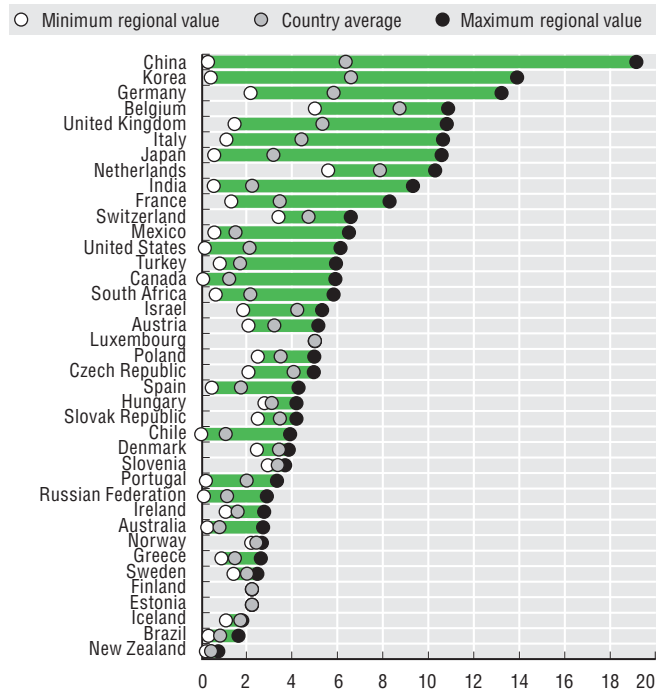
Information on data for Israel:
<http://dx.doi.org/10.1787/888932315602>.

5.1. Population exposure to fine air particulate matter (PM₁₀), 2010



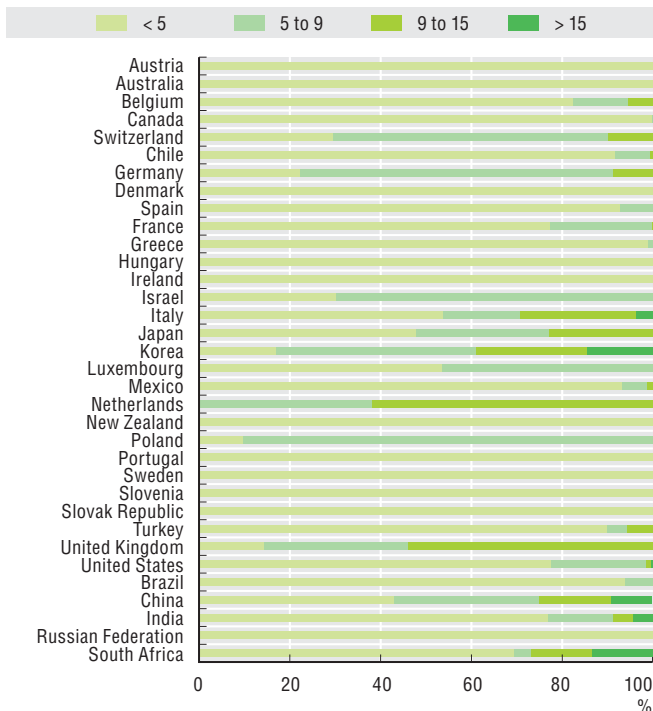
StatLink <http://dx.doi.org/10.1787/888932914862>

5.2. TL3 range in NO₂ emissions (10¹³ molec/cm²), average 2011-12



StatLink <http://dx.doi.org/10.1787/888932914881>

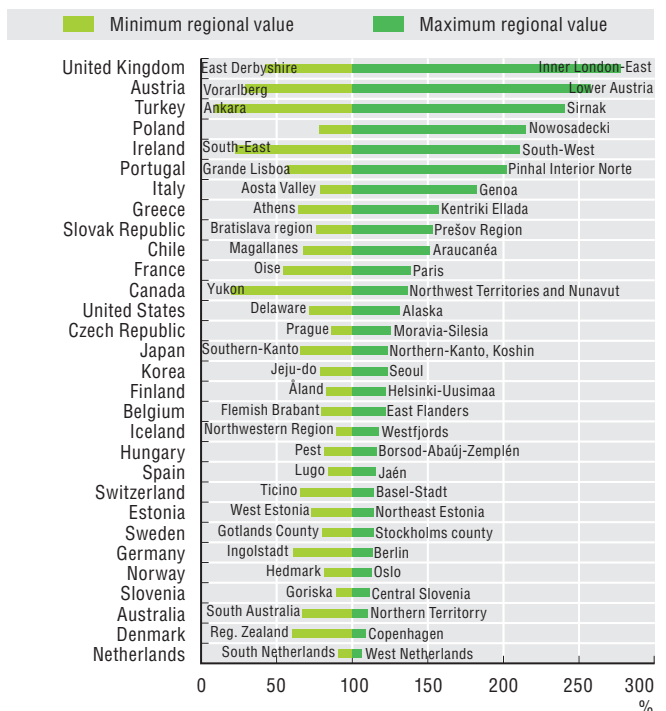
5.3. Population exposed to elevated and critical NO₂ emissions (molec/cm²), 2011-12



