



SCHOOL OF INTERNATIONAL AND PUBLIC AFFAIRS (SIPA),  
COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

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# CITIES AND CLIMATE POLICY ON THE GLOBAL STAGE - RIO DE JANEIRO CITY HALL

## G20 COMMITTEE CAPSTONE PROJECT

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# 00 Abstract

The report provides strategic recommendations for the City of Rio de Janeiro to utilize hosting the 2024 G20 Summit to enhance its global influence on urban climate policy. Numerous interviews with stakeholders within the city government, research entities, and former G20 affiliated personnel have identified major economic, technological, social, and administrative issues facing the city in implementing climate initiatives. Among other causes, these include a lack of financial resources, insufficient climate education, limited concrete implementation plans, and ineffective coordination throughout many U20 and G20 engagement groups.

The report will assess integrated strategies aligning the city's objectives of utilizing the U20 to amplify its visibility, rebranding itself as a sustainable investment hub, and establishing a lasting legacy for the G20. Recommendations will include formulating the new G20 Social platform to streamline engagement opportunities between engagement groups, developing a climate technological ecosystem to attract investment, rebranding the city through investment summits and city credit rating increasing initiatives, and establishing performance accountability mechanisms for the U20 Summit. These recommendations are for before, during, and after the G20 Summit.

By enacting our recommendations, the City of Rio de Janeiro can strategically position itself as a global leader in the world of urban sustainability. They will also spur local economic development, environmental benefits, and strong social impacts aligned with its climate goals. These recommendations lay the groundwork for the city to maximize opportunities presented by the U20 and G20 Summits and create long-lasting, positive impacts.



## 01

# Acknowledgement and Meet the Team

The Columbia University School of International and Public Affairs (SIPA) Capstone team expresses deep appreciation to our mentors, interviewees, participants, and advisors whose invaluable contributions enabled our research endeavors. We extend our gratitude to the civil servants, academic experts, C40 T20 Y20 coordinator, and professionals whose insights enriched our understanding of climate resilience and adaptation, particularly within the context of Rio de Janeiro's achievements in the climate arena. The candid input from interviewees directly shaped our recommendations aimed at positioning Rio de Janeiro as a global leader in sustainability.

Special acknowledgment goes to Daniel Zarrilli, Special Advisor for Climate and Sustainability at Columbia University, whose guidance and feedback were instrumental throughout the consulting project. We also acknowledge the support of Suzanne Hollmann, Saleha Awal, and the entire Columbia SIPA Capstone Program for their logistical assistance.

Lastly, we extend our gratitude to our client, the Government of the City of Rio de Janeiro, Lucas and his team, and particularly to Ana Carolina Abreu, whose provision of information and contacts greatly facilitated our understanding of Rio de Janeiro's climate leadership. We trust that the recommendations outlined in this report will contribute to Rio de Janeiro's journey towards becoming a renowned advocate of innovation and sustainable practices.

## Columbia University School of International and Public Affairs - Project Team



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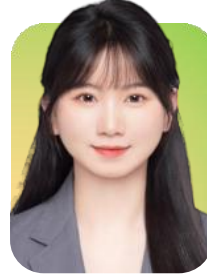
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## 02 Executive Summary

The City of Rio de Janeiro (Rio), along with Sao Paulo, is set to co-host the 2024 Global 20 Summit(G20) this November, a gathering of presidents and city leaders dedicated to local climate action. This summit, combined with the Urban 20 Summit, offers Rio and other cities a unique opportunity to advocate for their interests on the global stage.

In preparation for the summit, the mayor's office of Rio de Janeiro has tasked the Columbia University SIPA Capstone team with recommending strategies to achieve three key objectives:

- 1. Utilizing U20 to enhance its visibility and influence on the international stage.**
- 2. Leveraging the G20 Summit to rebrand the city as a sustainable, inclusive and innovative investment hub and climate leader.**
- 3. Establishing a G20 legacy that fosters enduring change and sustainability in Rio de Janeiro and beyond.**

The team has conducted 25 interviews with a diverse range of stakeholders, including representatives from Brazilian governmental bodies, local and international city officials, former G20 participants, and experts from Brazilian think tanks, among others. Our research also involved extensive literature reviews and other forms of inquiry to inform our recommendations. Furthermore, we conducted a week-long field visit to Rio de Janeiro to observe firsthand the city's G20 initiatives and gather insights for the conclusion of our research project.

Our research findings are organized into four main categories: financial, technological, social, and administrative challenges encountered by Rio. These categories break down the obstacles that impede the achievement of the aforementioned goals set at the summit, as well as aspects of the comments made by Rio officials during our visit.

In terms of financial challenges, the interviews identified difficulties in securing financing due to a lack of funding sources, limited public-private partnerships (PPPs), lacking human capital, and an overreliance on the oil industry. Funding sources are sparse and, with the country having a lower credit rating than the city, securing funding is very challenging. PPPs are rarely implemented and the city isn't very engaged with the private sector on climate funding sources. Highly skilled workers are moving from the city to different countries due to economic and passport related opportunities. Last, the oil industry has a powerful grasp over Brazil and Rio's economy. The combination of these challenges makes investing in Rio difficult to navigate.

### **In terms of technological challenges**

The interviews highlighted a significant technological gap between the Global North and South. This disparity impedes the adoption of environmentally friendly solutions in Brazil, such as waste-to-energy and hybrid vehicles, despite their potential economic significance, projected to reach \$2.1 trillion by 2030. In Brazil's automotive market, plug-in EVs comprise less than 2% of total sales, with challenges including environmental concerns over battery mineral mining and the dominance of low-cost E85 fuel cars. Additionally, Rio's waste-to-energy sector faces obstacles in meeting emission reduction targets due to infrastructure delays and a lack of private investment, exacerbated by the city's financial crisis.

### **In terms of social challenges**

The perception that society as a whole has not progressed in its understanding of climate change has become clear through interviews. First of all, local people can't understand the G20's benefits. Secondly, a climate education is too broad and generalized approach, which is less effective. Thirdly, our interviewee emphasized the importance of youth engagement in climate change. Lastly, resolving gender inequalities faced by women in Brazil is an urgent social problem despite social transformations improving women's participation.

### **In terms of administrative obstacles**

Discrepancies between planning and implementation within the G20 are consistently observed. Firstly, a strong strategy for effectively communicating the viewpoints of engagement groups to the G20 is lacking. Secondly, cities face challenges in properly evaluating their compliance with G20 and U20 directives. Thirdly, the absence of concrete actions undermines the implementation of economic strategies. Lastly, the multitude of engagement groups and their lack of collaboration with each other can result in inefficiencies.

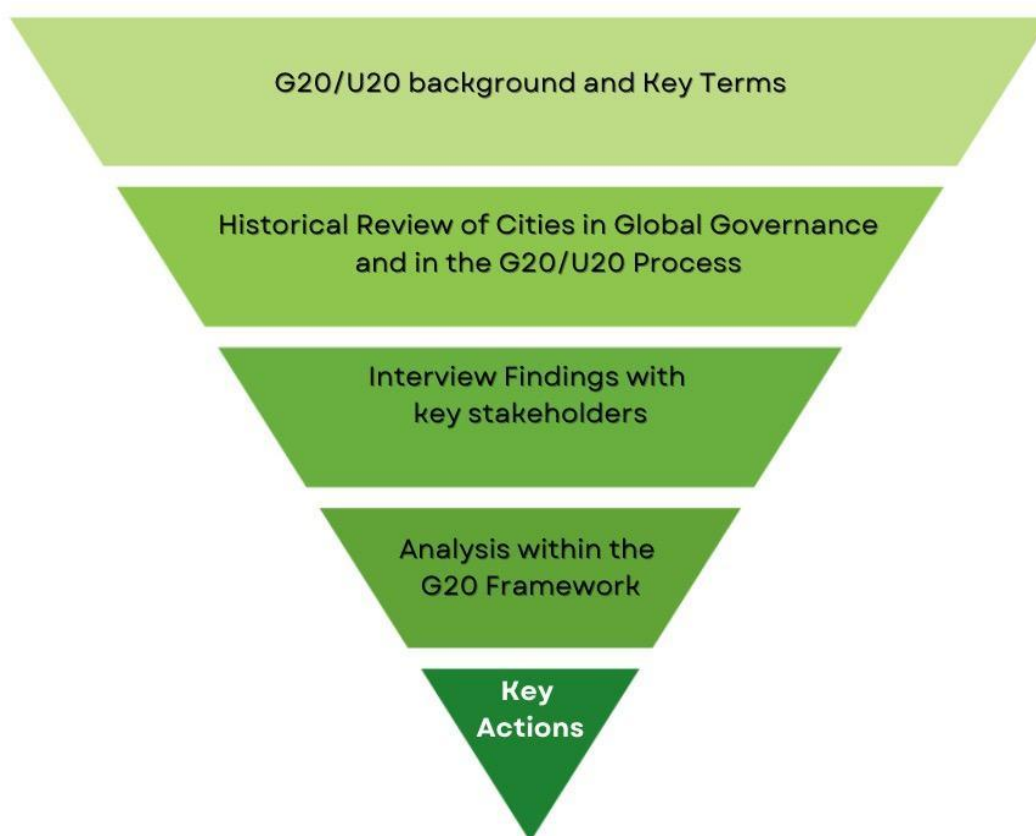
Our analysis reveals that while the Economic/Financial and Technological challenges lie at the heart of Rio's city agenda, the administrative and social obstacles must also be addressed to effectively promote policy implementation. Thus, our recommendations are strategically designed to align with the project's

three-part objectives, while also incorporating analytical insights from the investigative phase to effectively address the identified challenges.

To capitalize on the opportunities presented by the G20, we propose that Rio leverages its administrative power by reformulating the G20 Social platform to enhance civil engagement and establishing a permanent Task Force for Accountability to streamline administrative processes. To maximize the potential of media attention, we recommend the development of a Climate Tech Ecosystem to bolster human capital and rebranding Rio as a Sustainable Climate Investment Center to attract additional financing. To sustain policy momentum post-G20, we suggest that Rio focuses on managing human capital, investing in key sectors, and advancing green urbanism as preparatory steps for COP 30.

Ultimately, realizing Rio's objectives will require concerted efforts both immediately before the G20 Summit and in the aftermath to sustain momentum. Our recommendations are designed to guide the city in building a long-lasting legacy and positioning itself as a global leader in urban climate policy.

## Report Architecture



### Rio De Janeiro

Rio is the second most populous city in Brazil (6.6 million in 2022) and hosts many international events and financial opportunities for both the domestic and international economies. The city was the capital of Brazil from 1763 until 1960 and is currently the capital of the State of Rio de Janeiro. Also, the city is a cultural icon synonymous with music, dance, and arts along with hosting many Carnival events which helps it become one of the most important tourist destinations in South America. The city is the second richest economic hub and is diverse in various industries. Last, the environmental importance of the city is relevant through the biodiversity of the city's forests and mountains along with the natural beauty of its many beaches.

Rio is currently at a pivotal moment in its history as it prepares to host the G20, followed by two other major global events in the next year: the BRICS Summit and the United Nations Climate Change Conference (COP30). Hosting these prestigious gatherings not only showcases Rio's significance as a key player on the international stage but also provides a unique opportunity for the city to influence global policies and initiatives.

### G20

The G20 is a key international forum that started in 1999 after the Asian financial crisis. Initially, it was a meeting point for finance ministers and central bank heads, but it has grown to tackle broader global economic and financial challenges. Comprising nineteen of the world's largest economies and the European Union, and now including the African Union since 2023, the G20 represents a significant share of the global economy, trade, and population. Over time, its scope has broadened beyond macroeconomic policies to include pressing global issues like climate change<sup>1</sup>.

While economic and financial cooperation is the core of each summit, the G20 now recurrently engages with topics like the future of labor, climate, and health. The G20's role shifted post the global financial crisis from immediate crisis response to addressing long-term challenges. However, recent summits have seen more difficulty in reaching consensus as differences between developed and emerging economies become more pronounced.

The G20's organizational structure is unique due to its lack of a permanent secretariat. Instead, it operates with a rotating presidency that, along with the preceding and upcoming presidencies, forms a Troika to maintain continuity. The work is divided into two main tracks: the Sherpa Track, led by foreign ministers and dealing with socio-economic issues, and the Finance Track, managed by economic ministries focusing on monetary policy.

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<sup>1</sup> Council on Foreign relations, "What Does the G20 Do?," *Council on Foreign Relations*, 11 Oct. 2023, <https://www.cfr.org/backgrounder/what-does-g20-do#chapter-title-0-7>.

## Sherpa Track

The Sherpa Track is led by the personal emissaries of G20 leaders, and oversee negotiations, discuss the points that form the summit's agenda and coordinate most of the work. The sherpa appointed by the Brazilian government is Ambassador Maurício Lyrio, Secretary of Economic and Financial Affairs at the Ministry of Foreign Affairs (Itamaraty).

The Sherpas are an ethnic group from the mountainous region of Nepal, which in Tibetan means "people from the East". It is they who guide the climbers who aim to reach the top of Mount Everest. Without their skills, it would be almost impossible to reach the summit. In the G20, the Sherpas are the leaders of each country who take the discussions and agreements to the final summit with Heads of State and Government. The Sherpa Track is made up of 15 working groups, two task forces and an Initiative.

## Finance Track

The Finance Track deals with strategic macroeconomic issues and is led by member countries' Finance ministers and central bank heads. The coordinator of the Finance Track is economist and diplomat Tatiana Rosito, Secretary of International Affairs at the Ministry of Finance. There are seven technical groups in the Finance Track, as well as three Task Forces.

## U20

The U20, as a G20 Engagement Group, unites cities from G20 nations to impact the debates of national leaders within the G20 context. Its objective is to ensure persistent engagement between the G20 and urban areas, enhance the significance of urban topics on the G20 platform, and create a unified urban front to contribute substantially to G20 talks.

Initiated in 2017 by Buenos Aires' Mayor Larreta and Paris' Mayor Hidalgo, the U20 brings together mayors of significant G20 cities to influence the dialogue at the G20. This initiative strives to foster enduring partnerships between the G20 and urban communities, highlight urban matters within the G20's discourse, and create a collaborative environment for city leaders to contribute meaningfully to G20 negotiations<sup>2</sup>.

Represented by their mayors and a principal city official, each city involved in the U20 process contributes to the creation of the Urban 20 Communiqué, which is presented to the G20 Presidency and Heads of State during the annual U20 Summit, scheduled prior to the G20 Leaders' Summit<sup>3</sup>.

On December 1, 2023, Mayors Eduardo Paes of Rio de Janeiro and Ricardo Nunes of São Paulo assumed the co-chairmanship of the 7th U20 cycle, taking the helm of the U20 and advocating for the interests of urban populations integral to the G20's economies<sup>4</sup>.

<sup>2</sup> "Urban 20," *Urban 20*, <https://www.urban20.org/>.

<sup>3</sup> "Urban 20 Cities Met in Milan to Prepare for the U20 Summit in Tokyo," *C40*, 17 Apr. 2019, <https://www.c40.org/what-we-do/influencing-the-global-agenda/global-diplomacy-advocacy/urban-20->

<sup>4</sup> "Urban 20 Cycle to be Co-Chaired by Rio de Janeiro and São Paulo," *UCLG*, 12 Jan. 2024, <https://uclg.org/new/2024-urban-20-cycle-to-be-co-chaired-by-rio-de-janeiro-and-sao-paulo/>.

## G20 Social<sup>5</sup>

A defining feature of President Lula's administration in Brazil is the commitment to incorporating public input into the formulation of public policy, a principle that extends to the nation's international engagements. President Lula introduced the G20 Social during the 18th G20 Summit in New Delhi, India, as Brazil began its symbolic leadership of the group. The intention is to integrate a civil society dimension into the G20 framework, ensuring that societal perspectives, which have been historically neglected from the negotiation tables, are included in summit deliberations.

Reflecting the spirit of a nation characterized by diversity and plurality, the G20 Social initiative will provide a platform for the multifaceted voices, challenges, and demands of communities and non-governmental entities within the member countries, representing some of the world's most significant economies. The initiative aims to address critical global issues, including climate change, and the eradication of hunger and poverty.

The 13 engagement groups that are a part of the G20 Social are the following: C20 (civil society); T20 (think tanks); Y20 (youth); W20 (women); L20 (work); U20 (cities); B20 (business); S20 (science); Startup20 (startups); P20 (parliaments); SAI20 (supreme audit institutions); and the newest J20 (supreme courts) and O20 (oceans).

