INSERT DATE

MODULE 2

Environmental Dimension

Environmental Social Governance in Urban Planning (ESG in UP)

Kulliyyah of Architecture & Environmental Design

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DETAIL MODULE CONTENT

Module 1. Introduction to ESG in Urban Planning

- Foundational Concept of ESG, Context & Evolution, ESG in the Cities, the How, Performance Metrics & Evaluation, Practical Implementation, Deep Dive ESG

Module 2. Environmental Dimensions

- The WHY, ESG framework for UP, Practical strategies for Integration, Measurement, Reporting & Governance, Consolidated Case Study

Module 3: Social Dimensions

- ESG 101: Social Context & Principle, Identification & Prioritisation, The Practice, The Reality (Framework & Application), Synthesis & Conclusion

Module 4: Governance Frameworks

- Defining ESG Governance in UP, Structure & Function, Core Pillars, Regulatory Framework, Implementation & Real World Application

Conclusion

- Foundation Why It Matters, National Strategic Context, The How-To, Financing & Market Adoption, Implementation & Action, Challenges & Conclusion

I: Introduction & The "Why" (Contextual Foundation)



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I: Introduction & The "Why" (Contextual Foundation)

- **Title & Learning Outcomes:** Establish scope.
- **The Urban Challenge:** Cities as the main source of GHG emissions and energy consumption.
- **Key Environmental Issues:** Define the 10 core challenges (Climate Change, Urban Heat Islands, etc.) before introducing solutions.

ESG Framework



ESG FRAMEWORK

Integrating Environmental, Social and Governance practices to drive **sustainable** and **responsible** business.

ENVIRONMENT

Examines the effects of climate events on the physical environment, the risk company, and its suppliers/partners.

- Greenhouse gas (GHG) emission
- Energy efficiency
- Carbon neutrality
- Waste management
- Water management
- Biodiversity and ecosystems

SOCIAL

Discusses the social impact and associated risk that result from societal acts, workers, customers, and the communities where it works.

- Diversity, Equity and Inclusion
- Social responsibility
- Community Relations
- Health and Safety
- Labour rights
- Supply chain management

GOVERNANCE

Evaluates governance, the rights and responsibilities of various stakeholder groups, the timing and quality of decision-making, and governance in order to reduce risk and have a positive social impact.

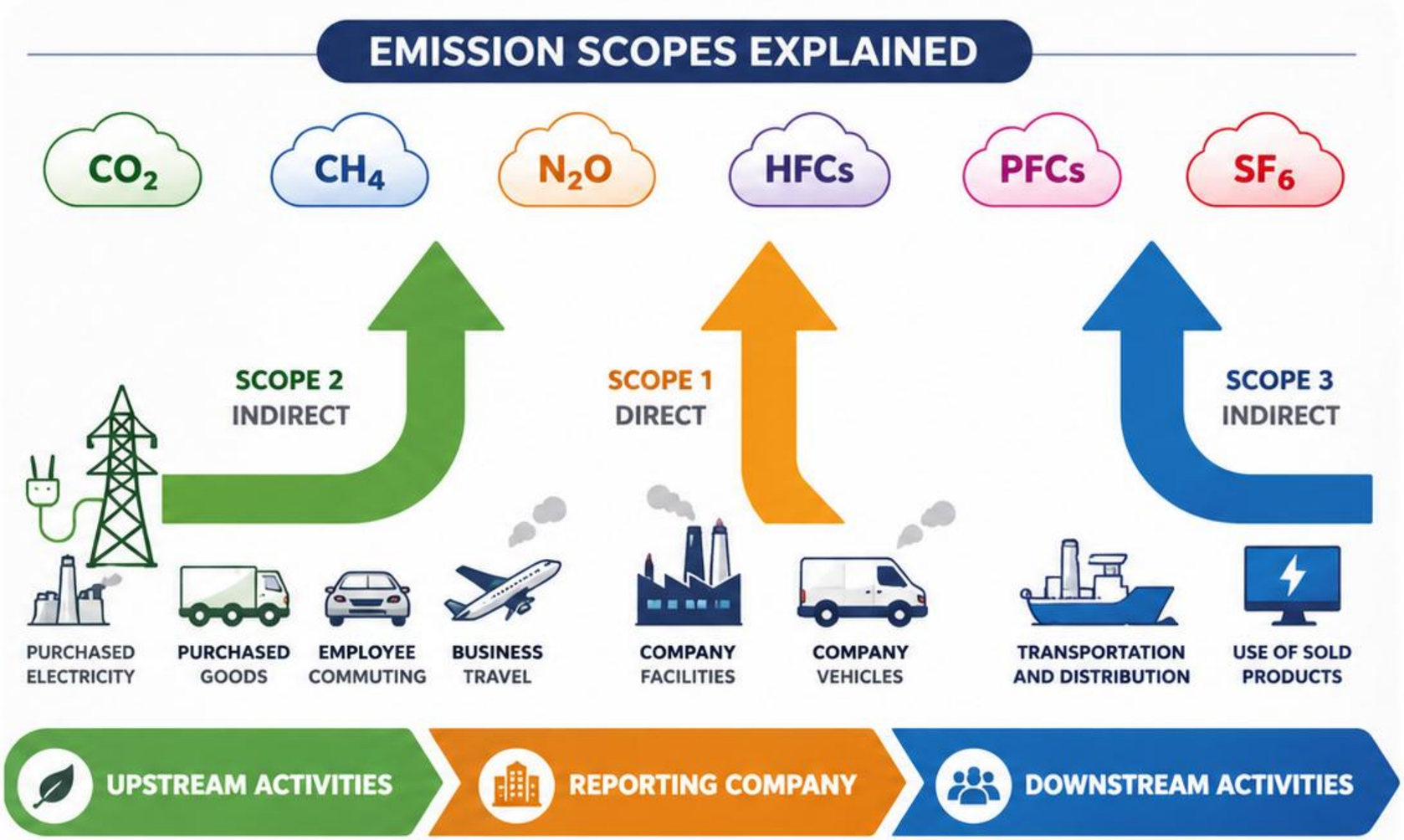
- Corporate governance
- Risk management
- Business ethics
- Bribery and corruption

OUR COMMITMENT | Driving long-term value through responsible practices that benefit people, communities and the planet.

Why Environmental Dimension of ESG matters in urban planning?

According to the UN, cities account for between **60% and 80% of energy consumption** and generate as much as **70%** of human-induced greenhouse gas emissions, primarily through the **consumption of fossil fuels** for energy supply and transportation.

Scope of Greenhouse Gas (GHG) Emissions



Most of the urban infrastructure and public facilities, i.e waste management, energy in the building, transport emits GHGs.

Contextual Background

Kindly refer to Notes Env ESG1 for the details of the Contextual Background

Environmental Dimension of ESG

Key Element 1: Climate Change, Global Warming & Carbon Footprint

1 Natural Energy Balance

- Solar radiation is absorbed by the Earth's surface.
- The Earth re-emits energy as infrared radiation.
- Greenhouse gases naturally retain heat, keeping the planet habitable.

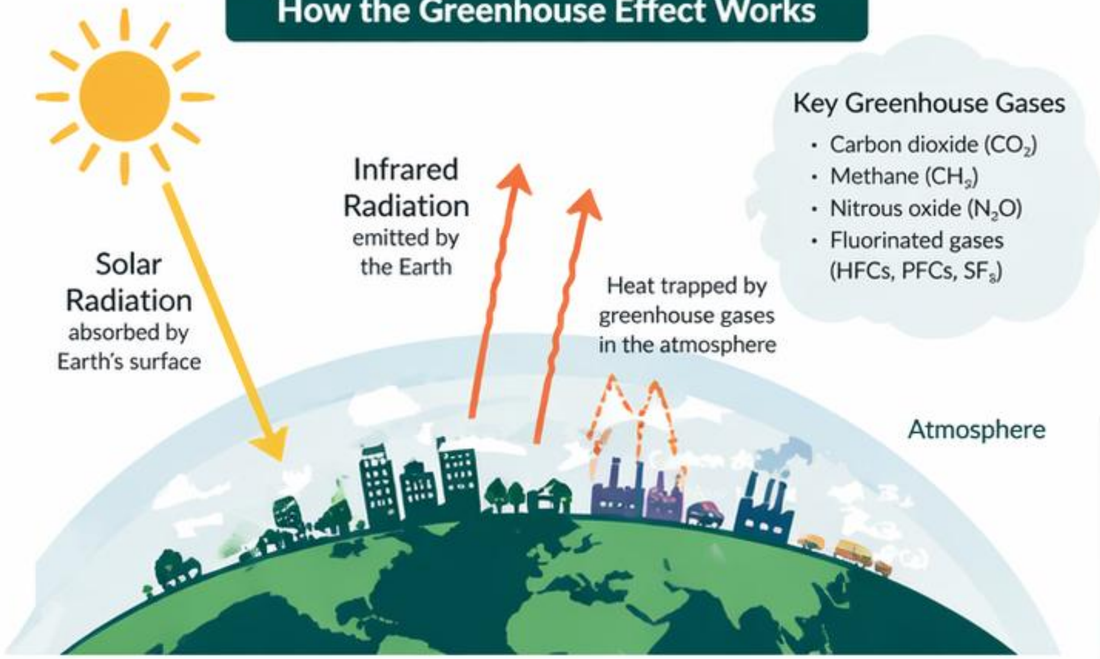
2 Enhanced Greenhouse Effect (Human-Induced)

- Human activities increase the concentration of greenhouse gases in the atmosphere.
- Major sources: energy production, transportation, industry, agriculture, and waste.

3 Result

- More heat is trapped.
- Global temperatures rise.
- Climate change and extreme weather events intensify.

How the Greenhouse Effect Works



Key Greenhouse Gases

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Fluorinated gases (HFCs, PFCs, SF_6)

Major Anthropogenic Sources

Energy Production | Transportation | Industry | Agriculture | Waste

Implications for Urban Systems

- Increased urban heat intensity and extreme weather events
- Greater risk to infrastructure resilience and service delivery
- Ecosystem degradation and biodiversity loss
- Rising city-level carbon footprint (Scope 1, 2, 3 emissions)

Strategic Responses (ESG Integration)

- Transition to low-carbon and renewable energy systems
- Promote sustainable urban mobility and compact city planning
- Integrate climate resilience into infrastructure design
- Implement urban carbon accounting and monitoring frameworks
- Strengthen governance, policy, and multi-stakeholder collaboration

Addressing climate change is fundamental to sustainable, resilient, and low-carbon cities, and a critical pillar of the **Environmental Dimension of ESG.**

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Contextual Background

Kindly refer to Notes Env ESG2 for the details Key Environmental issues in Urban Planning

2.1 Key Environmental Issues in Urban Planning

1. Climate Change
2. Air Quality
3. Water Management
4. Biodiversity Loss
5. Waste Management
6. Energy Consumption
7. Urban Heat Islands
8. Transportation Emissions
9. Land Use Conflicts
10. Resource Depletion



II: ESG Framework for Urban Planning (MLO1)

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II: ESG Framework for Urban Planning (MLO1)

- **Defining the Pillar:** "Pillar connects with Urban Planning".
- **Framework vs. Application:** Distinguish between the high-level investor framework and the practical planning level.
- **Prioritisation (Materiality):** Explains how a planner identifies what is "Material" (e.g., Flood Risk vs. Heritage Conservation) before moving into strategies

Environmental Dimension of ESG in Urban Planning

Environmental Sustainability



- ESG frameworks enable cities to implement **green infrastructure**, **renewable energy systems**, and **sustainable transportation**, thereby reducing their carbon footprint.



- Urban planning guided by ESG principles prioritises **climate resilience** through measures such as *energy-efficient buildings, urban greening, and waste management.*

A. INVESTMENT OPPORTUNITIES

The IFC reports that cities in Europe and Central Asia alone could attract **$1.2 trillion** in climate-related investments.



B. PUBLIC-PRIVATE PARTNERSHIPS (PPPS)

PPPs leverage private investments to fund green infrastructure.

C. DATA-DRIVEN DECISION MAKING

Cities use GHG inventories to identify emissions sources. Accurate data ensures targeted investments in sustainability initiatives.

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Urban Planning related project need to consider the environmental impact

ENVIRONMENTAL IMPACT

Assessing environmental factors is essential to build sustainable, resilient, and liveable cities.

CARBON FOOTPRINT



- Evaluate the project's carbon emissions from construction, operation, and transportation, and implement strategies to **reduce them**, such as using renewable energy and low-carbon materials.

WATER USAGE



- Assess water consumption throughout the project lifecycle and implement **water-saving measures** like rainwater harvesting and greywater recycling.

WASTE MANAGEMENT



- Design waste management systems that **minimize waste generation, maximize recycling and reuse**, and promote a **circular economy**.

ESG

ENVIRONMENTAL
- GHG Emissions
- Biodiversity
- Waste & Water Management
- Use of Natural Resources

SOCIAL
- Diversity & Inclusion
- Consumer Protections
- Community Support

GOVERNANCE
- Business Ethics
- Corruption
- Accounting Transparency
- Management Structure
- Employee Relations

Integrating environmental considerations in urban planning ensures long-term **sustainability, resource efficiency, and better outcomes** for people and the planet.

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ESG in Urban Planning: Building Sustainable Cities

Environmental Dimension

Integrating climate action, resource efficiency, and ecosystem protection into the very DNA of city development.