StatLink <http://dx.doi.org/10.1787/888932914900>

5.4. Regional (TL3) range in cars per person, 2011

Country average value = 100



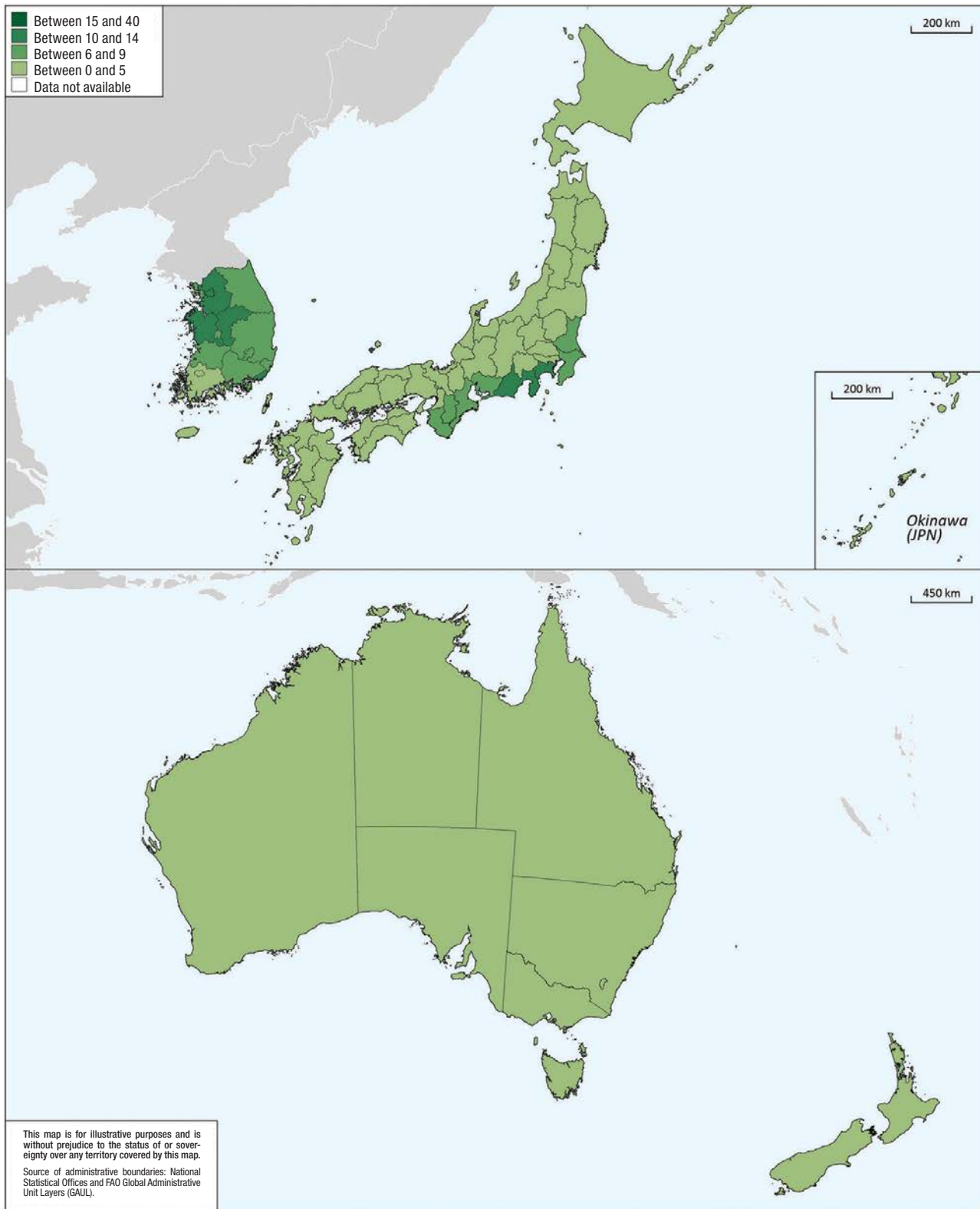
StatLink <http://dx.doi.org/10.1787/888932914919>