## Brazil G20 Agenda

G20 Brazil has put three main agenda priorities for the G20 dialogue in 2024:

1. *Social inclusion and the fight against hunger and poverty*
2. *Energy transition and sustainable development in its social, economic and environmental aspects*
3. *Reform of the global governance institutions.*

## Climate Finance

One of common challenges when advancing global and urban efforts against climate change addressing climate issues is lack of money. Thus, climate finance plays a crucial role in reaching the potential for meaningful impacts on sustainability and resilience. Commonly, climate finance incorporates public, private, bilateral, and multilateral sources to fund initiatives combating climate change. Public funds, such as those from the Climate Investment Funds (CIFs),<sup>6</sup> play a pivotal role in attracting private sector investment toward renewable energy and sustainable development. Multilateral Development Banks (MDBs) and dedicated climate funds like the Green Climate Fund (GCF)<sup>7</sup> are also instrumental in channeling finance toward climate change projects, particularly in developing countries, balancing efforts between mitigation and adaptation. Other funds to service climate-based solutions such as the Loss and

<sup>5</sup> "G20 Social," *G20 Brasil 2024*, <https://www.g20.org/en/g20-social>.

<sup>6</sup> "Climate Investment Funds," <https://www.cif.org/>.

<sup>7</sup> "Green Climate Fund," <https://www.greenclimate.fund/>.

Damage Fund, which was recently unveiled at COP, exist.<sup>8</sup> This fund intends to provide financial assistance for losses or ongoing damages that occur from climate change related actions. That financial assistance includes insurance options, investing in adaptive and resilience-based projects, technology transfers, research, and capacity building. Finally, sovereign green bonds represent a method by which governments secure funds for environmental projects, offering an investment avenue that returns the principal with interest after a set period.<sup>9</sup>

One example of International Climate Finance Investment among cities is the C40 Cities Finance Facility (CFF) 10, which supports cities in accessing the funds necessary for green infrastructure, emphasizing sustainable development and emissions reduction. The CFF's mission underscores the importance of both environmental sustainability and social equity, ensuring that green benefits reach all community members, especially those most vulnerable to climate impacts. Investments facilitated by the CFF in sustainable urban infrastructure like green buildings, renewable energy, and sustainable transport contribute significantly to urban sustainability and emissions reduction, aligning with global climate goals.

## 04 Literature Review

As the report centers around the recognition of cities' participation in global forums like G20, desk research is conducted to better understand the evolutionary roles of cities in global governance, with a specific focus on G20, U20 and urban climate policies in the recent decades. By understanding the historical challenges cities face in influencing global governance, the research aims to shed light on how Rio can more effectively engage in the global space and promote its own urban climate policies in the context of Brazil's G20.

### 1. Cities in Global Governance

#### 1.1 City Challenges in Global Governance

Historically, cities have been marginalized in the realm of global governance, grappling with issues of representation, scale, and alignment with national policies. The traditional view of cities as mere subnational entities is rooted in the European concept of state-centric international relations, leading to a neglect of cities' potential contributions to global challenges by federal governments<sup>11</sup>. However, modern

<sup>8</sup> "Fund for Responding to Loss and Damages," *United Nations*, <https://unfccc.int/loss-and-damage-fund-joint-interim-secretariat>.

<sup>9</sup> "What is Climate Finance and Why Do We Need More of It?," *United Nations Climate Promise*, 2 Oct. 2023, <https://climatepromise.undp.org/news-and-stories/what-climate-finance-and-why-do-we-need-more-it>.

<sup>10</sup> "Addressing Climate Change in Cities Across the World," *C40 Cities Finance Facility*, <https://c40cff.org/about>.

<sup>11</sup> Curtis, Simon. "Global Cities in the International System: A New Era of Governance," *The Chicago Council on Global Affairs*, 28 Nov. 2018, <https://globalaffairs.org/commentary-and-analysis/blogs/global-cities-international-system-new-era-governance>.

global cities possess significant capabilities, including economic strength through urban agglomeration, social influence through civic engagement, and the ability to lead and connect transnational networks<sup>12</sup>.

Furthermore, cities often find themselves at a structural disadvantage on the global stage and within international law. The prevailing international political and legal frameworks, such as the United Nations, are designed with the nation-state as the primary actor, leaving cities without an official role in global decision-making processes<sup>13</sup>.

The political landscape further complicates the role of cities, as their values often diverge from those of national governments. Cities tend to champion international openness, cosmopolitanism, and liberal values, which can clash with the recent global trends of authoritarianism, populist nationalism, and economic protectionism<sup>14</sup>. This divergence can lead to tensions and political instability, highlighting the potential of cities to influence both national and international agendas.

Despite these challenges, cities have been increasingly assertive and visible in international affairs, driven by their economic significance, centrality to global crises, and appeal to local communities. However, their influence is hampered by a lack of capacity, expertise, and funding. City leaders need to develop more internationally oriented personnel and convince taxpayers of the benefits of global engagement. Furthermore, financial constraints due to limited fiscal autonomy pose a significant obstacle to effective city diplomacy, necessitating innovative solutions to enhance cities' roles as global actors<sup>15</sup>.

## 1.2 Increasing Participation of Cities in Global Governance

While cities have historically faced challenges of representing and aligning themselves with national policies, they are gradually finding new ways to amplify their influence through various strategies:

### 1. Networks and Alliances:

Cities are forming alliances like C40 Cities and United Cities and Local Governments<sup>16</sup> (UCLG) to collaborate, share best practices, and advocate collectively on global platforms, engaging in "glocal" diplomacy.

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<sup>12</sup> Swiney, Chrystie. "The Urbanization of International Law and International Relations: The Rising Soft Power of Cities in Global Governance," *Michigan Journal of International Law*, 2020, <https://repository.law.umich.edu/cgi/viewcontent.cgi?article=2089&context=mjil>.

<sup>13</sup> Swiney, Chrystie and Foster, Sheila. "Cities Are Rising in Influence and Power on the Global Stage," *Bloomberg*, 15 Apr. 2019, <https://www.bloomberg.com/news/articles/2019-04-15/denied-by-united-nations-cities-make-global-pacts>.

<sup>14</sup> "Cities as Global Actors: Bringing Governance Closer to the People," *Finnish Institute of International Affairs*, 2 Feb. 2023, <https://www.fiaa.fi/en/publication/cities-as-global-actors>.

<sup>15</sup> Muggah, Robert. "Look to Cities, Not Nation-States, to Solve Our Biggest Challenges," *World Economic Forum*, 23 Jan. 2020, <https://www.weforum.org/agenda/2020/01/cities-mayors-not-nation-states-challenges-climate/>.

<sup>16</sup> "United Cities and Local Governments," <https://uclg.org>.

## 2. Participation in International Forums:

By engaging in international organizations and conferences, cities can present their perspectives, align local actions with global standards, and influence international policy-making. In forums like the UN's urban-focused programs<sup>17</sup> and the World Urban Forum<sup>18</sup>, cities contribute to policy discussions, and ensure their interests and challenges are being addressed..

## 3. City Diplomacy:

Establishing global relationships through initiatives like sister city programs and cultural exchanges enhances cities' international profiles and facilitates collaborative problem-solving. For example, New York City has established a worldwide relationship as a catalyst of city-to-city diplomacy.<sup>19</sup>

## 4. Innovation Leadership:

As innovators, cities can influence global urban policy by showcasing effective governance and sustainability practices, becoming role models for urban development. By utilizing platforms like COP 28 local climate action summit<sup>20</sup> Rio can showcase its innovations and successes in urban management and sustainability, therefore enhancing its reputation as an innovation hub and also encouraging a shift towards more sustainable urban development practices.<sup>21</sup> In addition, individual contributions, particularly those from influential figures such as the former mayor of New York City, who has increased his commitment to supporting cities in reducing emissions to over \$650 million, significantly underscores the role of city-level officials in driving global urban policy and sustainability efforts.<sup>22</sup> In conclusion, the synergy between individual leadership, like that of Michael Bloomberg, and the collective city platform provide strong catalysts for advancing urban innovation and sustainability.

## 5. Utilizing International Law:

Cities can harness the language of international law, especially in the domains of human rights and environmental law, to advance their agendas. Cities can employ instruments such as resolutions, declarations, and voluntary commitments that resemble state-made international law. This practice,

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<sup>17</sup> “United Nations Habitat,” <https://unhabitat.org/>.

<sup>18</sup> “World Urban Forum: The Premier Global Conference on Sustainable Urbanization,” <https://wuf.unhabitat.org>.

<sup>19</sup> “In a Multipolar World, Cities Have a Significant Diplomatic Role to Play,” *NCL*, 12 Sep. 2023, <https://www.nlc.org/article/2023/09/12/in-a-multipolar-world-cities-have-a-significant-diplomatic-role-to-play/>.

<sup>20</sup> “COP28 Local Climate Action Summit,” *Bloomberg*, <https://www.bloomberg.org/cop28-local-climate-action-summit/#:~:text=The%20COP28%20Local%20Climate%20Action,and%20faster%20on%20climate%20progress>.

<sup>21</sup> Swiney, Chrystie. “The Urbanization of International Law and International Relations: The Rising Soft Power of Cities in Global Governance,” *Michigan Journal of International Law*, 2020, <https://repository.law.umich.edu/cgi/viewcontent.cgi?article=2089&context=mjil>.

<sup>22</sup> “Michael R. Bloomberg Recommits Support for Local Climate Leadership Around the World,” *Bloomberg*, 1 Dec. 2023, <https://www.bloomberg.org/press/michael-r-bloomberg-recommits-support-for-local-climate-leadership-around-the-world/>.

referred to as "global law," enables cities to set their regulatory frameworks and standards, contributing to the global governance landscape.<sup>23</sup>

Together, these strategies demonstrate cities' evolving role as proactive contributors to global governance and leverage their unique assets to amplify their voices.

## 2. G20 and U20 Historical Research

### 2.1 Historical Overview of Cities in the G20 Process

Over the years, the G20 has increasingly recognized the importance of urban issues within its agenda, reflecting a global acknowledgment of the critical role cities play. Initially, the focus was on addressing the challenges of rapid urbanization, with an emphasis on sustainable urban mass transport projects. This perspective broadened to include a more comprehensive view of urban infrastructure, encompassing the development of resources and tools to support city planning and public-private partnerships. By 2021, the G20's commitment had expanded further to embrace a holistic approach to urban sustainability, integrating concepts such as the circular economy, resource efficiency, and inclusive urban planning. The agenda highlighted the significance of cities in achieving sustainable development goals, advocating for comprehensive strategies to enhance urban resilience, sustainability, and equitable development. This progression underscores a significant shift towards integrating urban-centric policies and frameworks within the G20, demonstrating a nuanced understanding of the complexities of urbanization and its implications for global policymaking.

In addition to the incorporation of urban issues in the G20 declaration, the participation of cities in the G20 is also noteworthy. Although host cities are primarily responsible for the operational and logistical aspects of the G20, some cases still reveal cities' participation in the G20. For example, Hangzhou, known as the birthplace of China's e-commerce and home to the largest e-commerce company, Alibaba, witnessed an increased mention of e-commerce and the digital economy in the 2016 G20 declaration.

Furthermore, evidence suggests that the G20 has influenced urban policies in cities from various perspectives. For instance, Indonesia has made significant strides in its urban policies toward renewable energy and sustainable practices, especially in transitioning to renewable energy sources within cities. This shift has influenced urban planning and policy, promoting the development of green cities and sustainable urban environments<sup>24</sup>. In terms of infrastructure, Hangzhou implemented policies to consolidate the outcomes of the G20, such as upgrading city roads and improving the level of civilization in construction site construction, according to municipal policy documents.

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<sup>23</sup> Swiney, Chrystie. "The Urbanization of International Law and International Relations: The Rising Soft Power of Cities in Global Governance," *Michigan Journal of International Law*, 2020, <https://repository.law.umich.edu/cgi/viewcontent.cgi?article=2089&context=mjil>.

<sup>24</sup> Ali, Hapzi and Saputra, Farhan. "The Impact of Indonesia's Economic and Political Policy Regarding Participation in Various International Forums: G20 Forum (Literature Review of Financial Management)," *Journal of Accounting and Finance Management*, Mar. 2021, <https://dinastires.org/JAFM/article/view/50>.

## 2.2 Evolution of Urban Climate Policy within the G20 Framework

Tracing the evolution of urban climate policies in G20 declarations over the years reveals a progression through three distinct phases.

From 2008 to 2011, climate discussions within the G20 framework were relatively less emphasized, with a primary focus on energy security and only a broad mention of climate change. The years 2008 and 2010 saw minimal attention to climate change, with a stronger emphasis on energy security. However, a significant shift occurred in 2011 as climate change was addressed explicitly, highlighting commitments to international cooperation and finance mobilization, marking the beginning of a more structured engagement with climate issues.

During the period of 2012 to 2016, there was a noticeable strengthening of commitments and frameworks. G20 nations emphasized the need for a structural transformation of economies toward a climate-friendly trajectory. There was a clear acknowledgment of the economic implications of climate change and a commitment to implementing the outcomes of major conferences like Cancun and Durban. Additionally, climate finance gained prominence in G20 discussions, with multiple financial supports being proposed.

After 2017, the focus shifted to urgent climate actions and the implementation of the Paris Agreement. Despite the withdrawal of the USA from the Paris Agreement in 2017, other G20 members reaffirmed their commitment to it. The emphasis was on mobilizing finance, enhancing Nationally Determined Contributions (NDCs), and implementing long-term strategies to achieve global net-zero emissions by mid-century. By 2023, there was a clear urgency to accelerate actions, with a focus on aligning efforts with scientific findings and enhancing international cooperation and support for developing countries.

In conclusion, the G20's engagement with climate policy has become more "diagnostic", evolving from broad declarations to more targeted and actionable commitments, underscoring critical issues such as international agreements, climate finance, and green actions. However, although the G20 has increased the coverage of sectoral policies, there are still some policy gaps. A study details the adoption of policies across different sectors, highlighting that while energy efficiency and renewable energy policies are prevalent, there are significant gaps, especially in policies aimed at phasing out coal and oil, reducing industrial process emissions, and promoting renewable energy in buildings<sup>25</sup>.

## 2.3 Urban Climate Policies among G20 Cities

The C40 network, consisting of nearly 100 mayors from major cities globally, is committed to addressing the climate crisis collaboratively. Introduced in 2016, the C40 Good Practice Guides offer practical solutions for urban policymakers and mayors to combat climate change, mitigate risks, and promote sustainable development. With 18 of the 20 G20 nations represented in C40 (excluding Saudi Arabia and Russia), these guides are valuable resources for comparing global cities' contributions to urban climate policies within the G20 framework, showcasing best practices and lessons learned.

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<sup>25</sup> Hoicka, Christina, Rhodes, Ekaterina, and Scott. William. "Multi-level Climate Governance: Examining Impacts and Interactions Between National and Sub-national Emissions Mitigation Policy Mixes in Canada," *Ideas*, 2023, <https://ideas.repec.org/a/taf/taf/v23y2023i8p1004-1018.html>.



The guides feature 100 real-life examples of successful projects and approaches in C40 member cities. This research focuses on three sectors identified as priorities in Brazil: addressing the urban heat island effect, decarbonizing buildings, and enhancing transportation systems.

#### For building surface cooling, strategies include:

- Presenting a compelling business case to property owners, as in London's "Greening the BIDs" project.
- Integrating cool options into larger infrastructure projects, like Tokyo's Thermal-barrier Coating and Water-retentive Pavement Program.
- Promoting public awareness and support, such as Melbourne's Growing Green Guide.
- Identifying cooling co-benefits and aligning them with related projects, as seen in New York's NYC °CoolRoofs Programme.
- Offering incentives for cool solutions, like Toronto's Eco-Roof Incentive Programme.
- Developing legislation for cool components, as in Tokyo's Nature Conservation Ordinance.

#### To decarbonize buildings, strategies include:

- Evaluating initial energy performance and monitoring advancements, as in Houston's open energy performance data for municipal buildings.
- Establishing clear objectives in an Energy Efficiency Strategy, akin to Hong Kong's Energy Saving Plan 2015-2025+.
- Implementing rigorous energy efficiency standards for municipal buildings, exemplified by Washington D.C.'s Green Code.
- Showcasing novel technologies to stimulate energy efficiency markets, as in the Wuhan New Energy Research Institute.
- Conducting tailored training sessions and awareness campaigns, like Cape Town's efforts.

