

Net Zero Panaji: 2050 Vision Report



Transitions
Research



Transitions Research is a social science collective driving radical transitions at the intersection of technology, society, and sustainability. We aim to ensure these transitions are just, inclusive, and empower people while protecting the planet. Our work focuses on discovering sustainable pathways by generating anticipatory knowledge, co-creating solutions, and building capacities for societal action.

Our initiative, PULL (People's Urban Living Lab) works to co-create, test and implement equitable climate solutions in mid-sized Indian cities. Through PULL: Net Zero, we are working to discover net-zero solutions for Indian cities that leave nobody behind

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We are thankful to our partners at the Goa Energy Development Agency (GEDA), whose proactive leadership has been instrumental in pioneering low-carbon transitions in Panaji.

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Collaborating to Achieve Panaji's Net Zero Goal

Urban areas have a tremendous role to play in India's ambition to achieve net-zero by 2070. India's rapidly growing, mid-sized cities are expected to grow from 120 to 164 in number and will need to accommodate 70 million new urban dwellers over the course of this decade. These cities could pioneer a transition to net zero by adopting socio-technical innovation across sectors like energy, buildings, mobility and business and avoid carbon lock-in as they grow.

Recognizing this potential, the Ministry of New and Renewable Energy (MNRE) has called for each State and Union Territory to designate at least one city to become a "solar city." These solar cities will develop time-bound action plans to advance renewable energy use, focusing on rooftop and grid-connected solar power generation, and implement transformative measures to meet energy needs sustainably. Panaji has been identified as Goa's solar city under this initiative. In addition to being selected to be developed into a solar city, the city of Panaji has also declared its ambition to become a net zero city by 2050 in the Cities Race to Zero.

Building on this, the Goa Energy Development Agency (GEDA), the state nodal agency to the Ministry of New and Renewable Energy (MNRE), Government of India, has been leading state-level clean energy transitions. GEDA is the State Designated Agency to undertake the installation of solar rooftop projects for government and autonomous bodies across the state. In this capacity, they have worked with partners like GIZ to develop a Clean Energy Roadmap for Goa. This roadmap outlines pathways for renewable energy adoption across key sectors like mobility, buildings, agriculture, and industry, demonstrating a strong commitment to scaling renewable energy at the state level.

Transitions Research, through its People's Urban Living Lab (PULL), brings a unique focus to urban transitions, working to address the specific challenges and opportunities cities face in their journey toward net zero. PULL signed a Memorandum of Understanding (MoU) to solidify their partnership with GEDA to support Panaji's transition to a solar-powered and net zero future. Together, GEDA and Transitions Research are collaborating to create a sectoral emissions inventory for Panaji, engage stakeholders in envisioning net zero futures, identify actionable socio-technical solutions, and pilot innovative approaches to drive demand for solar energy and electric mobility.

This partnership aims to ensure that Panaji's net zero journey not only aligns with state-level goals but also reflects the city's unique identity and aspirations, leading the way in sustainable and equitable urban transitions.



Charting an Equitable Future

Charting an equitable future for Panaji amidst rapid urban growth and evolving sustainability challenges is an ambitious yet essential undertaking. As we navigate the complexities of urbanisation and climate change, the need to transform Panaji into a net zero city becomes increasingly clear. The Goa Energy Development Agency (GEDA) recognises that achieving this goal requires not only technological innovation but also a shared vision—one built on collective aspirations and active community involvement of Panjimites.

Panaji's ambition to become a solar city lies at the heart of this transformation. Our commitment to leveraging renewable energy, adopting cutting-edge technologies, and improving energy efficiency will play a critical role in reducing carbon emissions and fostering sustainable growth. However, we also understand that technology alone cannot bring about the necessary change. True progress requires the involvement of residents, local businesses, and institutions, working together towards a common goal of sustainability.

This is why we have partnered with PULL (People's Urban Living Lab)—to bring the voices of Panaji's citizens into the conversation. Through extensive public engagement, this vision report reflects the aspirations of the people who call Panaji home. It acknowledges that alongside our technological and climate ambitions, we must inspire social change, build equity, and ensure that our policies serve the diverse needs of the entire community.

The **Net Zero Panaji: 2050 Vision Report** is the result of collaboration between GEDA, PULL, and the people of Panaji. It outlines a path towards a future where the city can thrive both economically and environmentally, all while ensuring that no one is left behind. This vision not only aligns with Goa's broader goals for sustainable energy but also underscores the importance of creating a resilient, inclusive, and forward-thinking city.

We trust that this report will serve as a powerful guide for policymakers, city planners, and all those dedicated to shaping Panaji's future. On behalf of GEDA, I thank all partners, residents, and stakeholders who have contributed to this process, and we look forward to working together on the journey towards a net zero Panaji.

- **Sanjeev Joglekar**,
Member Secretary, Goa Energy Development Agency (GEDA)



A People-Centric Path to Net Zero

People's Urban Living Lab (PULL) is delighted to launch **Net Zero Panaji: 2050 Vision Report**. The city of Panaji has embarked on an ambitious journey to achieve net zero emissions by 2050—20 years ahead of India's national target.

To achieve this goal, we need positive and tangible visions of the future—ones that align the solutions we need for a low-carbon city with the aspirations of Panaji's residents. This vision for a net zero future is driven not by technical targets, but by shared values, culture, and the collective desire to build a city that reflects what its residents want. This report envisions a future that honours Panaji's rich history and incorporates the aspirations of its people.

This report would not have been possible without the support of Sanjeev Joglekar and his team at the Goa Energy Development Agency (GEDA), especially Saina, and Nishit Tari. Their commitment to a just, low-carbon transition ensures that its benefits will be felt by every Panjimate. We must extend additional thanks to the residents of Panaji who participated in our oral histories, imagination walks and visioning workshop. Their insights and creativity have been crucial in co-creating this shared vision for a net zero future.

The vision for Panaji laid out in this report highlights what a people-centric low-carbon transition can achieve. It spans every facet of life—from culture and education to local businesses and livelihoods to biodiversity and architecture. This vision represents the future that Panjimites believe in.

