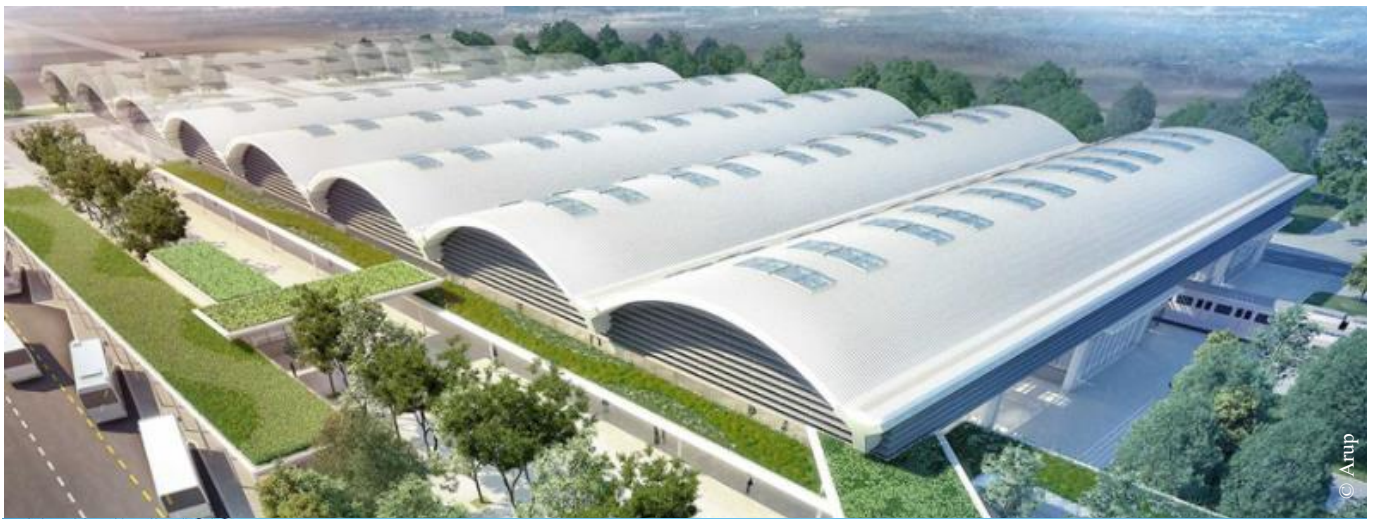


Part 1: Policy Paper

Building Back Better: Policy Analysis and Case Studies on the Philippines “Build Build Build” Infrastructure Programme

Friday 1st April 2022



Contributions



Foreign, Commonwealth & Development Office

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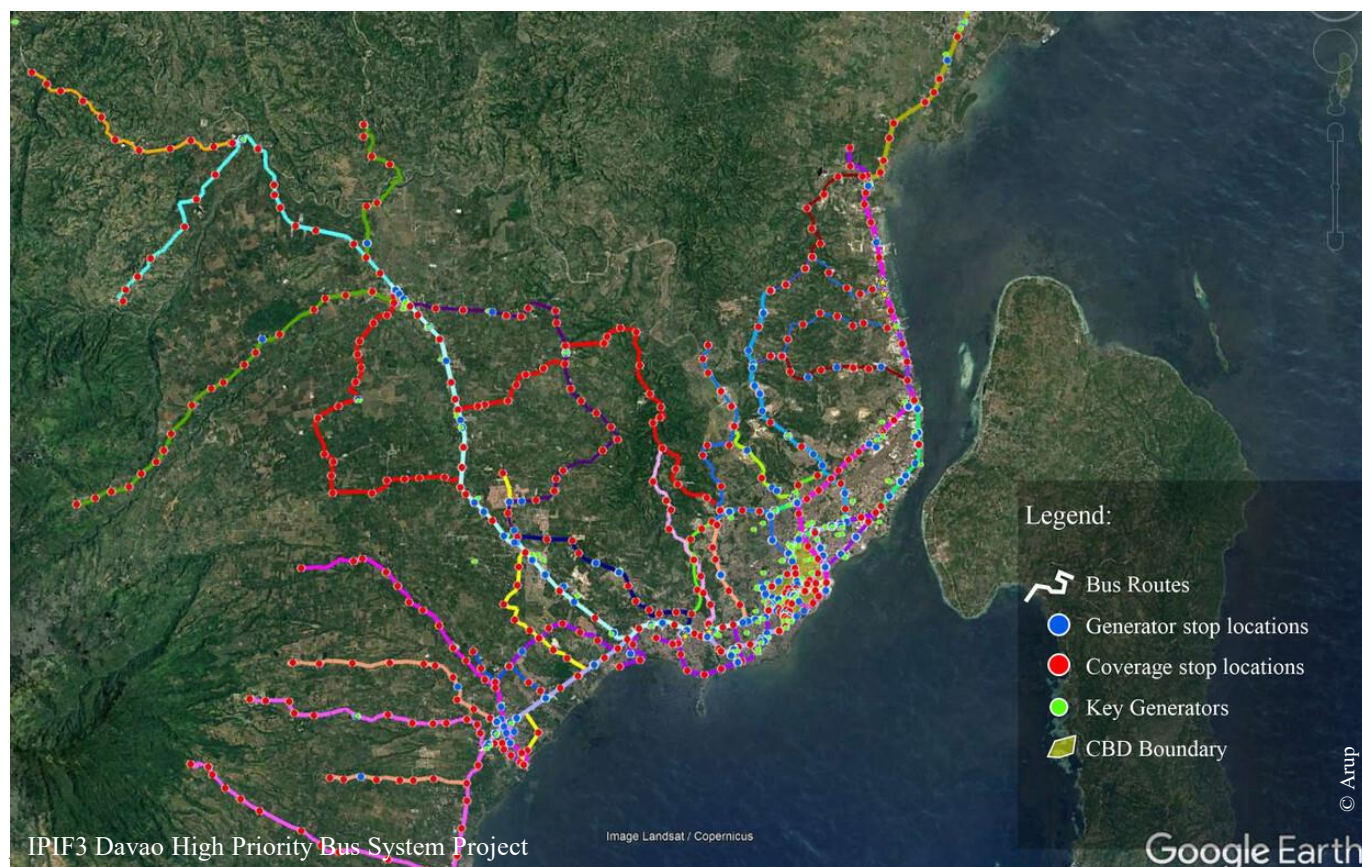
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Abbreviations