Why It Matters

By addressing key environmental issues, managing resources sustainably, and embedding climate-resilience strategies into plans, cities can turn ESG from a reporting exercise into a powerful tool for shaping more sustainable, liveable, and just urban futures.

Looking Ahead

In the next module, we will turn to the social dimension of ESG, exploring how urban planning can promote equity, inclusion, and community well-being in parallel with environmental sustainability.

KEY ENVIRONMENTAL DEVELOPMENT AREAS



Restore carbon-rich ecosystems



Promote agroforestry



Natural Capital Accounting



Integrate solar into the built environment



Increase offshore wind capacity



Afforestation with native trees

Urban Planning That Prioritizes Natural Resource Preservation Restores Ecosystems

Urban planning that prioritizes **natural resource preservation restores ecosystems** like forests and wetlands, improves **air quality**, **mitigates urban heat**, and fosters **biodiversity**.

KEY STRATEGIES

- **Conservation Zoning:** Zoning regulations are essential for designating areas for protection, reducing urban sprawl, and balancing development with ecological integrity.
- **Green Infrastructure Projects:** Strategies include incorporating nature-based solutions (NBS) such as green roofs, parks, urban forests, and tree-lined streets to support wildlife, manage stormwater, and reduce heat.
- **Biodiversity Efforts:** Enhancing connectivity between habitats is crucial to allow species to move across urban landscapes. This includes restoring degraded ecosystems and planting native species to promote local biodiversity.
- **Environmental Benefits:** These interventions not only conserve resources but also improve air and water quality, reduce the urban heat island effect, and provide recreational spaces for residents.

Effective urban greening requires integrating these natural elements from the **macro (regional)** to **micro (street)** levels to maximize ecological service efficiency.

Building Green and Resilient Cities

Nature-Based Solutions for a Sustainable Future

Cleaner Air & Water
Improve air quality and support water filtration.

Energy Efficiency
Reduce energy use through green buildings.

Community Well-Being
Create healthy, accessible spaces for people.

Biodiversity & Habitats
Protect and restore habitats to support urban wildlife.

Climate Resilience
Enhance resilience against heat, floods, and disasters.



Accessible Public Transportation
Promote low-carbon mobility and reduce emissions.

Green Corridors & Tree-Lined Streets
Provide shade, reduce heat, and improve walkability.

Permeable Surfaces & Sustainable Drainage
Manage stormwater and reduce flood risk.

Restored Ecosystems & Green Spaces
Restore forests, wetlands, and natural landscapes.

Deep-Rooted Vegetation
Improve soil health, stabilize land, and increase carbon sequestration.

Investing in nature is investing in our future.
Green cities are resilient, inclusive, and sustainable.

Aligned with national ESG frameworks and global sustainability goals.

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RESOURCE EFFICIENCY

Resource efficiency also applies to materials and waste.

Cities can adopt **circular-economy principles** by supporting **recycling hubs**, **low-waste construction practices**, and the **reuse** of existing infrastructure instead of constant greenfield expansion.

When ESG is applied, planners are required to **track and report** on indicators such as **energy intensity per capita**, **water use per unit of GDP**, **and waste diversion rates**, making resource management **measurable and accountable**.



ESG INDICATORS TO TRACK & REPORT

- **Energy intensity per capita** (kWh per capita)
- **Water use per unit of GDP** (m^3 per USD)
- **Waste diversion rates** (%)

Environmental Sustainability

Building a Greener, Resilient Future

ii. Preserving Natural Resources

Urban planning should prioritize the **preservation and restoration of natural ecosystems**, such as forests, wetlands, and green spaces.

This can be achieved through zoning regulations, green infrastructure projects, and biodiversity conservation efforts.

ZONING REGULATIONS

Set aside land specifically for natural ecosystems and conservation areas.

GREEN INFRASTRUCTURE

Develop parks, green roofs, rain gardens, and green corridors to enhance urban resilience and livability.

BIODIVERSITY CONSERVATION

Protect and restore habitats for local wildlife and plants to maintain ecological balance.



ENVIRONMENTAL PILLAR OF ESG & ENVIRONMENTAL ESG IN URBAN PLANNING

1 ENVIRONMENTAL PILLAR OF ESG (FRAMEWORK LEVEL)

This refers to the "E" in ESG (Environmental, Social, Governance)—a performance and reporting category used by investors, regulators, and institutions.

WHAT IT FOCUSES ON

- Environmental impact metrics
- Compliance and disclosure (e.g., carbon reporting)
- Risk management (climate, pollution, resource scarcity)

TYPICAL INDICATORS

- CO_2 Carbon emissions (Scope 1, 2, 3)
- Energy consumption
- Water use and efficiency
- Waste management
- Biodiversity impact

IN URBAN PLANNING

It is used to measure how sustainable a city or project is, often for:

- ESG reporting
- Green financing / investment decisions
- Benchmarking cities or developments

EXAMPLE:

A city reports reduced emissions under frameworks aligned with Global Reporting Initiative (GRI) or Task Force on Climate-related Financial Disclosures (TCFD).

GRI GLOBAL REPORTING INITIATIVE

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

2 ENVIRONMENTAL ESG IN URBAN PLANNING (APPLICATION LEVEL)

This is not just a metric—it is the practical integration of environmental principles into planning and design decisions.

WHAT IT FOCUSES ON

- Spatial planning strategies
- Design interventions
- Long-term ecological resilience

KEY PLANNING ELEMENTS

- Green infrastructure (urban forests, wetlands)
- Transit-oriented development (reducing emissions)
- Climate adaptation (flood control, heat mitigation)
- Land use planning (compact, mixed-use cities)
- Sustainable building design (energy efficiency, green materials)

IN URBAN PLANNING

It is used to shape how cities are built and function, often aligned with:

ICLEI – Local Governments for Sustainability initiatives

UN-Habitat guidelines

EXAMPLE:

Designing a flood-resilient township with green corridors and low-carbon transport systems.



IN SUMMARY:

The Environmental Pillar of ESG provides the metrics and accountability framework, while Environmental ESG in Urban Planning applies those principles to create sustainable, resilient, and livable cities for the future.

METRICS & DISCLOSURE → ASSESS & REPORT → PLAN & DESIGN → SUSTAINABLE CITIES

MATERIALITY ASSESSMENT (MA) IN URBAN PLANNING DIFFERENT FROM CORPORATE ESG MA

From Organisational Impact to Community Impact



CORPORATE ESG MATERIALITY ASSESSMENT

Focuses on identifying ESG issues that are most significant to a single organisation and its stakeholders, affecting its business value, risks, and performance.



VS.

MATERIALITY ASSESSMENT IN URBAN PLANNING

Focuses on identifying sustainability issues that are most significant to a city, community, development project, or planning area and its diverse stakeholders.



WHAT IS MATERIALITY ASSESSMENT IN URBAN PLANNING?

A materiality assessment helps planners determine:

1. **Which ESG issues** have the greatest impact on urban sustainability outcomes.



2. **Which issues** are most important to stakeholders.



3. **Which issues** should be prioritised in planning policies, investments, and development decisions.



WHY IT MATTERS FOR CITIES AND COMMUNITIES

- Focuses resources on what truly drives sustainable urban outcomes.
- Identifies and manages environmental, social, and governance risks early.
- Strengthens stakeholder engagement and trust.
- Supports resilient, inclusive, and liveable cities.
- Guides better policies, investments, and development decisions.

Urban Planning MA looks beyond the organisation— it builds better cities for people, planet, and future generations.

ESG Implementation Framework



Please refer to the Notes for the details



ESG INDICATORS FOR MATERIALITY ASSESSMENT IN URBAN PLANNING



MATERIAL ISSUE	INDICATOR	UNIT OF MEASUREMENT
FLOOD RISK	Flood-prone area	% of development area
	Number of flood events	Events/year
	Population exposed to flooding	Persons or households
GHG EMISSIONS	Carbon emissions	tCO_2e/year
	Emissions intensity	tCO_2e/capita/year
ENERGY EFFICIENCY	Renewable energy contribution	% of total energy
	Energy consumption	kWh/capita/year
WATER RESOURCES	Water consumption	Litres/capita/day
	Non-revenue water	%
WATER QUALITY	River Water Quality Index (WQI)	WQI Score
BIODIVERSITY	Green space provision	m^2/person
	Ecologically sensitive area protected	ha or %
	Tree canopy cover	%
AIR QUALITY	$PM_{2.5}$ concentration	$\mu g/m^3$
	Air Pollution Index	API Score
URBAN HEAT ISLAND	Surface temperature difference	°C
WASTE MANAGEMENT	Waste generation	kg/person/day
	Recycling rate	%

STAKEHOLDER IMPORTANCE SCALE

Used to rate how important an ESG issue is to stakeholders in urban planning.

SCALE	DESCRIPTION	EXPLANATION
1	 **Very Low Importance**	The issue is not a priority for stakeholders and has minimal influence on decisions.
2	 **Low Importance**	The issue has limited relevance to stakeholders and low influence on planning decisions.
3	 **Moderate Importance**	The issue is of medium relevance to stakeholders and has moderate influence on decisions.
4	 **High Importance**	The issue is important to stakeholders and has high influence on planning decisions.
5	 **Very High Importance**	The issue is critical to stakeholders and has very high influence on decisions.

URBAN IMPACT SCALE

Used to assess the level of impact an ESG issue has on the urban environment, people and systems.

SCALE	DESCRIPTION	EXPLANATION
1	 **Minimal Urban Impact**	The issue has little to no effect on the urban environment, infrastructure or communities.
2	 **Low Impact**	The issue has a limited effect on the urban environment or a small portion of the population.
3	 **Moderate Impact**	The issue affects parts of the urban area and has noticeable consequences for people or systems.
4	 **Significant Impact**	The issue affects a large part of the urban area and has serious implications for the environment, infrastructure or communities.
5	 **Critical Urban Impact**	The issue has severe, long-term or irreversible impacts on the entire urban system, environment and the well-being of the population.

MALAYSIAN TOWNSHIP ESG MATERIALITY ASSESSMENT

Stakeholder Importance and Urban Impact Scoring (Scale 1–5)

MATERIAL ISSUE	STAKEHOLDER IMPORTANCE (1-5)	URBAN IMPACT (1-5)
Flood Risk	4.9	5.0
Affordable Housing	4.8	4.7
Public Transport Accessibility	4.7	4.8
Community Wellbeing	4.7	4.6
Water Security	4.6	4.8
Biodiversity Protection	4.5	4.7
GHG Emissions	4.3	4.6
Heritage Conservation	4.2	4.0
Transparency in Planning Approval	4.1	3.9

MALAYSIAN TOWNSHIP ESG MATERIALITY ASSESSMENT



MATERIAL ISSUES

- Flood Risk
- Affordable Housing
- Public Transport Accessibility
- Community Wellbeing
- Water Security
- Biodiversity Protection
- GHG Emissions
- Heritage Conservation
- Transparency in Planning Approval

HOW TO READ

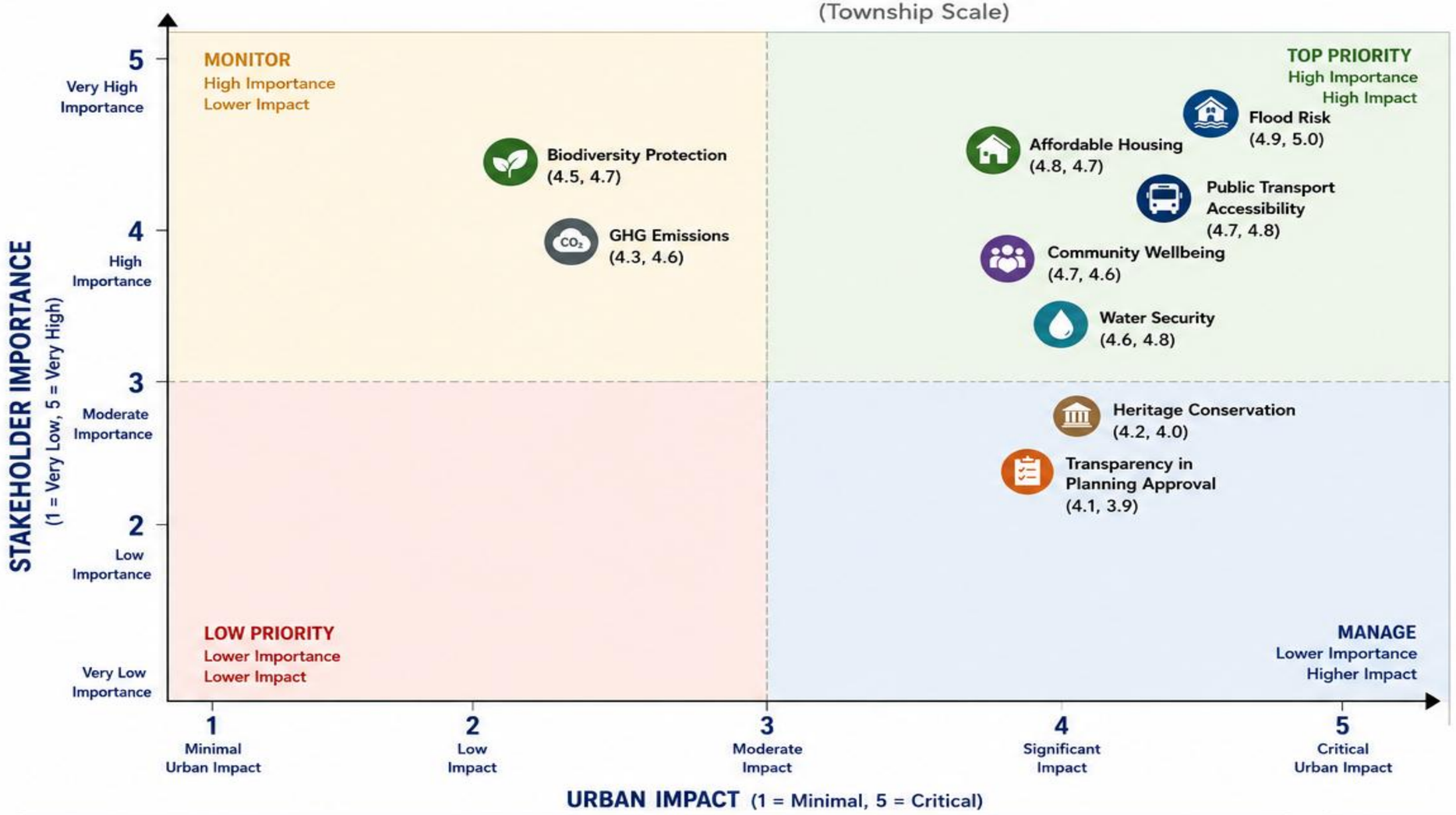
- **Upper Right (Top Priority):** High stakeholder importance and high urban impact.
- **Upper Left (Monitor):** High importance but lower impact.
- **Bottom Right (Manage):** Lower importance but higher impact.
- **Bottom Left (Low Priority):** Lower importance and lower impact.