In urban transportation, Brazil's Bus Rapid Transit (BRT) systems, such as Rio's TransOeste corridor, have reduced travel times and improved liveability, mobility, and sustainability. With four BRT lines opened by 2016, over 150 km of exclusive corridors are projected to serve two million passengers daily. Success factors include phased implementation, user surveys for feedback, and strategic location selection for intermodal stations, especially near high-demand areas like the 2016 Olympic sites. Leveraging the G20 platform could allow Brazil to further expand its BRT success and share best practices with other global cities.

## 2.4 Interaction between U20 and G20

The Urban 20 (U20) was established in 2018 to create a platform for the mayors of major G20 cities and other global urban centers to inform and enrich the discussions of national leaders. It publishes a Communiqué every year to the host of the G20, aiming to enhance the role of cities in global governance. However, the content has not yet been reflected in the G20 declarations.

### U20 Summits (2018-2023):

- 2018: Buenos Aires and Paris co-chair the inaugural U20 cycle, with the summit held in Buenos Aires.
- 2019: Tokyo hosts the second U20 Summit, focusing on climate initiatives, social equality, and sustainable development.
- 2020: Riyadh hosts virtual U20 Summit, with leaders endorsing collaboration with G20 for a resilient recovery.
- 2021: Milan and Rome co-chair U20 Summit, emphasizing cities' role in addressing global challenges.
- 2022: Jakarta chairs U20 Summit, highlighting Global South participation and inequality issues.
- 2023: Ahmedabad hosts U20 Summit, emphasizing urban climate action and multilateral bank reform, with a focus on translating intentions into actions aligned with India's G20 theme of 'One Earth, One Family, One Future'.

Over the years, we see a closer collaboration between U20 and G20, particularly in the areas of climate and environment. The number of cities signing the Communiqué has increased over years, demanding G20 leaders to take more concrete actions like multilateral bank reforms. In 2023, the G20 declaration included a chapter on "Financing Cities of Tomorrow," outlining principles for effective and efficient use of financial resources to support urban development that is socially inclusive, environmentally responsible, and economically feasible.





### 3. Key Insights from Literature Review

The literature review provides a holistic overview of cities' involvement in global governance. Despite historical marginalization, cities are emerging as influential players on the world stage. They possess economic strength, engage in civic participation and lead in transnational networks, yet face structural challenges within an international system designed for nation-states. To counter these limitations and grow their influence, cities are increasingly forming strategic networks, actively participating in international forums, fostering city diplomacy through sister cities and cultural exchanges, and showcasing innovative practices in urban policy.

As one of the most influential international forums, G20 has long acknowledged urban issues, evolving from a focus on sustainable urban transport to a comprehensive perspective on urban sustainability that includes circular economy and inclusive planning. The role of cities in the G20 has become more and more significant, exemplified by Hangzhou's influence on e-commerce discussions in the 2016 declaration. Moreover, city engagement in urban climate policy has transitioned from general proclamations to specific, actionable commitments. The C40 network's urban climate policy guides exemplify this trend, featuring successful case studies like Brazil's BRT systems in building cooling, carbon reduction, and transportation. Despite this progress, the U20's goal to bolster cities' influence in global governance, symbolized by annual Communiqués to the G20, has yet to be fully realized in G20 declarations. Nevertheless, the U20 Summits from 2018 to 2023 show an escalating synergy between cities and the G20, culminating in the 2023 G20 declaration's new focus on "Financing Cities of Tomorrow," which champions urban development that is socially inclusive, environmentally sustainable, and economically viable.

Although collaboration between G20 and U20 has intensified, continued efforts are essential to ensure urban issues are more prominently addressed within the G20 agenda.

Building upon the initial research, the group further conducted 25 interviews with key stakeholders involved in the U20 and G20 events to gain insights regarding the challenges and opportunities Rio currently faces as it wishes to leverage the U20 and G20 platforms for advancing urban climate policy. By synthesizing the inputs, the team has identified four main challenges that hinders the effectiveness and influence of Rio in advancing urban climate policies locally and nationally. Each section below will detail the findings.

## 5.1 Economic/Financial Challenges

### a. Lack of Funding Sources

Rio faces many issues with securing international funding for various investment opportunities. Our interview showed the primary financing issues with the city come down to four categories:

1. Lack of scale in climate adaptation projects
2. Limited access to international credit markets due to low credit ratings
3. Lack of multi level governmental coordination
4. Lack of access to finance through Multilateral Development Banks (MDBs)

First, with cities already facing adverse impacts from climate change, there's an imbalance in climate adaptive investment with up to 20% of finance allocated to adaptation projects. By already facing climate implications, cities often adapt to their existing scenarios by investing in mitigation technologies, such as improved drainage systems to mitigate existing flooding. Interviewees emphasized the city's needs for more support for adaptation, which includes technical assistance, innovative financial modeling, and support from multiple organizations.

Second, Rio has difficulty reaching international markets due to a discrepancy between the city and country credit ratings. The city has a Long-Term Foreign Currency and Local Currency Issuer Default Rating of a B+.<sup>26</sup> Differently, the country's rating is a B.<sup>27</sup> These ratings are crucial for international and domestic investors in evaluating the risk of default, potential returns, and numerous other aspects of financial investment. Because the country has a lower credit rating than the city, some international investors are dissuaded from investing in potential projects in the city. As a result, many projects require more localized funding or internationally financed projects from neighboring countries which rarely occurs. Last, when projects are able to secure international financing, the lower credit rating often results

<sup>26</sup> "Fitch Affirms City of Rio de Janeiro at 'B+'; Outlook Revised to Positive," *Fitch Ratings*, 16 Aug. 2023, <https://www.fitchratings.com/research/international-public-finance/fitch-affirms-city-of-rio-de-janeiro-at-b-outlook-revised-to-positive-16-08-2023>.

<sup>27</sup> "Brazil Long-Term Ratings Upgraded to 'BB' from 'BB-' Following Tax Reform Approval; Outlook Stable," *S&P Global Ratings*, 19 Dec. 2023, <https://disclosure.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3104158>.

in higher interest rates which, depending on the project, can make operating projects incredibly difficult and financially challenging - some developers will avoid these projects altogether.

Third, the lack of multi-level governmental coordination implies a lack of locally backed government funds intended to develop projects or initiatives. Often, government provided incentives for private sector projects are the only way some projects can exist due to difficult economic or regulatory conditions. For example, New York State is leading the United States in energy battery storage system implementation only because of generous financial incentives from the state's energy regulatory.<sup>28</sup> In fact, the U20 Mayors' Summit Report from the 2020 Saudi Arabia Summit suggests creating a city-led Global Urban Resilience Fund to support both short-term emergency interventions and long-term resilience-building investments in public infrastructure are apt goals or approaches for cities trying to maximize their investment potential.<sup>29</sup> Unfortunately, Rio doesn't provide enough multi-level governmental coordination to support resilience-building investments. Nonetheless, implementing an innovative structure like the Fund would benefit the city.

Fourth, cities often lack the ability to borrow directly from Multilateral Development Banks (MDBs) as these institutions typically develop investment projects that align with national government priorities, frequently excluding urban areas from significant funding opportunities. The prevailing project-focused financing model subnational institutions currently employ also presents a major challenge, since this model generally favors large-scale infrastructure projects, meaning smaller urban investments often do not meet the funding thresholds. Furthermore, the requirement for sovereign guarantees poses another hurdle, especially in contexts where there is political tension between national and local governments.<sup>30</sup> This situation complicates the ability of smaller and medium-sized cities to secure MDB financing, especially when such financing is denominated in hard currencies, which can pose significant currency risks and make the transaction costs prohibitively high.<sup>31</sup>

## **b. Lack of Awareness and Incentives for private sector participation (PPP)**

One of the popular funding models for urban climate policies is public-private partnerships (PPPs). In Rio, there are few PPPs in action like PPP PROPAR-RIO (a municipal program for public private partnerships in Rio), a PPP used in the process of smart city in Rio for the creation of COR (the municipal operations

<sup>28</sup> "Incentive Dashboard," *NYSERDA*, <https://www.nysenda.ny.gov/All-Programs/Energy-Storage-Program/Developers-and-Contractors/Retail-Incentive-Offer/Incentive-Dashboard>.

<sup>29</sup> "Urban 20 Summit - Riyadh," *U20*, <https://www.urban20.org/u20summit/2020-riyadh/>.

<sup>30</sup> Abigail, Mar-Len, Binay, Abby, and Lopez, Claudia. "Opinion: Why MDB Financing is Critical for Cities' Climate Action Plans," *DevEx*, 27 Oct. 2023, <https://www.devex.com/news/opinion-why-mdb-financing-is-critical-for-cities-climate-action-plans-106404>.

<sup>31</sup> Bagnera, Elena and Negreiros, Priscilla. "Blog: Urban Climate Finance is a Low-Hanging Fruit of MDB Reform," *Climate Policy Initiative*, 28 Feb. 2024, <https://www.climatepolicyinitiative.org/blog-urban-climate-finance-is-a-low-hanging-fruit-of-mdb-reform/#:~:text=Multilateral%20development%20banks%20play%20a,environments%20for%20city%20climate%20projects>.

Center) which uses real time analytics providing information regarding traffic, public transport, weather, energy services, among other administrative public services, but much more is desired as the embedded problems remain unaddressed.

While being aware of the potential of PPPs in fulfilling the vast capital needs for climate adaptation, Rio is not fully engaging with this funding source. This could be the result of the weaker relationship with the private sector on the climate agenda. As suggested by the interviews, the private sector doesn't feel a strong environmental and social responsibility for the climate agenda. Additionally, the private sector doesn't have a strong relationship with Rio because its headquarters are mostly located in Sao Paulo. They don't have strong motivation to engage in PPPs. As a result, the adoption of Public-Private Partnerships (PPPs) in Rio for urban climate projects is still in its infancy.

### **c. Lack of Human Capital**

Despite Rio's solid reputation for hosting significant events like the Rio Summit and the Olympics, the city still faces challenges in implementing concrete actions to follow its economic strategy. One of the factors, according to our interviewees, is that human capitals are still insufficient to achieve them.

Our interviews demonstrated the importance of education within human capital. Strong educational institutions able to domestically and locally educate their population with the intention of them joining the local, high-skilled workforce has become more and more important. Many young people in Rio are struggling to find suitable opportunities, highlighting a disconnect between the universities and the local labor market. Global cities such as New York, California's Bay Area, London, Singapore, and Beijing have a close and beneficial interaction between universities and economic development. Unfortunately, Rio overall doesn't have this streamlined educational pathway like many other cities. Rio's top-rated university, Universidade Federal do Rio de Janeiro, is ranked 333 globally and, besides the Pontificia Universidade Católica do Rio de Janeiro, they don't have another university within the global top thousand.<sup>32</sup> Importantly, it's not to say these universities aren't effective educational institutions - the Universidade Federal do Rio de Janeiro is the third highest-ranked university in Brazil and the seventh in Latin America as of 2018<sup>33</sup>. However, there are not many options that are competitive on the global market and these opportunities are challenging to gain admission to.

Furthermore, the communication gap between universities and the private sectors hinders the city's ability to harness its human resources effectively. Despite producing a significant number of professionals, like lawyers, there's a shortfall in training professionals crucial for economic growth, such as engineering and AI. The constraints on universities accepting funds from the private sector further exacerbate this issue, preventing the creation of a workforce aligned with the city's economic needs and stifling potential growth and innovation.

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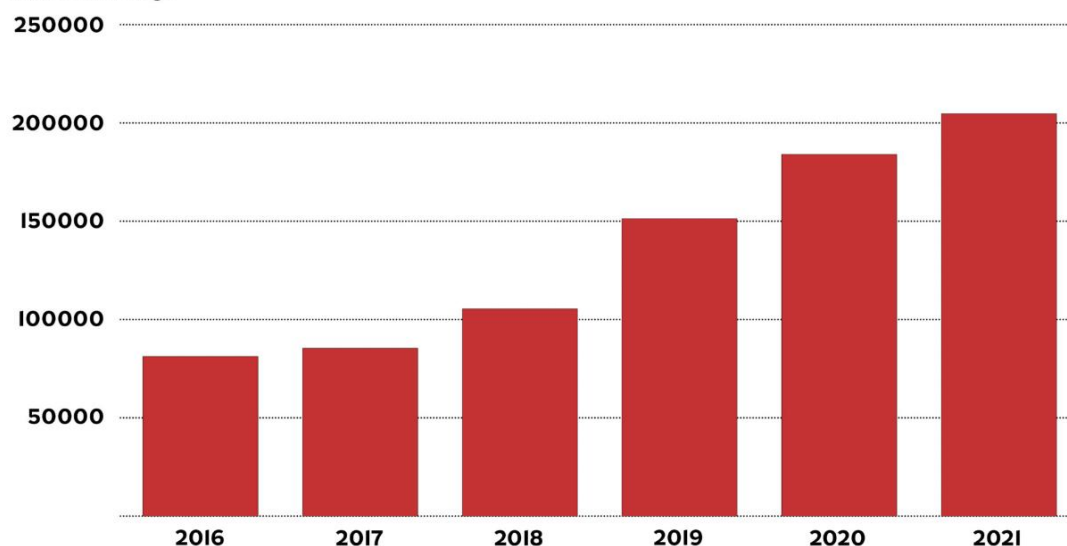
<sup>32</sup> "Universities in Rio de Janeiro - Rankings & Reviews," *UniversityGuru*, [https://www.universityguru.com/universities-rio-de-janeiro#google\\_vignette](https://www.universityguru.com/universities-rio-de-janeiro#google_vignette).

<sup>33</sup> "Universidade Federal do Rio de Janeiro," <https://ufrj.br/en/>.

Moreover, regardless of students being educated within or outside Brazil, job opportunities outside of Rio and Brazil are more attractive. Students studying outside of Brazil often have a clearer opportunity to work in the country they studied in through some visa options. Even for non-international students, our interviews revealed a more streamlined process for Brazilian citizens to gain access to a Portuguese passport, which opens them up to the European Union market. There's been an increasing trend of Brazilians moving to Portugal, even during the pandemic. Many of these Brazilians are high-skilled laborers seeking other opportunities abroad.

## **AQ** A record number of Brazilians are moving to Portugal

Brazilians registered as residents in Portugal



Source: Portuguese Serviço de Estrangeiros e Fronteiras (SEF)

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### **d. Over Reliance on the Oil Industry and the Dutch Disease**

In the simplest terms, the Dutch Disease<sup>35</sup> refers to a country's acquisition of wealth typically being tied to a singular industry involving the existence of cheap and abundant natural or human resources and, for many countries, this industry is often oil. Much of Brazil is experiencing a Dutch Disease as a lot of the country's economic generation is tied up in the oil industry - this applies to both the state and city of Rio de Janeiro. As of 2022, 37.2% of the country's energy consumption comes from oil.<sup>36</sup> On top of domestic

<sup>34</sup> Stuenkel, Oliver. "Brazil's Exodus of People is a Bad Omen," *Americas Quarterly*, 30 Aug. 2023, <https://americasquarterly.org/article/brazils-intensifying-brain-drain-is-a-bad-omen/#:~:text=In%202021%2C%20a%20staggering%2017,increase%20compared%20to%20last%20year.>

<sup>35</sup> Ebrahimzadeh, Christine. "Dutch Disease: Wealth Managed Unwisely," *International Monetary Fund*, <https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Dutch-Disease>.

<sup>36</sup> "Energy System of Brazil," *International Energy Agency*, <https://www.iea.org/countries/brazil>.

oil consumption, the country is the fifth largest exporter of oil in the world.<sup>37</sup> With the Dutch Disease, it's not to say there aren't other economic generation opportunities for Brazil - in fact, there are many. However, the oil industry provides a major economic importance.

Our interviews highlighted the importance of the Dutch Disease in Brazil and Rio. With the oil industry's large share of their economy, our interviewee argues more risky industries cannot capture the investments they need as oil investments often get prioritized. In turn, the expansion of other industries is hindered by the oil industry's economic vitality. This economic status is essential in considering the climate goals of both the city and the country. Many of the goals from Rio coming out of the G20 Summit involve facilitating climate finance and combating the climate crisis. To accomplish this, the country and Rio need to distance themselves from the grasp of the oil industry and facilitate long-term climate investment.

