



NHSMUN

UN-HABITAT

BACKGROUND GUIDE

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Delegate Experience
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Global Partnerships
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Anshul Magal

Analucia Tello
Sofia Velasco

Renata Venzor

Dear Delegates,

Welcome to the United Nations Human Settlements Programme (UN-Habitat) at NHSMUN 2025! I am your Director for Session I alongside Sofia Toledo for Session II. Last year, I was an Assistant Director for Session I of the Special Political and Decolonization Committee (SPECPOL). Before that, I was a delegate at NHSMUN 2023 in the United Nations Convention Against Corruption (UNCAC) and at NHSMUN 2022 in the best committee, UN-Habitat.

I am a sophomore at Columbia University in New York City. I am a Political Science major with subfields of study in American Politics and International Politics, though I may also study Statistics or French in some way. I am an Emergency Medical Technician and served on Columbia University Emergency Medical Services last semester. I also stay involved on campus through other extracurriculars, such as political-related clubs, journalism, and other fun organizations. I love to bike, explore neighborhoods, travel, and ski! I work in New Hampshire during school breaks as a Ski Patroller.

While I love NYC, I hail from New Hampshire, having lived there all my life except a year in our sister state, Vermont. When I was applying to college, I wanted to be in a city and I am so glad to be able to go to school in the greatest city in the world, NYC.

This past summer, I had the absolute pleasure of interning with NBCUniversal as a Hospitality Guide in Paris for the 2024 Summer Olympic Games. In this role, I welcomed 1,000+ guests to Paris on behalf of NBCUniversal including C-suite and top executives, celebrities, and other staff and guests of NBCUniversal and advertising partners. This experience also gave me incredible insights into the operations of international sporting events and has contributed to why I feel so attached to this year's topics. I have experienced some of what I have included in the Background Guide at least in part first-hand.

NHSMUN has particularly helped me to consider problems in new ways. I encourage you to make the most of your NHSMUN experience by embracing discussion, cooperation, communication, and collaboration to discuss real solutions to real issues.

Sofia and I have prepared a Background Guide that discusses the sustainability of sporting events and construction practices. This Guide contains numerous resources and a lot of information that will be beneficial to you as you research the topics, write position papers, and prepare for conference in March. I look forward to welcoming you to New York and to the ideas that you will propose. If you have any questions about anything at all, please reach out.

Best,

Miles Forbes Sturges

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Director, United Nations Human Settlements Programme, Session I



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Renata Venzor

Dear delegates,

I am so happy to welcome you to the United Nations Human Settlements Programme (UN-Habitat)! My name is Sofia Toledo, and I am your Director for Session 2 of NHSMUN 2025 alongside Miles Sturges from Session 1. I have attended NHSMUN three times as a delegate, and this is my second year working as a part of the staff. Last year, I was the Assistant Director for UNESCO during Session 2. I loved competing as a delegate, and I am so excited to be part of your NHSMUN experience.

I am from the South Florida Fort Lauderdale area, was raised by my large Cuban family, and cannot wait to escape the heat with you all in New York City. I am a sophomore at the University of Florida and a microbiology major on the premed track, and I also plan to minor in creative writing. Some things about me are that I love reading, writing, thrifting, playing card/board games, dancing (Latin and ballet), and watching movies. I am always down to play a round of Mario Kart with my friends or dedicate my night to finishing a game of Monopoly, and I will never say no to a trip to the beach. Food-wise, my grandparents have grown their fruit trees my entire life, so I love a wide variety of fruits, and a strawberry banana milkshake will not fix my mood. That or my go-to boba tea order, a rose green tea with lychee jelly, has not changed for the past four years, and I do not think it ever will.

Model United Nations is a great opportunity to meet and interact with a wide scope of people from a variety of backgrounds and also to gain valuable exposure to issues that affect places around the world. MUN teaches us to research and think on our feet and how to work with others to achieve change. I hope you all get to build on your leadership skills, public speaking, and ability to form respectful compromises to accomplish your goals while getting to know and understand new people and their perspectives.

As we spend our time discussing preserving sustainability in sporting events and the global construction industry, I look forward to watching you all work together towards unique forms of solvency. The Background Guide that Miles and I have prepared for you is there to support you in your research. The urban infrastructure consists of intricate details and plays a large role in how society is run, so establishing sustainability within it is crucial to promoting the public good. We hope it also helps to highlight the many different global perspectives that exist regarding both topics. Through your future lively and informative debates paired with respectful discourse, I cannot wait for this conference to be an excellent experience for all of us and to see what you can all bring to the table!

Best,

Sofia Toledo

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Director, United Nations Human Settlements Programme, Session II



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A Note on the NHSMUN Difference

Esteemed Faculty and Delegates,

Welcome to NHSMUN 2025! We are Terry Wang and Jordan Baker, and we are this year's Secretary-General and Director-General. Thank you for choosing to attend NHSMUN, the world's largest and most diverse Model United Nations conference for secondary school students. We are thrilled to welcome you to New York City in March.

As a space for collaboration, consensus, and compromise, NHSMUN strives to transform today's brightest thinkers, speakers, and collaborators into tomorrow's leaders. Our organization provides a uniquely tailored experience for all through innovative and accessible programming. We believe that an emphasis on education through simulation is paramount to the Model UN experience, and this idea permeates throughout numerous aspects of the conference:

Realism and accuracy: Although a perfect simulation of the UN is never possible, we believe that one of the core educational responsibilities of MUN conferences is to educate students about how the UN System works. Each NHSMUN committee is a simulation of a real deliberative body so that delegates can research what their country has said in the committee. Our topics are chosen from the issues currently on the agenda of that committee (except historical committees, which take topics from the appropriate time period). We also strive to invite real UN, NGO, and field experts into each committee through our committee speakers program. Moreover, we arrange meetings between students and the actual UN Permanent Mission of the country they are representing. Our delegates have the incredible opportunity to conduct first-hand research, asking thought-provoking questions to current UN representatives and experts in their respective fields of study. These exclusive resources are only available due to IMUNA's formal association with the United Nations Department of Global Communications and consultative status with the Economic and Social Council. No other conference goes so far to deeply immerse students into the UN System.

Educational emphasis, even for awards: At the heart of NHSMUN lies education and compromise. Part of what makes NHSMUN so special is its diverse delegate base. As such, when NHSMUN distributes awards, we strongly de-emphasize their importance in comparison to the educational value of Model UN as an activity. NHSMUN seeks to reward students who excel in the arts of compromise and diplomacy. More importantly, we seek to develop an environment in which delegates can employ their critical thought processes and share ideas with their counterparts from around the world. Given our delegates' plurality of perspectives and experiences, we center our programming around the values of diplomacy and teamwork. In particular, our daises look for and promote constructive leadership that strives towards consensus, as real ambassadors do in the United Nations.

Debate founded on strong knowledge and accessibility: With knowledgeable staff members and delegates from over 70 countries, NHSMUN can facilitate an enriching experience reliant on substantively rigorous debate. To ensure this high quality of debate, our staff members produce detailed, accessible, and comprehensive topic guides (like the one below) to prepare delegates for the nuances inherent in each global issue. This process takes over six months, during which the Directors who lead our committees develop their topics with the valuable input of expert contributors. Because these topics are always changing and evolving, NHSMUN also produces update papers intended to bridge the gap of time between when the background guides are published and when committee starts in March. As such, this guide is designed to be a launching point from which delegates should delve further into their topics. The detailed knowledge that our Directors provide in this background guide through diligent research aims to increase critical thinking within delegates at NHSMUN.

Extremely engaged staff: At NHSMUN, our staffers care deeply about delegates' experiences and what they take away from their time at NHSMUN. Before the conference, our Directors and Assistant Directors are trained rigorously through hours of workshops and exercises both virtual and in-person to provide the best conference experience possible. At the conference,

delegates will have the opportunity to meet their dais members prior to the first committee session, where they may engage one-on-one to discuss their committees and topics. Our Directors and Assistant Directors are trained and empowered to be experts on their topics and they are always available to rapidly answer any questions delegates may have prior to the conference. Our Directors and Assistant Directors read every position paper submitted to NHSMUN and provide thoughtful comments on those submitted by the feedback deadline. Our staff aims not only to tailor the committee experience to delegates' reflections and research but also to facilitate an environment where all delegates' thoughts can be heard.

Empowering participation: The UN relies on the voices of all of its member states to create resolutions most likely to make a meaningful impact on the world. That is our philosophy at NHSMUN too. We believe that to properly delve into an issue and produce fruitful debate, it is crucial to focus the entire energy and attention of the room on the topic at hand. Our Rules of Procedure and our staff focus on making every voice in the committee heard, regardless of each delegate's country assignment or skill level. Additionally, unlike many other conferences, we also emphasize delegate participation after the conference. MUN delegates are well researched and aware of the UN's priorities, and they can serve as the vanguard for action on the Sustainable Development Goals (SDGs). Therefore, we are proud to connect students with other action-oriented organizations to encourage further work on the topics.

Focused committee time: We feel strongly that face-to-face interpersonal connections during debate are critical to producing superior committee experiences and allow for the free flow of ideas. Ensuring policies based on equality and inclusion is one way in which NHSMUN guarantees that every delegate has an equal opportunity to succeed in committee. In order to allow communication and collaboration to be maximized during committee, we have a very dedicated administrative team who work throughout the conference to type up, format, and print draft resolutions and working papers.

As always, we welcome any questions or concerns about the substantive program at NHSMUN 2025 and would be happy to discuss NHSMUN pedagogy with faculty or delegates.

Delegates, it is our sincerest hope that your time at NHSMUN will be thought-provoking and stimulating. NHSMUN is an incredible time to learn, grow, and embrace new opportunities. We look forward to seeing you work both as students and global citizens at the conference.

Best,

Terry Wang
Secretary-General

Jordan Baker
Director-General

A Note on Research and Preparation

Delegate research and preparation is a critical element of attending NHSMUN and enjoying the debate experience. We have provided this Background Guide to introduce the topics that will be discussed in your committee. We encourage and expect each of you to critically explore the selected topics and be able to identify and analyze their intricacies upon arrival to NHSMUN in March.

The task of preparing for the conference can be challenging, but to assist delegates, we have updated our [Beginner Delegate Guide](#) and [Advanced Delegate Guide](#). In particular, these guides contain more detailed instructions on how to prepare a position paper and excellent sources that delegates can use for research. Use these resources to your advantage. They can help transform a sometimes overwhelming task into what it should be: an engaging, interesting, and rewarding experience.

To accurately represent a country, delegates must be able to articulate its policies. Accordingly, NHSMUN requires each delegation (the one or two delegates representing a country in a committee) to write a position paper for each topic on the committee's agenda. In delegations with two students, we strongly encourage each student to research each topic to ensure that they are prepared to debate no matter which topic is selected first. More information about how to write and format position papers can be found in the NHSMUN Research Guide. To summarize, position papers should be structured into three sections:

I: Topic Background – This section should describe the history of the topic as it would be described by the delegate's country. Delegates do not need to give an exhaustive account of the topic, but rather focus on the details that are most important to the delegation's policy and proposed solutions.

II: Country Policy – This section should discuss the delegation's policy regarding the topic. Each paper should state the policy in plain terms and include the relevant statements, statistics, and research that support the effectiveness of the policy. Comparisons with other global issues are also appropriate here.

III. Proposed Solutions – This section should detail the delegation's proposed solutions to address the topic. Descriptions of each solution should be thorough. Each idea should clearly connect to the specific problem it aims to solve and identify potential obstacles to implementation and how they can be avoided. The solution should be a natural extension of the country's policy.

Each topic's position paper should be **no more than 10 pages** long double-spaced with standard margins and font size. **We recommend 3–5 pages per topic as a suitable length.** The paper must be written from the perspective of your assigned country and should articulate the policies you will espouse at the conference.

Each delegation is responsible for sending a copy of its papers to their committee Directors via [myDais](#) on or before **February 21, 2025**. If a delegate wishes to receive detailed feedback from the committee's dais, a position must be submitted on or before **January 31, 2025**. The papers received by this earlier deadline will be reviewed by the dais of each committee and returned prior to your arrival at the conference.

Complete instructions for how to submit position papers will be sent to faculty advisers via email. If delegations are unable to submit their position papers on time, please contact us at info@imuna.org.

Delegations that do not submit position papers will be ineligible for awards.

Committee History

On January 1, 1975, the UN General Assembly created the United Nations Human Settlements Programme (UN-Habitat), originally referred to as the United Nations Habitat and Human Settlements Foundation (UNHHSF).¹ The committee was constructed to control the rapid growth of cities and provide safe and adequate protection.² In 1977, UN Resolution 32/162 transformed the Committee on Housing, Building, and Planning into the Commission of Human Settlements. Then, in 2002, UNHHSF and the Commission on Human Settlements and Habitat merged into UN-Habitat, an independent committee headed by the Executive Director and managed by the Secretariat.³ The committee’s mission is to “promote socially and environmentally sustainable human settlements, development and the achievement of adequate shelter for all.”⁴

UN-Habitat is structured into three main bodies: the Governing Council, Secretariat, and the Committee of Permanent Representatives. The committee contains 193 member states from Europe, Africa, Latin America and the Caribbean, and the Asia-Pacific region.⁵ UN-Habitat also has an Executive Board of 36 member states. These member states are elected by the UN-Habitat assembly and convene tri-annually to oversee ongoing operations.⁶ The Committee of Permanent Representatives meets every two years in an open-ended manner to prepare for the session and a high-level mid-term review meeting.⁷ UN-Habitat’s headquarters are located at the United Nations Office in Nairobi, Kenya. However, it also has two other regional offices in Fukuoka, Japan, and Rio de Janeiro, Brazil.⁸ Since May of 2019, the member states of UN-Habitat have met every four years in Mexico. These assemblies usually evaluate previous projects completed between committee meetings to discuss results and possible improvements.⁹ UN-Habitat is most frequently referred to as a “resolution writing committee” where each member is given one vote and no special vetoing power. All decisions, whether substantive or procedural, are decided by the majority vote¹⁰.

Since its inception, UN-Habitat has performed many important international undertakings. The committee has raised awareness on urban development issues at many levels and highlighted the importance of addressing urban issues in poverty reduction strategies. Every year, UN-Habitat releases their annual report to address pressing urban issues. Most recently, UN-Habitat released their 2023 annual report that included concerns about challenges such as the cost of living and housing, climate change, and the unavailability of basic necessities and services that local governments are facing.¹¹ The report emphasized local action to tackle our global climate change and inequality problems that are most prevalent in cities. The UN Assistant Secretary-General and Acting Executive Director of UN-Habitat Michal Mlynár explained that “we need a new approach to planning, building, and managing cities.”¹² These ideas are being outlined in the UN-Habitat 2026–2029 strategic plan. UN-Habitat plays an important role by adapting their mandate to respond to these new urban trends.¹³ The importance of UN-Habitat’s work on urgent issues is highlighted, and they will continue to undertake these essential missions.

1 “History, Mandate & Role in the UN System: UN-Habitat,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://unhabitat.org/history-mandate-role-in-the-un-system>.

2 “Background,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://evaw-un-inventory.unwomen.org/en/agencies/un-habitat>.

3 United Nations Human Settlements Programme, “History, Mandate & Role in the UN System: UN-Habitat.”

4 United Nations Human Settlements Programme, “History, Mandate & Role in the UN System: UN-Habitat.”

5 “Our Structure,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://unhabitat.org/our-structure>.

6 “Executive Board,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://unhabitat.org/governance/executive-board>.

7 “Committee of Permanent Representatives,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://unhabitat.org/governance/committee-of-permanent-representatives>.

8 “Regional Offices,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://mirror.unhabitat.org/categories.asp?catid=22>.

9 “General Concept,” United Nations Human Settlements Programme, accessed September 10, 2021, <https://unhabitat.org/results-based-management/4-1-general-concept>.

10 “United Nations Human Settlements Programme (UN-Habitat),” Special Presentation, accessed September 10, 2021, https://unhabitat.org/sites/default/files/2021/01/rules_of_procedure_of_the_united_nations_habitat_assembly.pdf

11 “Goals & strategies of UN-Habitat.” September. UN-Habitat. <https://unhabitat.org/goals-and-strategies-of-un-habitat>.

12 “UN-Habitat Assembly,” Accessed September 20, 2024. UN-Habitat. <https://unhabitat.org/governance/un-habitat-assembly>.

13 “United Nations Human Settlements Programme Development of the strategic plan for the period 2026–2029 I. Introduction II. P.” 2024. UN-Habitat. https://unhabitat.org/sites/default/files/2024/03/k2403539e_-_hsp-eb.2024-5_-_advance.pdf.



UN-HABITAT

NHSMUN 2025



TOPIC A: SOCIAL AND ENVIRONMENTAL IMPACTS OF SPORTING EVENTS

Photo Credit: Ibex73

Introduction

Hosting mega international sporting events can present many challenges despite their potential benefits. Organizers are under immense pressure to put on these events without interruption. Often, considerations about the environment, sustainability, workers' rights, and more are put to the side to ensure that these events run smoothly. Mega international sporting events can bring communities and people across the globe together. These athletic competitions allow countries to show off their best athletes to the world. Unfortunately, these events can come with serious social and environmental consequences. Sporting events have large environmental impacts despite some attempts to reduce emissions. While athlete, staff, and fan transportation are the largest contributors to carbon emissions at sporting events, other factors contribute as well. These factors include infrastructure, food and beverage, waste, electricity and utilities, and much more.¹

Historically, sporting events have contributed majorly to carbon emissions.² Due to public criticism, event organizers have been working to reduce carbon emissions and are continuing to try to do so and have often been successful. Despite these efforts, mega international sporting events continue to routinely negatively impact the environment. Sometimes, host cities and event organizers deceptively advertise their events as environmentally friendly to gain public support. This is done even when their events are not environmentally friendly or not as environmentally friendly as advertised. The term for this is 'greenwashing.'³ This is harmful as it makes people think that the events are green. This makes them focus less attention on environmentally friendly planning. If they had known the event organizers were not considering it, the environment could have benefitted.

Mega international sporting events also have many social impacts on communities. They tend to bring people closer, build community, increase happiness, and aid in teaching good skills. At the same time, these sporting events can break communities apart. Especially when building new infrastructure for these events. Communities can be displaced from their housing or even forcibly removed from their city. Fortunately, is now happening less often as sporting

organizations prioritize utilizing existing infrastructure.

In preparation for these events, planners need to decide where to build new infrastructure such as stadiums. These stadiums need to ideally be located proximal enough to the city center to be accessible by fans via public transit, which often means that this infrastructure needs to be built where people currently live.⁴ Planners usually choose lower-income neighborhoods as it is cheaper and politically easier to force these communities out of their homes due to lower property values and lower-income communities generally having fewer resources to resist.⁵ These displaced communities also frequently have large minority populations.

In addition, host cities often forcibly evict homeless people in advance of mega international sporting events.⁶ Sometimes, these communities are pushed farther out from the city center, while, at other times, these communities are pushed completely out of the city and sometimes forced out to other cities across the country which are sometimes very far away.

Mega international sporting events offer a great number of positive impacts to communities, but negative impacts abound as well. It is important to address these negative impacts. This will allow us to continue to reap the benefits of these

1 "Paris 2024 Olympics: A Greenwashing Nightmare of a Genuine Effort to Save the Planet?" Earthday.org. <https://www.earthday.org/paris-2024-olympics-a-greenwashing-nightmare-or-a-genuine-effort-to-save-the-planet/>

2 Saaniya Sharma, "What is the Carbon Footprint of Sport?," Carbon Literacy Project, February 2023, <https://carbonliteracy.com/what-is-the-carbon-footprint-of-sport/>.

3 Courtney Lindwall "What Is Greenwashing?" NRDC. February 9, 2023. <https://www.nrdc.org/stories/what-greenwashing>.

4 Victor A. Matheson, *Assessing the Infrastructure Impact of Mega-Events in Emerging Economies*, (Cambridge: Lincoln Institute of Land Policy, May 2013) 215-230, https://www.lincolninstitute.edu/app/uploads/legacy-files/pubfiles/assessing-the-infrastructure-impact-of-mega-events-in-emerging-economies_0.pdf.

5 Victor A. Matheson, *Assessing the Infrastructure Impact of Mega-Events in Emerging Economies*, 215-230.

6 "Olympic scale of sport-induced displacement," Forced Migration Review, accessed August 28, 2024, <https://www.fmreview.org/duplessis/>.

events that can bring the world together. With the appropriate changes and considerations, these events can continue to bring communities together in socially and environmentally sustainable ways. It is crucial to have a local focus at the forefront. This will allow planners to ensure that these events are safe and offer more services and opportunities for local residents.

History and Description of the Issue

Eviction and Displacement of Local Populations

When event organizers begin planning their major worldwide sporting events, they must consider the need for space. This space can serve numerous purposes to organizers, including athlete housing, staff housing, fan accommodations, venue areas, and much more. However, this can have a big impact on the enjoyment of the right to housing of citizens. Sometimes it is common to see that in preparation for the events governments evict and displace local residents in the name of development.⁷ These residents are most commonly of lower socioeconomic status. Evicting them is typically cheaper as property values are usually much lower, and society does not raise as much of an alarm in response to these evictions. Evictions are also frequently associated with a high proportion of minorities, often based on race or nationality.

In preparation for the 2024 Summer Olympics in Paris, government officials have begun putting homeless people in low-cost hotels. More recently, they have begun transporting them out of the city to open up these hotels for visitors as costs can be hiked.⁸ France, like many other countries that have hosted the Olympics, is displacing thousands of homeless people in the name of finding them permanent housing.

Nevertheless, this is hardly achieved. Similar efforts made by other countries have often not successfully provided new or permanent housing for displaced homeless people. Some countries did not even try to provide housing and just fully displaced people. One example is when the Tokyo Metropolitan Government violently raided Meiji Park in preparation for the 2020 Olympic Games. This action displaced dozens of homeless people without a plan to house them.⁹

This practice of removing homeless people to other areas can be referred to as ‘social cleansing.’¹⁰ Social cleansing in the context of sporting events is when organizers and country governments and officials forcibly remove certain “undesirable” populations from areas that will be heavily populated during the sporting event.¹¹ Cities often claim that these efforts are to increase the cleanliness and safety of the city. However, these efforts remove the homeless and other populations from where they know, sometimes forcing them to move to other parts of the city or unknown other cities across the country, left without resources to assist them.¹² None of them uphold a country’s responsibilities to its residents, even those without housing. An example can be seen with the Summer Olympics in Paris. A year before this event, almost 13,000 Parisians, including migrants, homeless people, and drug users have been moved outside of the city to present a “scrubbed-up version” of Paris.¹³ Similarly, almost 200,000 residents were evicted in the Brazil 2014 World Cup where many relocated to informal housing without adequate water or electricity. This led to an increase in child labor, violence, and social unrest.¹⁴

Homeless people are not the only population that suffers from social cleansing. Officials in Qatar in 2022 forcibly evicted thousands of migrant workers from their homes in the capital city of Doha with extremely short notice.¹⁵ Evicting

7 “Olympic scale of sport-induced displacement,” *Forced Migration Review*.

8 Kim Willsher, “Thousands of homeless people removed from Paris region in pre-Olympics ‘social cleansing,’” *The Guardian*, June 3, 2024, <https://www.theguardian.com/sport/article/2024/jun/03/homeless-people-removed-from-paris-before-olympics>.

