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# SUSTAINABLE URBANISATION IN ASIA

Drivers and Consequences

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**Professor Zheng Sijq** is **STL Champion Professor of Urban and Real Estate Sustainability at the Massachusetts Institute of Technology's Center for Real Estate**. She presented her research under the MIT Asia Real Estate Initiative, focusing on investigating whether the entries of so-called "Superstar Firms" into the cities in developing nations can cause environmental degradation or progress, illustrated by a case study of North Vietnamese cities' economic boom following a wave of supply chain relocation from China.

**Professor Phang Sock Yong** is the **Cella Moh Chair Professor of Economics at Singapore Management University**. She discussed green transit-oriented developments in Asia with a particular focus on Singapore, outlining a few key national level initiatives and contributions towards net-zero goals. Her presentation highlighted the potential challenges of sited approaches and the need for integration of green transit-oriented development and green building-oriented development policies.

**Dr Lee Nai Jia, PropertyGuru's Head of Research** presented on data-driven strategies for sustainable and inclusive cities in Asia. He outlined three challenges to sustainable urbanisation. He discussed the increased investment and interest in Asia as a growth engine, the role of technology in driving vibrant and environmentally sustainable cities, and the need for a holistic approach that aligns environmental data with critical metrics to track citizens' livability in Southeast Asia.

**Professor Sun Weizeng** from **Nanjing Audit University** presented research on mobile QR code ticketing as a digital leap towards seamless subway travel. Professor Sun's team studied the effect of implementing mobile QR code passes on station entry wait time in Hong Kong, uncovering that daily station wait time significantly decreased not only for QR code pass users – there were also substantial spillover effects for non-adopters.

**Professor He Shenjing** is **Lady Edith Kotewall Professor in the Built Environment** from the **University of Hong Kong**. She closed the symposium with an overview of theoretical approaches to achieving sustainable cities and presented her framework of "The Exquisite City" as the next step towards accurately outlining and measuring progress in achieving sustainability goals.

**Professor Orlando Woods** from **Singapore Management University's Urban Institute** moderated the symposium. He outlined the common threads and key challenges running across the five presentations: what does sustainability mean in the context of Asian cities and where does the resistance to sustainability lie?

INTRODUCTION

As climate risks and sustainability imperatives top urban priorities across the globe, Asian cities present an opportunity for some of the most complex and consequential urban transformations of the 21<sup>st</sup> century.

The *Sustainable Urbanisation in Asia Symposium* held in January 2025 at Singapore Management University's Urban Institute invited scholars and practitioners from a broad range of fields to explore the critical drivers and consequences of sustainable urbanisation in the region. The event was organised by the SMU Urban Institute in partnership with the Massachusetts Institute of Technology's Asia Real Estate Initiative (Affiliated with MIT Center for Real Estate), The University of Hong Kong's Urban Systems Institute, and PropertyGuru.

This white paper distils the key insights from the event and outlines emerging strategies for sustainable urbanisation in Asia. It addresses diverse topics, including the environmental impacts of global trade shifts, strategies for green transit-oriented development (GTOD), the role of digital innovation in urban mobility, and the application of data-driven approaches for inclusive and sustainable urban futures. Finally, we propose a way forward by shifting our focus to a new way of understanding urban sustainability. Highlighting how existing approaches overlook crucial aspects of sustainability ecosystems, we outline a holistic metric for tracking the sustainability progress of urban systems in Asia and beyond.



## 5 KEY CHALLENGES / OPPORTUNITIES

### (Mis)alignment of stakeholders

The future of urban sustainability depends on how power and responsibility are distributed across leading actors. In some contexts, such as Singapore, the state leads, and the market follows. In others, major conglomerates exert disproportionate control over land use, infrastructure, and operational standards. The key opportunity is not to contest the power and responsibility of different sectors, but to recognise the distinct roles each one can play and seek for alignment of their incentives: from leveraging the transformative power of major corporations to empowering civil society to demanding accountability.

### Uneven urbanisation

Rapid urban growth is a big challenge for megacities, but it is also affecting the region's secondary and tertiary cities. Smaller urban centres are under pressure to accommodate rising demands on infrastructure, housing, and services. Besides relieving the burden on capital cities and contributing to a more balanced national development, these decentralized and diverse urban centres present many opportunities as emerging sandboxes for innovation, experimentation, and more adaptive models for sustainable urbanisation.

