



[Dossier: Contemporary Reconfigurations of Latin American Political Modernity: Conflicts, Institutions, and Imaginaries]

Climate Policy Configurations in Rio de Janeiro: current conflicts, trends, and challenges

Configurações das Políticas do Clima no Rio de Janeiro: conflitos, tendências e desafios atuais

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Abstract

The city of Rio de Janeiro has been the stage for important international events on sustainable development and climate change since the Eco-92. As a pioneer in establishing a climate action plan, it is the first city in Latin America to adopt a climate budget. Although the expectations for the implementation of the city's mitigation policies are high, some obstacles remain latent, such as the case of the Ternium steel industry, which is undersized in the decarbonization municipal targets. Based on participant observation at public events of the "Rio Capital of Climate Bullshit" campaign (2024/2025) and on a bibliographic and documentary research on the subject, this work proposes to compare the climate action of three groups of collective actors with the greatest influence on Rio de Janeiro's climate policy: the steel industry, the public authorities and the organized civil society. This study seeks to present the current challenges of climate policy in the municipality through the conflicts and tendencies between corporate, political-institutional, and popular actions.

Palavras-chave: Decarbonization Consensus; Climate Policies; Rio de Janeiro.

Resumo

A cidade do Rio de Janeiro tem sido palco de importantes eventos internacionais sobre desenvolvimento sustentável e mudanças climáticas desde a Eco-92. Pioneira em estabelecer um plano de ação climática, é a primeira cidade da América Latina a adotar um orçamento climático. Embora a expectativa de realização das políticas de mitigação da cidade seja grande, alguns impasses permanecem latentes na implementação destas políticas, como é o caso da siderúrgica Ternium, que é subdimensionada nas metas municipais de descarbonização. A partir da observação participante em eventos públicos da campanha "Rio Capital do Caô Climático" (2024/2025) e de pesquisa bibliográfica e documental sobre o tema, o presente trabalho propõe comparar a ação climática de três grupos de atores coletivos com maior incidência na política do clima do Rio de Janeiro: a siderúrgica, o poder público e a sociedade civil organizada. Busca-se apresentar os desafios atuais da política do clima no município através dos conflitos e das tendências entre as ações corporativas, político-institucionais e populares.

Palavras-chave: Consenso da descarbonização; Políticas do clima; Rio de Janeiro.



1. Introduction

Climate policies have been at the center of political, economic, and theoretical debates in recent decades and currently constitute an inescapable topic in the public sphere. The recent proposals for Green New Deals have reoriented interdisciplinary research toward a closer dialogue between science and politics, thereby placing on the agenda not only the urgency of the climate problem but also the diversity of possible and necessary responses. Who decides what sustainable development is and how to "green" the economy?

The reconfiguration of Latin American political modernity is a complex process and one that is increasingly decisive for the climate agenda. As with any real process, this complexity entails contradictions, tendencies, and challenges. The article therefore aims to articulate an analysis of green capitalism from a local perspective (the city of Rio de Janeiro) in order to contribute to the debate on the "decarbonization consensus". The findings point to the correlation between the (absence of) corporate environmental and climate responsibility and the State–capital alliance.

The city of Rio de Janeiro has a history of hosting international gatherings on this subject since 1992, when the United Nations Conference on Environment and Development — better known as Eco-92 or Rio-92 — took place, resulting in the Climate Convention and disseminating the concept of sustainable development. Twenty years later, the city was once again the stage for the United Nations Conference on Sustainable Development (Rio+20) which sought to consolidate another concept in 2012, namely, the green economy (Furtado, 2012).

More recently, in late 2024, Rio hosted another major international gathering, the G20 Summit, whose motto was "Building a Just World and a Sustainable Planet." The city government's website featured the slogan "Rio, the world capital of the G20 in the fight against climate change" (*Rio, a capital mundial do G20 no combate às mudanças climáticas*), and during the event large advertising panels bearing the phrase "Rio Capital of the G20" could be seen throughout the city. In opposition to this, the grassroots campaign "Rio Capital of Climate Bullshit" (*Rio Capital do Caô Climático*) was launched. This campaign, organized by civil society organizations, sought to denounce Rio de Janeiro's Municipal Climate Policy, which benefits the city's largest polluter, the



multinational steel company Ternium, even as the city's image was being broadcast to the world as a promising example of mitigation policies.

It is within this field of disputes over the meaning of climate policies that the present work is situated, seeking to analyze the climate actions of three groups of collective actors with the greatest political influence in Rio de Janeiro: the Ternium steel company, the public authorities, and organized civil society. Drawing on participant observation at public events of the "Rio Capital of Climate Bullshit" campaign during 2024 and 2025, as well as on bibliographic and documentary research that included reports, booklets, legislation, official websites, and public social media accounts, this study aims to provide a critical diagnosis of the current landscape of disputes surrounding climate policy in the municipality, thereby comparing the normative and political orientations of corporate, political-institutional, and popular climate actions.

José Maurício Domingues (2021) argues that sociology's contribution to the debate on climate change remains rather limited, despite the discipline's engagement with environmental issues since the mid-1970s. On the one hand, environmental sociology is an indispensable starting point for building a sociological analysis of climate change; on the other, new questions are constantly raised, challenging both analytical categories and the political imaginary. In recent debates, discourses on solutions to the climate crisis are presented politically as definitive answers to the issue. However, "which solutions for overcoming the threats of climate change will materialize are still difficult questions to answer" (Domingues, 2024, p. 162, translated from portuguese)¹. What can be identified in the current conjuncture are wagers — whether on resources and targets or on effectiveness in the face of the gravity of the problem.

Drawing on energy transition projects within green capitalism, Bringel and Svampa (2023) propose the concept of the "decarbonization consensus" as a critique of contemporary hegemonic climate policies. The complexity of anthropogenic climate change is reduced to policies poorly connected with territories and frontier regions, compounded by a lack of intersectoral and integrated policies. As with the commodities consensus and the myth of Latin American development tied to natural advantages (Svampa; Viale, 2020), the decarbonization consensus is the new Latin American trend,

¹ The original passage reads: "que soluções para superar as ameaças da mudança climática se efetivarão são ainda questões difíceis de responder" (Domingues, 2024, p. 162).



which can be understood through the lens of green colonialism (Lang et al., 2023); and likewise on a local scale through the case of the city of Rio de Janeiro.

