OPPORTUNITY GREEN

# Loaded: the legal risks of air pollution caused by Heavy-Duty Vehicles

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## Executive Summary

Air pollution from heavy-duty vehicles (HDVs) sits at the intersection of public health, climate change, and human rights — a convergence that is rapidly translating into legal and financial risk for the states that regulate this sector and the original equipment manufacturers (OEMs) that supply it.

The central argument of this briefing is straightforward: the risks associated with continued inaction on HDV emissions are no longer speculative or distant. They are active, accelerating, and increasingly translating into realised financial cost, regulatory penalty, and legal liability, for governments and manufacturers alike.

### Key findings

- Air pollution is a systemic global crisis with severe public health and economic consequences, and trucks are a uniquely disproportionate contributor: making up only around 3% of vehicles on the road, they are responsible for roughly a third of road transport CO2 emissions and the vast majority of on-road NOx emissions. Air pollution does not operate in isolation but is locked into reinforcing feedback loops with climate change and nature loss, with impacts falling hardest on already vulnerable communities.
- States face a rapidly converging set of legal obligations across international climate law, human rights law, and domestic air quality regulation, with recent rulings from the ECtHR and ICJ confirming positive obligations to mitigate climate change and regulate high-emitting private actors, and a growing body of successful litigation demonstrating courts' willingness to hold states accountable for failing to meet binding air quality and human rights standards.
- OEMs face a widening risk landscape spanning regulatory non-compliance, business and human rights exposure, and an emerging shift "from tailpipe to tort," with research confirming that climate-related litigation already produces measurable, market-recognised financial consequences for the companies involved.

## Recommendations

### For states

1. Integrate robust, HDV-specific decarbonisation and air quality plans into national climate law frameworks, ensuring regulatory sufficiency to reduce legal vulnerability under both climate and human rights law.
2. Establish simple, long-term CO2 and pollutant emissions targets for commercial vehicles, applied consistently across vehicle segments and technologies without exemptions that risk undermining their effectiveness.
3. Simplify funding processes for the transition to zero-emission trucks, including through predictable, set funding cycles, point-of-sale vouchers for zero-emission truck purchases, and a clear separation between infrastructure funding and vehicle purchase subsidies.
4. Introduce targeted subsidies and fiscal incentives for small fleet operators purchasing zero-emission trucks, recognising the particular financial barriers facing SMEs in this transition.
5. Vary operational charges, such as road tolls, according to a vehicle's CO2 emissions profile, ensuring that the cost of using public infrastructure reflects the environmental cost of doing so.
6. Promote demand aggregation for zero-emission trucks and refuelling/recharging infrastructure, providing regulatory and financial support to help manufacturers and infrastructure providers scale at the pace required.

### For OEMs

1. Proactively adopt and publicly disclose clear, credible transition plans toward zero-emission HDVs, strengthening compliance with emerging standards (including Euro 7 and the revised Ambient Air Quality Directive) well ahead of mandatory deadlines.
2. Drive internal transformation toward electrification through sustained investment and R&D, while also addressing non-exhaust emissions through improved tyre and brake technology, recognising that decarbonisation alone will not resolve the full scope of HDV-related air pollution.
3. Offer lower, more transparent pricing for electric trucks, paired with credible, time-bound zero-emission sales targets that allow investors, regulators, and customers to hold manufacturers to account.
4. Align lobbying and trade association activity with stated climate and health commitments, closing the gap between public commitments and actual policy advocacy, particularly where current lobbying positions risk undermining ambitious emissions regulation.
5. Actively advocate for the external enabling conditions needed to support an orderly transition, including stable, ambitious emissions standards and a supportive broader policy environment, recognising that a credible regulatory framework benefits first-movers and reduces sector-wide legal and reputational risk.

## Air pollution: a public health emergency

Air pollution now ranks among the most significant threats to public health and economic stability. It is estimated to cause over 5 million deaths annually, surpassing both tobacco use and poor diet as a risk factor, and exposure to ambient air pollution alone is responsible for an estimated 6.7 million premature deaths each year – making it the second largest cause of death globally after cardiovascular disease.[1]

Fine particulate matter ($PM_{2.5}$) drives the overwhelming majority of this burden, accounting for more than 90% of pollution-related disease, while nitrogen oxides, volatile organic compounds, and black carbon contribute significantly to respiratory illness, cardiovascular disease, and cancer.[2] Children are disproportionately affected: an estimated 2 million paediatric asthma cases and 709,000 child deaths are attributed to air pollution each year, a burden increasingly recognised by bodies including the WHO and UNICEF as a violation of children's rights.[3] The economic costs are similarly stark, with global estimates ranging from USD 6–8 trillion annually (4.6% of global GDP), alongside 1.8 billion lost working days each year — costs projected to rise sharply absent intervention.[4] Crucially, these health and economic harms are not evenly distributed: they fall disproportionately on already vulnerable and marginalised communities, compounding existing inequities and reinforcing the case that addressing air pollution is as much an economic and social justice imperative as a public health one.