We look forward to building on this vision, celebrating the successes to come, and continuing our work together to co-create a net zero future for the city of Panaji.

- **Ashali Bhandari**,
Managing Director: PULL, Transitions Research



Executive Summary

The **Net Zero Panaji: 2050 Vision Report** represents the shared vision and priorities of the residents of Panaji, for a sustainable and equitable net zero future. It is the result of extensive public engagement, including workshops, interviews, and surveys undertaken by PULL in Panaji during 2023-2024. PULL brought together residents from diverse backgrounds to understand the community's aspirations for the future and align them with the city's climate goal of transitioning to net zero. Designed to serve as a guide for those who work to shape the city's future, the report's vision statement and strategic goals are detailed in the following chapters.

In 2050, a Net Zero Panaji is a culturally vibrant and sustainable city where urban nature thrives and people are socially connected. Our distinct heritage and community values are alive and flourishing; the economy is driven by sustainable local businesses; and people are encouraged to engage in civic life. The residents of Panaji envision that their city in 2050 will be:

A city that sustains

The city focuses on protecting biodiversity, promoting a circular economy, and adapting to climate change. Traditional livelihoods, such as fishing and agriculture, are supported and encouraged. By investing in youth education and engagement, Panaji cultivates a generation of informed and committed citizens.

A city that preserves

Panaji celebrates its vibrant neighbourhoods, distinct architecture, and local traditions. By prioritising heritage preservation, sustainable architecture, community engagement, and heritage-based tourism, the city aims to balance economic growth with cultural authenticity.

A city that connects

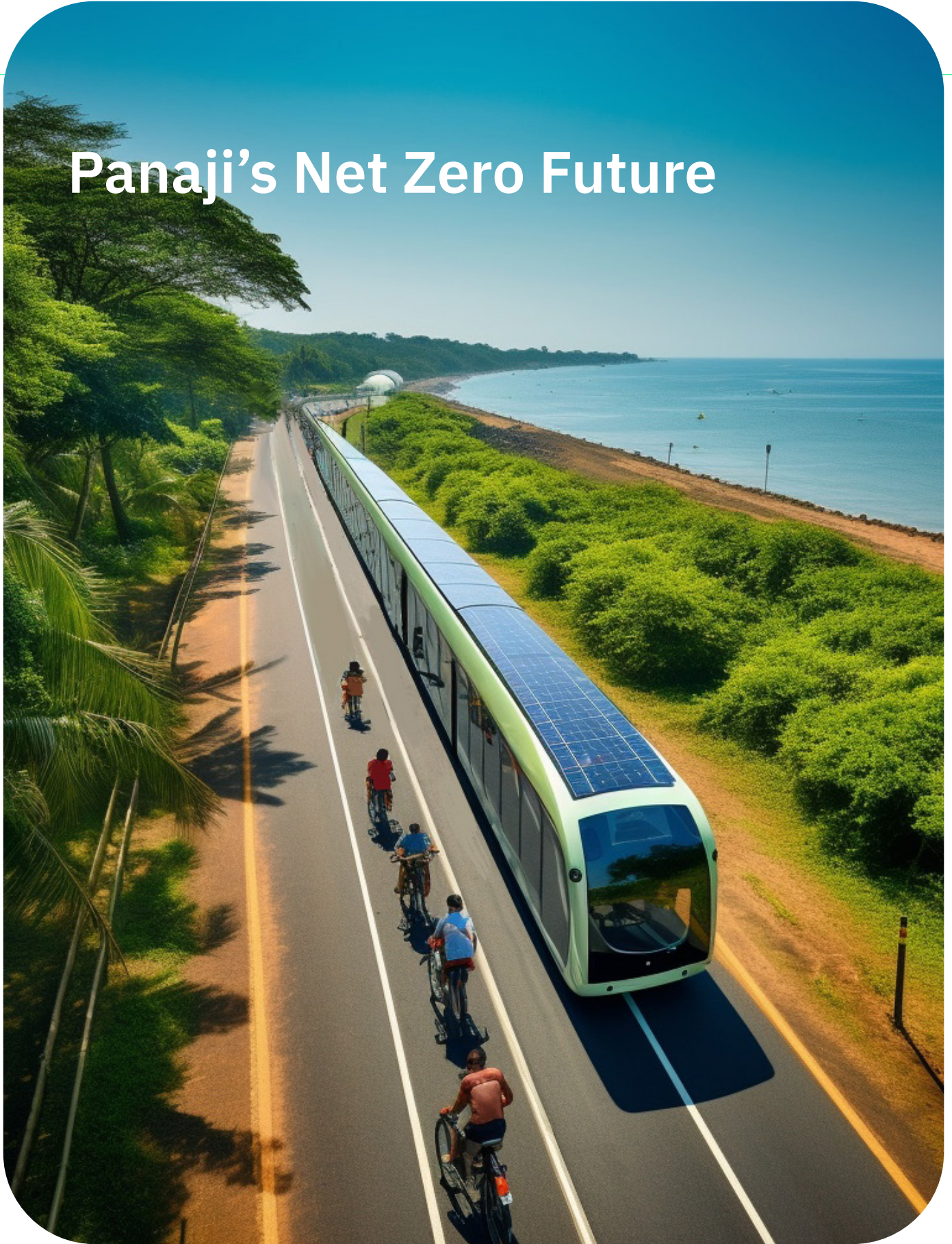
Panaji fosters a connected community through accessible public spaces, affordable transportation, and opportunities for civic engagement. The city prioritises pedestrian and cycling infrastructure, efficient public transport, and inclusive urban design to ensure that everyone can move freely and safely.

A city that prospers

Panaji fosters a thriving economy through strong community-business partnerships. The city promotes sustainable business practices, supports local entrepreneurs, and creates a vibrant urban environment that benefits both residents and businesses.