9 Sophie Hill, “The Hidden History of Eviction and Gentrification in Olympics Host Cities” *The McGill Daily*, October 16, 2023, <https://www.mcgilldaily.com/2023/10/the-hidden-history-of-eviction-and-gentrification-in-olympics-host-cities/>.

10 Willsher, “Thousands of homeless people removed from Paris region in pre-Olympics ‘social cleansing.’”

11 Willsher, “Thousands of homeless people removed from Paris region in pre-Olympics ‘social cleansing.’”

12 “Homelessness and Social Exclusion,” *No Boston 2024*, accessed August 29, 2024, <https://www.noboston2024.org/homelessness-social-exclusion>.

13 Kim Hjelmggaard, “Paris promised the most socially responsible Olympics ever. It’s been moving out migrants,” *USA Today*, July 23, 2024, <https://www.usatoday.com/story/sports/olympics/2024/07/23/olympic-social-cleansing-paris-migrants/744805330071>.

14 Selina Yang, “The Tale of Two Tournaments: A Football Story,” *Berkeley Economic Review*, November 20, 2023, <https://econreview.studentorg.berkeley.edu/the-tale-of-two-tournaments-a-football-story/>.

15 Andrew Mills, “Exclusive: Thousands of workers evicted in Qatar’s capital ahead of World Cup,” *Reuters*, October 29, 2022, <https://www>.

these workers with ample notice would still have drastically negatively affected these workers' lives. But, not providing ample notice, it is clear that the government of Qatar's priorities do not lie with protecting its residents. More than 12 buildings were shut down by authorities, which resulted in many former residents becoming homeless. Some of these residents were reportedly given as short as two hours' notice to leave their homes. Not everyone had been able to remove all of their belongings by the time officials locked the doors.¹⁶

The Qatar government claims that this was unrelated to the upcoming World Cup, though these buildings that were shut down were in similar areas to the ones where the government planned to accommodate World Cup fans.¹⁷ Vani Saraswathi, Director of Projects at MigrantRights.org, said that these evictions work to maintain Qatar's image of wealth without "publicly acknowledging the cheap labor that makes it possible."¹⁸ At least one evicted resident commented that "people like us" make the stadiums, roads, and everything else that countries rely on to host major sporting events, and that those people are now being pushed out.¹⁹

In 2019, Airbnb signed a contract with the International Olympic Committee. Airbnb is a company that allows people to rent out their homes primarily for short-term contracts online. This USD 500 million contract aimed to "promote housing and urban development for the games."²⁰ This did have economic benefits for the Olympics, but also resulted in less available permanent housing. Much of the previously available housing became Airbnb housing or similar to provide temporary accommodation. This made problems for homeless people much worse, as the little available housing became practically unavailable because of this. Airbnb's contract with the IOC has increased rent and the frequency of eviction

threats of those who live near Olympic venues.²¹

Lower-income residents can be trapped in a cycle of eviction and displacement that is difficult to escape. This is in part due to gentrification. An example of this was seen when Atlanta redeveloped the long publicly subsidized Techwood Homes. This displaced over 98 percent of its former residents. In all, the Atlanta Olympics resulted in the displacement of approximately 30,000 and the evictions of 6,000 from public housing, with gentrification abound.²²

It is important to note that social cleansing is not limited to only the homeless population. It often includes beggars, hawkers, drug addicts, and others. Cities tend to push these populations out of areas where a lot of visitors and fans will be to improve their city's image. The consequences that this has on these populations include reducing or eliminating often already low incomes, displacing people from where they normally live, embarrassment, and more. Police often sweep homeless and migrant camps, including some migrants who were seeking asylum. Sometimes, these people are held at holding facilities until the conclusion of the event.²³

Often, these populations are not offered other accommodations in the same city and are instead pushed to other parts of the country. This presented a large problem in Paris for the 2024 Olympic Games as many asylum seekers were relocated outside of Paris despite having upcoming court dates in Paris. They must attend these court dates but also generally do not have the means to travel far.²⁴

Reuters found in December 2023 that at least 60 squats, homeless camps, and migrant camps were shut down in Seine-Saint-Denis.²⁵ This is just one small neighborhood in Paris that has had so many camps cleared. Seine-Saint-Denis is

reuters.com/lifestyle/sports/exclusive-thousands-workers-evicted-qatars-capital-ahead-world-cup-2022-10-28/.

16 Mills, "Workers evicted."

17 Mills, "Workers evicted."

18 Mills, "Workers evicted."

19 Mills, "Workers evicted."

20 Hill, "The Hidden History."

21 Hill, "The Hidden History."

22 Michael McDougall and MacIntosh Ross, "The Olympics is a disaster for people who live in host cities," *The Washington Post*, July 29, 2021, <https://www.washingtonpost.com/outlook/2021/07/29/olympics-is-disaster-people-who-live-host-cities/>.

23 "Homelessness & Social Exclusion," No Boston 2024.

24 Jade Le Delay and Nicolas Garriga, "Police clear out migrant camp in Paris. Activists say it's a pre-Olympics sweep." *Associated Press*. April 23, 2024. <https://web.archive.org/web/20240423155348/https://abcnews.go.com/Sports/wireStory/police-clear-migrant-camp-central-paris-activists-pre-109525155>.

25 Tom Schad, "Ahead of Paris Olympics, police oversee evictions, leading to charges of 'social cleansing,'" *USA Today*, April 17, 2024. <https://www.usatoday.com/story/sports/olympics/2024/04/17/2024-olympics-social-cleansing-paris/73353671007/>.



Les bouquinistes des Quais de Seine, Paris
Credit: Ninara

home to several Olympic venues such as the 80,000-seat Stade de France, the venue for Closing Ceremonies, the Aquatics Centre, the Olympic Village, and more.²⁶

Additionally, in the name of security leading up to the opening ceremonies on the Seine River, Paris wanted to remove more than half of the more than 930 bookstands from along the quay of the river.²⁷ These bookstands are instrumental in Paris' history and culture, where local booksellers (in French, *les bouquinistes*) offer thousands of books, postcards, stamps, and similar items to passersby daily during the summer. Paris wanted to prevent hundreds of booksellers from opening this summer and temporarily relocate their boxes. These booksellers make their living this way, and relocation to less populated areas would have been detrimental to these businesses that are so ingrained in Parisian culture.²⁸

Luckily, there was enough public pushback against the government to get them to reverse their decision, but the possible impacts on the economy from international sporting events are evident. Particularly in the name of security, the

possibilities for locals to be hurt financially abound. In addition to the economic impacts, *les bouquinistes* are a large part of French and Parisian culture, and removing them would be a disruption to this culture and Parisian history. Writers have played a large part in Parisian history, *les bouquinistes* have sold books since the 17th century, and some say that the Seine River runs between bookshelves about the bookstands of *les bouquinistes*.²⁹

Antoine de Clerck of the NGO Refugee Food said “Cities hosting the Olympics want to hide poverty – and begging, drug use, whatever gives a less shiny image of a city.”³⁰ Many petitions and protests started in 2024 as Paris 2024 began to push out these populations in preparation for the Olympics. Paris is by no means the only offender. This practice is very common among host cities across the world in preparation for these types of events and can cause much harm to local underrepresented communities.

26 Schad, “Ahead of Paris Olympics, police oversee evictions, leading to charges of ‘social cleansing’.”

27 Christopher Parker, “Parisian Booksellers Have Lined the Seine for Centuries. Now, They’re Fighting to Stay,” *Smithsonian Magazine*, August 24, 2023, <https://www.smithsonianmag.com/smart-news/parisian-booksellers-object-to-planned-relocation-for-olympics-180982788/>.

28 Catherine Porter, “Booksellers on the Seine in Paris Get an Olympic Reprieve,” *New York Times*, February 14, 2024. <https://www.nytimes.com/2024/02/14/world/europe/paris-olympics-booksellers.html>.

29 Porter, “Booksellers on the Seine in Paris Get an Olympic Reprieve.”

30 “Activists urge Paris Olympics organizers to respect the rights of migrants and homeless people,” *El Pais USA*, October 30, 2023, <https://english.elpais.com/international/2023-10-30/activists-urge-paris-olympics-organizers-to-respect-the-rights-of-migrants-and-homeless-people.html>.

City Congestion During Sporting Events

Major sporting events can draw hundreds of thousands of tourists and workers to cities across the world. These cities are usually not prepared for this drastic influx of people, and its effects can be serious. Cities' roads, public transportation, business districts, and other popular locations frequently become overcrowded and overwhelmed.³¹ This can leave visitors as well as local citizens delayed or stranded. When public spaces and infrastructure become overcrowded, numerous safety issues arise. In addition, economies can also be seriously affected such as by traffic congestion delaying the trucking industry from completing deliveries, which can ripple across the country and internationally. It is important that hosts of major sporting events more carefully consider their events' impacts on cities and local populations and craft strategic plans to mitigate these impacts.³²

The impacts of increased city congestion can be detrimental to a city and its residents. Increased city congestion in street traffic, pedestrians, and public transportation result in increased commute times, affecting residents' daily lives while just trying to get to work, buy groceries, get to the doctor, or perform other routine tasks.³³ These events frequently cause street closures, construction delays, detours, and gridlock traffic. Not only does gridlock traffic contribute to increased commute times, but its impact on the environment is severe. Idling vehicles clog city streets, burning more fuel and using more electricity, negatively impacting the environment overall, and worsening the air quality, which affects wildlife, residents, and the environment in general.³⁴

Pedestrian traffic can also further delay vehicles and cause safety concerns. There is the possibility of simply running out of space for pedestrians on sidewalks or for the possibility of crowd crushes. Often already-stressed public transportation is pushed far past capacity. This results in long hours for workers,

dangerously packed buses or subway cars, crowded stations, and more. Increased street traffic, pedestrian traffic, and public transportation usage all contribute to further exacerbating each other. This creates an unsustainable cycle of dangerous city congestion that makes it difficult for residents and visitors to get around.³⁵

At the same time, hosting major sporting events often pushes some locals to leave their city for the duration or part of the duration of the event to avoid the often accompanying chaos that ensues. This reduces traffic congestion, pedestrian and bicycle activity, and public transportation usage, which counteracts some of the increased traffic from these events. Some streets were mostly empty in the lead-up to the Paris 2024 opening ceremonies. Many Parisians, who generally enjoy more paid vacation than their US counterparts, notably, left the city to return after opening ceremonies concluded and many of the streets reopened. Some remained out of Paris until the end of the games and many also worked remotely.

Getting tourists and workers to host cities can be the largest factor contributing to carbon emissions. Therefore, city and event planners must collaborate to reduce these impacts as much as possible. Planners can consider promoting the use of public transportation—if its infrastructure is robust enough to support the increased usage—or encourage walking, biking, and electric vehicles as much as possible.³⁶ Some events have provided discounted public transportation passes, numerous bike racks, and other perks such as discounts on merchandise, food, and beverage, and even free tune-ups for those who choose to bicycle.³⁷

It is important at major events like these to 'flatten the curve' of arriving fans. By spreading out crowd arrivals, the stresses on city infrastructure can be reduced. If, say, 100,000 fans arrive in the same one-hour window before an event, infrastructure will be extremely stressed. Instead, by flattening the curve,

31 Brad R. Humphreys and Hyunwoong Pyun, "Professional Sporting Events and Traffic: Evidence from US Cities," West Virginia University, March 25, 2017, http://busecon.wvu.edu/phd_economics/pdf/17-05.pdf.

32 Humphreys and Pyun, "Professional Sporting Events and Traffic: Evidence from US Cities."

33 Reem Elkhoully, Emi Tamaki, and Ken Iwasaki, "Mitigating crowded transportation terminals nearby mega-sports events," *Behaviour and Information Technology* 42, no. 7 (March 25, 2022): 904-920, <https://www.tandfonline.com/doi/abs/10.1080/0144929X.2022.2048890>.

34 "Humphreys and Pyun, "Professional Sporting Events and Traffic."

35 Elkhoully, Tamaki, and Iwasaki, "Mitigating crowded transportation terminals nearby mega-sports events," 904-920.

36 Knowledge at Wharton Staff, "Green Sports and Transportation: The Elephant in the Room," *Knowledge at Wharton*, December 13, 2013, <https://knowledge.wharton.upenn.edu/article/green-sports-transportation-elephant-room/>.

37 Knowledge at Wharton Staff, "Green Sports and Transportation: The Elephant in the Room."

organizers can spread out the window that fans arrive in to, say, three hours instead of one. This results in fewer possibilities of crowd surges and reduces stress on transportation and other infrastructure. This results in a safer ingress into the event venues. An ingress is when people enter a venue. Organizers can work to flatten the curve by offering more pre-event activities such as mini-concerts, games, or picnicking areas which entice fans to arrive earlier.³⁸

It is crucial that planners strategically address transportation and traffic concerns long before events to minimize congestion and dangerous overcrowding. People and residents especially, have a right to get around their city, which needs to be taken into account. True logistical measures must be taken to increase the frequency and capacity of public transportation and ease traffic congestion. Other measures such as encouraging people to show up early with pre-event entertainment, must also be taken to flatten the curve of when fans arrive and depart from event venues.

Some good practices to address these issues can be seen in the

38 The Wall Street Journal, “Expert Explains the Hidden Crowd Engineering Behind Event Venues,” YouTube Video, 6:48. July 10, 2024, <https://www.youtube.com/watch?v=L2XffHREa0j0>.

39 Knowledge at Wharton Staff, “Green Sports and Transportation: The Elephant in the Room.”

40 “Paris 2024: Olympic lanes reactivated this Thursday on the Periph’ for the Paralympic Games,” SortirAParis, August 21, 2024. <https://www.sortiraparis.com/en/news/in-paris/articles/315581-paris-2024-olympic-lanes-reactivated-this-thursday-on-the-periph-for-the-paralympic-games>

41 Gwen Topham, “Olympic route network opens with some confusion but little congestion,” *The Guardian*, July 25, 2012. <https://www.theguardian.com/uk/2012/jul/25/olympic-route-network-opens>.

42 Topham, “Olympic route network opens with some confusion but little congestion.”

recent Olympic Games. To promote greener transportation, the 2012 London Olympics provided a free transit pass to every ticket holder. Also, some events offered closer parking for electric vehicles and even offered bike valet service.³⁹ In addition, to spread out fans’ arrival and reduce the burden on a city’s public transportation network and driving infrastructure the Olympic Route Network (ORN) was implemented. The ORN are specific lanes on major highways and roads solely for Olympic traffic, public transport, emergency vehicles, and most taxis.⁴⁰ These lanes were implemented after the 1996 Atlanta Games after snarled traffic resulted in some athletes and officials missing their events.⁴¹

Despite difficulties and some confusion with the lanes in London 2012, Paris 2024 is proving these lanes to be incredibly useful. These lanes allow Olympic and affiliated vehicles to bypass major urban congestion to keep the Games running. Most city streets in Paris do not have these lanes, just major highways around Paris on the way to venues, Charles de Gaulle Airport, and other popular Olympic destinations.⁴²

There are a few city streets that have these lanes as well. These

Traffic congestion in Paris

Credit: daxtell



lanes often allow Olympic traffic to bypass standstill traffic at normal highway speeds. However, these lanes do have their issues. Generally, the Olympic lanes are the left lane of the highway. At some interchanges, though, when most Olympic vehicles need to exit or enter right, the Olympic lanes will be found in the right-most lane. Problems can arise when the Olympic lanes suddenly switch from the right to the left lane and vice versa, and all Olympic traffic crosses multi-lane highways with it. This can cause dangerous weaving points where aggressive drivers prevail.⁴³

It is necessary to be cautious in these areas. Additionally, by dedicating a lane of a major highway to Olympic traffic to decrease wait times for them, wait times for everybody else are inherently increased. Traffic in the non-Olympic lanes backs up frequently, contributing to increased wait times and emissions and worsened air quality. Increased stop-and-go traffic also results in more rear-end collisions.⁴⁴

Traffic congestion also results in increased delivery costs. This is because delivery vehicles are caught in traffic, resulting in increased delivery times and delivery costs, affecting Parisian and French businesses. If unauthorized vehicles use the

Olympic lanes, they are subject to fines of EUR 135 and prosecution. There are radar systems in place to fine drivers electronically. These lanes allow emergency vehicles to get around more efficiently. This improves overall city safety, especially when considering the increased security needs and necessary emergency responses and motorcades around Paris.⁴⁵

In addition to the Olympic lanes backing up regular traffic, the closures surrounding the Seine River contribute to even more backups across Paris. Especially before the opening ceremonies, with security of the utmost importance and greatest concern, bridges across Paris were closed. More and more bridges continued to close as opening ceremonies approached. Some bridges were restricted to one-way traffic or bike and pedestrian traffic only, while others were completely closed. At times, all but one or two bridges were closed, forcing all Paris traffic attempting to cross the Seine River to compete for space on one bridge or travel far out of the city. This, in combination with other street closures and roadblocks, snarled traffic across the city. Drive times became exponentially larger, not infrequently turning 20-30 minute drives into three-hour journeys.⁴⁶

43 SortirAParis, "Paris 2024: Olympic lanes reactivated this Thursday on the Periph' for the Paralympic Games."

44 "The Dangers of Traffic Congestion," Metropolitan Transportation Commission, Accessed August 22, 2024. <https://mtc.ca.gov/news/dangers-traffic-congestion>.

45 Metropolitan Transportation Commission, "The Dangers of Traffic Congestion."

46 Topham, "Olympic route network opens with some confusion but little congestion."



Olympic lane from London 2012

Credit: Christopher Hilton

Furthermore, non-local drivers are often brought into host cities by major companies to assist with the transportation of clients, staff, and more which can complicate local traffic further as these drivers learn a new city and local driving customs.

Ultimately, any major event will always worsen traffic congestion. However, there are many effective strategies to mitigate this. The use of public transportation, road design, strategic people flow routes, and the encouragement of biking, walking, and other means of transport can be instrumental in relieving traffic congestion. Increased city congestion is never good, but mega international sporting events often result in it. Organizers need to consider new, modern, and bold initiatives to mitigate these events' impacts on congestion to improve safety, the environment, and more throughout host cities.

Community Building

Sports have long brought together many communities, domestically and internationally, large and small. Small sporting events such as secondary school or recreational competitions bring people together, players and spectators alike. Large college competitions can unite schools of tens of thousands and professional leagues can unite states of hundreds of thousands or even millions. International mega-sporting events can bring people together from countries all over the world to one city to celebrate events that have a lot of cultural and societal significance for many.

With the first Paralympic Games in 1960, the International Olympic Committee has shown that sports can also be utilized to promote inclusivity. People from all backgrounds can participate in sporting events, sometimes adapted, to build community among all. Sports exist around the world regardless of race, ethnicity, gender, or any trait.⁴⁷

Another example of a sports building community is when youth participate in them. This occurs in many parts of the world. The youth can benefit greatly from participating in

sports. This can be an avenue for learning, either through following older role models, boosting confidence and self-esteem, and learning skills such as conflict resolution, how to engage with others positively, and much more.⁴⁸

These events also promote national pride and unity. Inevitably, it brings people from different backgrounds, providing them with a platform to address social and political issues. For instance, the 1968 Olympics in Mexico City became a platform for protesting racial inequality. During the ceremony for the 200-meter race, athletes Tommie Smith and John Carlos raised their fists in a Black Power salute as a form of protest against the issue of racial inequality in the United States.⁴⁹

When people come together internationally, not only do people build stronger communities with those from the same place as them, but they can also engage with those from different places to participate in cultural exchange and build appreciation of different cultures worldwide.⁵⁰ This cultural exchange results in an increased understanding of others, which improves inclusivity, international relations, and appreciation of other cultures. This helps spread other cultures across the world, which results in people considering others less as 'different' and increases worldwide respect for others.

This cultural exchange on the city/country-to-person level is extremely important in making people feel welcome while visiting, which builds community and also improves international relations with other countries. When cities build the necessary infrastructure to support these events, new areas such as event venues or other spaces designed to gather people can be used by local residents long after the event to come together as a community and host events such as concerts, meet with friends, or other similar community-building activities. The most benefits from these spaces can be seen when organizers plan for these other uses after the sporting event and design these spaces to be used as such.

The popular art of pin trading has come back in full force at

⁴⁷ Joshua Sipkin, "The Role of Sports in Building Strong Communities," *Medium*, October 2, 2023, <https://medium.com/@joshuasipkin/the-role-of-sports-in-building-strong-communities-43652d0d1b12>.

⁴⁸ Sipkin, "The Role of Sports in Building Strong Communities."

⁴⁹ Hossain Kamyab, "Global Impact of Major Sporting Events," *Medium*, May 18, 2023, <https://hossainkamyab.medium.com/global-impact-of-major-sporting-events-hossain-kamyab-21f31d400128>.

⁵⁰ Sipkin, "The Role of Sports in Building Strong Communities."



Pin trading in London 2012
Credit: Samantha Brough

the Paris 2024 Olympics after COVID-19 disrupted it during Tokyo 2020. Pin trading consists of fans, athletes, and anyone who wants to sport pins of different Olympic teams, different Olympic Games, athletes, sports, mascots, and so much more. Other pins have entered the mix as well, such as pins from other sporting competitions or just pins that people find fun and interesting.⁵¹

Pin traders and collectors will offer to trade a pin they have for one someone else has simply by going up to them when they see them at stadiums or on the street. This bonds the community and breaks language barriers as trades can be officiated with a simple head nod. Many avid pin collectors bring their collection from past Olympic Games, dating back tens of years to Games or events from long ago. Companies and sponsors also make their pins as a marketing tool.⁵² Some pin traders will stand outside stadiums as thousands pour in for a match solely to try to trade pins. Many athletes and staff wear their pins on their Olympic lanyards included with their accreditation, while others sport pins on hats, vests, backpacks, or anywhere they can. To start collecting and trading, one can purchase pins from the Olympic store or find free pins

offered by teams, companies, or other entities.⁵³ Pin trading has long brought and continues to bring together thousands from around the world, regardless of background, culture, or language.

Building a community can have more serious effects than happiness. A bonded community usually results in a safer community.⁵⁴ This is important for locals and visitors. By knowing people in your neighborhood, doing things with them, hosting neighborhood or town events or meetings, or having places where people can come together, communities become safer. Sporting events should only maintain the current level or increase the level of community in a host city, not tear it down. These events are meant for people to come together, whether for a particular team or country or generally to celebrate world-class athletes. The cultural exchange that can occur can be invaluable and something that attendees will never forget.

Economic Impacts of Sporting Events

When cities or countries bid to host mega international sporting events, many considerations must be made to

51 Liz Alderman, "Star Power Elevates Pin Trading, the Unofficial Sport of the Olympics," *The New York Times*. August 6, 2024. <https://www.nytimes.com/2024/08/06/business/paris-olympics-pin-trading.html>.

52 Alderman, "Star Power Elevates Pin Trading, the Unofficial Sport of the Olympics."

53 Alderman, "Star Power Elevates Pin Trading, the Unofficial Sport of the Olympics."

54 "To Achieve Public Safety, Invest in Strong Communities," Center for Justice Innovation, accessed August 29, 2024, <https://www.innovatingjustice.org/articles/what-is-public-safety>.

determine whether or not hosting will be worth it. These considerations vary among hosts, as countries have different motivations based on current infrastructure, economy, and how their residents think. This means that ideas and a country's specific history matter when considering what it wants to do. Some hosts want to increase tourism, some want to improve their country's image, and some want to improve their infrastructure.