ADB: Asian Development Bank	LGU: Local Government Unit
BCDA: Bases Conversion and Development Authority	MEP: Minimum Energy Performance
BOT: Build Operate Transfer	MRV: Monitoring, Reporting and Verification
BSP: Bangko Sentral ng Pilipinas	NbS: Nature-based solution
CAPEX: Capital expenditure	NCCAP: National Climate Change Action Plan
CCAM-DRR: Cabinet Cluster on Climate Change Adaptation, Mitigation and Disaster Risk Reduction	NCRMf: National Climate Risk Management Framework
CCC: Climate Change Commission	NDC: Nationally Determined Contribution
CPM: Carbon pricing mechanism	NDRRMC: National Disaster Risk Reduction and Management Council
CPI: Carbon pricing instrument	NEDA: National Economic Development Authority
CTRP: Comprehensive Tax Reform Programme	O&M: Operations and maintenance
DBM: Department of Budget and Management	OECD: Organisation for Economic Co-operation and Development
DBP: Development Bank of the Philippines	OPEX: Operations expenditure
DBCC: Development Budget Coordination Committee	PACTA: Paris Agreement Capital Transition Assessment
DENR: Department of Environment and Natural Resources	PAS: Publicly Available Specifications
DHSUD: Department of Human Settlements and Urban Development	PBSAP: Philippine Biodiversity Strategy and Action Plan
DILG: Department of Interior and Local Government	PDP: Philippine Development Plan
DOE: Department of Energy	PeGIF: Philippine eGovernment Interoperability Framework
DOF: Department of Finance	PENCAS: Philippine Ecosystem and Natural Capital Accounting System
DOST: Department of Science and Technology	PFMI: Project Facilitation, Monitoring and Innovation
DOTr: Department of Transportation	PPP: Public-private partnership
DPWH: Department of Public Works and Highways	PSA: Philippine Statistical Authority
DTI: Department of Trade and Industry	R&D: Research and development
EIA: Environmental Impact Assessment	RDC: Regional Development Council
EIS: Environmental Impact Statement	RLUC: Regional Land Use Committee
ECC: Environmental Compliance Certificate	SDG: Sustainable Development Goal
EMB: Environmental Management Bureau	TCFD: Task Force on Climate-Related Financial Disclosures
EMP: Environmental Management Plan	TS-NCA: Task Force on Natural Capital Accounts
ESIA: Philippine Environmental and Social Impact Assessment	UK: United Kingdom
EV: Electric vehicle	UNOPS: United Nations Office for Project Services
GAA: General Appropriations Action	UN: United Nations
GDP: Pound sterling	VfM: Value for Money
GDP: Gross domestic product	WoG: Whole-of-government
GHG: Greenhouse gas	
GPRAM: Generic Preferred Risks Allocation Matrix	
ICC: Investment Coordination Committee	
IATCTP: Inter-Agency Technical Committee on Transport Planning	
InfraCom: Infrastructure and Utilities Development Committee	
IPCC: Intergovernmental Panel on Climate Change	
IUCN: Intergovernmental Panel on Climate International Union for Conservation of Nature	

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1. Introduction

An overview to the study

Global infrastructure and climate change context

Infrastructure plays a critical role in enabling long term economic and social development while its role in enhancing the environment has historically played a more secondary role. According to UNOPS’s *Infrastructure for Climate Action* report that was published in 2021, infrastructure is responsible for 79% of global greenhouse gas (GHG) emissions and it can play a central role in climate change adaptation, due to its ability to safeguard the provision of essential ecosystem services and protect communities from harmful climate change impacts. Climate strategies and infrastructure development can no longer be considered separately if the world is to meet the goals set out in Paris Agreement.

Purpose of this paper

The Philippine “Build Build Build” infrastructure programme is a capital infrastructure programme with a public spend expected to reach PHP 8-9 trillion (GBP 114.9–129.2 billion) between 2016 and 2022. The physical and fiscal legacy of the “Build Build Build” programme means that incorporating strategies related to climate mitigation and adaptation should be non-negotiable to help the country meet its 2030 GHG emissions reduction targets and equitable adaptation efforts as per its Nationally Determined Contribution (NDC), as well as wider sustainable development goals under the Philippine Development Plan (PDP) 2017-2022.

This policy research paper compares current “Build Build Build” infrastructure development practices in the Philippines against global best practices related to integrating climate mitigation and adaptation strategies in infrastructure development to identify key constraints or gaps that the Philippines may look to address in the future. It should be emphasised that the purpose of this paper is to inform potential Official Development Assistance (ODA) opportunities provided by FCDO to the Philippine Government in the future, as opposed to a prescriptive set of recommendations for the Philippine Government.

During stakeholder validation sessions, the need to integrate climate strategies in infrastructure development beyond the national “Build Build Build” programme was highlighted. The importance of this is acknowledged and several proposals cover infrastructure development at both the national and the Local Government Unit (LGU) level, however, the focus of this paper is the “Build Build Build” programme.

Study approach

A summary of the five-stage approach used to undertake the study is provided below.

1 Map infrastructure governance in the Philippines

A review of legal, institutional and financial arrangements related to infrastructure development was conducted across government agencies to understand current roles, catalysts and constraints related to low carbon and climate resilient infrastructure development in the Philippines. A summary of this can be found in Section 2.

2 Identify climate related risks in the Philippines

Key climate-related risks in the Philippines and their implications to infrastructure development were identified to understand specific constraints related to climate resilience in the infrastructure sector. The assessment can be found in Section 2.