The city of Rio de Janeiro is emblematic on account of its historical leadership in the climate policy debate, having also been recognized as a global climate leader by Time magazine in 2025. Nevertheless, although the city's mitigation and adaptation policies appear promising, certain obstacles remain latent in their implementation, as is the case with the environmental and climate impact of the Ternium steel company in the neighborhood of Santa Cruz. In the context of designing a roadmap for the phase-out of fossil fuels, the industrial energy transition is a central concern: both for what is understood as sustainable development and for technological and scientific programs. As the largest steel producer in Latin America and the ninth largest in the world, Brazil is composed of a territory marked by mineral extractivism as well as by the production of its manufactured goods. While territories are organized in the fight for environmental justice due to the creation of sacrifice zones, it is noteworthy that the impact is also climatic, and decarbonization measures remain insufficient or incipient.

2. Between targets and “climate solutions”

In 2024, driven by rising greenhouse gas concentrations, the global average temperature reached the mark of 1.5°C above pre-industrial levels. Even in these recent years of the largest climate finance flows into mitigation policies, the IPCC reports (Intergovernmental Panel on Climate Change, 2023) state that, if the current pace continues, the global average temperature will exceed 1.5°C above pre-industrial levels within this century. The rate of warming is accelerating at a pace never before observed in any 50-year period within these two centuries of measurement (IPCC, 2023). The risks of epidemics, of extreme weather events — drought, heatwaves, storms, and floods — and of ecosystem degradation — coastal erosion and sea level rise — are central to Latin America. As part of the coastal zone and as the state capital, Rio de Janeiro is subject to greater risks than other Brazilian cities.

A pioneer in establishing a climate action plan, Rio de Janeiro is the first city in Latin America to adopt a climate budget. Although expectations of advancing the city's mitigation and adaptation efforts are high, certain obstacles remain latent in the



implementation of climate policies. Such is the case of the Ternium steel company, which is undersized in the city's decarbonization targets. On the one hand, the socio-environmental conflicts and degradation generated by the steel plant remain severe, even amid complaints and lawsuits filed by residents and collectives from the affected areas; on the other, climate action remains incipient and far from promising. Although the scientific grounding for energy transition and decarbonization projects in the steel industry may appear favorable, the reality imposed on steel production in Rio de Janeiro is harmful.

In a recent article on pathways for decarbonizing the iron and steel industry, it is argued that this production accounts for 7% of global emissions; with growth estimates for the coming years, Brazilian iron and steel production has the potential to reduce its greenhouse gas emissions by up to 88% (Rovere et al., 2023). According to the report by the Brazilian Institute of Circular Economy (Instituto Brasileiro de Economia Circular) on circular economy as a lever for decarbonizing the Brazilian steel sector (2025), sectoral targets range from a 15% to 50% reduction in CO₂ emissions by 2030. While some companies have already implemented reductions in mineral coal energy consumption and improvements in energy efficiency, alongside projecting carbon neutrality targets by 2050, others still set minimal targets with little provision for studies on new technologies. Among the energy transition plans for the Brazilian steel sector, the current alternatives are charcoal, natural gas, and green hydrogen — although the latter remains at an early stage and, like carbon capture, "are not sufficient for a significant reduction in the short term" (IBEC, 2025, p. 21).

While the corporate sector projects fossil fuels such as coal and gas as decarbonization targets, the public authorities lack planning for the industrial energy transition, even though the government's analyses of the city's inventory point to the industrial sector as the third-largest emitter (the first being stationary energy and the second the transport sector). According to the Sustainable Development and Climate Action Plan of the City of Rio de Janeiro (2021), most of the city's greenhouse gas emissions derive from energy consumption, of which more than 70% comes from "stationary energy" — that is, electricity and fuels in residential, commercial, and industrial installations, as well as rural activities, electricity generation, and energy transformation. The data collected up to 2017 show a decrease in emissions from the stationary energy sector but a significant increase in emissions from the industrial



processes sector, particularly in iron and steel production (Prefeitura da Cidade do Rio de Janeiro, 2021, p. 79).

The IPCC report (2022) on decarbonization points to rising indicators of greenhouse gas emissions in the industrial sector, drawing on data on energy use, process emissions, product use, and waste. In this century, emissions from the industrial sector are the fastest growing and constitute the second-largest share of global emissions, at 34% (IPCC, 2022). Decarbonizing steel production is not only important but also feasible through some currently available technologies, such as the electrolytic reduction of iron ore followed by an electric arc furnace (IPCC, 2022). Although still incipient, molten oxide electrolysis also holds great potential for decarbonizing the Brazilian steel sector (IBEC, 2025, p. 28).

Starting from a predominantly fossil-fuel-based energy mix, Rio de Janeiro's development plan (2021) sets as its target for 2050 a 25% increase in solar energy in residential buildings. While this is still a modest target for diversifying the city's renewable energy sources, neither is there any target for decarbonizing the industrial sector. The justifications offered are: on the one hand, "few financing lines to foster energy efficiency actions for the industrial sector" (Prefeitura da Cidade do Rio de Janeiro, 2021, p. 87, translated from portuguese), and, on the other, "even as a matter of cost reduction, industries already seek greater energy efficiency in their processes" (Prefeitura da Cidade do Rio de Janeiro, 2021, p. 304, translated from portuguese). Although the target of "implementing regulatory instruments establishing a cap on industrial GHG emissions, with a focus on the steel industry" (Prefeitura da Cidade do Rio de Janeiro, 2021, p. 305, translated from portuguese) is part of the plan, its deadline is set for 2050.

The adoption of both mitigation and climate adaptation measures is indispensable, including so that industrial sectors can avoid being negatively affected by extreme events and operational disruptions (IPCC, 2023). This is not a distant scenario, given that Ternium has been impacted in different regions in recent years on account of extreme weather events, whether through difficulties in accessing materials necessary for operations or through difficulties in accessing the sites of its facilities (Ternium, 2024, p. 31). Climate action is therefore increasingly unavoidable, even though the targets set and the solutions presented are still not commensurate with the scale of the climate problem.

Analyzing the data made available by the city government, but drawing connections between energy consumption, product use, and industrial sector production,



the Pacs Institute (2022) booklet shows that in 2017 the Ternium company in Rio de Janeiro emitted more than 50% of the city's total emissions. With reference to water consumption, the steel plant consumes the equivalent of a city of more than 6 million inhabitants, while the region of Santa Cruz, where the industrial facility is located, faces water crises in residential areas (Pacs, 2022). The Fair Steel Coalition report (2024) on the cost of steel production in different regions of the world points to inadequate corporate and regulatory responses and to the creation of sacrifice zones, with the city of Rio de Janeiro being one of the case studies analyzed.