Panaji's Net Zero Future



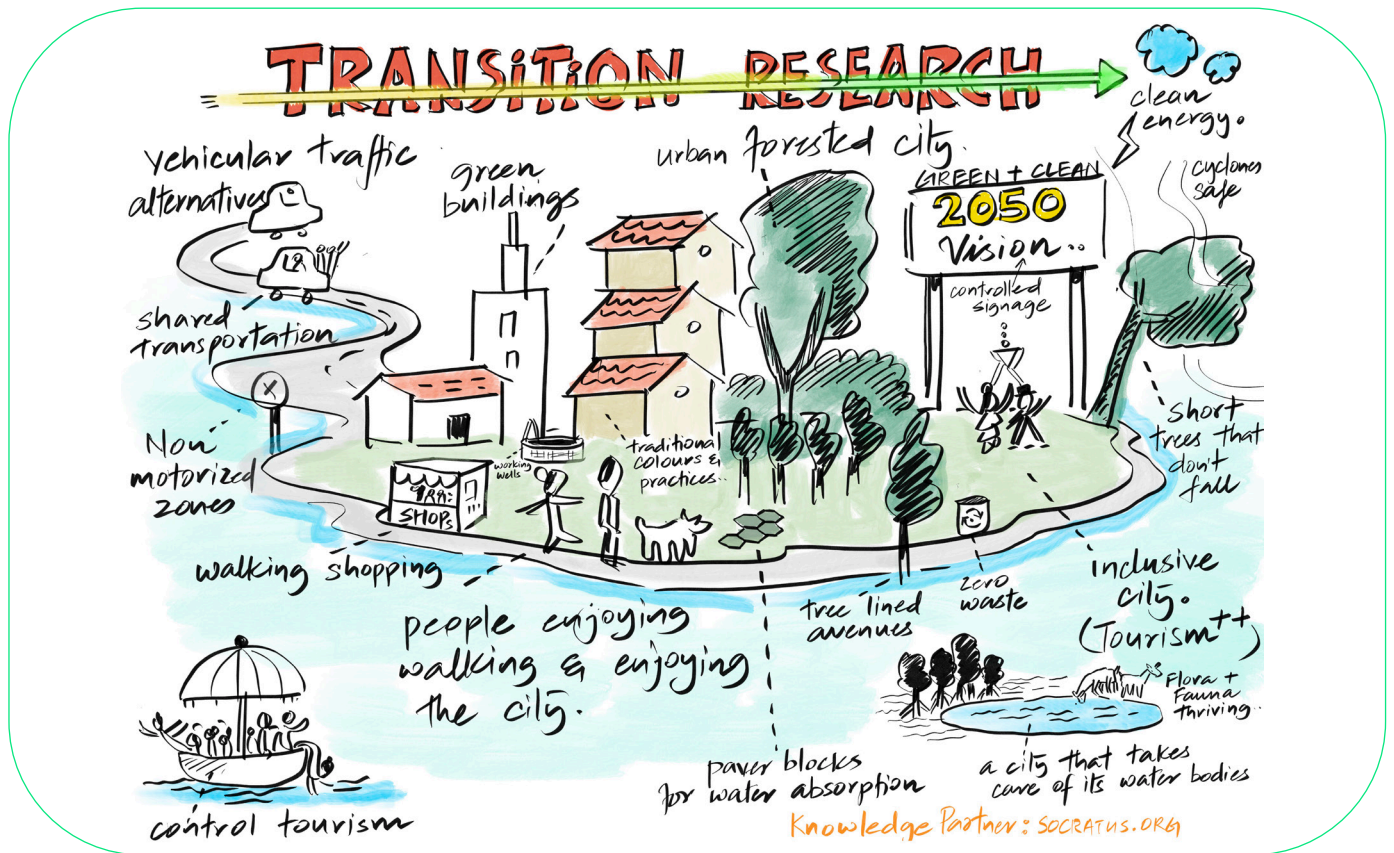
As part of the UNFCCC's Cities Race to Zero,¹ The City Corporation of Panaji has announced a commitment to achieve net zero by 2050, twenty years ahead of the national target. Plans to achieve this goal already include transitioning to renewable energy, shifting to electric public transport and mobility, and promoting green buildings, to reduce emissions; however, plans often overlook peoples' aspirations for their city. PULL's visioning work in Panaji aims to help the city meet its ambitious climate goals while **placing people, not carbon, at the forefront of climate action.**

The commitment to transitioning to a low-carbon future requires sweeping changes across various sectors, including industry, transportation, and consumption, thus also demanding massive shifts in individual behaviours from all citizens. Given that society has long depended on fossil fuels, these changes will significantly alter our daily lives and established systems.

However, despite the widespread adoption of the term "net zero" around the world, it remains a scientific concept that many find too abstract and intangible to be a call to action. This lack of clarity can undermine the effectiveness of net zero strategies.

Net zero plans often fail to account for the human behaviours, needs and aspirations of the people they impact. Therefore, to bridge the gap between policymakers and the public, we need shared visions of a net zero city that address diverse perspectives and unite the community. We need to understand people's current imaginaries of a net zero city and the potential socio-political impacts of pathways to achieve net zero.





Why “Vision” for Net Zero

With India’s urban population expected to grow from 483 million in 2020 to 675 million by 2035², cities have a tremendous role to play in climate action. India’s mid-sized cities, like Panaji, have the potential to pioneer India’s transition to a low-carbon and resilient future, if planned and designed to avoid carbon lock-in and with climate risks in mind. However, cities are growing in an unplanned manner, without accounting for the needs of current and future residents, or challenges such as climate change. Furthermore, government aspirations to achieve world-class cities, conforming to standards exemplified by the likes of London,

Singapore, and Dubai, do not necessarily align with the visions of local Indian communities or meet their needs. Still, these visions of the future shape our development plans, policies, institutions, and social choices.

“The future will only contain what we put into it now”
(Anonymous)

This is where visioning as a social and policymaking exercise comes in. Rather than relying on Western models of urban development or attempting to apply a one-size-fits-all approach, residents of Indian cities should be given the opportunity to envision the future of their city that is tailored to them,



prioritising sustainability and equity. Context-specific visions can then be used to direct policy planning to achieve the well-being of all residents and address the challenges of climate change.