### How Heavy-Duty Vehicles drive disproportionate harm

Within the transport sector, trucks are responsible for emissions that are starkly out of proportion to their numbers. Medium- and heavy-duty trucks make up only around 3% of vehicles on the road globally, yet they account for roughly 30% of $CO_2$ emissions from on-road transport, 86% of NOx emissions from on-road diesel vehicles, and as much as half of NOx emissions across all sectors combined.[5]

This outsized contribution stems from a combination of factors: trucks are predominantly diesel-powered, a fuel type associated with significantly higher pollutant emissions than petrol; their function in hauling heavy loads demands greater fuel consumption per kilometre than passenger vehicles; and their long-distance, high-mileage operation spreads pollutant release across wide geographic areas. Idling during loading and rest periods compounds the problem, particularly in urban and residential settings, while mounting evidence — reinforced by the 2015 Dieselgate scandal —

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[1] Jamie Kelly, Vera Tattari and Daniel Nesan, Heavy-Duty Harm: A Global Analysis of the Health and Economic Impacts of Emissions from Major Truck Manufacturers: Daimler, Traton, Volvo, and Paccar (Centre for Research on Energy and Clean Air, March 2025) https://energyandcleanair.org/wp/wp-content/uploads/2025/03/CREA_HIA_Trucks.pdf accessed 2 June 2026.

[2] Rebecca Drury, Rory Sullivan, Nicky Amos, Fatima Husain and Tanya Cox, Breath of Fresh Air: The Risks of Air Pollution and the Opportunity Beyond Toxic Assets (ShareAction, January 2026) https://shareaction-api.files.svdcdn.com/production/resources/reports/Breath-of-fresh-air_investor-briefing_2026.pdf?dm=1768399169 accessed 1 June 2026.

[3] Jamie Kelly, Vera Tattari and Daniel Nesan, Heavy-Duty Harm: A Global Analysis of the Health and Economic Impacts of Emissions from Major Truck Manufacturers: Daimler, Traton, Volvo, and Paccar (Centre for Research on Energy and Clean Air, March 2025) https://energyandcleanair.org/wp/wp-content/uploads/2025/03/CREA_HIA_Trucks.pdf accessed 2 June 2026.

[4] Ibid.

[5] Ibid.

suggests that real-world NOx emissions from diesel trucks routinely exceed laboratory test results.[6]

A recent health impact assessment of trucks sold between 2014 and 2023 by four major manufacturers — Daimler, Traton, Volvo, and Paccar — found that, accounting for historical and projected lifetime emissions to 2040, these vehicles will emit 6,466 kilotons of NOx: equivalent to 60 times Sweden's total annual human-caused NOx emissions. The associated health impacts are projected to include 307,000 premature deaths, 217,000 new cases of childhood asthma, and 120 million missed working days, at an estimated total economic cost of USD 1.4 trillion.[7]

## Systems thinking: the impacts of air pollution

### A complex, multidimensional crisis

Air pollution cannot be understood in isolation: it sits at the intersection of public health, climate change, nature loss, and human rights, with each dimension reinforcing the others. Fossil fuel combustion is a common source of both greenhouse gases — carbon dioxide, methane, and nitrous oxide — and a range of non-GHG air pollutants, while black carbon and ground-level ozone act as significant drivers of warming in their own right, despite being classified as short-lived climate pollutants and typically falling outside conventional carbon accounting. [8]

Beyond the climate, air pollution is now recognised as the fourth largest driver of nature loss, behind only land and sea use change, resource extraction, and climate change itself, with pollutants causing direct environmental harm and contaminating water and soil through atmospheric deposition.[9]

These dynamics are mutually reinforcing rather than discrete: degraded ecosystems lose their natural capacity to regulate air quality, while a warming climate drives more frequent wildfires and droughts that in turn worsen air pollution — a feedback loop in which each crisis compounds the others. Underpinning all of this is a human rights dimension: access to a clean and healthy environment is increasingly recognised as a fundamental right, meaning that failures to address air pollution carry not only environmental and economic consequences, but also legal and rights-based ones.

### Inequality: air pollution's uneven toll

The burden of air pollution is not evenly shared. Trucks and other heavy-emitting transport routes are disproportionately concentrated near low-income and marginalised communities, where major roads, industrial sites, and freight terminals

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[6] Ibid.

[7] Ibid.

[8] Rebecca Drury, Rory Sullivan, Nicky Amos, Fatima Husain and Tanya Cox, *Breath of Fresh Air: The Risks of Air Pollution and the Opportunity Beyond Toxic Assets* (ShareAction, January 2026) https://shareaction-api.files.svdcdn.com/production/resources/reports/Breath-of-fresh-air_investor-briefing_2026.pdf?dm=1768399169 accessed 1 June 2026.

[9] Ibid.

tend to be located, exposing these populations to elevated rates of asthma, respiratory illness, and related health harms.

This pattern is well documented: in the US Northeast and Mid-Atlantic, for example, Asian American, Black, and Latino residents face significantly higher exposure to vehicle-related air pollution than other groups — a disparity that reflects broader environmental justice failures, including the historic exclusion of marginalised communities from land use decision-making.[10] The same inequity is visible at every scale: within cities and across regions of the UK,[11] between richer and poorer EU member states,[12] and globally, where pollution levels are falling in high-income regions even as they continue to rise across much of the Global South.

The death of Ella Adoo-Kissi-Debrah — the first person in the UK to have air pollution recorded as a cause of death, and the catalyst for the proposed "Ella's Law" — stands as a stark illustration of how this inequity translates into individual harm, and of the gathering legal and policy pressure to recognise clean air as a basic right.[13]

## Interlinked but not identical

Because climate change, nature loss, and air pollution are so closely connected, action on one frequently delivers benefits for the others. Measures to cut greenhouse gas emissions — particularly through decarbonisation and electrification — generally reduce non-GHG pollutants too, creating efficiency gains where a single policy or technology investment improves both climate and air quality outcomes simultaneously.[14]

However, these objectives are not perfectly aligned and pursuing one can sometimes undermine the other. A shift toward hydrogen as a decarbonisation pathway, for instance, would result in 40% more NOx emissions by 2050 than a shift towards electrification — illustrating that climate strategy and air quality strategy, while complementary, require distinct and careful consideration (rather than being treated as interchangeable) in order to maximise co-benefits and minimise trade-offs.[15]

Further, decarbonisation alone does not resolve ambient air pollution, since a substantial share of harmful particulate matter originates from non-exhaust sources unrelated to fuel type — brake wear, tyre wear, and road dust resuspension. This is critical for Original Equipment Manufacturers (OEMs) and legislators to grapple with: an

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[10] Ibid.