Scores are based on a scale of 1 to 5 where 5 is the highest.

This materiality assessment helps identify and prioritise ESG issues that matter most to stakeholders and have the greatest impact on the township's sustainable future.

MALAYSIAN TOWNSHIP ESG MATERIALITY MATRIX FOR URBAN PLANNING

Informed by Sime Darby Property and Sunway Materiality Assessments
(Township Scale)



MATERIAL ISSUES (Township Scale)

- Flood Risk
- Affordable Housing
- Public Transport Accessibility
- Community Wellbeing
- Water Security
- Biodiversity Protection
- GHG Emissions
- Heritage Conservation
- Transparency in Planning Approval

HOW TO READ

Top Priority (High Importance, High Impact)
Critical issues that require immediate strategic focus, resources and action.

Manage (Lower Importance, Higher Impact)
Important issues that require effective management and monitoring.

Monitor (High Importance, Lower Impact)
Important to stakeholders but with relatively lower impact. Continue to monitor and integrate.

Low Priority (Lower Importance, Lower Impact)
Lower priority for now but monitor for future changes.

METHODOLOGY (Adopted from Sime Darby Property & Sunway)

1. Identify Issues
Review global ESG standards, local policies, township plans and industry benchmarks.

2. Stakeholder Engagement
Surveys, interviews and workshops with residents, local authorities, investors, NGOs, utilities and experts.

3. Evaluate Importance
Rate stakeholder importance on a scale of 1 (very low) to 5 (very high).

4. Assess Urban Impact
Assess current and future impact on environment, society, economy and infrastructure (scale 1–5).

5. Materiality Matrix
Plot the scores on the matrix to determine priorities and inform planning strategies.

KEY TAKEAWAYS FOR URBAN PLANNING

- Focus on Top Priority issues to build a resilient, inclusive and low-carbon township.
- Integrate ESG considerations into land use planning, infrastructure, housing, mobility and public spaces.
- Strengthen governance, transparency and community participation for sustainable urban development.

Note: Scores are based on a scale of 1 to 5 where 5 is the highest importance/impact.

Source: Adapted from Sime Darby Property Sustainability Report 2024/2025 and Sunway Sustainability Report 2024/2025

OUTCOME OF A MATERIALITY ASSESSMENT

HIGH PRIORITY ESG ISSUES

Issues with the greatest impact on:

- Business Success
- Stakeholder Interests
- Long-Term Sustainability



- **STRATEGIC FOCUS AREAS** — Focus on what matters most
- **TARGETED ESG INVESTMENTS** — Allocate resources where impact is greatest
- **ENHANCED CORPORATE PERFORMANCE** — Drive efficiency, innovation and long-term value
- **IMPROVED SUSTAINABILITY REPORTING** — Strengthen transparency and build stakeholder trust

Key Message

> A materiality assessment serves as the blueprint for effective ESG management, enabling organizations to focus on the issues that create the greatest value for both business and society.



ESG MATERIALITY ASSESSMENT = BETTER DECISIONS + REDUCED RISKS + SUSTAINABLE GROWTH

Climate Resilience Strategies

Kindly refer to Notes Env ESG for the details of the Climate Resilience Strategies

1 Climate Mitigation Strategies

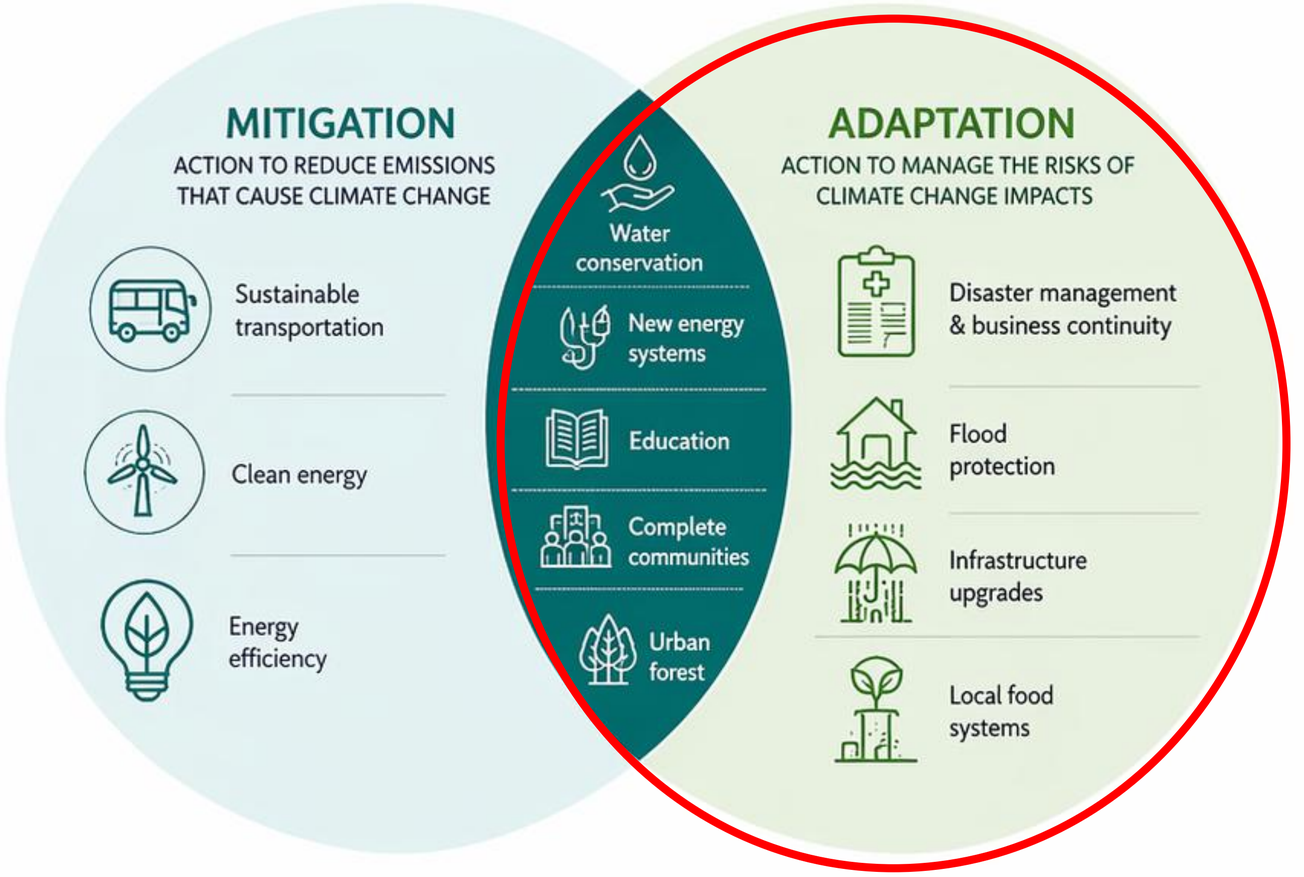
Urban planners incorporates strategies to **reduce greenhouse gas emissions**, such as **promoting public transportation**, **energy-efficient buildings**, and **renewable energy sources**. This aligns with ESG principles by minimizing environmental impact.

2 Climate Adaptation Strategies

Urban planners **develop measures to help cities adapt to climate** impacts, such as flooding and extreme weather.

This includes enhancing **green infrastructure** (like parks and green roofs) to manage stormwater and reduce heat.

Building Climate Resilience



Integrating Mitigation and Adaptation ensures cities are **low-carbon, climate-resilient, and sustainable for the future.**

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Climate Change and Resilience Strategies

Climate change is no longer a distant threat; it is already affecting cities through **rising temperatures**, **extreme rainfall**, **sea level rise**, and more frequent storms.

Urban planning has a central role in **climate mitigation and adaptation.**

On the **mitigation** side, **ESG-aligned** planning supports:

01 **Low-carbon mobility** (walking, cycling, public transport, electric vehicles)

02 **Green building standards** and energy-efficient urban forms

03 Protection and expansion of **carbon-sequestering ecosystems** such as urban forests and wetlands.







Green Building Certification Comparison

LEED	BREEAM	Green Globes	Living Building Challenge	GBI Malaysia
LEED	Breen Globes	Green Globes	Promotes Regenerative Design	Green Building Index Malaysia
Leadership in Energy & Environmental Design	Building Research Establishment Environmental Assessment Method	Focuses on Regenerative Design		

Building **climate-resilient cities** today for a **sustainable and prosperous tomorrow.**

Aligned with **ESG principles**, national frameworks, and global sustainability goals.

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Climate Change and Urban Resilience

Urban Planning Strategies

Green Infrastructure

Incorporating **green spaces**, **such as parks and green roofs**, helps **manage stormwater**, reduce urban heat, and improve air quality.

- Manages stormwater
- Reduces urban heat
- Improves air quality

For example, **Hunter's Point South Park** in **New York City** was designed with resilience in mind, focusing on durable materials and community engagement.



What are the strategies for local authorities to start their ESG Journey?

Building a sustainable future through strategic action, collaboration, and measurable impact.

Strong Governance
Embed ESG into policies, plans, and decision-making.

Environmental Responsibility
Reduce emissions, manage resources efficiently, and protect ecosystems.

Social Impact
Enhance community well-being, inclusivity, and stakeholder engagement.

Data & Performance
Use data-driven insights to measure progress and drive improvement.

Partnerships
Collaborate across sectors to accelerate impact and share best practices.



Develop practical strategies to integrate ESG into urban planning processes, specifically targeting:

2 Enhancement of urban biodiversity via green corridors and nature-based solutions

Integrating green corridors and nature-based solutions into urban planning enhances ecosystem resilience, improves environmental quality, and promotes healthier, more liveable cities.

Why it matters

- Protects and enhances biodiversity
- Manages stormwater and reduces flood risk
- Reduces urban heat island effect
- Improves air and water quality
- Enhances community well-being and quality of life



III: Practical Strategies for Integration (MLO2)



III: Practical Strategies for Integration (MLO2)

Organise the strategies into the three clusters defined in your learning outcomes:

- **Cluster A: Carbon Reduction & TOD:** Focus on compact cities, Intelligent Transport Systems (ITS), and "Preservation of Carbon Sinks" (Putrajaya example).
- **Cluster B: Biodiversity & Nature-Based Solutions (NBS):** Cover green corridors, Blue-Green Infrastructure (BGI), and flood mitigation.
- **Cluster C: Resource Efficiency & Circular Economy:** Focus on integrated waste infrastructure and modular building design.