5. ENVIRONMENTAL SUSTAINABILITY IN REGIONS

Air quality in regions

5.5. Regional range in NO₂ emissions: Asia and Oceania, 2011-12

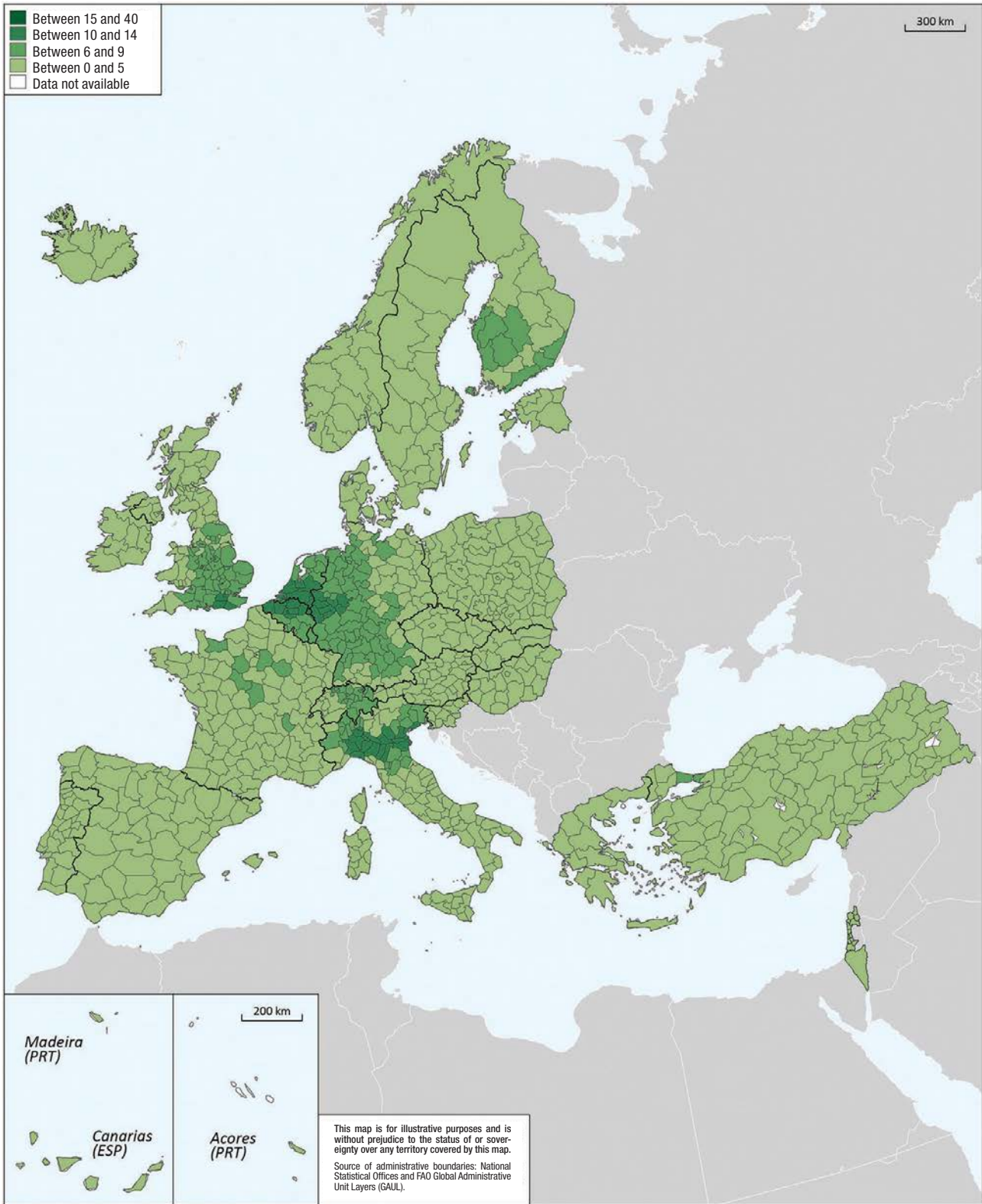
TL3 regions, average (10^xmolec/cm²)