### Infrastructure lag

In many Southeast Asian cities, planners and policymakers are in a constant state of catch-up not only to population growth and spatial expansion, but to evolving sustainability standards. The key challenge here is temporal: while sustainability is a future-oriented goal, the built environment is inherited and further shaped by present-day constraints.

### Data fragmentation

Across Southeast Asia, data systems remain siloed by sector, by jurisdiction, and by format. Environmental, transport, housing, and demographic data are often held by separate agencies, with limited collaboration capacities. In order to identify priorities and track environmental progress, it is essential for this data to be governed transparently and responsibly, and shared not only with different government sectors, but also with the general public through open-source platforms.

### Flawed metrics

Flawed metrics obscure the true sustainability performance of cities by prioritising outputs like infrastructure quality or GDP over the resource inputs and contextual constraints behind them. This biases rankings toward major Global North cities and fails to recognise the efficiency and innovation of secondary or less-resource rich urban centres.

## SUSTAINABLE URBANISATION IN ASIA

**Asian cities hold the key to the region's environmental futures.** Asia is home to half of the world's megacities, and its urbanisation rate will only continue to grow. This unprecedented urban demographic expansion carries major economic and environmental consequences and signals the central role that Asia's cities will play in shaping the region's future. Despite green urban policies gaining traction, the very definition of sustainable urbanism is still a subject of debate. There is an attempt to frame economic expansion as compatible with greener practices, better public transport, clean air and water. However, unchecked growth and profit-maximisation are in a fundamental conflict with long-term sustainability, and that leaves governments and cities on a difficult search for the balance between ecological targets, human well-being, economic growth, and infrastructural realities.

<sup>2</sup> Dan Friess. Saving Chek Jawa. Saving Chek Jawa. Accessed 22 July 2025.

In Southeast Asia specifically, these tensions unfold under distinctive patterns of urban governance and highly uneven urban development. Understanding these conditions and contradictions is an essential prerequisite to achieving sustainability and creating realistic pathways for change. A range of local and regional sustainability-focused frameworks already exist. But achieving their goals has proven to be challenging. Although multiple governments have committed to the United Nations' Sustainable Development Goal 11 ("Make cities inclusive, safe, resilient and sustainable") a 2021 review by ESCAP found progress in Southeast Asia to be 'very slow' or 'stagnant'.

<sup>1</sup> ESCAP Asia and the Pacific: SDG Progress Report. United Nations Economic and Social Commission for Asia and the Pacific, 2021.

shaped by powerful conglomerates. These major corporate actors exert disproportionate influence over employment, land use, infrastructure, and investment flows. In order to succeed, sustainability initiatives must first engage and align with their interests. This structural context where the private sector is not merely a stakeholder but often the lead decision-maker and coordinator defines a distinctly Asian model of sustainable urbanism.

However, far from being a barrier to sustainability as it is often thought to be, the private sector can also act as a setter of standards, a source of innovation, coordination, and even a public educator. A successful sustainability agenda must align itself with corporate interests and ensure public oversight – the latter being equally as important. In Singapore, a milestone in civic participation was achieved in 2001, when nature advocates came together to protect Chek Jawa – a small coastline area of Pulau Ubin – which faced land reclamation. Their efforts succeeded in changing government plans, making Chek Jawa the first nature area to be saved by the public.<sup>2</sup> In cases like this individuals and communities claim their role as an equal stakeholder in decision-making by shaping public norms and lobbying institutions to act on their behalf.

**Sustainable urbanisation demands shared responsibility and continuous evaluation.** To move forward, we need to be clear that sustainable development is a shared responsibility. A part of that responsibility is constantly re-evaluating how sustainability is being pursued in practice

– how policies are changing and how everyday actions of institutions, communities and individuals impact urban realities. The following cases offer grounded insights into these efforts, including the tensions that drive them and the consequences that emerge from them.

**Private sector buy-in and public oversight are decisive pieces in the sustainability puzzle.** Sustainability initiatives cannot be discussed without first recognising the unique political economy of urban governance in the region. Urban development in countries such as Indonesia, Thailand, and the Philippines is often



## ALTERNATIVE PATHWAYS TO SUSTAINABILITY

### Cities are nested constructs within global economic and political flows.

The challenge of uneven urbanisation is not merely a matter of geography: it is also about unequal capacity. While capital cities typically benefit from stronger governance and better infrastructure and financing, secondary cities often struggle to attract the investment and institutional attention required for sustainable urbanisation. Yet even in this uneven landscape, sustainability can emerge in surprising ways, and not always by design.

