What role do **businesses** play in **improving outdoor air quality?**

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entreprises pour l'environnement

CHAIRMAN'S MESSAGE

The air we breathe is essential to us, and its quality has a significant impact on our comfort, daily activities, and overall health. Its quality has been deteriorating since the Industrial Revolution, as exemplified by London's infamous smog and other occasional or chronic pollution episodes likely to have impacted people's health. The primary sources of this pollution are emissions from transport and industrial facilities.

Awareness of this issue has been raised for many years. Airparif was established in the early 1980s to combat air pollution in Paris. Regulations have been gradually extended in France and Europe to address these issues, encompassing both the industrial and transportation sectors.

The public debate was revived a few years ago, particularly with the introduction of low-emission zones (LEZs) in major urban areas. This issue is also increasingly taken into account in urban planning.

The member companies of Entreprises pour l'Environnement (EpE) acknowledge and address this issue, each in its own specific field.

Manufacturers have long endeavoured to reduce vehicle exhaust emissions in the transport sector. The electrification of fleets should also accelerate reductions in emissions of certain pollutants, such as nitrogen dioxide.

In the case of industrial facilities, emissions can vary. Although they are identified and controlled, they heighten concerns about the acceptability of these sites among residents. This publication showcases several examples of practical actions. We hope it will inspire many other companies and elected officials. Given the collective nature of this subject, fostering early dialogue among companies, their stakeholders, and public authorities helps to swiftly identify and address potential health issues while maintaining mutual trust between the company and the surrounding community.

Patrick Pouyanné
Chairman, Entreprises pour l'Environnement
CEO of TotalEnergies

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BEST PRACTICES

1

Why care about outdoor air quality?

Every year, air pollution causes approximately 6.7 million premature deaths globally[1], including 253,000 in the European Union (EU) in 2023[2]. A 2025 study by Public Health France (Santé Publique France - SPF) estimated that "between 12% and 20% of new cases of respiratory diseases in children (between 7,000 and 40,000 cases, depending on the disease and pollutant considered) and between 7% and 13% of new cases of respiratory, cardiovascular or metabolic diseases in adults (between 4,000 and 78,000 cases, depending on the disease and pollutant considered) are attributable annually to long-term exposure to ambient air pollution resulting from human activities"[3]. Air pollution covers two aspects: indoor air quality and outdoor air quality.

The first issue was examined in a previous publication by the French Association Entreprises pour l'Environnement (EpE) in 2023[4].

The second issue of air pollution presents a considerable challenge in France, across Europe, and worldwide due to its effects on human health and the environment.

Outdoor air pollution is consequently a growing concern among the general population due to its direct or indirect effects on:

- **health:** air pollution can cause or exacerbate benign diseases (fatigue, nausea, irritation of the eyes and skin, etc.), chronic diseases (asthma, allergies, cardiovascular diseases, etc.), or lead to fatal diseases (e.g. cancer). The effects of this pollution on human health can arise over both the short and long term and are observable even at low levels of exposure. In France, between 2016 and 2019, 40,000 deaths each year were attributable to the exposure of individuals aged 30 and over to fine particles ($PM_{2.5}$), resulting in a loss of life expectancy of eight months[5];
- **environment and food security:** certain air pollutants contribute to the eutrophication of aquatic environments, the acidification of water and soil, and the contamination of ecosystems, plants, and animals by metals and persistent organic pollutants (POPs). Moreover, ozone pollution leads to a decline in agricultural yields, among other effects;
- **climate change:** according to a recent report by the World Meteorological Organisation (WMO), "chemicals responsible for air pollution are generally emitted at the same time as greenhouse gases"[6]. Similarly, climate change plays an indirect role (heat waves, drought) in forest fires which, in turn, degrade air quality due to a mixture of chemicals contained in smoke. At the same time, the deposition of certain air pollutants in soil, such as nitrogen, sulphur or ozone, can harm ecosystem health and thus reduce the services they provide, such as carbon storage;
- **the economy:** for society, businesses, and local authorities, the economic costs associated with healthcare, productivity loss, or the decline in tourism's appeal are substantial. In 2015, a Senate enquiry committee estimated that France's air pollution-related health expenditure

1 Fuller (R.) *and al.*, "Pollution and health: a progress update", The Lancet Planetary Health, vol. 6.
2 European Environment Agency, "Harm to human health from air pollution in Europe: burden of disease 2023", 24 November 2023.
3 SPF, *"Asthme, accident vasculaire cérébral, diabète... quels impacts de la pollution de l'air ambiant sur la santé ? Et quel impact économique ?"*, 28 January 2025.
4 EpE, "Improving indoor air quality", April 2024.
5 SPF, *"Pollution de l'air ambiant : nouvelles estimations de son impact sur la santé des Français"*, 14 April 2021.
6 WMO, "Vicious circle of climate change, wildfires and air pollution has major impact", Press release, 5 September 2024.

covered by social security was around three billion euros annually, with the overall expenditure related to this issue somewhere between 70 and 100 billion euros[7];

- **the legal system:** multiplication of international, national, and local disputes, particularly resulting in fines that amount to millions of euros and projects being abandoned;
- **diplomatic relations:** cross-border pollution incidents;
- **innovation:** sensors, depollution, skin cosmetics, etc.;
- **media and politics.**

A genuine and consistent improvement in air quality has been observed in the EU and France since the 2000s, largely due to the implementation of various regulations and policies. This is especially true of regulated pollutants.

