COP31 IN ANTALYA: WHEN THE CONFERENCE KITCHEN CONTRADICTS THE DISCOURSE OF THE STAGE

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ABSTRACT

COP31, held in Antalya, Turkey, operates within its own perimeter both fossil cooking routes: natural gas in the fixed kitchen and LPG in the food trucks of the outdoor areas. This article documents that contradiction based on on-site observation at the conference complex and a review of recent scientific literature. Gas combustion emits nitrogen dioxide in linear association with fuel flow and, through incomplete combustion, carbon monoxide, formaldehyde and benzene (SELTENRICH, 2024); the nitrogen oxides and volatile organic compounds emitted are precursors of tropospheric ozone (YOU et al., 2025), whose formation is also fed by methane (MENDOZA-CANO et al., 2023). For each 10 µg/m³ increment in O_3, the risk of hospital admission for myocardial infarction is 1.0084 and for stroke 1.0023. The association is stronger in Asia for both outcomes and, specifically for stroke, stronger in low- and middle-income countries; for myocardial infarction, the difference by national income was not statistically significant. It argues that the Paris Agreement does not regulate event cooking technology nor set indoor air quality standards (LOUREIRO; FERREIRA; BARROS, 2025), that replacing the source is already technically feasible (HAKAM et al., 2022), and that the case of Escola José César de Mesquita demonstrates the feasibility and educational potential of the measure. It concludes with a warning that COP32, scheduled for 2027 in Ethiopia, should adopt a sustainable and educational event venue, with an emissions inventory, offsetting, carbon credits, indoor air measurement and a multidisciplinary scientific committee, and include indoor air quality in its official agenda, leapfrogging the fossil step towards electric induction cooking.

Keywords: indoor air quality; gas cooking; methane; ozone; COP31; decarbonisation.

RESUMO

A COP31, realizada em Antalya, na Turquia, opera em seu próprio perímetro as duas rotas fósseis de cocção: gás natural na cozinha fixa e GLP nos food trucks das áreas externas. Este artigo documenta essa contradição a partir de observação presencial no complexo da conferência e de revisão da literatura científica recente. A queima a gás emite dióxido de nitrogênio em associação linear com o fluxo de combustível e, na combustão incompleta, monóxido de carbono, formaldeído e benzeno (SELTENRICH, 2024); os óxidos de nitrogênio e os compostos orgânicos voláteis emitidos são precursores do ozônio troposférico (YOU et al., 2025), cuja formação também é alimentada pelo metano (MENDOZA-CANO et al., 2023). Para cada incremento de 10 µg/m³ de O_3, o risco de internação por infarto é de 1,0084 e por acidente vascular cerebral de 1,0023. A associação é mais forte na Ásia para os dois desfechos e, especificamente no acidente vascular cerebral, mais forte em países de baixa e média renda; para o infarto, a diferença por renda nacional não foi estatisticamente significativa. Argumenta-se que o Acordo de Paris não disciplina a tecnologia de cocção de eventos nem fixa padrão de qualidade do ar interno (LOUREIRO; FERREIRA; BARROS, 2025), que a substituição da fonte já é tecnicamente executável (HAKAM et al., 2022) e que o caso da Escola José César de Mesquita demonstra a viabilidade e o potencial educativo da medida. Conclui-se com um alerta para que a COP32, prevista para 2027 na Etiópia, adote

local de evento sustentável e educativo, com inventário de emissões, compensação, créditos de carbono, medição do ar interno e comitê científico multidisciplinar, e inclua a qualidade do ar interno em sua agenda oficial, saltando a etapa fóssil em direção à cocção elétrica por indução.

Palavras-chave: qualidade do ar interno; cocção a gás; metano; ozônio; COP31; descarbonização.

1 INTRODUCTION

There is a measurable distance between what is proclaimed in the plenary halls of COP31 and what is operated in the service corridors. In one of the food service areas that serve the thousands of participants who move daily through the conference complex — delegates, negotiators, representatives of non-governmental organisations, journalists, technicians, security staff and support teams —, the kitchen operation runs on natural gas (NG) as fuel for food preparation. In the outdoor areas of the event, the food trucks and mobile food units use LPG (liquefied petroleum gas) to cook food.