Divesting from the oil industry is challenging but not impossible. One method of divestment while spurring economic production is through investing in renewable energy sources. Other methods can include projects towards energy efficiency which will require less energy production or consumption and, in turn, reduce the demand for oil. Generally, natural divestment from the oil industry and a push towards renewables will modify oil producers' activities with companies seeking survival and economic success - if the market becomes against oil consumption, oil producers will likely modify or go out of business<sup>38</sup> Ultimately, Rio and Brazil can begin distancing themselves from the oil industry through climate-positive investments and initiatives but this process will take time. The market will follow their positive actions.

## 5.2 Technological Challenges

### a. Lack of Green Technology in Brazil

The interviews underscored a notable technological gap between the Global North and South, as highlighted in UNCTAD's<sup>39</sup> 2023 technology and innovation report. The report revealed a substantial increase in exports of green technologies from the industrialized North, nearly tripling from \$60 billion in 2018 to over \$156 billion in 2021. In contrast, exports from the Global South saw a more modest rise, climbing from \$57 billion to \$75 billion during the same period.<sup>40</sup>

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<sup>37</sup> "Brazil - Country Commercial Guide," *International Trade Administration*, <https://www.trade.gov/country-commercial-guides/brazil-oil-and-gas#:~:text=By%202030%2C%20Brazil%20is%20expected,burn%2C%20and%20E%26P%20consumption>).

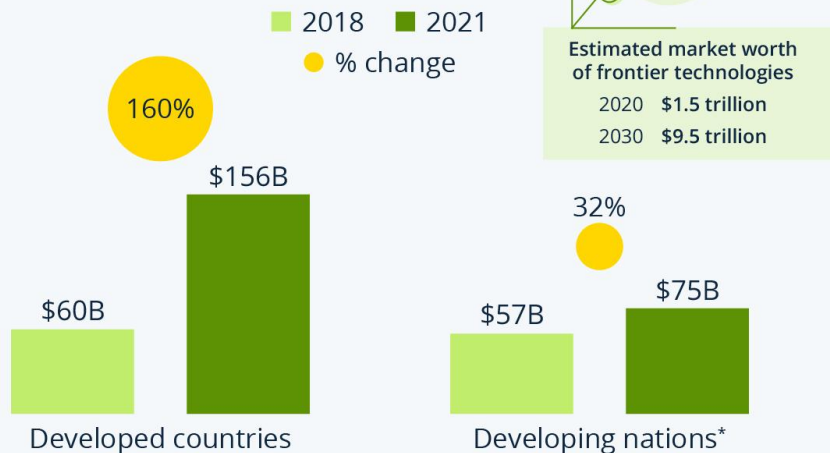
<sup>38</sup> "BP Agrees to Take Full Ownership of Lightsource BP," *BP*, 30 Nov. 2023, <https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-agrees-to-take-full-ownership-of-lightsource-bp.html>.

<sup>39</sup> UNCTAD is the United Nations Agency for Trade and Development.

<sup>40</sup> "Technology and Innovation Report," *United Nations Agency for Trade and Development*, 2023, <https://unctad.org/tir2023>.

## Global South Is Already Losing Ground in the Green Tech Boom

Total exports of green technologies from developed/developing nations



\* including China  
Source: UNCTAD



statista

41

UNCTAD cautioned that without active support from the international community and national governments, many developing countries, particularly in Latin America, the Caribbean, and sub-Saharan Africa, may struggle to access the benefits of lower-emission technologies. This disparity has impeded the adoption of nano-technology and nature-based solutions, as well as the development of environmentally friendly infrastructure in sectors such as waste-to-energy and hybrid vehicles. These technologies, when combined with solar and wind energy, are forecasted to reach a market value of \$2.1 trillion by 2030, highlighting the potential economic significance if addressed effectively.

### b. Low Adoption of Electric Vehicles (EVs) in Brazil's Market: Embracing Ethanol Hybrid Cars

In Brazil, while boasting the largest automotive market in Latin America, plug-in electric vehicles (EVs) still represent a meager fraction, comprising less than 2% of total annual sales.<sup>42</sup> The interview had

<sup>41</sup> Fleck, Anna. "Global South is Already Losing Ground in the Green Tech Boom," *Statista*, 21 Apr. 2023, <https://www.statista.com/chart/29790/total-exports-of-green-technologies-from-developed-and-developing-nations/>.

<sup>42</sup> "Brazil Electric Vehicle Market 2024-2030," *Mobility Foresights*, <https://mobilityforesights.com/product/brazil-electric-vehicle-market/>.

outlined several challenges in adopting EVs in Brazil, including the country's inadequate charging infrastructure. While states like Rio de Janeiro offer tax incentives, such as a 0.5% rate for battery electric vehicles (BEVs) and 1.5% for hybrid electric vehicles (HEVs), significantly lower than standard rates aiming to spur consumer interest in EVs, further investments and supportive measures are needed to boost adoption and infrastructure nationwide.<sup>43</sup> Besides, the abundance of affordable flex-fuel vehicles (FFVs) capable of running on various gasoline and ethanol blends presents a significant barrier to EV uptake, with FFV sales reaching 1.63 million units last year according to data from Brazil's National Registry of Motor Vehicles (Renavam).<sup>44</sup> Environmental worries regarding battery mineral mining persist, although Brazil primarily relies on sugarcane as ethanol feedstock. Sugarcane cultivation has contributed to deforestation, notably in vital ecosystems such as the Amazon Forest.<sup>45</sup> Government policies permitting sugarcane plantations in environmentally delicate regions like the Pantanal and the Amazon exacerbate this issue.<sup>46</sup> Consequently, flex-fuel vehicles utilizing ethanol present a significant environmental hazard. Therefore, transitioning to electric vehicles is crucial to address climate concerns effectively.

Hybrid vehicles, including Flex-fuel hybrid electric and flex-fuel plug-in hybrid models, offer a practical alternative to electric vehicles (EVs). These hybrids can utilize gasoline, E-85, or E-100 to drive the wheels alongside the electric engine or recharge the battery pack. This versatility has attracted significant investment from major automakers like Toyota, with \$2.2 billion allocated for hybrid technologies between 2023 and 2030.<sup>47</sup> This strategic move underscores the importance of hybrid solutions in addressing both environmental concerns and consumer preferences in Brazil's automotive market.

### c. Lack of Waste to Energy Technology

The inadequate disposal of Municipal Solid Waste (MSW) presents a significant environmental challenge in Brazil. Despite 93% of MSW being collected, only a fraction undergoes recycling or composting,

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<sup>43</sup> Bland, Daniel. "EVs Emerging in Brazil but Which States Offer Fiscal Incentives?," *Global Fleet*, 2023, <https://www.globalfleet.com/en/taxation-and-legislation/latin-america/features/evs-emerging-brazil-which-states-offer-fiscal-incentives?a=DBL10&t%5B0%5D=Latin%20America&t%5B1%5D=FLet%20LaTAm&t%5B2%5D=Taxation&t%5B3%5D=Electric%20Hybrid&curl=1>.

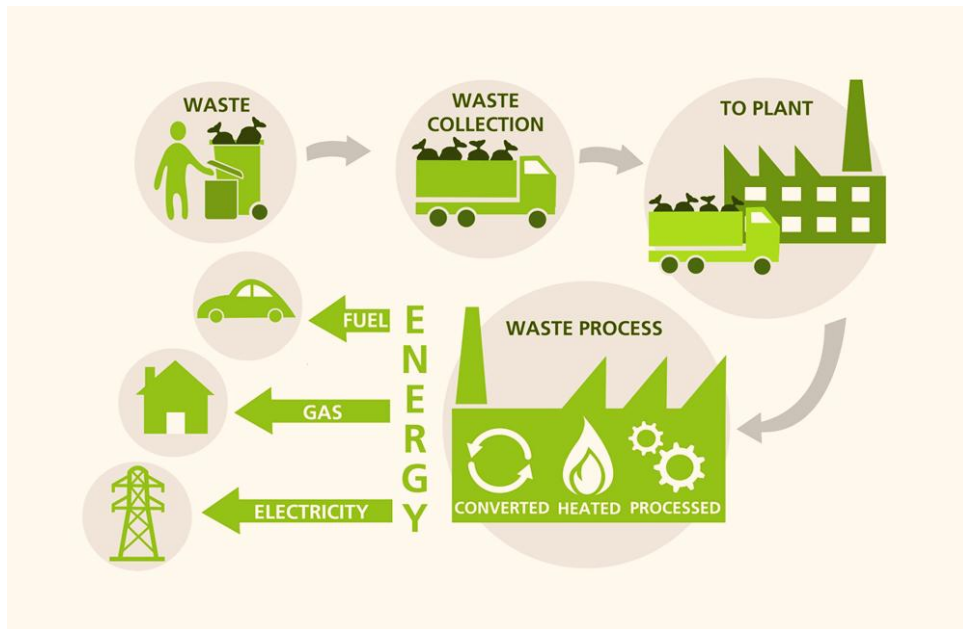
<sup>44</sup> Chapman, Alexandra. "Brazil Favours Ethanol Cars as 2024 Flex-Fuel Vehicles Continue to Overshadow EVs," *Fastmarkets*, 20 Jan. 2023, <https://www.fastmarkets.com/insights/brazil-favours-ethanol-cars-flex-fuel-vehicles-overshadow-evs/>.

<sup>45</sup> Jusys, Tomas. "A Confirmation of the Indirect Impact of Sugarcane on Deforestation in the Amazon," *Journal of Land Use Science*, 1 Mar. 2017, <https://www.tandfonline.com/doi/full/10.1080/1747423X.2017.1291766>.

<sup>46</sup> Mendelsohn, Lima et al. "Sugarcane: Brazilian Public Policies Threaten the Amazon and Pantanal Biomes," *Perspectives in Ecology and Conservation*, 2020, <https://www.perspectecolconserv.com/en-sugarcane-brazilian-public-policies-threaten-articulo-S2530064420300262>.

<sup>47</sup> Lara, Leonardo. "Toyota Ups its Bet on Hybrids in Brazil with \$2.2 Billion Plan," *The Japan Times*, 6 Mar. 2024, <https://www.japantimes.co.jp/business/2024/03/06/companies/toyota-investment-brazil-hybrid/>.

contributing to environmental degradation and climate change.<sup>48</sup> To address this issue, incineration, also known as mass burning, has emerged as a well-established technique for MSW disposal. This approach offers the advantage of recovering energy from non-biodegradable and low-moisture materials without the need for preprocessing.<sup>49</sup> Therefore, investment in the waste-to-energy sector is increasingly vital for Brazil, especially in densely populated cities like Rio, to enhance waste management strategies effectively.



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Interviews highlighted significant challenges facing waste-to-energy initiatives in Rio de Janeiro. Firstly, while waste incineration is favored over landfills for its energy potential, the construction of incineration sites is hindered by uncertainties arising from delays in crucial infrastructure projects and a lack of private investment, exacerbated by the city's financial crisis. Consequently, attracting funding for clean energy initiatives like waste-to-energy becomes increasingly difficult despite attempts to incentivize adoption.<sup>51</sup> Moreover, the lack of regulatory frameworks further complicates the situation, necessitating scalable solutions that incorporate advanced technologies to address these challenges effectively. Concerns about

<sup>48</sup> Ismail, Kamal and Lino, Fatima. "Municipal Solid Waste Treatment in Brazil: A Comprehensive Review," *Energy Nexus*, Aug. 2023, [https://www.researchgate.net/publication/373021883\\_Municipal\\_solid\\_waste\\_treatment\\_in\\_Brazil\\_A\\_comprehensive\\_review](https://www.researchgate.net/publication/373021883_Municipal_solid_waste_treatment_in_Brazil_A_comprehensive_review).

<sup>49</sup> Dadario, Natalia et al. "Waste-to-Energy Recovery from Municipal Solid Waste: Global Scenario and Prospects of Mass Burning Technology in Brazil," *Sustainability*, 17 Mar. 2023, <https://www.mdpi.com/2071-1050/15/6/5397>.

<sup>50</sup> "Waste-to-Energy Solves So Many Problems," *CM Industrial*, 27 Aug. 2020, <https://www.searchingindustrial.com/media/1075/waste-to-energy-solves-so-many-problems>.

<sup>51</sup> Mendes, Karla. "Rio de Janeiro is Burning Trash to Create Energy and Cut Emissions," *World Economic Forum*, 28 Feb. 2019, <https://www.weforum.org/agenda/2019/02/rio-de-janeiro-hits-the-gas-in-push-toward-its-zero-carbon-goal/>.

pollution from incineration further decrease community acceptance of waste-to-energy plants. While solutions like Denmark's ski slope built atop a factory demonstrate emission control,<sup>52</sup> meeting EU emission standards swiftly is challenging, especially considering the higher costs of EU/US standard factories. Given that waste-to-energy facilities are often located in economically disadvantaged areas, environmental justice concerns arise, highlighting the need to prioritize the well-being of residents, particularly those in favelas.<sup>53</sup>

Despite the obstacles discussed, interviewees emphasized the potential of waste-to-energy projects to generate eco-friendly job opportunities, fostering economic growth and providing sustainable income, especially in favela neighborhoods.<sup>54</sup> By forming city consortia equipped with efficient waste transportation systems to deliver to power plants, a viable market for waste-to-energy initiatives could be established in Rio. In conclusion, despite the challenges, waste-to-energy projects in Rio de Janeiro hold promise for fostering economic growth, environmental sustainability, and community well-being, necessitating innovative solutions to overcome existing obstacles and realize their potential.

## 5.3 Social Challenges

### a. Lack of Sufficient Communication Strategy on G20 Benefits

Conducted interviews highlighted a significant gap in understanding the G20's benefits among the local population, particularly regarding tangible advancements and economic development in their locale. They pointed out several key challenges in bridging this disconnect in Rio, including the need to overcome communication hurdles to elucidate the G20's significance for the city, mobilize civil society for broader support, ensure transparency for trust, establish a lasting beneficial impact, and enhance Rio's global positioning. Moreover, the interviewees underscored the issue of inadequate transparency concerning G20 activities. This lack of clarity hampers the local community's ability to engage with and benefit from the summit meaningfully.

### b. Lack of Targeted Climate Education

Interviewees have highlighted that in Rio, there is a broad and generalized approach to climate education, which is less effective than targeted programs. There is a need for dedicated educational efforts that cater to specific groups, recognizing their unique perspectives and needs.

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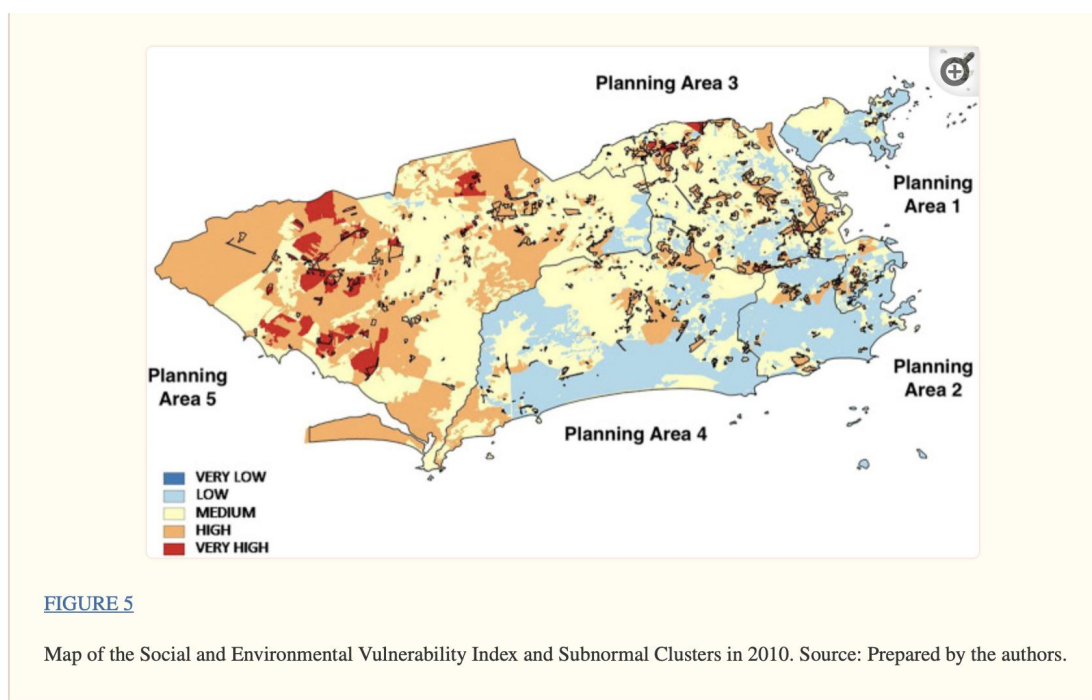
<sup>52</sup> Murray, Adrienna. "The Incinerator and the Ski Slope Tackling Waste," *BBC News*, 3 Oct. 2019, <https://www.bbc.com/news/business-49877318>.