However, several difficulties persist:

- average **ozone** levels are not declining and are even **increasing**, particularly due to climate change. Ozone is regarded by Intergovernmental Panel on Climate Change (IPCC) experts as one of the four key climate change-related human health issues;
- **recurring breaches of regulatory air quality thresholds** designed to protect human health are observed in specific agglomerations (e.g. Paris and Lyon). Pollution episodes involving ozone and fine particles are on the rise;
- **not all pollutants are regulated,** and some are increasingly concerning: black carbon, pesticide residues, ultra-fine particles (UFPs), pollen, and so on;
- **regulations classify fine particles solely based on their size** (e.g. less than or equal to 2.5 µm), making it impossible to benchmark the nature and health effects of different particles of the same size;
- besides occasional pollution episodes, the most alarming type of pollution for both human health and the environment is **chronic pollution**, which is often less visible and publicised.

Air pollution is, therefore, a concern for both public authorities and economic actors. In 2024, twenty major EpE member companies engaged in discussions with each other and their stakeholders, under the aegis of the Health and Environment Commission, to understand the health, environmental, and economic challenges associated with air pollution and to identify actions taken by some to tackle these issues. This report summarises various testimonies but does not provide a comprehensive account of all the actions undertaken by businesses and public authorities.

7 Husson (J.-F.) and Aïchi (L.), *"Le coût économique et financier de la pollution de l'air"*, Report on behalf of the Committee of Enquiry, French Senate n° 610, 9 July 2015.

2

What are the sources of outdoor air pollution?

Air quality is dependent on:

- the substances released from natural sources such as volcanic eruptions, sea spray, and pollen;
- pollutants released directly into the atmosphere by human activities (such as industrial or domestic chimneys, road transport, agriculture, etc.);
- the formation of additional pollutants through physico-chemical reactions in the atmosphere. For instance, ground-level ozone is produced by chemical reactions between NOx and VOCs under the influence of sunlight (indirect pollution);
- weather conditions.

The sources of man-made pollution emissions vary significantly depending on the sector of activity and region in question (see Figure 1).

- Road transport accounts for 34% of nitrogen oxide (NOx) emissions in France[8] and 39% in Europe[9].
- Fine particles (PM_{10} and $PM_{2.5}$) are primarily produced by residential heating and industry.
- Sulphur dioxide (SO_2) emissions originate from industry.
- Non-methane volatile organic compounds (NMVOCs) are produced by the residential sector and industry.
- Ammonia (NH_3) comes almost exclusively from agriculture.
- Heavy metals, including arsenic, cadmium, nickel, and lead, are chiefly produced by industry and transportation.

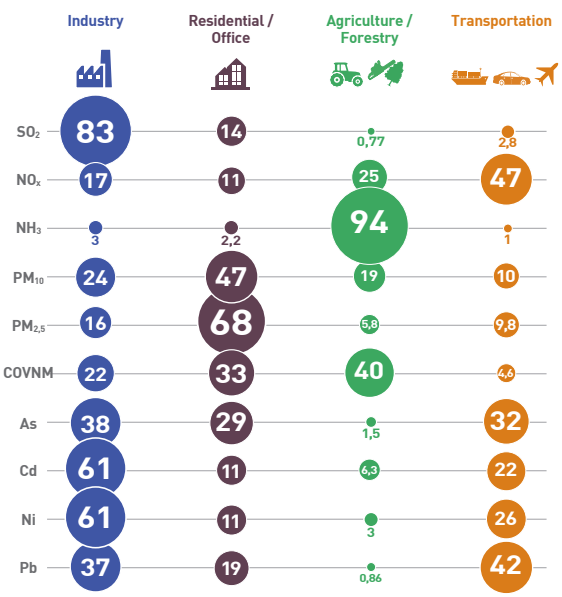


Figure 1 / Contribution of economic sectors to anthropogenic emissions of the ten worst pollutants in France[10].

8 Datalab, "*Chiffres clés des transports – Edition 2025*", March 2025.
9 EEA, "Air quality in Europe – 2020 report", 23 November 2020.
10 Datalab, "*Bilan de la qualité de l'air extérieur en France en 2023*", December 2024, p. 16. Figures from Citepa, June 2024.

3

How is outdoor air quality regulated in Europe and France?

In the European Union, the European Parliament and the Council adopted the new Directive (EU) 2024/2881 of 23 October 2024 on ambient air quality and cleaner air for Europe. This directive updates the European air quality indicators for the 12 regulated pollutants (limit values, target values, and requirements to reduce average exposure) starting from 1 January 2026 and again in 2030, in light of the revised World Health Organisation (WHO)[11] air quality guidelines, without strictly conforming to them (see Figure 2). Furthermore, certain emerging pollutants, such as ultrafine particles and black carbon, are now to be monitored. Finally, it outlines the actions to be taken by Member States when there is a risk of exceeding the target values. Through its various measures, the goal is to achieve 'zero pollution' by 2050. France has until 11 December 2026 to transpose the Directive.

