# Climate Mitigation/Adaptation Screening Report for Lagos State Office of Public-Private Partnership (OPPP)

## 1 Background and Context

### 1.1 Nigeria's Climate Policy Landscape

Nigeria is among the top ten countries most exposed to climate change impacts. The Climate Change Act 2021 sets a net-zero target between 2050 and 2070. It provides a framework for mainstreaming climate actions into national development. The act requires the Federal Ministry of Environment to set carbon budgets aligned with the Paris Agreement, develop five-year climate action plans, and establish a National Council on Climate Change to coordinate mitigation and adaptation efforts. Public and private entities with 50 or more employees must implement emission-reduction measures and assign climate change officers to report annually. The act also establishes a Climate Change Fund, promotes nature-based solutions, and permits climate litigation, empowering civil society to hold entities accountable for climate-related harms.

Nigeria's Nationally Determined Contribution (NDC 2021) commits to an unconditional 20 % reduction in GHG emissions and a conditional 47 % reduction by 2030 relative to business-as-usual. Priority sectors include energy, agriculture, waste, transport and forestry. The National Adaptation Plan (NAP) Framework emphasises multi-sector stakeholder engagement, aims to mainstream adaptation into development planning and identifies agriculture, freshwater, coastal ecosystems, forests and biodiversity as priority sectors. Implementation, however, remains limited. Nigeria's climate finance flows reached US$2.5 billion in 2021/22. Yet, adaptation finance amounted to only US $735 million, meeting about 6 % of annual needs. This underscores the need to mobilise private capital through PPPs and other innovative instruments.

### 1.2 Lagos State: Climate Hazards and Emissions Profile

Lagos is a low-lying megacity built on reclaimed land, estuaries and barrier islands. It faces three intersecting climate hazards:

1. **Coastal inundation and sea-level rise** – Projections indicate that sea levels could rise to 3 metres by 2050. Without adaptation, about 165 $km^2$ across 14 Local Government Areas (LGAs) could be inundated, threatening 82 % of wetlands and putting 1.4 million people at risk of displacement. The economic cost of unmitigated sea-level rise includes relocation costs of US $6 billion, infrastructure damage of US $5 billion and yearly GDP losses of US $17 billion, potentially totalling US $40 billion by 2050. Coastal erosion already undermines property and infrastructure along Victoria Island, Lekki and Badagry.

2. **Extreme rainfall and flooding** – Lagos experiences heavy rainfall (1,500–2,700 mm annually) concentrated in intense events. Extreme precipitation, inadequate drainage, blocked canals and poor waste management cause recurrent floods, damaging homes, roads and businesses. Recent events (July 2021, September 2022) flooded major roads and displaced thousands. Floods spread water-borne diseases and disrupt economic activities.

3. **Heat stress and urban heat island** – Temperatures are projected to rise by about **1 °C** by 2050, increasing heat stress for residents and workers. Urban heat islands exacerbate this issue, particularly in informal settlements with limited tree cover. Heat impacts public health, productivity and energy demand for cooling.

Lagos emitted about **26.44 million $tCO_2e$** in 2015 (1.3 $tCO_2e$ per capita). Stationary energy (buildings and industry), transport, and waste sectors together accounted for the majority of emissions. Electricity supply relies heavily on diesel generators due to inadequate grid power. Transportation is dominated by private vehicles and fuel-inefficient buses. Rapid urbanisation leads to increasing waste generation, with limited recycling and landfill gas capture. Without climate action, emissions could triple by 2050.

### 1.3 Lagos' Climate Policy Framework

Lagos has adopted several policies to address climate change:

- **Lagos Climate Action Plan (CAP) 2020-2025** – Developed in partnership with C40 Cities, this plan aligns with Nigeria's NDC. It sets sectoral targets for mitigation and adaptation. It calls for expanding renewable energy, improving public transport, upgrading waste management and enhancing water and wastewater infrastructure. Specific measures include building 20 transfer loading stations, constructing material recovery facilities, procuring 100 waste collection trucks and creating a network of composting plants via PPPs. For wastewater, the plan proposes constructing new treatment plants and sewers through PPPs.