Climate Resilience Strategies

Kindly refer to Notes Env ESG for the details of the Climate Resilience Strategies

1 Climate Mitigation Strategies

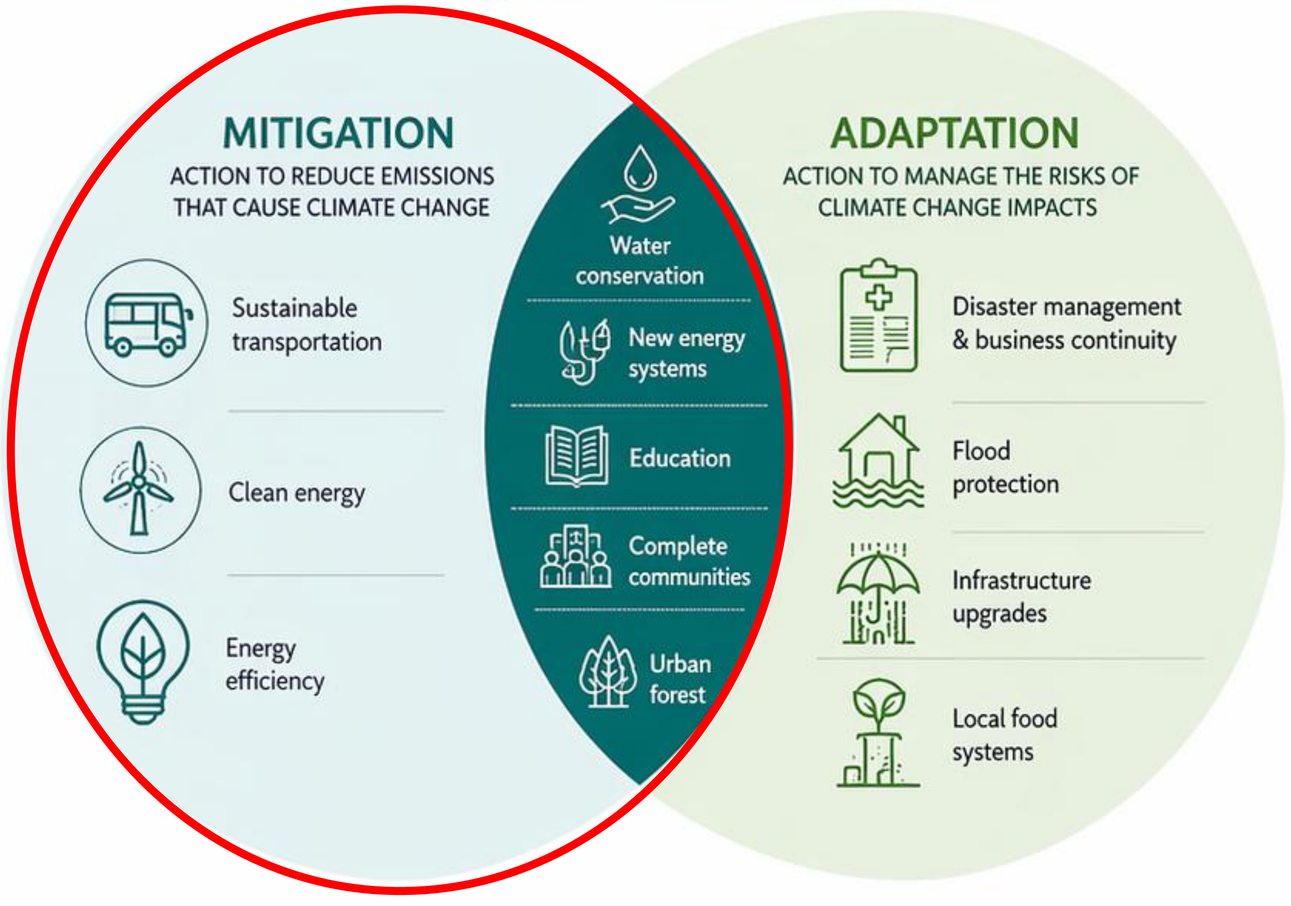
Urban planners incorporates strategies to **reduce greenhouse gas emissions**, such as **promoting public transportation**, **energy-efficient buildings**, and **renewable energy sources**. This aligns with ESG principles by minimizing environmental impact.

2 Climate Adaptation Strategies

Urban planners **develop measures to help cities adapt to climate** impacts, such as flooding and extreme weather.

This includes enhancing **green infrastructure** (like parks and green roofs) to manage stormwater and reduce heat.

Building Climate Resilience



Integrating Mitigation and Adaptation ensures cities are **low-carbon, climate-resilient, and sustainable for the future.**

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MLO1. Reducing Carbon Emissions
through Compact, Transit-Oriented Development

INTEGRATING ESG IN URBAN PLANNING

- Integrating Environmental, Social, and Governance (ESG) principles into urban planning through **Transit-Oriented Development (TOD)** and compact city models.
- A key strategy for achieving substantial **carbon emission reductions**.

COMPACT & TRANSIT-FOCUSED COMMUNITIES

- These models focus on **high-density, mixed-use** communities centered around public transportation hubs to **reduce car dependency** and **minimize urban sprawl**.

SUSTAINABILITY IMPACT

- ✓ Reduced **car dependency**
- ✓ Lower **carbon emissions**
- ✓ Controlled **urban sprawl**



MLO1. i. Reduction of Carbon Emission Through Compact, Transit Oriented Development

Kindly refer to Notes Env ESG for the details MLO1

Intelligent Transport Systems (ITS) to Cut Carbon Footprints

Intelligent Transport Systems (ITS) leverage **digital technologies**, **data**, and **smart infrastructure** to manage transportation more efficiently, safely, and sustainably—thereby reducing greenhouse gas emissions from the transport sector.

KEY BENEFITS

Reduced Emissions
Lower greenhouse gas emissions through optimized transport operations.

Lower Congestion
Improved traffic flow and reduced travel delays.

Efficient Mobility
Better connectivity and mobility for people and goods.



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Environmental Impact and Carbon Reduction

Compact, transit-oriented urban forms significantly lower a city's carbon footprint compared to sprawling, car-centric developments.

03 Preservation of Carbon Sinks

By containing development within specific boundaries (e.g., Urban Growth Boundaries), compact cities protect natural landscapes, forests, and wetlands that act as vital carbon sinks.

Protected Forests
Preserve mature forests that absorb and store carbon.

Wetlands
Safeguard wetlands that capture and store carbon naturally.

Carbon Capture
Healthy ecosystems continuously capture and store CO_2.

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Transit-Oriented Urban Form

Compact, transit-oriented urban forms significantly lower a city's carbon footprint compared to sprawling, car-centric developments.

ENERGY EFFICIENCY

- Denser urban areas foster **shared infrastructure.**
- Reduces energy use for **heating and cooling.**

TRANSPORT ENERGY IMPACT

- Higher urban density **reduces reliance** on private vehicles.
- Consistently **lower transport-related energy consumption.**

Building compact, transit-oriented cities drives energy efficiency and supports a **low-carbon, sustainable future.**



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Putrajaya Carbon Sink

Kindly refer to Notes Env ESG for the details of the Climate Resilience Strategies

The city, part of the Low Carbon Green City program, uses extensive green spaces and the 200-hectare Putrajaya Wetland—which **sequestered 2,960 tCO_2 between 2012 and 2021**—to offset emissions.

KEY CARBON SINK COMPONENTS & STRATEGIES

PUTRAJAYA WETLANDS & GREEN AREAS:

200-hectare wetland acts as a major ecological sponge and carbon sequestration area. Extensive urban landscaping and tree planting are core to the city's green strategy.

CARBON SINK DATA:

From 2001 to 2024, forests in Putrajaya **removed -11 $ktCO_2e$/year**, while emitting 7.1 $ktCO_2e$/year, resulting in a **net sink of -4.0 $ktCO_2e$/year**.

LOW CARBON CITY FRAMEWORK:

Launched in 2009, the program aims to make Putrajaya a carbon-neutral city by 2050 by **improving energy efficiency, increasing renewable energy usage**, and **enhancing green infrastructure**.

BUILDING & ENERGY INITIATIVES:

The Building Carbon Index (BCI) for 2023 showed a **38% reduction from 2012 levels**, indicating successful retrofitting and green building certifications.

The city's strategy, detailed in the Putrajaya Sustainable Landscape Blueprint 2035, aims for a **15-minute walkable city** to further minimize transportation-related emissions.

PUTRAJAYA

LOW CARBON CITY MODEL

2030

TOWARDS A GREEN CARBON NEUTRAL CITY



REPORT CARD 2024

CARBON SINK (2012–2021)	NET CARBON SINK (2001–2024)	BUILDING CARBON INDEX (BCI 2023)	VISION 2050
2,960 tCO_2 sequestered	**-4.0** $ktCO_2e$/year	**38%** reduction from 2012 levels	Carbon-neutral city with a **15-minute walkable city**

Learn more:
https://www.ppj.gov.my/storage/lain-lain/839/839.pdf

Greener Spaces. Smarter City. Sustainable Future.

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ML01. ii. Enhancement of Urban Biodiversity Through Green Corridor & Nature Based Solution

ENVIRONMENTAL

- Energy usage and efficiency
- Climate change strategy
- Waste reduction
- Biodiversity loss
- Greenhouse gas emissions
- Carbon footprint reduction

How cities can plan and develop in ways that protect ecosystems, reduce emissions, and build resilience to climate change?

The environmental pillar of ESG looks at issues such as **carbon emissions, air and water quality, waste, biodiversity, and resource use.**

In urban planning, this means asking:

i. How does this land use or infrastructure decision affect the environment?

ii. Are we using resources efficiently?

iii. And is the city prepared for climate-related shocks such as floods, heatwaves, or sea level rise?



MLO2.ii. Enhancement of Urban Biodiversity via Green Corridors and Nature-Based Solutions

Green Spaces

Green spaces refer to **natural or semi-natural areas**—such as parks, urban forests, wetlands, green corridors, and community gardens—that are intentionally protected or integrated into urban and regional development to support **sustainability** and **human well-being**.

Well-planned green spaces are essential for building **resilient**, **livable**, and **sustainable** cities.

The Benefits of Green Spaces



Cleaner Air & Water
Absorb pollutants, improve air quality, and support water filtration.

Lower Temperature
Mitigate urban heat island effect and create cooler neighborhoods.

Community Well-Being
Promote recreation, social interaction, and mental health.

Climate Resilience
Reduce urban heat, manage stormwater, and enhance climate adaptation.

Biodiversity & Habitats
Provide habitat for wildlife and support ecosystem balance.

Integrating green spaces into our cities **enhances biodiversity**, **improves quality of life**, and builds a **sustainable future** for all.

Aligned with national ESG frameworks and global sustainability goals.

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MLO2.ii. Enhancement of Urban Biodiversity via Green Corridors and Nature-Based Solutio

Please refer to Notes Env ESG for the details on urban resilience

Resource Management

Resource management refers to the **strategic**, **efficient**, and **responsible** use of **natural**, **financial**, and **human resources** to minimize environmental impact, support social well-being, and ensure long-term organizational sustainability.

It focuses on **reducing waste**, improving **energy and water efficiency**, promoting **circular economy** practices, and **conserving natural resources** to **lower environmental degradation** and **carbon emissions**.



Effective resource management creates **resilient cities**, **healthier ecosystems**, and a **sustainable future** for all.

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Integrating Green Corridors and Urban Forests for Sustainable Malaysian Cities

Integrating green corridors, urban forests, and blue-green infrastructure (BGI) is a **top priority under** Malaysia's National Physical Plan and Low Carbon Cities. In the Malaysian context, these initiatives are essential for addressing several critical urban challenges:

FLOOD MITIGATION. BGI, such as bioswales and constructed wetlands (e.g., Putrajaya), acts as a natural sponge. Vital for managing flash floods in Kuala Lumpur and Selangor [1, 2].

HEAT ISLAND REDUCTION. Urban forests and shaded green corridors help lower ambient temperatures in dense areas like the Klang Valley, mitigating tropical heat [3, 4].

BIODIVERSITY LINKS. Green corridors act as "ecological bridges" allowing wildlife to move between fragmented reserves, such as the Bukit Nanas link [5].

MENTAL WELL-BEING. High-quality green spaces are linked to improved public health outcomes for Malaysia's urban population [4, 6].

Examples on a large scale include the Central Forest Spine (CFS) master plan, while city-level efforts focus on pocket parks and river beautification, such as the River of Life project [1, 5].



RESOURCE EFFICIENCY

Resource efficiency also applies to materials and waste.

Cities can adopt **circular-economy principles** by supporting **recycling hubs**, **low-waste construction practices**, and the **reuse** of existing infrastructure instead of constant greenfield expansion.

When ESG is applied, planners are required to **track and report** on indicators such as **energy intensity per capita**, **water use per unit of GDP**, **and waste diversion rates**, making resource management **measurable and accountable**.



ESG INDICATORS TO TRACK & REPORT

- **Energy intensity per capita** (kWh per capita)
- **Water use per unit of GDP** (m^3 per USD)
- **Waste diversion rates** (%)

MLO2. iii.

Improvement of resource efficiency through circular economy approaches

Adopting circular economy principles to optimize resource use, minimize waste, and create sustainable value across product life cycles.

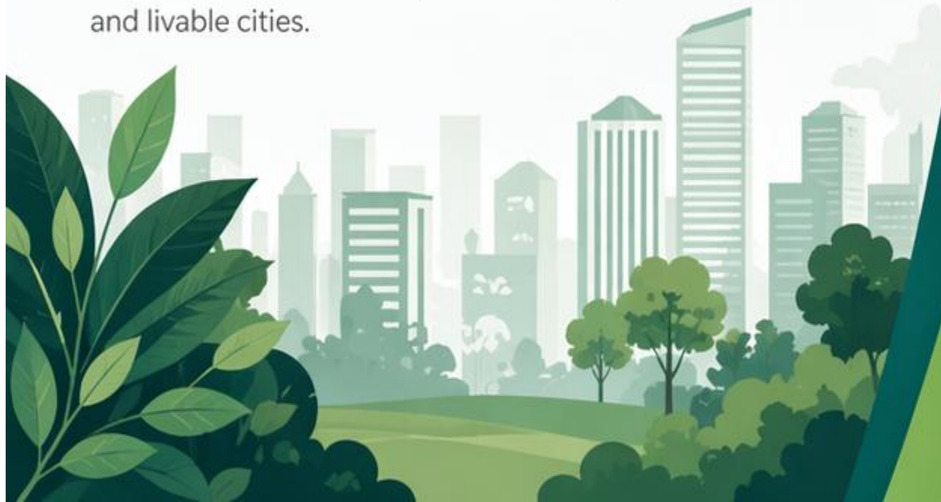


MLO2. iii.

The Environmental Pillars of ESG – Waste Reduction Practices

in Urban Infrastructure

Integrating sustainable waste management solutions to build cleaner, more resilient, and livable cities.