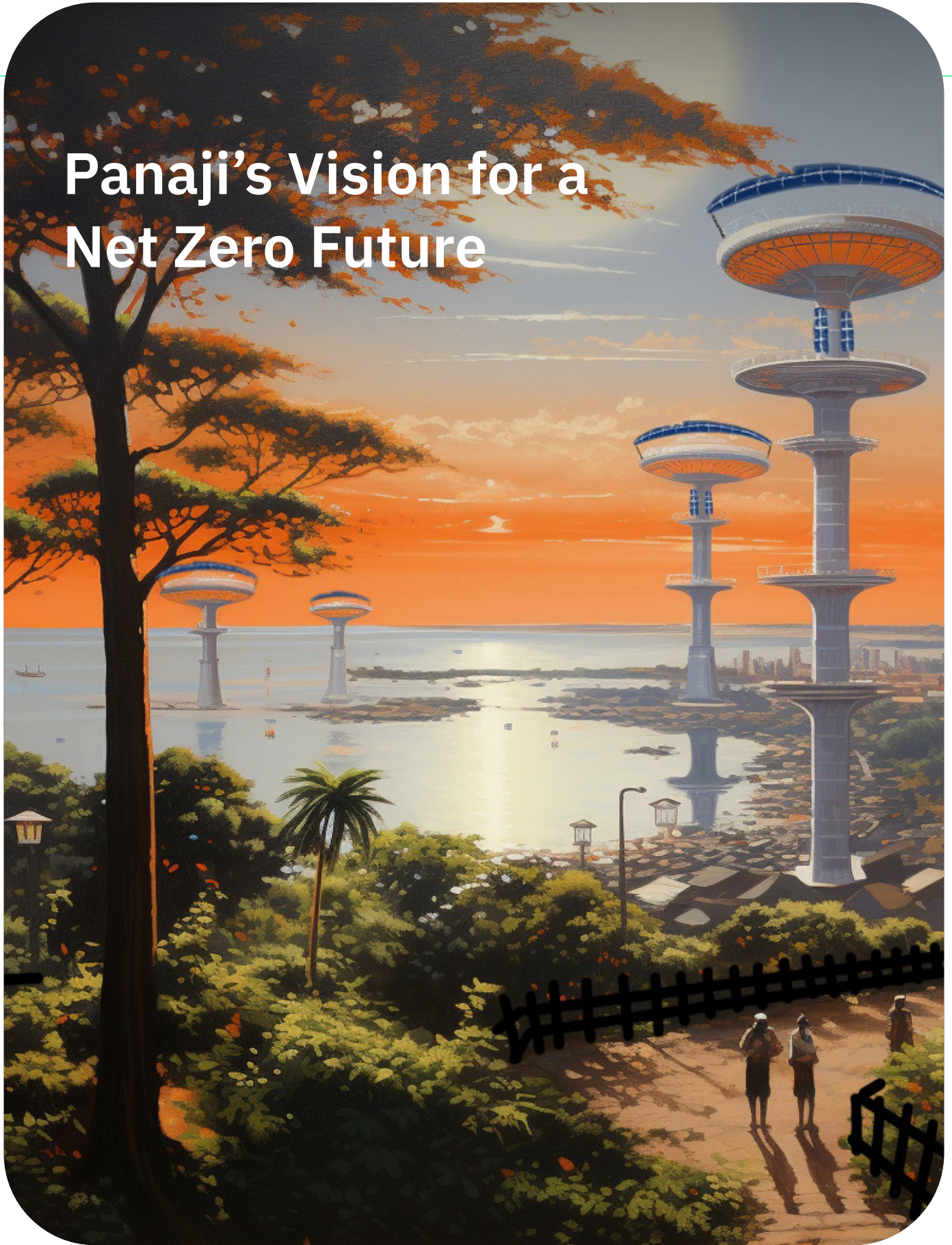
Visioning is the process of imagining and articulating a desired future state for a city. It provides a clear direction for policy planning, ensuring that all initiatives align towards a shared goal, leading to more effective and coherent urban development. Visioning exercises are a tool for understanding the diverse needs, aspirations, and concerns of a growing population. They can help build consensus and foster a shared sense of ownership among residents, increasing the likelihood of successful policy implementation. By considering the long-term implications of population growth and urbanisation, and anticipating growing resource requirements in a world plagued by climate change, cities can make informed decisions about infrastructure development, resource allocation, and service delivery. This multidisciplinary endeavour can provide valuable insights into the social and cultural dynamics of a city in order to address issues of inequality, social cohesion, and community resilience.

¹ C40 Cities, *C40 Cities Climate Leadership Group, Inc.* <https://www.c40.org/cities/>

² United Nations, Department of Economic and Social Affairs, Population Division, *World Urbanization Prospects: The 2018 Revision*, custom data acquired via website (2018). (accessed September 15, 2024) <https://population.un.org/wup/>



Panaji's Vision for a Net Zero Future



Vision Statement:

In 2050, a Net Zero Panaji is a culturally vibrant and sustainable city where urban nature thrives and people are socially connected. Our distinct heritage and community values are alive and flourishing; the economy is driven by sustainable local businesses; and people are encouraged to engage in civic life.

Panaji is a city that:



Sustains:

We conserve our coastal ecology and enhance natural spaces and water bodies to build resilience for future generations.



Preserves:

We celebrate our vibrant neighbourhoods, distinct architecture, and local traditions and festivals.



Connects:

We bring people together through affordable transportation, accessible public spaces, and opportunities to contribute to society.



Prosper:

We promote strong relationships between businesses and local communities to drive a sustainable economy.





A city that sustains: we conserve our coastal ecology and enhance natural spaces and water bodies to build resilience for future generations.

Urbanisation in Panaji is planned around the city's unique coastal landscape. As the city grows, children learn to swim in the city's creeks, people forage amongst the city's tree-lined streets, farm as they watch otters in the khazans (wetlands), and birdwatch among the mangroves. The city celebrates its biodiversity, promoting traditional livelihoods and rediscovering its history of existing in harmony with nature. The city's culture of sustainability contributes to the protection of its entire ecosystem, including the plants, the animals, and the people, ensuring a resilient and net zero future for generations to come.