Polluant	Frequency	Type of Standard	Standard in force		Revised standards adapted for 2030	Authorised exceedances	WHO guide values (2011)
$PM_{2,5}$	Annual	Limit value	25 µg/m³	↘	10 µg/m³	-	5 µg/m³
	24h	Limit value	*No standard*	↓	25 µg/m³	18 times a year	15 µg/m³
PM_{10}	Annual	Limit value	40 µg/m³	↘	20 µg/m³	-	15 µg/m³
	24h	Limit value	50 µg/m³	↘	45 µg/m³	18 times a year	45 µg/m³
O_3	Average daily max. over 8h	Target value	120 µg/m³	→	120 µg/m³	18 days a year (average over 3 years)	100 µg/m³
	Average daily max. over 8h	Long-term objective	120 µg/m³	↘	100 µg/m³	3 days a year	10 µg/m³
NO_2	Annual	Limit value	40 µg/m³	↘	20 µg/m³	-	
	24h	Limit value	*No standard*	↓	50 µg/m³	18 times a year	25 µg/m³
	1h	Limit value	200 µg/m³	→	200 µg/m³	3 times a year	-
SO_2	Annual	Limit value	*No standard*	↓	20 µg/m³	-	-
	24h	Limit value	125 µg/m³	↘	50 µg/m³	18 times a year	40 µg/m³
	1h	Limit value	350 µg/m³	→	350 µg/m³	3 times a year	-
CO	24h	Limit value	*No standard*	↓	4 µg/m³	18 times a year	4 µg/m³
	Average daily max. over 8h	Limit value	10 µg/m³	→	10 µg/m³	-	-
Benzene	Annual	Limit value	5 µg/m³	↘	3,4 µg/m³	-	-
Lead	Annual	Limit value	0,5 µg/m³*	→	0,5 µg/m³	-	-
Arsenic	Annual	Limit value	6 ng/m³*	→	6 ng/m³	-	-
Cadmium	Annual	Limit value	5 ng/m³*	→	5 ng/m³	-	-
Nickel	Annual	Limit value	20 ng/m³*	→	20 ng/m³	-	-
BaP	Annual	Limit value	1 ng/m³*	→	1 ng/m³	-	-

Figure 2 / Table of new air quality standards for the protection of human health set by Directive (EU) 2024/2881, in comparison with the 2021 WHO guideline values (source Citepa)[12].

In France, in accordance with regulations, air quality monitoring has been entrusted to regional associations: the 19 accredited air quality monitoring associations (AASQA). In Île-de-France, Airparif is the approved association. The association has four tasks: monitoring, understanding, supporting, and innovating. To carry out these tasks, it uses various complementary tools (fixed stations, measurement campaigns, and

11 For more information: https://www.who.int/fr/news-room/questions-and-answers/item/who-global-air-quality-guidelines.

12 Citepa *"Le Parlement européen adopte formellement la nouvelle directive sur la qualité de l'air"*, 26 April 2024. Citepa is a non-profit association specialising in the fight against climate change and atmospheric pollution by supporting public and private players in their green transition. To find out more about Citepa: https://www.citepa.org/.

modelling systems) that produce real-time, annual average concentration maps, an inventory of air pollutant and greenhouse gas (GHG) emissions, an air quality index, and forecasts of pollution episodes. Airparif disseminates this information widely through various media and platforms, adapting its formats and content to suit the target audiences. Air quality measurements and indices are accessible to all. Additionally, Airparif conducts local diagnostics, for example of emissions by sector of activity and concentrations.

The **French judiciary** has also become involved in the issue. In a July 2020 decision, France's Council of State (Conseil d'État) ordered the government to take "all necessary measures" to reduce the concentrations of nitrogen dioxide (NO_2) and PM_{10} fine particles in 13 particularly polluted areas. On 4 August 2021, the government was ordered to pay 10 million euros to Friends of the Earth and several other organisations and associations involved in the fight against air pollution for failing to do so within the deadline. Consequently, since July 2020, the government has adopted a series of measures to reduce air pollution, including the introduction of new low-emission zones (LEZs), incentives for converting the national fleet to cleaner vehicles, and the gradual ban on gas or oil boilers. These measures impact specific industrial sectors. Further convictions of the government followed - by the Council of State (17 October 2022 and 24 November 2023) and by administrative courts and courts of appeal - acknowledging the causal link between the deterioration of the complainants' state of health and the exceedance of air pollution thresholds as a result of state negligence[13].
In addition to these general measures, there are **sector-specific regulations** influencing air pollution. For instance, in the automotive sector, the initial measures were adopted as early as 1992, primarily in the form of Euro standards that set unit emission limits per vehicle. The French classification of vehicles according to their emissions (Crit'Air label) originated from these measures and permits two actions: emission-based driving restrictions during peak pollution events and LEZs. The introduction of LEZs is a public health policy spearheaded by the Ministry of the Environment to restrict the use of the most polluting vehicles. In Paris, as of 1 January 2025, nearly 1 million vehicles are no longer allowed to run in the city.