[11] Greater London Authority, *Air Pollution and Inequalities in London: Update 2023* (Mayor of London, 2023) https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/environment-and-climate-change-publications/air-pollution-and-inequalities-london-update-2023 accessed 8 June 2026.

[12] European Environment Agency, *Europe's Environment 2025: Environmental Health Inequalities Related to Air Pollution* (EEA, 2025) https://www.eea.europa.eu/en/europe-environment-2025/thematic-briefings/environment-and-human-health/environmental-health-inequalities-related-to-air-pollution accessed 3 June 2026.

[13] *The Guardian*, "'Ella's Law' Bill Seeks to Establish Right to Clean Air in UK" *The Guardian* (20 May 2022) https://www.theguardian.com/environment/2022/may/20/ellas-law-bill-right-to-clean-air-uk-pollution-jenny-jones accessed 4 June 2026.

[14] Rebecca Drury, Rory Sullivan, Nicky Amos, Fatima Husain and Tanya Cox, *Breath of Fresh Air: The Risks of Air Pollution and the Opportunity Beyond Toxic Assets* (ShareAction, January 2026) https://shareaction-api.files.svdcdn.com/production/resources/reports/Breath-of-fresh-air_investor-briefing_2026.pdf?dm=1768399169 accessed 1 June 2026.

[15] Ibid.

electrification-only strategy risks leaving a growing source of harmful pollution unaddressed, even as it succeeds in cutting tailpipe emissions and greenhouse gases.

Legislators and OEMs alike should therefore turn their attention towards brakes and tyres as well as a rapid and just transition towards battery electric vehicles.

**Air pollution**

Air pollution is no longer a peripheral environmental concern but a systemic threat to public health, economic stability, and planetary health.

- Air pollution causes millions of premature deaths and trillions of dollars in economic losses every year, making it one of the most significant public health and economic crises of our time.
- Trucks are a disproportionate contributor: representing only around 3% of vehicles on the road, they are responsible for roughly a third of road transport $CO_2$ emissions and the vast majority of on-road NOx emissions, placing outsized responsibility on the OEMs that manufacture them.
- Air pollution does not operate in isolation: it is locked into reinforcing feedback loops with climate change and nature loss and falls hardest on the most vulnerable communities.

## Mounting legal exposure for states

### International law obligations

Where states fail to regulate OEM design choices that drive air pollution serious enough to harm human health and climate, they risk breaching obligations not only under domestic and EU environmental law, but under international human rights and climate law instruments. This exposure has been sharpened considerably by recent developments in international jurisprudence.

In 2024, the European Court of Human Rights (ECtHR) handed down a landmark ruling in *Verein KlimaSeniorinnen Schweiz and Others v Switzerland*,[16] holding that Article 8 ECHR imposes positive obligations on states to protect citizens from the serious adverse effects of climate change, and that inadequate climate mitigation measures can themselves constitute a breach of that right. This confirmed, for the first time at this level of authority, that the right to private and family life extends to effective state protection against the harms caused by climate change — including, by clear extension, the GHG

[16] Verein KlimaSeniorinnen Schweiz and Others v Switzerland App no 53600/20 (ECtHR, 9 April 2024).

and non-GHG emissions driving the climate and air pollution crises associated with heavy-duty vehicles.

This precedent was substantially reinforced in 2025, when the International Court of Justice (ICJ) issued its Advisory Opinion on Climate Change.[17] The ICJ found that, because the adverse effects of climate change impede the enjoyment of human rights, states are under a positive obligation to take the necessary measures to protect the climate, including through the regulation of private actors. This significantly broadens the basis on which states can be held accountable not just for their own direct emissions, but for their failure to adequately regulate high-emitting private sector actors operating within their jurisdiction.

The interconnection between air pollution and climate harm is increasingly recognised as a "two-pronged" legal issue: many of the same activities that degrade air quality also contribute materially to climate change, and states are understood to bear a legal obligation to mitigate both in tandem rather than treating them as separate regulatory silos. Given the substantial body of evidence establishing trucks as a significant contributor to climate-warming emissions, states that fail to adequately regulate this sector face a growing risk of liability for failing to take necessary mitigation and protective measures.

## Human rights

Beyond climate-specific obligations, states face a parallel and increasingly well-established body of human rights risk arising directly from air pollution exposure, whether through breaches occasioned by close proximity to pollution sources or through the broader climate-mediated harms described above.

*The emerging right to a clean, healthy and sustainable environment*

The right to a clean, healthy, and sustainable environment is now widely recognised as a fundamental human right by the international legal community, reflected in a growing body of international instruments and in the practice and jurisprudence of international human rights bodies.[18] The ICJ's Advisory Opinion affirmed this directly, finding that a clean, healthy and sustainable environment is a precondition for the enjoyment of many other human rights, making it inherent to, and essential for, those rights' fulfilment.[19]

At the domestic level, every EU Member State has recognised this right in some form, whether through constitutional provision, statutory law, or ratification of international agreements incorporating it. Since clean air is an inseparable component of a clean, healthy and sustainable environment, this right has direct application to air pollution caused by HDV emissions. Where the right has been incorporated into national law — as it has in Greece, Portugal, Spain, Belgium, the Netherlands and France, among others — air pollution becomes a directly justiciable matter within the relevant domestic courts.