3 Review emerging best practices globally

Global literature and Arup infrastructure projects focussing on low carbon and climate resilience infrastructure development was reviewed to understand best practices and trends globally. Interviews with global sustainable infrastructure experts supplemented the review. The findings are summarised in Section 3.

4 Undertake a critical review and gap analysis

Key constraints - from evident gaps to observed shortcomings - related to embedding climate strategies in infrastructure development were identified by comparing the existing infrastructure governance arrangements in Section 2 with the best practices in Section 3. This was complemented by interviews with infrastructure and climate experts in the Philippines. The final set of constraints are provided in Section 4.

5 Proposals to address the constraints

High level proposals were developed to address each constraint covering the mechanisms for action, key stakeholders that should be involved and proposed timeframes for action. The proposals and their potential roadmap for implementation are provided in Section 4 and Section 5, respectively.

2. Country context

Existing infrastructure and climate change governance

Overview of the “Build Build Build” programme

The “Build Build Build” programme was first introduced in 2016 as the central programme of the Duterte administration. When it was launched, the Government envisioned that the programme would usher in the golden age of infrastructure between 2016 and 2022. To do so, public infrastructure expenditure was expected to increase to around 7.3% of the country’s gross domestic product (GDP) by 2022 compared to an average of 2.9% of GDP that was spent on infrastructure during the last administration.

The original programme portfolio comprised around 20,000 projects nationwide with a budget of around PHP 8 trillion (GBP 114.9 billion). Initially, the National Economic and Development Authority (NEDA) identified 75 Infrastructure Flagship projects (IFPs) under the programme. Of the 75 projects, 53 projects fell under transport and mobility, and 15 projects fell under water resources. The total indicative cost for the initial 75 IFPs was PHP 2.17 trillion (GBP 31.2 billion). The list has since extended to 112 flagship projects as of 12th May 2021, with total project costs amounting to PHP 4.69 trillion (GBP 67.3 billion).

Appendix B contains the revised list of 112 IFPs. The majority are transport and mobility, water resource and urban development projects with some power and energy, ICT and health projects. ODA has been the main mode of financing with 54 out of 112 IFPs implemented via ODA, mainly from Japan, China, South Korea and the Asian Development Bank (ADB). The ADB has strengthened its lending support for the country in view of the programme. In 2018, the bank announced it was to double its annual lending to the country to PHP 101.85 billion (GBP 1.5 billion) between 2018 and 2021. Two other main financing modes include public expenditure through the General Appropriations Action (GAA) and private sector participation via public private partnerships (PPPs). 25 out of 112 IFPs were financed through GAA, while 23 were financed via PPPs. The remaining projects were financed by the private sector as single sources or through a combination of two of the following: ODA, PPP, GAA or Supplemental Toll Operation Agreement (STOA).

Existing infrastructure governance

The main roles of the key government entities for infrastructure and land use policy, planning, budgeting and implementation are summarised below. An extended list of government entities involved in infrastructure governance is provided in Appendix C.

National Economic and Development Authority (NEDA) is the premier social and economic development planning and policy coordinating body. It formulates fully integrated policies, plans and programmes.

Regional Development Council (RDC) is the primary institution that coordinates and sets the direction for all regional social and economic development efforts. It also serves as a forum to integrate local efforts.

Project Facilitation, Monitoring and Innovation (PFMI) Task Force is an inter-agency task force, established by NEDA, that facilitates development, approval, and implementation of the IFPs.

Public-Private Partnership (PPP) Center is the central coordinating and monitoring agency, attached to NEDA, for all PPP projects in the country. It also provides technical assistance to national and local government.

Infrastructure and Utilities Development Committee (InfraCom) within NEDA Board provides the RDC with information and proposals on matters concerning regional development.

Development Budget Coordination Committee (DBCC) within NEDA Board advises on the consolidated public sector financial position and the national government fiscal programme.

Investment Coordination Committee (ICC) within NEDA Board evaluates the fiscal, monetary and balance of payments implications of major national projects.

Regional Land Use Committee (RLUC) within NEDA Board evaluates priority development areas for land conversion as identified by the Department of Trade and Industry, Department of Agriculture and Department of Tourism.

2. Country context

Existing infrastructure and climate change governance

Bases Conversion and Development Authority (BCDA) engages in public-private partnership projects to push forward vital public infrastructure.

Department of Public Works and Highways (DPWH) functions as the engineering and construction arm of the government, undertaking major projects.

Department of Transportation (DOTr) is the primary policy, planning and implementing entity for promotion, development and regulation of transportation systems.

Department of Budget and Management (DBM) formulates and implements the National Budget for the attainment of the country’s development objectives.

Department of Finance (DOF) formulates revenue policies that ensure funding of programmes that promote welfare and accelerate economic growth.

Existing climate change governance

The main roles of key government entities for climate change and disaster risk reduction policy and planning are provided below:

Climate Change Commission (CCC) is the lead policy-making body that coordinates, monitors and evaluates programmes. It also ensures the mainstreaming of climate change in national/local development plans.

National Disaster Risk Reduction and Management Council (NDRRMC) is a working group of various government, non-government, civil sector and private sector organisations for disaster risk reduction.

Department of Environment and Natural Resources (DENR) oversees conservation, management, use and development of environment and natural resources.

Cabinet Cluster on Climate Change Adaptation, Mitigation and Disaster Risk Reduction (CCAM-DRR) is a cross-departmental body, chaired by DENR with CCC serving as the secretariat, that ensure coordinated and complementary policies and programmes.

Department of Energy (DOE) develops and implements programmes on energy efficiency and renewable energy.

Department of Science and Technology (DOST) provides central direction, leadership and coordination of scientific and technological efforts.

Bangko Sentral ng Pilipinas (BSP) as the central bank, it provides policy directions in the areas of money, banking and credit.

Development Bank of the Philippines (DBP) as the country’s pre-eminent development financial institution, it provides financing to influence and accelerate sustainable economic growth.