Both fuels are fossil derivatives and share the same origin: NG is methane (CH_4) in a proportion of 60% to 90%, and LPG is a mixture of propane (C_3H_8) with smaller amounts of butane (C_4H_{10}) and traces of ethane, methane, pentane and other volatile organic compounds, a by-product of petroleum refining and natural gas processing (HAKAM et al., 2022). The operation of COP31 thus combines both fossil cooking routes within the same perimeter: the methane burned in the grid-connected fixed kitchen and the LPG burned in the food trucks and mobile units. A conference whose declared axis is converting decarbonisation promises into concrete delivery hosts, within its own space, a direct emission source that could be replaced by electric induction cooking, powered by the local electrical grid — a caveat that the conversion literature itself imposes, by conditioning the environmental benefit of electrification on the composition of the matrix that supplies it (HAKAM et al., 2022).

The inconsistency lies not in the existence of the kitchen nor of the food trucks, but in the absence of a decarbonisation guideline that reaches the event's service chain, and not only the high-level panels. This article aims to document that contradiction, examine the health cost of fossil cooking in indoor environments, demonstrate the regulatory gap that keeps it invisible on the climate agenda, and present alternatives already implemented, at national and local scale, that could have been adopted by the conference itself.

2 METHODOLOGY

The empirical basis of this work is documented on-site observation. During the stay at the COP31 complex, in Antalya, the cooking operation was examined directly in two distinct environments. In the fixed kitchen of the food service area, photographs were taken of the installed natural gas equipment and of the burner operation during food preparation. In the outdoor areas, the use of LPG in food preparation by the food trucks and mobile units was

verified, as identified in those establishments' communication to the participant public. The photographic record and the on-site verification constituted the primary instrument of evidence — not inference nor third-party report, but the direct confirmation of the fossil fuel in use within the perimeter of a climate conference.

To this field evidence was added a review of recent scientific literature, organised into six axes: gas cooking emissions and direct health effects (SELTENRICH, 2024); short-term ozone exposure and cardiovascular hospital admissions (YOU et al., 2025); energy-related methane emissions and cardiovascular burden (MENDOZA-CANO et al., 2023); indoor air quality and regulatory gaps (LOUREIRO; FERREIRA; BARROS, 2025); health cost of environmental stressors (MÜNZEL et al., 2026); and conversion from LPG to induction (HAKAM et al., 2022). In addition, the Brazilian case of Escola José César de Mesquita was examined (INSTITUTO SAFEWEB, 2026; SINDICATO DOS METALÚRGICOS DA GRANDE PORTO ALEGRE, 2026).

The method is qualitative, descriptive-analytical in nature, and combines primary observational evidence with a synthesis of peer-reviewed literature. No instrumental measurement of pollutant concentrations was carried out on site, which constitutes a declared limitation and delimits the scope of the conclusions: the exposure data discussed here come from the scientific literature and are mobilised to dimension the risk associated with the observed source, not to quantify the specific exposure of that perimeter.

3 GAS COMBUSTION AND WHAT IT RELEASES INTO THE AIR

The question gains weight when the gaze shifts from carbon to what combustion actually releases into the air. Seltenrich (2024) describes that when a gas burner is switched on, pollutants reach immediate peaks: the heat of the flame triggers the formation of nitrogen dioxide (NO_2), a pulmonary irritant whose production has a linear association with gas flow — the more gas burned, the more NO_2 released into the environment.

To this are added the products of incomplete combustion, which occurs even in new and well-functioning equipment: carbon monoxide (CO), formaldehyde (CH_2O), a respiratory irritant and recognised human carcinogen, and benzene (C_6H_6), also a carcinogen, detected at levels that may exceed the reference values of the United States Environmental Protection Agency and the World Health Organization.