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[17] *Obligations of States in respect of Climate Change* (Advisory Opinion) [2025] ICJ Rep (23 July 2025).

[18] Opportunity Green, *Air Pollution, People and Ports: A Human Rights Perspective* (Opportunity Green, October 2025) https://opportunitygreen.org/wp-content/uploads/2026/01/OpportunityGreen_Portspollutionbriefing.pdf accessed 9 June 2026.

[19] *Obligations of States in respect of Climate Change* (Advisory Opinion) [2025] ICJ Rep (23 July 2025).

The Galicia High Court's recent finding that industrial livestock-related air pollution breached human rights law illustrates the direction of travel here.[20]

*Direct human rights harms from proximity to pollution*

Where the evidence establishes a clear link between air pollution and serious harm to human health, including excess deaths, states have well-established human rights obligations to take proactive steps to minimise or eliminate the resulting risk. Two ECHR provisions are particularly relevant: Article 2, the right to life, which requires states not only to refrain from unlawfully taking life but to take active steps to protect individuals from real and imminent threats, including from widespread environmental pollution; and Article 8, the right to respect for private and family life, which is engaged wherever environmental factors — including pollution — concretely interfere with a person's private life, even absent loss of life.

ECtHR case law confirms that these obligations apply even where pollution sources are diffuse and difficult to attribute with precision — a point of particular relevance to HDV emissions, which are dispersed across road networks rather than concentrated at a single point source. In *Cannavacciuolo v Italy*,[21] the Court held that no proven causal link between exposure to a specific pollutant and a life-threatening illness or death was required, embracing the precautionary principle on the basis that scientific uncertainty as to a pollutant's precise effects does not negate a state's protective duty under the right to life. Similarly, in *Pavlov and Others v Russia*,[22] the Court found Russia in breach of Article 8 for failing to minimise the effects of industrial air pollution, holding that an elevated health risk was sufficient even without unequivocal medical proof of causation, and notwithstanding that the applicants lived a considerable distance from the polluting source. Taken together, these cases establish that states cannot rely on an absence of pollution monitoring or data to excuse inaction — indeed, the inadequacy of monitoring may itself constitute a rights violation. Where a pollution source is established, the case law requires states to comprehensively assess the extent of the pollution, investigate its health impacts, provide affected individuals with timely information to assess risk, take action to manage identified risk, proactively regulate the conduct of polluters (public and private), and provide reparation for resulting harm.

## Equality and discrimination law

Given the unequal health burden of air pollution on already vulnerable groups, claims may also arise under equality and anti-discrimination law, a cross-cutting right enshrined in Article 14 ECHR, Articles 2(1) and 26 ICCPR, and Article 2 ICESCR, among other instruments, and which prohibits both direct and indirect discrimination in the context of environmental and public health harms.[23] The UN Special Rapporteur on the human right to a clean, healthy and sustainable environment has explicitly framed this as a "dual public health and human rights crisis," noting that where exposure to pollution is shaped by immutable characteristics, it compounds existing inequality and discrimination, and

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[20] Tribunal Superior de Xustiza de Galicia (Sala de lo Contencioso-Administrativo, Sección 2ª), Judgment of July 2025 (As Conchas reservoir pollution case), confirmed by Tribunal Supremo, Auto of 11 February 2026 https://www.poderjudicial.es/cgpj/es/Poder-Judicial/Noticias-Judiciales/El-TSXG-condena-a-la-Xunta-y-la-Confederacion-Hidrografica-del-Mino-Sil-por-la-contaminacion-del-embalse-de-As-Conchas accessed 10 June 2026.

[21] *Cannavacciuolo and Others v Italy* App nos 51567/14 and 5 others (ECtHR, 30 January 2025).

[22] *Pavlov and Others v Russia* App no 31612/09 (ECtHR, 11 October 2022).

[23] Opportunity Green, *Air Pollution, People and Ports: A Human Rights Perspective* (Opportunity Green, October 2025) https://opportunitygreen.org/wp-content/uploads/2026/01/OpportunityGreen_Portspollutionbriefing.pdf accessed 9 June 2026.

that the right to a clean, healthy and sustainable environment cannot be meaningfully realised where entire communities have no real choice but to breathe polluted air.[24]

In the UK context, two distinct legal routes are available. First, a challenge may arise under the Public Sector Equality Duty (PSED), where a public authority's air quality plan or strategy fails to demonstrate "due regard" to the need to eliminate discrimination, advance equality of opportunity, and foster good relations between groups with and without protected characteristics.[25] Separately, a standalone claim may be brought for direct or indirect discrimination under the Equality Act 2010 or Article 14 ECHR (read together with Articles 2 and 8), particularly where apparently neutral policies (such as freight transport routing) have the practical effect of disproportionately exposing communities with protected characteristics to pollution. The ECtHR's reasoning in *Thlimmenos v Greece* is instructive here: a failure to treat differently situations that are significantly different, absent objective and reasonable justification, can itself amount to discrimination.[26] This means that uniform air quality regulation or enforcement applied across communities with materially different pollution burdens may itself give rise to an indirect discrimination claim.