Our Priorities:

Thriving biodiversity: Panaji's biodiversity is protected through ecologically informed planning and urban design. The city's ecosystems are pristine and home to diverse aquatic, avian, and terrestrial species. Responsible tourism, waste management, and environmental programming ensure that the city's residents and visitors are educated about and celebrate local nature.

A Circular Economy: Sustainability is a priority across all aspects of resource management and urban planning, including transportation, energy, and waste management. Panaji relies largely on renewable energy for its energy needs. Panaji's rooftops are equipped with solar panels, making electricity cheaper and energy-efficient, reducing the need for imported energy. Panaji conserves water using innovative capturing, recycling and treatment mechanisms. Some of this recycled water is used on hydroponics farms to grow plants and farm fish.

Designing for Climate Change: The city employs ecological planning and continuous monitoring systems to assess the status of the city's ecology, to adapt to a changing climate and mitigate emissions. The city's mangroves and trees serve as natural carbon sinks, while keeping the city cool and reducing air pollution and providing opportunities for foraging and play. The city's ecology is integrated with human-made green and blue infrastructure protecting the city from natural disasters. Panaji's wealth of creeks and freshwater bodies support local biodiversity. Residents have access to well-maintained natural springs. Anti-pollution measures, waste management, and regular clean-ups to protect biodiversity and human health are in place.

Prospering traditional livelihoods: Panaji preserves cultural traditions and knowledge related to climate adaptation and local resources. Larger fishing operations and commercial activities, which can negatively impact local fishing communities through pollution and resource depletion, are subject to careful regulation. Local fishermen retain control over how and to whom they sell their catch and utilise technology where it improves efficiency, like taking online payments. There are subsidised solar fishing boats, designed with fishing communities' inputs to make fishing more sustainable. Through green tourism, Panaji protects the livelihoods of locals by promoting the famous salt-harvesting and agricultural khazans on the outskirts of the city.

An Informed Youth: To achieve net zero goals, Panaji invests in youth education and engagement. By fostering a deep understanding of climate change, its impacts, and local adaptation strategies among the next generation, Panaji cultivates informed and committed residents who drive sustainable development and contribute to a resilient future. The city's youth take an active role in sustainability initiatives, collecting and recycling packaging materials and e-waste. The youth lead tree plantation drives cultivating indigenous edible trees like jackfruit in clearly delineated public areas where trees are protected by relevant authorities.





A city that preserves: we celebrate our vibrant neighbourhoods, distinct architecture, and local traditions and festivals.

Panaji is a thriving tourist destination and commercial hub. The city showcases its rich heritage, exemplified by its colourful historical core and dynamic newer neighbourhoods. Conservation and intentional planning has enabled the city to grow and new infrastructure to develop, while maintaining its culture and character. By striking a balance between economic growth and cultural preservation, Panaji aims to become a model for sustainable urban development.



Our Priorities:

Heritage Preservation: Using insights from conversations with local community leaders and residents, Panaji's heritage has been mapped in a thorough, geospatial inventory of heritage sites, revealing little-known treasures to locals and visitors alike. The city's diverse architectural styles, suited to its climate and relying on local materials, have been protected through principles of preservation, rehabilitation, and restoration, especially in historical neighbourhoods.

Net Zero Architecture: The city's built environment including its buildings are designed keeping in mind green building principles, net zero standards for new construction, and retrofits in historical neighbourhoods. By emphasising renewable energy, energy efficiency, water conservation, and the use of locally-sourced and recycled materials, the city's buildings use minimal resources and contribute to achieving net zero. Buildings are designed to be cooled by natural ventilation and clay-tiled roofs.

Aesthetic Cohesion: Panaji's development is cohesive with and remains authentic to the city's character. New infrastructure and buildings are not only sustainable, but reflect the city's style and culture. New buildings successfully blend the city's historical aesthetic with modern amenities and style, retaining vibrant facades and traditional elements, but featuring contemporary and functional interiors. The city will be architecturally distinct.

Community Engagement: Residents of the city are included in urban planning processes to foster a sense of community ownership and to ensure their needs and preferences are reflected in the city's development. While the city promotes the Serendipity Arts Festival and the International Film Festival of India (IFFI), which attract large numbers of tourists, it also champions local traditions such as the Cashew, Mango and Konkan Fruit festivals. Public spaces are utilised with government support to host regular public events, such as non-motorised zones for local markets or celebrations of traditional beverages like feni and arak. This allows residents to enjoy the city year-round, instead of having access to only a few festivals that largely cater to tourists.

Heritage-Based Tourism: The city's unique character boosts its thriving but regulated tourism industry. Low-impact tourism leverages historical assets to attract visitors and generate economic benefits, while preserving the city's identity and prioritising resident needs. Watersports and beach tourism are carefully regulated to ensure they are environmentally friendly. Visitors are able to leverage technology to learn about the city's history through varied media, like 360 degree virtual viewing of heritage buildings and electronic information kiosks around the city. Locally-led architecture and food tours promote cultural preservation and equitable economic development. Residents and leaders in the local tourism industry frequently gather to discuss policies and regulations to ensure that their ideas and concerns are addressed.





A city that connects: we bring people together through affordable transportation, accessible public spaces, and opportunities to contribute to society.

As a connected city, Panjimites travel in safe, low-carbon, and affordable public mobility systems, enabling them to easily access public spaces, services, and livelihood opportunities. Efficient eco-transport networks, accessible green spaces, and a supportive community atmosphere have transformed the city into a thriving environment for all. Young residents are enjoying recreational and educational opportunities within their neighbourhoods, while older residents easily access community amenities. Panaji is a vibrant, inclusive community where everyone feels safe, engaged, and connected.