There are many potential benefits to hosts such as improved infrastructure in preparation for the event, an improved economy, or a better worldwide image, which can remain in existence after the event for local citizens to use for years to come. This could mean that public transportation is more frequent, more reliable, more safe, or less expensive.⁵⁵ Additionally, hosting major sporting events can cause tourists to flock to the city, spending a lot on housing or accommodations, travel, food and beverage, entertainment, souvenirs and the like, and more.⁵⁶ This tourist spending positively impacts the local economy.

For example, the Super Bowl is one of the most important

sporting events in the United States. It has approximately 100 million viewers per year. Considering the number of visitors, hotel rates, and daytime spending per person the economic benefits of the Super Bowl are between USD 234 million and USD 477 million.⁵⁷ Such revenue has a direct link with the approximately 2,200 to 4,700 new jobs in the LA region. Employment in transportation, hotels and motels, personal care services, and restaurants constitute more than half of these expected gains.⁵⁸

Another positive example can be found in the Euro 2024, where the UEFA Champions League is estimated to make around USD 1.3 billion in net revenue. While this event is not as profitable as the World Cup, several positive aspects can be highlighted. UEFA set many tickets at affordable prices, going as low as USD 32.50, allowing larger access to these events for more people. Moreover, the cost of hosting was not large with only a few stadium upgrades needed. Many German cities not normally seen as tourist destinations, such as Gelsenkirchen and Leipzig, saw a more than 500 percent on-year increase in bookings. In general, the Euro 2024 was seen as a well-

55 Andrew Zimbalist, "Is It Worth It?" International Monetary Fund, March 2010. <https://www.imf.org/external/pubs/ft/fandd/2010/03/zimbalist.htm>.

56 Zimbalist, "Is It Worth It?"

57 Roy Weinstein, Joe Hale, and Jeremy De Gracia, "The Economic Impact of Super Bowl LVI," *Micronomics*, September 2021, <https://lasuperbowlhc.com/wp-content/uploads/2022/01/Super-Bowl-LVI-Economic-Impact-Report-Summary.pdf>.

58 Weinstein, Hale, and De Gracia, "The Economic Impact of Super Bowl LVI."

Deodoro Olympic Park under construction in Rio de Janeiro

Credit: Andre Motta



organized and reasonably affordable tournament.⁵⁹

Similarly, Cricket in India has become an economic powerhouse. The Indian Premier League (IPL), was launched in 2008 and since then it has become one of the richest and one of the most-watched cricket leagues globally. An IPL game is worth more than USD 15 million. IPL has aided by creating jobs, boosting tourism, and providing substantial advertising opportunities. Television rights form a substantial part of the cricket economy in India. Broadcasting companies pay huge amounts of money to secure the rights to telecast cricket matches, resulting in massive revenues. This has benefitted the entire ecosystem of cricket, including players and associated businesses.⁶⁰

However, sporting events are a double-edged sword: they could bring great economic benefits or they can be very costly for the host country. Potential host cities and countries must also be aware of possible negative effects to their economy as well. Economic benefits that may be seen by businesses in the area may be shuttled out of the area to a company's larger corporate office. It is also extremely expensive to build the necessary infrastructure for these events, including stadiums, housing, and transportation. However, this infrastructure can have benefits for locals beyond the event.⁶¹

For instance, the 2014 Brazil World Cup was one of the most expensive World Cups to date. Brazil decided to have 12 host cities instead of the required eight. This meant more stadiums, hotels, and infrastructure which was too large of an economic strain to handle. Moreover, citizens were angered by the implemented tax increases to finance the World Cup. The World Cup added USD 14 billion to the country's economy. Nevertheless, the total cost of the tournament was over USD 11 billion, considering that USD 3.6 billion came from taxes and only 2.5 percent of the cost came from tourist revenue.

Moreover, the Brazilian government promised to construct much-needed infrastructure like basic road renovations or plumbing. Nevertheless, most projects were dropped to construct tournament-related infrastructure.⁶²

Cities also spend a lot of money to bid for these mega sporting events. Money must be spent to improve the appearance, feasibility, and benefit of hosting events in specific cities, and cities are not hesitant to do so.⁶³ For many cities and countries, stadiums built for the Games that go unused afterward continue to cost a lot of money to maintain, so hosts must find ways to utilize numerous large stadiums effectively to benefit the most economically.⁶⁴ Most venues at the Olympic Park in Rio during the 2016 Olympics have been abandoned and serve no purpose for residents. Many believe this money that was spent on the Olympics could have been much better spent on other infrastructure that would have benefitted locals, rather than unused stadiums.⁶⁵

International sporting events have put numerous cities and countries into substantial debt. Montreal incurred USD 2.8 billion in debt while putting on the 1976 Summer Olympic Games, despite city officials previously projecting a cost of USD 124 million to put on the Games.⁶⁶ When cities go into debt or over budget when hosting the Olympics, it is usually due to building infrastructure, such as stadiums. Because of this incurred debt, zero cities bid for the 1984 Games, though Moscow had already agreed to the 1980 Games. Los Angeles finally agreed to host the 1984 Games if they did not have to pay for it. The IOC was forced to accept this proposal and the 1984 Summer Games took place in Los Angeles.⁶⁷

Much private money was raised to fund these Games and Los Angeles was successful in spending little on its production. This led to overall financial success for Los Angeles due to hosting the Games. Because of this, many more cities wanted

59 Steve Price, "From Saxophones To Rival Jerseys, The Economic Impact Of Euro 2024," *Forbes*, July 8, 2024, <https://www.forbes.com/sites/steveprice/2024/07/08/from-saxophones-to-rival-jerseys-the-economic-impact-of-euro-2024/>.

60 Ngawang Gamtso Hardy, "Cricket and Indian Economy," *Thai India*, accessed August 24, 2024, <https://www.thaiindia.net/information/in-focus/item/5050-cricket-and-the-indian-economy.html>.

61 Worden, "Human Rights Abuses Will Taint the Olympics and the World Cup. It's Time to End 'Sportswashing' Now."

62 Yang, "The Tale of Two Tournaments: A Football Story."

63 Zimbalist, "Is It Worth It?"

64 Zimbalist, "Is It Worth It?"

65 "These abandoned Olympic venues look so sad," *CBS News*, January 24, 2022. <https://www.cbsnews.com/pictures/abandoned-olympic-venues-sites/>.

66 Zimbalist, "Is It Worth It?"

67 Zimbalist, "Is It Worth It?"

to host future games. However, the financial structure of the Games did not continue. It was not possible to gain as much private support as was gained in Los Angeles 1984, so future cities had to spend billions of dollars to ensure the success of the Games, including Seoul, Barcelona, Nagano, Sydney, Athens, and Beijing.⁶⁸

The initial cost estimates for hosting the Games can be deceptive. Often, these estimates do not include all costs associated with hosting the event, but rather just some of the more basic costs. Also, as cities want to impress the world while hosting, cities can be inclined to spend more on “unnecessary” features or the like for the Games to improve their image.⁶⁹ Some suggest that the best way to ensure the best use of land and reuse of stadiums is to have a select number of cities rotate hosting the Games.⁷⁰ This would aid in being able to reuse stadiums and utilize previous infrastructure and the like, but it would also diminish the potential benefits hosting the Games can have, especially for developing countries, such as catalyzing growth due to new infrastructure or other improvements.

Case Study: The 2008 Beijing Olympics and the Legacy of International Sporting Events

While major international sporting events draw thousands of attendees, and are watched by millions, it is equally important to consider what happens after the event or competition concludes. Hosting an international sporting event, like the Olympics, is extremely costly for the host city, largely due to the large amounts of buildings, arenas, or stadiums needed. In 2008, the city of Beijing, China, hosted the Summer Olympics. Beijing 2008 was remembered as one of the most expensive Olympics in history.⁷¹ However, the 2008 Summer Olympics have opened up a wider conversation about the

long-term impacts of constructing such massive venues, as well as what happens long after the competition ends.

In July of 2001, Beijing was awarded its bid to host the 2008 Summer Olympics. China won the bid over countries like Cuba, Egypt, Malaysia, Spain, and Thailand. Immediately after receiving the bid, China began to plan out its Beijing Olympics Action Plan. This Plan called for new stadiums and facilities, as well as a “makeover” of the city of Beijing itself.⁷² China had originally planned to spend around USD 62 billion.⁷³ This included USD four billion for stadiums, venues, and the Olympic Village, as well as around USD 25 billion on infrastructure projects, such as roads, railways, or sewage plants.⁷⁴ The total budget ended up being closer to USD 40 billion by the end of construction. The goal of hosting the Olympics was for China to show the world how “democratic, open, civilized, friendly, and harmonious” it had become.⁷⁵

However, despite the money invested into the construction of new stadiums, the Chinese government quickly received backlash from the international community. This was largely due to the massive amount of forced displacement reported by Chinese citizens, due to “Olympics-related redevelopment.”⁷⁶ In a 2007 report done by the Centre on Housing Rights and Evictions (COHRE), it was estimated that, between 1987-2007, over two million people had been forcibly displaced from their homes to clear space for the Olympic Games.⁷⁷ Of that number, over three-quarters of the displaced people are in China. According to COHRE, “eviction [in China] is characterized by arbitrariness and lack of due process. In many cases, tenants are given little or no notice of their eviction and do not receive the promised compensation.”⁷⁸ During the lead-up to the Games, protests by evicted residents were suppressed,

68 Zimbalist, “Is It Worth It?”

69 Zimbalist, “Is It Worth It?”

70 CNBC, “How Paris Pulled Off One Of The Cheapest Olympics,” YouTube Video, 12:24. July 25, 2024. <https://www.youtube.com/watch?v=WveQVv9rd4A>.

71 “For China, Hosting the Olympics is Worth Every Billion,” *The New York Times*, February 15, 2022. <https://www.nytimes.com/2022/02/14/business/economy/olympics-china-economics.html>.

72 USCBC, “The 2008 Olympics’ Impact on China,” *China Business Review*, July 1, 2008. <https://www.chinabusinessreview.com/the-2008-olympics-impact-on-china/>.

73 “Venues and Infrastructure for the 2008 Olympics in Beijing,” Facts and Details, Accessed August 22, 2024. <https://factsanddetails.com/china/cat12/sub79/item1009.html>.

74 Facts and Details, “Venues and Infrastructure for the 2008 Olympics in Beijing.”

75 USCBC, “The 2008 Olympics’ Impact on China,”

76 Julian Borger, “Olympics blamed for forcible removal of 2m over 20 years,” *The Guardian*. June 5, 2007. <https://www.theguardian.com/world/2007/jun/06/sport.china>.

77 Borger, “Olympics blamed for forcible removal of 2m over 20 years.”

78 Borger, “Olympics blamed for forcible removal of 2m over 20 years.”

and advocates for renters were also reportedly jailed.⁷⁹

The Chinese government repeatedly denied allegations brought up by COHRE or other international human rights organizations. According to Beijing's Olympic organizing committee, only 6,000 people were displaced between 2002 to 2008.⁸⁰ However, COHRE has also noted that many housing rights lawyers and activists had been jailed, some up to five years, for protesting forced evictions.⁸¹ In 2007, the IOC stated that they were seeking a "better understanding" of how events like the Olympics impact the displacement of local communities.⁸²

Despite calls to boycott the event, and concerns raised about both the treatment of citizens as well as athletes, both the Chinese government and the IOC declared the 2008 Olympics a massive success.⁸³ The 2008 Beijing Olympics also set a new record for the largest global audience with just under five billion people tuned in to watch the Olympics.⁸⁴ Outside of just the amount of people watching the competition, a successful Games sped up China's opening to the international community, including through foreign investment, trade, or increased communication.⁸⁵

Nearly 20 years after the conclusion of the 2008 Olympics, its legacy remains complicated. This is largely due to concerns raised over what to do with the stadiums, arenas, or meeting spaces created for the Games. Since many of these structures were created specifically for the Games, they have seen little use since 2008.⁸⁶ In 2018, a photographer captured images of the abandoned stadiums, many of which had weeds, wild

plants, or abandoned merchandise.⁸⁷ Many have pointed to the large human and financial cost of creating a now empty arena as examples of the need to reform policies surrounding international sporting events.

However, abandoned sporting arenas or venues are not unique to Beijing, with many former host cities of the Olympics having similar issues. These buildings, which are sometimes known as "white elephants" have been the subject of debate for decades, as many argue what to do with stadiums after the competition concludes.⁸⁸ After South Africa hosted the FIFA World Cup in 2010, local groups recommended that the newly built Green Point Stadium in Cape Town be converted into affordable housing.⁸⁹ However, this proposal was ultimately unsuccessful and the stadium is still used for local teams. A similar proposal was created in Brazil ahead of the 2016 Rio Olympics. Architects suggested the creation of "Casa Futebol." This proposal would have built low-cost housing units into a stadium.⁹⁰ While this proposal was unsuccessful, it did continue the debate over what to use former arenas and stadiums for.

For countries with political or financial struggles, these structures represent more of a burden than a national honor. The 1984 Winter Olympics were held in Sarajevo, Yugoslavia, yet many of the buildings still sit abandoned nearly forty years later. According to experts, this is mainly due to political instability and war in the area.⁹¹ In 2004, after hosting the Athens Summer Olympics the country of Greece was massively in debt. This resulted in almost every structure built

79 Y. Lee, "Beijing's Poor and the 2008 Olympic Games," Lausanne World Pulse Archives. Accessed August 22, 2024. <https://lausanneworldpulse.com/urban-php/978/07-2008>.

80 Lindsay Beck, "Beijing to evict 1.5 million for Olympics: group," *Reuters*, August 9, 2007. <https://www.reuters.com/article/world/beijing-to-evict-15-million-for-olympics-group-idUSPEK122632/>.

81 Beck, "Beijing to evict 1.5 million for Olympics: group."

82 Beck, "Beijing to evict 1.5 million for Olympics: group."

83 Griffiths James, "The 2008 Olympics was a soft power victory for Beijing. A successful Games in 2022 could validate its authoritarian system." *CNN*, February 21, 2021. <https://www.cnn.com/2021/02/21/asia/beijing-olympics-2008-2022-soft-power-dst-intl-hnk/index.html>.

84 "Beijing Olympics Draw Largest Ever Global TV Audience." Nielsen, September 2008, <https://www.nielsen.com/insights/2008/beijing-olympics-draw-largest-ever-global-tv-audience/>.

85 USCBC, "The 2008 Olympics' Impact on China."

86 Francesca Street, "Beijing's eerie abandoned Olympic venues," *CNN*, August 15, 2018. <https://www.cnn.com/travel/article/beijing-abandoned-olympic-venues/index.html>.

87 Street, "Beijing's eerie abandoned Olympic venues."

88 "The white elephant - What mega sporting events leave behind," SportAndDev.Org, July 7, 2015. <https://www.sportanddev.org/latest/news/white-elephant-what-mega-sporting-events-leave-behind>.

89 SportAndDev.Org, "The white elephant - What mega sporting events leave behind."

90 Jonathan Glancey, "What happens to abandoned stadiums?" *BBC*, July 20, 2014. <https://www.bbc.com/culture/article/20140731-eerie-abandoned-stadiums>.

91 "These abandoned Olympic venues look so sad."

for the games being completely abandoned.⁹² Despite Greece spending an estimated EUR nine billion on construction, it took less than a decade for the event's stadiums to become completely unusable.⁹³

In rare cases, international stadiums are abandoned due to the sport they are built for becoming unpopular. In 1900, the city of Barcelona constructed "Las Arenas," a bull-fighting stadium.⁹⁴ For over a century, "Las Arenas" drew in massive crowds up until Catalonia abolished bullfighting. As a result, the stadium was converted into a shopping mall.⁹⁵

The 2008 Beijing Olympics were also unique due to the city hosting the Winter Olympics in 2022. While both the Winter and Summer Olympics are overseen by the IOC, both competitions do have several differences. For one, almost three times the number of athletes compete at the Summer Olympics compared to the Winter Olympics.⁹⁶ However, a smaller size does not mean that host countries do not spend a large amount of money to put on the event. In a report done shortly after the Olympics, researchers found that the 2022 Beijing Olympics may have cost the Chinese government around USD 40 billion.⁹⁷

Similar to 2008, the Chinese government also faced controversy while hosting the event. The COVID-19 pandemic dominated much of the discussions surrounding the Olympics.⁹⁸ Due to COVID-19 restrictions, tickets were not sold to the general population, instead they were given to select individuals.⁹⁹ The United States government also boycotted the event, due to human rights abuses. This included the repression of the

Uyghurs, a Muslim ethnic minority located within China.¹⁰⁰

Notably for the discussions of infrastructure at the Olympics, the Chinese government reused many structures from the 2008 Summer Olympics in 2022. Around 60 percent of the venues used for the Winter Olympics were already existing or temporary.¹⁰¹ To boost efforts to develop the area as a winter sports destination, the Chinese government also released plans to turn the Olympic Village into apartments following the Games. Meanwhile, the Olympic satellite sites in Yanqing and Zhangjiakou will be refurbished into hotels, apartments, and other commercial spaces.¹⁰² Other plans to transform Big Air Shougang, the Winter Olympic location for skiing and snowboarding, have still gone unused.¹⁰³

Overall, the 2008 Beijing Olympics are a unique case study of the legacy of hosting international sporting events. While many countries may wish to host these competitions, they are often unequipped and unprepared to deal with the massive construction they require. It is encouraged to look into the political, social, and financial repercussions of hosting events that many countries face.

Current Status

Sustainability in International Sporting Events

As international sporting events and competitions only grow in size, so have concerns about their impact on the environment, and their hosts' desire for sustainable building practices. The

92 Bloor Steven, "Abandoned Athens Olympic 2004 venues, 10 years on – in pictures," *The Guardian*, August 13, 2014. <https://www.theguardian.com/sport/gallery/2014/aug/13/abandoned-athens-olympic-2004-venues-10-years-on-in-pictures>.

93 Steven, "Abandoned Athens Olympic 2004 venues, 10 years on – in pictures,"

94 Glancey, "What happens to abandoned stadiums?"

95 Glancey, "What happens to abandoned stadiums?"

96 Mary Cunningham and Taylor Johnston, "How many athletes compete in the Olympics, and more details by the numbers for the 2024 Paris Games," CBS News, July 30, 2024. <https://www.cbsnews.com/news/athletes-olympics-numbers-2024-paris-games/>.

97 Ed Dixon, "Report: Beijing 2022 may cost more than US\$38.5bn," *SP*, February 1, 2022. <https://www.sportspromedia.com/news/beijing-2022-winter-olympics-china-cost/>.

98 Saphora Smith and Jennifer Jett, "Beijing Olympics then and now: Why the 2008 and 2022 Games feel worlds apart," *NBC News*, February 3, 2022. <https://www.nbcnews.com/news/world/beijing-winter-olympics-china-changed-2008-2022-rcna12047>.

99 Saphora Smith and Jennifer Jett, "Beijing Olympics then and now: Why the 2008 and 2022 Games feel worlds apart."

100 Keir Simmons, Laura Saravia and Yuliya Talmazan, "China guilty of genocide, crimes against humanity against Uyghurs, watchdog finds," *NBC News*, December 1, 2021. <https://www.nbcnews.com/news/china/china-guilty-genocide-crimes-humanity-uyghurs-watchdog-finds-rcna8157>

101 "Beijing's Awkward Olympic Legacy Shows Risk of Venue Reuse," *Bloomberg News*, February 3, 2023. <https://www.bloomberg.com/news/features/2023-02-03/beijing-s-awkward-olympic-legacy-shows-risk-of-venue-reuse>.

102 Carlie Porterfield, "Here's How China Repurposed 2008 Summer Olympic Venues For The Winter Games," *Forbes*, February 3, 2022. <https://www.forbes.com/sites/carlieporterfield/2022/02/01/heres-how-china-repurposed-2008-summer-olympic-venues-for-the-winter-games-photos/>.

103 "Beijing's Awkward Olympic Legacy Shows Risk of Venue Reuse."

United Nations defines sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”¹⁰⁴ Climate activists have also called attention to the massive environmental impact that hosting an international event like the Olympics could cause. The last three Olympic Games produced an average of 3.5 million tons of CO₂. This is more than the annual emissions of India and Germany combined.¹⁰⁵

The International Olympic Committee (IOC) and previous host cities have also made efforts to reduce the environmental impact of the games. These included using strong waste management systems, sustainable infrastructure development, renewable energy, and materials obtained responsibly.¹⁰⁶ The IOC also co-launched the United Nations Sports for Climate Action Framework¹⁰⁷ and committed to reducing 50 percent of direct and indirect greenhouse gas emissions by 2030.¹⁰⁸

The 2024 Paris Olympic Games aimed to distance themselves from previous years, by promoting themselves as the “greenest games ever.”¹⁰⁹ Organizers pledged to cut the carbon footprint of the games in half, largely in order to align with the 2015 Paris Agreement on Climate Change.¹¹⁰ This was done by cutting back on constructing new stadiums and venues, as well as relying on wood and low-carbon concrete to construct new

buildings.¹¹¹ Tony Estanguet, the President of Paris Olympics 2024, stated: “We want the legacy to be different. We’ve promised to cut the carbon footprint in half from the London Olympics in 2012.”¹¹²

However, despite some activists praising the steps taken by the Paris Olympics, others have noted that hosting a truly sustainable Olympics may be impossible.¹¹³ Many have pointed to a lack of transparency from organizers, especially in their claim that the Games will only be using renewable energy.¹¹⁴ Climate activists have stated that in much of Europe, renewable energy certificates are often given to projects that are not renewable.¹¹⁵ In Tahiti, where events like surfing occurred for the 2024 Games, Paris organizers damaged a coral reef in the process of installing an optional tower.¹¹⁶ After harsh criticism from local populations, the project was scaled back.¹¹⁷ Finally, climate activists have pointed out that the largest percentage of greenhouse gas emitted during sporting events occurs due to travel to and from the event.¹¹⁸ Paris organizers did little to offset the environmental costs of travel.

One of the most famous “green” actions taken by the Paris Olympics was their ambitious plan to clean the Seine River. While the river is one of Paris’s most famous landmarks, people have been banned from swimming in the river since

104 “Sustainability,” The United Nations, Accessed August 22, 2024. <https://www.un.org/en/academic-impact/sustainability>.

105 Mike Gavin, “How the Paris Olympics is going green to help protect the environment,” Boston10, May 7, 2024. <https://www.nbc.com/paris-2024-summer-olympics/paris-olympics-2024-carbon-footprint/3345708/>.

106 “The Sustainable Olympics: A Green Future in Global Sports,” Cadence, May 29, 2024. https://community.cadence.com/cadence_blogs_8/b/life-at-cadence/posts/the-sustainable-olympics-a-green-future-in-global-sports.

107 “Sports for Climate Action,” United Nations Climate Change, Accessed August 22, 2024. <https://unfccc.int/climate-action/sectoral-engagement/sports-for-climate-action>

108 Ywan Penvern, “From Sports Hero to Net Zero,” Deloitte, Accessed August 22, 2024. <https://www.deloitte.com/global/en/about/story/impact/ioc-sustainability.html>.

109 Tony Heynen, “Timber venues, river swimming and re-use: how the Paris Olympics is going green – and what it’s missing,” University of Queensland News, July 26, 2024. <https://www.uq.edu.au/news/article/2024/07/timber-venues-river-swimming-and-re-use-how-paris-olympics-going-green-%E2%80%93-and-what-it>.

110 “The Sustainable Olympics: A Green Future in Global Sports.”