Sustainability discourses can change how cities are viewed. Cities are not isolated constructs. They are deeply embedded in, and shaped by, global flows of trade, investment, financial capital, human capital, and political power. Every urban sustainability initiative, whether led by the state, local government, private capital, or civil society, draws upon and feeds into these transnational flows. At the same time, the instability of global political and economic dynamics can often introduce friction, which can affect cases where policy and industry actors willing to work together to drive sustainability and turn them into adversaries, or vice versa. While high-level policy strategies remain important, sustainability can also emerge from this global embeddedness, as an unintended by-product of other geopolitical or economic forces.

### Economic growth can be decoupled from environmental degradation.

Such is the case of Northern Vietnamese cities, where the U.S.-China trade war, has surprising implications for sustainable urban growth. Chinese firms seeking to circumvent U.S. tariffs are relocating manufacturing to nearby cities across the Vietnam border, which has made the geographically closest secondary cities in Vietnam experience a dramatic influx of industrial activity. Notable here is that this economic and manufacturing boom did not lead

to fast degradation of environmental quality, largely due to Vietnam's growing reliance on clean energy sources such as hydro, wind, and solar power.<sup>3</sup>

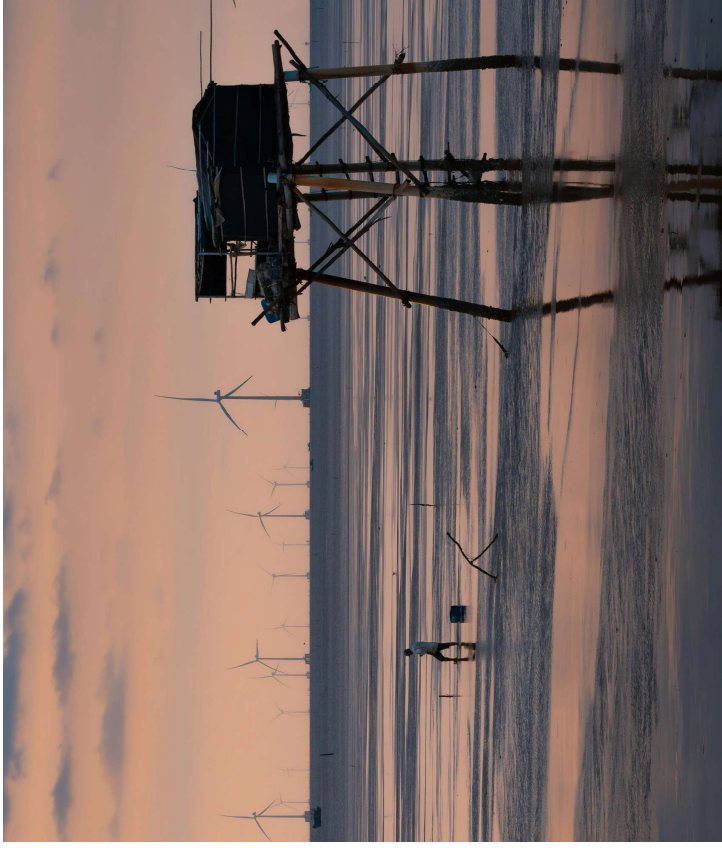
The case of Northern Vietnam complicates the long-standing assumption that rapid urban growth necessarily leads to pollution and congestion. In fact, the trade war-induced expansion has contributed to a more balanced spatial distribution of economic activity across the country. For decades, Southern Vietnam (particularly the Ho Chi Minh City metropolitan region) dominated the national economy, while Northern cities lagged. The recent emergence of dynamic secondary cities in Northern Vietnam signals a reversal of this spatial growth pattern. As new economic hubs gain momentum, competition between cities fosters improved local governance and enhances national resilience. This economic boom helped rebalance Vietnam's spatial development and showcases how sustainability can result from unexpected circumstances, adaptive responses to technological adoption, or private sector reallocation.

### Geopolitical shifts can unintentionally foster sustainable urbanisation.

This example indicates a broader potential for the region to take advantage of the fact that sustainability can be shaped by the strategic decisions of global private actors. The relocation of manufacturing to Southeast Asia amid shifting geopolitics is not just a Vietnamese phenomenon. It reflects a wider reconfiguration of global value chains, driven by cost-down pressures in the Global North and the rise of 'superstar firms' – large multinational corporations with the market power and scale to transform entire industrial ecosystems. These firms strategically distribute their operations, locating headquarters, design and R&D functions in global cities with strong agglomeration.