In the booklet on Ternium's climate footprint, students from FGV Law School Rio (FGV Direito Rio) together with the Pacs Institute (2024) present three concepts related to the implementation of climate policies in the city of Rio: sacrifice zones, greenwashing, and the architecture of impunity. Both the region of Santa Cruz and other nearby areas are affected by the contamination of water, soil, and air resulting from industrial iron and steel production in the region. Corporate compensatory measures for socio-environmental damages have proven ineffective and insufficient to address the scale of the impacts. Since 2010, 240 families residing in Santa Cruz have filed lawsuits that have yet to receive any response.

As Ferreira and Martins (2010) argue, the challenges for the implementation of local and subnational public climate policies are varied: lack of national and international support; lack of authority and management capacity; lack of financial, human, and technological resources. However, additional obstacles and barriers include: a lack of attention to environmental problems; short-termism; the disconnect between the knowledge produced and the needs of decision-makers; and weak and ineffective governance structures that do not include the participation of important actors and sectors. The industrial sector is of great relevance to the climate policy debate, since it connects the various necessary transitions, such as the energy transition. Although "solutions" to the climate emergency are not to be found exclusively in this sector, it is primarily with it that we must seek to build climate action that is both just and consistent with socio-environmental reality. It is worth recalling that "some climate-concerned corporate actors have been working to counterbalance the climate obstruction of



traditional emissions-intensive industries" (Roberts et al., 2025, p. 14, translated from portuguese)².

Given the recognized importance of targets and "climate solutions," the challenges are also political: how to translate the causes and consequences of a socio-environmental process that is complex and, often, uncertain? The diagnoses and prognoses of the climate emergency reveal discrepancies between the phenomenon itself and the action plans designed to address it, as well as between expected outcomes and the actual effectiveness of those plans in the face of the challenges encountered. In the case of the city of Rio de Janeiro, dialogue with the industrial sector is permeated by disputes, as exemplified by the substantial emissions from iron and steel production, which are undersized in the municipality's decarbonization targets. In 2024, new tensions intensified the conflict between the economic, political, scientific, and popular sectors of the city — owing to a document that links the activities of the steel industry to the deaths of hundreds of people. This finding had a significant impact and pressured the company to take a public position on the socio-environmental reality of the region.

3. Corporate climate action: the Ternium case

In 2024, the Finnish independent research organization CREA (Centre for Research on Energy and Clean Air) published the report "Air quality impacts of the Ternium Brasil Santa Cruz steel plant", documenting the impact of the Ternium company on air quality in Santa Cruz and surrounding areas. Based on data collected between 2010 and 2023, the findings were alarming: emissions of toxic pollutants at dangerous levels reaching as far as regions of the state of São Paulo, with the strongest health impact on the population living near the plant. The report estimated a direct link between Ternium's pollutant emissions and the deaths of 1,200 people. The repercussions of the CREA report were so significant that it generated a news story on Brazil's largest free-to-air television network (De Lannoy, 2024). In response to this situation, Ternium held a meeting with community

² The original passage reads: "alguns atores empresariais preocupados com o clima têm atuado no sentido de contrabalançar a obstrução climática das indústrias tradicionais intensivas em emissões" (Roberts; et al; 2025, p. 14).



representatives at the company's headquarters, at which it publicly presented a response to the report.

On October 8, 2024, Ternium opened its doors to civil society organizations and residents living near Sepetiba Bay. Among the speakers was the current president of Ternium Brasil. With the aim of responding to the complaint documents that had been presented, to the serious events that had occurred, and to the company's policy regarding its socio-environmental responsibility, the corporate narrative was defended. At first, the explanation of the socio-environmental disasters that had occurred was framed as a purely technical matter, without considering the socio-environmental consequences of operational disruptions; at another point, the defense was legitimized through a specific interpretation of the city government's data, while obscuring important analytical dimensions; and finally, the argument relied on data produced by the company itself, but without presenting such data or by hindering access to and transparency over it. These three justifications were repeated in nearly all the speeches delivered that morning, except when the community relations director elaborated on the social projects currently being developed.

In denying any of the findings presented by the CREA study, the corporate discourse drew on data from the Rio de Janeiro Epidemiological Surveillance Information System (Sistema de Informação de Vigilância Epidemiológica do Rio de Janeiro), comparing different regions of the city of Rio de Janeiro and the incidence of respiratory diseases. With no temporal analysis to compare Ternium's impact on the region over the years, the analysis invoked different sectors and sources of gas emissions in the city — such as wildfires and the road network — without taking into account the toxic chemical compounds that industrial production emits. These data were published in its newsletter *Alô Comunidade!* (Ternium, 2024), whose special edition was devoted to contesting the CREA report, dismissing the study as fake news.

The interpretation chosen by the corporate discourse was to highlight cases by city region only for the year 2024. It was not specified which neighborhoods were included in the data correlation across city regions, nor whether the data were collected based on patients' area of residence or on the reporting health facility. The outcome of the company's interpretation of the data was that the city center had more notified cases of Severe Acute Respiratory Infection than Santa Cruz. However, compared to Santa Cruz,



the city center has a larger hospital network, which may contribute to a higher number of cases notified per facility.

The construction and interpretation of socio-environmental and climate data are part of a dispute among corporate, political-institutional, and popular actions — as is the case with the municipality's GHG emissions database, since although available monitoring extends up to 2021, the time frame underlying the targets of the sustainability and climate action plan extends only up to 2017, the year in which Ternium began operating the steel plant with investment in expanding production. Ternium is the largest industrial investment ever made in Sepetiba Bay; nevertheless, its social return consists of the establishment of sacrifice zones in the region, and its dialogue with research institutions has been a matter of controversy (Ikeda Junior, 2018, p. 369).