- **Lagos Climate Adaptation and Resilience Plan (LCARP) 2024** – Launched in 2024, the LCARP identifies 33 adaptation projects across waste management, transportation, infrastructure resilience and community resilience. The plan estimates financing needs of **US$9–16 billion** by 2035 and highlights 14 projects suitable for private sector engagement. Projects include waste-to-energy plants, sewage treatment plants, improved transport links, coastal embankments, mangrove restoration and resilient housing. The plan emphasises partnerships with the private sector and international financiers to mobilise climate finance.

- **Lagos Resilience Strategy (2019)** – Part of the Rockefeller Foundation's 100 Resilient Cities initiative, this strategy identifies resilience challenges. It proposes actions across urban planning, health, infrastructure and social systems. Key

initiatives include strengthening drainage networks, improving solid waste management and enhancing institutional coordination.

- **Other policies** – Lagos has enacted regulations on environmental protection, flood control and building codes. The state is developing a Green Bond Programme to finance climate-smart infrastructure. The Lagos State Water Sector Strategy aims to expand water supply coverage using PPPs.

## 2 International Guidance on Climate Risk Screening Adapted by OPPP

### 2.1 Climate Risk Screening Tools and Principles

Several multilateral organisations and research institutions have developed tools and guidelines for assessing climate risks in infrastructure projects. The Lagos OPPP has drawn on these to design its screening framework:

1. **World Bank Climate and Disaster Risk Screening** – The World Bank mandates climate and disaster risk screening for all investment projects. The process involves assessing exposure to climate and geophysical hazards, evaluating potential impacts on project objectives, examining the adaptive capacity of the project area and determining overall risk to outcomes. Screening is performed early in the project cycle to incorporate resilience measures and inform engineering design. Sector-specific modules (e.g., water, transport, energy) provide targeted guidance.
2. **Asian Development Bank (ADB) Climate Risk Management (CRM) principles** – ADB advocates starting climate risk management upstream in strategy-level planning, identifying whether a project requires a light-touch or in-depth assessment early to secure resources, focusing on key climate risks before emphasising projections, selecting climate information based on decision context, emphasising no- and low-regret adaptation options for light-touch assessments, and ensuring downstream implementation with monitoring and learning. These principles highlight the importance of early integration and continuous adaptation.
3. **OECD Policy Guidance on Climate Change Risks and Adaptation** – The OECD emphasises that adaptation must be mainstreamed into policy development and resource allocation. Reliable cost-benefit analysis is necessary to prioritise adaptation investments, and there must be strong institutional coordination to translate plans into implementation. The guidance stresses the need to address uncertainties and ensure that adaptation measures account for distributional impacts and the needs of vulnerable communities.

4. **IDB Climate Resilient PPP Toolkit** – This toolkit focuses on integrating climate resilience into the PPP project lifecycle, spanning project identification, business case development, transaction structuring and contract management. It provides tools to quantify risks and integrate them into PPP contracts and financial evaluations. Projects are screened for exposure to geophysical and hydrometeorological risks, ensuring that climate considerations are embedded in project appraisal and contractual provisions.

### 2.2 Climate-Smart Public-Private Partnerships

A climate-smart PPP integrates mitigation and adaptation into the project lifecycle:

- **Project identification and feasibility** – Screening potential projects for alignment with national and state climate targets and identifying opportunities to reduce emissions or enhance resilience. In Lagos, transport projects (e.g., BRT expansions), waste management facilities, renewable energy plants, and water infrastructure should be prioritised.
- **Business case and risk assessment** – Conducting climate risk assessments to analyse exposure to hazards, vulnerability and adaptive capacity. This includes quantifying potential physical impacts (e.g., flood damage) and operational disruptions (e.g., heat affecting rail performance). Financial models should incorporate carbon pricing, internalising the cost of emissions. The business case should evaluate mitigation benefits (e.g., emissions reductions from WtE plants or electric buses) and adaptation benefits (avoided damage costs, improved service reliability).
- **Transaction structuring** – Embedding climate resilience in bid documents and contracts. Requirements might include climate-resilient design standards, performance indicators (e.g., energy efficiency targets), provisions for updating designs based on evolving climate data, and allocation of climate risks (e.g., flood risk) between public and private partners. Contracts should encourage innovation and flexibility to adapt to new information.
- **Contract management and monitoring** – Tracking climate metrics (emissions reductions, resilience indicators) throughout construction and operation. Regular audits can ensure compliance with environmental and social standards. Contingency plans should be tested and updated. Stakeholder engagement, including communities and civil society, is critical to maintain transparency and trust.