<sup>53</sup> "Energy Justice and Efficiency in Rio de Janeiro's Favelas Series Report," *Rio on Watch*, [https://riononwatch.org/?page\\_id=55545](https://riononwatch.org/?page_id=55545).

<sup>54</sup> Araujo, Cleber. "Waste is Gold: Energy Recovery as a Solution for the Favelas," *Rio on Watch*, 4 Feb. 2021, <https://riononwatch.org/?p=63898>.

The Socio-Environmental Vulnerability Index (SEVI) study applied to Rio reveals disparities in socio-environmental vulnerabilities across different regions<sup>55</sup>. The highest SEVI values are found in favela regions and other marginalized communities, indicating that the poorest populations suffer most from the negative effects of urbanization.

Additionally, an article from RioOnWatch emphasizes the impacts of climate change on Rio's vulnerable communities, particularly in the favelas, during extreme weather events. Favela organizers, climate activists, and lawmakers have denounced the patterns of action by government authorities in the face of socio-environmental disasters, asserting that it reflects 'Environmental Racism,' a structural phenomenon. They argue that Black people and vulnerable individuals are systemically pushed into areas of environmental risk, such as steep slopes or areas close to rivers<sup>56</sup>. Therefore, they criticize the general and ineffective approach to climate education and emergency response, highlighting the necessity for targeted, community-specific strategies.



<sup>55</sup> Malta, Fernanda and da Costa, Eduarda. "Socio-Environmental Vulnerability Index: An Application to Rio de Janeiro-Brazil," *National Library of Medicine*, 29 Mar. 2021, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8565255/>.

<sup>56</sup> Tavares, Janaina. "It Isn't the Rain! What's Killing Rio de Janeiro's Favela Residents is Environmental Racism, Say #VoicesFromSocialMedia," *Rio on Watch*, 24 Jan. 2024, <https://rioonwatch.org/?p=77204>.

### c. Lack of Better Youth Engagement

One interviewee, who is actively engaged with the youth population, emphasized that "Change has to come from the youth." He highlighted the urgent need for better integration of young people into the G20 policymaking process, ensuring that their voices are heard and their concerns are addressed.

In the favela of Cidade de Deus, internationally known as the City of God, a youth-led group organized more than 10,000 food basket donations. In Santa Cruz, young people supported over 3,000 families with food and essential items<sup>57</sup>. These numbers suggest that youth organizations are surpassing the support and impact provided by local governments. Young people decided to take action when they realized that the government was either incapable or lacking the political will to help their communities. Especially as young black individuals, they deeply understand the vulnerabilities they face in their country.

### d. Lack of Established Framework for Women's Policies

Despite that Rio is currently developing programs like the "Women from Rio " which empowers women through training and support for economic autonomy, interviewees highlighted that previously there was no dedicated secretary for women's policies. This indicates a need for a more structured approach to addressing women's issues. These include economic empowerment, gender equality, and anti-violence initiatives. Marta de Araujo Pinheiro's research at Sciences Po CERI discusses the persistent gender inequalities faced by women in Brazilian contexts, such as Teresópolis, despite social transformations improving women's participation.

In Brazil, women make up 51.4% of the population and have seen increased involvement in the workforce, education, and access to information. However, gender inequalities are still pronounced, with women earning less and holding increasingly precarious jobs. Women play a fundamental yet often invisible role in household management, especially in the poorest regions, and increasingly support their families by themselves. About 40% of families have a woman "at their head," who assumes the dual responsibility of being the head of the household and taking care of the emotional and daily needs of the family nucleus<sup>58</sup>. This situation underscores the necessity of recognizing and integrating women's needs and perspectives into the policy process.

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<sup>57</sup> Calarco, Daniel. "There Can Be No New Realities in Rio's Favelas Without Youth Organisations Centre Stage," *We Are Restless*, 8 Dec. 2020, <https://wearerestless.org/2020/08/12/there-can-be-no-new-realities-in-rios-favelas-without-youth-organisations-centre-stage/>.

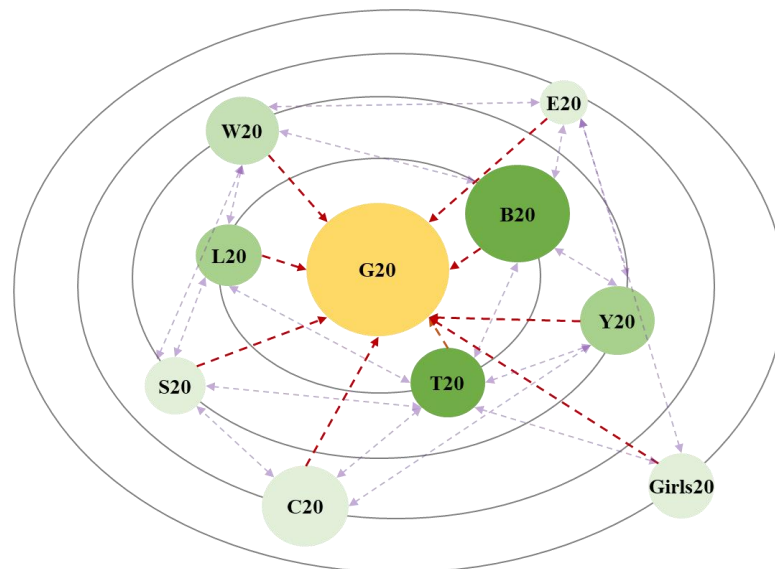
<sup>58</sup> "Women, Vulnerability, Resilience, and Natural Disasters: Interview with Marta de Araujo Pinheiro," *SciencesPo Center for International Studies*, 23 Mar. 2020, <https://www.sciencespo.fr/ceri/en/content/women-vulnerability-resilience-and-natural-disasters-interview-marta-de-araujo-pinheiro>.

## 5.4 Administrative Challenges

### a. Lack of Concrete Implementation Plan for Connectivity

Despite the U20 Summit's efforts to influence G20 policies through annual communiqués, there remains a significant gap in integrating these urban insights into the G20's actionable plans. Over the years, while the number of cities endorsing the U20 communiqués has increased, calling for more substantial actions such as multilateral bank reforms, the actual reflection of these urban issues in G20 declarations is limited. This disconnection highlights a lack of a concrete implementation plan to effectively bridge the ideas from city leaders to the global economic policies shaped by the G20.

In addition, a paper<sup>59</sup> compared the engagement groups of G20 social to small or large planets orbiting the G20 “sun”, contributing ideas and power on different areas where they are representatives of different groups of the society and also with professional knowledge in their own area. As the number of engagement groups continue to rise, there still lack a set of regulations to ensure each group be listened to and be engaged in the decision processes.



---> Lack of delivery mechanism to G20      <---> Lack of cooperation with each other

Evidence has also shown that the effectiveness of delivering engagement groups' opinions to the G20 is not guaranteed, instead, it varies a lot from different host cities. For instance, at the 2016 Hangzhou G20 summit, the weighted average compliance between the T20 and G20 commitments is 86%. However, The G20 Research Group's assessments of the T20 recommendations for subsequent summits have found fewer matches with the leaders' declarations, with a 26% match between T20 Germany and the 2017 Hamburg Summit documents and a 24% match between T20 Argentina and the 2018 Buenos Aires

<sup>59</sup> Alexander, Nancy and Löschmann, Heike. "The Solar System of G20: Engagement Groups," *Heinrich Böll Foundation*, 9 Dec. 2020, <https://www.boell.de/en/2016/12/08/solar-system-g20-engagement-groups>.

Summit, compared to 86% for China<sup>60</sup>. China's successful approach in facilitating T20's advisory role to the G20 could be attributed to kicking off a T20 meeting a year before the G20, and having three think tanks responsible for coordinating instead of only one like other host cities did. In 2016, the T20 summit happened two months earlier before the G20 summit, which allowed ample time for formulating ideas, and a set of suggestions were sent to the G20 leaders through the Chinese Sherpa Office<sup>61</sup>.

Our interviews also indicate that many engagement groups lack concrete implementation plans for delivering their ideas to the G20 and promoting their proposed actions into practice. For example, one of our interviewees mentioned that the second stage of T20's work this year is to shift the focus to implementation, where these policies are translated into concrete actions, ensuring that the recommendations are grounded in reality and lead to tangible outcomes. The difficulty and the key is to think about what mechanisms to be utilized after July to deliver T20's outcomes to the G20.

### **b. Lack of Performance Evaluation on G20 Agenda's Implementation**

A significant challenge that cities face is the inadequate evaluation of their execution of G20 and U20-recommended actions. While tools such as the G20 Business Scorecard have been developed to assess implementation, they are often hindered by inconsistent methodologies and a reliance on self-reporting. Additionally, the structural limitations of the G20 itself, such as the lack of a permanent secretariat and the reliance on a Troika-based model, further complicate effective evaluation<sup>62</sup>. And the G20 also lacks formal enforcement mechanisms and relies on tightly controlled processes to create transparency and justify its actions. This includes interacting with media, publishing self-produced accountability reports, and engaging in dialogue with civil society and businesses<sup>63</sup>.

During discussions on key metrics for assessing the impact of urban climate policies, one interviewee emphasized the importance of prioritizing the protection of vulnerable populations. This is crucial because the impacts of climate change are experienced locally, necessitating that cities prepare for a variety of scenarios. In the case of Brazil, the country faces unique challenges in both adaptation and mitigation efforts. Deforestation stands as a major source of emissions, followed closely by the transportation sector.

This situation highlights the complexity of evaluating the needs of vulnerable populations and the necessity of tailoring evaluation tools to the specific contexts of different cities. As a result, establishing a unified framework for performance evaluation becomes a challenging endeavor. It requires a nuanced understanding of local conditions and the development of adaptable metrics that can accurately reflect the diverse challenges faced by cities in implementing G20-recommended actions.

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<sup>60</sup> Tops, Julia and Hou, Angela. "T20 Recommendations Realized: 2016 Hangzhou Summit," *G20 Research Group*, 25 Oct. 2019, <http://www.g20.utoronto.ca/analysis/t20-2016-recommendations-realized.html>.

<sup>61</sup> <http://www.g20.utoronto.ca/biblio/koch-china-b20-t20-leadership.html>

<sup>62</sup> Loureiro, Márcia. "G20: Participation of Non-State Actors and Prospects for the Brazilian Presidency," *CEBRI Journal*, Dec. 2020, <https://cebri.org/revista/en/artigo/125/g20-participation-of-non-state-actors-and-prospects-for-the-brazilian-presidency>.

<sup>63</sup> Hillbrich, Sören and Schwab, Jakob. "Towards A More Accountable G20? Accountability Mechanisms of the G20 and the New Challenges Posed to Them by the 2030 Agenda," *Deutsches Institut für Entwicklungspolitik (DIE)*, Bonn, 2018, <https://www.econstor.eu/handle/10419/199533>.



### c. Lack of a Developed Ecosystem for Innovation and Businesses

Despite Rio's strong reputation for hosting major events like the Olympics, the city lacks a developed ecosystem in executing concrete actions to realize its economic strategy. For instance, one interviewee pointed out that although human resources are incorporated into the economic plan and policy objectives, there is still a lack of sufficient capacity to achieve them. The interviewee mentioned that many young individuals in Rio struggle to find appropriate opportunities, echoing our previous research on employment and brain drain<sup>64</sup>. The relatively low quality of employment can be attributed to the lack of a developed ecosystem to conduct effective and self-driven actions.

To be more specific, the lack of a developed ecosystem for policy implementation can be revealed by the disconnect between different sectors in the society. For instance, one interviewee stated that, in contrast to cities such as Chicago, NYC, and Boston where there is a close and beneficial interaction between universities and economic development, Rio lacks meaningful channels that connect between its universities, government, and the private sector. For example, on the top universities' official websites in the three cities, there's always a "Partnership" section showing the university's collaboration with NGO, think tanks, famous enterprises, etc. However, on Rio's top universities website, there is little partnership information listed, and some only have partnerships with other universities for exchange students instead of with the labor market. This lack of channel hampers the city's ability to formulate an ecosystem for holistic and high quality development.

This lack of a developed ecosystem, which could support the implementation of key developmental policies in various sectors, poses significant risks for Rio to continue its desired legacy after major events. For instance, Rio experienced the highest amount of job closures due to the fiscal deficit after hosting the 2016 Olympic Games, with 38,400 people being let go between June 2017 and June 2018<sup>65</sup>.

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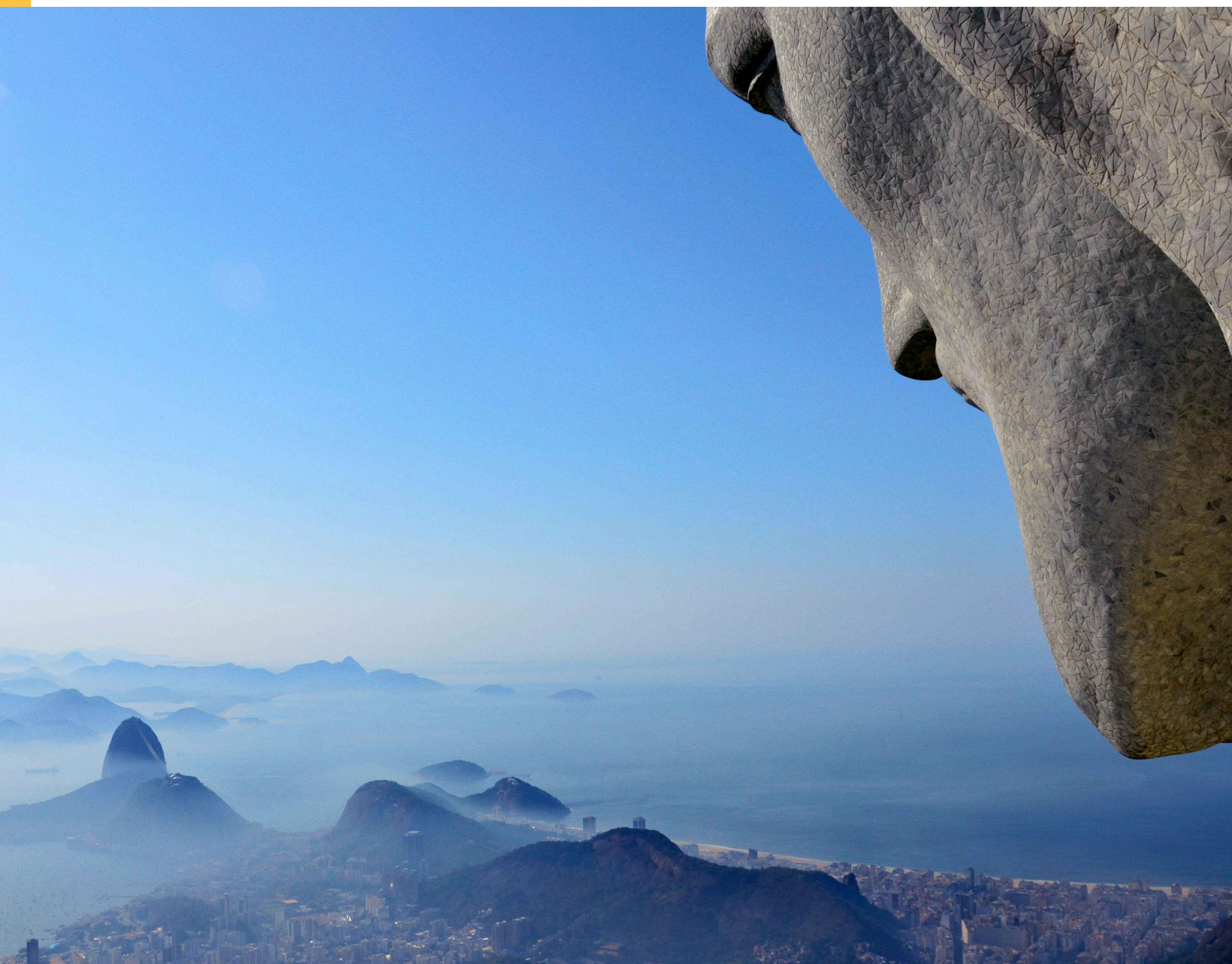
<sup>64</sup> "Informal Employment As Percentage of Total Employment in Brazil from 2011 to 2022," *Statista*, 3 Nov. 2023, <https://www.statista.com/statistics/1232760/informal-employment-share-brazil/>.