Headquartered in Luxembourg and with a production chain spread across nine countries in the Americas, Ternium has a diversified structure that includes iron ore extraction mines (and other natural elements required for steel production), facilities where the metallic mixture is transformed into steel (through blast furnaces and processes of refining and rolling the resulting steel), and distribution and service centers. In Latin America, it operates in Mexico, Brazil, Argentina, Colombia, Guatemala, Nicaragua, El Salvador, and Costa Rica. In 2023, in Brazil, the company increased its shareholding in Usiminas, whose main facility is located in Ipatinga, Minas Gerais. Under the name Ternium, the company established itself in Brazil in 2017 with the purchase of the steel complex originally belonging to ThyssenKrupp Companhia Siderúrgica do Atlântico (TKCSA), which began operations in 2006 in the West Zone of Rio de Janeiro, in Santa Cruz.

As Ternium's innovation frontier in Brazil, the region of Santa Cruz stands out due to the installation of air quality monitoring stations linked online with the State Environmental Institute (Instituto Estadual do Ambiente — Inea), the body responsible for implementing state policies on the environment, water resources, and forest resources. This corporate–institutional alliance functions as a means of legitimizing air quality control over the industry's operations; however, monitoring takes the form of notifications about leaks posted on the social media pages of *Alô Comunidade*. The texts of these posts tend to use the formula that the leak or the emissions from malfunctioning filters "did not affect or alter air quality". The region's air quality monitoring system has up-to-date data, but these are unavailable for public access. Through judicial proceedings,



the data collected by the stations were requested from institutional members; the results for the years 2016 and 2017 reveal alarming pollution levels, with figures up to six times higher than those recommended by the World Health Organization (WHO) (Fair Steel Coalition, 2024).

In a case study on the corporate newsletter *Alô Comunidade*, drawing on editions from the TKCSA period, Viégas and Mendes (2017) argue that a "politics of silence" is at work as a journalistic conception that censors and/or conceals important information about the locality. Its strategy aims to "influence the Santa Cruz community and encourage different actions for its own benefit" (Viégas; Mendes, 2017, p. 125, translated from portuguese)³. The tactics of biased interpretation of the data provided, the lack of transparency (with no presentation or interpretation of data produced by the company itself), and an excessively technical discourse — though one little aligned with reality — indicate a continuity of this politics of silence. On the one hand, complaints and demands regarding socio-environmental impacts are sources of tension and conflict; on the other, climate issues have yet to translate into concrete actions (even with the potential of already existing decarbonization technologies).

In its sustainability report, Ternium states that Latin America holds potential for "nature-based decarbonization solutions" (Ternium, 2023, p. 30). Nevertheless, among the catalysts for Ternium's decarbonization, the following points stand out: first, although not explicitly named as a catalyst, technological advancement in multiple sectors (for instance, in green hydrogen); and named explicitly as catalysts are financial incentives, such as tax reductions and/or direct state investment; the availability of an energy infrastructure that facilitates the transmission of renewable energy; and the approval of new legislation supporting projects for capturing atmospheric carbon dioxide for storage in underground geological formations. On this last point, the company estimates that Mexico and Brazil hold significant potential for carrying out such storage, and further suggests that this activity may be a long-term solution to the climate problem (Ternium, 2023, p. 30). In 2023, Ternium in Mexico carried out the capture and sale of 280,000 tons of CO₂, in 2024 the figure was 274,000 tons, and the company is studying the implementation of the same project in Brazil, which, however, still depends on the regulatory framework for this practice. Mary Ann Manahan (2023) argues that nature-

³ The original passage reads: "influenciar a comunidade de Santa Cruz e incentivar diferentes ações em benefício próprio" (Viégas; Mendes, 2017, p. 125).



based solutions are part of the myth of sustainable development, framed within a perspective that seeks to turn the climate crisis into a moment of speculation over natural capital.

In 2019, the World Economic Forum highlighted that socio-environmental risks could lead to a collapse of ecosystems, since it is necessary to integrate corporate solutions and public policies for environmental regeneration and the safeguarding of community rights. The proposal is to harness nature's potential in order to offer sustainable projects with the capacity to regenerate both natural and social ecosystems. Integration is a first key principle, since socio-environmental relations must be conceived as directly correlated. The second principle is efficiency, whereby low cost and accessibility shape projects in the interest of social benefit, in contrast to projects focused solely on geoengineering. Nature-based solutions are described as an "umbrella term", since they include four strands of solutions: ecosystem-based adaptation, ecosystem-based mitigation, disaster risk reduction, and green infrastructure (Seddon et al., 2020). Operating at the interface between socio-economic systems and ecosystems, the impacts identified act along the following dimensions: exposure, in which ecosystems and communities are subject to various risks; sensitivity, regarding the capacity of ecosystems and communities to respond to climate risks; and resilience.

The proposal of nature-based solutions is grounded in the estimate that the management of terrestrial ecosystems holds the potential to deliver 30% of carbon dioxide emissions mitigation; nevertheless, certain challenges arise in reforestation and environmental conservation projects: monoculture plantations are often counted as part of reforested areas — which does not enable an increase in biodiversity; and although some forests can capture more carbon in their early stages, they are also more vulnerable to disturbances, thus requiring a longer time to develop resilience (Seddon et al., 2020). This is a challenge made all the more pressing by demand for charcoal and the planting of monocultures. When offset solutions in fact result in increased emissions and damages, then those solutions are false (Pacs, 2022).

Ternium's 2023 and 2024 sustainability reports set out modest targets, though higher than those of previous years. In 2019, the company launched its 2030 mitigation plan, aiming for a 6.9% reduction in emissions through an energy plan based on substitution by charcoal (Pacs, 2022). In 2023, the target was raised to 15% by 2030, with charcoal to be replaced by biomass (for Brazil). In 2024, the 15% target was maintained,



but, for Ternium Brasil, the focus shifted from the use of charcoal or biomass to energy efficiency improvements alone. Energy consumption at Ternium Brasil is fossil-fuel-based, as is that of the city of Rio de Janeiro; the industrial energy source comes from coal, and the solutions presented remain little implemented or amount only to expectations of mitigating energy consumption through the use of scrap and the diversification of the energy mix with charcoal, natural gas, or hydrogen (Pacs, 2022).

In Rio de Janeiro, the history of Ternium, formerly TKCSA, is marked by conflicts and socio-environmental disasters, such as the "silver rains" (*chuvas de prata*) of 2010 and 2012 (a silvery dust resulting from the industry's steel production). Since its establishment in the region, the company has invested in publicizing its project and in social visibility through specific discursive strategies grounded in technicist science (Viégas, 2011). Although the Sepetiba Bay environment has undergone an intense process of anthropization (Castelo, 2020), the environmental compensation carried out by the company has focused predominantly on social initiatives, particularly in the field of education. Its projects to revitalize schools in the region — and even to build its own technical school — neither address the core of the environmental degradation caused nor have any impact on the deterioration of the collective health of the population living in the area (Silva, 2021).