This reasoning extends into the climate sphere. Although *Verein KlimaSeniorinnen Schweiz and Others v Switzerland* was not decided on discrimination grounds, the Court's acknowledgment of the unequal burden borne by vulnerable demographics in the climate crisis may pave the way for discrimination-based arguments in future climate litigation.[27]

Domestic precedent already points in this direction: in the Friends of the Earth challenge to the UK's third National Adaptation Programme (NAP3), one ground of challenge was a failure to discharge the PSED by not lawfully assessing NAP3's unequal impact on protected groups such as elderly and disabled people, while a separate human rights ground argued that NAP3's deficiencies breached the claimants' rights to life, home, and possessions, compounded by discrimination on the basis of their vulnerability.[28] Similarly, in its challenge to the UK's Heat and Building Strategy, Friends of the Earth successfully argued that the government's failure to assess the strategy's impact on vulnerable groups — including low-income households, disabled people, the elderly, and people of colour, who are disproportionately affected by rising energy costs and poor insulation — constituted a breach of equalities law.[29]

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[24] Office of the United Nations High Commissioner for Human Rights (OHCHR), 'Air Pollution Driving Widespread Human Rights Violations: UN Expert' (Press Release, 7 March 2026) https://www.ohchr.org/en/press-releases/2026/03/air-pollution-driving-widespread-human-rights-violations-un-expert accessed 30 June 2026.

[25] Equality Act 2010, s 149.

[26] *Thlimmenos v Greece* App no 34369/97 (ECtHR, 6 April 2000).

[27] V*erein KlimaSeniorinnen Schweiz and Others v Switzerland* App no 53600/20 (ECtHR, 9 April 2024).

[28] *R (Friends of the Earth and others) v Secretary of State for Environment, Food and Rural Affairs* [2024] EWHC 2707 (Admin); Friends of the Earth, 'High Court Judgment on the National Adaptation Plan' (25 October 2024) https://friendsoftheearth.uk/climate/high-court-judgment-national-adaptation-plan accessed 30 June 2026; Friends of the Earth, 'UK Climate Adaptation Case Goes to European Court of Human Rights' (14 August 2025) https://friendsoftheearth.uk/climate/uk-climate-adaptation-case-goes-european-court-human-rights accessed 30 June 2026.

[29] *R (Friends of the Earth Ltd) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (Admin); Friends of the Earth, 'Equality and the Government's Climate Strategies' (11 May 2022) https://friendsoftheearth.uk/climate/equality-and-governments-climate-strategies accessed 30 June 2026.

This body of equality law adds a further layer of legal exposure for states that fail to account for the unequal distributional impact of air pollution policy and enforcement, particularly where HDV traffic routing and emissions enforcement disproportionately affect specific communities.

## Public law and air quality litigation

A parallel and expanding strand of litigation operates under air quality regulation directly, including the EU's Ambient Air Quality Directive (recently revised in 2024 to grant individuals a right to compensation for pollution-related harm), thereby expanding litigation prospects further. In *Janecek v Freistaat Bayern*,[30] the Court of Justice of the European Union held that citizens must be able to access competent authorities and domestic courts where pollution limit values risk being exceeded, request an air quality action plan, and seek judicial review of that plan. Subsequent litigation has built substantially on this foundation: in Germany, ClientEarth and Environmental Action Germany have brought around 40 largely successful cases resulting in significant air quality rulings, with Germany's top court confirming in 2017 that local authorities are required, not merely permitted, to implement diesel bans where legal pollution limits are exceeded. In Belgium, ClientEarth's litigation in *Case C-723/17* strengthened the public's right to challenge the adequacy of state pollution monitoring and confirmed that national courts may review and order corrective measures regarding the placement of sampling points.[31] The Court of Justice of the European Union has separately found Italy in breach of EU air pollution law over excessive nitrogen dioxide levels in its cities, while the UK was found to have systematically and persistently exceeded legal $NO_2$ limits since 2010 and to have failed in its duty to implement adequate corrective plans. In France, nearly a decade of litigation culminated in findings against the state for breach of EU Air Quality Directive obligations,[32] with the Lyon Administrative Court of Appeal subsequently awarding compensation for harm including pain and suffering and loss of enjoyment of life, building on Paris case law recognising a scientifically grounded causal link between specific pathologies and outdoor air pollution.[33]

Taken together, this body of human rights and public law jurisprudence demonstrates that states face mounting and increasingly well-evidenced legal exposure for failing to regulate the sources of air pollution within their jurisdiction — exposure that extends naturally to their oversight of HDV manufacturers as a significant and growing contributor to that harm.

[30] Case C-237/07 *Janecek v Freistaat Bayern* [2008] ECR I-6221.

[31] Case C-723/17 *Craeynest and Others v Brussels Hoofdstedelijk Gewest and Others* [2019] ECLI:EU:C:2019:168.

[32] *Friends of the Earth France and Others v France*, Conseil d'État, Decision No 428409 (2021) (Climate Litigation Database) https://climatecasechart.com

[33] Cour Administrative d'Appel de Lyon, 3e Chambre, 19 February 2025, No 21LY00245.

**Legal risks for states**

States face a rapidly converging set of legal obligations across international, human rights, and domestic regulatory law – each independently reinforcing the case that inaction on HDV emissions is no longer a viable position.

- Under international climate law, recent rulings from the ECtHR and ICJ confirm that states have positive obligations to mitigate climate change and regulate high-emitting private actors, meaning failure to address HDV-driven emissions risks direct legal liability.
- Under human rights law, established ECtHR jurisprudence confirms that states must act to protect the rights to life and private/family life from air pollution even where sources are diffuse or causation is scientifically uncertain, with equality law adding a further layer of exposure where pollution burden falls unevenly on vulnerable communities.
- Under public law and air quality regulation, a growing body of successful litigation across the EU and UK demonstrates that courts are willing to hold states accountable for failing to meet binding air quality limits, with recent developments extending this accountability to compensation for individuals harmed by non-compliance.