The industrial sector is subject to strict regulations in this regard. For instance, it is required to measure the presence of pollutants in air discharges from facilities classified for environmental protection (ICPE). Depending on the type of facility (e.g. waste storage centre, incinerator, airport hub), additional measures may be implemented by various supervisory bodies responsible for air quality management[14].

13 Judgement of the Paris Administrative Court, 16 June 2023 (n° 2019924), judgements of the Paris Court of Appeal, 9 October 2024 (n° 23PA03742 and 23PA03743) and judgement of the Lyon Court of Appeal, 19 February 2025 (n° 21LY00245).

14 For example, the requirements of 6 October 2020 on air quality management by airport operators on and around airports.

4

What actions have businesses taken?

EpE industrial member companies implement various measures to monitor and reduce air pollutants emitted by their production facilities or the products they introduce to the market. These actions contribute to enhancing air quality in the area, often in collaboration with local authorities. To achieve this, businesses can rely on studies or forge partnerships with a number of specialist organisations on this issue, such as INERIS, Atmo France, AASQA, and Citepa.

1 Joint actions with public authorities

Examining the local situation improves the likelihood of success of reduction measures tailored to each region, based on the sectors of activity and the pollutants targeted.

PeopleLab: A citizen's approach to improving air quality

In 2020, Engie, together with Crédit Agricole, Grenoble École de Management, ERM Lyon Business School, International Mozaik, and Atmo Auvergne-Rhône-Alpes, launched **PeopleLab**, a citizen-driven initiative aimed at improving air quality. The goal was to gather key players, including local authorities, researchers, students, residents, industrialists, and experts, for brainstorming sessions and discussions on air quality issues.

This process included three stages:

- **People Ask** listening to citizens' and experts' viewpoints to undertake a stock-take of air quality perceptions in everyday life and science-based information;
- **People Lab** bringing together decision-makers and committed stakeholders to engage in collective thinking on solutions, governance and funding methods;
- **People Fab** hosting workshops to explore, pursue, and implement practical actions at the heart of the two regional industrial hubs of Grenoble and Lyon. The workshops were held in schools and businesses. The ideas discussed centred on the installation of air quality sensors in companies, integrating this issue into annual employee interviews, and linking the matter of air quality with sustainable mobility and food.

This approach is based on the notion that everyone can contribute to improving air quality by examining their modes of production, consumption, transportation and heating. It is crucial to build an active community around these issues, as technology alone will not resolve all the problems. Adopting a **holistic perspective on sufficiency, CO_2, and air quality is therefore essential.**

There are additional measures as well, particularly regarding town planning. Urban planning is essential for air quality (location, construction, stakeholder training, innovation, etc.), to such an extent that several economic players in the sector, including **Vinci Autoroutes** and ICADE, have joined Airparif's board of directors[15]. The aim is to limit pollutant emissions in the air of buildings and infrastructures (air, energy, and climate strategy) and reduce population exposure.

As well as actively working to improve indoor air quality in buildings[16], **Vinci Group**, operating under the name Axians[17], a Vinci Energies brand, is involved in the airEAS project to implement a real-time air quality measurement system at more than 30 locations across Eindhoven (Netherlands)[18]. The aim of this citizen-initiated collaborative project is to enable every citizen to monitor air quality in their neighbourhood in real time, identify the primary sources of pollution, and ultimately enhance health in the city.

Veolia also assists local authorities in managing their air pollution emissions with Dinapsis Air, a system deployed by its subsidiary Aquatec to monitor outdoor air pollution events and potentially implement protection plans for the local population.

EDF has developed a strategy to assess air quality and its impact on health and the environment in its customers' urban projects, thus facilitating decision-making.

15 Airparif's governance body is made up of four panels representing all local stakeholders: (1) government agencies, (2) local authorities, (3) economic stakeholders, and (4) environmental and consumer protection associations, researchers and health experts. The third panel comprises more than 100 business players, including Groupe ADP, SNCF, ENGIE Solutions, Veolia, Vinci Autoroutes and La Poste Group.

16 See EpE, "Improving indoor air quality", April 2024, p. 15.

17 https://www.axians.nl/.

18 https://www.vinci-energies.com/projet/Collective intelligence supporting urban air quality/.

Air quality assessments in urban projects

EDF and the European Institute for Energy Research (EIFER)[19] have devised an operational approach aimed at evaluating air quality in their customers' urban projects during the planning stage. The aim is to support decision-makers and regional or local stakeholders in their decision-making by providing a systemic view of quality of life that enables the identification of both realistic and the most environment-friendly and health-promoting solutions.

This approach consists of several modules, ranging from territorial analysis of energy production, mobility, and industry to economic analysis (cost-benefit analyses and assessment of avoided costs), illustrated below by three case studies.