Because the region is inhabited largely by Black and low-income people, environmental racism is explicit in this sacrifice zone, which lays bare "the structural fragility of Brazilian environmental federalism" (Denari; Zanotelli, 2025, translated from portuguese)⁴. In discussing the commodification of ecosystem services, Robertson (2006) questions the role that science plays in the process of environmental degradation, where scientific data and abstract projections translate species, biomes, and natural elements into part of an instrumentalized calculus within the logic of capital accumulation. The ethical challenges entailed by nature-based solutions can be summarized as follows: utilitarian anthropocentrism, whose productive orientation within the profit-driven logic of capitalist accumulation may lead to greater degradation and exploitation; and instrumentalized knowledge systems, which fail to encompass the territorial dimensions of local knowledges (Eggermont et al., 2015).

⁴ The original passage reads: "a fragilidade estrutural do federalismo ambiental brasileiro" (Denari; Zanotelli, 2025).



4. Popular climate action: Santa Cruz residents and civil society organizations

The research on Ternium's pollution featured in the television news story cited earlier was celebrated by Santa Cruz residents for finally exposing on national television what they had long been denouncing without being heard: the socio-environmental devastation carried out by the steel plant since its installation in the neighborhood. Years before this CREA study came to light, in 2016, a group of young people received training to monitor air quality in Santa Cruz with low-cost equipment, given the difficulty of accessing Ternium's data on air quality in the region. The project was called *Vigilância Popular em Saúde* [People's Health Surveillance], a partnership between Fiocruz (Oswaldo Cruz Foundation), the Pacts Institute, and the Justiça nos Trilhos Network. The results of the two rounds of sampling were alarming, showing that residents were exposed to pollution levels above those recommended by the WHO, which has been associated with premature deaths, chronic diseases, and even cancer (Fair Steel Coalition, 2024).

The group of young people from Santa Cruz who participated in this project then formed the Coletivo Martha Trindade [Martha Trindade Collective]. The collective's name pays tribute to Martha Trindade, a Black woman and Santa Cruz resident who led the denunciation against the operations of the former TKCSA, now Ternium. Martha called the press to denounce the first "silver rain" that occurred in 2010 (following the company's inauguration) and continued to tirelessly denounce the consequences of the steel industry's activity in the region. Since then, the Coletivo Martha Trindade has been engaged in research, writing reports, disseminating data, organizing environmental education cycles and *Vigilância Popular Ambiental* [People's Environmental Surveillance] training, workshops with children and adolescents in schools, and lectures, as well as taking part in campaigns denouncing Ternium, in public hearings, among other activities.

In August 2024, for example, the collective took part in the public hearing of the Special Commission on Climate Emergency and Socio-Environmental Justice (Comissão Especial de Emergência Climática e Justiça Socioambiental) titled "Climate crisis and health in the West Zone". With the City Council's (Câmara de Vereadores) auditorium at full capacity, Santa Cruz residents were able to denounce the serious problems arising from the pollution caused by Ternium in the region, ranging from health problems to food insecurity and threats to income generation due to the contamination of air, river, and soil. The testimonies included calls for environmental reparation, as well as denunciations



of environmental racism and of the transformation of Santa Cruz and its surroundings into a sacrifice zone.

Along these lines, in a public Instagram post with an illustration of thermometers comparing the temperature in Santa Cruz and in Jardim Botânico (a wealthy neighborhood in Rio de Janeiro), the collective highlights socio-environmental inequalities, drawing on the concept of sacrifice zones:

IT'S REALLY HARD TO BREATHE AROUND HERE!

Heatwaves and low air humidity. A problem generated not only by wildfires in the north of the country, but also by the polluting industries that surround Rio de Janeiro's territory.

Among the accounts of respiratory problems and difficulties in carrying out basic activities, one thing becomes clear: the problem is not the same for everyone!

While the more tree-lined neighborhoods experience the climate crisis in a milder way, places chosen as sacrifice zones face the worst scenarios (Coletivo Martha Trindade, 2024, [Post], translated from portuguese)⁵.

In tracing a critical genealogy of the term "sacrifice zones," Juskus (2023) shows that it was originally a conservationist concept referring to cattle and pasture management, and that it was transformed into a concept critical of the nuclear and coal industries by social movements in the United States in the 1970s. Subsequently, in the 1980s, it became a concept of Indigenous political ecology critical of nuclear energy and uranium production, before finally being expanded and widely disseminated from the 1990s onward as a concept of Environmental Justice, referring to "any geographical area that bore a disproportionate amount of industrial pollution, toxic chemical exposure, or other environmental harms associated with industry or national security" (Juskus, 2023, p. 11).

According to the author, the Environmental Justice movement emerged from within the civil rights struggle of the Black movement in the U.S. South, which did not feel represented by mainstream environmentalism (Juskus, 2023). With its origins in the 1980s in opposition to the dumping of toxic waste in racialized communities, it was in the 1990s that the Environmental Justice movement rose to prominence, and with it came the wider

⁵ The original passage reads: "POR AQUI ESTÁ MUITO DIFÍCIL RESPIRAR! Ondas de calor e baixa umidade do ar. Problema gerado não só pelas queimadas no norte do país, mas também pelas indústrias poluidoras que cercam o território do Rio de Janeiro. Dentre os relatos de problemas respiratórios e dificuldades para realizar atividades básicas, uma coisa fica clara: o problema não é igual para todos! Enquanto os bairros mais arborizados passam pela crise climática de forma mais branda, locais escolhidos como zonas de sacrifício enfrentam os piores cenários" (Coletivo Martha Trindade, 2024, [Postagem]).



dissemination of the sacrifice zone concept, which began to foreground race, class, and gender within its analytical framework.