THE ENVIRONMENTAL PILLARS OF ESG

WASTE REDUCTION PRACTICES

INFRASTRUCTURE RELEVANT IN URBAN PLANNING

01 SMART WASTE BINS



Install sensor-equipped bins for efficient and timely collection of waste.

02 COMPOSTING FACILITIES



Establish community composting facilities for organic waste management.

03 MATERIAL RECOVERY FACILITIES



Develop facilities to sort and process recyclables efficiently.

04 USING RECYCLED MATERIALS



Promote the use of recycled materials in construction projects.

RETHINK • REUSE • REDUCE • RECYCLE



MLO2. iii. | The Environmental Pillars of ESG – Waste Reduction Practices

The Environmental Pillars of ESG – Waste Reduction Practices in Urban Infrastructure:

1. Integrated Waste Infrastructure.

Urban planning incorporates recycling facilities, waste segregation systems, and smart collection networks. Infrastructure is designed to reduce landfill dependency.

- Reduces Landfill Dependency
- Promotes Resource Efficiency
- Enhances Urban Sustainability
- Supports a Circular Economy



MLO2. iii. The Environmental Pillars of ESG – Waste Reduction Practices

2. Circular Economy Approach: Promotes reuse, recycling, and material recovery within cities. Encourages sustainable construction materials and modular building design.

Circular Economy Approach in Urban Development

A circular economy approach in cities focuses on minimising waste and maximising resource efficiency by promoting the reuse, recycling, and recovery of materials. Instead of the traditional linear model of produce–use–discard, this approach keeps materials in circulation for as long as possible.

In the construction sector, it encourages the use of sustainable building materials, prefabrication, and modular building design, allowing building components to be reused, repaired, or recycled. This reduces construction waste, lowers environmental impact, and supports more sustainable and resilient urban development.

- Reduces Waste
- Conserves Resources
- Enhances Urban Resilience
- Supports Sustainable Development



Outcome: Minimised waste, efficient resource use, and resilient, future-ready cities.

MLO2. iii.

The Environmental Pillars of ESG – Waste Reduction Practices

3. SUSTAINABLE URBAN DESIGN

Mixed-use developments reduce waste from transportation and packaging.

Green buildings integrate on-site waste management solutions.

MIXED-USE DEVELOPMENTS

Minimize transportation emissions and packaging waste.

GREEN BUILDINGS

Incorporate sustainable materials and resource efficient designs.

ON-SITE WASTE MANAGEMENT

Enable segregation, composting, and recycling at the source.

STRONGER COMMUNITIES

Promote healthier, cleaner, and more livable cities.

Sustainable design today, resilient cities tomorrow.



KEY BENEFITS

- Reduced waste from transportation and packaging
- Lower operational costs and higher resource efficiency
- Improved environmental performance and compliance
- Enhanced quality of life for urban communities

MLO2. iii. The Environmental Pillars of ESG – Waste Reduction Practices

The Environmental Pillars of ESG – Waste Reduction Practices in Urban Infrastructure

4. Policy & Governance Support: ESG frameworks guide municipal regulations on waste reduction targets. Data monitoring improves accountability and performance tracking.

In Malaysia, ESG frameworks increasingly shape municipal policies on waste reduction by **embedding sustainability targets** into local regulations. Data monitoring through these frameworks enhances governance by enabling **transparent performance tracking** for local authorities.



MLO2. iii. The Environmental Pillars of ESG – Waste Reduction Practices

Urban infrastructure backdrop
Representing municipalities and city governance.

ESG policy document
Symbolizing regulatory frameworks guiding waste reduction.

Waste reduction targets checklist
Indicating municipal policy goals.

Data monitoring charts and analytics dashboard
Representing performance tracking and accountability.

Waste collection truck & recycling bin
Illustrating operational waste management systems.

Monitoring and evaluation icon
Showing transparency and ESG performance assessment.



The Environmental Pillars of ESG – Waste Reduction Practices

The Environmental Pillars of ESG – Waste Reduction Practices in Urban Infrastructure":

5. Community & Stakeholder Engagement: Public participation strengthens recycling programs. Awareness campaigns support responsible consumption behaviours.

Engaged communities **drive sustainable habits**, improve program effectiveness, and create **long-term environmental impact.**



The Environmental Pillars of ESG – Waste Reduction Practices

The Environmental Pillars of ESG – Waste Reduction Practices in Urban Infrastructure

01

Governance Role

ESG standards from bodies like Bursa Malaysia and the Securities Commission extend to public sector accountability, requiring municipal reports on waste metrics for investor and stakeholder scrutiny. This fosters better enforcement, as seen in operational goals like **95% collection rates** and cost reductions tied to ESG reporting.

Further reading: https://wellkinetics.com.my/esg-malaysia/

02

Performance Tracking

Digital tools for real-time waste data align with ESG's emphasis on verifiable metrics, supporting audit-ready documentation and progress against national sustainability KPIs. Municipalities benefit from centralised dashboards that link waste diversion rates to broader ESG compliance, improving long-term urban resilience.

Further reading: [wellkinetics.com](https://wellkinetics.com.my/esg-malaysia/)



Effective waste reduction drives **environmental sustainability**, **economic efficiency**, and **stronger ESG performance** in cities.

Aligned with national ESG frameworks and global sustainability goals.

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IV: Measurement, Reporting & Governance (MLO3)

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IV: Measurement, Reporting & Governance (MLO3)

GHG Accounting: Place the technical "how-to" slides (GPC Framework and Carbon Footprint Calculation) here.

The Regulatory Context: Malaysia Climate Policy 2.0 and Low Carbon Cities Framework to show how these strategies align with national agendas.

Market Reality: Bursa Malaysia ESG scores to show the current performance of Malaysian property companies.

Lower Green house gas emission

Principles of Carbon Footprint Calculation (Based on ISO 14067:2018)

$\sum$ Usage items × **1 Activity Data** (Life cycle inputs and outputs) × **2 Emission Factor** (CO_2e; Emissions in terms of Carbon Dioxide Equivalent (CO_2e; carbon dioxide equivalent)) = **3 Carbon Footprint**

EXAMPLE

Activity Data (Usage Items)			Emission Factor (CO_2e / Unit)			Carbon Footprint (CO_2e per Unit)
Term	Quantity per Unit	Unit	Term	Data (CO_2e / Unit)	Unit	
Steel Billet	1.03	Ton	Steel Billet	0.677	Ton	0.697
Inhibitor	0.0000053	Ton	Inhibitor	2.09	Ton	0.000
Natural Gas	0.052	kWh	Natural Gas	2.56	kg CO_2e	0.133
Taipower Electricity	0.108	kWh	Taipower Electricity	0.601	kg CO_2e	0.065
Fuel Oil	0.01	Ton	Fuel Oil	3.891	Ton	0.039

= 

0.934 tons CO_2e per ton of hot-rolled H-beam steel

Figure 5: Example of Product Carbon Footprint Calculation Based on ISO 14067
(Source: ITRI, iST edited)

1 Activity Data (Input Stage)
refers to the amount of resources used (e.g., steel, electricity, fuel). These are the life cycle inputs and outputs of a product.

2 Emission Factor (Conversion Stage)
Each activity has a specific emission factor that converts usage into emissions (measured in CO_2 equivalent).

3 Multiplication Process
Carbon emissions are calculated by multiplying: Activity Data × Emission Factor

4 CO_2 Equivalent (Standard Unit)
All emissions are expressed as CO_2e (carbon dioxide equivalent) to standardize different greenhouse gases.

5 Summation of Emissions
Emissions from all activities (materials, energy, fuel) are added together to get the total carbon footprint.

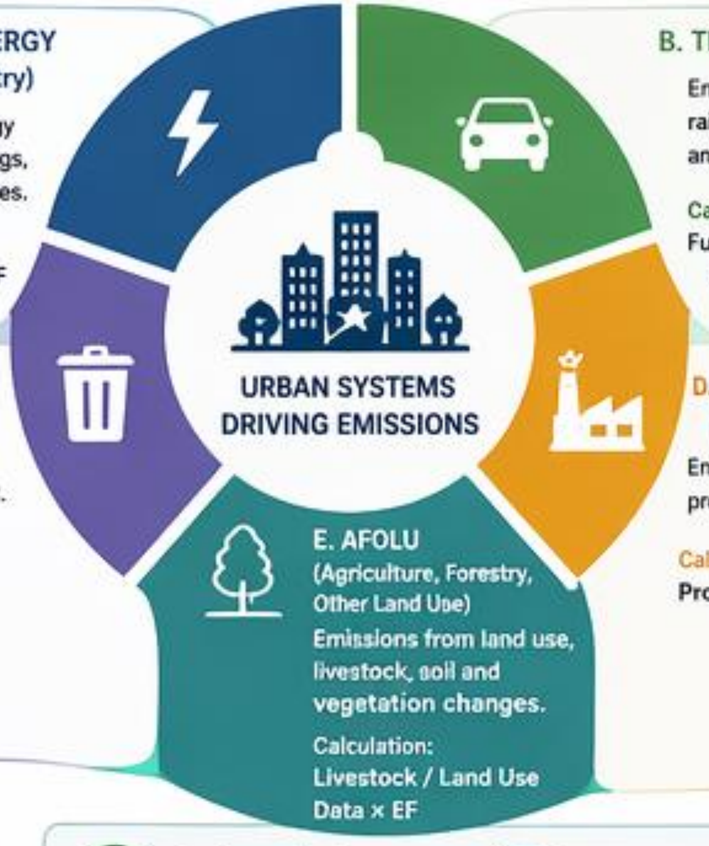
6 Final Carbon Footprint Result
The total is presented per unit of product (e.g., 0.934 tons CO_2e per ton of steel), enabling comparison and sustainability assessment.

Measure. Calculate. Reduce. Towards a Low-Carbon Future

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3 SECTOR-BASED EMISSION CALCULATION (OPERATIONAL LAYER)

Breaking down emissions by key urban sectors



A. STATIONARY ENERGY (Buildings & Industry)

Emissions from energy used to power buildings, facilities and industries.

Calculation:
Fuel / Electricity Use × EF

B. TRANSPORTATION

Emissions from on-road, rail, aviation (within city), and marine transport.

Calculation:
Fuel Consumption or Distance × EF

C. WASTE

Emissions from solid waste disposal and wastewater treatment.

Calculation:
Waste × Methane Conversion Factor

D. INDUSTRIAL PROCESSES (IPPU)

Emissions from industrial processes and product use.

Calculation:
Production × Process EF

E. AFOLU (Agriculture, Forestry, Other Land Use)

Emissions from land use, livestock, soil and vegetation changes.

Calculation:
Livestock / Land Use Data × EF

TOTAL CITY EMISSIONS

Total GHG =
Scope 1 + Scope 2 + Scope 3

WHY SECTOR BREAKDOWN MATTERS

- ☑ Identifies major emission **hotspots**
- ☑ Supports targeted mitigation actions
- ☑ Improves data quality and transparency
- ☑ Aligns with net-zero and climate commitments

ESG CONNECTION

- **E** Reduce emissions and environmental impact
- **S** Improve quality of life, health and social equity
- **G** Strengthen governance, accountability and climate reporting

A STRONG GPC CALCULATION SYSTEM = BETTER DATA, BETTER DECISIONS, BETTER CITIES

4 REPORTING, PRINCIPLES & PRACTICAL EXAMPLE

From data to insights and decisions

REPORTING UNITS & GASES

Emissions are reported in tCO_2e (tonnes of CO_2 equivalent) to allow comparison across different greenhouse gases.

Covers 7 Kyoto Green House Gasses

CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NF_3
Carbon Dioxide	Methane	Nitrous Oxide	Hydrofluoro-carbons	Perfluoro-carbons	Sulfur Hexafluoride	Nitrogen Trifluoride

GPC PRINCIPLES (Ensure Data Quality)

- **Transparency** — Clear, documented data sources and methods
- **Completeness** — All relevant sectors and sources included
- **Consistency** — Same methods over time for comparison
- **Accuracy** — Use of appropriate and reliable emission factors

PRACTICAL EXAMPLE

600 tCO_2e

If a city uses:

- 1,000,000 kWh electricity
- Emission Factor (EF) = 0.6 kg CO_2e/kWh

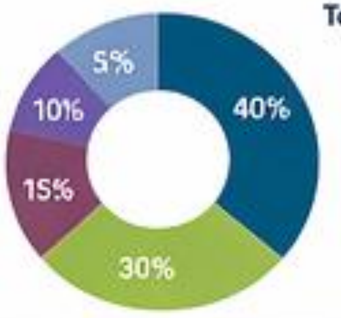
Calculation:

Emissions = 1,000,000 × 0.6 = 600,000 kg CO_2e

= **600 tCO_2e**

EXAMPLE OUTPUT DASHBOARD (Illustrative)

Total GHG Emissions: 1,250,000 tCO_2e



Energy (Buildings & Industry)	40%
Transportation	30%
Waste	15%
Industrial Processes (IPPU)	10%
AFOLU	5%

PLANNING & DECISION-MAKING RELEVANCE

- Evidence-based policy and investment
- Carbon budgeting and performance tracking
- Meet net-zero targets and climate goals
- Strengthen ESG reporting and stakeholder trust

MEASURE • MANAGE • MITIGATE • TRANSFORM

Possible Project Development to Mitigate Environmental Impact

Environmental Impact:

- **Green Infrastructure:** Incorporate green spaces, such as parks and green roofs, to **improve air quality**, **reduce the urban heat island effect**, and **enhance biodiversity**.

- **Land Use:** Consider the impact of the project on natural habitats, arable land, and biodiversity, and prioritize **sustainable land use planning**.