StatLink  <http://dx.doi.org/10.1787/888932915850>

5.6. Regional range in NO₂ emissions: Europe, 2011-12

TL3 regions, average (10^x molec/cm²)



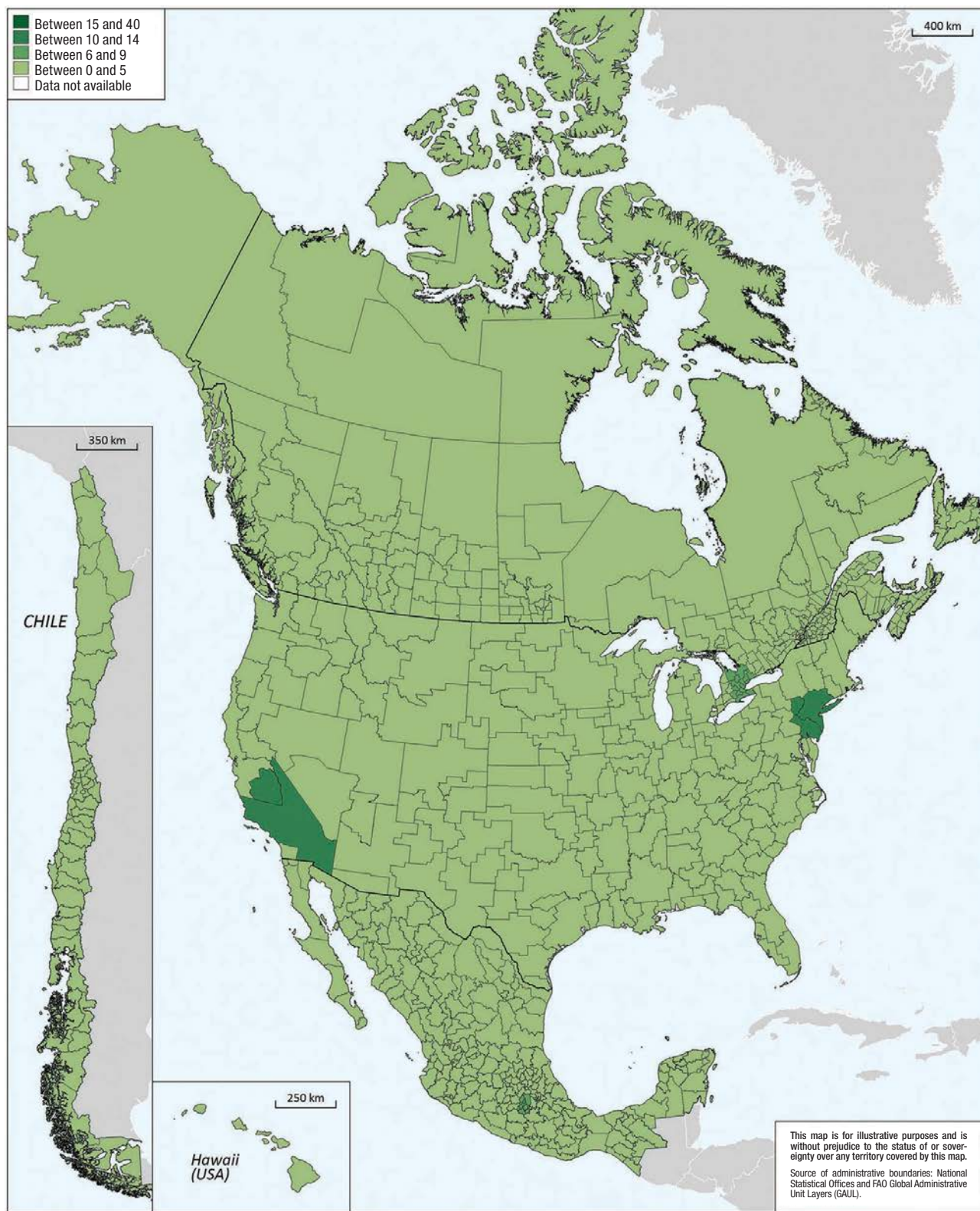
StatLink  <http://dx.doi.org/10.1787/888932915869>