With a strong critique of institutional racism on the part of both the State and the market, Bullard argues that "environmental racism combines with public policies and industry practices to provide benefits for whites while shifting costs to people of color" (Bullard, 1993, p. 23). In this vein, a member of the Coletivo Martha Trindade drew on the concept of environmental racism to denounce the case of Santa Cruz at a public hearing of the Legislative Assembly of the State of Rio de Janeiro (Assembleia Legislativa do Estado do Rio de Janeiro):

I work in Santa Cruz against the impacts of the industrial district, with a special focus on Latin America's largest steel plant, Ternium Brasil. For those who are not familiar with it, this is a clear case of environmental racism. Santa Cruz is a neighborhood at the far end of Avenida Brasil, in the far West Zone, whose population is predominantly Black and whose HDI is among the lowest in the municipality of Rio de Janeiro. (...) We are breathing air three to eight times more polluted than what is recommended for our health (Coletivo Martha Trindade, 2024, [Video post], translated from portuguese)⁶.

And the data confirm this denunciation: according to the most recent national census, conducted in 2021, 66% of Santa Cruz's 250,000 inhabitants are Black and *pardo* (mixed-race), and the neighborhood's Human Development Index (0.742) ranks among the lowest in the city, placing it 119th out of 126 neighborhoods. According to Selene Herculano, environmental racism "concerns the social and environmental injustices that fall disproportionately on vulnerable ethnic groups" (Herculano, 2008, p. 16, translated from portuguese)⁷ and "is configured not only through actions carrying racist intent, but equally through actions producing racial impact, regardless of the intent that gave rise to them" (Herculano, 2008, p. 16, translated from portuguese)⁸.

The Coletivo Martha Trindade also emphasizes how this violence affects the women of the neighborhood in distinct ways, as becomes evident in an Instagram post:

⁶ The original passage reads: "Eu atuo em Santa Cruz contra os impactos do distrito industrial, com especial foco na maior siderúrgica da América Latina, Ternium Brasil. Pra quem não conhece, é um caso nítido de racismo ambiental. Santa Cruz é um bairro lá no final da Avenida Brasil, na extrema zona oeste, cuja população é majoritariamente negra e o IDH é um dos mais baixos do município do Rio de Janeiro. (...) Nós estamos respirando um ar de 3 a 8 vezes mais poluído do que o indicado para a nossa saúde" (Coletivo Martha Trindade, 2024, [video post]).

⁷ The original passage reads: "diz respeito às injustiças sociais e ambientais que recaem de forma desproporcional sobre etnias vulnerabilizadas" (Herculano, 2008, p. 16).

⁸ The original passage reads: "não se configura apenas por meio de ações que tenham uma intenção racista, mas igualmente por meio de ações que tenham impacto racial, não obstante a intenção que lhes tenha dado origem" (Herculano, 2008, p. 16).



The daily routine of a woman who has no contact with a megaproject compared to one who does is very different. There is the impact on my health, from the constant dirt inside the house. [...] It is not easy to reconcile academic work with household duties. It is not only a matter of mental health, it is also about women's time. [...] Nowadays I can no longer go out on my father's boat with the same safety I had 15 years ago because now there is a port (Coletivo Martha Trindade, 2021, [Post], translated from portuguese)⁹.

In this sense, the Coletivo Martha Trindade emphasizes that the women of Santa Cruz would be even more exposed to toxins related to cleaning and household maintenance, since historically domestic work has fallen on them. Compounding this greater physical exposure, there is also a higher incidence of mental illness stemming from the burden of care work when other family members fall ill due to this situation.

In this same vein, in addition to the CREA and People's Health Surveillance studies already cited, the newspaper Folha de São Paulo published a recent study conducted by the Federal University of Rio de Janeiro (UFRJ) and Veiga de Almeida University (UVA) which shows that air pollution in Santa Cruz and Bangu has contributed to the hospitalization and premature death of children up to the age of five (Gama, 2025). Conducted in 2023, the study estimates that 8.5% of infant deaths from cardiorespiratory diseases in Santa Cruz and Bangu could have been avoided had the fine particulate matter limit followed the WHO's recommendation.

Thus, the Coletivo Martha Trindade positions itself within this dispute over climate policies in Rio de Janeiro through a territorialized, community-based socio-environmental discourse framed through the lenses of class, race, and gender, struggling for the transformation of a policy that directly affects its members' bodies, territories, food supply, income, and ways of life. Critical of the current model of industrial production, the collective denounces environmental racism and the sacrifice zone that the neighborhood has become. In contrast to Ternium's generic corporate environmental discourse, which instrumentalizes the climate agenda for market expansion, the collective takes part in the struggle for environmental justice grounded in scientific studies on pollution and health impacts on the population arising from the industrial activity in the region.

⁹ The original passage reads: "A rotina da mulher que não tem contato com um megaprojeto em comparação com a que tem é bem diferente. Tem o impacto sobre a minha saúde, pela sujeira constante dentro de casa. [...] Não é simples conciliar a parte acadêmica com os afazeres domésticos. Não é só uma questão de saúde mental, é do tempo das mulheres também. [...] Hoje em dia eu não posso mais sair com o barco do meu pai com a mesma segurança que tinha há 15 anos atrás porque agora tem um porto" (Coletivo Martha Trindade, 2021, [Postagem]).



It is worth emphasizing that the concrete struggle waged from this territory affected by the steel industry is localized but not localist, since it articulates with the concrete experiences of other territories impacted by similar socio-environmental conflicts (Bringel, 2024). Thus, collectives such as Martha Trindade share not only bonds of solidarity with other social movements but also participate in the creation of a "common vocabulary" of resistances (Alier, 2015), as well as in the construction of alternative agendas and horizons to this scenario of environmental and ecological injustice (Bringel, 2024).

5. Political-Institutional Climate Action (or the State–Capital Alliance)

In September 2024, at the foot of the Christ the Redeemer statue, a banner was unfurled and the "Rio Capital of Climate Bullshit" campaign was launched, in explicit opposition to the panels spread across the city bearing the slogan "Rio Capital of the G20". In smaller letters, the banner also read "Ternium's pollution reaches here". The campaign, composed of various collectives and civil society organizations — among them the Coletivo Martha Trindade and the Pacs Institute — sought to denounce that, although the city government claimed to prioritize the building of "a just world and a sustainable planet," the opposite was being done in the city, given that the Municipal Climate Policy undersizes the emissions of the companies in the Santa Cruz Industrial District within the municipality's decarbonization targets.