## A widening risk landscape for Original Equipment Manufacturers

### Behind the curve: regulatory non-compliance risk

The regulatory landscape governing HDV emissions is moving rapidly toward stricter standards, broader pollutant coverage, and lower barriers to enforcement.

In Europe, heavy-duty vehicles are already subject to Euro VI requirements targeting NOx, particulate matter, hydrocarbons, and carbon monoxide.[34] The forthcoming Euro 7 standard extends this further (introducing enhanced real-world emissions testing and, significantly, bringing brake and tyre particles within scope for the first time), and will apply to HDVs from May 2028.[35] Equally consequential is the EU's 2024 Ambient Air Quality Directive, which, as mentioned above, now grants individuals an explicit right to seek compensation for health harm caused by unlawful pollution.[36] This is a structural

[34] Regulation (EC) No 595/2009 of the European Parliament and of the Council of 18 June 2009 on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information and amending Regulation (EC) No 715/2007 and Directive 2007/46/EC and repealing Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC [2009] OJ L188/1.

[35] Regulation (EU) 2024/1257 of the European Parliament and of the Council of 24 April 2024 on type-approval of motor vehicles and engines, and of systems, components and separate technical units intended for such vehicles, with respect to their emissions and battery durability (Euro 7), amending Regulation (EU) 2018/858 and repealing Regulations (EC) No 715/2007, (EC) No 595/2009 and (EU) 2018/1832 [2024] OJ L 2024/1257.

[36] Directive (EU) 2024/2881 of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe [2024] OJ L 2024/2881.

shift that materially lowers the barrier to individual and class-based claims against both states and the manufacturers whose products contribute to non-compliance.

The financial consequences of falling foul of these regulations are material. Hino Motors was fined $1.6 billion in 2025 for fraudulent emissions testing,[37] while Volkswagen's costs arising from the Dieselgate scandal have exceeded $30 billion since 2015, including a settlement with UK consumer claimants worth £193 million.[38] These figures illustrate that regulatory non-compliance in this sector carries realised losses of the first order, not merely tail risk.

## Business and human rights

Legal recognition of corporate human rights obligations is expanding rapidly, moving from soft law expectation toward hard legal accountability. At the soft law level, the UN Guiding Principles on Business and Human Rights and the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct already set clear standards for corporate responsibility to respect human rights,[39] and a growing number of strategic litigation cases have been brought against corporate actors, with several setting landmark precedents holding companies directly accountable for human rights violations and environmental harm. This trend is likely to gain further force in the EU through emerging corporate sustainability due diligence legislation.

At the hard law level, courts are increasingly willing to apply human rights obligations directly to private actors. Indirect horizontal claims — where human rights principles inform the application of private law, such as tort — have already been seen in *Milieudefensie et al v Royal Dutch Shell*.[40] More recently, direct horizontal claims, in which human rights obligations are applied straight to a private entity, have emerged in *Milieudefensie v ING Group*,[41] reflecting the development of a more robust body of jurisprudence following *Verein KlimaSeniorinnen*.

Parallel developments in the financial sector reinforce this trajectory: in France, a coalition of NGOs is pursuing BNP Paribas under the French corporate duty of vigilance law, alleging that its continued financing of fossil fuel expansion breaches its obligation to prevent human rights and environmental harm linked to its business activities.[42] Litigation has also begun to target export credit agencies in hybrid public-private contexts, as seen in the *Friends of the Earth v UK Export Finance*.[43] Evidence suggests

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[37] João da Silva, "Toyota Unit to Settle Emissions Scandal for $1.6bn" *BBC News* (17 January 2025) https://www.bbc.co.uk/news/articles/c62666374l4o accessed 11 June 2026.

[38] Sarah Tobin, "Carmakers Face UK Dieselgate Lawsuits Worth at Least $7.6bln, Lawyers Say" *Reuters* (11 June 2024) https://www.reuters.com/business/autos-transportation/carmakers-face-uk-dieselgate-lawsuits-worth-least-76-bln-lawyers-say-2024-06-11 accessed 15 June 2026.

[39] UN Human Rights Council, *Guiding Principles on Business and Human Rights* (2011); OECD, *Guidelines for Multinational Enterprises on Responsible Business Conduct* (2023).

[40] *Milieudefensie and Others v Royal Dutch Shell plc* ECLI:NL:RBDHA:2021:5337 (Hague District Court, 26 May 2021).

[41] *Milieudefensie v ING Group and ING Bank* (Dutch District Court of Amsterdam, filed 28 March 2025); Milieudefensie (Friends of the Earth Netherlands), Notice of Liability for Unlawful Climate Policy (19 January 2024) https://en.milieudefensie.nl/news/milieudefensie-holds-ing-liable-for-climate-damage accessed 30 June 2026.

[42] *Notre Affaire à Tous, Les Amis de la Terre France and Oxfam France v BNP Paribas* (Judicial Court of Paris, filed 23 February 2023); Notre Affaire à Tous, 'French NGOs Take BNP Paribas to Court in World's First Climate Lawsuit Against a Commercial Bank' https://notreaffaireatous.org/french-ngos-take-bnp-paribas-to-court-in-worlds-first-climate-lawsuit-against-a-commercial-bank/ accessed 30 June 2026. See also *Comissão Pastoral da Terra and Notre Affaire à Tous v. BNP Paribas* (Judicial Court of Paris, filed 27 February 2023).