<sup>65</sup> De Jesus, Diego et al. "The Decline of Creative Education in the City of Rio de Janeiro: Main Causes and Consequences," *Creative Education*, Jul. 2019, <https://www.scirp.org/journal/paperinformation?paperid=93957>.

#### **d. Ineffective Collaboration Among Engagement Groups**

The G20 Social consists of 13 engagement groups, each focusing on a specific sector or demographic: C20 (civil society), T20 (think tanks), Y20 (youth), W20 (women), L20 (labor), U20 (cities), B20 (business), S20 (science), Startup20 (startups), P20 (parliaments), SAI20 (supreme audit institutions), J20 (supreme courts), and O20 (oceans). During interviews with representatives from several of these groups, it was observed that many share common goals and visions. However, none of the interviewees indicated any collaboration with other groups.

Furthermore, interviews with personnel involved in the G20 process reveal that the diversity and differing approaches of these engagement groups introduce redundancy and bureaucratic complexity to the G20's operations. The absence of a comprehensive document that aggregates the insights and requirements of all groups presents a significant challenge in harmonizing their contributions and aligning their activities within the G20 structure. This lack of coordination can hinder the effectiveness of the G20 in addressing global issues and achieving its objectives.



So far, the initial research highlights the ongoing endeavors of global cities to assert greater influence on the international climate agenda, and the G20 and U20 can act as crucial venues despite some previous challenges. This section will outline a strategic approach for Rio during and after its G20 presidency, providing a logical pathway for the city to enhance its impact and leadership in global climate policy.

First, by synthesizing the interviews and research findings, this report has identified four major challenges that Rio is currently facing in advancing its urban climate policy: Economic/Financial, Social, Technological, and Administrative. These challenges are particularly pertinent as Rio seeks to maximize the opportunities presented by hosting the G20 this year.

The analysis reveals that while Economic/Financial and Technological challenges lie at the heart of Rio's urban policy agenda, it is the Social and Administrative challenges that significantly hinder the city's effectiveness in formulating and implementing policy solutions. This underscores the importance of leveraging G20 opportunities to tackle Social and Administrative challenges, which will, in turn, facilitate solutions for the core policy issues.

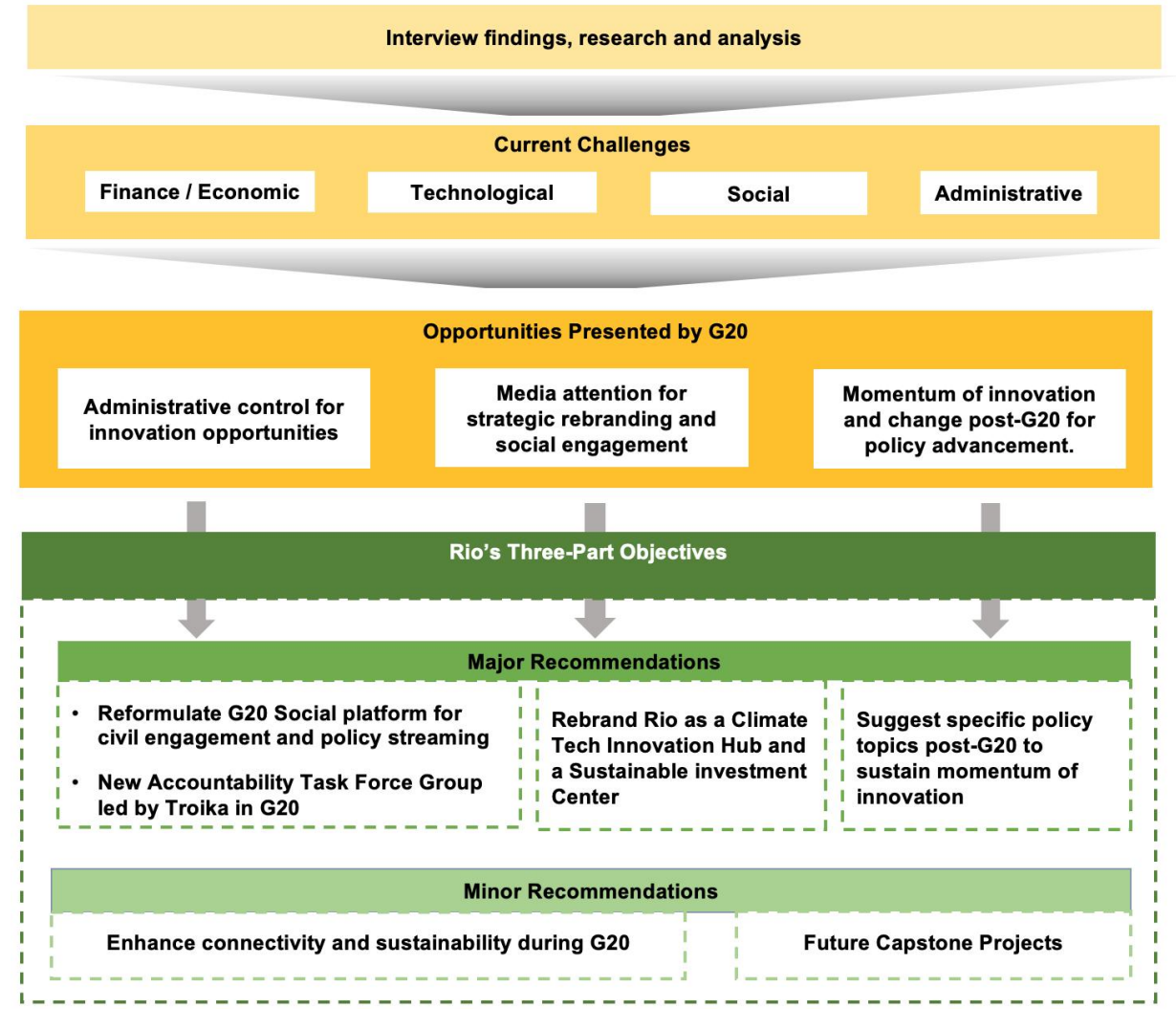
Furthermore, the analysis illustrates Rio's unique position as a bridge between top-tier global leaders and local grassroots communities. This strategic positioning offers Rio an opportunity to bolster its aspirations of becoming a global leader in sustainable development and establishing itself as a 'global city.' By enhancing civic engagement, Rio can strengthen its influence not only within the G20 but also among national leaders, thereby promoting a more inclusive approach to policy-making.

In light of these insights, the next step involves identifying specific opportunities that the G20 has brought to Rio and formulating targeted recommendations. Firstly, as the host city, Rio has significant control over the administration and structure of the G20 process. This presents an opportunity for Rio to innovate within the G20 framework to address its administrative challenges. For instance, the city has already created the G20 Social platform and now has the chance to further refine it to serve as a comprehensive solution for civil engagement and policy streamlining.

Secondly, the global spotlight on Rio during the G20 provides the city with an unparalleled opportunity to strategically use media attention to rebrand and reimagine itself. This media attention can be harnessed to reconnect with civil society and garner further support from Rio's residents, thereby enhancing the city's image as a hub for Climate Tech Innovation and Climate Finance Investment.

Finally, hosting the G20 acts as a catalyst that propels Rio into a momentum of innovation and change. This momentum is crucial for the city to sustain its policy discussions and action plans even after the event has ended, helping to further advance its agenda. By capitalizing on this momentum, Rio can focus on a set of policy topics that will continue to drive its development post-G20.

Each of these recommendations will be discussed in detail in the following section, providing a comprehensive strategy for Rio to leverage the G20 platform to overcome its challenges and achieve its policy objectives.



Priority	Recommendation	Action Items	
Major	Reformulate G20 Social Platform	G20 Social Website	Immediately Actionable
		Policy Radar Initiative	Immediately Actionable
	Develop a Climate Tech Ecosystem	Rio Resilience Challenge	Immediately Actionable
		AI Climate Resilience Hub	Immediately Actionable
	City Climate Finance: Rebrand Rio as Sustainable Investment Center	Carioca Innovation District	3 - 6 Month Actionable
		G20 Investment Summit	3 - 6 Month Actionable
U20 Collaboration for Securing City Climate Finance		3 - 6 Month Actionable	
Task Force for Accountability led by Troika	Increase Private Sector Participation	3 - 6 Month Actionable	
	Advocate for a new Task Force Group	3 - 6 Month Actionable	
Future Agenda	Green Corridor Project	Future / Post G20	
	Future Investment Focus	Future / Post G20	
	Human Capital Enhancement	Future / Post G20	
Minor	Enhance Connectivity and Sustainability	Mobile Solar Power Station	Immediately Actionable
		COP30 Summit	Future / Post G20
	Future Capstone	15th Clean Energy Ministerial (CEM)	Future / Post G20
		9th Mission Innovation Ministerial (MI)	Future / Post G20

## 1. Reformulating the G20 Social Platform

### a. A One-Stop Solution for Information Dispersion

To address the current dispersal of information surrounding the G20 Social Summit, we advocate for the creation of an official website<sup>66</sup> dedicated to the event.<sup>67</sup> This platform will serve as a centralized

<sup>66</sup> "G20 Social," *G20 Brasil 2024*, <https://www.g20.org/en/g20-social>.

<sup>67</sup> "C40," <https://www.c40.org/>.

repository for all summit-related updates, announcements, and discussions, offering a convenient one-stop solution for stakeholders seeking information. By consolidating resources and providing easy access to relevant materials, the website aims to streamline communication both internally among civil society groups and externally with the broader public. With distinct sections for event updates and press releases, stakeholders will be kept informed about upcoming activities and official statements, fostering transparency and engagement.

Furthermore, the website will feature discussion forums where stakeholders can exchange ideas and provide feedback on public policy initiatives. One key function of these forums will be to enable engagement groups to collaboratively decide on an annual policy area of focus, allowing stakeholders to align their efforts towards addressing pressing challenges, and producing more concise and impactful G20 Social Communique. Additionally, providing contact details for engagement groups will facilitate easier communication and collaboration, promoting inclusivity and enhancing the overall effectiveness of the G20 Social Summit initiatives.<sup>68</sup>

### **b. “Rio Policy Radar” Initiative**

Given the abundance of policy briefs presented by engagement groups, there is a need for a structured system to organize and categorize these briefs to enhance accessibility, usability and connectivity. The "Rio Policy Radar" section on G20 Social website would serve as a dedicated repository for these briefs, categorizing them into relevant sectors such as "green technology," "hunger resolution," and "women empowerment."

This categorization would streamline user navigation, aiding in locating relevant briefs efficiently and boosting stakeholder engagement. Its presence on the G20 Social website highlights government initiatives in critical policy areas, driving awareness and support. Additionally, it fosters collaboration among engagement groups, promoting innovation and progress towards common goals.

#### **Key Actions:**

- Create an official website dedicated to the G20 Social Summit, featuring four main sections: event updates, press releases, discussion forums, and the "Rio Policy Radar."
- Launch "Rio Policy Radar" as a repository for policy briefs submitted by engagement groups, providing a comprehensive resource for stakeholders.

## **2. Developing a Climate Tech Ecosystem in Rio: Positioning Rio as a Tech Innovation Hub via G20**

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<sup>68</sup> Currently, the G20 website's list of engagement groups within G20 Social is incomplete (<https://www.g20.org/en/g20-social/engagement-groups>), as it only includes contacts for the W20, S20, O20, and L20 groups. It is recommended that the G20 social website follow a similar structure, ensuring comprehensive contact details for all associated groups

As the G20 summit approaches, Rio has the opportunity to create and develop a Climate Tech Ecosystem—a bold step towards establishing the city as a beacon of sustainability and technological advancement. Our recommendations includes launching the below initiatives:

### **a. Competition - RIO RESILIENCE CHALLENGE**

To establish Rio as a Sustainability Tech Hub, we propose the "Rio Resilience Challenge", a citywide competition to ignite innovation in sustainable technology. The City Hall can set up a line of competitions across the city under this banner, inviting companies - well established as well as startups to come up with innovative solution ideas, ideas which help the city to transition towards a sustainability tech hub. There could be various domains of competitions that could be initiated viz. optimization algorithms for grid operations, Digital platforms for waste collection optimization, recycling apps, app-based solutions for optimizing public transportation, car-sharing, bike-sharing systems, competitions focusing on sustainable urban design concepts, green building designs, or the use of simulation software to create energy-efficient city layouts can generate actionable ideas.

#### **Key Actions:**

- Launch the "Rio Resilience Challenge" for sustainable tech solutions with immediate effect
- Engage global participants (startups, businesses, global universities etc) with a focus on innovative domains like green tech, smart city design, and energy efficiency.
- Promote the event globally in the lead-up to the G20 summit to maximize impact and participation.
- Offer significant rewards for this competition through sponsorships to incentivize groundbreaking ideas.
- Utilize the challenge to solidify Rio's status as an emerging global Sustainability Tech Hub.

### **b. Artificial Intelligence (AI) – Enhanced Climate Resilience Hub for the G20 Summit**

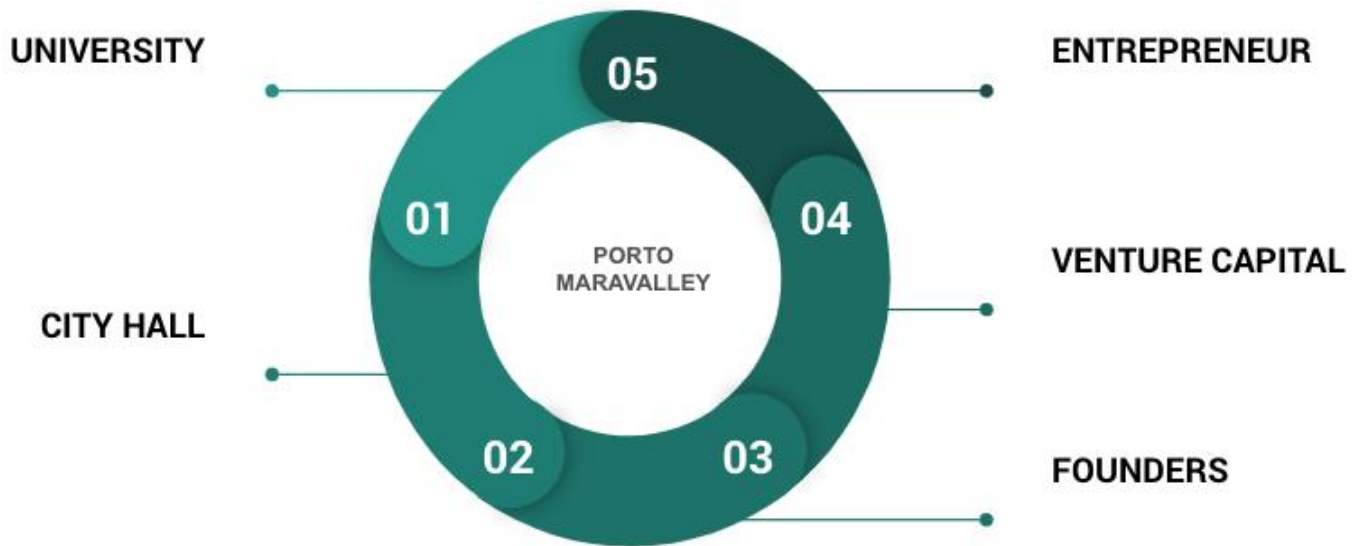
For the upcoming G20 Summit, Rio can establish itself as a global leader in urban climate policy initiatives by launching an AI-Enhanced Climate Resilience Hub, where Rio's existing AI related projects in the field of Sustainability are showcased to the world. This hub would not only serve as a command center for the summit's operations but also act as a lasting testament to the city's commitment to innovation and sustainability. The generative AI has rapidly evolved over the past few years transforming how machines interact with and understand humans. Today it is capable of creating entirely new content and not just classifying or analyzing the existing data.

#### **Key Actions:**

- Offer AI-powered virtual tours of Rio's existing green infrastructure projects, startups and investment sites to G20 participants and global investors well in advance before the G20 summit.
- Focus on showcasing existing AI related projects in the field of sustainability, such as tie up with MORFO, a startup where it assists the City in reforestation by seed distribution.
- Host a symposium alongside the G20 Summit, featuring AI-driven simulations of climate policy impacts and interactive strategy development.
- Announce plans to maintain and expand the AI Climate Resilience Hub beyond the summit, integrating it into city operations and policy making.
- Launch a global communication campaign to share Rio's successes in leveraging AI for urban climate resilience, positioning the city as a leading investment and innovation hub.