Environmental and climate legislation constitutes a privileged stage for disputes among the collective actors under analysis: while Ternium benefits from current legislation and pursues the approval of new laws to further facilitate its operations, civil society organizations seek the repeal of the law that masks the data on the pollution emitted by the steel plant:

Law No. 5,248/2011, which instituted the Municipal Climate Policy, creates targets for reducing greenhouse gas (GHG) emissions in the municipality, but establishes, in Article 6, that emissions from the companies in the Santa Cruz Industrial District, located in the West Zone, are to be accounted for separately, subject to different targets. This creates a climate exclusion zone in the West Zone of Rio de Janeiro — where the population is predominantly Black and impoverished. This is the "Rio, Capital of Climate Bullshit", where



laws that promise sustainability deliver environmental racism (Pacs, 2024, [Post], translated from portuguese)¹⁰.

In this vein, city councilor William Siri (PSOL — Socialism and Liberty Party), former chair of the Special Commission on Climate Emergency and vice-chair of the Environment Committee of the City Council of Rio de Janeiro, submitted two bills to amend the Municipal Climate Policy: Bill No. 1,152/2025 and Bill No. 1,154/2025, which are yet to be discussed in the Council's internal committees before being put to a vote on the floor. On its public Instagram profile, the Pacs Institute emphasizes the importance of popular mobilization:

This initiative is yet another outcome of the mobilization and advocacy actions of the Rio Capital of Climate Bullshit campaign. In August of last year, the organizations that make up the campaign brought this complaint to a public hearing at the City Council. On that occasion, a Working Group was created to advance solutions to the problem — which culminated in the drafting of the bills submitted by city councilor William Siri (PSOL) (Pacs, 2025, [Post], translated from portuguese)¹¹.

In addition to the repeal of this law, Santa Cruz residents also demand from the public authorities the suspension and return of the tax incentives granted to the company (Deister, 2018). Along these lines, the booklet “Chuva local, poluição global” (FGV, 2024) shows that from 2006 to the present, Ternium has obtained approximately R\$ 5 billion in tax benefits. The Fair Steel Coalition's report “The Real Cost of Steel” shows that in 2020 alone Ternium reported US\$ 186 million in state tax benefits. Moreover, according to that same report, “Despite public controversy over tax breaks for this polluting industry, the state renewed this benefit for Ternium and other steelmakers until 2032 under Law 9.693/2022” (Fair Steel Coalition, 2024, p. 25).

When questioned, public authorities tend to point out that Rio de Janeiro was the first city in Brazil to have a greenhouse gas emissions inventory, in 2005, and also the first to establish a climate change policy in 2010, through Ordinary Law No. 5,690, which

¹⁰ The original passage reads: “A Lei nº 5.248/2011, que institui a Política Municipal do Clima, cria metas para reduzir a emissão de gases de efeito estufa (GEE) no município, mas estabelece, em seu Artigo 6º, que as emissões das empresas do Distrito Industrial de Santa Cruz, localizado na Zona Oeste, serão contabilizadas em separado, observando metas diferentes. Isso cria uma zona de exclusão climática na Zona Oeste do Rio de Janeiro — onde a população é majoritariamente negra e empobrecida. Este é o Rio Capital do Caô Climático, onde leis que prometem sustentabilidade entregam racismo ambiental” (Pacs, 2024, [Postagem]).

¹¹ The original passage reads: “Essa iniciativa é mais um fruto das ações de mobilização e incidência da campanha Rio Capital do Caô Climático. Em agosto do ano passado, as organizações que compõem a campanha levaram essa denúncia a uma audiência pública, na Câmara Municipal. Na ocasião, foi criado um Grupo de Trabalho para encaminhar soluções para o problema — o que culminou na criação dos projetos protocolados pelo vereador William Siri (PSOL)” (Pacs, 2025, [Postagem]).



instituted the State Policy on Global Climate Change and Sustainable Development. What is not mentioned, however, is that the steel sectors were excluded from the proposed targets. Even more strikingly:

When the steel mill in Santa Cruz went into operation in 2010, municipal GHG emissions doubled. But this is hidden in the city's plans. The city has committed to reduce its net emissions by 20% by 2030 and by 100% by 2050 compared to the base year of 2017. However, if the steel and aviation sectors were included, the 2030 target would only represent a 11% reduction over 2017 levels. Furthermore, if the base year were reset to 2005, when Rio de Janeiro undertook its first GHG inventory and before Ternium's plant was in operation, the 2030 target would be 68% higher. Not a reduction at all (Fair Steel Coalition, 2024, p. 25).

Thus, while Santa Cruz residents ask "how long will the public authorities remain complicit in these violations of human and environmental rights?", the authorities respond by renewing the tax exemption of the city's largest polluters and by undersizing them in the municipal targets for reducing greenhouse gas emissions. Reaffirming the logic of impunity and corporate privilege, this alliance between State and capital "allows both the city and the steel mills to greenwash their decarbonization strategies, which on a large scale aggravates the climate crisis, and on a local scale reproduces environmental racism" (Fair Steel Coalition, 2024, p. 25).

Thus, while the population and the ecosystem continue to suffer from industrial pollution, in 2025 Ternium received an international award as one of the Steel Sustainability Champions from worldsteel, for the seventh consecutive year, and the mayor of Rio de Janeiro was named in 2025 by Time magazine as one of the world's 100 most influential climate leaders for having led climate efforts to transform the city in a sustainable manner.

In 2021, the year in which Ternium was undergoing the renewal process for its Operating License, the Pacs Institute and the Coletivo Martha Trindade, in partnership with other organizations, launched the campaign "Licença pra quê?" [Permit for what?], denouncing the impacts caused by the steel company and the public authorities' neglect of the population. By creating and relaxing environmental laws and licenses to shield major polluting industries and by ignoring the violations they commit, the public authorities reveal the interests of the dominant classes, making the State–capital alliance in the city's climate policies plainly evident.



It is worth highlighting that this architecture of impunity has been under construction since the 2005 licensing process for the installation of the steel complex in Santa Cruz, whose irregularities were denounced by residents, researchers, and social movements, many of whom were threatened and had to enter the National Program for the Protection of Human Rights Defenders (Furtado, 2012). It is interesting to note that the year of this problematic licensing is the same year in which Rio de Janeiro released the first greenhouse gas emissions inventory in Brazil, just as it became the first city to establish a climate change policy — even as it undersizes the industrial district in its GHG emissions reduction targets.