Existing climate strategies in infrastructure

The Philippine Government is committed to addressing the climate change challenge. However, the extent to which climate mitigation and adaption strategies are integrated into existing legal, financial and institutional arrangements varies between government entities. The tables overleaf summarise current climate strategies related to infrastructure development adopted by key government entities.



2. Country context

Climate-related legal, financial and institutional arrangements

Table 1: Current climate-related legal, financial and institutional arrangements adopted by key government entities

Government entity	Legal arrangements	Financial arrangements	Institutional arrangements
NEDA	- Philippine Ecosystem and Natural Capital Accounting System (PENCAS) Law requires the NEDA Board and its instrumentalities to ensure that PENCAS is considered in all its policy decisions and project evaluation systems. - Executive Order. 138, s. 2021 mandates NEDA, DOF, DBM and DILG to update existing circular and recalibrate synchronised local and regional planning and budgeting calendars to support devolution.	- Economic Recovery programme in preparation to include four key areas: smart infrastructure, innovation, regional equity, and climate change. - Public Investment Programme 2017-2022 (with DBM and DOF) contains the rolling list of priority programmes and projects.	- NEDA is responsible for the development of policy and strategies to ensure the preservation and maintenance of assets, incorporate these strategies into investment programming processes and formulate standard asset performance indicators. - National SDG Indicator Framework to be developed by NEDA, PSA and other government agencies.
PPP Center attached to NEDA	Build Operate Transfer (BOT) Law authorises the financing, construction, operation and maintenance of infrastructure projects by the private sector.	Policy on Assessing Value for Money (VfM) in PPP Projects aims to institutionalise VfM analysis in PPP projects.	Joint ventures is a fast-emerging option to implement infrastructure projects with private sector participation at the local level. PPP Center provided guidance on the process including environmental considerations.
InfraCom within NEDA Board	Executive Order. 230, s. 1987 mandates that InfraCom advise the President and the NEDA Board, coordinate the activities of government agencies, and recommend to the President policies, programmes and projects concerning infrastructure development.	Three Year Rolling Infrastructure Programme 2020-2022 (with DBM) is the primary mechanism for establishing a pipeline of infrastructure projects and sources of financing.	NEDA, DOTr and DPWH through the IATCTP and InfraCom shall undertake the necessary measures to implement the National Transport Policy.
DPWH	- Green Building Code proposes a set of standards which apply to efficient use of resources, site selection, planning, design, construction, etc. - Social and Environment Management Systems 2021 was launched for the fast-track development of infrastructure projects. - Design Guidelines, Criteria and Standards 2015 covers the design of highways, bridges, buildings and flood control projects.	- Projects that meet the feasibility criteria are then included in the Medium-Term Infrastructure Plan. Funds are appropriated to projects listed in the plan. - Projects that are considered high-priority or that have completed detailed design are included in the Annual Infrastructure Programme. Major national roads and bridges and flood control structures remain under DPWH's financial responsibility during the operational phase.	DPWH serves as the chair of the Cabinet Cluster on Infrastructure, which was created to ensure efficient and transparent management of assets and resources, improve the quality and reliability of public infrastructure and public investment, strengthen implementation capacity and budget execution of key government agencies and ensure equitable access to infrastructure services.

2. Country context

Climate-related legal, financial and institutional arrangements

Government entity	Legal arrangements	Financial arrangements	Institutional arrangements
DOF	Comprehensive Tax Reform Programme (CTRP) was introduced to generate revenue for the “Build Build Build” programme.	- People's Survival Fund is an annual fund intended for LGUs and accredited local organisations to implement climate change adaptation projects. - Ongoing studies on instituting an appropriate carbon pricing instrument.	Philippine Sustainable Finance Roadmap identifies DOF as one of the lead agencies responsible for developing sustainable insurance products climate resilient infrastructure and exploring the establishment of a Green Investment Vehicle to mobilise private investments in sustainable infrastructure.
CCC	- Standards for Climate-Smart Buildings under development and will be used to provide inputs to DPWH's Philippine Green Building Code. - A Resolution adopting the National Climate Risk Management Framework (NCRMF) to address intensifying adverse impacts of climate change.	- Philippines Climate Budget Brief FY 2021 (with DBM) includes budget for mainly climate resilient infrastructure. - Climate Change Expenditure Tagging (with DBM and DILG) for incorporation into national and local budget process.	- Climate Change Act of 2009 well-defined mandate will be executed by CCC. Multilevel collaboration is enshrined in the law. - Philippine Greenhouse Gas Inventory Management and Reporting System was launched to institutionalise GHG reporting in relevant line departments.
CCAM-DRR	Section 10 of Executive Order. 24, s. 2017 mandates the adoption of a Performance and Projects Roadmap for 2018-2022 to achieve objectives, including increased resilience of critical infrastructure.	Priority investments under the Performance and Projects Roadmap 2018-2022 that are infrastructure-related are integrated water resources management and enhanced coastal protection.	CCAM-DRR takes the lead in the effective integration of policies and programmes on climate risk management, disaster risk reduction, and sustainable development.
DENR	- Philippine Environmental Impact Statement System requires, by law, an environmental impact assessment is conducted for every proposed project. - Executive Order. 193, s. 2015 was signed with the aim of rehabilitating all the remaining unproductive and degraded forestlands estimated at 7.1 million hectares during the period 2016-2028.	Risk Resiliency Programme (with DBM) is an investment programme for climate change adaptation that takes priority programmes of LGUs into consideration and including them in the national budget.	Environmental Management Bureau of DENR oversees implementation of the Environmental Impact Statement System at a project level.