In a pilot study in New York apartments, NO_2 levels in units with gas stoves jumped from a background median of 18 ppb to an average of 197 ppb during the preparation of a standardised meal, exceeding 400 ppb in one case; in units equipped with electric induction, the average remained between 11 and 14 ppb. The same work gathers meta-analyses that associate gas cooking with a higher risk of asthma and wheezing in children and estimates that 12.7% of childhood asthma cases in the United States are attributable to gas stove use (SELTENRICH, 2024).

4 THE LINK THE KITCHEN DOES NOT CONTAIN: OZONE PRECURSORS

There is a link the kitchen does not contain and that most of the climate debate ignores: the same gases the flame releases indoors are the chemical precursors of tropospheric ozone. Seltenrich (2024) demonstrates that combustion produces nitrogen oxides through the reaction of atmospheric nitrogen and oxygen at high temperature, and that incomplete combustion — present even in new equipment — generates a panoply of volatile organic compounds. You et al. (2025) define ozone (O_3) precisely as the gaseous pollutant produced from nitrogen oxides and volatile organic compounds under ultraviolet radiation. Mendoza-Cano et al. (2023) close the circuit by registering that methane emissions can contribute to the formation of ozone and fine particulate matter, both already associated with cardiovascular risk. The chain, therefore, is complete and documented across the three sources: the methane of the fixed kitchen and the LPG of the food trucks emit the precursors; these precursors form ozone; and ozone exacts its price in hospital admissions.

The distinction between indoors and the atmosphere is chemical, not rhetorical. You et al. (2025) define ozone formation as dependent on ultraviolet radiation, a condition that enclosed environments practically do not offer: in measurements of 77 windows and window samples, most completely attenuated solar radiation at wavelengths below 320 nm, and the transmittance differences among them alter indoor photolysis constants by up to fifty times (ZHOU et al., 2021). Indoor air chemistry is therefore predominantly a chemistry in the dark: oxidants enter from outside and react with surfaces, materials and volatile organic compounds, rather than forming by photolysis within the environment itself (WESCHLER; CARSLAW, 2018). Inside the kitchen, then, combustion does not form ozone photochemically — it accumulates primary pollutants, without dilution. O_3 formation occurs outside, in the plume, after the precursors are released through exhaust, dilute in the atmosphere and encounter solar radiation. The kitchen does not suffer the ozone it helps to produce: it exports it to the urban environment and to those who breathe downstream.

You et al. (2025), in a meta-analysis published in the Journal of the American Heart Association with 111 articles and 65,855,727 participants from 26 countries, quantify this outcome precisely: for each 10 µg/m³ increment in short-term exposure to O_3, the relative risk of hospital admission for myocardial infarction was 1.0084 (95% CI: 1.0019–1.0151; p = 0.012) and for stroke 1.0023 (95% CI: 1.0012–1.0034; p < 0.001), associations that persisted after adjustment for fine particulate matter — and the correlation between O_3 and PM2.5 in the included studies was weak (-0.060 for infarction and 0.161 for stroke), which supports that the effect belongs to ozone and is not a proxy for particulate matter.

The proposed mechanisms — oxidative stress, systemic inflammation, autonomic imbalance and thrombus formation — cause endothelial dysfunction, vasoconstriction and abnormal coagulation, promoting progression to the acute event (YOU et al., 2025). The most eloquent datum for this article's argument lies in effect modification, which operates

differently in the two outcomes. For infarction, the significant modifier was geographic region (p = 0.001), with a relative risk of 1.0154 (95% CI: 1.0058–1.0251) in Asia against 1.0007 (95% CI: 0.9872–1.0145) in the Americas and 0.9967 (95% CI: 0.9940–0.9994) in Europe, where the association reverses; the difference by national income in this outcome did not reach significance (p = 0.471), with 1.0116 (95% CI: 1.0002–1.0230) in low- and middle-income countries against 1.0062 (95% CI: 0.9974–1.0152) in high-income countries. For stroke, both modifiers were significant: region (p = 0.030), with 1.0032 (95% CI: 1.0018–1.0046) in Asia, and national income (p < 0.001), with 1.0029 (95% CI: 1.0018–1.0040) in low- and middle-income countries against 1.0005 (95% CI: 1.0001–1.0010) in high-income countries. Average O_3 concentrations are higher in those countries precisely because the intensification of industrial activities, transport, urbanisation and the combustion of solid and biomass fuels has raised emissions of nitrogen oxides and volatile organic compounds — the same asymmetry that places kitchen workers, rather than negotiators, as the first to pay the bill.