Our Priorities:

A Walking and Cycling City: Residents, commuters, and tourists explore the city safely and sustainably on foot or by bicycle, thanks to the extensive network of well-maintained walking and cycling paths. The sidewalks are wide and well-maintained, and crosswalks are clearly marked with traffic-calming measures to slow down vehicles and create safer pedestrian zones.

Convenient, Accessible Transport: From clean, comfortable minibuses catering to a range of needs, people of all ages, and with suitable accessibility measures, to eco-friendly ferries and digital ticketing for public transport, the public transport system is a joy to use. The bus stops match the city's colour palette, provide shade, and decoration along the streets during the day, and are well-lit and safe spaces at night.

Embracing Innovation to Move Panaji: The city embraces technology to enhance the efficiency and accessibility of the transportation network. Real-time information, integrated traffic signals, and other innovative solutions like app-enabled carpooling, ensure reliably seamless travel experiences and reduced emissions.

Panaji, a City for Everyone: All residents are proximate to a number of open, accessible, green spaces, giving residents a chance to gather with others and engage in physical fitness activities easily and without requiring motorised transport to get there. The streets are designed to accommodate all users, including children, the elderly, and people with disabilities. Referred to by urban planners as 'complete streets', all streets in Panaji prioritise safety, accessibility, and sustainability creating a welcoming environment for all. This network of well-maintained infrastructure has a range of benefits like allowing the smooth functioning of prospering businesses, healthier residents breathing cleaner air, preventing traffic delays, and increasing peoples' access to all corners of the city.





A city that prospers: we promote strong relationships between businesses and local communities to drive a sustainable economy.

Panaji is a prosperous city where residents shop at bustling local markets filled with eco-friendly upcycled and repaired products, where sustainable businesses profit, and where residents enjoy the benefits of a circular economy. With regular community events, non-motorised zones, and healthy commercial activity, businesses profit without increasing emissions, and everyone thrives.



Our Priorities:

Thriving Local Businesses: Panaji has a circular economy, bolstered by local businesses, that encourages people to upcycle goods, buy second-hand, and reduce consumption. Collaborations between businesses and other local stakeholders create a sense of responsibility and belongingness, and a culture of sustainability. In this way, businesses are able to grow while still prioritising sustainability.

Zero-waste: Panaji incentivises businesses to adopt zero-waste and green practices, conserve resources, and build a more sustainable and beautiful urban environment. Businesses recycle and compost, as well as design products with their full lifecycle in mind, taking full responsibility for the waste they generate.

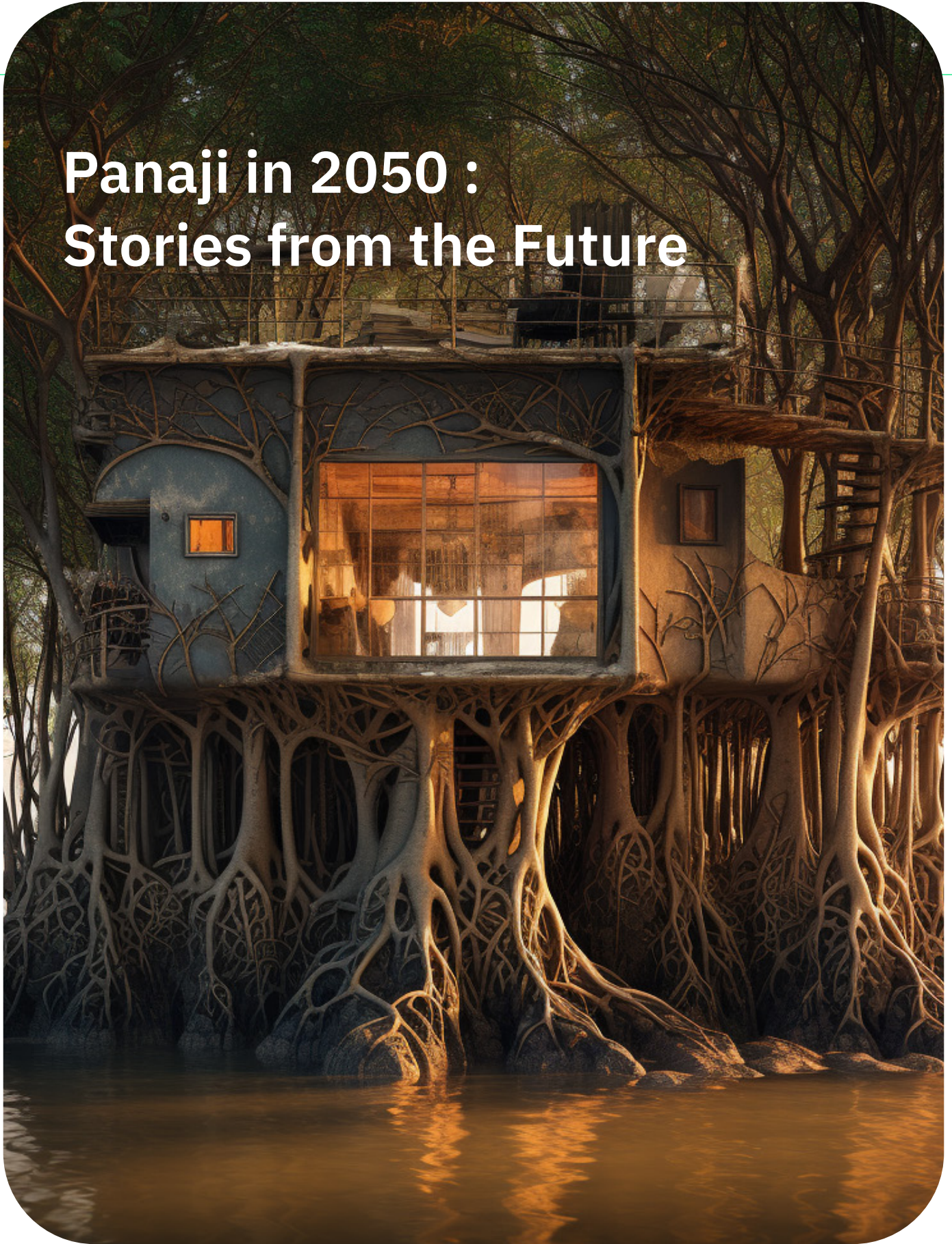
A Vibrant, Commercially Active Urban Environment: The city supports local initiatives that enhance livability, such as pedestrian-friendly streets, green spaces, and community business events. With well-connected commercial hotspots, businesses attract residents and visitors, stimulate economic activity, and improve the overall quality of life.