2. Country context

Climate-related legal, financial and institutional arrangements

Government entity	Legal arrangements	Financial arrangements	Institutional arrangements
DOE	- Renewable Energy Act 2008 provides a framework of interventions for the development of renewable energy. - Energy Efficiency and Conservation Act 2018 sets energy performance standards and labeling requirements and establishes plans for a demand side management program for the power industry.	- Renewable Energy Trust Fund finances R&D programmes on renewable energy systems - Clean Energy Finance and Investment Mobilisation (CEFIM) Programme involves roadmap development for clean energy investments; database development to track funding for energy-related assets; and training financing institutions on clean energy financing. - Renewable Energy Act 2008 specifies general incentives for renewable energy projects. - Energy Efficiency and Conservation Act 2018 provides incentives for projects that develop energy efficient technologies.	Energy Utilization Management Bureau spearheads policies and programmes on clean energy. The Bureau consists of four divisions focusing on (i) developing alternative fuels and clean energy technologies; (ii) evaluating energy efficiency and conservation technologies and developing a communication strategy for public awareness; (iii) providing technical support to other public agencies on energy management activities; and (iv) regulating minimum energy performance standards and energy labeling requirements.
DOTr	The National Transport Policy (NTP) promotes the use of clean and energy-efficient transport technologies and fuels and the continuous adoption of stringent emission standards. The NTP also requires projects to conform to environmental requirements and provide necessary resiliency and redundancy measures.	Official development assistance (ODA) loans and partnerships with domestic banks dominate transport infrastructure financing.	DOTr consists of various planning and project development offices that plan and implement climate interventions for infrastructure projects in various sectors, including road, rail, maritime, and aviation.

2. Country context

Climate hazards to consider in infrastructure development

A deep dive into climate hazards

The Philippines is among the world’s most vulnerable to climate change in the world. Therefore, a deep dive into how climate hazards are likely to impact different infrastructure typologies both now and, in the future, was undertaken. This is to understand to what extent and to what specificity have the impacts been incorporated into current infrastructure development practices.

Approach

A qualitative risk screening exercise was undertaken that involved gathering of climate data and infrastructure design considerations in the Philippines.

We used the Coupled Model Inter-comparison Project Phase 5 (CMIP5) models under the RCP2.6 and RCP8.5 emissions pathways for temperature change, noting that RCPs are only applicable to primary climate variables including rainfall/precipitation, temperature and sea level rise. Climate projections for these variables were considered for the following time horizons: 2030, 2050 and 2100s. The likelihood of other climate-related hazards such as flood and tropical cyclones is based on recurrence intervals or return periods between 5 to 10 years and not on time horizons.

Data sources include published reports, journal articles and web portals. Three references were used for temperature data, three references were used for rainfall/precipitation data and up to four references were used for floods, tropical cyclones, storm surges, and drought data. The full list of data sources can be found in the References section.

Following this, the data was analysed to identify climate impacts on infrastructure typologies of the “Build Build Build” programme. A summary of the findings are provided overleaf.

Impact profile

Generally, climate-related hazards would result in damage to roads, bridges, and water and sanitation facilities. For infrastructure located in the urban and peri-urban areas, heavy rainfall, high temperatures, and strong winds are likely to impact the Philippines’ infrastructure and services, where over 60% of the population resides. Main climate-related hazards are sea level rise, severe weather events, and increased temperatures. Extreme weather also poses risks to water and sanitation facilities. Rising sea levels would increase the vulnerability of infrastructure in 25 cities located along the coastline, causing coastal inundation and storm surges and damaging infrastructure such as sea walls, roads and bridges. Extreme weather events would likely damage water facilities, increasing health risks. Increased temperatures would result in damage to infrastructure, include roads and bridges, through overheating of electrical equipment and increase in number of days where track maintenance cannot be carried out.

Specifically, climate change could impact the supply of energy, as well as increase its demand, in the country. Hydropower production, which contributes 20% to the country’s energy supply, is at risk to reduced water availability due to climate change. Other critical energy infrastructure, such as the offshore natural gas field of Malampaya, is vulnerable to more intense and frequent storms. For water infrastructure, climate variability is already resulting in water stress due to the reduction of the quality and quantity of water supply. On the other hand, droughts reduce water inflows to watersheds, causing water shortages and disruption in water supply, creating shortages for agricultural, industrial and municipal users. Floods and landslides due to extreme rainfall increase runoff, reduce water quality, and damage water supply infrastructure. Saltwater intrusion of coastal aquifers is expected to increase due to sea level rise, causing poor water quality in about 25% of coastal municipalities in Luzon, Visayas and Mindanao.



Flooding in Manila

2. Country context

Climate hazards to consider in infrastructure development

Table 2: Baseline and future climate hazards related to “Build Build Build” infrastructure

Hazard	Baseline hazard conditions	Future hazard profile	Infrastructure implications
Flood	- The Philippines is highly exposed to flooding, the consequence of severe cyclones and heavy rainfall. Damage from floods and associated landslides are escalating due to an increase in frequency and intensity of typhoons. - Floods in the Philippines are usually due to monsoon surges (intensification of the monsoons) and slow-moving tropical cyclones in the Philippine Area of Responsibility (PAR).	- Potentially damaging and life-threatening urban floods are expected to occur at least once in the next 10 year. Medium confidence in more frequent and intense heavy precipitation days and an increase in the number of extreme rainfall events. The present hazard level may increase in the future due to the effects of climate change. - Damaging waves are expected to flood the coast at least once in the next 10 years. Based on this information, the impact of coastal flood must be considered in different phases of the project for any activities located near the coast.	Transport and mobility: - Flooding will reduce or eliminate main access routes - Inundation of track, depots, tunnels, stations and signaling equipment Water resources: - Increased sedimentation of reservoirs from runoff and erosion - Increased incidence of floods would result in degradation of watershed health and reduction of water quality - Scour failure of embankments; loss of support to track - Drainage problems (blocked or unable to cope) Power and energy: - Damage to electrical systems; debris impact requiring removal
Tropical cyclone and Southwest Monsoon (Amihan)	- The Philippines is one of the most cyclone-prone countries in the world, lying on what is often described as the ‘typhoon belt’. - Approximately 19–20 cyclones enter the Philippine Area of Responsibility annually, with 7–9 reaching landfall. - The moist southwestern monsoon (amihan) brings as much as 90% of the annual rainfall over the northwestern region (Luzon) and up to 43% over the country. - Luzon is significantly more at risk than more southern areas due to the intensity of rainfall associated with <i>amihan</i> that can be indirectly affected by tropical cyclones. - Increased number of cyclones during El Niño years and a slight increase of cyclone passage over Visayas since the 1970s. - Maximum occurrences have been noted during July to September and during October to November, with the least occurrences during February and March. - Most of these storms come from the southeast, with their frequency generally increasing from south to north.	The severity of tropical cyclone in the country is high according to the information that is currently available. This means that there is more than a 20% chance of potentially-damaging wind speeds in the country in the next 10 years.	Transport and mobility: - Overhead line equipment damage caused by falling trees; obstructions on tracks General infrastructure: - Damage to buildings and infrastructure