A methodological caveat lends rigour to the argument: in the aggregate outcome of all cardiovascular causes there was no significant association (RR 1.0007; 95% CI: 0.9986–1.0029; p = 0.496), because the aggregate brings together distinct subtypes and stages of progression; the effect concentrates in the acute forms, infarction and stroke, which are exactly the ones that lead to hospital admission (YOU et al., 2025).

5 WHO PAYS THE BILL AND THE POLLUTION PARADOX

The workers who spend entire shifts in these kitchens and food trucks — cooks, assistants, pantry staff and cleaning teams, many outsourced and without a seat at the negotiating tables — absorb this mixture in two distinct ways, and the distinction matters. In the fixed kitchen, the volume of the environment and the extractor hood dilute part of the exposure. In the food truck, there is no such dilution: the operator works inside the cabin, in a cramped space, centimetres from the griddle, and breathes directly the plume he himself produces, without the service opening functioning as exhaust. It is the same combustion, under worse conditions. And both also absorb the part of the risk that no ventilation resolves: the hood reduces NO_2 inside the kitchen but does not prevent ozone formation in the atmosphere from the emitted precursors. It is this double exposure — internal, direct, and external, chemical — that makes replacing the source, and not mitigating the environment, the only intervention capable of closing both ends.

Münzel et al. (2026) place the problem at the correct scale: in a joint statement of the European Society of Cardiology, the American College of Cardiology, the American Heart Association and the World Heart Federation published in the Journal of the American College of Cardiology, the authors position environmental risk factors as a central category of contemporary cardiovascular health, with about 20 million annual deaths from ischaemic heart disease, stroke, hypertension and type 2 diabetes, of which pollution alone accounts for 9 to

12.6 million.

They formulate the pollution paradox — those who contribute least to environmental degradation are the ones who suffer the greatest health consequences —, which is exactly the condition of the outsourced workers of a climate conference. And they point to the technical gap that sustains this article's thesis: there is no accepted international consensus nor standardisation of approaches for communicating air pollution levels and risk, resulting in a myriad of heterogeneous indices around the world (MÜNZEL et al., 2026).

This absence of a comparable standard is the same one that keeps indoor air quality outside the COP31 negotiations: the texts under discussion deal with emissions at global scale, with national targets, with finance and with adaptation, but the scale of the built environment — where people actually breathe — remains outside the mandate. There is no negotiated obligation, no procurement guideline, no indicator that charges for the use of fossil cooking in food services.

6 METHANE: THE GAS THAT FEEDS OZONE AND THE CARDIOVASCULAR BURDEN

The methane dimension aggravates the mismatch with a datum that climate diplomacy rarely incorporates. Mendoza-Cano et al. (2023), in a cross-sectional analysis of 73 countries published in Scientific Reports, evaluated the relationship between energy-related methane emissions and the burden of cardiovascular diseases measured in disability-adjusted life years (DALYs) in 2019.

The results show a significant positive correlation between methane emissions and DALYs attributed to cardiovascular diseases (Spearman's rho = 0.53; 95% CI: 0.34–0.68; p < 0.001) and, in the multiple model adjusted for obesity prevalence and life expectancy at birth, each unit increment in energy-related methane emissions corresponded to a 0.06% increase in cardiovascular burden (95% CI: 0.03–0.09%; p < 0.001).

The authors register that the energy industry accounts for approximately 40% of total methane emissions and that the independent analysis of the International Energy Agency indicates that these emissions are 70% higher than what national governments officially report — and they conclude that reducing methane emissions from the energy sector could improve the public health of those under cardiovascular risk (MENDOZA-CANO et al., 2023). This is precisely what COP31 fails to do by cooking with methane in the fixed kitchen and with LPG in the food trucks: every burner lit within the perimeter of a climate conference emits a gas that, beyond retaining heat, feeds the formation of the ozone that hospitalises workers.