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The relation of carbon emission with climate policy and urban planning

Malaysia Climate Policy 2.0 supports the **Net Zero Emission** target by **2050**.

- Hence, **sources of carbon emissions** that come from transportation, waste generation and energy consumption in buildings need to be **mitigated**.

- As cities become the main **source of GHG emissions**, planning to lower carbon emissions becomes **crucial**.

Malaysia Updates Climate Policy to Achieve 2030 Carbon Goals

Supporting Net Zero and Climate Change Act by 2025

National Climate Change Policy 2.0

- Aims for a **45% reduction** in economy-wide **carbon intensity** by **2030** (compared to 2005 levels)
- Sets a clear roadmap towards achieving **net-zero greenhouse gas emissions by 2050**
- Introduces guidelines for **governance**, **low-carbon development**, **climate adaptation**, and **financing**
- Malaysia to highlight its climate initiatives at UNFCCC's **COP29**, **November 2024**



Malaysia Updates **Climate Policy 2.0**, Aims for a **45% reduction** in **economy-wide carbon intensity** by **2030** (compared to 2005 levels)
Sets a clear roadmap towards achieving **net-zero greenhouse gas emissions** by **2050**

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Regulatory Context

Malaysia's **National Low Carbon Cities Framework** empowers municipalities to establish **waste reduction baselines and action plans**, aligning with ESG principles for emissions control and resource efficiency.

The **Solid Waste Management and Public Cleansing Act** mandates segregation and compliance, where ESG-guided targets push local councils toward measurable reductions in landfill use.

Source:
Wellkinetics. (n.d.). ESG Malaysia.
https://wellkinetics.com.my/esg-malaysia/

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Supporting Net Zero and Climate Change Act by 2025

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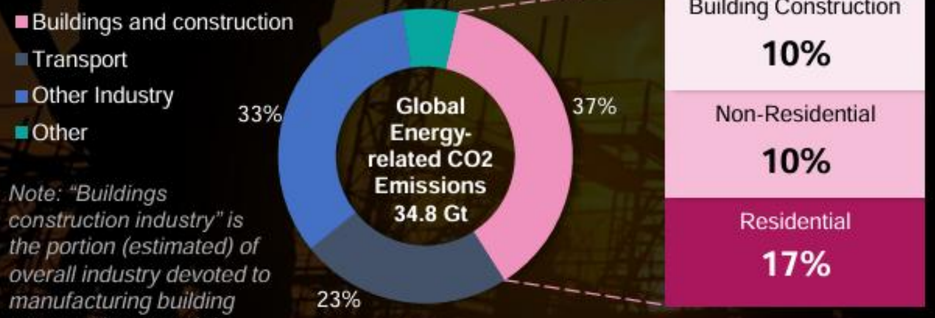
Sustainability & ESG Planning for Built Environment – Reading Material

ESG in real estate has become a critical consideration to fight climate change



In the built environment, ESG concerns being well informed about assets' environmental impact, communicating this across the value chain and taking responsibility.

Share of Global Energy-related CO2 Emissions By Sector
(%, 2020)



Note: "Buildings construction industry" is the portion (estimated) of overall industry devoted to manufacturing building construction materials.

Source: Deal Path

ESG is a framework that allows investors to measure the impact of their real estate investments across ESG-related factors. **Achieving data-driven ESG certifications** can prove valuable to investors in the form of more funding, exclusive lending opportunities, and more.

ESG considerations in built environment have become a top priority for investors at every stage in the asset lifecycle– from screening prospective acquisitions, to building development, and of course, while optimizing building energy usage in servicing tenants.

The built environment sector generates **37 percent global energy-related CO2 emissions**; construction uses 32 percent of the world's natural resources.

The World Bank estimates, the built environment sector has to **reduce CO2 emissions by 36% by 2030** to support staying within the 2°C threshold. If the world's nations do not reduce global warming quickly, temperatures may increase dramatically in the coming decades.

There are still many Malaysia's property companies having low ESG scores

In July 2021, Bursa Malaysia and FTSE Russell launched the FTSE4Good Bursa Malaysia Shariah (F4GBMS) Index to cater to investor demand for ESG and Shariah-compliant index solutions. The F4GBMS index is designed to track constituents in the F4GBM Index that are Shariah-compliant. The list has evaluated **249** public listed companies in Malaysia



Note:
Definition of Band by ESG Rating by FTSE Russell
Band 4: Top 25%; Band 3: Top 26% - 50%;
Band 2: Top 51% - 75%; Band 1: Bottom 25%

Sectors	Band 1	Band 2	Band 3	Band 4
Financial Services	6%	0%	25%	69%
Transportation & Logistics	0%	13%	38%	50%
Telecommunications & Media	0%	18%	36%	45%
Utilities	14%	0%	43%	43%
Plantation	8%	33%	17%	42%
Health Care	11%	22%	33%	33%
Energy	24%	29%	18%	29%
Consumer Products & Services	28%	30%	20%	22%
Technology	41%	18%	23%	18%
Real Estate Investment Trusts	0%	33%	50%	17%
Property	25%	20%	45%	10%
Industrial Products & Services	54%	15%	25%	6%
Construction	53%	26%	16%	5%

Only 10% of companies in Property sector achieve the Band 4 …

Stock Code	Company Name	Band
7105	HCK CAPITAL GROUP BERHAD	1
6181	MALTON BHD	1
6114	MKH BERHAD	1
7765	RAPID SYNERGY BHD	1
5239	TITIJAYA LAND BERHAD	1
1589	ISKANDAR WATERFRONT CITY BERHAD	2
5789	LBS BINA GROUP BHD	2
5073	NAIM HOLDINGS BHD	2
5401	TROPICANA CORPORATION BERHAD	2
3417	EASTERN & ORIENTAL BHD	3
8206	ECO WORLD DEVELOPMENT GROUP BERHAD	3
5283	ECO WORLD INTERNATIONAL BERHAD	3
3174	LAND & GENERAL BHD	3
1651	MALAYSIAN RESOURCES CORPORATION BERHAD	3
5236	MATRIX CONCEPTS HOLDINGS BHD	3
1724	PARAMOUNT CORPORATION BHD	3
5288	SIME DARBY PROPERTY BERHAD	3
8664	SP SETIA BHD	3
8583	MAH SING GROUP BHD	4
5148	UEM SUNRISE BERHAD	4

… **20** out of the 249 companies are under Property sector, and **90%** are still at **Band 3 or below**.

*Property Companies need to have **more comprehensive overview on its operations especially on labour management, product design and raw material followed by structured ESG reporting & disclosure** in order to improve their ESG scoring*

V: Consolidated Case Studies (Evidence of Success)

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V: Consolidated Case Studies (Evidence of Success)

Instead of scattering them, use these as deep-dive examples of everything discussed:

City-Level: Toronto and Seattle.

Project-Level: DBKL Low Carbon Building and Sime Darby Property's township applications.

5 City Priorities for the Environment

The City is committed to reducing greenhouse gas emissions, building resilience against a rapidly changing climate, moving to zero waste and a circular economy, improving air and water quality, building sustainable energy and transportation systems, and supporting biodiversity. The following chapter identifies the key plans, strategies and programs that are contributing to a greener, more sustainable and liveable city.



5a Key Plans and Strategies

TransformTO Net Zero Strategy

The TransformTO Net Zero Strategy is the City's climate action strategy. It is one of the most ambitious in North America and sets targets to reduce community-wide greenhouse gases by 45% by 2025, 65% by 2030, and to net zero by 2040.

To reach its targets, the City will use its influence to regulate, advocate and facilitate transformation in five key areas:

- Demonstrate carbon accountability
- Build and scale climate solutions
- Partner to accelerate action
- Invest in a sustainable future
- Track progress and adapt

To ensure that Toronto is on track to reach net zero by 2040, the following 2030 goals have been established:

Homes & Buildings

- All new homes and buildings will be designed and built to be near zero greenhouse gas emissions.
- Greenhouse gas emissions from existing buildings will be cut in half, from 2008 levels.

City of Toronto Environmental, Social & Governance (ESG) Performance Report | 2023

TransformTO Net Zero Strategy – 2030 Corporate Goals

- City corporate greenhouse gas emissions are reduced by **65%** from 2008 base year.
- All City Agency, Corporation and Division-owned new developments are designed and constructed to applicable Toronto Green Standard Version 4 standard achieving **zero carbon emissions**, beginning in 2022.
- Greenhouse gas emissions from City-owned buildings are reduced by **60%** from 2008 levels; City-owned buildings reach **net zero** greenhouse gas emissions.
- All City-owned facilities have achieved **zero waste**.
- Generate and utilize **1.5 Million Gigajoules** of energy from biogas.
- Approximately **107,700 tonnes CO2e** per year are reduced through Organics Processing with Renewable Energy and Landfill Gas Utilization.
- **50%** of the City-owned fleet is transitioned to **zero-emissions vehicles**.
- **50%** of the TTC bus fleet is **zero-emissions**.
- Greenhouse gas emissions from food the City procures are reduced by **25%**.

City of Toronto ESG Report –Environmental Dimension - 3

TransformTO Net Zero Strategy - 2030 Corporate Goals:

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- All City Agency, Corporation and Division-owned new developments are designed and constructed to applicable Toronto Green Standard Version 4 standard achieving zero carbon emissions, beginning in 2022
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- 50% of the TTC bus fleet is zero-emissions
- Greenhouse gas emissions from food the City procures are reduced by 25%

City of Toronto ESG Report –Environmental Dimension - 4

How Toronto's Debt Issuance Program aligns with the Corporate Strategic Plan

Capital Projects –Corporate Strategic Plan	Debenture Type		
	Green	Social	Conventional
Maintain and create housing that's affordable		✓	✓
• Capital projects that reduce GHG emissions e.g. energy retrofits	✓		
Keep Toronto Moving		✓	✓
• Capital projects that reduce GHG emissions e.g. subway	✓		
Invest in people and neighbourhoods		✓	✓
• Capital projects that reduce GHG emissions e.g. green roofs	✓		
Tackle climate change and build resilience	✓		✓
Maintain a well-run City	✓	✓	✓

Since 2018, the City has issued $980 million of Green and Social Bonds:

- **In 2018:** $300 million Green Bond
- **In 2019:** $200 million Green Bond
- **In 2020:** $130 million Green Bond; the City was the first Canadian government to issue a Social Bond ($100 million)
- **In 2021:** $150 million Green Bond; $100 million Social Bond

The City continues to be a pioneer in advancing ESG objectives within the Canadian government sector. For details about the City's Green Bond and Social Bonds, please refer to sections 5g and 6g in this Report.

City of Toronto ESG Report – Environmental Dimension

Long-Term Waste Management Strategy

The City's Long-Term Waste Management Strategy (the Waste Strategy) provides a roadmap for the way waste will be managed by the City through its integrated waste management system over the next 30 to 50 years. It focuses on waste reduction, reuse and recycling and activities that promote resource conservation and reduce environmental impact. The Waste Strategy includes an aspirational goal of transitioning to a **circular economy** and **zero-waste future**.

Through the Long Term Waste Management Strategy, the City sets an aspirational goal to become the first circular city in Ontario. Working towards circular and sustainable consumption and reducing greenhouse gas emissions is key to achieving the goals of the City's **TransformTO Net Zero Strategy**.

The City will be developing a Circular Economy Road Map that will guide Toronto's circular city transition and is currently implementing a variety of initiatives to drive innovation and the growth of a circular economy to achieve the following outcomes.

Following Outcomes

- **Increased resilience** of services and infrastructure.
- **Waste reduction**, including reduction and diversion of waste streams not managed by the City's Integrated Waste Management System.
- **Economic prosperity** for a green and equitable pandemic recovery, including green-sector development and local supply chain resilience.
- **Local emissions reduction** to help build more resilient, low-carbon neighbourhoods.
- **Enhanced well-being, equity** and community activation fostered through partnerships with local agencies and non-profit organizations.
- **Strengthened local innovation ecosystems** to support local businesses and innovators to develop and scale circular business models.

City of Toronto ESG Report – Environment Dimension - 2

5b Performance Metrics

Objective	Performance Metrics	Targets	2021	2020	2019	2018
Environment						
The City's Long Term Waste Management Strategy was approved by City Council in 2016 and provides a road map for the way waste will be managed in Toronto during the next 30-50 years.	City of Toronto Residential Waste Diversion Rate (City Items + Provincial Allowances for Other Diversion)	The Long Term Waste Management Strategy sets a goal of diverting 70 per cent (%) of Toronto's waste away from landfill by 2026.	52%	53%	53%	

*2018 & 2019 values reflects updated NIR emission factors released since the publication of the 2018 inventory and updated landfill emission. The values reported annually may not match those reported previously. Updates to various datasets occur throughout each year. The values reported here are the most up-to-date as of the publication of this Report.