111 Heynen, “Timber venues, river swimming and re-use: how the Paris Olympics is going green – and what it’s missing.”

112 Jules Boykoff, “The Paris Olympics Are a Lesson in Greenwashing,” Scientific American, July 24, 2024. <https://www.scientificamerican.com/article/the-paris-olympics-are-a-lesson-in-greenwashing/>.

113 Boykoff, “The Paris Olympics Are a Lesson in Greenwashing.”

114 Boykoff, “The Paris Olympics Are a Lesson in Greenwashing.”

115 Mooldijk Silke, Thomas Day and Sybrig Smit “Navigating the nuances of corporate renewable electricity procurement: Spotlight on Fashion and Tech,” New Climate Institute, January 2024. https://newclimate.org/sites/default/files/2024-01/NewClimate_RenewableElectricityReport_%20Jan24.pdf.

116 John Leicester, “The Paris Olympics scales back design of a new surf tower in Tahiti after criticism from locals,” Associated Press, November 17, 2023. <https://apnews.com/article/paris-olympics-tahiti-surfing-environment-c6fd6bc7787fbc593a7e9641f5dd1a5>

117 Leicester, “The Paris Olympics scales back design of a new surf tower in Tahiti after criticism from locals.”

118 David M. Herold, Tim Breitbarth, Anja Hergesell, Nico Schulenkorf, “Sport events and the environment: Assessing the carbon footprint of spectators’ modal choices at professional football games in Austria.” *Journal of Cleaner Production*, (Volume 452, 2024). <https://doi.org/10.1016/j.jclepro.2024.142259>.

1923.¹¹⁹ This is due to the large amount of pollution and human waste that makes it unsafe for the public to use.¹²⁰ To prepare the Seine to host the Olympics' open water swimming events, the city invested EUR 1.4 billion into cleaning up the river.¹²¹ Specific infrastructure projects included overhauling the river's sewage process, and encouraging households who live upstream of Paris to discharge their waste into sewer systems, instead of the river itself.¹²²

Despite the large amount of time and money spent on the project, many have criticized the effectiveness of the Seine clean-up. While the river did meet the requirements to be used for the Games just before the event occurred, heavy rain caused concern over the river's safety.¹²³ Two athletes also reported illness due to the river. Claire Michel, a Belgian athlete, was admitted to a French hospital with an infection that was later reported as E.coli, a type of bacteria that can cause infections in your gut, urinary tract, and other parts of your body. This caused the withdrawal of the entire Belgian triathlon team.¹²⁴

With these concerns, many have labeled the 2024 Paris Olympics, and similar "green" sporting events as greenwashing. Greenwashing may be defined as initiatives that appear eco-friendly, but continue to cause environmental harm.¹²⁵ This can include anything from a team's merchandise being advertised as using recycled materials, to an event marketing itself as carbon neutral. For example, the 2022 Qatar World Cup has received backlash for their "dubious carbon neutrality claims," and partnerships with oil and gas companies.¹²⁶ Even individual sports teams have been accused of greenwashing. In

2022, Manchester City, a soccer team in England, launched a sustainability campaign, encouraging fans to recycle plastic bottles in exchange for reward miles from Etihad Airways.¹²⁷ Concerns were immediately raised by activists, due to the large amount of pollution caused by air travel.¹²⁸

Sustainability, or negative environmental impacts, in sports, is not just something considered in mega-sporting events. The Rugby World Cup is an international rugby tournament held every four years, with the most recent tournament being held in France in 2023. The Rugby World Cup 2023 (RWC 2023) was unique in that it aligned its objectives with 12 of the United Nations's Sustainability Goals (SDGs) in order to host a tournament with "a positive impact."¹²⁹ While the tournament was criticized by activists for lacking clear measures and targets for reducing its impact on the environment, it was applauded for beginning to develop an environmental strategy. Examples like RWC 2023 demonstrate the increasing interest from the international community in sustainable sporting events. Delegates are encouraged to look into green sporting events, in order to create solutions that help to truly limit their environmental impact.

Case Study: The 2022 FIFA World Cup and Labor Exploitation

The Federation Internationale de Football Association (FIFA) was founded in 1904 to govern, host, and create regulations surrounding international games of soccer.¹³⁰ In 1930, FIFA would host the first World Cup in Uruguay.¹³¹ The World Cup is the largest international soccer tournament, taking place

119 O'Sullivan Feargus, "Paris Spent €1.4 Billion to Clean Up the Seine. Has It Worked?" Bloomberg, July 23, 2024. <https://www.bloomberg.com/news/features/2024-07-23/how-paris-cleaned-up-the-seine-ahead-of-2024-olympics-and-where-to-swim>.

120 Sylvie Corbet, "Cleaning up the Seine: the Olympics boosts a Parisian dream, but it's still far from fully achieved," Associated Press. August 10, 2024. <https://apnews.com/article/olympics-2024-paris-seine-water-cleanup-legacy-88717b690920af051e7008e37671bd7b>.

121 Sylvie, "Cleaning up the Seine: the Olympics boosts a Parisian dream, but it's still far from fully achieved."

122 Feargus, "Paris Spent €1.4 Billion to Clean Up the Seine. Has It Worked?"

123 Corbet, "Cleaning up the Seine: the Olympics boosts a Parisian dream, but it's still far from fully achieved."

124 Feargus, "Paris Spent €1.4 Billion to Clean Up the Seine. Has It Worked?"

125 "Greening the Games? Diving Into the 2024 Paris Olympics' Sustainability Efforts," Plastic Pollution Coalition, Accessed August 20, 2024. <https://www.plasticpollutioncoalition.org/blog/2024/8/20/are-efforts-to-green-the-olympic-games-enough>.

126 Jacob Whitehead, "Qatar World Cup and Manchester City handed 'Bad Sport' awards for 'greenwashing'," The Athletic. September 28, 2022. <https://www.nytimes.com/athletic/3637095/2022/09/28/world-cup-manchester-city-greenwashing/>.

127 "Badvert of the Month: Free flights for plastic bottles? Greenwash reaches new heights with Manchester City x Etihad," Badvertising, Accessed April 13, 2022. <https://www.badverts.org/latest/badvert-of-the-month-free-flights-for-plastic-bottles-greenwash-reaches-new-heights-with-manchester-city-x-etihad>.

128 "Badvert of the Month: Free flights for plastic bottles? Greenwash reaches new heights with Manchester City x Etihad,"

129 Fulton Ben, "How Sporting Events Can Score Big on Sustainability," Knowledge Instead, September 20, 2023. <https://knowledge.insead.edu/responsibility/how-sporting-events-can-score-big-sustainability>.

130 FIFA, "History," Accessed August 22, 2024. <https://www.ussoccer.com/history/organizational-structure/fifa>.

131 Orlando Mayorquin, "How does the World Cup work? The ultimate soccer showcase, explained," USA Today. November 30, 2022. <https://www.usatoday.com/story/sports/soccer/2022/11/19/2022-qatar-world-cup-group-knockout-stage-explained/8083358001/>.

every four years.

Since its creation, the World Cup has only grown in popularity with over 550 million people tuned in to watch the opening match of the 2022 Qatar World Cup.¹³² However, as the event has become more widespread and crowd size has only increased, more concerns have been raised regarding its impact on the country hosting it and the international community.

In 2010, following a series of votes by FIFA officials, Qatar won its bid to host the 2022 World Cup over countries like Australia, Japan, South Korea, and the United States.¹³³ However, this decision was marked with controversy, with many accusing FIFA members and other organizations of accepting bribes to give the bid to Qatar. A 2014 internal inquiry from FIFA cleared Qatar of any charges of wrongdoing, allowing the tournament to proceed.¹³⁴ However, the United States Department of Labor later concluded that FIFA officials were bribed to give the bid to Qatar.¹³⁵

During the lead-up to the tournament, it is estimated that the government of Qatar invested more than USD 200 billion into infrastructure and construction in the city of Doha.¹³⁶ This included eight new stadiums, hotels, public transportation, and expanding airport access.¹³⁷ The majority of construction and labor was done by the city's two million migrant workers. 95 percent of Qatar's workforce is made up of migrant laborers from East Africa, South Asia, and Southeast Asia. All of these groups were essential to the World Cup's success and creation.¹³⁸ Various human rights groups have alleged malpractice by the Qatari government and the mistreatment

of laborers. This included discrimination, modern slavery, charging recruitment fees, workers being trapped in their occupations, thousands of workers dying as a result of health and safety violations, and non-payment of wages.¹³⁹

A major concern of international human rights organizations is the *Kafala System*, which is a common labor practice in the Gulf. The *Kafala System* ties workers to their sponsors, which gives employers control over migrant workers' employment and immigration status.¹⁴⁰ As a result, many migrants reported traveling to Qatar in the hopes of earning wages to send to their families, only to take on debt and become trapped in "labor camps" on the outskirts of Doha, or die during the creation of these massive infrastructure projects.¹⁴¹

In early 2023, over six months after the conclusion of the tournament, Human Rights Watch reported that FIFA and the Qatari government had still not provided compensation for "widespread abuses, including wage theft and unexplained deaths of migrant workers who prepared and delivered the tournament."¹⁴² In 2023, many workers were effectively stuck in Qatar, without employment or compensation, fearing they may lose significant end-of-service payments that are given to them after years of employment if they leave. Many received orders from their employers to hold off until they received new business or contracts.¹⁴³ FIFA has also not addressed the concerns of migrants, despite generating over USD seven billion in revenue.

Outside of the impacts on migrant workers, and the loss of life to create new infrastructure for the tournament, the

132 "One Month On: 5 billion engaged with the FIFA World Cup Qatar 2022," InsideFIFA, January 18, 2023. <https://inside.fifa.com/tournaments/mens/worldcup/qatar2022/news/one-month-on-5-billion-engaged-with-the-fifa-world-cup-qatar-2022-tm>

133 Becky Sullivan, "Why Qatar is a controversial host for the World Cup," National Public Radio, November 18, 2022. <https://www.npr.org/2022/11/18/1137204271/qatar-world-cup-controversies>.

134 Sullivan, "Why Qatar is a controversial host for the World Cup."

135 Tariq Panja and Kevin Draper "U.S. Says FIFA Officials Were Bribed to Award World Cups to Russia and Qatar," *New York Times*, December 18, 2022. <https://www.nytimes.com/2020/04/06/sports/soccer/qatar-and-russia-bribery-world-cup-fifa.html>.

136 Grace Hauck, "Migrant workers were deceived and died for Qatar's World Cup. Thousands want compensation," *USA Today*, November 29, 2022. <https://www.usatoday.com/in-depth/sports/2022/11/29/migrant-worker-deaths-qatar-world-cup/8316405001/>.

137 Hauck, "Migrant workers were deceived and died for Qatar's World Cup. Thousands want compensation."

138 "Qatar World Cup Parallel Portal," Business & Human Rights Resource Centre, Accessed August 22, 2024. <https://www.business-humanrights.org/en/from-us/fifa-world-cup-qatar-2022-parallel-portal/>.

139 "Qatar World Cup Parallel Portal."

140 Christina Thornell, "How Qatar built stadiums with forced labor," VOX, December 1, 2022. <https://www.vox.com/videos/23488387/qatar-fifa-world-cup-kafala-system-migrant-forced-labor>.

141 Hauck, "Migrant workers were deceived and died for Qatar's World Cup. Thousands want compensation."

142 "Qatar: Six Months Post-World Cup, Migrant Workers Suffer." Human Rights Watch, June 16, 2023. <https://www.hrw.org/news/2023/06/16/qatar-six-months-post-world-cup-migrant-workers-suffer>.

143 "Qatar: Six Months Post-World Cup, Migrant Workers Suffer."

World Cup also has a massive economic impact on its host country.¹⁴⁴ When Qatar won the bid to host the World Cup, FIFA estimated that the country would generate around USD 20 billion in revenue.¹⁴⁵ Studies have also shown that the financial gains from hosting an international sporting event like the World Cup are often a lot less than estimated. This is largely due to the need for public investments and the private sector to pay for large international sporting events, as well as that many jobs created in host countries are short-term or tourism jobs.¹⁴⁶

Almost two years after the conclusion of the 2022 World Cup, all of its eight stadiums are still standing, with many still actively being used. However, for a long period after the tournament concluded, many sat empty, still decorated and filled with signs for the 2022 event, even in late 2023.¹⁴⁷ In other cities, including Al Bayt, there were additional construction plans to develop a five-star hotel, shopping center, or food court. However, little, if any, progress has been made. Many experts point to Qatar's wealth as a sign that the country may wait to deconstruct 2022 World Cup facilities or engage in further construction to create more long-lasting structures.¹⁴⁸

According to a statement made by the Qatari government, "All of the Qatar 2022 stadiums have been in regular use since the FIFA World Cup ended. Clubs in the Qatar Stars League use several venues as their home grounds for domestic league matches. Stadiums are also used for the Amir Cup final -- Qatar's showpiece competition -- and international matches, including FIFA World Cup 2026 qualifiers."¹⁴⁹

As much of the world sets its sights on the 2026 World Cup, many are left to contend with the 2022 tournament's complicated legacy. For fans of the sport, as well as FIFA,

the tournament was a major success and raised a historically large amount of money for both Qatar and FIFA.¹⁵⁰ However, for many human rights organizations and activists, the 2022 World Cup sets a troubling precedent for labor regulations when it comes to creating large sporting events. Even after international outcry, there was little improvement made for migrant workers in Qatar.¹⁵¹ According to Amnesty International, workers still need permission from their employers to change jobs, and many predatory labor practices still exist within the country.¹⁵²

The tournament was held in 2022 in one of the richest countries on earth, but still, thousands of laborers died or suffered mistreatment to create the massive amount of infrastructure needed. As of today, the international community is still unable to determine the exact number of people who died as a result of the Qatari's government refusal to investigate.¹⁵³ Overall, the 2022 Qatar World Cup is a clear example of both the economic and human toll that the construction of sporting events takes, and should be used as a case study for the need to balance the human cost of hosting such an event.

Sustainable Development Goals

Sustainable Development Goals (SDGs) are goals that the United Nations has deemed to be incredibly important to accomplish for society. The United Nations has identified 17 goals.¹⁵⁴ There are many SDGs that are relevant to the work of UN-Habitat in relation to the social and environmental effects of sporting events.

One of the first relevant goals is SDG 8, Decent Work and Economic Growth. This goal looks to "promote sustained,

144 "Understanding the Economic Impact of Hosting the FIFA World Cup," AngelouEconomics, December 1, 2022. <https://angeloueconomics.com/keep-up-with-ae/understanding-the-economic-impact-of-hosting-the-fifa-world-cup/>.

145 "Understanding the Economic Impact of Hosting the FIFA World Cup,"

146 "Understanding the Economic Impact of Hosting the FIFA World Cup,"

147 James Olley, "One year after 2022 FIFA World Cup, what has changed in Qatar?" *ESPN*, November 22, 2023. https://www.espn.com/soccer/story/_/id/38919896/one-year-2022-fifa-world-cup-changed-qatar.

148 Olley, "One year after 2022 FIFA World Cup, what has changed in Qatar?"

149 Olley, "One year after 2022 FIFA World Cup, what has changed in Qatar?"

150 "FIFA earns record \$7.5bn revenue for Qatar World Cup," *Al Jazeera*, November 20, 2022. <https://www.aljazeera.com/sports/2022/11/20/fifa-revenue-hits-7-5b-for-current-world-cup-period>.

151 Miguel Delaney, "Qatar World Cup workers suffered 'human rights abuses', new Amnesty report finds," *The Independent*, June 15, 2023. <https://www.independent.co.uk/sport/football/qatar-human-rights-abuse-world-cup-amnesty-b2357713.html>.

152 Miguel Delaney, "A year on from Qatar, this is the real legacy of the 2022 World Cup," *The Independent*, November 20, 2023. <https://www.independent.co.uk/sport/football/qatar-2022-world-cup-lionel-messi-b2449055.html>.

153 Delaney, "A year on from Qatar, this is the real legacy of the 2022 World Cup."

154 "The 17 Goals," United Nations Department of Economic and Social Affairs, Accessed August 22, 2024. <https://sdgs.un.org/goals>.

inclusive and sustainable economic growth, full and productive employment and decent work for all.”¹⁵⁵ When considering the big economic growth opportunity that host countries face when hosting sporting events, there is a clear need to make sure that it is sustainable. Target 8.4 refers specifically to the need to achieve this growth without causing harm to the environment. This should be done by promoting “resource efficiency in consumption and production.”¹⁵⁶ Mega sporting events provide jobs for people as they require thousands of workers to set up venues, deliver goods, staff necessary positions, and much more. It is also important to consider that decent work for everyone involved in the event needs to be granted. Target 8.8 refers to promoting “safe and secure working environments for all workers.”¹⁵⁷ Considering the history of human rights violations to workers in sporting events, this target should be kept in mind in the development of such.

Another very relevant goal is SDG 9, Industry, Innovation, and Infrastructure. This goal looks to “build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.”¹⁵⁸ When thinking about the creation or modification of infrastructure in host countries, it is crucial that sustainability is promoted. Target 9.1 refers to the development of “quality, reliable, sustainable and resilient infrastructure.”¹⁵⁹ It is important to use existing infrastructure creatively and build new infrastructure strategically in order to minimize empty stadiums wasting away after events while continuing to draw a lot of public money in maintenance costs. Also, strategically building stadiums, venues, and athlete or worker housing can benefit countries or cities for years to come.

An additional goal that should be considered is SDG 13, Climate Action. This SDG refers to taking “urgent action to combat climate change and its impacts.”¹⁶⁰ Specifically, target 13.2 makes reference to the need to “Integrate climate change measures into national policies, strategies and planning.”¹⁶¹

The planning of sporting events should not be overlooked when taking steps to achieve this goal. There are many ways in which sporting events contribute negatively to the environment. From the large carbon footprints of traveling, to the creation of new infrastructure, there is no denying that there are a lot of steps that are needed to achieve this goal.

The SDGs are challenging goals to accomplish. Accomplishing these goals will require tremendous collaboration and diplomacy between countries. It is important that these goals are accomplished to better society. Delegates should consider how these SDGs relate to initiatives that their own country may have already enacted or what work can be done domestically that can contribute to an overall international effort and response to address these goals.

Bloc Analysis

Points of Division

Countries differ widely in their opinion of the overall benefit of mega international sporting events. These opinions are generally based upon the impact that a sporting event like this will have or has had on their country. Understandably, this is at the forefront of what countries are considering, though it is important to note that the same sporting event could have widely varying effects in different countries and host cities. Many countries have hosted mega international sporting events like the Olympics or FIFA before. Many have not. In addition, many countries or their cities have applied to host but have been denied.

The topic of Social and Environmental Impacts of Sporting Events can be a difficult one to distinguish blocs for. While countries can unite on many experiences or ideas, they will also likely disagree on many aspects as these events can have different outcomes in different countries based on existing infrastructure, economy, and more. Thus, these blocs are a

155 “Goal 8,” United Nations Department of Economic and Social Affairs, Accessed August 22, 2024. <https://sdgs.un.org/goals/goal8>.

156 United Nations Department of Economic and Social Affairs, “Goal 8.”

157 United Nations Department of Economic and Social Affairs, “Goal 8.”

158 “Goal 9,” United Nations Department of Economic and Social Affairs, accessed August 22, 2024. <https://sdgs.un.org/goals/goal9>.

159 United Nations Department of Economic and Social Affairs, “Goal 9.”

160 “Goal 13,” United Nations Department of Economic and Social Affairs, accessed August 22, 2024, <https://sdgs.un.org/goals/goal13>.

161 United Nations Department of Economic and Social Affairs, “Goal 13.”

guide of countries who likely have similar overall opinions about these types of events, but there will likely be much disagreement within these blocs as well. Delegates should be prepared to identify these differences and determine how to move forward with the shared goals within each bloc.

Countries Whose Cities Have Hosted Mega International Sporting Events

These countries have hosted mega international sporting events, though with varying success. These countries will also vary into what extent their hosting was done sustainably. Recent requirements include sustainable execution of these events, so these countries will be largely aligned on a goal of sustainability moving forward, even if they did not host sustainably previously. These countries will also vary in how hosting positively or negatively affected them, but they will share the experience of the challenges of hosting and the complexity it involves and can use that knowledge and experience to move forward with making these events more sustainable in the future.

One example of a country that would belong to this bloc is Canada. The country has hosted multiple mega sporting events, such as the Summer and Winter Olympic Games four times total.¹⁶² They are also expected to host the 2026 FIFA World Cup alongside the United States and Mexico, countries that would also belong to this bloc.¹⁶³ Another example is Japan, which has hosted the Summer and Winter Olympic Games four times total.¹⁶⁴ Brazil would be another example of a country in this bloc, hosting the Summer Olympic Games once, the FIFA World Cup one time, and expected to host the 2027 FIFA Women's World Cup.¹⁶⁵

As noted, despite all of these countries having hosted mega international sporting events, they have done so a different number of times, in different years, and have had varying

outcomes and degrees of success. These countries have also had varying levels of sustainability in hosting these events.

Countries Whose Cities Have Applied to Host Mega International Sporting Events and Been Declined

These countries have decided that at least at one time that hosting would be beneficial to them, though their reasoning may vary. Reasons could include infrastructure, the economy, or image. These countries share that they have been denied, though reasons vary. These reasons could include security concerns or doubts about if sustainability was feasible.

One example of a country that would belong to this bloc is Türkiye. The country submitted a bid to host the 2020 Olympic Games. The reasons for this seem to vary, however, on the bid stood out the promise of multiple mega-projects to get the city ready.¹⁶⁶ This differed with Japan's approach, as they focused on how they would use the existing infrastructure. Another country that would belong to this bloc is Morocco, which was the only other country that bided to be a host for the 2026 FIFA World Cup.¹⁶⁷ Delegates within this bloc are encouraged to look into smaller international sporting events that may have occurred within their country.

Countries Whose Cities Have Never Applied to Host Mega International Sporting Events

These countries have never hosted a mega international sporting event. Their reasoning for this may vary. These reasons could include economic infeasibility, the belief that they won't be selected and therefore hosting would not be worth it, or concerns about possible disruption to displacement in the city.

Many major sporting organizations show bias towards Western countries to host these events. Delegates should consider this as well and if it is possible to reduce this bias or

162 Paul McGaughey, "Canada's history of hosting Olympic Games," CBC, July 25, 2015, <https://www.cbc.ca/sports/pan-american-games/canada-s-history-of-hosting-olympic-games-1.3167868>.

163 "Host Countries and Cities," FIFA, accessed August 30, 2024, <https://www.fifa.com/en/tournaments/mens/worldcup/canadamexicousa2026/host-cities>.

164 "Olympic Games," Japan-Guide, accessed August 30, 2024, <https://www.japan-guide.com/e/e2260.html>.

165 "Brazil appointed FIFA Women's World Cup 2027 hosts," FIFA, May 17, 2024, <https://www.fifa.com/en/tournaments/womens/womensworldcup/brazil-2027/articles/womens-world-cup-2027-host-announced>.

166 "There are many reasons why Istanbul's Olympic bid failed," The National, accessed August 30, 2024, <https://www.thenationalnews.com/there-are-many-reasons-why-istanbul-s-olympic-bid-failed-1.341248>.