## 3 Climate Risk and Mitigation/Adaptation Screening Methodology for Lagos OPPP

The screening methodology synthesises national and international best practices and adapts them for Lagos State's context. It comprises six stages: **(i) project definition and climate relevance, (ii) hazard and exposure assessment, (iii) vulnerability analysis, (iv) mitigation and adaptation options, (v) scoring and decision-making, and (vi) integration into the PPP process**.

### 3.1 Stage 1: Project Definition and Climate Relevance

- **Define project scope** – Outline the project's objectives, sector, location, timeframe and anticipated socio-economic outcomes. For example, Solid Waste Treatment aims to develop a solid waste treatment plant at Olusosun Landfill.
- **Climate relevance screening** – Determine whether the project is vulnerable to climate hazards or contributes substantially to emissions. Projects near coastlines, floodplains or heat-prone areas have high exposure. Projects in the energy, transport and waste sectors usually have high mitigation potential.
- **Alignment with policy** – Verify consistency with national policies (NDC, NAP, Climate Change Act), state plans (CAP, LCARP) and sectoral strategies (transport master plan, waste management plan). Use the NDC and CAP targets (e.g., reducing waste sector emissions by composting and recycling) as benchmarks.
- **Stakeholder mapping** – Identify relevant stakeholders (government agencies, communities, private partners, financiers, NGOs) to engage throughout the screening process. Early engagement fosters buy-in and identifies local knowledge about climate risks.

### 3.2 Stage 2: Hazard and Exposure Assessment

- **Hazard identification** – Collect data on historical and projected climate hazards relevant to the project location. For Lagos, key hazards include coastal inundation, storm surges, extreme rainfall and heatwaves. Use national meteorological datasets, IPCC projections and local climate models.
- **Exposure analysis** – Determine the physical footprint of the project and the assets that could be affected. Use Geographic Information Systems (GIS) to overlay project sites with hazard maps (e.g., flood zones, erosion zones, heat hotspots). For example, a waste-to-energy plant near Epe must consider the exposure to floods and storm surges.
- **Scenario development** – Consider multiple time horizons (short-term, 2050, 2100) and different emission scenarios (e.g., RCP 4.5, 8.5). This helps account for uncertainties and ensures designs are robust.

### 3.3 Stage 3: Vulnerability Analysis

- **Sensitivity Assessment –** Evaluate the susceptibility of project components to hazards. For instance, road surfaces may deteriorate under prolonged flooding, while electrical equipment can malfunction in extreme heat.
- **Adaptive capacity** – Examine the project's capacity to cope or recover, including design flexibility, redundancy, maintenance systems, and community preparedness. Projects with low adaptive capacity require stronger resilience interventions.
- **Socio-economic vulnerability** – Analyse the vulnerability of affected communities (e.g., informal settlements near project sites) to climate impacts. Consider gender, age, disability and income dimensions. For example, women and children often bear greater burdens during flood events due to caregiving responsibilities and limited mobility.

### 3.4 Stage 4: Mitigation and Adaptation Options

- **Mitigation measures** – Identify opportunities to reduce GHG emissions throughout the project lifecycle. Options include using renewable energy (solar PV, biogas), improving energy efficiency, switching to low-emission vehicles (electric buses), capturing landfill gas and adopting circular economy practices. For example, the Lagos CAP proposes 20 transfer loading stations and material recovery facilities to enhance waste separation and composting.
- **Adaptation measures** – Propose structural (engineering) and non-structural measures to enhance resilience. Structural options include elevating infrastructure above flood levels, constructing seawalls or embankments, using heat-resistant materials, improving drainage networks, and retrofitting existing assets. Non-structural measures include early warning systems, emergency response plans, ecosystem-based solutions (e.g., mangrove restoration), insurance schemes and capacity building. The Lagos waste-to-energy project includes early warning systems for extreme weather events that allow the private partner to embed resilience.
- **Socio-economic co-benefits** – Assess co-benefits such as job creation, reduced air pollution, improved health, gender equality and empowerment of vulnerable groups. For instance, the BRT system reduces congestion and air pollution while offering safer, affordable transport for women.
- **Cost-benefit analysis** – Compare costs of mitigation and adaptation options against avoided damages and long-term savings. Use shadow carbon pricing and incorporate externalities (e.g., health costs of pollution). The OECD notes that reliable cost-benefit analysis is essential to prioritise adaptation investments.