1) Strasbourg (in partnership with Eurométropole de Strasbourg, Atmo Grand Est, Cerema, and École Centrale de Lyon). The objective was to create a neighbourhood with a high quality of life based on environmental factors related to air quality and noise. The study identified:

- the impact of energy production, and especially road traffic, on the quality of life of residents;
- the minimal impact of an individual neighbourhood on the overall environmental quality of the city;
- a reduction in the projected annual rate of deaths and hospitalisations due to respiratory causes, thanks to changes in the vehicle fleet, primarily resulting from regulatory adjustments in vehicle emission standards (i.e. transition to Euro 7 planned for 2026) and the city's proactive policy;
- moderate impact of changes in the road fleet on residents' exposure to noise.

2) New York City (in partnership with Columbia University – Mailman School of Public Health). The objective was to assess the effectiveness of the city's air quality improvement policies. Two scenarios were considered: (1) business as usual and (2) interventionist (such as the introduction of urban tolls at the entrance to the city center, an increase in soft modes and public transport, a reduction in individual car numbers, and the conversion of all boilers to natural gas). If put into practice, the interventionist scenario would lead to a significant decrease in air pollutants that are detrimental to the health of residents.

3) Paris. The objective was to model air quality in the streets of the capital by examining several fleet scenarios. The interaction between trees and road traffic, often overlooked in air quality models, was also investigated.

This approach promotes the integration of environmental health issues into global thinking by proposing a **systemic vision** of a "liveable city" with human beings at its core. It involves assessing the connections between urban planning (including energy and mobility), the environment, and health, minimising negative impacts (such as air pollution, noise, and heat islands) while enhancing positive impacts (including attractiveness, soft mobility, and biodiversity).

19 Research Institute created by EDF et the KIT (Karlsruhe Institute of Technology) in 2002.

2 Controlling and reducing transport emissions

Businesses in the transport sector, such as **Groupe ADP**, **Renault Group** and **Michelin**, are actively engaged in monitoring and reducing atmospheric emissions associated with their activities.

Air quality monitoring at Île-de-France airports

The "Air Quality" unit at Group ADP's Laboratory conducts three types of monitoring activities.

1) **Measurement networks and campaigns which are** responsible for:

- monitoring emissions from thermal power plants;
- monitoring ambient air quality using five permanent measurement stations that continuously track six parameters: four regulated (nitric oxide, nitrogen dioxide, $PM_{2.5}$ and PM_{10}) and two unregulated or "emerging" (ultrafine particles and black carbon), as recommended by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES). All data is public and available on the "Between Neighbours" platform[20].

2) **Research and development (R&D)** for gathering scientific knowledge and data while, above all, anticipating the integration of new techniques and evolving standards. This forms the basis of Groupe ADP's involvement in the European OLGA project[21]. Launched in 2021 and coordinated by the Groupe ADP in partnership with three airports, the project aims to develop a platform for real-time air quality assessment and to identify the contributions of various sources in a complex environment, including road, cityside, and airside activities, as well as take-off and landing.

3) **Emissions inventory and modelling** (pollutants and greenhouse gases [GHGs], etc.). Several sources of emissions are recorded, including road traffic, aircraft take-off, and rail traffic. Currently, Groupe ADP teams can create modelling maps on an annual basis.

Thanks to its Laboratory, the airport management has access to experts who produce regulatory reviews, contribute to the study and implementation of the group's major investment projects, and assist in controlling significant risks, especially environmental and health hazards, while also anticipating future needs.

20 https://entrevoisins.groupeadp.fr/.
21 https://www.olga-project.eu/.

Polluting road transport emissions arise from the exhaust of vehicles with internal combustion engines, wear and tear on components, road emissions, and the resuspension of dust on the road. Several measures could be implemented to address this:

- **avoid:** reduce travel (urban planning policy);
- **shift:** modal shift, along with measures to promote active mobility and transport. To achieve this, businesses could encourage their employees to adopt less polluting transport modes, as suggested, for instance, by the EV 100 initiative[22] or the EpE employees' green transition initiative[23] ;
- **improve:** improve vehicle occupancy rates, the environmental efficiency of the proposed vehicles, and the road surface to minimise tire wear particle generation.

Renault Group

Cutting road transport emissions

The widespread use of particulate filters and efficient pollution control systems has led to a significant reduction in pollutant emissions from the exhausts of internal combustion engine vehicles (including hybrids) in Europe since the 2000s. Consequently, approximately 75% of road transport $PM_{2.5}$ emissions may now originate from non-exhaust sources. This percentage could rise to 87% by 2030 and 91% by 2035 due to fleet renewals (new vehicles producing less exhaust pollution) if no measures are taken to limit emissions of abrasion particles (from brakes, tires, and roads).

Renault Group is developing **new brake disc technologies and pad materials** to reduce wear particles across all its vehicles (ICEVs and EVs).

For electric and hybrid vehicles, **regenerative braking** also reduces particulate emissions from the braking system by about 60% to 90%, depending on the vehicle's level of electrification.

After optimising its pollution control and braking system technologies across its vehicle range, Renault Group is actively working to reduce both exhaust and non-exhaust pollutant emissions.

Furthermore, the group is adapting to **mobility trends**, particularly through the Ampere and Mobilize entities[24], which develop electric vehicles and mobility services tailored to individual needs. As a result, its range of electric vehicles continues to expand, including a Mobilize Duo quadricycle dedicated to urban mobility.