167 "World Cup 2026: Canada, US & Mexico joint bid wins right to host tournament," BBC, accessed August 30, 2024, <https://www.bbc.com/sport/football/44464913>.

its effects moving forward. Countries may also not have the infrastructure or organization in government to even consider applying. Delegates can also consider why this is the case for these countries. Countries in this bloc may include India, New Zealand, and Vanuatu. Although it should be considered that India has stated their intention to bid to host the 2036 Olympics.¹⁶⁸

Committee Mission

The United Nations Human Settlements Programme (UN-Habitat) works towards better cities for all. The UN General Assembly mandates UN-Habitat to “promote socially and environmentally sustainable towns and cities.”¹⁶⁹ As the rate of urbanization continues to increase every year, the work of UN-Habitat continues to be extremely important to ensure cities are safe for all. Urbanization is when people move from rural to more urban areas. 33 percent of the world lived in cities in 1950, 50 percent in 2000, and it is estimated that 66 percent of people will live in cities by 2050.¹⁷⁰ UN-Habitat believes urbanization is a positive phenomenon that can “[reduce] inequality, discrimination and poverty.”¹⁷¹

UN-Habitat works towards its goals by looking at many issues that grip cities. Cities have the potential to have positive effects on their residents, but negative impacts such as disease, crime, pollution, and poverty abound in today’s cities as well.¹⁷² UN-Habitat is mandated by the UN General Assembly to improve cities while considering the effects that vulnerable populations can suffer from them.¹⁷³

When considering the topic “Social and Environmental Impacts of Sporting Events” delegates are expected to consider the positive and negative effects that they can bring. The focus would not only be on countries as a whole but individual communities should be also considered. UN-Habitat works towards its goals through collaboration and diplomacy, science and research, and creativity.

Mega international sporting events can also have numerous positive impacts on cities. However, the negative impacts can be serious and must be addressed despite the positive impacts that occur. UN-Habitat cannot enforce its decisions on UN member states. Its decisions are non-binding. Keeping this in mind, delegates should identify the most pressing issues related to the social and environmental impacts of these large international sporting events and determine how to best curb these negative impacts while allowing the positive impacts to prevail.

168 Menon Anirudh, “India 2036: Hosting Olympics is a whole new ball game - on the field and off it,” ESPN, October 19, 2023. https://www.espn.com/espn/story/_/id/38694544/india-2036-olympics-hosting-games-whole-new-ball-game.

169 “About Us,” UN-Habitat, Accessed August 22, 2024. <https://unhabitat.org/about-us>.

170 “UN-Habitat: United Nations Human Settlements Programme,” Office of the Secretary-General’s Envoy on Youth, Accessed August 22, 2024. <https://www.un.org/youthenvoy/2013/08/un-habitat-united-nations-human-settlements-programme/>.

171 UN-Habitat, “About Us.”

172 Office of the Secretary-General’s Envoy on Youth, “UN-Habitat: United Nations Human Settlements Programme.”

173 Office of the Secretary-General’s Envoy on Youth, “UN-Habitat: United Nations Human Settlements Programme.”



UN-HABITAT

NHSMUN 2025

TOPIC B:
SUSTAINABLE CONSTRUCTION PRACTICES

Photo Credit: Jeff Kubina

Introduction

Building new infrastructure is important for population growth and innovation. It is also important to use environmentally conscious construction techniques. Concern is rising regarding the potential damage new cities, roads, and infrastructure may bring. The global construction industry is responsible for 27 percent of the world's carbon emissions.¹ The United Nations Environment Programme (UNEP) states the steel and concrete industries are 38 percent of Sub-Saharan Africa's global carbon emissions.² This highlights the critical need for zero-emissions buildings. Pollution impacts other areas of life including water quality, air, and overall health. Sustainable construction can reduce energy costs, upcycle old materials, and minimize waste.³ The impact of tackling this issue on a global scale goes far beyond building habitable spaces.

Regulation through policy enforcement and global cooperation efforts is also key. Tackling this issue through policy also has economic benefits. These can be lowering operational costs, enhancing property values, and creating green jobs. Corporations can also experience similar benefits, as sustainable materials and developments are more long-lasting and less costly to maintain. Efficient resource management is also crucial to maintaining these goals.⁴ For example, Colombia's successful enforcement of sustainable building regulations has encouraged citizens and corporations to build with sustainable materials and energy efficiency in mind.⁵ Using sustainable materials and innovative technologies emphasizes the industry's responsibility to adopt sustainable practices. These practices aim to mitigate climate change and promote long-term resilience. To achieve this, life cycle assessments have increased in popularity, as they allow for the review of the environmental impact of materials over their entire duration. This helps in choosing the most sustainable options.⁶ Delegates in UN-Habitat should focus on enhancing the global technological capacity for environmentally sound construction to incentivize and enforce these changes. UN-Habitat seeks to implement new standards, enforce a greater

concern for the environment, and develop new building codes to ensure sustainable practices.

History and Description of the Issue

Sourcing Sustainable Materials

The construction industry is important for the global economy. It boosts GDP, creates jobs, and has a big environmental impact. It uses many natural resources and produces a lot of waste and emissions. In the past, construction materials were chosen for their cost and performance, not their environmental effects. The global community must understand the impact of these materials on our health and the environment.

Efforts toward sustainability began with projects like those from the United Nations Economic and Social Council. They highlight the need to focus on energy efficiency in steel production.⁷ This can be achieved by improving blast furnace technology or using more efficient electric furnaces. Carbon Capture and Storage (CCS) technologies can also help by capturing carbon dioxide emissions from steel production. Recycling is another key initiative. Using more

1 Tim Fujio, "How Colombia Is Incentivizing Sustainable Construction," *Setting Mind*, December 28, 2023, <https://settingmind.com/how-colombia-is-incentivizing-sustainable-construction/>.

2 United Nations Environment Programme, *Global Status Report for Buildings and Construction: Towards a Zero-Emissions, Efficient and Resilient Buildings and Construction Sector*, (Nairobi: UNEP, 2022), <https://digitallibrary.un.org/record/3995803?ln=en&v=pdf>.

3 Confederation of International Contractors' Associations, *Construction: A Report Prepared by the Confederation of International Contractors' Associations (CICA)*, (Paris: UNEP, 2002), <https://digitallibrary.un.org/record/475240?ln=en>.

4 Louis Mosca, "The Future Of Construction: Why Sustainability Is A Hot Topic," *Forbes*, May 3, 2024, <https://www.forbes.com/sites/louismosca/2024/05/03/the-future-of-construction-why-sustainability-is-a-hot-topic/>.

5 Tim Fujio, "How Colombia Is Incentivizing Sustainable Construction," *Setting Mind*, December 28, 2023, <https://settingmind.com/how-colombia-is-incentivizing-sustainable-construction/>.

6 United Nations Centre for Human Settlements (Habitat), *Development of National Technological Capacity for Environmentally Sound Construction*, (Nairobi: UN-HABITAT, 1993), <https://digitallibrary.un.org/record/624386?ln=en>.

7 United Nations Economic and Social Council, *Activities of Other United Nations and International Bodies Concerned with Iron and Steel*, Geneva, United Nations Economic and Social Council, 2000, <https://digitallibrary.un.org/record/408975?v=pdf>

recycled materials in steel production reduces the need for raw materials and lowers emissions. Additionally, adopting alternative materials in steel production can further decrease the environmental impact.

To solve this issue, it is important to know where building materials come from and how they are made. In the construction industry, circularity means reusing or regenerating the materials used. This matters because the demand for buildings increases as society grows. With more people, we need more housing, roads, and public spaces. The global construction industry manages this growth, so it must be careful about how it gets its materials. There needs to be a steady supply, but how this supply is sourced is crucial. For example, when it comes to wood, experts stress using products that are responsibly sourced and can be reused or recycled. Wood is a renewable resource, making it key to sustainable building. However, even renewable resources must be used wisely. Overharvesting can harm the environment and biodiversity.⁸ As a renewable resource, wood is crucial in sustainable building practices. This concept of renewable resources is another factor that must be carefully understood. This is because, though more can be made of renewable resources, the industry cannot abuse its collection. Doing so can have detrimental impacts on the

environment or biodiversity.

Making building materials takes a lot of energy and is a big part of the construction industry's job. "Embodied energy" refers to the total energy needed to create a building material. Wood usually has a lower impact on the environment compared to other materials. This reduces the need for new raw materials and supports ecosystem health. Traditional materials, like bamboo, have low energy needs and are often locally sourced. Thatch and mud are also good options, as they are biodegradable and easy to find in many places.

Modern materials often have high embodied energy and environmental impacts because of complex industrial processes and long transportation distances. Concrete, for instance, has high energy use and CO₂ emissions during production. This is why using slag products in road construction can improve sustainability. Slag is a by-product of steel production that can be repurposed. By using it, waste and emissions from traditional materials are reduced. In the EU, data shows that roads built with slag have better strength and durability, supporting sustainability. When used correctly, slag cuts down the need for natural resources and prevents unnecessary landfill waste.⁹ When used in road construction,

⁸ Jim, Bowyer, Katie Fernholz, and Alicja Kacprzak, *Circularity Concepts in Wood Construction*, Geneva: United Nations (UNECE) and Food and Agriculture Organization, 2023, <https://digitallibrary.un.org/record/4025341?ln=en&cv=pdf>.

⁹ M., Mäkiyö, and A. Hiltunen, *The use of slag products as means towards sustainable development in road construction: summary*

Pieces of slag
 Credit: MET Museum



the data collected in the EU showed that the result was higher long-term strength and improved long-term durability, which contributes to overall improvements in sustainability.¹⁰ When handled correctly, this reduces the need for natural resources and helps prevent unnecessary waste from going to landfills. China, the biggest producer, was responsible for 48.5 percent of total slag production, and other essential producers (Japan, European Union (EU), United States (US), India, Russia, and South Africa) contribute as well.¹¹ This is a good example of how industrial by-products can be used sustainably in construction.

Steel and bricks also have high energy costs and environmental impacts because of their production processes. Compared to traditional and modern materials, conventional materials are usually more sustainable in terms of energy use and environmental impact. However, they may lack the strength and durability of modern materials. While modern materials are durable, they often lead to more environmental harm. Hybrid approaches, which mix traditional and modern materials, can balance sustainability with performance and reduce environmental damage.¹²

Another major issue regarding source materials in the construction industry is how producing these materials impacts the atmosphere. Problems such as manufacturing waste or unregulated carbon emissions are tackled through decarbonization.¹³ This focuses on reducing the embodied carbon in building materials. Sweden, for example, is a country that is highly committed to this process, stating their goal is to reduce “greenhouse gas (GHG) emissions to net-zero by 2045” and whose data showed that emissions in the construction industry could be significantly reduced

by 50 percent by applying existing processes.¹⁴ The country uses processes in its framework, such as amine scrubbing for cement, carbon capture and storage with steel production, and electric furnaces during material production. These strategies allow their construction industry to continue growing and building to support the demand for housing while also allowing them to meet their sustainability goals. Still, the analysis of this data emphasizes the importance of sustaining this plan, which relies on producing the necessary materials through alternative means of production.

However, there are barriers to adopting these sustainable materials in construction projects, such as cost, availability, and a need for more awareness. Usually, sustainable materials can have higher upfront costs compared to conventional materials. Their final cost includes sourcing, manufacturing, and transportation.¹⁵ There is a perception among developers, builders, and clients that sustainable materials are more expensive, which can deter their use. Supply chain disruptions for building materials are another significant concern. This issue can have consequences because it could push corporations to stray from sustainable practices in exchange for efficiency and speed or to save money. Thus, providing incentives for maintaining sustainability is essential for solutions to this issue. Moreover, it is necessary to educate the public more on why sustainable construction would positively impact the lives of the average citizen.

Regarding availability, it is essential to realize how technology and research have made this category of materials more accessible. Sustainable construction materials are increasing from new technology that prioritizes production that is not vastly harmful to the environment. They are made now to

/ prepared by M. Mäkikyrö and A. Hiltunen, SKJ Companies, Finland, Geneva: United Nations, December 1, 1997, <https://digitallibrary.un.org/record/248652?ln=en>.

10 İsa, Yüksel, “A review of steel slag usage in construction industry for sustainable development,” *Environment, Development and Sustainability* 19 (2017): 369-384, <https://link.springer.com/article/10.1007/s10668-016-9759-x>.

11 İsa, Yüksel, “A review of steel slag usage in construction industry for sustainable development,” *Environment, Development and Sustainability* 19 (2017): 369-384, <https://link.springer.com/article/10.1007/s10668-016-9759-x>.

12 I., Karlsson, Rootzén, J., Toktarova, A., Odenberger, M., Johnsson, F., & Göransson, L. (2020), Roadmap for decarbonization of the building and construction industry—a supply chain analysis including primary production of steel and cement, *Energies*, 13(16), 4136, <https://doi.org/10.3390/en13164136>.

13 Michael E. Webber and Yael R. Glazer, “Solid Waste, a Lever ofr Decarbonization,” *Science*, November 16, 2023, <https://www.science.org/doi/10.1126/science.adl0557>,

14 I., Karlsson, Rootzén, J., Toktarova, A., Odenberger, M., Johnsson, F., & Göransson, L. (2020), Roadmap for decarbonization of the building and construction industry—a supply chain analysis including primary production of steel and cement, *Energies*, 13(16), 4136, <https://doi.org/10.3390/en13164136>.

15 Peter, Akadiri, “Understanding Barriers Affecting the Selection of Sustainable Materials in Building Projects,” *Journal of Building Engineering*, no. 4 (December, 2015), <https://doi.org/10.1016/j.jobe.2015.08.006>.

improve the energy efficiency of both materials and buildings.¹⁶ It is also important for policymakers to encourage using sustainable material options and spread knowledge about them. For example, researchers confirm that the cataloging of alternative building materials helps to alert all potential clients and stakeholders to the potential within the industry.¹⁷ Overcoming these barriers, therefore, requires collaborative efforts among policymakers, industry stakeholders, and researchers.

Digital Transformation in Construction

Technology is an important factor to consider when discussing the construction industry's future. Many countries hope it takes a larger role in improving sustainability within the industry. Innovation is critical to overcoming the challenges of sustainability in construction. Still, though it is welcome in many parts of the world, some obstacles stand in the way of fully enacting these changes.

Automation and data analytics are two examples that show that technology has improved the operation of the construction industry. The widespread adoption of Building Information Modeling (BIM), the Internet of Things (IoT), and advanced data analytics has been shown to help optimize resource management, energy efficiency, and life cycle assessment.¹⁸ BIM helps create collaborative design procedures and enables this life cycle analysis to minimize the environmental impact. It works to facilitate collaborative planning, design, construction, and management of buildings by enabling precise resource allocation and energy simulations.¹⁹ IoT sensors monitor energy usage, indoor air quality, and occupancy patterns in real

time, which supports attempts to have proactive maintenance and operational efficiency.²⁰ Exploring innovations driving the industry towards a more sustainable future is key.

The United Kingdom is a country that has shown to have made advancements in this area through BIM and other digital approaches that aim to improve environmental consciousness in their construction industry's processes.²¹ BIM deployment was a key part of digital innovation driven by the UK government's policy mandates for public projects. A study made by an engineering firm showed significant changes to the company's technology and work procedures were necessary for BIM integration. To speed up the adoption process, the company first centralized the management of digital technology.²² This created a cohesive approach to technology use by ensuring that various projects and departments used the same standards and procedures. The company started standardizing its digital work procedures after the centralization.²³ This required developing a uniform workflow, data management, and collaborative process rules. To guarantee that everyone, including clients and subcontractors, could use the new tools effectively, standardization was necessary.²⁴ The last stage involved spreading these digital techniques to the company's international activities. This globalization of digital resources is intended to provide a unified digital environment that promotes cooperation and supports multinational projects. Some challenges pointed out were that the construction industry has a trend of putting down specific new policy proposals mainly due to the size of these companies.²⁵

The construction industry needs to show faster adoption of these technological innovations. Advancements in computing

16 H., Danso, (2018). Identification of key indicators for sustainable construction materials. *Advances in Materials Science and Engineering*, 2018(1), 6916258. <https://onlinelibrary.wiley.com/doi/abs/10.1155/2018/6916258>.

17 J. J., Marut, ALAEZI, J. O., & OBEKA, I. C., (2020), A review of alternative building materials for sustainable construction towards sustainable development, *Journal of Modern Materials*, 7(1), 68-78, <https://journals.aijr.org/index.php/jmm/article/view/3225>.

18 E, Papadonikolaki, Krystallis I, and Morgan B, Digital Transformation in Construction: Systematic Literature Review of Evolving Concepts, London: University College London, 2024, https://discovery.ucl.ac.uk/id/eprint/10113245/1/2020_EPOC-Digital%20transformation%20in%20construction-Systematic%20literature%20review%20of%20evolving%20concepts_Papadonikolaki.pdf.

19 Ayokunle O. Olanipekun and Monty Sutrisna, "Facilitating Digital Transformation in Construction—A Systematic Review of the Current State of the Art," *Frontiers in Built Environment* 7, no. 660758 (July 2021). <https://www.frontiersin.org/journals/built-environment/articles/10.3389/fbuil.2021.660758/full>

20 Olanipekun and Monty Sutrisna, "Facilitating Digital Transformation in Construction—A Systematic Review of the Current State of the Art."

21 A. Shibeika and C. Harty, "Diffusion of digital innovation in construction: a case study of a UK engineering firm." *Construction management and economics*, 33(5-6), (2015): 453-466. <https://www.tandfonline.com/doi/abs/10.1080/01446193.2015.1077982>.

22 Shibeika and Harty, "Diffusion of digital innovation in construction: a case study of a UK engineering firm."

23 Shibeika and Harty, "Diffusion of digital innovation in construction: a case study of a UK engineering firm."

24 Shibeika and Harty, "Diffusion of digital innovation in construction: a case study of a UK engineering firm."

25 Shibeika and Harty, "Diffusion of digital innovation in construction: a case study of a UK engineering firm."

power, data analytics, and connectivity have motivated a digital revolution.²⁶ Smart building systems are a clear example of where energy consumption can be adjusted based on real-time data. This transformation works alongside broader global efforts towards sustainability, as outlined in various United Nations reports and conferences. Digitalization involves utilizing Artificial Intelligence (AI), big data, and blockchain for sustainable construction management.²⁷ AI-driven predictive analytics can optimize building performance. At the same time, robotics helps automate difficult tasks more precisely. Blockchain technology offers a way to improve transparency in supply chain management and the verification of sustainable materials' origins to keep compliance with environmental standards.

Also, modular construction reduces waste and improves efficiency by constructing buildings off-site. With this, the units or sections of a structure are pre-made in a factory setting and then transported to the construction site for assembly. 3D printing has also been used for precise and waste-free construction of building components.²⁸ Prefabrication is a method that enhances quality control and reduces construction time and waste. This approach is aligned with circular economy principles, optimizing material use and minimizing waste. Challenges identified in the research include cost and skills gaps.²⁹ Addressing these barriers requires joint efforts across sectors to standardize practices and educate stakeholders on the benefits of digital transformation in sustainability.

It is important to look to the future. It is suggested that the integration of advanced analytics and machine learning for predictive maintenance and improved project outcomes will be beneficial in the construction industry. There is also a larger predicted emphasis on real-world data analytics and

standardization across different platforms and systems.³⁰ Through safety and site management, predictions are made after collecting data that help make it easier for the sites to be managed sustainably. Heritage conservation efforts also use data analytics to preserve historic structures. Waste minimization is another key opportunity provided by better data-driven project planning and execution. Overall quality improvement will eventually be achieved in construction projects across the globe through the use of comprehensive data analysis.

The construction of smart cities is contributing to sustainability improvements. A smart city is explained as a new idea regarding the management of urban areas that are directed towards bettering overall sustainability, people's quality of living, and ecological conditions.³¹ Renewable energy forms are also a key factor in these plans. Solar and wind are highly valued as energy sources in city initiatives to lessen their reliance on fossil fuels and lower greenhouse gas emissions.³² Smart grids and energy storage systems have also been put in place to manage energy more efficiently and to establish stability within the up-and-coming technological system. An example of this system that continues past the construction stage is the building of smart thermostats and lighting systems that change based on the inhabitants' patterns and the natural light availability.³³ Information and communication technology (ICT) also helps improve urban services and infrastructure efficiency. It helps by bettering resource management, reducing waste, and enhancing the quality of life for residents. They promote sustainability within the construction process and for the future by monitoring energy consumption, managing traffic, and improving public services, which collectively contribute to sustainability.³⁴ For example, data analytics helps improve

26 United Nations Centre for Human Settlements. Development of National Technological Capacity for Environmentally Sound Construction. Nairobi, United Nations - HABITAT, 1993. <https://digitallibrary.un.org/record/624386?ln=en>

27 Robert, Klinc, and Ziga Turk, "Construction 4.0 – Digital Transformation of One of the Oldest Industries," *Economic and Business Review* 21, no. 3 (December 20, 2019): 393-410, <https://www.ebrjournal.net/cgi/viewcontent.cgi?article=1042&context=home>.

28 Peter Akadiri, "Understanding Barriers Affecting the Selection of Sustainable Materials in Building Projects," *Journal of Building Engineering*, no. 4 (December, 2015), <https://doi.org/10.1016/j.jobe.2015.08.006>.

29 Akadiri, "Understanding Barriers Affecting the Selection of Sustainable Materials in Building Projects."

30 Muhammad, Bilal, Lukumon O. Oyedele, Junaid Qadir, Kamran Munir, Saheed O. Ajayi, Olugbenga O. Akinade, Hakeem A. Owolabi, Hafiz A. Alaka, and Maruf Pasha, "Big Data in the construction industry: A review of present status, opportunities, and future trends," *Advanced engineering informatics* 30, no. 3 (2016): 500-521, <https://doi.org/10.1016/j.aei.2016.07.001>.

31 M. G. Almihat, M., Kahn, M. T. E., Aboalez, K., & Almaktoof, A. M., "Energy and sustainable development in smart cities: An overview," *Smart Cities*, 5(4), (2022): 1389-1408. <https://www.mdpi.com/2624-6511/5/4/71>.

32 Almihat, Kahn, Aboalez, and Almaktoof, "Energy and sustainable development in smart cities: An overview."

33 Almihat, Kahn, Aboalez, and Almaktoof, "Energy and sustainable development in smart cities: An overview."

34 Almihat, Kahn, Aboalez, and Almaktoof, "Energy and sustainable development in smart cities: An overview."



Cranes working in the construction industry.
 Credit: Fons Heijnsbroek

energy usage in buildings and public infrastructure. This then allows for a greater chance of reducing waste in the construction process.

Another important point to consider is the machinery currently used on the site of construction projects. The construction industry generates large amounts of data but fails to use it effectively due to its slow technological adoption. Factors to consider about the machinery being used include operating costs, which include fuel, maintenance, and repair expenses.³⁵ Construction machinery plays an important role in the modern construction industry. The machines contribute greatly to the efficiency of project execution and can have large impacts on the sustainability of said projects. Companies need to stay up to date with modern machines because they are designed to perform more quickly and accurately. This helps improve efficiency and speed up project timelines while reducing costs. The life cycle of machines is also something to consider. Lifecycle costs and operational efficiency of machines that both are built and work sustainably will help companies make economically smart decisions that lower long-term expenses.³⁶ This ties back to sustainability because it is how a company

can benefit from new sustainable machines. They, in turn, will also help lessen harmful CO₂ emissions and reduce energy consumption in their projects. The safety of the equipment also plays a role in the industry's sustainability. The right to development must be achieved efficiently, and minimizing harm done to the community is meant to house. Therefore, advanced safety features reduce the risk of construction work-related accidents and protect workers.