### c. Carioca Innovation District

As we understood from the interviews conducted, Rio is all set to inspire innovation by encouraging cross sector collaboration, knowledge sharing and the best practices. The main features of the Porto Maravalley innovation hub are:



Source: presentation by invest.rio

- 10,000 square meters of infrastructure with diverse facilities.
- R\$ 90 million investment split between construction and student accommodations.
- Direct educational link with IMPA Tech.
- Capacity for 600 work positions.
- Collaborative environment for students, startups, and established companies.
- Supported by major corporations like Eletrobras and Shell.
- Offers tax incentives to attract businesses (only to tech companies)
- Managed by Rio Energy Bay consortium.

The idea of having an innovation hub is no doubt highly visionary, but it lacks certain important metrics to be successful. We have done a SWOT (Strength, Weakness, Opportunities and Threats) analysis for this model and have come up with the following structure:



### 3. City Climate Finance - Rebranding Rio as a Sustainable Investment Hot Spot

#### a. Hosting an Investment Summit during G20

Until date, Rio has not been the major beneficiary of any of the investor summits that have taken place in Brazil. In order to maximize the opportunities presented by the G20 summit, Rio should host an international investment summit in June 2024, serving as catalysts for future foreign investment. The Summit should focus on establishing mutual interactions between city officials and the private sector to understand each others' needs, emphasizing potential attractive factors such as long term incentive mechanism, necessary safety criteria for future investment. The summit could be modeled after the International Investment Latin America Forum, where various countries in Latin America collectively host a summit to attract foreign investment and promote economic growth with investment focuses ranging from energy, infrastructure, technology, and tourism. Brazil had successes from these forums with increasing renewable energy and infrastructural investment within some cities, such as São Paulo.

Language barriers occur with some of the documents coming out of summits, company releases, and government initiatives. Naturally, many of these documents are primarily created in Portuguese and, if they are translated, their translations are often to English. However, it's crucial that many of these relevant documents and press releases are translated to multiple languages.

#### Key Actions:

- Host the summit in around June, inviting global private sector participants.
- Foster connections and understandings between public and private sectors.
- Focus on green and sustainable energy, infrastructure, technology, and tourism.
- Ensure diverse and multi-lingual, producing materials not only in Portuguese and English, but also other important market languages like Chinese and Indian.

#### b. U20 Collaboration for Securing City Climate Finance

As discussed previously, Rio faces various issues around securing funding. Rio can use U20 and G20 to foster collaborative initiatives to enhance the financial stability and general creditworthiness of the city, such as advocating for the inclusion of urban agenda in multilateral development banks (MDB).

#### Reforming Multilateral Development Banks (MDBs)'s Operation Model:

To reform Multilateral Development Banks (MDBs) and enable cities to access funds more effectively for climate initiatives, several key steps are necessary. Currently, MDBs primarily focus on large infrastructure projects, making it challenging for smaller cities to secure financing. Additionally, sovereign guarantee requirements create barriers, particularly in politically tense situations between

national and local governments.<sup>69</sup> To address these issues, MDBs should transition to a more programmatic approach, akin to the European Bank for Reconstruction and Development's Green Cities program. This model emphasizes jointly developed climate action plans, fostering coordination and efficiency in addressing urban climate needs. Furthermore, reform efforts should advocate for direct borrowing opportunities for cities from MDBs, circumventing the need for national government guarantees. This shift would decrease transaction costs for municipal borrowers and enhance their access to timely and affordable financing for climate-resilient initiatives. By collaborating within coalitions and leveraging platforms like the U20, cities can amplify their voices and negotiate favorable conditions for loans, such as through the establishment of mechanisms like the Green City Guarantee Fund and programs where the MDBs can directly lend local currencies to municipal governments. Ultimately, these reforms aim to empower cities to implement impactful climate policies and initiatives, driving progress towards urban sustainability and resilience.

#### Key Actions:

- Leverage the U20 platform to establish shared platforms for the exchange of experiences and coordination in engaging with MDBs among major cities.
- Advocate for the inclusion of urban climate finance as a strategic component in MDB reforms, including, such as increasing the volume and share of urban climate finance, creating programs for lending to a group of cities in local currencies, and improving urban focus in strategy, coordination and tracking.

### c. Increasing Private Sector Participation

Rio can leverage Public-Private Partnerships (PPPs) effectively by initially resolving its challenges with private sector engagement. Subsequently, it can strategically deploy PPPs to strengthen infrastructure, improve educational systems, and foster innovation within the city.<sup>70</sup>

#### Public-Private Partnerships Working Committee for Rio:

Despite the existence of the Investment Partnership Program Board (PPI Board) and SPPI (PPI Secretariat)<sup>71</sup>, it appears that they have not addressed Rio's core challenges when forming PPPs, that is, a lack of mutual understanding between the public and the private sectors. At the municipal level, private sector individuals often have experience working with national governments but may not be familiar with local government dynamics. Conversely, city officials struggle to grasp the priorities of the private sector when investing in urban climate projects. This mutual misunderstanding hinders the development of attractive business models.

<sup>69</sup> Negreiros, Priscilla et al. "Accelerating Urban Climate Finance in Low-and Middle-Income Countries: An Important Strategic Dimensions of MDB Reform," *Cities Climate Finance Leadership Alliance*, 22 Nov. 2023, <https://citiesclimatefinance.org/publications/accelerating-urban-climate-finance-in-low-and-middle-income-countries/>.

<sup>70</sup> Gupta, Nayanee et al. "Innovation Policies of Brazil," *Institute for Defense Analyses*, Sep. 2013, <https://www.ida.org/-/media/feature/publications/i/in/innovation-policies-of-brazil/ida-p-5039.ashx>.

<sup>71</sup> "Leading Practices in Governmental Processes Facilitating Infrastructure Project Preparation," *GIHUB*, [https://cdn.gihub.org/umbraco/media/2334/gih\\_procurement-report\\_case-study\\_brazil\\_final\\_web.pdf](https://cdn.gihub.org/umbraco/media/2334/gih_procurement-report_case-study_brazil_final_web.pdf).

To address this issue, the City Hall can establish a municipal PPP working committee that includes both government officials and industry experts. This group would have several objectives:

1. Create spaces for mutual interactions and understanding between city officials and the private sector to co-create projects.
2. Provide consultancy services for developing concrete business plans and enhancing PPP project preparation capabilities.
3. Facilitate information sharing and networking between the city and private sectors.
4. Compile case studies and best practice guides for Public-Private Partnerships (PPPs) and green projects. An exemplary model is the C40 Best Practices Guide, which distills successful climate policies from 140 global cities, enabling others to benefit from their experiences and insights.<sup>72</sup>
5. Offer technological advice to both private and public entities through expert assistance.
6. Establish technical standards, performance benchmark and consistency of qualified projects.

Establishing this group would enhance the connection between Rio and private sectors. City officials could better comprehend private sector needs and priorities, enabling them to design projects conducive to coordination, financial stability, and long-term incentives. Prioritizing incentives for private investment, such as through mechanisms like the green city fund, ensures support from private sector funds. Meanwhile, involving the private sector from the project's outset allows them to contribute to design and witness long-term benefits firsthand. Private sector entities seeking business opportunities and collaboration can utilize this group to identify partner cities and formulate detailed business plans.

### City-Based Collateral Initiatives with Private Sector Entities:

Rio can partner with private sector entities to guarantee certain projects or percentages of the debt financing for projects to ensure private sector investment entities have more support from the government. Rio can identify which industries they want to prioritize and determine funding guarantee structures - whether the government fully funds projects or a certain percentage - and create a financially trust fund with government provided finances used for these projects. Chicago successfully implemented this program through the Chicago Infrastructure Trust which provided financial guarantees to private infrastructural projects ensuring the trust would provide any funding needed if projects went into default.<sup>73</sup> From the perspective of international investors, a guarantee type system like Chicago's provides an additional layer of derisking projects. If the City of Rio de Janeiro can successfully implement a collateral based initiative with private sector entities, the city can strengthen their own credit rating over time and can set an example for other Brazilian cities to do the same, which will ideally strengthen the country's credit rating.

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<sup>72</sup>C40 Best Practice Guide offers comprehensive insights into nearly 70 categories of effective climate change actions, encompassing energy, transport, solid waste management, urban planning, adaptation, and finance. This guide equips cities with evidence-based examples and success stories, empowering them to undertake impactful measures to address climate breakdown. [Source: C40 Best Practice Guide, <https://www.c40.org/good-practice-guides/>]

<sup>73</sup> "Chicago Infrastructure Trust," <https://chicagoinfrastructure.org/>.

### Key Actions:

- Establish the PPP Working Committee.
- Provide preferential treatment to businesses, including tax incentives, subsidies, or regulatory frameworks that promote private sector participation in green projects and PPP emphasizing environmental and social responsibility.
- Enhance engagement with private sector stakeholders by hosting forums and conferences where government officials, businesses, and environmental experts can discuss and collaborate on green initiatives.
- Motivate companies based in Sao Paulo to expand their presence in Rio by offering benefits such as access to government contracts, simplified bureaucratic procedures, or assistance in establishing regional offices dedicated to sustainability efforts.
- Establish clear guidelines and reporting mechanisms to guarantee transparency and accountability in PPP projects.
- Establish a collateral based fund for the private sector to provide an additional layer of government backed financial security for investors to trust the investment potential of projects based in Rio.

## 4. Advocate for the Creation of a New Accountability Task Force Group led by Troika in G20

The G20 has made declarations every time. These declarations include recommendations for the global economy, sustainable development, climate change, and so on. However, implementing recommendations in each declaration is becoming a serious problem. There is no mechanism to check each country's action based on G20 Declarations, hindering effectiveness in country collaboration and G20 discussions.

We propose a new Task Force Group in G20, following the rotating membership of the Troika, to monitor and evaluate each country's actions regarding the G20 Declaration, addressing the issue of non-implementation despite commitments, despite potential resistance from member cities. This group may consist of experts from G20 countries.

Alongside, effective evaluation and feedback mechanisms need to be developed for policy recommendation in G20. For example, creating an objective and universal index for each policy recommendation is essential. Similarly, asking experts outside the organization to give feedback about each country's action for policy recommendation may be very useful. In a new Task Force group, members should discuss and agree with these mechanisms at first.

### Key Actions:

- Create the permanent Task Force group led by Troika to analyze the implementation of past G20 Declarations.
- Establish objective Evaluation and Feedback mechanism for implementing G20 Declarations, with particular attention to the needs of vulnerable populations and the specific contexts of different countries.

## 5. Reimagining Rio as a Green Hub: Enhancing Connectivity and Sustainability

As Rio de Janeiro aspires to become a green hub of technological innovation and sustainability, deploying solar-powered stations in the city is essential to align with this vision. These stations, strategically positioned in key areas such as Copacabana and Ipanema beaches, will not only enhance the digital and energy infrastructure but also showcase Rio's commitment to sustainable practices and technological innovation.



(Solar-power Station/Truck Example)

### Key Actions:

- Positioning these solar-powered stations at high-traffic locations due to tourism, local commerce or cultural significance should be prioritized to ensure maximum accessibility.
- Conduct a thorough cost-benefit analysis to evaluate the economic viability to identify regions where solar-powered stations could have the most significant impact.
- Building stations to serve as a reliable mobile charging hub and a Wi-Fi hotspot to facilitate communication and information access.
- Adopting sustainable and resilient design in these stations by using environmentally friendly materials.
- Decorate the trucks with G20 logos to raise awareness and advertise the event.
- Engage local communities in the planning and implementation process to ensure the stations meet the actual needs of residents and visitors. These stations can also be used as an educational platform to raise local awareness about renewable energy and sustainability.

## 6. Future Agenda

### 6.1 Manage Human Capital and Attract Top Talents

Drawing from the population growth data of Hangzhou<sup>74</sup> after hosting the G20 and the lessons learned during the Rio Olympics, it's crucial to anticipate future transportation demands and expand BRT routes to cover more areas after G20, especially the densely populated favelas. In order to be prepared to effectively manage the potential increasing human resources and incorporate it into the economic development plan of Rio, certain important issues need to be taken into consideration.

#### a. Enhance Labor Mobilization

First, conduct data-driven route planning. The former BRT was established mainly for the commute between Olympic sporting spots instead of between working places, so the new BRT routes should be consolidated by thorough traffic and employment flow analysis, ensuring that the network effectively connects residential areas in the North and West Zones with the city's primary employment hubs. This alignment will be more targeted to solve the labor mobilization problems faced by vulnerable groups, thus facilitating access to employment for residents across those regions.

Second, incorporate an innovative transportation solution. Taking inspiration from Medellín, Colombia's urban cable car system, Rio could consider introducing a similar cable car system in favela areas facing

<sup>74</sup> Hangzhou's acceleration of new permanent population from 2016 to 2020: 170,000, 280,000, 338,000, 554,000, 1,605,000.

comparable topographical challenges. Cable car systems are more economical and efficient. Medellín's cable car system is able to carry 3,000 passengers per hour, and the use of the cable cars has led to a reduction of 121,029 tonnes of CO<sub>2</sub> from 2010 to 2016. Although the gondola that served the Alemão favela is defunct, a holistic and community-centric approach can be helpful to rebuild it. The process should prioritize extensive community engagement to align the project with residents' needs and ensure inclusivity in planning, and integrate with existing transport networks, targeting isolated areas for enhanced accessibility.

#### Key Actions:

- Conduct data-driven route planning to align new BRT routes with actual traffic and employment flows, enhancing connectivity between residential and employment hubs.
- Distribute questionnaires through employers to gather comprehensive transportation data, ensuring all workers, especially those in impoverished areas, are represented.
- Introduce an innovative cable car system in favela regions to address topographical challenges, drawing inspiration from Medellín's efficient and eco-friendly model.
- Engage communities extensively to ensure the cable car project meets the actual needs of residents and integrates well with existing transportation infrastructure.
- Implement ongoing evaluations and maintain transparent communication to refine the transportation project based on community feedback and its impact.

#### b. Attract and Retain Top Talents

Previous research and interviews reveal a lack of linkage between universities and the labor market in Rio. Most of Rio's universities have funding for academic research but have insufficient resources for career development such as career service, partnership with employers, and student venture fund.

First, foster stronger connections between the local job market and leading universities by establishing robust human capital pipelines. Enhance collaboration between universities and the private sector, particularly within city innovation hubs like the Carioca Innovation District. Encourage universities to strengthen their career network platforms, facilitating internships and co-op programs with businesses and streamlining recruitment processes for students. Promote the growth of university-based incubators and accelerators to nurture student startups, offering mentorship, financial support, and workspace facilities throughout the entire journey from idea conception to commercialization.

Second, improving the living and community environment for top talents is advised. This can be achieved by building mixed-use complexes comprising contemporary, affordable apartments and offices tailored for tech experts and entrepreneurs. Additionally, offering two-year free leasing or discounted rent to qualified talents or startups can further enhance the appeal of these spaces.

Third, Rio could organize events to ease the transit of international talent. The effectiveness of hosting an annual international talent conference has been demonstrated in other cities.<sup>75</sup> Regarding incentives, although there's already a substantial tax exemption (exceeding 50%) for technology firms, specific incentives tailored to attracting top talents should be considered on a case-by-case basis.

### Key Actions:

- Foster university-city innovation hub partnerships.
- Enhance university career network platforms for internships and co-op programs with targeted recruiting.
- Support university incubators and accelerators for student startups.
- Organize innovation competitions and hackathons linking students with companies.
- Develop mixed-use complexes with affordable housing and tech-focused office spaces.
- Offer two-year free leasing or discounted rent to qualified talents or startups.
- Establish a conference committee to select top talents in green technologies and sustainable development.
- Facilitate partnerships between local and international companies through conference committee mediation.
- Provide customized incentives for enterprises' human capital introduction.

## 6.2 Key Sectors for Future Investment

As the G20 propels Rio into the spotlight, it is crucial that policy discussions extend beyond the event. The team suggests that Rio concentrate on four pivotal sectors to maintain this momentum.

