

## Impact on air quality in the Île-de-France region of lockdown as part of the fight against COVID-19 – Focus on fine and ultrafine particles

Updated assessment on May 15<sup>th</sup>, 2020

**In order to limit the spread of COVID-19, authorities implemented confinement measures from March, 17<sup>th</sup> to May, 11<sup>th</sup>. From the start of lockdown until the end of April, Airparif's assessments of the impact on air pollution show a significant improvement in air quality for regulated pollutants such as nitrogen dioxide (a local pollutant mainly emitted by traffic) of -20% to -35% depending on the week and up to -50% along traffic routes.**

**There is less impact for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) with a decrease of -7%, which is explained by a strong influence of unfavourable meteorological conditions and by more diverse emission sources, which are not only local.**

**Beyond these regulated pollutants, the monitoring of ultrafine particles (with a size of less than 100 nm, which can be as small as a DNA molecule) allows us to further the analysis and shows a decrease of around -30% for this type of particles, whose emissions are mainly linked to traffic (road, air) in urban areas.**

The impact of lockdown is less pronounced for pollutants originating from diversified sources and more influenced by weather conditions, than for nitrogen oxides along traffic routes. For regulated PM<sub>10</sub> (less than 10 µm in size, smaller than a cell), the reduction observed over the period March 17<sup>th</sup>-April 27<sup>th</sup> was about 7%. Indeed, the sources of these particles are more numerous (traffic, heating, including wood heating, agriculture, construction sites, pollution transfers, chemical reactions in the atmosphere, etc.) and concentrations are very sensitive to weather variations.

To go further, Airparif has looked into the composition of this particulate pollution, by studying unregulated compounds. During the pollution episode of March the 28<sup>th</sup>, the analysis of the chemical composition of the particles highlighted a significant impact from agriculture. In fact, secondary inorganic aerosols, which agriculture contributes to the creation of, accounted for 32% by mass of the particles (see press release of 21/04/2020).

Regarding much smaller compounds, the observation of ultrafine particles (PUF) in Paris shows a greater impact of the lockdown on this type of particulate pollution.

**A direct comparison of ultrafine particle concentrations before and during the lockdown, i.e. from February 16<sup>th</sup> to April 18<sup>th</sup> 2020, shows a 30% decrease in ultrafine particle concentrations during the time period. This decrease is even greater over the range of the smallest ultrafine particles, i.e. less than 20 nanometres, with a decrease of around 50% between the two periods.**

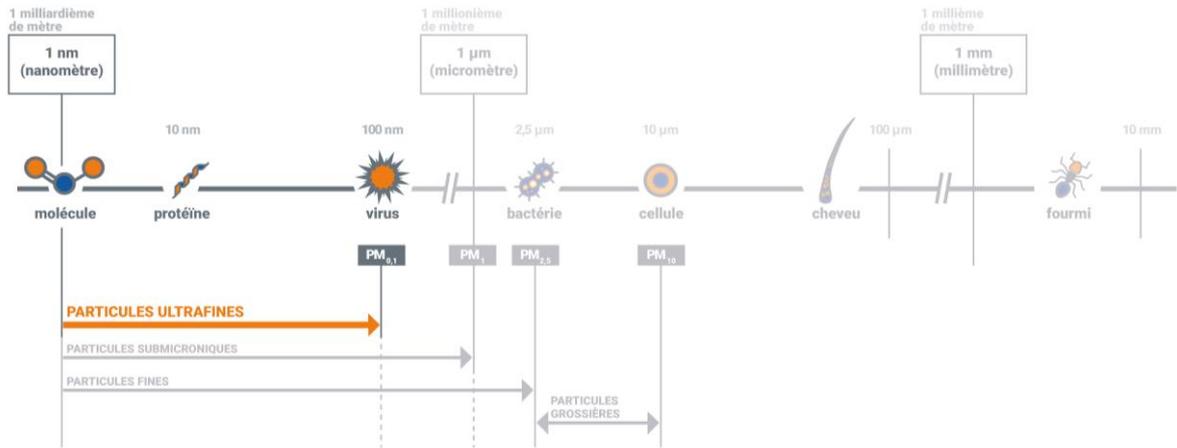
## AVERAGE NUMBER OF ULTRAFINE PARTICLES SMALLER THAN 100 nm IN INNER PARIS



Comparison of average ultrafine particle concentrations in inner Paris before lockdown (February 16-March 16) and during lockdown (March 17-April 18)

In the case of ultrafine particles, the historical data is limited compared to decades of measurement of regulated pollutants, and knowledge is still growing among air pollution experts. This exploratory analysis is based on Airparif's first reference station for ultrafine particles (which have yet to become regulated pollutants). This reference station was set up in the Paris conurbation in September 2019, and has benefited from financial support by the Île-de-France region which made the purchase of equipment possible. Such data, even if limited, do illustrate in a complementary way the positive impact of the lockdown on air quality in the Paris conurbation. It also provides valuable insights into the behaviour of these pollutants and the contribution of traffic to them. In the short term, this study will be supplemented by the analysis of the data collected 30 days after the end of the confinement measures in order to observe whether an increase in ultrafine particles is once again observed. In the medium term, measurements on the Boulevard Périphérique are also planned with the City of Paris.

Ultrafine particles, which are smaller than 100 nanometres, are emitted in cities, particularly by traffic-related combustion (road and air). Potential contributions from agriculture are still poorly documented, as are those from the residential and industrial sectors. Ultrafine particles are currently not regulated in ambient air, therefore their monitoring is not mandatory and there is no reference value. But given their health effects which are increasingly documented, the French National Agency for Environmental, Food and Occupational Health Safety (ANSES) in a report published in July 2019 recommended the monitoring of ultrafine particles in addition to that of PM<sub>10</sub> and PM<sub>2.5</sub> (see ANNEX).



Comparative infographic of the different sizes of particles in ambient air

Airparif remains fully committed to assessing the consequences on air quality of the lifting of confinement measures, for both regulated and non-regulated pollutants. While the impact of the lockdown on air quality has been sudden, changes in air quality seem to be more gradual as the lockdown is lifted. Particular attention will be paid to the consequences of the increase in road traffic, the main source of air pollution in the Île-de-France region, which has been gradually increasing over the last ten days. However, at the time of writing, emissions from road traffic have not yet returned to their pre-lockdown levels.

This vigilance is all the greater since motorists are most exposed to air pollution from road traffic and since air pollution could be an aggravating factor in the COVID-19 outbreak.