<sup>3</sup> Kahn, Matthew E., Wen-Chi Liao, and Siqu Zheng. 'How the U.S. China Trade War Accelerated Urban Economic Growth and Environmental Progress in Northern Vietnam'. National Bureau of Economic Research Working Paper Series No. 33126 (2024).



ation economies, while outsourcing production to cities offering cheap labour and land. In doing so, they catalyse local economies, stimulate technology adoption, and reshape urban development pathways across the Global South.

### Diverse pathways to sustainability are viable but require baseline green infrastructures.

The arrival of superstar firms has spurred waves of industrial development. These firms can generate scale, composition and technique effects and those effects work together to shape environmental outcomes. Yet they also attract networks of smaller manufacturers that might not have as advanced sustainability practices. In countries where renewable energy infrastructure is present, such as in Vietnam, the positive effects (like the technique effect) outweigh the negative ones, and thus the environmental degradation can be effectively mitigated. Where it lags, the environmental gains are negligible. Critically then, positive spillovers mimicking the case

in Northern Vietnam are not guaranteed. Many secondary cities lack the renewable energy endowment and infrastructure, regulatory capacity, financial instruments, and planning coordination needed to manage transformation effectively. Above all, renewable, clean energy infrastructure is fundamental in driving more holistic sustainability transitions.

Still, this case is a testament that sustainability is not always, or necessarily, achieved by design – sometimes it emerges simply by virtue of the fact that cities are nested constructs. Sustainable practices may arise from unintended consequences, local endowment and improvisation, or shifts in global industrial geography. Rather than insist on a single model, Asian cities must remain open to diverse pathways – deliberate and accidental, top-down and bottom-up, public and private. Especially in contexts of uneven urbanisation, this flexibility may prove essential to realising more inclusive and resilient urban futures.

### What insight does it offer for sustainable urbanisation?

Sustainable urbanisation can emerge not only through deliberate planning but also through strategic responses to global economic shifts when investment by multinational firms aligns with local clean energy and governance capacity.



## GREEN TRANSIT ORIENTED DEVELOPMENT



**Green Transit-Oriented Development in Asia combines high-density networks with sustainability standards.** The race to net-zero by 2050 is already reshaping urban agendas across Asia. Countries have introduced carbon taxes, green finance instruments, and energy efficiency mandates in pursuit of ambitious climate targets. Cities are tasked with implementing policy frameworks for energy, the urban environment, and transport – domains that have been developing at best in parallel, at worst in individual silos. It is here that Green Transit-Oriented Development (GTOD) emerges as a strategic nexus, a space where emission targets, infrastructure planning, and urban liveability converge.

Transit-oriented development on its own refers to the integration of housing, jobs, and services within walkable distance to transit nodes. It promises reduced emissions, improved access, and a more compact urban form. GTOD builds on this logic by introducing green building codes and other infrastructure standards from the outset, enabling more effective planning.

GTOD in Asia is distinct from GTOD elsewhere in the world. Megacities such as Seoul, Tokyo, Delhi and Shanghai operate at vastly different scales, in terms of population, spatial reach and sprawl, and urban density. Asia's GTODs are not walkable neighbourhoods: they are vertical, high-capacity systems tasked with efficiently embedding transit networks into the built environment. Realising this ideal is difficult. Especially across Southeast Asia, GTOD efforts are hindered by fragmented planning authorities, weak coordination between transport and land use, and the persistent siloing of various urban development goals.

## What insight does it offer for sustainable urbanisation?

Sustainability efforts have historically been tackled in silos by different government bodies or agencies, which has held back the real potential of cities to grow and innovate.

Singapore's Urban Redevelopment Authority (URA) has introduced a Strategic Placemaking Incentive Scheme which can catalyse GTOD through holistic redevelopment. The initiative encourages owners of ageing properties to pool their lots and reimagine them as mixed-use, sustainable precincts, with the potential to integrate green buildings with public spaces and transit access.

**Community innovations are being employed to harness renewable energy.** Community creativity is also emerging as a catalyst. In China, firms have developed battery-electric buses with onboard solar panels; in India, railways are harnessing solar to power stations. Rooftop solar aggregation programmes, such as Singapore's SolarNova initiative, aim to scale distributed energy generation. Excess solar energy is sold back to the grid and reduces energy bills of town councils. Households have the option to specify renewable energy options when purchasing electricity from retailers.