This case study examines how these machines and new technologies impact sustainability and examines the power capacity of the photovoltaic systems during Dubai's construction project on the Mall of the Emirates. The photovoltaic system is a technology that converts sunlight into electricity and has minimal adverse effects on the environment.³⁷ Traditional cranes, machines commonly used in the construction industry that lift and move objects, are powered on diesel fuel. The study examined whether solar-powered cranes could significantly reduce carbon emissions compared to diesel-powered alternatives by not producing direct emissions. They found that powered cranes emit a great deal less carbon emissions, meaning they greatly reduce the

35 M. Waris, M. S. Liew, M. F. Khamidi, and A. Idrus, "Criteria for the selection of sustainable onsite construction equipment," *International Journal of Sustainable Built Environment* 3, no. 1, (2014): 96-110. <https://www.sciencedirect.com/science/article/pii/S221260901400034X>.

36 Waris, Liew, Khamidi, and Idrus, "Criteria for the selection of sustainable onsite construction equipment."

37 T. (Ed.), Markvart, (2000), *Solar electricity* (Vol. 6), John Wiley & Sons, https://books.google.com/books?hl=it&lr=&id=3GjiEAAAQBAJ&oi=fnd&pg=PR9&dq=Solar+explained+Photovoltaics+and+electricity&ots=RG2yJ2tefE&sig=8Qj_52T0ozGboF_Q-fVEDqSr5RU.

overall carbon footprint of construction projects.³⁸ Intelligent energy management systems were employed to use the stored solar energy best. This also helped improve sustainability by improving the efficiency and resource management of crane operations and the project.

Demand for Regulation in the Construction Process

Countries worldwide must consider how policies, laws, and regulations can impact, encourage, or hinder sustainability practices in construction. In the past, policies have focused mainly on safety and structural integrity. However, with growing awareness of construction's environmental impacts, a shift has been made towards integrating sustainability into the industry's regulations. Recent studies have shown that the effect of reporting sustainable practices in the construction sector has led to the implementation of more regulatory measures.³⁹ This shows that governments can work to form more responsible policies to keep corporations and industry projects accountable.

Government policies and regulations play a crucial role in promoting sustainable construction. Countries must review existing international, regional, and national policies that drive sustainability in the construction industry. This will assist in creating new and relevant policies. Examples of new and relevant policies at the international level include the current use of National Determined Contributions (NDCs). NDCs are commitments made by countries to mitigate greenhouse gas emissions, mitigate climate change, and achieve the Paris Agreement's global targets.⁴⁰ They incorporate local climate actions into urban planning and construction practices and

outline specific targets that countries undertake to mitigate climate change.⁴¹ This influences construction regulations to prioritize energy efficiency, carbon reduction, and sustainable materials. The Paris Agreement has been a great step to address sustainability. Through it, countries have committed to reducing greenhouse gas emissions and enhancing climate resilience. This includes a dedicated effort towards preventing the increase of global temperatures, focusing on sustainable urban planning, among others.⁴² Moreover, there should be a global meeting every five years to evaluate the overall progress towards the Paris Agreement's goals. Sustainable construction practices can be evaluated here as part of this process to ensure the countries are progressing on emission reduction and environmental goals.

Regional frameworks are also on the rise and are incredibly helpful in creating change. For example, the European Union Green Deal promotes sustainable construction practices through material efficiency.⁴³ This is a legally binding instrument adopted by the European Parliament. It has a goal to reduce emissions by 55 percent and achieve climate neutrality by 2030.⁴⁴ Energy-efficient buildings and processes are expected to result from this deal. Increasingly strict regulations, client demands for these green buildings, and societal expectations for environmental responsibility are helping to convince the stakeholders to integrate these sustainability goals into every phase of construction projects.⁴⁵

Although regulations exist, there are many challenges to their implementation. Some of these include enforcement gaps, inadequate compliance monitoring, and differing interpretations of sustainability criteria, which come into

38 R., Imam, & Ayadi, O. (2022), Powering electric tower cranes by solar energy for sustainable construction, *International Journal of Construction Management*, 22(13), 2614-2624, <https://www.tandfonline.com/doi/abs/10.1080/15623599.2020.1814940>.

39 Jacqueline Glass, "The State of Sustainability Reporting in the Construction Sector," *Smart and Sustainable Built Environment*, no. 1, 1, (2012): 87-104, <https://doi.org/10.1108/20466091211227070>.

40 "The Paris Agreement and NDCs," United Nations Climate Change, accessed September 20, 2024, <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs>.

41 UN Habitat, 'Inclusive Communities, Thriving Cities,' and the SDG Localization and Local Government teams. Urban Regeneration for Localizing the Sustainable Development Goals, (Nairobi: UN-Habitat, 2024), https://unhabitat.org/sites/default/files/2024/05/ur_-_paper_22052024.pdf.

42 M. C. C., Segger, (2016). Advancing the Paris Agreement on climate change for sustainable development, *Cambridge International Law Journal*, 5(2), 202-237, <https://www.elgaronline.com/view/journals/cilj/5-2/cilj.2016.02.03.xml>.

43 "Buildings and Construction," The European Commission, Accessed September 10, 2024, https://single-market-economy.ec.europa.eu/industry/sustainability/buildings-and-construction_en.

44 "Green Deal: key to a climate-neutral and sustainable EU," European Parliament, last modified July 16, 2024, <https://www.europarl.europa.eu/topics/en/article/20200618STO81513/green-deal-key-to-a-climate-neutral-and-sustainable-eu>.

45 Louis Mosca, "The Future of Construction: Why Sustainability Is A Hot Topic," *Forbes*, May 3, 2024, <https://www.forbes.com/sites/louismosca/2024/05/03/the-future-of-construction-why-sustainability-is-a-hot-topic/>.

play often in this industry.⁴⁶ Addressing these challenges requires both strengthening regulatory efforts and fostering collaboration among stakeholders. International initiatives such as United Nations Sustainable Development Goals 9, 11, and 13 focus on sustainable industry, cities, and climate action. These help guide local governments in implementing policies that promote sustainable urban development. This includes building codes that mandate green building certifications and renewable energy integration.⁴⁷

Another challenge comes with implementing the Occupational Health and Safety (OHS) reforms. The OHS reforms are rules and systems that help to reduce risk, injury, or damage to workers and their environment. Subcontractors trying to implement this have been experiencing barriers in enforcing sustainability regulations due to resource constraints, lack of awareness, and resistance to change. The construction industry heavily relies on this because the industry generally has more hands-on, risky, and active labor force requirements. This is also worsened or emphasized by large amounts of heavy machinery. For example, the OHSAS 18001 and ISO 45001 are two internationally acknowledged standards of safety management that follow these protocols. While the popularity of their implementation is growing, there is still a clear need for supportive initiatives in the industry.⁴⁸ Costs of new safety equipment, training programs, and potential upgrades have made many companies hesitant to implement these. However, corporations typically do not like the penalties for not complying with reform rules. Though intended to influence construction companies to follow the sustainability rules, the penalties can give them a more negative public opinion.

This can act as another barrier because it means there is less public support for pushing for implementing more safety and sustainability policies that the industry dramatically needs.

Various initiatives around the world are already working to promote sustainability in construction. A great example is Japan's Comprehensive Assessment System for Built Environment Efficiency (CASBEE).⁴⁹ Developers with a higher CASBEE rating earn tax incentives, subsidies, and regulatory compliance. They can achieve these high ratings by complying with the government's initiatives and policies.⁵⁰ Another example can be seen in the United States through the Leadership in Energy and Environmental Design (LEED) certification and federal green building standards. These initiatives work with a point-based rating system that allows buildings to earn points across several categories that judge sustainability.⁵¹ In China, there is the Green Building Action Plan (GBAP). It helps establish mandatory green building codes for new constructions. It also establishes training programs, encourages research and innovation, and raises public awareness of the need for sustainability in this industry.⁵² Despite challenges like cost barriers and capacity constraints, the GBAP has significantly increased the adoption of green building standards and practices nationwide, contributing to China's sustainable development goals.⁵³ India also utilizes the Green Rating for Integrated Habitat Assessment (GRIHA) and the National Building Code (NBC). These establish methods of voluntary certification and recognize successful sustainable projects. The NBC establishes mandatory standards to ensure safety, quality, and sustainability in building construction across the country.⁵⁴ The future of sustainable construction

46 Peter Chege Njoroge, "A Study of Effectiveness of Regulatory Framework in Construction Industry in Promoting Sustainability," (Nairobi: University of Nairobi, August, 2013), http://erepository.uonbi.ac.ke/bitstream/handle/11295/56365/PETER%20CHEGE%20NJOROG%20B50_72313_2008%20M.A.CONST.%20MNGT_2013.pdf?sequence=3&isAllowed=y.

47 UN Habitat, "Inclusive Communities, Thriving Cities,' and the SDG Localization and Local Government teams. Urban Regeneration for Localizing the Sustainable Development Goals."

48 M. Loosemore and N. Andonakis, "Barriers to implementing OHS reforms – The experiences of small subcontractors in the Australian Construction Industry," *International Journal of Project Management*, no. 25, 6, (August 2007): 579-588, <https://doi.org/10.1016/j.ijproman.2007.01.015>.

49 Sheau-Chyng Wong and Naoya Abe, "Stakeholders' perspectives of a building environmental assessment method: The case of CASBEE," *Building and Environment* 82 (2014): 502-516, <https://doi.org/10.1016/j.buildenv.2014.09.007>.

50 Wong, and Abe, "Stakeholders' perspectives of a building environmental assessment method: The case of CASBEE," 502-516.

51 S. Humbert, Abeck, H. Bali, N. Horvath, A., "Leadership in Energy and Environmental Design (LEED) - A critical evaluation by LCA and recommendations for improvement," *International Journal of Life Cycle Assessment* 12 no. 1: (46-57), 2007, <https://escholarship.org/uc/item/01n0q8bx>.

52 Jian Zuo, and Zhen-Yu Zhao, "Green building research—current status and future agenda: A review," *Renewable and sustainable energy reviews* 30 (2014): 271-281, <https://doi.org/10.1016/j.rser.2013.10.021>.

53 Jian, Zuo, and Zhen-Yu Zhao, "Green building research—current status and future agenda: A review," 271-281.

54 Apoorv, Vij, "National green building assessment tool in India," *Central Europe* (2010), https://cesb.cz/cesb10/papers/5_assessment/040.pdf.

lies in innovation, improving international collaboration, and detailed policy support.

Policy recommendations that involve financial incentives for green buildings and sustainable technologies are also shown to help strengthen building codes and standards. For instance, the Republic of Korea used a variety of incentives to help promote environmentally conscious construction.⁵⁵ Subsidies are a form of financial support offered in exchange for installing renewable energy systems. These subsidies are aimed at new buildings and renovations but mainly to support energy-efficient upgrades in existing structures.⁵⁶ Low-interest loans were also offered for remodeling buildings to improve energy efficiency. These loans are normally based on how the construction company goes about installing energy-efficient components instead of going off of the building's overall energy performance.⁵⁷ The implementation of this in the city of Seoul is a good example, as the urban community offers additional subsidies and incentives for low-rise housing remodels.⁵⁸ This is meant to serve as a more targeted plan for urban regeneration efforts. This aims to help solve an issue specific to a smaller area that came from the lack of sustainability in the construction industry. Achieving sustainability in construction internationally is a challenge requiring all stakeholders' focused efforts. By embracing innovative practices, addressing barriers, and implementing expansive policies, the construction industry can significantly reduce its environmental impact and contribute to a more sustainable future.

Consequences of Unsustainable Construction

There are major consequences to unsustainable construction that aren't always considered. The Earth, biodiversity, and

people's health are affected greatly by increased carbon emissions, deforestation, and habitat destruction. All of them are, in great measure caused by the construction industry. Some issues have a disguised connection with this topic. People's emotional well-being as well as their relationship with the local government, can experience strain as a result of a lack of environmentally conscious construction.

An initial challenge to note is the fragmented nature of the industry. Production, transport, and building sectors are largely disconnected from each other. Because of this, uniform management of construction projects becomes hard to achieve. This especially applies to issues regarding sustainability when different countries do not enforce the same environmental protection policies, regulations, or goals. Therefore, this lack of enforcement makes the construction plans less efficient and opens up harmful opportunities for irresponsible damage to the environment.

A major consequence of the lack of sustainable practices within the industry that the UN hopes to tackle is its growing carbon emissions. The process of producing building materials like cement, steel, and brick is very energy-intensive, releasing large amounts of carbon dioxide (CO₂) and greenhouse gases.⁵⁹ For example, the fuelwood collected and burned in brick-making is only sometimes conducted sustainably. In Asia, for example, four point five percent of the overall biomass fuel carbon emissions resulted from these emitted gasses.⁶⁰ There is a high demand for fuelwood in many countries around the world, so the trees used for harvest are not often replanted for efficiency purposes in the construction material manufacturing process.⁶¹ This is again an example of sustainability being a trade-off for efficiency and the harmful effects this has on the air people breathe and the environment they inhabit.

55 Fabrizio M. Amoruso, Min-Hee Sonn, Soyeon Chu, and Thorsten Schuetze, "Sustainable building legislation and incentives in Korea: a case-study-based comparison of building new and renovation," *Sustainability*, 13(9), (2021): 4889, <https://doi.org/10.3390/su13094889>.

56 Amoruso, Sonn, Chu, and Schuetze, "Sustainable building legislation and incentives in Korea: a case-study-based comparison of building new and renovation."

57 Amoruso, Sonn, Chu, and Schuetze, "Sustainable building legislation and incentives in Korea: a case-study-based comparison of building new and renovation."

58 Amoruso, Sonn, Chu, and Schuetze, "Sustainable building legislation and incentives in Korea: a case-study-based comparison of building new and renovation."

59 Fadi Althoey, Wajahat Sammer Ansari, Muhammad Sufian, and Ahmed Farouk Deifalla, "Advancements in low-carbon concrete as a construction material for the sustainable built environment," *Developments in the Built Environment* 16, (December 2023) <https://www.sciencedirect.com/science/article/pii/S2666165923001667>.

60 Syed Ashraf Alam, and Mike Starr, "Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan," *Science of the total environment* 407, no. 2 (2009): 847-852, <https://doi.org/10.1016/j.scitotenv.2008.09.040>.

61 Alam, and Starr, "Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan."

Problems emerge when companies attempt to cut costs or dangerously improve efficiency in their processes. For example, in Nigeria, soil erosion has harmed wildlife, and the cause is connected to industrial activity.⁶² Soil erosion is largely caused by the construction industry because of the amount of land that needs to be cleared for construction. This deforestation causes the land to dry up and lose nutrients from being exposed to the sun, wind, rain, and more.⁶³ This damage to the ground and soil can create even more problems, such as flooding, difficulty farming, and a hotter climate. Another issue this country faces due to the construction industry's deforestation is habitat fragmentation.⁶⁴ This is when large land areas are divided into smaller, isolated patches. This hurts biodiversity and native wildlife communities, making it difficult for the species to find mates, access food, and migrate. Therefore, animal and plant populations decline, and it is not only the human population that feels the negative effects.⁶⁵

The United States has a similar issue in the San Francisco Bay Area, where the construction of highways and transportation avenues has led to habitat fragmentation.⁶⁶ The roads divide the ecosystem unnaturally, leaving the space with less nature surrounding it and less biodiversity overall. This also disrupts the migration patterns of many species, which leads to the death of wildlife.⁶⁷ Pollution also tends to occur in this situation, as runoff from the highway can enter the nearby water. This harms the animals and plants who both live in and drink from this water source, poisoning the local ecosystem as a whole.⁶⁸ This irresponsible disruption of wildlife can cause irreparable damage if sustainability efforts are not made.

Water pollution due to construction runoff is a prevalent issue that poses major health concerns that must be addressed. The problem occurs when rainwater flows over construction sites, picking up pollutants and sediments. Then it will enter

62 Temidayo Olowoyeye, "A review of the environmental impact of deforestation and industrial activities in Nigeria," (2021), https://www.researchgate.net/profile/Temidayo-Olowoyeye/publication/348603473_A_REVIEW_OF_THE_ENVIRONMENTAL_IMPACT_OF_DEFORESTATION_AND_INDUSTRIAL_ACTIVITIES_IN_NIGERIA/links/6007030792851c13fe21cf8a/A-REVIEW-OF-THE-ENVIRONMENTAL-IMPACT-OF-DEFORESTATION-AND-INDUSTRIAL-ACTIVITIES-IN-NIGERIA.pdf.

63 Olowoyeye, "A review of the environmental impact of deforestation and industrial activities in Nigeria."

64 Olowoyeye, "A review of the environmental impact of deforestation and industrial activities in Nigeria."

65 Olowoyeye, "A review of the environmental impact of deforestation and industrial activities in Nigeria."

66 T. A., Wall, Walker, W. E., Marchau, V. A., and Bertolini, L., "Dynamic adaptive approach to transportation-infrastructure planning for climate change: San-Francisco-Bay-Area case study," *Journal of Infrastructure Systems*, 21(4), (2015):05015004. [https://ascelibrary.org/doi/abs/10.1061/\(ASCE\)IS.1943-555X.0000257](https://ascelibrary.org/doi/abs/10.1061/(ASCE)IS.1943-555X.0000257).

67 Wall, Walker, Marchau, and Bertolini, L., "Dynamic adaptive approach to transportation-infrastructure planning for climate change: San-Francisco-Bay-Area case study."

68 Wall, Walker, Marchau, and Bertolini, L., "Dynamic adaptive approach to transportation-infrastructure planning for climate change: San-Francisco-Bay-Area case study."

Nigeria's soil erosion

Credit: Bembety



and deposit into local bodies of water carrying harmful contaminants that can severely impact water quality and aquatic ecosystems.⁶⁹ This problem is worsened when considering the problems mentioned above because of the soil's lesser capacity for water retention after eroding from deforestation. The damage can have huge impacts on local rivers or lakes when toxic building materials like paints, solvents, and fuels mix into the runoff from these sites.⁷⁰ This poses an additional risk that extra runoff can disrupt the chemical balance of these bodies of water and lead to excessive nutrients in the water. This is known as eutrophication.⁷¹ This nutrient loading takes place jointly with deforestation and the excess nitrogen and phosphorus from loose soil runoff.⁷² These nutrients can promote problematic, uncontrolled growth of algae in bodies of water. The unfortunate result is the depletion of oxygen levels in the water, which causes dead zones where aquatic life cannot survive.

Irresponsible infrastructure construction can also increase the chance of emergency or disaster situations for pedestrians and locals. A case study on road construction in the Peruvian Andes shows how challenging the environment in construction makes it more likely to cause accidents. Some of these accidents can include landslides, soil erosion, deforestation, and water pollution.⁷³ Respiratory problems can also arise from dust and pollution caused by construction zones that don't apply sustainable preventative measures. Issues such as corruption or poor policy regulation are major contributors to this issue, and it puts down the voices and needs of local populations.⁷⁴ Local people and individuals may begin to feel unsafe, unrepresented, and uncared for in situations where construction is harming their environment and community.

This can have effects beyond the environment, such as leading to distrust in their government officials and also harms the morale of the community.⁷⁵ The damage to or decline of a local member's appreciation for or happiness with their community breeds the potential for further issues. Sustainable practices help better a neighborhood's sense of unity by growing shared goals and collective actions. Environmental components have strong ties with impacting social bonds and emotional ties to and within an area.⁷⁶ Clean air, green spaces, and reduced pollution help beautify and preserve the physical environment, making neighborhoods more pleasant and healthier. Exposure to nature and green spaces is normally increased through sustainable practices, and it helps people attain lower stress levels, improved mood, and better overall mental health.⁷⁷ Studies show the importance of enforcing sustainable building policy to provide the residents with hope and optimism, which are key components of maintaining high community spirit.⁷⁸

The inefficiency present on many governmental levels can be the number one cause of inconsistent implementation of existing policies.⁷⁹ This, in turn, causes different standards and degrees of enforcement of environmental regulations across regions. This can create uncertainty among higher-ups and community members alike. Policy alignment and education are essential to achieving sustainability goals globally. This is how to ensure one party is not doing damage that impacts the others. Trust in these initiatives requires transparent and inclusive processes to ensure the community does not give up on sustainable plans or legislation.

People's Right to Development

Sustainable cities promote improved quality of life, social

69 Carla SS Ferreira, Zahra Kalantari, Samaneh Seifollahi-Aghmiuni, Navid Ghajarnia, Omid Rahmati, and Marijana K. Solomun, "Rainfall-runoff-erosion processes in urban areas," *Precipitation*, (2021): 481-498, <https://doi.org/10.1016/B978-0-12-822699-5.00018-5>.

70 Ferreira, Kalantari, Seifollahi-Aghmiuni, Ghajarnia, Rahmati, and Solomun, "Rainfall-runoff-erosion processes in urban areas,"

71 "What is eutrophication?," National Ocean Service, accessed September 20, 2024, <https://oceanservice.noaa.gov/facts/eutrophication.html>.

72 Yang Yun-Ya, and Mary G. Lusk, "Nutrients in urban stormwater runoff: Current state of the science and potential mitigation options," *Current Pollution Reports* 4 (2018): 112-127, <https://doi.org/10.1007/s40726-018-0087-7>.

73 H. Knox and P. Harvey, "Anticipating harm: regulation and irregularity on a road construction project in the Peruvian Andes," *Theory, Culture & Society* 28 no. 6, (2011): 142-163, <https://journals.sagepub.com/doi/abs/10.1177/0263276411420889>.

74 Knox and Harvey, "Anticipating harm: regulation and irregularity on a road construction project in the Peruvian Andes."

75 A. Ross, C. A. Talmage, and M. Searle, "Toward a flourishing neighborhood: The association of happiness and sense of community," *Applied Research in Quality of Life*, 14(5), (2019): 1333-1352, <https://link.springer.com/article/10.1007/s11482-018-9656-6>.

76 Ross, Talmage, and Searle, "Toward a flourishing neighborhood: The association of happiness and sense of community."

77 Ross, Talmage, and Searle, "Toward a flourishing neighborhood: The association of happiness and sense of community."

78 Ross, Talmage, and Searle, "Toward a flourishing neighborhood: The association of happiness and sense of community."

79 Peter H. Schuck, "Why government fails so often: And how it can do better," *Princeton University Press*, (2014): 1-488, <https://www.torrossa.com/gs/resourceProxy?an=5580319&publisher=FZO137>.

equality, and increased environmental care. This aligns with the key aspects of the right to development, which includes a person's economic, social, and cultural rights concerning their living space.⁸⁰ The United Nations and UN-Habitat strive to provide every community with sustainable urbanization. The right to development is defined as a person's ability to access shelter that is healthy, safe, affordable, and secure.⁸¹ This also encompasses basic access to clean water, sanitation, healthcare, education, and child development. It is very interconnected with sustainability, as it entails the protection from environmental hazards and pollution.⁸²

To understand the social impact the construction industry has on the global community, it is important to consider the economic impact on individuals and the country as a whole. The construction industry is vast and has a global reach. Various conditions heavily influence the world market of international development firms. There are four attributes of the home country that shape a competitive advantage. They include the quality of several basic factors: natural resources, climate, location, and infrastructure.⁸³

The construction industry more directly impacts people than they tend to realize. Sustainable urban development fosters economic opportunities by promoting sustainable industries and jobs. As sustainability becomes a larger goal for companies in the industry, more positions open up for people who specialize in improvements within the sector. These are known as 'green jobs' and are defined as positions that contribute to preserving and restoring environmental quality.⁸⁴ These jobs have been shown to help improve energy and resource efficiency, reduce waste and pollution, and enhance biodiversity.⁸⁵ Sustainable building has also been shown to enhance productivity, despite some corporations' reactions to it as expensive and inefficient.