2. Country context

Climate hazards to consider in infrastructure development

Hazard	Baseline hazard conditions	Future hazard profile	Infrastructure implications
Rainfall / precipitation	- Average annual rainfall is approximately 2,348 millimeters (mm), but this varies geographically, from 960 mm in southeast Mindanao to over 4,050 mm in central Luzon. - There is geographical variation in the distribution of precipitation: during June to September heavy rainfall is concentrated to the west of the country, whereas between October and March, heavy rainfall is predominantly found in the country's eastern regions.	- For two time periods (2030s and 2050s), the drier seasons of March-April-May (MAM) will become drier in most parts of the country. The wetter seasons of June-July-August (JJA) and September - October-November (SON) will generally become wetter in Luzon and Visayas. - Increased heavy and extreme rainfall in Luzon and Visayas during the southwest monsoon, making the wet season wetter, but decreasing rainfall trends for most of Mindanao.	Transport and mobility: - Damage or disruption from river or pluvial flooding - Instability of earthworks - Inundation of track, depots, tunnels, stations and signaling equipment Water resources: Damage or disruption from river or pluvial flooding - Soil moisture reduction - Gradual wastewater overflows - Contamination of drinking water Power and energy: - Damage or disruption from river or pluvial flooding ICT: - Damage to cellphone towers and telephone poles - Pole failures - Damage from debris and falling objects - Inundation of telcom assets - Breakage from tension
Temperature	- Temperatures are generally high, particularly in the valleys and plains, averaging 27°C throughout the year. - The lowest temperature ever recorded was 6.3°C on 18 Jan 1961 in Baguio city, while the highest temperature was recorded was in Tuguegarao, Cagayan on 22 April 1912 and 11 May 1969 at 42.2°C. - Hottest months are April and May, with the coldest months experienced during December, January and February, across the latest climatology, 1991–2020. - The mean annual temperature is 27.1°C, with a relatively low seasonal temperature variation of approximately 3°C. There is minimal spatial variation in temperatures across the country. - An increase in average temperature of 0.65°C from 1951–2010, with greatest increases in northern and southern regions.	- Models show a trend of consistent warming, with more significant warming occurring towards the end of the century. - Using Coupled Model Inter-comparison Project Phase 5 (CMIP5) models, under the RCP8.5 emissions pathway, average temperatures are projected to increase by 3.1°C by the 2090s, nearly 0.5°C less than the global average, and 0.8°C by the 2090s under the RCP2.6 emissions pathway, 0.2°C less than the global average. Under all emissions scenarios, projected maximum and minimum temperature increases are greater than increases in the average temperature. - Using the PRECIS (Providing Regional Climates for Impact Studies) model, under A1B emission scenario, annual average temperature rise is 0.9 °C to 1.1° C by 2030s and is 1.9 °C to 2.1° C by 2050s.	Transport and mobility: - Overheating of electrical equipment - Overhead line sag - Increase in number of days where track maintenance cannot be carried out - Increased flights grounded (2x from 2030) per year Water resources: Altered biological processes - Increased demand for services - Inadequate flow of sewers - Blockages and inability to process human waste Power and energy: - Reduced hydropower production - Damage to energy infrastructure - Disruption to services - Increased incidence of power outages and resultant economic losses - Increased demand for energy services, particularly cooling

2. Country context

Climate hazards to consider in infrastructure development

Hazard	Baseline hazard conditions	Future hazard profile	Infrastructure implications
Sea level rise	- Sea-level rise is happening at an above-average rate for some parts of the Philippines, exposing up to one million people to flooding from rising sea levels by 2070–2100. - In the 1980s, a rise of about 150mm was recorded in the Manila, Legazpi, and Davao stations. For Manila, the average increase rate of mean sea level is 1.33mm per year since the 1900s, which increased further to 26mm per year in the 1960s. - The above rates are way above the average rate of global sea level (GMSL) of about 1.77mm/year in 1901-2010, around 2.33mm/year in 1971-2010, and almost 3.2mm/year from 1993-2010. These values indicate accelerating rates of GMSL over time.	0.48-0.65 m rise in sea levels by 2100.	Water resources: - Saltwater intrusion of freshwater coastal aquifers Transport and mobility: - Inundation of track, buildings, infrastructure (including tunnels) and systems; corrosion. - Damage to connected infrastructure e.g., sub-stations Coastal infrastructure: - Coastal erosion and damage to sea walls. - Rising sea levels threaten infrastructure in 25 cities located along the coastline
Storm surge	- The Philippines is considered as one of the most vulnerable countries in the world to the impact of storm surges with increased wave heights due to climate change. - Metro Manila is ranked as the most vulnerable city in the world, with one study suggesting a potential increase in the population exposed to storm surge as a result of a 10% increase in surge height of 3.4 million.	According to the IPCC (2013), there is high confidence that extremes in sea level will increase with mean sea level rise yet there is low confidence in region-specific projections in storm surges.	Coastal infrastructure: - Structural damage to coastal buildings and infrastructure - Scour or debris impact
Drought and extreme weather events	- Increased number of “hot” days/decreased number of “cold nights” from 1951–2010. - The most significant drought events occurred in 1982–1983, 1986–1987, and 1997–1998, which were associated with El Niño events, but the drought in 1989–1990 occurred during a neutral condition (Hilario et al., 2009).	- Increased frequency of extreme weather events, including days exceeding 35°C, days with less than 2.5 mm of rain, and days exceeding 300 mm of rain. - Water scarcity is classified as high according to the information that is currently available. This means that droughts are expected to occur on average every 5 years.	Water resources: - Drought would cause water shortages and disrupted provision of water supplies - Embankment shrinkage Power and energy: - Movement of overhead line equipment (OLE) due to soil shrinkage around foundations Transport and mobility: - Earthworks failure due to desiccation