The road to net zero will demand more than incentive abundance. It will require a transformation in how cities conceptualise infrastructure and coordinate governance. From individual rooftops to utility-scale energy aggregation; from isolated transit corridors to citywide GTOD ecosystems; from siloed agencies to cross-cutting partnerships – the transitions underway are institutional as well as technological. Learning from pilot projects and cross-sector exchanges will be vital. But so too will be the political will to break with existing procurement norms, rethink incentives, and create the enabling conditions for more integrated and sustainable processes.





## THE ROLE OF DATA

**We need open and transparent data management.** Another critical need is that of a broad public attitude shift. Too often individuals believe their everyday actions are too small to matter, but collectively these everyday actions create trends. And trends signal shared values, shape markets, and inform the agendas of both policymakers and corporate actors. Once communities start to consistently prioritise sustainability in their daily lives, they can send powerful signals that hold institutions accountable.

If we are going to pursue sustainable urbanisation collectively, we must also manage it transparently. This is where the role of data becomes important. Data can allow citizens to understand how their urban environments are changing, aid governments in anticipating future needs, and be used by industries to measure their positive and negative impacts.

It is necessary to point out the importance of data-driven strategies in addressing current challenges and promoting sustainable and inclusive future cities in Asia. And there is

much that the private sector can do to guide such efforts. For example, PropertyGuru has developed ways to forecast economic segment growth and consumer sentiment trends in advance of official transaction data and national statistics. However, a constant challenge is presented by the fragmented, incomplete, or outdated nature of the available data. Sometimes lags in data collection cause inaccurate assumptions, other times improper methods create unusable data.

**Private sector innovations can be utilised for strategic urban planning.** In Selangor, Malaysia, a government-led urban redevelopment project was hampered by the inefficiency of relying on disparate data sources. By consolidating property sales transaction histories and demographic information, the PropertyGuru project team could identify high-demand areas, align developments with community needs, and make strategic planning decisions with confidence. In another case, a leading insurance provider was able to improve its risk assessment capabilities using weather-based risk

### What insight does it offer for sustainable urbanisation?

Sustainable urbanisation depends not only on top-down planning but on empowered publics and transparent, accessible data – when citizens understand, trust, and can act on urban information, their everyday choices can drive market shifts, inform policy, and co-produce more inclusive, resilient cities.

analytics and market valuation data. By integrating multiple data streams via Application Programming Interfaces (APIs), used to facilitate communication between applications), the insurer reduced reliance on manual research and improved the accuracy of their models.

Private actors such as PropertyGuru help to empower communities to thrive. It does this not just by listing properties, but by also serving as an educator that helps buyers understand how property is built, how they can measure its sustainability impact, identify financing options, and understand access to public goods and services. PropertyGuru also acts as a source of well-structured data for governments to identify areas for potential urban development, as well as to understand public sentiments based on the preferences towards specific types of dwellings or locations within the city.

**User-generated mobility data can confirm sustainable solution outcomes.** The crucial role of data is further showcased in urban mobility research. Public transport systems are generally regarded as net positives for sustainability due to reducing reliance on cars, lowering emissions and improving urban efficiency. However, environmental benefits can be offset when systems face routine overcrowding, as is the case in Hong Kong's subway stations

where 700,000 passengers line up to purchase tickets every day. A local study on the introduction of QR code ticketing reveals that QR codes and mobile technologies can significantly improve station entry wait time for both adopters and non-adopters. More importantly, the study was based on user-generated data, illustrating how indispensable this data is and how it can be used to measure impact and argue for various sustainability initiatives.

**Participatory data initiatives are key to empowering communities.** Across the region, new models of participatory data use are emerging. In Thailand, the People Map Analytic Platform empowers communities by visualising local inequalities and enabling targeted aid. In Singapore, the government's open data initiatives have seeded bottom-up innovations in mobility, energy, and urban planning. These experiments point to a shared lesson: data is not just an institutional resource. It is a tool for civic empowerment.

And yet for bottom-up innovation to flourish, data must be treated as a public good. By investing in clean, accessible, and cross-sectoral data infrastructure, cities can better align public action with policy ambition. And in doing so, they can ensure that sustainability is not imposed from above but co-created from within.





## FUTURE OF SUSTAINABLE URBANISATION IN ASIA

**New urban frameworks must address resource inputs alongside sustainability outcomes.** Asian cities are active systems that can enable or disenable ecological resilience and human wellbeing. At the heart of this rethinking lies a need for new urban theories and epistemological frameworks that can guide meaningful change. The question at the centre of these discourses is how urban systems can maximise human wellbeing while minimising resources used.