### a. Waste to Energy

Investing in the waste-to-energy sector in Brazil, particularly in cities like Rio, is imperative given the pressing need for effective waste management strategies. Recent data highlights the stark reality that while 93% of municipal solid waste (MSW) is collected, only a fraction undergoes recycling (1.47%) or composting (0.168%)<sup>76</sup>, contributing to environmental degradation and climate change. The Rio de Janeiro City Hall Strategic Plan (2021-2024) recognizes this challenge and aims to reduce landfill

<sup>75</sup> The annual Hangzhou International Human Resources Exchange and Cooperation Conference, which began in 2009, has drawn 5,970 overseas talents from 58 countries and over 5,900 projects. Over 13 years, it facilitated nearly 2,000 project contracts worth over 38 billion yuan (\$5.34 billion), supporting local workforce development, curbing brain drain, and boosting economic growth. ([http://www.ezhejiang.gov.cn/2022-11/14/c\\_830771.htm](http://www.ezhejiang.gov.cn/2022-11/14/c_830771.htm))

<sup>76</sup> Ismail, Kamal and Lino, Fatima. "Municipal Solid Waste Treatment in Brazil: A Comprehensive Review," *Energy Nexus*, Aug. 2023, [https://www.researchgate.net/publication/373021883\\_Municipal\\_solid\\_waste\\_treatment\\_in\\_Brazil\\_A\\_comprehensive\\_review](https://www.researchgate.net/publication/373021883_Municipal_solid_waste_treatment_in_Brazil_A_comprehensive_review).

disposal by valorizing recyclables and organic waste, aligning with broader efforts to promote a zero-waste approach.<sup>77</sup>

To bolster these initiatives, Rio initiated a Biomethanisation Unit pilot project in January 2024, demonstrating the feasibility of processing organic waste and mitigating CO<sub>2</sub> equivalent emissions. Scaling up these efforts, particularly through the establishment of mechanical-biological treatment (MBT) facilities, is essential to increase organic waste treatment capacity and facilitate selective collection for household organic waste. However, challenges persist, as noted by Guilherme Syrkis of the Brazil Climate Center, including the absence of nationwide waste-to-energy mechanisms, illegal waste management practices, and a lack of regulatory frameworks and skilled professionals.

Addressing these challenges requires comprehensive strategies that span the entire waste management process, from collection to incineration and emission control. Establishing city consortia with efficient logistics for waste transportation to power plants presents an opportunity to create a viable market for waste-to-energy initiatives. By investing in the waste-to-energy sector, Brazil can not only improve its waste management practices but also create sustainable economic opportunities, mitigate environmental impacts, and contribute to global efforts to combat climate change.

#### Key Actions:

- Establish mechanical-biological treatment (MBT) facilities.
- Implement public awareness campaigns to promote waste reduction, recycling, and proper waste disposal practices.
- Enhance enforcement of waste management regulations to deter illegal dumping and promote compliance.
- Create city consortia with efficient logistics for waste transportation to power plants.
- Improve infrastructure for waste collection, sorting, and processing to enhance efficiency and reduce environmental impact.
- Set up emission control standards, preferably following EU emission guidance.

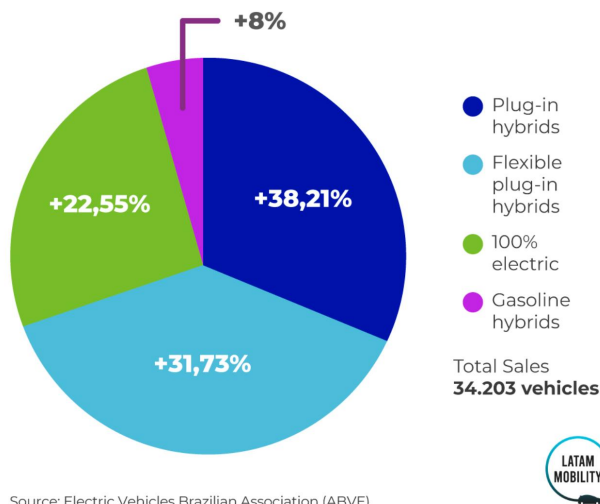
#### b. Hybrid Vehicles

The hybrid vehicles market in Brazil, encompassing both flex-fuel hybrid electric and flex-fuel plug-in hybrid models, presents substantial potential for future foreign investment. In January to December 2022, with plug-in hybrids selling 2,442 units, representing 38.21% of the total low-emission sale, and flexible plug-in hybrids capturing 31.73% of the market, there's evident growth momentum<sup>78</sup>. The hybrid vehicles, including vehicles that can operate on gasoline, E-85, or E-100, alongside an electric engine, are set for

<sup>77</sup> "Organic Waste to Biogas in Rio de Janeiro's Biomethanisation Unit," *C40*, Jan. 2024, <https://www.c40.org/case-studies/rio-biomethanisation-unit/>.

<sup>78</sup> "Brazil Registers a Historic Increase in Electric Vehicle Sales," *LATAM Mobility*, <https://latamobility.com/en/brazil-registers-a-historic-increase-in-electric-vehicle-sales/>.

expansion, with sales anticipated to increase from 73,600 units this year to 117,900 units in 2024<sup>79</sup>. The market's appeal is underscored by significant commitments from global automakers like Toyota, which has earmarked \$2.2 billion for hybrid technology development from 2023 to 2030, highlighting the industry's robust growth potential and the high level of interest from leading foreign vehicle manufacturers such as Stellantis, BYD, and Toyota in the Brazilian market.



While Brazil benefits from using sugarcane as a sustainable and low-carbon biofuel, deforestation remains a concern. Sugarcane cultivation contributes to the degradation of critical ecosystems, such as Brazil's Atlantic Forest, now only 7% of its original size. To meet the global sugarcane demand by 2050, an expansion of almost 50% in cultivated land is required<sup>80</sup>. Moreover, as Brazil aims to integrate further into the global industrial chain, it cannot overlook the EV industry. According to Anfevea president Marcio de Lima Leite, the hybrid is a “transitional mode” and Brazil faces a technology gap in cost-effective battery production<sup>81</sup>. Thus, attracting investment and introducing technology in the EV sector are crucial steps for Brazil's long-term economic strategy.

During the G20 summit, Rio de Janeiro has the unique opportunity to attract global investors to its burgeoning hybrid vehicle and EV sector by organizing investor summits and showcases that highlight Brazil's growing market, projected sales growth, and engagement with leading manufacturers, alongside emphasizing its strategic market position, bolstered by a robust biofuel industry.

<sup>79</sup> “Standard Engines to Endure in Brazil Amid EV Growth,” *ARGUS*, 20 Dec. 2023, <https://www.argusmedia.com/en/news-and-insights/latest-market-news/2521149-standard-engines-to-endure-in-brazil-amid-ev-growth>.

<sup>80</sup> “Sugarcane Farming’s Toll on the Environment,” *World Wildlife Fund*, 2015, <https://www.worldwildlife.org/magazine/issues/summer-2015/articles/sugarcane-farming-s-toll-on-the-environment#:~:text=Sugarcane%20farming%20has%20fueled%20deforestation,meet%20projected%20global%20sugarcane%20demand>.

<sup>81</sup> Genot, Louis. “Brazil Revs Up for Jolt of Hybrid Car Investments,” *Barrons*, 13 Mar. 2024, <https://www.barrons.com/news/brazil-revs-up-for-jolt-of-hybrid-car-investments-27412697>.

### Key Actions:

- Showcase Brazil's commitment to the hybrid vehicle sector through detailed presentations of supportive policies.
- Present and discuss Brazil's supportive policy frameworks for the hybrid vehicle market at the summit, highlighting tax incentives, decarbonization legislation, clean energy investments.
- Reveal phased plans in 3 and 5 years to expand the charging infrastructure, demonstrating the government's support for hybrid and electric vehicles.
- Address investor concerns by outlining the government's initiatives and readiness for sustainable transportation investment.

### c. Decarbonizing buildings

Decarbonizing buildings in Brazil, including Rio, is critical for mitigating climate change and improving energy efficiency. Currently, low and zero-carbon building initiatives are in the demonstration phase, with the academic community focusing on raising awareness and standards. However, Brazil faces significant challenges in this endeavor. One major obstacle is the unclear demand for energy-efficient homes from end users. Buyers often do not prioritize energy efficiency, thermal comfort, or reduced environmental impacts when purchasing properties. This lack of demand perpetuates issues with housing quality, such as poor thermal performance and indoor air quality problems like mold growth. Moreover, inertia in the construction industry towards improvement further hinders progress, as builders can sell their products regardless of quality standards.<sup>82</sup>

To address these challenges, a multifaceted policy approach is necessary. First, assessing baseline energy performance and setting clear targets are essential steps. Municipalities can lead by example by implementing ambitious energy efficiency standards for public buildings, demonstrating the viability of new technologies to create markets for energy efficiency.<sup>83</sup> Additionally, raising awareness and promoting behavior change among consumers and builders alike is crucial. Incentives for implementing energy-efficient solutions, such as cool roofs and insulation, can further drive adoption. Legislation mandating the incorporation of energy-efficient components in building codes can also spur progress.<sup>84</sup>

A holistic policy solution is needed to address not only environmental concerns but also issues of poverty and equity. For example, when constructing new housing, integrating solutions that prioritize heat management and decarbonization is essential. These measures can include using energy-efficient materials and devices, implementing proper insulation, and utilizing renewable energy sources for heating and cooling systems. By adopting a comprehensive approach to decarbonizing buildings, Brazil can

<sup>82</sup> “Zero Carbon Buildings: A Brazilian Perspective,” *Buildings & Cities*, 16 Feb. 2021, <https://www.buildingsandcities.org/insights/commentaries/zero-carbon-brazil.html>.

<sup>83</sup> “Good Practices Guide: Cool Cities,” *C40*, <https://www.c40.org/wp-content/uploads/2022/02/C40-Good-Practice-Cities-Guide-Cool-Cities.pdf>.

<sup>84</sup> “Good Practices Guide: Decarbonizing Buildings,” *C40*, <https://www.c40.org/wp-content/uploads/2022/02/C40-Good-Practice-Guides-Municipal-Building-Efficiency.pdf>.

significantly reduce its carbon footprint, improve energy efficiency, and enhance the quality of life for its citizens

#### Key Actions:

- Assess baseline energy performance and set clear targets.
- Implement ambitious energy efficiency standards for public buildings.
- Raise awareness and promote behavior change among consumers and builders.
- Provide incentives for implementing energy-efficient solutions, such as cool roofs and insulation, to further drive adoption.
- Enact legislation mandating the incorporation of energy-efficient components in building codes to spur progress.

#### d. Transportation

Avenida Brasil is one of the most important roads in Brazil<sup>85</sup> and serves as one of the primary expressways connecting people, goods, and services in the Rio de Janeiro metro area. TransBrasil BRT, introduced in February 2024, greatly enhances the options for medium and high-capacity transportation for Rio's daily public transit users. The BRT route, currently comprising 20 stations, is projected to accommodate over 250,000 passengers per day by 2030.

The primary focus of the TransBrasil BRT should be on integrating the metropolitan area. Since there are no articulated buses for intercity BRT routes yet, many commuters from neighboring cities within the metro region will remain stuck in traffic congestion.

#### Key Actions:

- Collaborate with other cities to install intercity BRT
- Invest in BRT systems more to reduce travel time, increase people's access to opportunities, and better integrate other transport services

### 6.3 Rio's Green Urbanism - Green Corridor Project

In alignment with Rio de Janeiro's ambitions to be recognized as a leader in green urbanism, the Green Corridor Project aims to enhance the city's environmental, social, and economic landscape. This project will connect sustainability efforts across various domains, transforming urban spaces into green and inclusive environments.

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<sup>85</sup> "In Rio de Janeiro, the New TransBrasil BRT Takes Shape," *Transportation Matters*, 27 Feb. 2024, <https://www.itdp.org/2024/02/27/in-rio-de-janeiro-the-new-transbrasil-brt-takes-shape/#:~:text=The%20BRT%20corridor%2C%20currently%20with,%2C%20and%20transit%2Ddependent%20populations.>

### Key Actions:

- Develop green parks within city areas to enhance urban biodiversity. Also potentially integrate 'One Forest Per Favela' initiatives in efforts to promote equitable access to green spaces.
- Create eco-tourism packages that include guided tours of Tijuca National Park and other significant environmental sites, highlighting Rio's biodiversity and conservation practices.
- Transform a segment of a major highway or street into a 'green corridor,' which would become a landmark for pedestrians and cyclists, lined with local flora, sustainable markets, and spaces for community art. This transformation would symbolize Rio's commitment to green urbanism.

## 6.4 Future Capstone Projects

The upcoming COP30 Summit, the 15th Clean Energy Ministerial (CEM), and the 9th Mission Innovation Ministerial (MI), alongside Brazil's presidency of the G20, offer a unique confluence of opportunities for collaboration between Rio and Columbia University. These events are pivotal moments on the international stage, focusing on sustainability, innovation, and economic cooperation. Rio along with Columbia University can collaborate in developing capstone projects that explore innovative clean energy solutions, sustainable urban development and climate resilience aligning with the themes of CEM, MI and COP 30. The prestigious School of International and Public Affairs (SIPA) at Columbia University has been the front runner in providing students with advanced knowledge on global energy and environmental issues and how governments, businesses and civil society can lead effective action.

SIPA can further facilitate projects that aim to engage Rio's local communities in the lead up to these major events focussing on raising awareness about climate change, sustainability and the importance of clean energy. Collaborating on these capstone projects and initiatives can not only enhance the academic and practical experiences of Columbia University students but also significantly contribute to Rio's preparation and execution of these international events.

While this paper provides insights into several key challenges facing Rio's pursuit of sustainability and innovation, it is important to note that not all issues have been addressed, such as considerations on engaging the oil industry in green climate investments or incorporating water transportation into the City's initiatives. Future research could delve into these areas to further explore their implications for Rio's sustainability efforts.

Nonetheless, as Rio steps onto the global stage with the upcoming G20 Summit, it has a golden opportunity not only to showcase its commitment to sustainability and innovation but also to set a precedent for urban climate leadership worldwide. The strategies we have outlined are designed to harness the summit's momentum, turning aspirations into action and fostering lasting change. By capitalizing on this unique moment, Rio can transform challenges into stepping stones toward a more sustainable and equitable future. Let us move forward with purpose, leveraging every opportunity the G20 Summit presents to ensure that the legacy of this event is one of enduring progress and renewed hope for our global community.

## Interviewees List

No.	Name	Position	Institution/ Organisation
1	Alexandre Vermeulen	CEO	Invest.Rio
2	André Corrêa do Lago	Ambassador and Secretary for Climate, Energy and Environment	Ministry of Foreign Affairs
3	Beatriz Pfeifer	Organizing Committee Member	CEBRI
4	Carolina Tandler	Coordinator of International Relations	Rio de Janeiro City Hall
5	Cintya Feitosa	International Relations Advisor	Climate and Society Institute
6	Daniel Mancebo	Planning Office Coordinator	Rio de Janeiro City Hall
7	David Miller	Managing Director, C40 & Former Toronto Mayor	C40
8	Eugenie Birch	Professor at the University of Pennsylvania	Member of SDSN Global Commission for Urban SDG Finance
9	Gaurav Pundir	Director	Ministry of Commerce, Government of India - G20
10	Guilherme Syrkis	Executive Director	Centro Brasil no Clima
11	Gustavo Westmann	G20 Engagement Groups Coordinator (Special Advisor for International Affairs)	G20 Federal Organizer Committee (Federal Government)
12	Ilan Cuperstein	Latin America Director	C40 Cities (Convener U20)
13	Lidiane de Paula	Municipal Deputy Secretary for Women's Policies and Promotion	Rio de Janeiro City Hall
14	Lolita Jackson	former NYC Mayor's Office climate liaison to U20	For city hall official - climate diplomat, primary contact for C40
15	Maiara Folly	Executive Director	Cipó Platform
16	Marcelo Furtado	Director	Nature & Finance
17	Márcia Loureiro	President	Alexandre de Gusmão Foundation - FUNAG (Convener T20)
18	Mariana Albuquerque	Professor	Federal University of Rio de Janeiro

19	Marta Fenandéz	Director	BRICS Policy Center
20	Mauricio Rodas	Former Mayor of Quito, Ecuador	Member of SDSN Global Commission
21	Natalie Unterstell	President	Talanoa Institute
22	Salvino Oliveira	Secretary	Youth 20, Rio de Janeiro
23	Sergio Besserman	President	Rio de Janeiro Botanical Garden Research Institute
24	Tainá de Paula	Municipal Secretary of Environment and Climate Change	Rio de Janeiro City Hall
25	Thomas Trebat	Director	Columbia Global Centers - Rio

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