

Information topic	Details
Indicator name	<b>Carbon monoxide concentrations</b>
Domain and topic	Air quality – Other air pollutants: Carbon monoxide
Indicator definition and units	<ol style="list-style-type: none"> <li>1. Number of occasions that monitored sites exceeded the national environmental eight-hour rolling average standard for carbon monoxide (CO): exceedances occur when eight-hour rolling averages are greater than 10mg/m<sup>3</sup> (one exceedance per 12-month period allowed).</li> <li>2. Number of occasions that monitored sites exceeded the WHO one-hour average guideline for carbon monoxide (CO): exceedances occur when one-hour average concentrations are greater than 35mg/m<sup>3</sup>.</li> <li>3. Number of occasions that that monitored sites exceeded the WHO 24-hour average guideline for carbon monoxide (CO): exceedances occur when 24-hour averages are greater than 4mg/m<sup>3</sup>.</li> </ol>
Data source	Ministry for the Environment and Statistics NZ. 'Our Air' annual reports
Numerator	Number of sites exceeding guidance values or national standards.
Denominator	Nil
Methodology	<p><b>Average calculation:</b> Raw data is received in the form of hourly measurements, and hourly/8-hour/24-hour average values are calculated using these as a base. For instance, daily Average values are determined based on the average of the hourly recordings for a given day – but only if sufficient data for that day is available.</p> <p><b>Data validity check:</b> In the calculations of average values, a check to make sure the data meets the 75% completion requirement (Ministry for the Environment and Stats NZ. 2021) is made.</p> <ul style="list-style-type: none"> <li>• An eight-hour rolling period must have at least 6 hours of data to be 'complete'</li> <li>• A day must have at least 18 hours of data to be 'complete'.</li> <li>• A year must have at least 6,570 hours of data (6588 hours in the case of leap years) to be 'complete'. This is equivalent to 274 complete days (275 in leap years)</li> <li>• Numbers of exceedances are not calculated or reported for incomplete days &amp; years.</li> </ul>
Time period and time scale	Annual, from 2005 onwards.
Population coverage	Nil

## Metadata

Spatial Coverage	All sites with valid data that were reported by the Ministry for the Environment and Stats NZ. Validity of data is discussed in the 'methodology' section above.
Measures of frequency	Number of exceedances of the relevant air quality limit/guideline value per year
Limitations of indicator	The population coverage of the monitoring site is unknown, meaning a national representative average cannot be applied.
Limitations of data source	<ul style="list-style-type: none"> <li>Monitoring information is only reported if the site achieves greater than 75% valid data collection and data were present for at least three consecutive years.</li> <li>Monitoring site data is only applicable to a small area around the site – a single station is not representative of a whole city, let alone an entire region. The small number of sites further reduces the spatial coverage of the data.</li> <li>Much of the monitoring occurs at peak sites (sites expected to have high concentrations e.g. close to high-volume SO<sub>2</sub> emitters in industrial areas). These sites may, therefore, not be representative of the surrounding area.</li> </ul>
Related indicators	<ul style="list-style-type: none"> <li>Nitrogen dioxide concentrations</li> <li>Sulphur dioxide concentrations</li> <li>PM<sub>2.5</sub> and PM<sub>10</sub> concentrations.</li> </ul>
For more information	Ministry for the Environment 'Our air 2021': <a href="https://environment.govt.nz/publications/our-air-2021/">https://environment.govt.nz/publications/our-air-2021/</a>
References	