City of Toronto ESG Report – Environment Dimension - 2

5b Performance Metrics

Objective	Performance Metrics	Targets	2021	2020	2019	2018
Environment						
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Case Study 1: Environmental Issues

Case Study: Los Angeles Urban Heat Island Effect

Overview

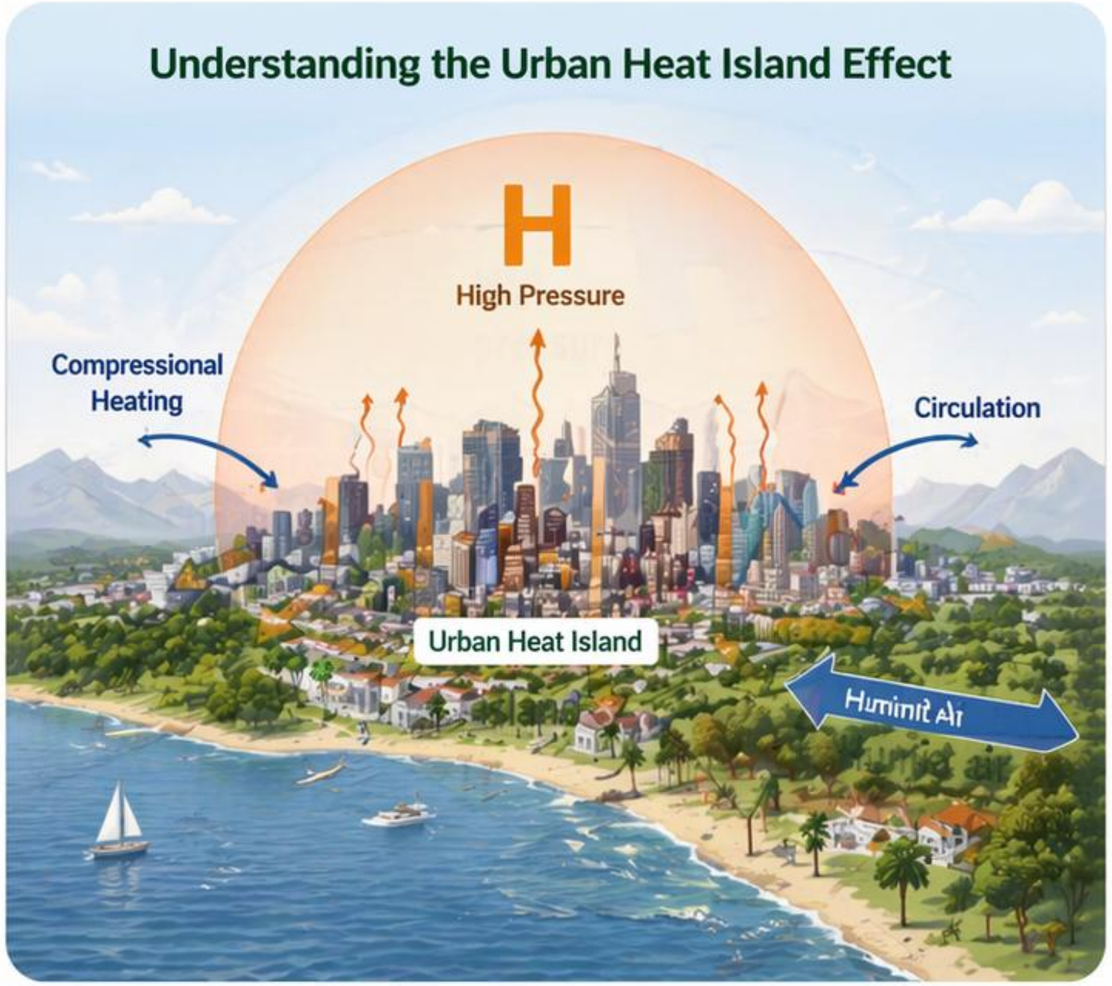
Los Angeles experiences significant urban heat island (UHI) effects due to **extensive asphalt surfaces and limited vegetation**. This results in higher temperatures in urban areas compared to surrounding rural regions.

Actions Taken

- **Tree Canopy Expansion:** The city initiated a plan to increase tree cover by **planting 1 million trees** over several years.
- **Green Roof Incentives:** Programs were established to encourage the installation of **green roofs** on commercial buildings to reduce heat absorption.

Outcome

- Increased urban greenery helped **lower local temperatures**, improve air quality, and enhance community well-being.
- The initiatives also contributed to **biodiversity** and **reduced energy consumption** from cooling systems.



Integrating green infrastructure into urban planning is critical for building **climate-resilient**, **healthy**, and **sustainable cities**.

Case study of DBKL Low Carbon Building

Fact Sheet Renewable Energy and Energy Efficiency

Improving Energy Performance (Renewable Energy and Energy Efficiency) for 27 Kuala Lumpur City Hall's Building

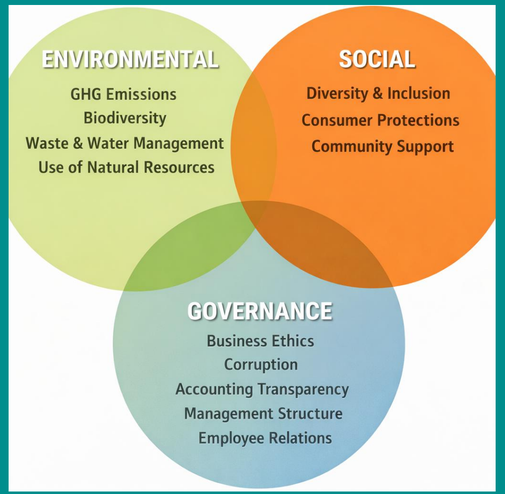
27 Kuala Lumpur City Hall Council assets have been identified for solar PV installation and energy audits have been done to implement low-cost energy efficiency measures and install renewable energy. The project has high upscaling potential through including further buildings in the city. The selection of buildings is based on criteria including electricity demand/energy intensity, roof space and structure, positive health impacts, contribution to resilience, potential for energy efficiency, and public visibility.

Goal

Improving the Energy Performance (Renewable Energy and Energy Efficiency) of 27 Public Buildings through Energy Efficiency Saving Measures and installation of Rooftop Solar PV in Kuala Lumpur, Malaysia.

Objective

Development of a customised, comprehensive, and holistic Procurement Package, consisting of a request for proposal and draft contract.



https://www.dbkl.gov.my/files/kl-energy-management-plan-2050.pdf

Case study of DBKL Low Carbon Building

Summary

Sector	Capacity	Investment	Mode
Renewable Energy (Rooftop Solar PV)	4.2 MWp	13 RM million	Zero Capex
Energy Efficiency (ESM Retrofits)	2.5 GWh/y	8 RM million	Zero Capex
Total		**21 RM million**	

Benefit

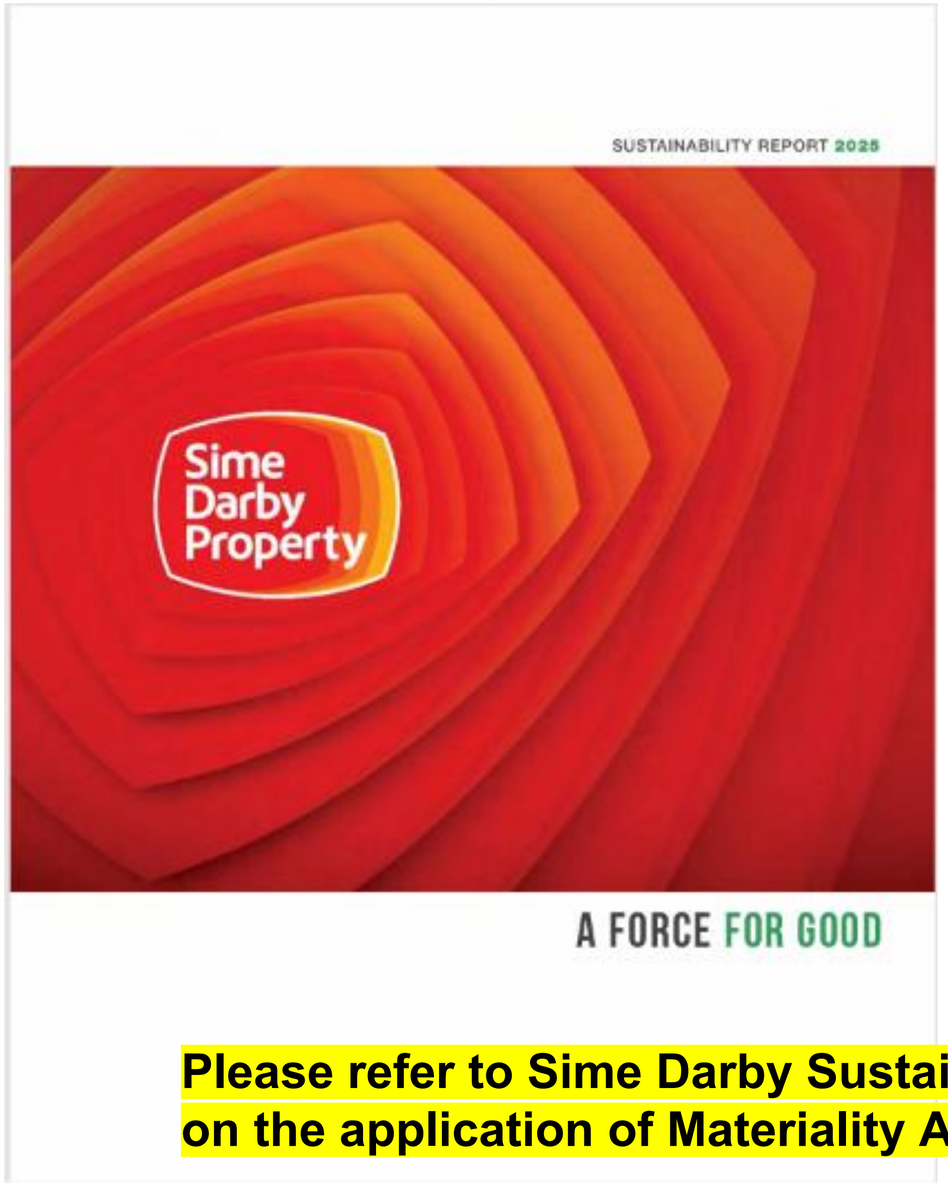
Sector	Production / Savings	Monetary Savings	Impact (annual reduction)
Renewable Energy (Rooftop Solar PV)	25,770 MWh	14.9 RM million (2.6 million EUR) from electricity use/ year	6,930t CO_2
Energy Efficiency (ESM Retrofits)	3,415 MWh		1,940t CO_2

Milestones



https://www.dbkl.gov.my/files/kl-energy-management-plan-2050.pdf

Sustainability Report Sime Darby 2025



THE FOUR PILLARS OF SSR2030 AND THEIR AMBITIONS

Energy and Carbon	Reduce Scope 1 and 2 emissions by 40%
Urban Biodiversity	Achieve net biodiversity positive status through avoidance, regeneration and conservation efforts
Climate Resilience	Establish climate adaptation and resilience plans for high-risk assets
Community Experience	Deliver positive community experiences through social value integration

These pillars are further supported by the 15 material matters identified from our 2023 double materiality assessment These material matters provide a structured basis for prioritising initiatives, setting targets, and allocating resources, ensuring that our sustainability efforts remain focused on areas pertinent to the Group and its stakeholders.

Please refer to Sime Darby Sustainability Report, pages 34 - 38 for details on the application of Materiality Assessment

ENVIRONMENTAL

Energy and Carbon	We manage our GHG by reporting across various scopes, setting reduction targets and initiating strategies such as reducing energy demand through the adoption of good energy practices, improving energy efficiency and adopting renewable energy sources, including rooftop solar PV panels.	Page 53 to 58 of our Sustainability Report. Page 62 of our Integrated Annual Report.
Urban Biodiversity	We strive to minimise the impact of our development on urban biodiversity and mitigate these impacts through conservation and regeneration efforts. By incorporating various initiatives, we aim to enhance urban biodiversity and their ecosystem services.	Page 59 to 74 of our Sustainability Report. Page 63 of our Integrated Report.
Circularity	We embed circular principles throughout our value chain by prioritizing recycling, reuse, composting, procuring recycled materials, sustaining low-waste construction processes and managing waste to minimise landfill contributions.	Page 75 to 78 of our Sustainability Report. Page 65 of our Integrated Report.
Water Management	We optimise water usage by incorporating water considerations into our designs, reducing water intensity, ensuring proper treatment and providing adequate access to water for our employees, contractors and tenants.	Page 79 to 80 of our Sustainability Report. Page 65 of our Integrated Report.
Climate Resilience	We assess and mitigate risks from the physical impacts of climate change (e.g., urban flood, sea-level rise) in our project design, development and management.	Page 81 to 91 of our Sustainability Report. Page 65 of our Integrated Report.

METRICS AND TARGETS

Scope 1 DIRECT EMISSIONS *[GRI 305-1]*

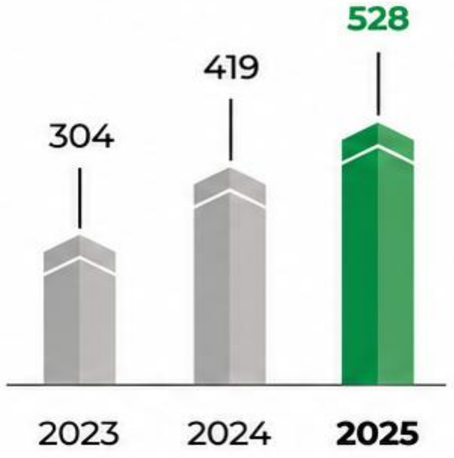
In 2025, Scope 1 emissions increased by 21% to 1,029 tCO_2e. This rise was primarily driven by two factors: significant refrigerant refills following major air-conditioning repairs, and higher gasoline and LPG usage in the Leisure segment due to an increase in organised events. Additionally, we have also expanded our inventory in 2025 to include fugitive emissions and waste treatment emissions.