[43] R (Friends of the Earth Ltd) v Secretary of State for International Trade [2023] EWCA Civ 14

that such legal action against corporate actors carries real commercial consequences, measurably affecting share value and consumer confidence.

## From tailpipe to tort: civil liability in the making

Litigation extends beyond regulatory breaches. Companies producing harmful emissions face potential tort claims for personal injury, private nuisance and even negligence (for failure to prevent foreseeable harm). There is also the risk of action for misrepresentation or greenwashing where advertising amounts to unfair commercial practices (misleading the consumer to believe a product or service is more 'eco-friendly' than it is).

Direct tort claims against companies for air pollution harm remain comparatively rare in the UK and EU, with most established case law instead concerning asbestos and mesothelioma — as in *Fairchild v Glenhaven Funeral Services Ltd*,[44] *Barker v Corus*,[45] and *Sienkiewicz v Greif*[46] — or, in the case of *Corby Group Litigation*,[47] atmospheric toxic waste linked to birth defects, albeit brought against a public authority rather than a private company. Odour-related air pollution has occasionally been addressed through nuisance claims, as in *Halsey v Esso Petroleum Co Ltd*[48] and *Barr v Biffa Waste Services Ltd*,[49] though these too sit at some remove from the factual pattern of HDV-driven air pollution.

Historically, air pollution litigation — including claims for compensation — has been directed overwhelmingly at public authorities rather than corporate manufacturers, plausibly because the underlying problem is often framed as one of traffic concentration and air quality management rather than the inherent characteristics of the vehicles themselves. This does not mean, however, that manufacturers are immune from litigation risk; rather, the prevailing view is that recent developments — particularly following the recognition of air pollution as a contributing cause of death in the Ella Adoo-Kissi-Debrah case — points toward courts increasingly being willing to infer a duty of care to prevent air pollution above permitted levels, opening the door to class actions and civil liability claims against businesses, including HDV manufacturers.

The convergence of public health framing, air quality harms and climate related duties heightens air pollution-related litigation risk for companies.[50] This shift is reinforced by developments in the climate litigation space, where public health and human rights arguments are being deployed with growing frequency against corporate, rather than solely governmental, defendants. A 2025 report from the London School of Economics found that more than 80 "polluter pays" cases were filed globally between 2015 and 2024 (including 11 in 2024 alone), that 20% of climate cases filed in 2024 targeted companies or their directors and officers, and that "climate-washing" claims — a form of

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[44] *Fairchild v Glenhaven Funeral Services Ltd* [2002] UKHL 22.

[45] *Barker v Corus (UK) plc* [2006] UKHL 20.

[46] *Sienkiewicz v Greif (UK) Ltd* [2011] UKSC 10.

[47] *Corby Group Litigation v Corby Borough Council* [2009] EWHC 1944 (TCC).

[48] *Halsey v Esso Petroleum Co Ltd* [1961] 1 WLR 683.

[49] *Barr and Others v Biffa Waste Services Ltd* [2012] EWCA Civ 312.

[50] Narayan Toolan, Hannah Marcus, Elizabeth G Hanna and Chadia Wannous, "Legal Implications of the Climate-Health Crisis: A Case Study Analysis of the Role of Public Health in Climate Litigation" (2022) 17(6) PLOS ONE e0268633 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0268633 accessed 17 June 2026.

greenwashing involving misrepresented progress toward climate goals, increasingly including misuse of carbon credits — were among the most widely used corporate litigation strategies that year.[51] Though ultimately dismissed on evidentiary grounds, the German ruling in *Lliuya v RWE AG* is a notable precedent, confirming in principle that companies can be held liable for their historic contribution to global emissions even where the specific claim fails.[52] As attribution science continues to mature in the climate litigation space, it is plausible that direct air pollution claims will increasingly follow a similar trajectory towards corporate accountability, whether through advances in air pollution attribution methodologies, the evolution of causation principles, or a combination of both.

## Connecting the dots: how legal risk becomes material financial risk

The convergence of public health framing, air quality harms, and climate-related legal duties is materially heightening litigation risk for companies, with exposure spanning environmental, human rights, and tort-based forums simultaneously. The financial consequences are increasingly visible and quantifiable. The consequences of these risks include significant damages awards (or settlement costs), injunctions restricting operations or forced changes to policy and/or investment. It is estimated that firms experience, on average, a 0.41% fall in stock returns following a climate-related filing or unfavourable court decision and that financial markets consider such litigation to be a relevant financial risk.[53]

The broader economic backdrop reinforces why this risk is becoming difficult for investors and OEMs to ignore. The World Bank estimates that ambient air pollution costs the global economy $6 trillion annually — equivalent to 4.6% of global GDP, with the heaviest burden falling on middle-income countries —through premature death, lost productivity, and associated health impacts.[54]

The OECD estimates that ambient air pollution already results in 1.2 billion lost working days globally each year, a figure projected to reach 3.8 billion by 2060, with poor air quality additionally linked to reduced labour supply, lower worker productivity, increased absenteeism, reduced educational attainment, disrupted supply chains, and — in some studies — elevated rates of violent crime and road traffic accidents.[55]

Taken together, the potential consequences for OEMs span the full spectrum of corporate exposure: damages and settlement costs arising from personal injury or health-related claims; injunctions forcing operational changes or accelerated electrification; regulatory sanctions and ongoing compliance costs; and reputational harm capable of affecting both brand value and investor confidence. Given the trajectory

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[51] Joana Setzer and Catherine Higham, *Global Trends in Climate Change Litigation: 2025 Snapshot* (Grantham Research Institute on Climate Change and the Environment, LSE, June 2025) https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2025/06/Global-Trends-in-Climate-Change-Litigation-2025-Snapshot.pdf accessed 16 June 2026.