In the context of China's rapid urbanisation, marked by sprawling growth and low land-efficiency patterns, a research team from the University of Hong Kong have re-examined the prevailing urban paradigms of the past several decades. These include conceptualisations such as the compact city, the garden city, the human-centric city, new urbanism, smart city, circular economy, the happy city, among others, frameworks that include top-down as well as bottom-up initiatives, policy-driven, as well as utopian imaginations.

Existing theories tend to focus either on the processes of urban planning – governance, land use, urban form, streetscape design, social inclusion – or on outputs, such as neighbourhood vitality, population health, or livability. The inputs are rarely looked at: the energy, materials, labour, land, and emissions that the outputs are built on. This omission is mirrored in global city performance indices, such as Oxford's Global Cities Index, the City Prosperity Index, the Global Liveability Index, the Sustainable Development Index, etc. These metrics overwhelmingly privilege outputs and, by extension, the wealthy cities of the Global North. Additionally, indicators tied closely to GDP or infrastructural readiness systematically advantage certain cities, obscuring the progress of smaller, resource-constrained urban centres in the Global South.

**The "Exquisite City" illuminates urban centres' input-output efficiency.** Addressing this gap, the idea of the "Exquisite City" reframes sustainability as a question of input-output efficiency. It raises important

## What insight does it offer for sustainable urbanisation?

Before creating utopic ideals of urban life or attempting to pigeonhole a handful of western cities as the standard in sustainability, urban planners and leaders need to consider what the data is saying, more importantly, what existing data frameworks are obscuring.

questions, such as the role of administration versus input factors like population and capital investment in determining human well-being in cities, the consistency of input-output relationships across regions and time, and the feasibility of measuring urban system efficiency in resource allocation. The Exquisite Quotient Index (ExQ) is a tool to operationalize this framework, accounting for context-specific factors like population size, location, climate, and administrative hierarchy to establish benchmarks for progress tracking and resource allocation.

Applied in a pilot study of 156 cities (148 in China and a global selection of others), the model reveals how cities like Amsterdam and New York rank high in both inputs and outputs. But perhaps more compelling is the finding that cities such as Hong Kong and Singapore achieve comparable wellbeing outcomes using only moderate resource inputs – demonstrating a high "efficiency factor". Even more notable was the emergence of smaller, second and third-tier cities such as Quzhou, Huzhou, Lishui, and Huangshan among the top ten performers in China. These

cases challenge the assumption that scale and capital are prerequisites for a successful urban sustainability approach.

**Secondary cities can achieve high wellbeing with moderate resource use.** The framework does share some familiar limitations – specifically the availability and standardisation of open-access data, as well as possible time-lags in data reporting. However, the findings are valuable for challenging the idea that larger or richer cities always achieve greater well-being, especially if their resource use is inefficient. Opening the door for a new understanding of sustainability that positions cities as systems whose sustainability should be measured not only by outcomes, but by how those outcomes are achieved, the ExQ reframes sustainability as a question of governance, not just growth. Moving forward, this theory and its associated index can empower municipalities to more accurately assess their progress, identify areas for improvement, and allocate resources effectively, eventually leading to a new paradigm for sustainable urbanisation.



**Stakeholder collaboration and holistic metrics will drive future sustainability progress.** Sustainability initiatives emerge not only through deliberate strategy but also through unplanned alignments of economic shifts, infrastructure development, and data innovation. Various but recurring challenges are often encountered along the way: the uneven landscape of data availability and quality, and the persistent temporal lag between sustainability goals and infrastructure delivery. Moreover, siloed thinking continues to impede the kind of systemic transformation required to meet the climate and urbanisation challenges of the Anthropocene.

Effective sustainability work must stitch together different actors: public agencies, private firms, local communities, and international financiers. Likewise, we must connect datasets to lived experiences,

planning ambitions to ground-level realities, and short-term actions to long-term goals. Importantly, this also means actively seeking co-benefits. In northern Vietnam, for instance, environmental progress did not arise from a sustainability-first agenda, but from the convergence of trade shifts, industrial relocation, renewable energy production, and firm-level adaptation. Recognising and amplifying these kinds of emergent alignments – rather than treating them as exceptions – opens new possibilities for change. Finally, frameworks like the Exquisite Quotient challenge us to rethink the meaning of the metrics we measure. They push us beyond technocratic sustainability proxies toward a more equitable vision of urban progress.

In that spirit, we hope this white paper contributes to the larger project of reimagining sustainable urbanisation as a continuous negotiation between people, institutions, and cities.



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