7 THE REGULATORY GAP: WHAT THE PARIS AGREEMENT DOES NOT SAY

The point of greatest rigour in this article is that none of this is written in the Paris Agreement. The treaty establishes obligations regarding greenhouse gas stocks and sinks, nationally determined contributions and inventory transparency — it does not regulate the

cooking technology of event food services, does not set an indoor air quality standard and does not bind supplier procurement to combustion criteria.

Methane entered the debate through voluntary instruments external to the text, such as the Global Methane Pledge, and not through an obligation of the agreement. Hence the mismatch: COP31 can be entirely in compliance with the letter of the Paris Agreement and, at the same time, cook with methane in one of the kitchens and with LPG in the food trucks in the middle of a climate conference. Formal compliance is not material coherence — and the distance between the two is exactly what a methane stove in a fixed kitchen and an LPG stove in a food truck, both in Antalya, make visible.

The gap is even harder to justify because recent scientific production has already mapped the problem precisely. Loureiro, Ferreira and Barros (2025), in a systematic review published in BMC Public Health following the PRISMA methodology, analysed 38 articles published between January 2019 and March 2024 on indoor air quality in healthcare units and its effects on health.

Three findings interest this article. First, the scale framing: indoor air pollution is considered one of the five greatest public health threats, and inside buildings levels can be two to five times higher than outdoors, reaching in severe cases up to a hundred times, while people spend about 80% to 90% of their time in enclosed environments. Second, the precise identification of relevant pollutants: among the most assessed chemical parameters are precisely total volatile organic compounds, carbon monoxide, formaldehyde and nitrogen dioxide — the same ones Seltenrich (2024) documents coming out of gas burners —, in addition to particulate matter and CO_2, present in 55.3% of the articles. Third, the confirmation of the regulatory asymmetry this article denounces: the authors conclude that indoor air quality management should be a priority for governments, facility managers and occupational and public health professionals, who should join forces to adopt public policies, technical standards, adequate procedures and frequent monitoring — exactly the apparatus that exists for outdoor air and does not exist for indoor air. The review also registers that 73.7% of the studies were conducted in Asia, which reinforces the same geography of exposure pointed out by You et al. (2025).

8 INDOOR AIR AS A RIGHT UNDER BRAZILIAN LAW: ABSENCE FROM GLOBAL REPORTS AND LEGAL FOUNDATION

The case observed in this article is international — a climate conference held in Turkey —, but the legal analysis developed here is delimited to the Brazilian legal system, where the duty to protect worker health and the ecologically balanced environment has a binding and verifiable normative basis. Extending the analysis to other legal systems constitutes a topic for comparative studies, outside the scope of this work.

In the World Economic Forum's global risk reports, indoor air quality is not treated as a category of its own. The Global Risks Report 2026 ranks pollution ninth among global risks