Many in the industry consider that truly sustainable construction should be made up of practices that aim to minimize environmental impact while maximizing resource efficiency and social benefits. For the successful integration of economic, ecological, and social dimensions in construction activities, they should be prioritized all at once. For example, data collected in China and the Russian Federation showed that sustainable construction policies that encompass the three components benefited both respective construction industries if or when the national business environment is sustainable.⁸⁶ It also showed how a sustainable focus in the construction industry would drive innovation in industrial areas. Some of the areas include engineering, metallurgy, electricity production, and transport.⁸⁷ The sustainable construction industry can become a significant consumer of products from these industries if there are economic benefits from preserving environmentally conscious construction. This also plays a vital role in the potential economic growth benefits that are available to communities around the world within all segments of society.⁸⁸

It is important also to consider that while urban and economic development can damage the existing natural resources, they can also positively contribute to growth. Sustainable building practices aim to reduce environmental degradation and improve people's living conditions. Collaboration between the urban and economic sectors becomes crucial to this type of solution. When countries work together to keep and promote universal sustainability, it can help improve the industry's efficiency. It can also help with lessening its negative impact on the natural environment. When dealing with this issue, it is essential to understand the concept of embodied energy. This concept refers to the total energy required to produce

80 UN General Assembly, Declaration on the Right to Development, A/41/128, December 4, 1986, <https://www.ohchr.org/en/instruments-mechanisms/instruments/declaration-right-development>.

81 E. Ibem and E. Aduwo, "A framework for understanding sustainable housing for policy development and practical actions," *ARCHITECTS COLLOQUIUM*, 2015, <https://core.ac.uk/download/pdf/83592991.pdf>.

82 Ibem and Aduwo, "A framework for understanding sustainable housing for policy development and practical actions."

83 A. B. Ngowi, E. Pienaar, A. Talukhaba, and J. Mbachu. "The globalisation of the construction industry—a review." *Building and environment* 40, no. 1 (2005): 135-141. <https://www.sciencedirect.com/science/article/pii/S0360132304001635>.

84 Ramin Kievani, Joseph HM Tah, Esra Kurul, and Henry Habanda, "Green jobs creation through sustainable refurbishment in the developing countries," Vol. 275. (Geneva: ILO, 2010), https://www.academia.edu/download/66422834/wcms_160787.pdf.

85 Kievani, HM Tah, Kurul, and Habanda, "Green jobs creation through sustainable refurbishment in the developing countries."

86 Zhi-Jiang Liu, Paula Pyplacz, Marina Ermakova, and Pavel Konev. "Sustainable construction as a competitive advantage," *Sustainability* 12, no. 15 (2020): 5946. <https://www.mdpi.com/2071-1050/12/15/5946>.

87 Liu, Pyplacz, Ermakova, and Konev, "Sustainable construction as a competitive advantage."

88 Liu, Pyplacz, Ermakova, and Konev, "Sustainable construction as a competitive advantage."

a building material, including extraction, manufacturing, transportation, and assembly.⁸⁹ Preserving resources for future generations is a responsibility that today's citizens have so that all individuals can enjoy a healthy living environment. The right to a safe place to inhabit is a human right that is important to help provide to people around the world now and in the future. Making sure that the choices made within this industry today do not ruin the state of the environment for others is key.

An example of this preventative and mindful policy can be seen in India, where green building and sustainable policies have been growing for a decade.⁹⁰ The country has accounted for rapid population growth and is experiencing a constant demand for more urban housing, clean water, electricity, and sanitation methods. Therefore, their construction industry is continuously growing, and they are experiencing problems such as damage to the land's fertility, unclean water, and pollution.⁹¹ Then, more modern 'green' buildings became a policy goal, and government action started prioritizing energy efficiency and sustainable usage. To achieve this, they implemented the Ministry of Environment and Forests (MoEF), part of the Environment Protection Act 1986. This created an established framework that allowed a way to determine how a construction project was impacting the environment during and after being built.⁹² They also began to use the GRIHA system, which rates green buildings in the country. The system rates the level of energy consumption in the buildings, the amount of water used in the building, and if the resources are being used responsibly.⁹³ Then, the points are granted depending on the different scores in the sustainability sectors. India's government also checks that the system is updated to reflect new research, technologies,

and changing environmental conditions.⁹⁴ This ensures that the rating system stays beneficial and relevant so that it can be effective in promoting sustainability. It helps portray how different solutions can help to provide people with a safe, sustainably developed home.

Another facet of sustainable construction is how cities reduce inequalities within the community. Areas that are densely populated, low-income, or need better infrastructure can need help to advance construction sustainably. Applying sustainable construction practices in these areas ensures that all residents have access to essential services, affordable housing, and opportunities for participation in civic life. Sao Paulo, Brazil, is an example of a city that has worked towards urban development goals to combat this type of problem.⁹⁵ The city has tackled its issues regarding the peoples' right to development, as this refers to the population having access to adequate housing and city services. One-third of the municipality has been noted to live in low-income housing, and many of these people have suffered from being displaced.⁹⁶ Legislative projects were designed to improve infrastructure and services in informal settlements. They focused on upgrading instead of demolishing existing informal settlements to avoid displacement and prevent the worsening of the ongoing issue. These efforts to integrate informal settlements into the formal urban plans, in turn, helped improve connectivity and access to services.⁹⁷ This type of policy revolves around sustainable practices, as its main goal is to improve and build upon existing infrastructure rather than tear it all down. This helps more smoothly integrate housing policies with broader urban development goals, which ensures sustainability and inclusivity. Sustainable construction is about 'building green' and creating inclusive, longstanding, and equitable urban

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90 Apoorv Vij, "National green building assessment tool in India," *Central Europe* (2010). https://cesb.cz/cesb10/papers/5_assessment/040.pdf.

91 Vij, "National green building assessment tool in India."

92 Vij, "National green building assessment tool in India."

93 Vij, "National green building assessment tool in India."

94 Vij, "National green building assessment tool in India."

95 Jessica Budds, Paulo Teixeira, and Sehab, "Ensuring the right to the city: pro-poor housing, urban development and tenure legalization in São Paulo, Brazil," *Environment and Urbanization* 17, no. 1 (2005): 89-114, <https://journals.sagepub.com/doi/epdf/10.1177/095624780501700105>.

96 Budds, Teixeira, and Sehab, "Ensuring the right to the city: pro-poor housing, urban development and tenure legalization in São Paulo, Brazil."

97 Budds, Teixeira, and Sehab, "Ensuring the right to the city: pro-poor housing, urban development and tenure legalization in São Paulo, Brazil."

spaces for all residents.

Climate-Mindful Construction

A key focus for policymakers across the globe is how to build sustainably while acknowledging local climate changes or climate disasters. Global warming needs to be kept to less than a two degrees Celsius increase to prevent irreversible climate change. This calls for strong international cooperation like the Paris Agreement and significant cuts in greenhouse gas emissions by 2050. It also means searching for innovative and new approaches to conserve energy and the land. At the same time, it must be done while constructing strong infrastructure and buildings that can withstand the climate change and natural disasters that are both occurring in today's world and will occur in the future.

One solution to consider is the emerging prevalence of solar power in modern society. To better understand this, it is important to look at the role of utility-scale solar energy (USSE) systems in the industry.⁹⁸ Their greater implementation would help to reduce greenhouse gas emissions and the construction industry's significant carbon footprint. Regarding people directly, their health would benefit from the reduced air pollution.⁹⁹ Solar energy technology has faults, as it is not necessarily a universally applicable solution. Different areas will have differing climates, infrastructure, cultures, technical capabilities, and regulations, and they will also have unique, changing land and material prices. Some methods that policies may want to adopt are to internalize costs for developers or standardize regulations to keep development efficient under sustainable goals. Still, the variables are why it is crucial to tackle having long-term commitments from countries regarding sustainability in this industry.

The fuelwood industry also has the potential to be conducted

more sustainably so that it could be considered an energy-neutral process.¹⁰⁰ Looking at large-scale reforestation programs that can restore the bare areas and improve carbon recapture would help to counteract this problem. In Sudan specifically, one can also commend the effort to improve kiln technology by introducing more efficient brick kiln technologies.¹⁰¹ This can significantly reduce fuelwood consumption and other harmful emissions. Some examples are hybrid kilns, vertical shaft brick kilns, and zig-zag kilns.¹⁰² People need to be aware of these technologies so that they can encourage their implementation of sustainable construction policy.

The toxic water runoff problem is another issue that needs to be addressed. This problem often comes from irresponsible construction practices that carelessly allow toxins to seep into water sources. Constructed wetlands are notable for achieving biological and chemical attributes similar to biological wetlands. A constructed wetland is a man-made area intended to treat the polluted water like a natural wetland would. Benefits include water storage, breaking down organic compounds, nitrogen cycling, peak-flow reduction, metal capture, and sediment settling.¹⁰³ Having officials put solutions like this into play to combat the issue posed by the industry is why policymakers are so relevant to this global issue. This solution also offers additional advantages like leisure spaces for the public.¹⁰⁴ Making urban spaces more welcoming while allowing the public access to nature is a strong plus to the solution. It also helps protect biodiversity in more urbanized areas by creating additional spaces for local wildlife to inhabit.

With the extreme weather events that are being brought on by climate change, both constructed and natural habitats will be impacted, which in turn will affect society's well-being. Several countries have decided to address this in different ways. Australia, for example, is a country with citizens focusing

98 Rebecca R. Hernandez, S. B. Easter, Michelle L. Murphy-Mariscal, Fernando T. Maestre, M. Tavassoli, Edith B. Allen, and Cameron W. Barrows, "Environmental impacts of utility-scale solar energy," *Renewable and sustainable energy reviews* 29 (2014): 766-779, <https://doi.org/10.1016/j.rser.2013.08.041>.

99 Hernandez, Easter, Murphy-Mariscal, Maestre, Tavassoli, Allen, and Barrows, "Environmental impacts of utility-scale solar energy."

100 Syed Ashraf Al Alam, and Mike Starr, "Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan," *Science of the total environment* 407, no. 2 (2009): 847-852, <https://doi.org/10.1016/j.scitotenv.2008.09.040>.

101 Alam and Starr, "Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan."

102 Alam and Starr, "Deforestation and greenhouse gas emissions associated with fuelwood consumption of the brick making industry in Sudan."

103 Piyush Malaviya and Asha Singh, "Constructed wetlands for management of urban stormwater runoff," *Critical Reviews in Environmental Science and Technology* 42, no. 20 (2012): 2153-2214, <https://doi.org/10.1080/10643389.2011.574107>.

104 Malaviya and Singh, "Constructed wetlands for management of urban stormwater runoff."



Home in Rincón, Puerto Rico destroyed by Hurricane Maria

Credit: National Oceanic and Atmospheric Administration

more on current natural disasters or climate consequences than on future ones. Despite the subjects' awareness of climate change, there was still a gap in their ability to organize it into decision-making.¹⁰⁵ Risks related to the construction industry were noted. Specifically, weather-related risks like extreme heat and storms can affect project timelines and costs. The Green Building Council of Australia helps promote sustainable development with a Green Star rating system that evaluates each building's sustainability rating. In Sydney specifically, a large renovation project is working to achieve carbon neutrality in building the urban area Barangaroo South.¹⁰⁶ It also encourages collaboration amongst the different industry sectors to promote innovation and environmental consciousness.

An example of an environmental emergency with severe effects on society is Hurricane Maria, which hit Puerto Rico in 2017. The storm caused widespread damage to the island, specifically to residential buildings. The destruction it caused

showed how vulnerable the buildings were, as they failed to withstand harsh environmental conditions due to poor materials, poor construction practices, and unsustainable building regulations.¹⁰⁷ This situation brought greater awareness to the problem, so a shift began toward using more durable, sustainable materials in the building process. This helped prevent issues such as water damage that occurred after the hurricane. Renewable energy, such as solar panels, has also begun to be more greatly implemented in rebuilding residential constructions to improve sustainability. This reduced their dependence on the power grid to help the community be prepared for dangerous weather situations. Since Hurricane Maria caused the power grid to fail dramatically, these improvements helped to improve adaptability and a sense of safety in the community.¹⁰⁸ This, coupled with attempts to enforce building codes more strictly helps the community infrastructure be more prepared for heavy storms, winds, and rains. These measures help Puerto Rico and other countries build more resilient infrastructures to protect better and stand

105 Hurlimann, Anna Catherine, Georgia Warren-Myers, and Geoffrey R. Browne. "Is the Australian construction industry prepared for climate change?" *Building and Environment* no. 153, (2019): 128-137. <https://doi.org/10.1016/j.buildenv.2019.02.008>.

106 Jill Bennet and Saskia Beudel, *Curating Sydney: Imagining the city's future*. (Sydney: UNSW Press, 2014) <https://books.google.com/books?hl=it&lr=&id=ayVtBgAAQBAJ&oi=fnd&pg=PA5&dq=Notable+Green+Star+certified+projects+include+Barangaroo+South+in+Sydney,+a+large-scale+urban+renewal+project+aiming+for+carbon+neutrality&ots=6RQX7H77jR&sig=UtFtWHmeE1gxdfQcsoHPrQq4WEE>.

107 M. Bradley Wells, Iifton B. Farnsworth, Andrew South, Evan D. Bingham, and James P. Smith, "Evaluating the Impacts of Hurricane Maria on Residential Construction Practices in Puerto Rico," *Construction Research Congress 2024* (2024): 495-504, <https://ascelibrary.org/doi/abs/10.1061/9780784485279.050>.

108 A. E. Lugo, *Social-ecological-technological effects of hurricane María on Puerto Rico: planning for resilience under extreme events*, Springer, (2018), https://books.google.com/books?hl=it&lr=&id=4vt9DwAAQBAJ&oi=fnd&pg=PR7&dq=construction+industry+sustainability+and+hurricane+maria&ots=15HJnd_Ulj&sig=tCyFABTyW6mDsQpZCO9wux6ln90.

firm against future natural disasters.

A second example of disaster response is the 2011 Great East Japan Tsunami, which was brought on after a strong earthquake. The structures were not designed to withstand such strong stresses, so much destruction was only worsened by the tsunami. Due to its dangerous and unprecedented height, the seawalls made to protect the area were destroyed, and there was significant flooding.¹⁰⁹ The situation brought on much-needed discussions regarding how to improve the construction procedures in the region to protect the citizens and the infrastructure better. Hybrid technologies were implemented to help promote sustainable and withstanding construction and be beneficial in other countries such as the Netherlands through dunes and wetlands.¹¹⁰ They combine the preservation of natural, existing ecosystem barriers with man-made methods like levees and breakwaters. For example, utilizing an enforced seawall supported by the growth of mangroves or wetlands acts as a double barrier. It contributes to increased biodiversity and also is complemented by human engineering. Combining these different types of defenses creates multiple layers of protection, reducing the risk of failure.¹¹¹ Natural systems also adapt quickly to changing environmental conditions, such as rising sea levels. The ecosystem-based solution has other benefits, such as improved water quality and carbon sequestration. This helps mitigate the potential environmental harm that may result from man-made constructions. It is also beneficial that these natural solutions have comparably low maintenance costs. Meanwhile, the engineered structures provide immediate and reinforceable protection.¹¹²

Current Status

Case Study: Colombia Incentivizing Sustainable Construction

Promoting change through positive reinforcement is a modern way that some nations hope to spark these changes. Colombia's efforts to improve and incentivize sustainable construction reflect a broader commitment to bettering the environment while furthering economic development. They consider and define sustainable buildings as ones that utilize energy-efficient technologies, sustainable materials, and designs that minimize environmental impact.¹¹³ Their energy efficiency standards refer to policies that require energy-saving technologies and practices in new constructions. These standards aim to reduce the overall energy demand of buildings, particularly in terms of electricity consumption for lighting, heating, cooling, and other functions. The country's approach involves governmental policies, innovative construction practices, and international certifications that guide the industry toward more sustainable outcomes.¹¹⁴ These plans aim to reduce the construction sector's environmental footprint and promote energy efficiency.

Currently, Colombia implements the Leadership in Energy and Environmental Design (LEED) certification system. This is one of the most widely recognized and respected green building certification programs globally.¹¹⁵ LEED provides regulations surrounding designing, constructing, and operating buildings that are environmentally responsible, energy-efficient, and healthy for the occupants. The certification covers many different factors of sustainability. This includes energy and

109 Anawat Suppasri, Nobuo Shuto, Fumihiko Imamura, Shunichi Koshimura, Erick Mas, and Ahmet Cevdet Yalciner, "Lessons learned from the 2011 Great East Japan tsunami: performance of tsunami countermeasures, coastal buildings, and tsunami evacuation in Japan." *Pure and Applied Geophysics* 170, (2013): 993-1018, <https://link.springer.com/article/10.1007/s00024-012-0511-7>.

110 K. D. C. R. Dissanayaka, Norio Tanaka, & T. L. C. Vinodh, "Integration of Eco-DRR and hybrid defense system on mitigation of natural disasters (Tsunami and Coastal Flooding): a review," *Natural hazards* 110, no. 1, (2022): 1-28, <https://link.springer.com/article/10.1007/s11069-021-04965-6>.

111 Dissanayaka, Tanaka and Vinodh, "Integration of Eco-DRR and hybrid defense system on mitigation of natural disasters (Tsunami and Coastal Flooding): a review."

112 Dissanayaka, Tanaka and Vinodh, "Integration of Eco-DRR and hybrid defense system on mitigation of natural disasters (Tsunami and Coastal Flooding): a review."

113 Jessica Arias-Gaviria, Verónica Valencia, Yris Olaya, and Santiago Arango-Aramburo, "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach," *Journal of Cleaner Production* 314 (2021): 128041. <https://www.sciencedirect.com/science/article/abs/pii/S0959652621022599>.

114 Arias-Gaviria, Valencia, Olaya, and Arango-Aramburo, "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach."

115 Andrés Peláez Ospina, Alexander González Castaño, and Laura Marín Restrepo. "LEED certification and the new standard of sustainable construction in Colombia," *International Journal of Sustainable Building Technology and Urban Development* 8, no. 2 (2017): 125-134, <https://doi.org/10.12972/susb.20170010>.

water efficiency, site selection, use of materials, indoor environmental quality, and innovative design.¹¹⁶ The LEED certification has become a global keystone for sustainable construction, influencing building practices worldwide. In Colombia, adopting LEED standards marks an essential shift towards more sustainable construction practices. It aligns the country with international trends and enhances its reputation as a promoter of green building.

One of the key steps taken by the Colombian government is their use of tax incentives and subsidies for developers that agreed to adopt green building practices.¹¹⁷ A subsidy is a certain amount of money the government gives to industries to help control the price of something else. Specifically, they have conducted reductions in property taxes and exclusions from some construction-related taxes for buildings that meet certain sustainability standards.¹¹⁸ For example, a subsidy can pay for some of the costs related to sustainable materials, energy-efficient systems, and other environmentally conscious construction methods. The project's energy efficiency, water conservation, and the use of environmentally friendly materials are taken into account.¹¹⁹ This financial support is important in encouraging adherence to sustainable practices. Especially considering that this industry has many who follow traditional construction methods despite their proven lack of sustainability. Their tax incentives hope to counteract the higher initial costs of sustainable construction. This system makes it more financially appealing and removes economic strain as an excuse for developers and property owners.

Another development is to set required energy efficiency standards that mandate the installation of energy-saving devices in new construction.¹²⁰ These guidelines are part of a larger set of rules meant to lessen the construction industry's impact on the environment. For instance, energy-efficient heating, cooling, and lighting equipment, as well as minimally

conductive insulation, are required for new construction.¹²¹ Enforcing these standards aims to help Colombia achieve its overall goal of lowering greenhouse gas emissions by drastically lowering the energy consumed by newly constructed buildings. This was paired with revised building codes to include requirements for green building certifications. These certifications also helped set a standard for eco-friendly construction. It helped establish rules on site selection, water efficiency, energy use, and indoor environmental quality.¹²² This inclusion strategically aided Colombia in standardizing sustainable practices across the industry.

Education is another innovative part of the country's plan. Their government and other partnering private organizations have developed training programs for construction professionals. These programs are made to teach architects, engineers, and builders the knowledge and skills necessary to enforce green building practices.¹²³ Effectively, the training covers many aspects of sustainable construction. For example, the use of renewable energy sources, waste reduction techniques, and the uses for different sustainable materials.¹²⁴ There are clear long-term benefits of sustainable buildings and spreading support for energy efficiency standards, making gaining broader acceptance and support crucial.

Colombia also approaches the issue with an openness to global partnerships and has participated in several international organizations. Even cities can learn from one another's experiences and share the best practices through regional alliances. They understand that cooperation could help accelerate the adoption of sustainable policies and practices across the continent. This mindset enabled them to develop and implement model developments that showcase the latest green technologies and sustainable building practices.¹²⁵ This collaboration brings in others' global experience and helps ensure that their projects meet the best sustainability

116 Pelez Ospina, Gonzalez Castano, and Marın Restrepo, "LEED certification and the new standard of sustainable construction in Colombia."

117 Fujio, "How Colombia Is Incentivizing Sustainable Construction." Setting Mind, December 26, 2023. <https://settingmind.com/how-colombia-is-incentivizing-sustainable-construction/>.

118 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

119 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

120 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

121 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

122 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

123 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

124 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

125 Fujio, "How Colombia Is Incentivizing Sustainable Construction."

standards. Additionally, these partnerships can provide access to further funding and technical assistance, which helps support furthering sustainable construction in Colombia.

Colombia also faces obstacles to its current strides on the topic. They face the ongoing challenge of balancing economic development with environmental sustainability. Other negative contributing factors include rapid urbanization, environmental degradation, social inequalities, and financial instability.¹²⁶ These challenges necessitate the development of policies that promote sustainability and address the region's unique socio-economic conditions. While the incentives and regulations are designed to promote sustainable practices, they must confirm that these measures do not minimize economic growth. They also have to see to it that it does not make construction exceedingly expensive.¹²⁷ Their government's current approach is to promote a supportive environment where sustainability and economic development are equally prioritized. With this, they hope to support and nurture a construction industry that is both eco-conscious and economically solid.

To understand better the way Colombia addresses this issue, one can look into urban areas.¹²⁸ Bogotá has the largest potential for electricity savings because it is their largest city. The current need for heating systems is increased because of the city's colder environment. This makes energy-saving solutions like upgraded insulation and energy-efficient heating systems more beneficial.¹²⁹ In Medellín, there is mild weather and a moderate potential for energy savings. The benefits of energy efficiency regulations here are largely connected to lighting and appliance efficiency. Here, the city's stable weather minimizes the otherwise large demand for heating and cooling.¹³⁰ On the other hand, Barranquilla has a hot and humid environment, which leads to a significant demand for power needed for

cooling systems. Using sustainable building techniques can result in significant electricity savings. This is especially true when lowering the need for air conditioning by improving building insulation and design. Lastly, Cali is a warmer state where the weather increases the people's need for electricity to power air conditioning. Also, while there are policies in place to reduce greenhouse gas emissions, their impact is limited by insufficient enforcement and a lack of public awareness in the city.¹³¹ Urban planning in Cali should prioritize affordable housing and public transportation systems. This way, they can reduce carbon emissions while improving access for low-income populations. The combined data collected from the four cities shows a significant reduction in the country's electricity usage. This may be due to the implementation of energy efficiency regulations and sustainable building practices.¹³² Similar to Colombia's environmental objectives, this cut would also help to reduce greenhouse gas emissions and lessen the strain on the nation's electrical grid. Studies also surveyed promoting the country's use of energy-efficient air conditioning systems and building designs. This is suggested with the hope of improving natural ventilation and energy efficiency regulations so they could then dramatically cut electricity use.