22 https://www.theclimategroup.org/EV100.
23 https://www.epe-asso.org/engagements-entreprises-initiatives-collectives/.
24 https://www.mobilize.com/.

At **Michelin**, tire wear particles have been a focal point for many years. In 2021, its tires emitted an average of 28% fewer wear particles than those of its competitors. Michelin continues to explore ways to further reduce these emissions and develop new sustainable materials[25].

Combining reductions in greenhouse gas (GHG) emissions and air emissions

For Groupe ADP, commitments to reducing GHG emissions contribute to lowering air emissions. It tackles both issues with a range of measures:

- the **Airport Carbon Accreditation** (ACA) programme[26] engages airports in the fight against climate change. It comprises seven levels from calculating internal GHG emissions (scopes 1 and 2) to achieving net zero (scopes 1 and 2), along with net zero emission commitments concerning scope 3 (external emissions). The three Parisian airports reach the level 4[27], which involves setting GHG emission reduction targets in absolute terms, charting a reduction pathway aligned with the IPCC's 1.5°C scenario (scopes 1 and 2), including scope 3 emissions items. It also involves strengthening the action plan in collaboration with stakeholders;
- improving **energy performance** and control of the group's consumption, particularly under a sobriety plan implemented after the war in Ukraine.
- renewing Groupe ADP's **vehicle fleet** with electric or low carbon vehicles;
- greening **airside activities** by reducing, for example, the aircraft emissions during taxiing by reducing the use of auxiliary power units;
- deployment of **multi-energy stations** (hydrogen and electricity) on both landside and airside; and
- actions regarding **hub access and intermodality**. Groupe ADP aims to transform its airports into multimodal hubs for daily mobility and long-distance intermodality. This initiative involves linking the airports to the Transilien and regional rail networks in Île-de-France. For example, the Paris-Charles de Gaulle airport will be connected to the Gare de l'Est train station. At the Paris-Orly airport, Groupe ADP intends to develop a multimodal station by 2035 to reduce the number of thermal engine vehicles near the terminal.

25 See EpE, "Combating plastic pollution: A collective effort", January 2025, p. 26.
26 https://www.airportcarbonaccreditation.org/.
27 For more information: https://entrevoisins.groupeadp.fr/.

3 Monitoring, controlling and reducing emissions from industrial facilities

The primary obligation of manufacturers is to comply with evolving regulations. For instance, the new EU Air Quality Directive is being enforced across the EU. Furthermore, striving to maintain air quality addresses both innovation and community concerns.

In this context, businesses take actions to measure and characterise the pollutants emitted by industrial facilities. For example, the Air Control system offered by **Veolia**'s subsidiary OFIS is designed to audit and manage sources of odour emissions from industrial facilities. **Suez** and **Engie** are also pursuing innovative approaches to controlling air pollutant emissions.

This marks the initial step in a policy aimed at reducing emissions from industrial facilities, as exemplified by **Séché Environnement**'s strategy to lessen methane emissions from non-hazardous waste storage.

Beyond France and the EU, EpE member companies have made voluntary commitments to reduce pollutant emissions at all their facilities in every country where they operate. This is true, for example, of **Solvay** renewing its act4nature international commitments[28], as well as **TotalEnergies**.

Since its launch in 2018, **act4nature international** has brought together business networks, environmental NGOs, public bodies, and scientific partners to promote the incorporation of biodiversity issues into corporate strategies. This initiative aims to mobilise businesses regarding their direct and indirect impacts, dependencies, and potential for nature-friendly actions. Participating companies present their commitments during sessions conducted by the act4nature office. These commitments are subsequently evaluated by a Partners' Review Committee consisting of the aforementioned stakeholders. Their feedback informs discussions in the Steering Committee, which collectively decides whether to validate the commitments, ensuring they meet the SMART criteria[29] and embrace the ten common commitments outlined by the scheme. Once validated, the commitments are endorsed by the executives of the companies involved and published on the act4nature international website[30].

28 https://www.act4nature.com/wp-content/uploads/2024/09/SOLVAY-VF.pdf.
29 This acronym stands for objectives that must be specific, measurable, achievable, relevant and time-bound.
30 https://www.act4nature.com/bilans-engagements-entreprises/.

AirAdvanced®: Helping businesses manage their impact on air quality

To support businesses in improving air quality, Suez has developed a customised **AirAdvanced®** digital solution consisting of four modules:

- assessing regulatory compliance, pollution measurement and characterisation;
- optimising predictive scenarios to help investment decision-making regarding the implementation of specific processes;
- monitoring real-time measurement and predictive models; and
- specific treatments for pollutants and odours.

This system, created in collaboration with air quality operators and experts, enables manufacturers to monitor air quality (odours and pollutants) at their facilities in real time, simulate the impact of their operations, and implement relevant action plans. It provides them a better understanding of their facilities, map their impact on air quality and health, prioritise sources, and model accident scenarios. The data originates from local sources produced by regional associations (e.g., Airparif) and is mapped at company level. The quality, reliability, and traceability of the data support dialogue with stakeholders, particularly the local community. To minimise disturbances, residents can report complaints directly on the platform.