over two years and tenth over a decade horizon — below the sixth position of the 2025 edition (WORLD ECONOMIC FORUM, 2026) —, but the report treats pollution only as an aggregate category: there is no indicator, section or metric dedicated to the air breathed inside buildings. The omission is all the more serious when the Forum itself acknowledges that people spend between 60% and 90% of their time in enclosed environments, that indoor air pollution accounts for about 3.2 million premature deaths per year and that gas cooking and heating produce pollutant concentrations two to twelve times higher than outdoor air — to conclude that indoor environments receive regulatory priority far lower than outdoor air (WORLD ECONOMIC FORUM, 2025). This invisibility is incompatible with the legal nature of the good at stake. The air one breathes is a constitutional right — article 225 of the Federal Constitution guarantees to all an ecologically balanced environment as essential to a healthy quality of life, and PEC 7/2021 seeks to make explicit the right to air quality, including in indoor public and private environments for collective use (BRASIL, 1988; SENADO FEDERAL, 2024); it is a civil right, because the consumer who frequents a shopping mall food court has a legitimate expectation of not inhaling carcinogens; and it is a labour right, because Annex 13 of NR-15 classifies hydrocarbons and related carcinogenic substances as maximum-degree insalubrity, and benzene has its own annex (13-A) dedicated to preventing occupational exposure to a proven carcinogen (BRASIL, 1978). Added to this framework are article 196 of the Constitution, which defines health as a right of all and a duty of the State, article 227 and Law No. 8,069/1990 (Child and Adolescent Statute), which ensure comprehensive protection and absolute priority to children in the school environment (BRASIL, 1988; BRASIL, 1990), article 6, items I and VI, and article 12 of the Consumer Defence Code, which impose protection of life and health and liability for product and service defects (BRASIL, 1990b), and ABNT NBR 17037, which establishes reference parameters for indoor air quality in artificially air-conditioned non-residential environments (ABNT, 2024). It suffices to imagine four everyday scenarios — the food court of a shopping mall, the canteen of a large industrial plant, the kitchen of a hospital and the food truck of a COP — operating with methane or LPG: incomplete combustion releases formaldehyde and benzene, both classified by the International Agency for Research on Cancer in Group 1, of carcinogens confirmed for humans (SELTENRICH, 2024). These are Group 1 carcinogens circulating in environments where clients, patients and workers who hold rights are present. The question that opens to the investor is direct: how much is a health and legal liability of this nature worth, in material risk — and how much do companies actually measure and report to their shareholders about the indoor air quality they produce? At the labour level, this liability unfolds into insalubrity premium, classification as an occupational disease and strict liability of the employer for an unsafe work environment — consequences that are measurable and, therefore, reportable. The suggestion is recorded for future studies: measuring the distance between what is disclosed in sustainability reports and what is emitted inside one's own

facilities is a research agenda with concrete financial consequences.

9 THE SOLUTION ALREADY EXISTS: FROM NATIONAL SCALE TO THE SCHOOL

It is worth recalling that the solution is neither experimental nor distant: it has already been implemented at national scale, and the Indonesian case is the most robust example available. Hakam et al. (2022), in Energy Strategy Reviews, document the massive conversion of LPG stoves to induction in Indonesia, designed to replace residential LPG in 8.2 million households by 2025 and 58 million by 2050.

In the comparison between technologies, induction produces no indoor pollution and presents the lowest CO_2 emissions; an 1,800 W induction stove achieved 81.78% energy efficiency against 45.06% for the LPG stove, cooking in 3.7 minutes against 3.9 minutes and at lower cost in the analysed scenarios, and 1 kg of LPG is energetically equivalent to only 7.9 kWh in high-efficiency induction. The authors register the methodological caveat that lends rigour to the argument: the environmental benefit of induction depends on the electrical matrix that supplies it — if the electricity comes from coal, indirect exposure to pollution is significant (HAKAM et al., 2022). This is exactly why a COP's choice should fall on the cleanest source available in the host country.

Here the conference loses the opportunity that would be natural to it: that of being itself the sustainability laboratory it recommends to the world. A COP need not only legislate on good practices — it can demonstrate them, and the Indonesian precedent offers a ready script. Adopting high-efficiency electric induction cooking in the fixed kitchen, in the food trucks and in the mobile food units, with public targets for progressive replacement, measurement of avoided CO_2 and methane emissions and open disclosure of results, would transform a fragility into a replicable protocol.

In the context of emitting fewer greenhouse gases into the atmosphere, society's contribution ceases to be an accessory gesture and becomes a relevant mitigation factor — every kitchen, canteen, school cafeteria, restaurant or food truck that exchanges methane and LPG for induction powered by a clean matrix removes a real fraction of emissions from the atmosphere and eliminates, in the same movement, the source of the ozone precursors that hospitalise workers. The aggregate result can appear in national accounts without depending on a single treaty.

10 THE CASE OF ESCOLA JOSÉ CÉSAR DE MESQUITA

What COP31 lacks is neither technology nor evidence: it is someone who has already done the homework and can show the result. Escola José César de Mesquita, in Porto Alegre, maintained by the Metalworkers' Union of Greater Porto Alegre, fully replaced the LPG stoves in its kitchen with electric induction equipment and, in March 2026, became the first school in the state to receive the Instituto Safeweb Sustainability Seal.