### 3.5 Stage 5: Scoring and Decision-Making

After identifying risks and options, the project is scored based on its contributions to mitigation and adaptation. The scoring system should be simple, transparent and adaptable. Table 1 provides a framework.

**Table 1 – Scoring matrix for climate mitigation and adaptation screening**

| Assessment domain | Description | Scoring criteria (0 = poor; 1 = low; 2 = moderate; 3 = high) |
|---|---|---|
| **Alignment with policies** | Degree to which the project aligns with Nigeria's NDC, Climate Change Act and Lagos CAP/LCARP | 0 = no alignment; 1 = mentions general alignment; 2 = explicitly meets sectoral targets; 3 = integrates targets with measurable indicators |
| **GHG mitigation potential** | Expected impact on emissions (positive or negative) | 0 = significant increase in emissions; 1 = neutral; 2 = modest reduction (<10 %); 3 = substantial reduction (>10 %) or negative emissions |
| **Resilience to climate hazards** | Ability to withstand hazards (floods, heat, sea-level rise) | 0 = high vulnerability; 1 = moderate vulnerability; 2 = improved resilience measures included; 3 = design optimised for resilience with redundancy |
| **Socio-economic benefits and inclusion** | Contribution to health, equity, livelihoods, and inclusion of vulnerable groups | 0 = no consideration; 1 = general benefits; 2 = targeted benefits for disadvantaged groups; 3 = explicit gender and inclusion measures |
| **Financial viability and climate finance access** | Ability to attract finance, including climate funds and green bonds | 0 = unviable; 1 = relies solely on public finance; 2 = leverages private finance but no climate finance instruments; 3 = uses innovative climate finance instruments (green bonds, blended finance, carbon credits) |

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| **Adaptive management and monitoring** | Provision for monitoring, evaluation and adaptive management | 0 = none; 1 = basic monitoring; 2 = structured M&E with climate indicators; 3 = iterative learning and adaptive management |
| **Stakeholder engagement** | Participation of communities, civil society and the private sector | 0 = limited; 1 = consultations; 2 = ongoing engagement; 3 = co-design and co-management |

Projects with low scores in critical domains (e.g., resilience or mitigation) would require redesign or additional measures. Scores are aggregated to identify overall climate performance. The matrix is customised for each sector and updated as new data and policies emerge.

### 3.6 Stage 6: Integration into the PPP Process

- **Pre-feasibility stage** – Use the screening results to decide whether to proceed, adjust project design or abandon. If risks are high and adaptation options are limited, the project may not be viable.
- **Feasibility and Business Case –** Incorporate resilience measures and mitigation options into feasibility studies, costings**,** and risk assessments. The business case should demonstrate positive net benefits and alignment with climate policies.
- **Procurement stage** – Include climate requirements in the Request for Proposals (RFP) and evaluation criteria. Bidders must show how they will meet mitigation and adaptation targets and report on climate metrics. Use performance-based contracts with clear environmental obligations and incentives.
- **Negotiation and contract structuring** – Allocate climate risks appropriately. For example, the government may take on residual climate risk (e.g., catastrophic flood) through force majeure clauses. At the same time, the private partner should handle manageable risks (e.g., designing drainage). Adjust concession length or revenue structures to reflect climate risks.
- **Implementation and operation** – Monitor climate indicators and compliance. Provide technical assistance to private partners to integrate new technologies (e.g., electric buses). Establish early warning systems and contingency plans. Regularly update risk assessments to respond to new climate data.

- **Post-project evaluation** – Evaluate performance against climate objectives, document lessons learned and feed them into future projects. Transparent reporting fosters trust and accountability.

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