Suez has developed and begun implementing **dust treatment modules (Hyp'R)**, primarily for industrial production plants. These modules stem from experiments conducted with the metro operator RATP in underground rail tunnels. They achieve a good abatement rate for fine, ultrafine, and nano particles while using minimal energy.

Air quality biomonitoring

Engie has introduced air quality biomonitoring at and around its facilities. Experts have experimented with utilising natural elements, such as lichens and bees, to assess global air quality, including NOx, SOx, metals, PAHs, pesticides, and the state of biodiversity in the vicinity of these facilities.

Engie has particularly focused on studying lichens due to the numerous advantages they provide. Naturally occurring in the environment and at the facilities, lichens are resistant to climatic conditions and act as sponges for NOx and SOx emissions. The bioindicator method used involves observing the effects of pollution on the presence or absence of specific types of lichen and identifying the species present in the environment. The impact of winds is considered in defining the scope of the study. This method enables the creation of **maps that illustrate the distribution of pollutants at facilities and in the surrounding area**.

In concrete terms, deploying such a biomonitoring tool at a facility to analyse overall air quality and SOx and NOx concentrations requires an investment of ten thousand euros and has a lower carbon impact than the use of sensors. The tool is the property of Aair Lichens. Engie employees act as observers of the lichens present on trees.

Engie uses this method at various types of facilities:

- some lichens can be used to assess the environmental impact zone of a wood boiler by absorbing levoglucosan, a sugar and tracer specific to this type of combustion. This helps identify any further actions that could be taken to reduce the impact;
- the group has expanded this method to include gas storage and natural gas transport facilities (GRT Gaz plants). This allows the group to assess the dispersion zone of emitted atmospheric pollutants. When an abnormal presence of NOx is detected around a facility due to certain lichens, operators can convene to seek solutions (e.g. higher stacks). Unlike waste incineration facilities, biomonitoring of gas storage and natural gas transport facilities is not mandatory. However, it supplements stack analyses, particularly regarding the actual impact area of industrial activity.

Combating ground-level ozone by reducing methane emissions from non-hazardous waste storage

Methane is one of the principal contributors to the formation of ground-level ozone, a local pollutant that is notably detrimental to human health and the environment. It contributes namely to respiratory diseases, smog formation (a mixture of fog and smoke), lower agricultural productivity, and diminished carbon sequestration by plants. Methane emissions account for the majority of greenhouse gas (GHG) emissions from the waste industry and arise from the biodegradation of fermentable materials in non-hazardous waste storage facilities (NHWSFs).

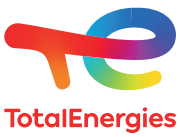
To reduce its GHG emissions and combat local pollution, since 2023 Séché Environnement has carried out a specific methane (CH_4) knowledge and control programme at its NHWSF in France. In 2023, Séché Environnement engaged Bureau Veritas to develop a **method for quantifying and identifying methane leaks** through drone mapping, isolation of biogas emission zones and on-foot detection. The methodology has been verified and validated by Citepa. Several campaigns are conducted annually for each site to take account of weather conditions as well.

The detection and prioritisation of CH_4 emission zones enable the implementation and the enhancement of various short- and long-term management actions.

- Maintenance management actions include monitoring capture and recovery sites, regular verification of the network by on-site teams, and network interventions, inspections and adjustments. These actions primarily consist of leak detection (failure of the capture or transport network), implementation of corrective measures, and retroactive improvements in emissions monitoring.
- Advance capture is conducted as soon as the waste is introduced into the cell, prior to the mechanization process. This helps control CH_4 emissions throughout the operating phase.
- Design and selection of the type of cell cover. Clay and geomembrane isolations assist in controlling emissions and play a significant role in biogas capture.

Thanks to these actions, Séché Environnement raised the CH_4 capture rate at its six French facilities from 86% to 94% between 2022 and 2023, in comparison with an average capture rate of around 60% across France. This **reduces the group's carbon footprint, limits the impact of NHWSFs on local** pollution (particularly in rural areas), and **increases the quantities of biogas recovered** as low-carbon steam, low-carbon electricity, or, after purification, biomethane injected into gas networks.

At the national level, achieving this capture rate for all NHWSFs in France would lead to a reduction of approximately 86% in methane emissions from the waste sector, according to Citepa inventories (2022 data).



Policies and measures for monitoring and reducing emissions from its industrial facilities

TotalEnergies has been modelling and monitoring air emissions from its industrial facilities for several years.

The company's ambition is to achieve carbon neutrality by 2050 at the same time as society. With this in mind, the company aims to:

- cut scopes 1 and 2 net emissions[31] from its industrial operations by more than 40% by 2030 (compared to 2015);
- reduce methane emissions from its industrial operations by 60% by 2025 and 80% by 2030, compared to 2020. This target is even more relevant as methane is often emitted alongside other volatile organic compounds (VOCs). Frequent leak detection campaigns using drones have been implemented, and routine flaring is being phased out. Eliminating this practice goes beyond reducing GHG emissions; it also helps to cut pollutant emissions from the total or partial combustion of gases, such as VOCs and particulates;
- lower the carbon intensity of energy products sold to customers by 25% by 2030 (compared to 2015). For example, TotalEnergies promotes the replacement of heavy fuel oil (sulphur emitter) in shipping with lower-emitting LNG. In road transport, TotalEnergies encourages the use of electric vehicles by installing charging stations and generating electricity.