The decision was not one of operational convenience: it was an act of health responsibility. By removing combustion from the indoor environment, the school eliminated at the source the gases and pollutants that Seltenrich (2024) documents coming out of burners — carbon monoxide, methane and, above all, nitrogen dioxide, a pulmonary irritant that in poorly ventilated kitchens exceeds air quality standards within minutes of use. To this list is added nitrous oxide, which gas combustion also emits and which national inventories account for as a greenhouse gas, with a global warming potential about 310 times that of CO_2 (IPCC, 2006). It is important to register the limit of this evidence precisely: the school eliminated the internal combustion source but did not carry out instrumental measurement of pollutant concentrations before and after the replacement. The absence of monitoring data prevents affirming magnitudes of reduction; what can be affirmed, with rigour, is the suppression of the generating source — a necessary, though not sufficient, condition for improving indoor air quality. Measurement is the next step, and low-cost sensors already make such monitoring feasible.

What the school did, at the scale of the kitchen, is exactly what COP31 did not do, at the scale of the event: remove the source instead of managing exposure. And it did so with a component that a climate conference has an obligation to replicate — turning the case into education. The replacement of the stoves entered the pedagogical routine of students and the school community as living content of environmental education, energy efficiency, indoor air quality and energy transition, and the institution has continued the process by seeking ESG Bronze certification.

This is the model Antalya could have delivered to the thousands of participants who passed through its canteens and food trucks: not the promise of a future transition, but the demonstration of a transition already implemented and taught. A COP that replaced the methane of the fixed kitchen and the LPG of the food trucks with induction and turned that choice into an educational programme for its participants would have produced, in two weeks, the kind of legacy that Escola Mesquita builds every day in Porto Alegre — the proof that decarbonising is not a plenary abstraction, it is a management decision with an immediate effect on the air that children and workers breathe.

11 CONCLUSION AND WARNING FOR COP32

None of this invalidates the advances Antalya can produce in the global climate architecture — finance, adaptation, Article 6 and the next generation of national targets remain what really moves the needle in global emissions. But the credibility of a climate regime is also built at the scale of the concrete, and it is precisely at that scale that multilateral organisations are most fragile.

The question COP31 should answer at the end is not only how many billions were mobilised or how many nationally determined contributions were delivered, but whether the physical space where the negotiation took place would have passed its own test of

sustainability and of protection for the health of those who worked in it.

The warning that remains is direct. The next Conferences of the Parties should require that the event venue be, itself, sustainable and educational. Sustainable in the material sense: electric induction cooking powered by a clean matrix, elimination of fossil combustion in kitchens, food trucks and mobile units, with public measurement of avoided emissions. Educational in the pedagogical sense: turning that choice into content accessible to participants, as Escola José César de Mesquita does daily with its students.

COP32, scheduled for 2027 in Ethiopia, in Addis Ababa, is the opportunity and the obligation to correct this gap. The choice of host could not be more pertinent to this article's argument: more than 96% of Ethiopian households depend on traditional biomass for cooking, predominantly firewood, and less than 10% of the population has access to clean cooking solutions, one of the most acute deficits in the world (CLEAN COOKING ALLIANCE, 2025; UNDP, 2025). It is also a low-income country, where the effect of ozone on hospital admissions proved more pronounced (YOU et al., 2025) — precisely the geography of exposure that victimises those who cook. The request is concrete: that indoor air quality enter the official agenda of COP32, cease to be a peripheral topic and come to feature in the negotiated texts — with standard, indicator, monitoring and procurement obligation.