A Green Economy: The city uses incentive programs that encourage local businesses to both preserve Panaji's heritage and conduct their operations sustainably. Independent green rating systems help maintain a high standard of sustainable business practices and raise awareness amongst locals of which businesses to support. The city supports the green economy, offering residents upskilling programs to access green jobs in sustainable industries. As Panaji is a pioneer in sustainable practices and governance, the city attracts more visitors who come to experience a more sustainable way of living.

Eco-Conscious Hospitality: The hospitality sector is famous for its sustainability, managed in socially conscious ways and in compliance with government regulations. A green rating system incentivises businesses to innovate in order to keep emissions as low as possible. Restaurants advertise that their produce is locally and responsibly sourced, boosting the local economy. Locals lead this industry and feel a strong sense of pride in the way their businesses are run in harmony with nature while attracting tourists from all over the world.



Panaji in 2050 : Stories from the Future



Part of visioning is to showcase what the future could look like. Personas help us envision the future by grounding abstract concepts in relatable human experiences.

In this section of the report, we get a glimpse of life in 2050 through the lives of Zahra, a high school student, Anthony, a retired fisherman, Mary, a hotel manager, and Vijay, a motorcycle pilot. Their stories illustrate how Panaji becomes **a city that sustains, a city that preserves, a city that connects** and **a city that prospers**, and how these goals have transformed the lives of individuals from different backgrounds.



Zahra

Zahra is 16. She starts her day by cycling to school on a shaded, protected bicycle path. She meets her friends on the main road so they can cycle together. **Her school building is designed to be energy-efficient, with solar panels on the roof and natural ventilation, not requiring air conditioning for most of the day.** During her environmental science class, she learns about the local mangrove forests and their importance in protecting the coastline.

After school, in Taleigao, **Zahra volunteers at a community garden** where she helps plant indigenous vegetables. She enjoys the fresh air and the opportunity to connect with nature. In the evening, she attends a local sustainable fashion show featuring designs made from recycled materials.

Later, Zahra meets up with friends at a cafe near Miramar beach for dinner. Zahra likes the cafe because the food is made of locally sourced ingredients, leftovers are composted and they have a policy against non-biodegradable packaging. The teenagers enjoy watching the sunset over the ocean together, their view unobstructed by tall buildings.

Mary

At 45 years old, Mary is a successful hotel manager in Panaji. She is passionate about sustainable tourism and is committed to running her hotel in an eco-friendly manner. Mary's hotel is green certified, having implemented various sustainable initiatives, such as reducing energy consumption, using renewable energy sources, and minimising waste. These practices have helped to improve the hotel's profitability and reputation.

Mary starts her day by reviewing the hotel's sustainability performance metrics. She meets with her team to discuss ways to further reduce the hotel's environmental impact. She has recently started an initiative where hotel guests are also required to segregate their trash so she checks to see how that is going. **Her latest project is to spotlight local guides, artisans, and restaurants with a cultural evening at the hotel every Sunday.**

In the evening, Mary attends a sustainable tourism conference to learn about new trends and best practices. She heads home using the electric buses that make the whole city easily accessible.



Anthony

Anthony is now 65 and has lived in Panaji his entire life, inheriting his family's fishing business. He is proud of his heritage and deeply connected to the local community. He is retired now and has passed his business on to his son. Anthony's **family benefits from sustainable fishing regulations that protect marine ecosystems and ensure a healthy supply of fish. He has seen an increase in sustainable tourism and local businesses, providing new opportunities for his community.**

Anthony wakes up early and heads to the beach with his son where he enjoys the fresh breeze and blue water off of Panaji's Caranzalem beach, which has a positive impact on his health and well-being. Anthony watches his son using his phone which has an AI advisory feature, explaining government regulations he must follow about which fish he can harvest in this month, and telling him how the monsoons and water temperatures will affect his catch. This helps him ensure their business practices sustainable fishing. Anthony **has seen the benefits of these new practices – he notices how there are now much larger populations of different species of fish and birds at the beach.**

In the afternoon, they both go to Panjim Market to sell the day's catch and to pick up some local produce for their evening meal. **The indoor part of the market now runs on renewable energy generated from solar panels on the roof.** Retrofits to the building's design have enabled sunlight to percolate in and cool breeze to flow, keeping the vendors cool throughout the year and minimising the need for artificial lighting before nightfall. Mario Miranda's artwork still adorns the walls, attracting visitors and amusing shoppers.

The organic waste from the market is used as fertiliser in local community gardens. Anthony **feels welcome at the market, which features tactile floors preventing him from slipping.** The signage is very clear, so he is able to read it without his glasses. There are accessibility ramps and the whole area is well-shaded so he is not overexposed to the sun. He enjoys the vibrant atmosphere and the variety of locally grown products. In the evening, he meets his retired friends to have some feni and watch youngsters play football. He appreciates the clean and well-maintained public spaces in Panaji.



Vijay

Vijay is a 38-year-old local pilot (motorcycle taxi driver) in Panaji. He has been working as a pilot for over 10 years, when he switched from a traditional motorcycle to an electric bike. This has reduced his operating costs and improved his income. Vijay was interested in learning how to maintain his new e-bike and found a government upskilling programme. He participated in the government scheme to become certified as an electric vehicle mechanic to supplement his income.

Vijay starts his day by checking the battery level of his electric bike and decides to head to the closest EV charging station, not far from his home to ensure it is at full charge before he starts his work for the day. There is a poi stall next to the charging station where he eats his breakfast and has some chai while he waits out the short time his bike needs to charge. He then drives to the local market to pick up passengers.