In the future, Colombia plans to support further research to examine the long-term impact of sustainability policies and explore new indicators that highlight emerging sustainability challenges, such as climate change adaptation and resilience. Colombia calls for more investigation into sustainability's social restrictions, specifically in Latin American cities.

Case Study: Energy-Efficient Cities in China

Shifting to a different region, sustainable building techniques are needed and improving in China. The country's fast

126 Daniela Santana Tovar, "Evaluations for sustainable policies in Latin-American countries. A Sustainability Measurement Framework for Cali, Colombia." PhD diss., Politecnico di Torino, 2019. <https://webthesis.biblio.polito.it/secure/11877/1/tesi.pdf>.

127 Santana Tovar, "Evaluations for sustainable policies in Latin-American countries. A Sustainability Measurement Framework for Cali, Colombia."

128 Jessica Arias-Gaviria, Verónica Valencia, Yris Olaya, and Santiago Arango-Aramburo. "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach," *Journal of Cleaner Production* 314 (2021): 128041, <https://www.sciencedirect.com/science/article/abs/pii/S0959652621022599>.

129 Arias-Gaviria, Valencia, Olaya, and Arango-Aramburo. "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach."

130 Arias-Gaviria, Valencia, Olaya, and Arango-Aramburo. "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach."

131 Santana Tovar, "Evaluations for sustainable policies in Latin-American countries. A Sustainability Measurement Framework for Cali, Colombia."

132 Arias-Gaviria, Valencia, Olaya, and Arango-Aramburo. "Simulating the effect of sustainable buildings and energy efficiency standards on electricity consumption in four cities in Colombia: A system dynamics approach."

urbanization has created a need to lessen construction’s negative effects on the environment, natural resources, and urban living standards. The country’s active pursuit of sustainable construction in recent years emphasizes energy efficiency, modular construction, and the creation of smart cities. The Chinese government and local authorities have put several initiatives and incentives in place to encourage sustainability in buildings.

Modular construction has become more prevalent in China because of the lower construction waste, energy consumption, and environmental effects. It involves a process of pre-assembling building components off-site and assembling them on-site. When examining the three locations of mainland China, Hong Kong, and Macau, it shows they have all embraced modular construction, but their methods and degrees of application differ greatly.¹³³ In comparison, the government of China’s mainland has been encouraging modular construction more and more in an attempt to improve the sustainability of the building sector. To promote the use of modular construction, the Chinese government has implemented several laws and initiatives, such as tax breaks,

subsidies for builders and contractors, and the addition of modular construction to the country’s green building guidelines¹³⁴. Due to these initiatives, modular construction is now widely used in large cities, especially when developing public infrastructure and residential structures.

In contrast, Hong Kong has embraced modular construction in response to the increased demand for housing and the need to save costs and construction time.¹³⁵ The Hong Kong government has also offered incentives for the use of modular construction. Examples include accelerated approval procedures for projects incorporating modular elements.¹³⁶ However, due to several obstacles, such as legislative barriers and a lack of local experience in modular construction techniques, Hong Kong has adopted modular construction more slowly than mainland China.¹³⁷

Another area to highlight is Macau, which struggles with its dense urbanization, limited land area, and high energy consumption. Recently, the local government has implemented strategies and initiatives that look to improve energy efficiency and sustainability in the city.¹³⁸ Since the city uses a lot more

133 Zhao Xu, Tarek Zayed, and Yumin Niu. “Comparative analysis of modular construction practices in mainland China, Hong Kong and Singapore.” *Journal of Cleaner Production* 245 (2020): 118861. <https://www.sciencedirect.com/science/article/pii/S095965261933731X>.

134 Xu, Zayed, and Niu, “Comparative analysis of modular construction practices in mainland China, Hong Kong and Singapore.”

135 Xu, Zayed, and Niu, “Comparative analysis of modular construction practices in mainland China, Hong Kong and Singapore.”

136 Xu, Zayed, and Niu, “Comparative analysis of modular construction practices in mainland China, Hong Kong and Singapore.”

137 Xu, Zayed, and Niu, “Comparative analysis of modular construction practices in mainland China, Hong Kong and Singapore.”

138 Qingbin Song, Jinhui Li, Huabo Duan, Danfeng Yu, and Zhishi Wang. “Towards to sustainable energy-efficient city: A case study of



Modular construction

Credit: ArcMath

energy than other areas with comparable populations, energy efficiency is an important thing to consider. Because of Macau's growing economy and expanding tourism industry, it is anticipated that the city's energy consumption will continue to rise.¹³⁹ Therefore, methods for managing and reducing energy usage are desperately needed to assure long-term sustainability and lessen environmental impact. The area is also even more vulnerable because it relies on fossil fuels for energy generation. This worsens its carbon footprint, making it crucial for the city to explore alternative energy sources and improve its energy efficiency.¹⁴⁰ The growth of smart grids, energy-efficient building materials, and renewable energy technologies present opportunities for technological innovation.

The main goals that Macau has to contribute to the creation of an intelligent city development include improving the efficiency of urban infrastructure, environmental sustainability, and the promotion of innovation and technical advancement.¹⁴¹ Advanced technologies such as big data analytics, the Internet of Things, artificial intelligence, and smart infrastructure are used to achieve these goals. Working together with foreign organizations and nearby areas can also yield insightful information and useful resources for Macau's energy efficiency advancement.¹⁴² Being a popular travel destination worldwide, Macau has the chance to integrate sustainability and energy efficiency into its brand to draw eco-aware tourists and serve as a model for other towns in the area.

The Macau government plays a pivotal role in propelling the agenda for smart cities. They work to establish relationships with the business sector, invest in technology infrastructure, and formulate policies. The government has started several programs to aid in the growth of smart city capabilities. One

of these projects is the "Macau Smart City," which provides a thorough framework for integrating smart technologies into a variety of industries.¹⁴³ Initiatives taken by the government to support smart city innovation include the establishment of research centers, financial incentives, and cooperative efforts between public agencies, businesses, and academia.

This cooperative strategy is crucial for developing the knowledge and skills required to fulfill Macau's aspirations of becoming a smart city. The smart city concept in Macau is based on the principle of environmental sustainability.¹⁴⁴ It describes how intelligent technologies are being applied to better monitor and manage the city's natural resources. This includes monitoring energy use, trash management, and air and water quality in real-time using Internet of Things sensors. It also explores how to lower the city's carbon footprint and increase energy efficiency by integrating renewable energy sources and smart grids.¹⁴⁵ Smart grids make it possible to distribute electricity more effectively, facilitating a greater integration of renewable energy sources like wind and solar power. This helps the city achieve its objectives of lowering greenhouse gas emissions and lessening the effects of global warming.

Despite the advancements made thus far, Macau's journey towards developing sustainable construction through a smart city has faced some difficulties. The city's antiquated infrastructure is one of the main issues since it can block the adoption of cutting-edge technologies. To enable smart city technologies, a substantial investment is needed to modernize the current infrastructure, which includes energy grids, transportation networks, and telecommunications networks.¹⁴⁶ Furthermore, Macau faces challenges in keeping

Macau." *Renewable and Sustainable Energy Reviews* 75, (2017): 504-514. <https://doi.org/10.1016/j.rser.2016.11.018>.

139 Song, Li, Duan, Yu, and Wang, "Towards to sustainable energy-efficient city: A case study of Macau."

140 Song, Li, Duan, Yu, and Wang, "Towards to sustainable energy-efficient city: A case study of Macau."

141 Yujia He, Felix Tan, Carmen Leong, Jingbo Huang, and Don Rodney Ong Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities," *Journal of Urban Affairs* (2023): 1-19, <https://doi.org/10.1080/07352166.2023.2211274>.

142 Yujia, Tan, Leong, Huang, and Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities."

143 Yujia, Tan, Leong, Huang, and Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities."

144 Yujia, Tan, Leong, Huang, and Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities."

145 Yujia, Tan, Leong, Huang, and Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities."

146 Yujia, Tan, Leong, Huang, and Junio, "Realizing innovation and sustainability: A case study of Macau SAR's smart city development capabilities."

up with the latest advancements and making sure that smart city solutions continue to be applicable and efficient due to the quick speed of technological change.¹⁴⁷ Ongoing research investments and partnerships with global tech corporations are required to overcome these obstacles.

Cultural and socioeconomic variables also influence how well Macau's smart city projects work out.¹⁴⁸ There is a need for increased public acceptance and an understanding of smart technology, as well as initiatives to close the digital divide and guarantee that smart city developments benefit all facets of society. Adopting smart city solutions may be slowed by cultural resistance to change and a lack of digital literacy among particular populations. Community involvement projects and focused education and training programs are crucial for fostering public confidence and promoting the broad adoption of smart city services.

Sustainable Development Goals

To continue achieving the United Nations Sustainable Development Goals (SDG), addressing the construction industry's deficits in sustainability is crucial. The issue is highly tied to the goals outlined in SDG 11: Sustainable Cities and Communities.¹⁴⁹ It also overlaps with the goals detailed in SDG 17: Partnership for the Goals.¹⁵⁰

Goal 11 is at the core of what UN-Habitat aims to accomplish by tackling this issue. It highlights how important it is to use resources effectively. This translates into the construction sector implementing procedures that limit waste, lower energy usage, and make better use of available materials.¹⁵¹ Sustainable construction methods like using recycled materials and integrating energy-efficient technologies directly aid this objective. Another goal is to build resilient infrastructure that

is immune to climate change and natural calamities. This entails creating infrastructure and structures that are resilient, flexible, and able to withstand harsh weather conditions.

Target 11.3 of this goal refers to “enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.”¹⁵² Sustainable human settlement planning is especially important for this issue because sustainable construction practices must be ensured to achieve it. Considering the fast pace at which cities are growing, it is crucial to take actions that promote sustainability within the growth of cities.

Moving on to goal 17, it is also important to consider how targeting this issue involves many different actors coming together to find a working solution. This is important because the construction industry is global, and the negative implications of this problem will affect everyone's environment. The significance of cooperation between the public, business, and civil society sectors is heavily considered in this issue. Within the framework of sustainable building, this entails encouraging cooperation between various stakeholders to exchange innovations, technologies, and best practices. For example, partnerships between technology companies and construction companies can result in the creation and adoption of innovative, sustainable building practices and materials.

Target 17.7 of this goal refers to promoting “the development, transfer, dissemination, and diffusion of environmentally sound technologies to developing countries on favorable terms, including on concessional and preferential terms, as mutually agreed.”¹⁵³ Environmentally sound technologies strongly relate to sustainable construction practices. By encouraging both, the growth and development of cities can be ensured.

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152 “Goal 11: Make Cities Inclusive, Safe, Resilient and Sustainable,” United Nations Sustainable Development, accessed September 20, 2024, <https://sdgs.un.org/goals/goal11>.

153 “Goal 17: Partnership For The Goals,” United Nations, accessed September 20, 2024, <https://sdgs.un.org/goals/goal17>.

Bloc Analysis

Points of Division

How a country handles sustainability depends on the laws it has passed. Carrying out sustainable construction practices requires strong laws and the ability to enforce them. This is a challenge when some countries do not prioritize sustainable practices or disagree on how to approach sustainability issues. Countries with weaker regulatory frameworks are more likely to face obstacles in prioritizing and enforcing sustainability. Also, countries with limited technological infrastructure may find it more difficult to implement the latest sustainable building practices.¹⁵⁴ Economic factors also play a role in the country's stance. Countries with high economic reliance on fossil fuels might be less supportive of enforcing sustainable changes to renewable energy in the construction sector. For example, oil-rich countries may be slower to adopt restrictive energy regulations that serve as sustainability measures since it could counter their economic interests.¹⁵⁵ The middle ground lies with countries planning to develop their infrastructure more sustainably and have made strides with policies. For these countries, the struggle is more about successfully enforcing their goals and addressing problems throughout the industry that were accustomed to former, less sustainable practices. Overall, collaboration across the board is encouraged to reach sustainable solutions in infrastructure development and the construction industry that work towards protecting people and the environment.

Countries with Advanced Sustainable Construction Policy

The countries in this bloc have developed sustainable construction policies. In addition, they are considered leading

in actively implementing their policies by utilizing strict, well-enforced regulations. They work to promote green building and incorporate sustainability into market practices. They also consistently meet or exceed global standards in energy efficiency, CO2 emissions reduction, and green building certifications. By tracking each state's progress on decarbonization efforts and energy efficiency in buildings worldwide, one can better spot this trend. This bloc also has strong public opinion and cultural awareness regarding environmentally conscious development. Some examples include Germany, the Netherlands, Singapore, Sweden, and Canada. A strong foundation based on market demand for 'green building' likely exists for the construction industry here due to the higher property value.¹⁵⁶ Clear jurisdictions and diligent construction approval processes also drive their policies.

Construction projects must also be completed with the proper consent documents. For example, in Australia, yearly approval of emergency services like fire alarms is a requirement in all states and territories. These are designed to keep buildings safe during fires or climate issues. Another example of policies these countries would support is permits required for the "operation of lifts, waste disposal or for storage, and the transportation and use of hazardous substances."¹⁵⁷ This bloc of countries will have ambitious policies in place. They will also be actively pursuing further implementation of environmentally sustainable policy regulations. Though not specific to the construction industry, they may also tend to be high on the 2024 Environmental Performance Index (EPI), scoring 60 and above. There is an overall consensus that their sustainability efforts in the industry will allow them to reach long-term cost savings through energy efficiency, reduced waste, and lower maintenance costs.¹⁵⁸ These countries may also be encouraged by a shared risk regarding their environmental or geographical situation. Therefore, sustainable construction is necessary to

¹⁵⁴ Charles J. Kibert, "Sustainable construction: green building design and delivery", John Wiley & Sons, 2016, https://www.perlego.com/book/993932/sustainable-construction-green-building-design-and-delivery-pdf?utm_source=google&utm_medium=cpc&campaignid=19806006398&adgroupid=147253247415&gad_source=1&gclid=Cj0KCQjwiOy1BhDCARIsADGvQnA7SjFeO26dc1zdG_6LMdhpcvBpSSpuK55pvwztDhhLpmXoiLjnn_saAssjEALw_wcB.

¹⁵⁵ Sadar Din, Khalid Mehmood, and Md Sayuti Ishak, "Sustainable Building Construction Materials in the United Arab Emirates: A Review," *Sustainability* 16, no. 15: 6565, 2024, <https://doi.org/10.3390/su16156565>

¹⁵⁶ Leskinen Niina, Jussi Vimpari, and Seppo Junnila, "A Review of the Impact of Green Building Certification on the Cash Flows and Values of Commercial Properties" *Sustainability* 12, no. 7: 2729, 2020, <https://doi.org/10.3390/su12072729>.

¹⁵⁷ Juan Bernardo Garcia, "Global Corporate Real Estate Guide. Baker McKenzie Resource Hub," Baker McKenzie, September 2023, <https://resourcehub.bakermckenzie.com/en/resources/global-corporate-real-estate-guide>.

¹⁵⁸ IEA, "The Guide to Sustainable Construction – Policies - IEA," IEA, November 5, 2017, <https://www.iea.org/policies/1137-the-guide-to-sustainable-construction>.

keep their infrastructure resilient and safe for inhabitants.

Countries with Emerging Sustainable Construction Policy

The countries in this bloc are emerging with new and improving policies incorporating sustainable construction policies more effectively within their society. Still, they face challenges with successful enforcement among industries and communities. Moderate policy frameworks show varying levels of implementation, and their effectiveness is growing. Countries like the United Arab Emirates and China fall into this category. These countries have rapid urbanization that drives a need for sustainable practices, but challenges remain in fully realizing policy potential. The UAE is an example, with its strict green building regulations, including the Dubai Green Building Regulations and Estidama in Abu Dhabi.¹⁵⁹ Estidama, which translates to “sustainability” in Arabic, is a method for architectural design that prioritizes social, economic, and environmental sustainability. All new construction in Abu Dhabi must follow the Pearl Rating System under Estidama, which attempts to increase waste reduction, water/energy efficiency, and environmentally friendly materials.

These emerging countries may be attempting to implement new policies that help improve environmental sustainability. Therefore, they may also show an increased score on the 2024 EPI compared to previous years. Still, it is important to consider how these countries face barriers such as the more recent policy transition or an ongoing reliance on fossil fuels. Success with the sustainability campaigns will depend on how effectively they can maintain and grow these initiatives. This must happen while overcoming the challenges associated with other current problems.

Countries with Minimal Establishment or Implementation of Sustainable Construction Policy

Lastly, the countries in this bloc have few existing sustainable construction policies or have yet to implement the ones they have. This can be considered a result of them being

uninterested or struggling to mitigate the issues. Basic regulatory frameworks may exist, but significant gaps exist in policy enforcement and industry adoption. Countries like India, Venezuela, and Indonesia belong to this bloc, where economic and developmental priorities can overshadow environmental considerations. This indicates they may be struggling with poor air quality or declining biodiversity but have not pooled enough resources to tackle the issue’s root. These countries may be ranked low on the 2024 EPI with a score below 40 because they do not prioritize policy goals that revolve around promoting environmental sustainability.

This can be due to many factors, such as an outweighing desire or need for faster economic growth. This is often perceived as more achievable through less sustainable practices, as the processes are cheaper at the moment — despite having future costly consequences. Areas with rapidly growing populations may also view sustainability as a luxury instead of part of the solution. This is due to the stress of providing for such a large influx of people and demands. Here, one should also consider countries that are less active in international environmental agreements because they lack the external pressure to adopt and enforce sustainability policies. This later results in slower progress towards sustainable construction practices, specifically in areas where economic or political interests are being prioritized over environmental commitments. On the other hand, it is also possible that these states’ construction industries may struggle to enforce any existing regulations and may desire collaborative help from others to improve their future efforts.

Committee Mission

The United Nations Human Settlements Programme aims to ensure that all people have access to acceptable housing and aims to build more sustainable infrastructure. They are dedicated to helping people who reside in areas defined as slums by the United Nations. This is an urban area that lacks (one or more) durable housing, sufficient living area, access to decent water, access to improved sanitation facilities, and

¹⁵⁹ Sadar Din, Khalid Mehmood, and Md Sayuti Ishak, “Sustainable Building Construction Materials in the United Arab Emirates: A Review” *Sustainability* 16, no. 15: 6565, 2024, <https://doi.org/10.3390/su16156565>.

protected tenure.¹⁶⁰ The construction industry is critical to achieving this and more, as it is what works behind every new housing development across the globe. From sourcing materials and mitigating climate change to enforcing action through policy, Un-Habitat is responsible for growth in all sectors of the issue.

The committee had a goal of improving the lives of 100 million slum dwellers by 2020, and this became even more later on as the population continued to grow.¹⁶¹ Still, with these crucial goals comes heavy challenges as the committee faces roadblocks in parts of its plans. Material sourcing can become complicated as there is a stigma that sourcing sustainably leads to economic risk or losses. This is one of the many examples of how governments have to juggle with the wants and needs of private corporations that play large roles in construction. UN-Habitat must be resilient in promoting the many ways that sustainability benefits both private corporations and the public good. This is something that can be done over time as the results of sustainable infrastructure are best examined over time. They must also consider which countries have the resources, existing infrastructure, and economic capacity to prioritize such change. It is important that the committee also focuses on areas that struggle with prioritizing sustainable construction. This is important because these foundational changes in industry can often be overlooked. Delegates should ask how to reframe the global perspective on sustainability in construction. They should also be asking how to push citizens to invest more in how their infrastructure is being built. Moreover, what changes can be made to existing systems so that policy can be more efficiently, strictly, and beneficially enacted in the industry? The committee strives to propose answers to these questions along with posing new ones that help pave the way toward new solutions.

160 Laura B. Nolan, "Slum Definitions in Urban India: Implications for the Measurement of Health Inequalities," *Population and Development Review* 41 (1): 59–84, 2015, <https://doi.org/10.1111/j.1728-4457.2015.00026.x>.

161 UN-Habitat. 2024, "UN-Habitat: United Nations Human Settlements Programme – Office of the Secretary-General's Envoy on Youth," United Nations, 2024, <https://www.un.org/youthenvoy/2013/08/un-habitat-united-nations-human-settlements-programme/>.

Research and Preparation Questions

Your dais has prepared the following research and preparation questions as a means of providing guidance for your research process. These questions should be carefully considered, as they embody some of the main critical thought and learning objectives surrounding your topic.

Topic A

1. Has your country hosted any international-scale sporting events? What can be learned from your policies and procedures during them? If not, how would your country work towards the relevant SDGs to ensure an equitable event for all?
2. Have there been any cases of greenwashing in your country? Does your country require transparency in environmental efforts, and how do or could these standards affect greenwashing by organizers of sporting events?
3. How does your country care for displaced citizens during sporting events, especially those experiencing homelessness after being forcibly evicted? What are some programs used by your country to ensure the physical safety and psychological well-being of residents during this process? If this does not apply to your country, consider what other countries should do. Consider also the general issue of forced eviction, not necessarily as a consequence of sporting events.
4. How does your country handle the impact of major sporting events and/or other events on traffic and public transportation infrastructure? Consider how the daily lives of residents and visitors are affected.
5. Considering the high-density areas created by sporting events, what security measures does your country implement to improve safety at large events? What effects do these security measures have on citizens' everyday lives?
6. How have sports positively affected citizens in your country? If your country has hosted international sporting events, what were the economic impacts on local residents and businesses? Has your country repurposed stadiums, housing, and/or other facilities from sporting or other major events to create long-lasting domestic benefits?
7. What protections has your country implemented or considered implementing for workers? How could some of these protections be implemented by other countries to ensure fair treatment of workers at international sporting events?

Topic B

1. In the past, how has your country dealt with population surges? How has it impacted sustainable development and are there any lasting implications of these actions you must address?
2. Is green infrastructure highly incorporated in your country's policies? Considering this, how could the adoption of greener infrastructure and more advanced technology deepen the divide between different social classes and countries of different economic standings?
3. How can your country collaborate and support others to ensure collaboration is maintained, while still respecting the diverse economic capabilities and resource availability of each respective country?
4. What certain advantages and disadvantages has your country identified in adopting eco-friendly construction techniques? How can countries without these advantages still adopt these practices?
5. How does certain criteria such as time constraints, available resources, population stability, and global conflict affect

the construction of city infrastructure? How could these phenomena possibly inhibit your ability to adopt greener infrastructure?

6. How can certain climate events set sustainability plans back and what can be done within the industry to mitigate the issues?
7. Does your country encourage the public to be involved in community infrastructure? How has your country utilized construction efforts to uplift or alienate communities in the past, and what can be done to sustainably respond to any potential social repercussions that have or will occur?
8. How are countries making an effort to develop new technologies that are dedicated to sustainability efforts such as reducing construction-based carbon emissions? What possible economic side effects could arise, and how do you balance these while maintaining sustainable practices?

Important Documents

Topic A

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