More than hosting, Ethiopia can constitute itself as the host of a model sustainable event, and it has the material conditions for that. A qualification that rigour imposes applies here, however, and it separates the scale of the event from the scale of the country. The recommendation of electric induction cooking is addressed to the perimeter of the conference, in Addis Ababa, where there is an electrical grid and where an international event can guarantee quality supply; it does not extend, as national policy, to a territory where the universal electrification target for 2030 foresees 72.3% of rural coverage by grid and 21% off-grid, and where only 1% of rural households use electricity for cooking (UNDP, 2025). Recognising this limit does not weaken the thesis: it strengthens it, because it establishes the risk hierarchy that makes it defensible. Traditional biomass is the worst of the options — highly incomplete combustion, with emission of fine particulate matter and black carbon —, and it is what today accounts for almost the entirety of Ethiopian cooking. LPG is not a transition solution for Ethiopia: the national LPG penetration target remains stagnant at 1% until 2030 (UNDP, 2025). What is proposed, therefore, is not to travel the fossil step that Antalya travelled, but to leap over it — which the conversion literature describes as viable where there is a grid and a clean matrix, and which the predominantly hydroelectric Ethiopian matrix favours (HAKAM et al., 2022).

The design of this model comprises four complementary and verifiable instruments: the inventory of the event's greenhouse gas emissions, which establishes the baseline and makes the commitment auditable; the offsetting of remaining emissions after source reduction; the acquisition of carbon credits with integrity and traceability criteria; and the measurement

of indoor air quality in food, work and circulation spaces. The four instruments, applied together, produce something that no plenary declaration delivers: verifiable assurance to participants and a replicable example for delegations. It is the difference between promising decarbonisation and demonstrating it in the very space where the negotiation occurs. By adopting this standard, Ethiopia would not only fulfil the role of host — it would educate by example, which is the most effective pedagogical instrument a climate conference has at its disposal.

To these instruments should be added an independent scientific committee, multidisciplinary in composition, bringing together researchers in air quality, pulmonologists, cardiologists, paediatricians, occupational physicians, epidemiologists, geneticists and specialists in energy transition and public and occupational health. The last two specialties are not accessory. Geneticists are necessary because prolonged exposure to air pollution already produces measurable epigenetic alterations in the human genome — a systematic review of 52 observational studies, published in the Journal of Global Health by researchers from the University of Edinburgh and the University of Zhejiang, identified alterations in DNA methylation at specific loci associated with prolonged exposure to particulate matter and nitrogen oxides (YU et al., 2026), while a meta-analysis of 29 epidemiological studies published in PLOS ONE, gathering more than 16 thousand children with acute lymphoblastic leukaemia and about 1.4 million controls, associated maternal contact with petroleum derivatives during pregnancy with a 42% increase in risk (ZHOU et al., 2014) —, which shifts the problem from a scale of individual morbidity to a scale of intergenerational transmission of risk. Specialists in energy transition complete the arrangement because the solution is not only sanitary: it is a decision on the energy matrix, on equipment efficiency and on replacement financing, as the Indonesian conversion from LPG to induction demonstrates (HAKAM et al., 2022). Paediatricians, in turn, answer for the fraction of childhood asthma attributable to gas cooking (SELTENRICH, 2024). It would fall to this committee to guide the conference on two fronts: to define the indoor air quality parameters to be measured and the reference limits to adopt in food, work and circulation spaces; and to translate the results into public health guidance for participants, delegations and host populations. The function is not decorative. The literature registers that there is no accepted international consensus nor standardisation of approaches to communicate air pollution levels and risk, resulting in a myriad of heterogeneous indices around the world (MÜNZEL et al., 2026), and that indoor air quality management should involve governments, managers and occupational and public health professionals, who should join forces to adopt policies, technical standards, procedures and frequent monitoring (LOUREIRO; FERREIRA; BARROS, 2025). A committee composed in this way would give the event what it today lacks: technical parameter and health credibility. And it would produce the educational effect that is sought — not the generic recommendation, but the demonstration that health, climate, genome and built environment

are a single agenda, assessed by those competent to do so.

As long as outdoor pollution has a standard, a monitoring network and a treaty, and the air breathed inside buildings continues without the three, climate diplomacy will keep measuring its success in mobilised billions and failing at the scale where people actually breathe. The distance between propaganda and practice will continue to be measured in metres — the distance between the stage, the methane kitchen and the LPG food truck.

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