2. Country context

Current infrastructure and climate governance assessment

Assessing current arrangements

The climate-related legal, financial and institutional arrangements and climate hazards assessment have been critically reviewed to identify strengths and weaknesses across eight enabling factors for sustainable infrastructure. These eight enablers are based on proposals by the Institute of Civil Engineer's *Enabling Better Infrastructure: 12 Guiding Principles for Prioritising and Planning Infrastructure* report published in 2019 and the OECD's *Climate Resilient Infrastructure: Policy Perspectives* report published in 2018. The eight factors are presented below.



Institutional architecture: Effective cooperation and collective decision-making with climate resilience as a priority between government departments responsible for climate change, infrastructure, planning and finance. Responsibilities are clearly identified, and departments are held accountable.



Legal and regulatory frameworks: Legal and regulatory frameworks for both public and private sector to implement infrastructure projects integrate climate resilience clearly, consistently and informed by the latest available data and science that is adapted to their context.



Policy, planning and strategic environment: Good coordination, political willingness, and policy coherence across administrative boundaries and sectoral priorities. Public policy and strategies consolidate policy goals for low-carbon and resilient infrastructure and inform national spatial development frameworks, infrastructure development plans and city masterplans.



Technology uptake, affordability and private-sector financing: A ‘life cycle’ and ‘total value’ approach is taken from master-planning to operation and maintenance. Life cycle cost approaches consider new technologies. Investments are made to support the industry's capacity to uptake, sustain and afford technologies and share risks with the private sector.



Data and information for decision-making: Data and information are up-to-date, cross-sectoral, accessible and transparent. This includes climate data and science, related assessments and scenarios, demographic and sectoral data on infrastructure needs and drivers.



Stakeholder engagement: Cross-sectoral and multi-level engagement between stakeholders involved in climate change, disaster risk management, broader sustainability, sectors (e.g. transport, water, ICT, etc.) and infrastructure. This includes the public and private sector, academia and civil society. Stakeholders are engaged during project prioritisation and to support data collection, technology uptake and adaptation of regulations and technical guidance.



Human capacity and construction industry uptake capability: There is sufficient human capital with skills for planning and developing infrastructure that is financially viable and informed by climate, geo-environment, and social science. Technical assistance for skills reinforcement is available from academia and professional associations. Government entities can uphold standards and guidelines at all levels. Existing technologies are mastered and there is a plan for the industry to uptake and sustain new technologies.



Financial governance: Financial System Governance Bodies understand and govern climate risks on infrastructure investments. Climate risks are disclosed to enable long-term investment planning and stimulate market confidence. International and domestic mechanisms such as innovative climate bonds and resilience-specific mechanisms are available. Local level budgeting aligns with national, regional and city sustainable infrastructure strategies.

A high-level assessment of the strengths (catalysts) and weaknesses (constraints) in low carbon and climate resilient infrastructure development in the Philippines across the eight enabling factors is provided overleaf. Each factor has been assigned a 1-5 scoring, with 1 being furthest to best practice and 5 being closest to best practice. The scorings assigned are based on the best practice literature review summarised in Section 3 and stakeholder interviews. It should be noted that the scores indicate that factor's overall performance, which comprises a wide range of strengths and weaknesses in subfactors that are elaborated in Section 4.

2. Country context

Current infrastructure and climate governance assessment



Figure 1: Assessment of the enabling framework for low carbon and climate resilient infrastructure development in the Philippines

Figure 1 provides an overview of the current enabling environment for low carbon and climate resilient infrastructure development in the Philippines as compared to best practice. Progress has been made in some areas and further support is required in other areas. Further detail on the existing catalysts and constraints that require addressing are provided in Section 4.

The climate change agenda is a national priority in the Philippines as reflected in the Philippine Development Plan 2017-2022 and National Framework Strategy on Climate Change. The country has been focusing on strengthening the provision of sustainable finance and the national legal and regulatory frameworks for climate change. Some examples include the recent Philippine Sustainable Finance Roadmap, the Climate Change Act and the development of climate smart building standards. Platforms for stakeholder engagement have been formally introduced, notably, the CCC's National

Panel of Technical Experts brings together a group of scientists, economists and other specialists to advise on climate science and green technologies.

While there is a lot of positive activity in this space, there are also areas that could benefit from further support, especially in the areas of institutional architecture, technology uptake, private sector financing, data and information for decision-making and capacity building. More specifically at the strategic level, clarity is required on the sustainable infrastructure governance arrangements. There is also room to improve the quality, accessibility and usability of climate data to shape infrastructure projects. On a more project level, diversified environmental indicators are required to assess project feasibility, among other aspects. Also, while building and infrastructure design codes cover standards for flooding and wind, they do not account for the range of climate risk and how this might change in the future. Interviewees mentioned that even if codes did change, enforcement would remain challenging.

3. International best practice Overview

Approach

A total of 28 documents were reviewed to identify best practices related to low carbon and resilient infrastructure planning and development. Of these, eight were published by a national government (e.g. UK, New Zealand, Australia), eight were prepared by multilateral institutions (e.g. Asian Development Bank, World Bank, OECD), four were from the private sector (e.g. International Coalition for Sustainable Infrastructure, Coalition for Climate Resilient Investment), three were from academia (e.g. Oxford Smith School of Enterprise and the Environment, Grantham Research Institute on Climate Change and the Environment), three from a civil society association (e.g. Institution of Civil Engineers) and two were prepared by public-private organisations (e.g. Green Building Council, FAST-Infra). A list of these documents is provided in the References section.