[52] *Lliuya v RWE AG*, Higher Regional Court of Hamm, Case No 5 U 15/17 (28 May 2025).

[53] Misato Sato, Glen Gostlow, Catherine Higham, Joana Setzer and Frank Venmans, "Impacts of Climate Litigation on Firm Value" (2024) 7(11) Nature Sustainability 1461 https://doi.org/10.1038/s41893-024-01455-y accessed 17 June 2026.

[54] World Bank Group, *The Global Health Cost of PM2.5 Air Pollution: A Case for Action Beyond 2021* (World Bank, 2022)

[55] Rebecca Drury, Rory Sullivan, Nicky Amos, Fatima Husain and Tanya Cox, *Breath of Fresh Air: The Risks of Air Pollution and the Opportunity Beyond Toxic Assets* (ShareAction, January 2026) https://shareaction-api.files.svdcdn.com/production/resources/reports/Breath-of-fresh-air_investor-briefing_2026.pdf?dm=1768399169 accessed 1 June 2026.

of regulatory tightening, expanding rights to compensation, and a judiciary increasingly willing to hold corporate actors to account, these risks are best understood not as speculative tail scenarios, but as a maturing and increasingly material category of financial exposure.

**Legal risks for OEMs**

For HDV manufacturers, the legal risk landscape is widening rapidly across regulatory, human rights, and civil liability fronts, and is increasingly translating into measurable financial exposure.

- Regulatory non-compliance risk is escalating as Euro VI gives way to the more stringent Euro 7 standard and the 2024 Ambient Air Quality Directive lowers the barrier to individual compensation claims.
- Business and human rights exposure is growing as courts show increasing willingness to apply human rights obligation directly to corporate actors, reinforced by soft law (UNGPs, OECD Guidelines) and emerging EU due diligence legislation.
- Civil liability is shifting with public health and climate-related litigation increasingly targeting corporations rather than governments alone, and courts showing growing openness to inferring a duty of care for harmful emissions.

## Conclusion

The legal, regulatory and financial risks associated with HDV emissions are intensifying and are becoming impossible for states and OEMs to treat as a peripheral or future concern. The shift to electric trucks is the only viable long-term solution to the health and climate impacts of diesel-powered HDVs, offering by far the greatest potential for reducing lifecycle emissions, and the recommendations below are intended to chart a credible, risk-mitigating path toward that transition.

### Key findings

- Air pollution is a systemic global crisis with severe public health and economic consequences, and trucks are a uniquely disproportionate contributor: making up only around 3% of vehicles on the road, they are responsible for roughly a third of road transport CO2 emissions and the vast majority of on-road NOx emissions. Air pollution does not operate in isolation, but is locked into reinforcing feedback loops with climate change and nature loss, with impacts falling hardest on already vulnerable communities.
- States face a rapidly converging set of legal obligations across international climate law, human rights law, and domestic air quality regulation, with recent rulings from the ECtHR and ICJ confirming positive obligations to mitigate climate change and regulate high-emitting private actors, and a growing body of successful litigation demonstrating

courts' willingness to hold states accountable for failing to meet binding air quality and human rights standards.

- OEMs face a widening risk landscape spanning regulatory non-compliance, business and human rights exposure, and an emerging shift "from tailpipe to tort," with research confirming that climate-related litigation already produces measurable, market-recognised financial consequences for the companies involved.

## Recommendations

### For states

1. Integrate robust, HDV-specific decarbonisation and air quality plans into national climate law frameworks, ensuring regulatory sufficiency to reduce legal vulnerability under both climate and human rights law.
2. Establish simple, long-term CO2 and pollutant emissions targets for commercial vehicles, applied consistently across vehicle segments and technologies without exemptions that risk undermining their effectiveness.
3. Simplify funding processes for the transition to zero-emission trucks, including through predictable, set funding cycles, point-of-sale vouchers for zero-emission truck purchases, and a clear separation between infrastructure funding and vehicle purchase subsidies.
4. Introduce targeted subsidies and fiscal incentives for small fleet operators purchasing zero-emission trucks, recognising the particular financial barriers facing SMEs in this transition.
5. Vary operational charges, such as road tolls, according to a vehicle's CO2 emissions profile, ensuring that the cost of using public infrastructure reflects the environmental cost of doing so.
6. Promote demand aggregation for zero-emission trucks and refuelling/recharging infrastructure, providing regulatory and financial support to help manufacturers and infrastructure providers scale at the pace required.

### For OEMs

1. Proactively adopt and publicly disclose clear, credible transition plans toward zero-emission HDVs, strengthening compliance with emerging standards (including Euro 7 and the revised Ambient Air Quality Directive) well ahead of mandatory deadlines.
2. Drive internal transformation toward electrification through sustained investment and R&D, while also addressing non-exhaust emissions through improved tyre and brake technology, recognising that decarbonisation alone will not resolve the full scope of HDV-related air pollution.
3. Offer lower, more transparent pricing for electric trucks, paired with credible, time-bound zero-emission sales targets that allow investors, regulators, and customers to hold manufacturers to account.
4. Align lobbying and trade association activity with stated climate and health commitments, closing the gap between public commitments and actual policy advocacy, particularly where current lobbying positions risk undermining ambitious emissions regulation.

5. Actively advocate for the external enabling conditions needed to support an orderly transition, including stable, ambitious emissions standards and a supportive broader policy environment, recognising that a credible regulatory framework benefits first-movers and reduces sector-wide legal and reputational risk.