5. ENVIRONMENTAL SUSTAINABILITY IN REGIONS

Air quality in regions

5.7. Regional range in NO₂ emissions: Americas, 2011-12

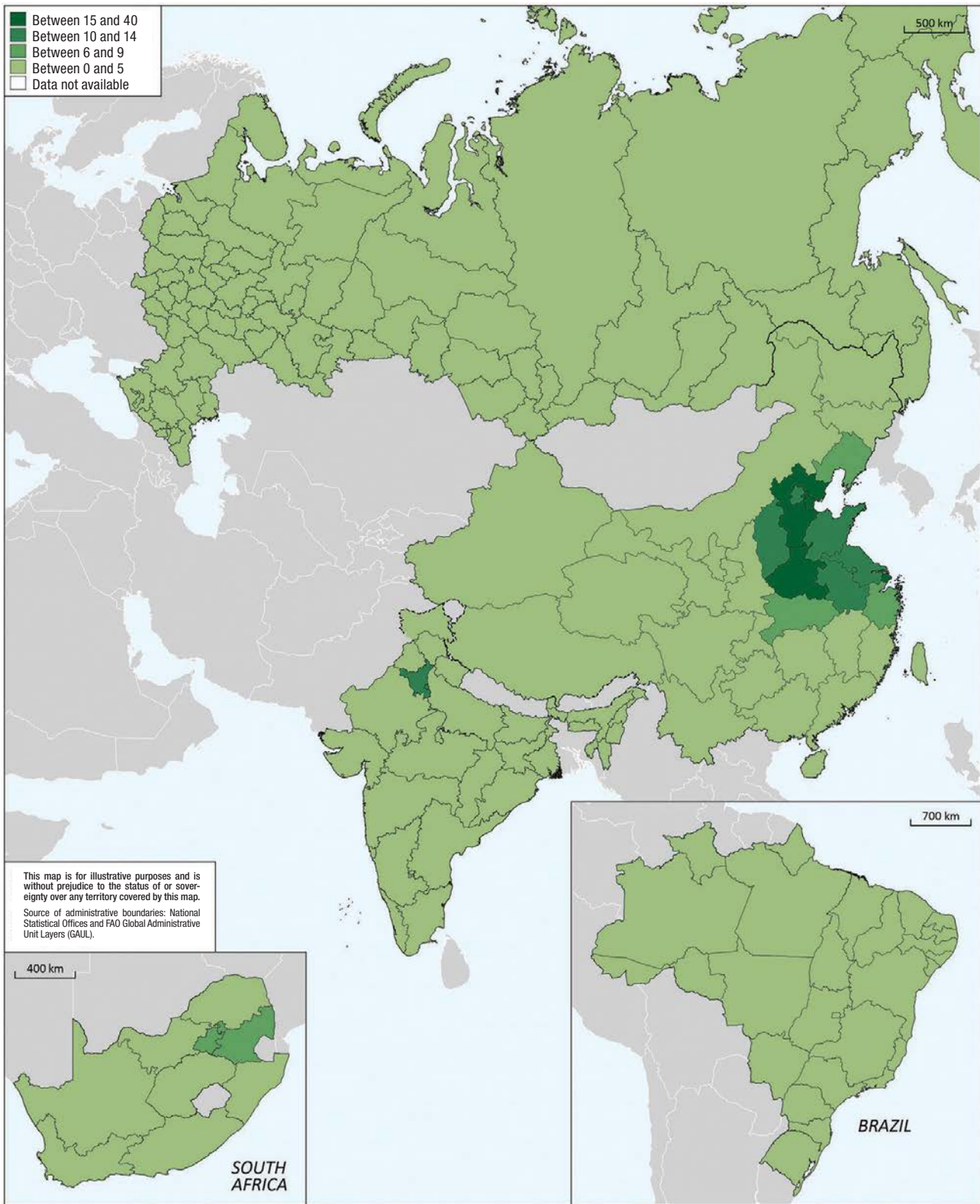
TL3 regions, average (10^x molec/cm²)



StatLink  <http://dx.doi.org/10.1787/888932915888>

5.8. Regional range in NO₂ emissions: Emerging economies, 2011-12

TL2 regions, average (10^x molec/cm²)



StatLink <http://dx.doi.org/10.1787/888932915907>



From:
OECD Regions at a Glance 2013

Access the complete publication at:
https://doi.org/10.1787/reg_glance-2013-en

Please cite this chapter as:

OECD (2013), "Air quality in regions", in *OECD Regions at a Glance 2013*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/reg_glance-2013-42-en

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