During the day, he also provides maintenance and repair services for other electric vehicles in the area. In the evening, Vijay attends a community meeting to discuss plans for expanding the network of electric charging stations in Panaji to a new area, where the sale of EVs has grown.

Given his own investment in it, Vijay is involved in local community initiatives to promote electric mobility and raise awareness about the benefits of sustainable transportation. He is thinking of joining the government upskilling programme as a teacher down the line.



Appendix: Methods



PULL Net Zero conducted oral histories, imagination walks, and a visioning workshop as a participatory approach to understand the aspirations of Panaji's residents for a net zero future.

The oral histories captured the personal narratives and experiences of residents, offering valuable insights into their perceptions of climate change and their hopes for the city. Given their backgrounds across diverse climate-related professions, we understood how spending their whole lives in Panaji affected citizens' aspirations for the future. Some imagined dramatic techno-centric futures while others hoped for a return to tradition. These stories provided a rich context for understanding the cultural and social dimensions of sustainability transitions.

The imagination walks encouraged participants to think creatively and experientially about their city's future, exploring how different spaces might be used and experienced in a net zero scenario. This method helped to stimulate innovative ideas and foster a sense of place-based ownership. This led to interesting insights about how popular one-size-fits-all net zero policies may be at odds with residents' own views on city planning priorities.

The visioning workshop brought together diverse stakeholders to collaborate on developing a shared vision for Panaji's net zero future. By building upon the insights gained from the oral histories and imagination walks, participants were able to engage in meaningful discussions and develop actionable strategies. There were a range of contradictory as well as compatible ideas coming from an array of stakeholders. This helped us identify points of compromise and areas of agreement.

While we acknowledge that the sample of people we spoke to does not represent all the residents of Panaji, PULL has employed an iterative process of soliciting feedback and incorporating it into the vision for the city. A draft of the vision statement and goals was shared with all participants involved in the three exercises to solicit their feedback and ensure that the final document reflected their collective aspirations. Additionally, plans are underway to gather further input from the broader public through social media to enhance the inclusivity of the vision.

Oral Histories

capture the personal narratives and experiences of residents, offering valuable insights into their perceptions of climate change and hopes for the city.

Imagination Walks

encourage participants to think creatively and experientially about their city's future, exploring how different spaces might be experienced in a net zero scenario.

Visioning Workshop

bring together diverse stakeholders to collaborate on developing a shared vision for Panaji's net zero future.



Oral Histories



This activity documented the perspectives of residents of Panaji interested in and affected by the impacts of climate change in their city. It is based on the idea that imagining visions for the future can help individuals and groups create stories that can shape the trajectory of sustainability transitions. We encouraged participants to imagine a net zero city, and talk to us about what innovations or ideas they imagined would help arrive at that reality.

Storytelling activities, like oral histories, provide communication strategies that can facilitate broader stakeholder engagement³ and participation in the co-creation of low-carbon pathways. We posed the following questions: As climate change reconfigures how we live and work in cities, how do residents imagine a net zero society in 2050 (race to

zero target for the city), 2070 (India target) or 2150 (long future)? How do personal histories of residents shape the way people imagine net zero futures?

While we encouraged participants to think broadly and imaginatively, we reminded participants to think about their lifetimes up to the present day in Panaji to help them understand the rate at which the city transformed, keeping the answers to our futuristic questions grounded in reality. Still, the far future, like the year 2150, brought about interesting responses. We collaborated with AI artist, Anita Saran, to illustrate some of the unique themes that came from the exercise.

³ Miller, C.A. et al. (2015) 'Narrative futures and the governance of Energy Transitions', *Futures*, 70, pp. 65–74. doi:10.1016/j.futures.2014.12.001.



Imagination Walks



In March 2024, the PULL Net Zero team conducted two Imagination Walks in collaboration with Tallulah D'Silva's Travelling Dome, one titled The Future of Panaji's Built Environment and the other The Future of Nature in Panaji. We wanted to understand from locals what they thought their city would look like in 2050.

The activity was designed to create citizen engagement and gather new insights about Panaji's residents related to their city. Guided walks encourage people to think deeply and experientially about how they might interact with these spaces in a net zero future to create place-based imaginings. These two walks organised by PULL prompted participants to imagine the future of their city and what their lives might look like in a net zero Panaji.

This physical exploration of the city was intended to prompt participants to imagine how they would engage with strangers or conduct their social lives in a net zero Panaji, what they would see on their morning commute if they still had one, where they would like to spend their time, what purpose public spaces served for them, etc. Our goal was to help them connect these explorations with a vision of their city that included emissions reductions.

We used these insights and the conversations from these walks to illustrate a comic strip, showing how walks can be used to elicit interesting place-based imaginings.









Visioning Workshop



The Panaji Net Zero: Shared Visions Session was a collaborative effort between PULL and the Goa Energy Development Agency (GEDA) to envision a sustainable future for the city. Participants from diverse backgrounds, including residents, local business owners, and community leaders, gathered to share their perspectives and ideas. The oral histories and the imagination walks were used to design the visioning workshop, providing content and discussion points, themes and personas.

The session began with a discussion around participants' personal connections to places around the city. This helped to establish a shared understanding of the city's unique character and identify important community assets. Next, participants engaged in a series of visioning exercises, where they were asked to imagine a net zero Panjim in 2050. Prompts in the form of personas, similar to the ones mentioned above, were instrumental in guiding participants toward

a future-focused yet practical perspective. They encouraged participants to think of real people from diverse backgrounds and a range of demographics to help account for equity and representation. Themes such as transportation, energy, housing, and social interactions were used to maintain a consistent focus on emissions across industries throughout the discussions. Participants delved deeper into specific areas of focus in groups, identifying challenges and opportunities. The session culminated in the development of a comprehensive vision statement that captured the collective aspirations of the community for a sustainable and equitable Panjim. The vision statement served as a roadmap for future action, guiding the city's efforts towards achieving a net zero future.

In collaboration with Socratus, Artist Srinivas Mangipudi helped us capture the flow of conversation through graphic comic artwork which showcases the themes that participants arrived at.





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