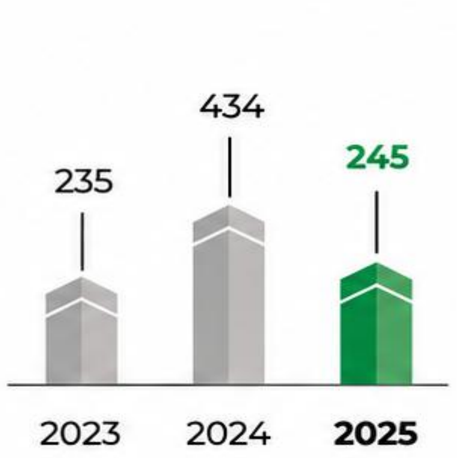
Others (waste treatment emissions)
(tCO_2-e)

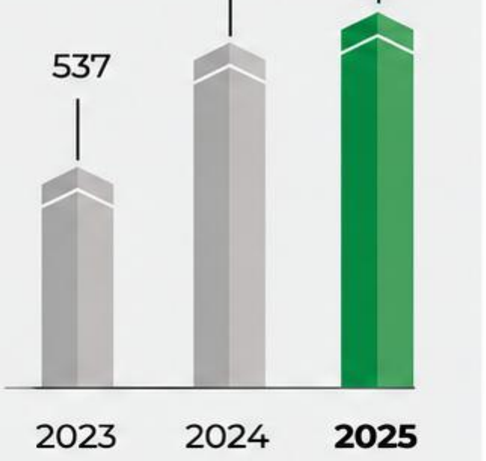
2025
4

Fugitive Emissions
(tCO_2-e)

2025
252







Energy and Carbon

NATURE-BASED SOLUTIONS

Our net-zero pledge expands on our ongoing efforts to lower our carbon footprint by embedding sustainable practices into all areas of our projects and operations.



Sculpture at KL East Park Lookout Point

KL East Park

We integrate nature-based solutions into township planning to strengthen climate resilience and deliver long-term environmental value. Our approach was piloted at KL East Park, where forest regeneration was intentionally conserved and managed as part of the development.

To quantify the climate value of this approach, we commissioned an independent forest carbon stock assessment by PANTAS and the Forest Research Institute Malaysia (FRIM), using internationally recognised methodologies under Verra and REDD+ standards.

The study found that, as at July 2023, forest regeneration at KL East Park had:

- Stored 7,983 tonnes CO_2e in total carbon stock; and
- Sequestered an additional 345 tonnes CO_2e annually through ongoing biomass accumulation.

These findings demonstrate the role of regenerating urban forests as long-term carbon sinks, reinforcing our commitment to scaling nature-based solutions across our townships.



254.6 m of boardwalk allow communities to appreciate and learn on wetland ecosystem in BBR

Bandar Bukit Raja Wetland Townpark

Bandar Bukit Raja Wetland Townpark is designed as nature-based climate infrastructure integrated within the township. Covering approximately 180 acres, the interconnected wetland system can retain over 50,000 m^3 of stormwater during extreme rainfall events, helping to attenuate peak runoff and reduce flood risk to surrounding areas.

In addition to climate adaptation benefits, the wetland supports water quality improvement, urban heat moderation, carbon storage in soils and vegetation, and biodiversity outcomes, with over 50 recorded bird species, including migratory waterbirds, informed by technical input from Wetlands International.



Taman Subang Ria

Scaling Nature-Based Solutions Across Our Townships

Building on our site-specific nature-based interventions, we accelerated tree planting across multiple townships to support our Net Zero pathway and reduce climate-related physical risks. In FY2025, our cumulative tree count increased by 23%, from 155,549 to 191,827 trees, reflecting a step-change in on-ground implementation.

This progress was driven by targeted restoration at the Elmina Urban Biodiversity Corridor, Taman Subang Ria and Hamilton Biodiversity Park, with planting programmes prioritising native and threatened species to enhance carbon sequestration, urban cooling and ecological connectivity.

Safeguarding Urban Biodiversity

FROM BUILDING FOUNDATION TO SCALING OUTCOMES

[GRI 3-3]

2025 Performance



Assessed **89.4%*** of operations for biodiversity risks



Asia Pacific's first property developer verified under the Preferred by Nature Ecosystem Restoration Standard



191,827 trees planted since 2011, including **38,874** fruitangosa, Rasa and Tematenol (RNT) species



2.1 km Elmina Urban Biodiversity Corridor (EUBC) completed, with nearly **3,000** trees planted



Achieved a **13.4%** increase in recorded flora species across our developments, increasing from a 2024 baseline of **291** species



135% increase in reptile and amphibian species recorded across our developments, from a 2024 baseline of **39** species

* This data was subjected to an external limited assurance by an independent third party. Refer to the independent limited assurance *report on page 145 of the Sustainability Report 2025.*

Sustainable Resource Management

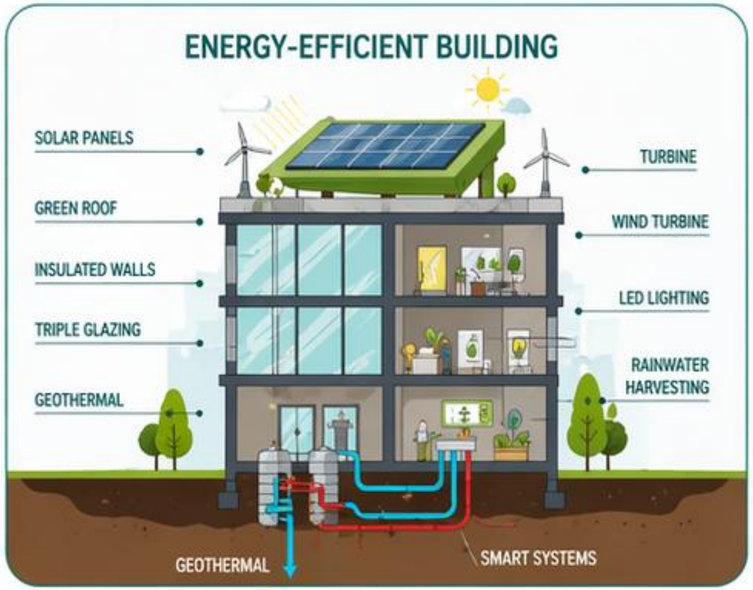
The environmental pillar of ESG strongly emphasises **sustainable resource management** – using **energy, water, land, and materials efficiently and responsibly.**



In urban planning, this can mean:

Promoting **compact, mixed-use development** that reduces travel distances and land consumption.

Encouraging **energy-efficient buildings,** district-energy systems, and renewable energy integration in zoning and building codes.



ENVIRONMENTAL

- Energy usage and efficiency
- Climate change strategy
- Waste reduction
- Biodiversity loss
- Greenhouse gas emissions
- Carbon footprint reduction

Environmental Sustainability

i. Minimising environmental impact:

Projects should aim to minimize their **environmental footprint, such as reducing carbon emissions,** conserving water and energy, and minimizing waste generation.

This can be achieved through using **sustainable materials, implementing green building designs**, and promoting **renewable energy sources.**



Environmental Sustainability

Building a Greener, Resilient Future

ii. Preserving Natural Resources

Urban planning should prioritize the **preservation and restoration of natural ecosystems**, such as forests, wetlands, and green spaces.

This can be achieved through zoning regulations, green infrastructure projects, and biodiversity conservation efforts.

ZONING REGULATIONS

Set aside land specifically for natural ecosystems and conservation areas.

GREEN INFRASTRUCTURE

Develop parks, green roofs, rain gardens, and green corridors to enhance urban resilience and livability.

BIODIVERSITY CONSERVATION

Protect and restore habitats for local wildlife and plants to maintain ecological balance.



Urban Planning That Prioritizes Natural Resource Preservation Restores Ecosystems

Urban planning that prioritizes **natural resource preservation restores ecosystems** like forests and wetlands, improves **air quality**, **mitigates urban heat**, and fosters **biodiversity**.

KEY STRATEGIES

- **Conservation Zoning:** Zoning regulations are essential for designating areas for protection, reducing urban sprawl, and balancing development with ecological integrity.
- **Green Infrastructure Projects:** Strategies include incorporating nature-based solutions (NBS) such as green roofs, parks, urban forests, and tree-lined streets to support wildlife, manage stormwater, and reduce heat.
- **Biodiversity Efforts:** Enhancing connectivity between habitats is crucial to allow species to move across urban landscapes. This includes restoring degraded ecosystems and planting native species to promote local biodiversity.
- **Environmental Benefits:** These interventions not only conserve resources but also improve air and water quality, reduce the urban heat island effect, and provide recreational spaces for residents.

Effective urban greening requires integrating these natural elements from the **macro (regional)** to **micro (street)** levels to maximize ecological service efficiency.

Building Green and Resilient Cities

Nature-Based Solutions for a Sustainable Future

Cleaner Air & Water
Improve air quality and support water filtration.

Energy Efficiency
Reduce energy use through green buildings.

Community Well-Being
Create healthy, accessible spaces for people.

Biodiversity & Habitats
Protect and restore habitats to support urban wildlife.

Climate Resilience
Enhance resilience against heat, floods, and disasters.



Accessible Public Transportation
Promote low-carbon mobility and reduce emissions.

Green Corridors & Tree-Lined Streets
Provide shade, reduce heat, and improve walkability.

Permeable Surfaces & Sustainable Drainage
Manage stormwater and reduce flood risk.

Restored Ecosystems & Green Spaces
Restore forests, wetlands, and natural landscapes.

Deep-Rooted Vegetation
Improve soil health, stabilize land, and increase carbon sequestration.

Investing in nature is investing in our future.
Green cities are resilient, inclusive, and sustainable.

Aligned with national ESG frameworks and global sustainability goals.

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Climate Change and Urban Resilience

Urban Planning Strategies

Green Infrastructure

Incorporating **green spaces**, **such as parks and green roofs**, helps **manage stormwater**, reduce urban heat, and improve air quality.

- Manages stormwater
- Reduces urban heat
- Improves air quality

For example, **Hunter's Point South Park** in **New York City** was designed with resilience in mind, focusing on durable materials and community engagement.



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Environmental Sustainability

Addressing Climate Change

Urban planning should incorporate climate change adaptation and mitigation strategies, such as improving infrastructure resilience to extreme weather events and promoting sustainable transportation options.



WHY IT MATTERS

Climate change is real
Rising temperatures and extreme weather threaten our cities, communities and ecosystems.

Resilient cities are stronger
Smart planning protects lives, property and essential services when disasters strike.

Sustainable choices today, a better tomorrow
Low-carbon transport and green infrastructure create healthier, more livable cities for all.

Enhance Infrastructure Resilience

Build flood defenses, green roofs, and stormwater management systems to protect communities and critical infrastructure from extreme weather.

- Strengthen flood defenses
- Install green roofs
- Improve stormwater management
- Protect communities and critical assets

Promote Sustainable Transport

Develop cycling lanes, electric public transit, and pedestrian-friendly infrastructure to reduce emissions and improve urban livability.

- Build safe cycling lanes
- Expand electric public transit
- Create pedestrian-friendly spaces
- Reduce emissions and congestion

THE BENEFITS

Safer Communities
Reduced risks from floods, storms and extreme weather.

Healthier Environment
Cleaner air, greener spaces and stronger ecosystems.

Economic Resilience
Lower recovery costs and more efficient, future-ready infrastructure.

Inclusive Mobility
Accessible, affordable and efficient transport for everyone.

Sustainable Future
Lower emissions and sustainable growth for generations to come.

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SUMMARY ENVIRONMENTAL DIMENSION – MODULE 2, ESG IN UP



This module explores the environmental dimension of Environmental, Social, and Governance (ESG) principles in urban planning, providing strategies and frameworks to build sustainable, resilient, and people-centred cities.

KEY TAKEAWAYS

COMPREHENSIVE EDUCATIONAL MODULE

The materials outline a comprehensive educational module focusing on the environmental dimension of ESG principles within urban planning.

TRANSFORMING CITIES

The sources emphasise transforming cities into sustainable and resilient ecosystems by shifting from traditional zoning to data-driven accountability.

KEY STRATEGIES

Implement transit-oriented development to lower carbon footprints and utilise nature-based solutions to protect urban biodiversity.

CRITICAL CHALLENGES

Addresses key challenges such as urban heat islands, waste mismanagement, and resource depletion that require a circular economy approach.

OVERARCHING GOAL

Align city design with global sustainability goals to ensure long-term viability and public health.

KEY STRATEGIES FOR SUSTAINABLE CITIES

TRANSIT-ORIENTED DEVELOPMENT

Reduce reliance on private vehicles and lower carbon footprints.

NATURE-BASED SOLUTIONS

Enhance urban biodiversity, improve climate resilience, and support ecosystem health.

CIRCULAR ECONOMY APPROACH

Promote resource efficiency, reduce waste, and support sustainable eonsumption.

DATA-DRIVEN ACCOUNTABILITY

Leverage data and technology for informed decisions and transparent governance.

CRITICAL ENVIRONMENTAL CHALLENGES

URBAN HEAT ISLANDS

Rising temperatures impact comfort, health, and energy use.

WASTE MISMANAGEMENT

Inefficient systems lead to pollution and health risks.

RESOURCE DEPLETION

Unsustainable use of water, energy, and materials threatens future generations.

THE ULTIMATE AIM

To align city design with global sustainability goals, ensuring long-term viability, environmental stewardship, and public health.

BUILDING BETTER CITIES FOR A SUSTAINABLE TOMORROW

THANK YOU

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