The measures implemented to address climate change also help to enhance air quality.

Furthermore, TotalEnergies monitors and mitigates air emissions from its facilities through measures such as:

- a 75% sulphur dioxide emissions reduction target between 2015 and 2030. To achieve this, the company is focusing on its sulphur-containing gas assets and is investing in technologies to reduce SO_2 emissions from its refineries;
- a 68% reduction in VOC emissions from 2013 to 2024 through reducing venting and methane leakage, optimising processes, and using vapour recovery units;
- a 40% reduction in NOx emissions between 2013 and 2024 by optimising processes, rationalising the use of liquid fuel, utilising low NOx burners, and so forth;
- a 62% reduction in $PM_{2.5}$ fine particulate emissions from 2013 to 2024 through process optimisation and the use of electrostatic precipitators.

31 The calculation of net emissions takes into account nature-based carbon sink projects from 2030 onwards.

5

Outdoor air quality in the green transition

Air pollution is **one of the most significant health challenges of the 21st century**. It also affects environmental issues such as water and soil pollution, food security, and economic factors related to productivity loss, leading to the rejection of or opposition to large-scale industrial projects.

The sources of pollutants emitted by human activities differ from sector to sector, encompassing industry, residential and office environments, agriculture, and transportation. These pollutants may originate from either diffuse or point sources, which are understood and regulated to varying degrees, each having distinct impacts.

In recent years, various regulatory and policy measures have been adopted to reduce concentrations of certain pollutants. However, not all pollutants, for instance, carbon soot, pesticide residues, ultrafine particles, and pollen, have thresholds that are consistently respected. Despite this, improvements in air quality have been noted in the EU and France since the 2000s. The new directive, adopted in 2024, is expected to further enhance this trend and encourage the mobilisation of all stakeholders around the new goals.

Businesses, through their wide-ranging actions, play a crucial role in this long-term reduction:

- they **monitor, control and reduce emissions from their operating and industrial sites** in the EU and in the rest of the world where regulations are not as stringent;
- they **reduce pollutant emissions from the products** they sell, particularly in the transport sector;
- they bring their **knowledge and expertise to bear on public authorities** and collaborate on joint projects, especially regarding urban planning;
- they contribute to **raising awareness among their employees** about these issues and can encourage them to adopt less polluting modes of transport through their **mobility policies**.

The testimonies and feedback mentioned above also highlight the **important link between decarbonisation and air pollution reduction**. For example, GHG and $PM_{2.5}$ emission sources and locations are prevalent in Île-de-France. Therefore, **reducing sources of GHG emissions** through energy sufficiency and efficiency[32], as well as decarbonisation, can contribute to both tackling climate change and improving air quality. To do so, it would be beneficial to consider both issues when developing action plans.

An unintegrated approach can have **adverse effects**:

- pollution control systems for vehicles or industrial installations are beneficial for air quality but have little to no impact on GHG emissions and may even lead to a slight increase in energy consumption;
- wood heating, the use of biofuel and biogas, and the thermal insulation of homes with poor ventilation, alongside poorly planned urban densification, can benefit the climate, but not necessarily enhance indoor air quality (see EpE "Improving indoor air quality", October 2023).

32 See EpE, "Sufficiency: A new driver for business transformation", July 2025.

Concerted actions, using a systemic approach, appear to be most effective in helping companies (and public authorities) improve air quality while supporting their decarbonisation pathways.

Furthermore, improving outdoor air quality benefits all living beings, including animals and plants. By reaping the rewards of pollution control efforts, ecosystems can also take on a more effective role in regulating the environment, absorbing carbon dioxide and creating a virtuous cycle.

Acknowledgements

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Disclaimer

About EpE

The French association Entreprises pour l'Environnement (EpE), set up in 1992, brings together around sixty major French and international companies to share their best practices and work together on better incorporating the environment into their strategies and operations. Its *raison d'être* - **one planet and a prosperous world** - sums up the resolve of its members to lead their own green transition as well as that of society, and to ensure that economic development compatible with planetary boundaries is socially accepted, indeed desired. EpE is the French partner of the World Business Council for Sustainable Development (WBCSD).

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What role do **businesses** play in **improving outdoor air quality?**

Member companies

accenture
GROUPE ADP
AIRFRANCE
Air Liquide
AlixPartners
Amundi Investment Solutions
apave
ARKEMA
AXA
BCG BOSTON CONSULTING GROUP
BIC
BNP PARIBAS
BPCE
Caisse des Dépôts GROUPE
Capgemini
GROUPE CARSO
CMA CGM
CRÉDIT AGRICOLE S.A.
Crédit Mutuel Alliance Fédérale
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FORVIA Inspiring mobility
HERMÈS PARIS
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GROUPE iliad
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KERING
LVMH
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Meridiam for people and the planet
MICHELIN
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SAINT-GOBAIN
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