It should also be noted that the municipality of Rio created Brazil's first Green Economy Secretariat and the world's first environmental assets exchange, BVRio. In this way, the city manages to become a "showcase" of both green capitalism and the development model based on the exploitation of oil and gas and on industrial and steelmaking activity, characterizing the "fossil gattopardism" (Bringel, 2024) and becoming the city of the environmentalism of the spectacle (Furtado, 2012).

6. Transition for whom?

Confronting the climate crisis is a stage of disputes. If the topic is increasingly difficult to deny as important to public debate, there are also increasingly hegemonic interests seeking to turn the problem into an opportunity for capital. What is known as green capitalism is a range of programs, targets, and actions that orient wagers on confronting the climate crisis toward the sustainability of capitalism itself. From the politicization of the scientific climate debate, studies on the largest greenhouse gas emissions have converged on the use of carbon as the main element for underscoring the gravity of the process of anthropogenic climate change. Carbon dioxide is the element present in the greatest quantity of anthropogenic emissions and has a stable cycle in the terrestrial ecosystem, which enables a better understanding of the metabolic rift through the carbon cycle, thereby making visible the problem of contemporary climate change (Clark and York, 2005).

For the Earth not to exceed 2°C in global temperature, the 2023 IPCC report highlights the need for mitigation and adaptation measures such as: the energy transition;



the decarbonization of industry, agriculture, and transport; and the valorization of green areas. The tensions produced by the climate agenda within sustainable development policies result in discourses and practices at odds with reality. What is observed in hegemonic climate actions is an instrumentalization of the problem, through climatic reasoning, within a carbon metric — whose practice of offsetting various activities fails to address the true scale of the problem (Moreno, 2016).

Bringel and Svampa (2023) draw attention to the contradictions of this reality through the concept of the "decarbonization consensus," in which a dominant decarbonization discourse prevails over the popular demands necessary for a just and popular eco-social transition. Drawing on the case study of climate policies in Rio de Janeiro, we have been able to identify the typologies of socio-ecological transitions currently in dispute, namely: corporate climate action (Ternium), political-institutional climate action (city government and legislature), and popular-territorial climate action (Coletivo Martha Trindade, Pacs Institute, Santa Cruz residents, and others).

On the one hand, Ternium (2023) proposes as its target a decarbonization of production of up to 15% by 2030; on the other, civil society organizations denounce the socio-environmental degradation and health harms carried out by the company from its installation to the present day, which continue without redress and unfold into new damages. Drawing on data made available by state and non-governmental institutions, the justifications of the socio-environmental discourses diverge both in diagnosis and in prognosis, both in gravity and in the urgency of policies.

Henri Acselrad (2025) points to the importance of the environmentalization of politics, including in its climate dimension, which has often occurred through a "politicization by seepage" — that is, the capacity of the ecological movement to have influence in the formulation and implementation of policies.

Critics have come to argue that a technical and administrative consensus has dominated the discussion on energy transition, disregarding conflictuality and excluding alternatives proper to the field of politics. The delegation of decision-making dynamics to private agents and the establishment of new financial assets fueled by climate rationales would have hollowed out political action, thereby explaining, in part, the very absence of results in combating global warming (Acselrad, 2025, p. 152, translated from portuguese)¹².

¹² The original passage reads: "Os críticos passaram a sustentar que um consenso técnico e administrativo tem dominado a discussão sobre transição energética, desconsiderando a conflitualidade e excluindo as alternativas próprias ao campo da política. A delegação das dinâmicas decisórias aos agentes privados e a instauração de novos ativos financeiros alimentados por razões climáticas teriam esvaziado a ação política,



The continuity of fossil-fuel policies is part of a movement by industrial sectors to obstruct the construction of a just energy transition (Milani et al., 2025). In this sense, it is possible to identify fossil gattopardism as the same facet of decarbonization solutions, whether in the promise (with little investment) of renewable energy or in the very continuity of fossilized production (Bringel, 2024). By maintaining the ideology of indefinite economic growth and the commodification of nature, "fossil capitalism and decarbonized capitalism are not two distinct paths, much less two opposing projects, but rather two sides of the same coin in the reconfiguration of the dynamics of accumulation" (Bringel, 2024, p. 83, translated from spanish)¹³.

Just as the commodities consensus in Latin America was justified as necessary for the development of the subcontinent, the decarbonization consensus arrives as a promise of the region's sustainable development — the so-called "green reindustrialization". However, the contradictions of Brazilian climate policies intertwine with Latin America's crossroads: the (mere) promise of development and socio-environmental conflicts. Against the powerful discussions on ecological debt and climate debt (Lang, Acosta, and Martínez, 2023), what prevails in the geopolitics of contemporary energy transitions is the continuation of the centuries-old practice of fossil capitalism. Whereas the Global South was once the sacrifice zone for the industrialization of the Global North, it is now the sacrifice zone for the energy transition of wealthy countries.

As exemplified by the conflict between the multinational Ternium and those affected by steel activity, corporate climate action does not deliver a genuine transition but rather a market expansion, a continuation of the colonial extractivist logic that sees in climate collapse an opportunity to sell products and (false) green solutions — "accumulation by defossilization" (Slipak and Argento, 2022). Territorialized popular movements, in turn, struggle for a transition from the perspective of environmental justice, which encompasses a structural change in modes of production and ways of life, since it is not confined to a carbon metric.

explicando inclusive, em parte, a própria ausência de resultados no combate ao aquecimento global" (Acseirad , 2025, p. 152).

¹³ The original passage reads: "el capitalismo fósil y el capitalismo descarbonizado no son dos caminos distintos, ni mucho menos dos proyectos enfrentados, sino más bien dos caras de la misma moneda en la reconfiguración de las dinámicas de acumulación" (Bringel, 2024, p. 83).



Between the consensuses (and dissensuses) of the corporate, popular, and political-institutional sectors, the configurations of Rio de Janeiro's climate policies are traversed by tensions: the omission of the climate impacts of the municipality's industrial development, the denial of the gravity of the socio-environmental impact of the iron and steel industrial sector, and the obstruction of climate policies that would correspond to and address the demands of the affected regions. The city's mitigation policies undersize industrial sectors in its decarbonization targets and its adaptation policies remain scarcely developed. The architecture of impunity in the city is designed in such a way that the largest polluters receive sustainability awards while the sacrifice zones foot the bill. Given the climate context of this century, the political imagination for climate actions demands a greater capacity to understand sectoral interdependence, the complexity of socio-environmental reality, and the deployment of effective climate policies in the face of the challenges at hand.

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