This review resulted in a long list of 262 mitigation and adaption strategies across 10 key themes. The themes and examples of what each theme includes is provided below:

1. **Laws:** acts, laws, building codes, binding targets
2. **Regulations and standards:** engineering design standards, building and green finance regulations
3. **Strategy:** strategies, policies, high-level approach, short-term and long-term plans
4. **Investment and finance:** investment frameworks, finance mechanisms, government funds, taxonomy
5. **Commercial:** procurement, policy and project appraisal, business case development
6. **Governance:** roles and responsibilities, stakeholder engagement, community-based planning
7. **Measurement:** assessments, evaluation tools, metrics, benchmarking frameworks, reporting, data
8. **Knowledge and awareness:** training, skills development, culture change
9. **Social:** equitable access, co-benefits, resilient communities, social impact
10. **Design:** design approaches and specifications, nature-based solutions, construction materials

A content analysis was then conducted to identify trends and derive insights from the long list of best practices. The analysis looked at the frequency of strategies that emerged within each theme. The most recurring strategies were considered to have greatest consensus globally for implementing those practices.

Frequency graphs highlighting the prevalence of strategies (with larger circles denoting strategies that came up more frequently), a description of the more prevalent strategies and how applicable these strategies are to the Philippine context is provided overleaf. For the purposes of this paper, insights related to ‘Laws’ and ‘Social’ have not been provided with few data points available to derive trends and key features; there were only two strategies categorised under ‘Laws’ and three strategies categorised under ‘Social’ while other themes had between eight and 35 strategies categorised under them.

Summary findings

As a summary of the literature review, the graphs below show the proportion of best practices identified by key themes (10 key themes on the left) as well as climate strategy (mitigation, adaptation, both mitigation and adaptation, and broader sustainability). A graph showing the breakdown of the best practices by climate strategy split by infrastructure typology is provided in Appendix D.

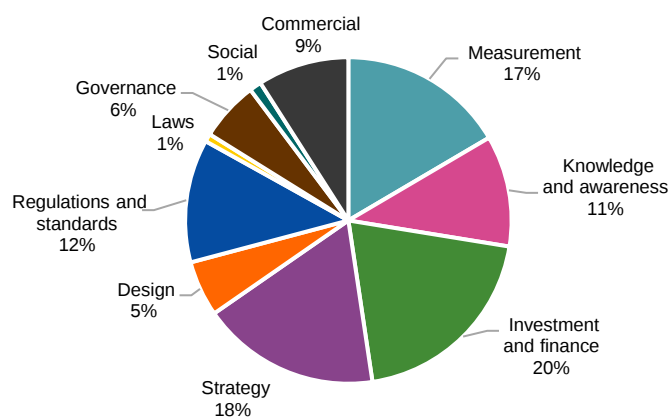


Figure 2: Best practices distributed by key themes

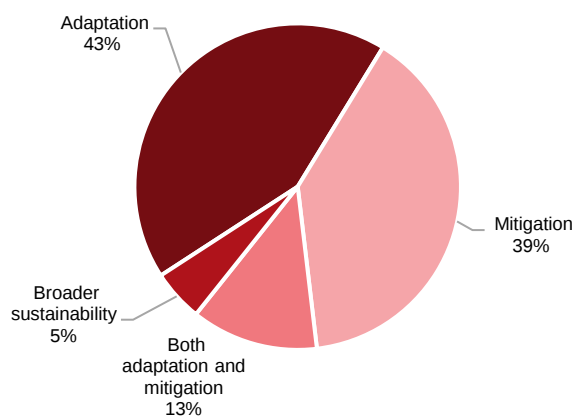
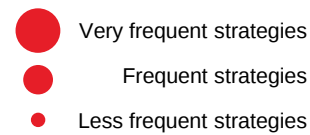


Figure 3: Best practices distributed by climate strategies



3. International best practice

Theme deep dives

Regulations and standards

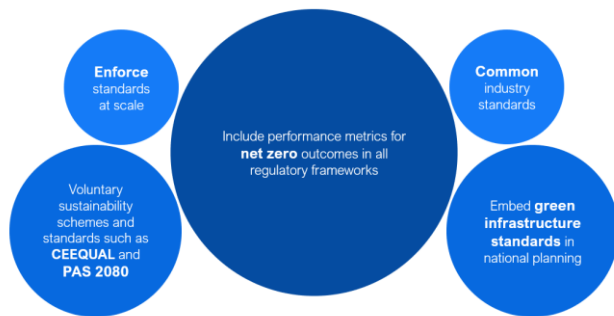


Figure 5: Thematic analysis of strategies categorised under ‘regulations and standards’

There is growing momentum to adhere to voluntary climate standards. For example, the International Union for Conservation of Nature (IUCN) recently launched its Professional Certificate on the IUCN Global Standard for nature-based solutions (NbS). There is also the Building Research Establishment’s CEEQUAL assessment for improving sustainability in civil engineering, infrastructure, landscaping and public works. The voluntary scheme now includes PAS 2080 certification for carbon management in infrastructure as a minimum requirement for a project to receive an ‘outstanding’ rating.

Despite the growing uptake of voluntary standards, it is still met with resistance as early adopters often face commercial and liability implications. This is signaling the need for compulsory standards to accelerate the implementation of the Paris Agreement or to overcome market failures and barriers. For this reason, the UK Green Construction Board recommends including net zero performance metrics in all regulatory frameworks. Similarly, the Institution of Civil Engineers asserts that regulatory models need to be updated to promote net zero. Putting this in practice, the UK Infrastructure and Projects Authority aims to develop a national framework of green infrastructure standards and to embed these standards in national planning policy and guidance within the next few years.

Applicability to the Philippines

- Incentivise private sector to uptake voluntary standards that are common practice in other countries to gain international finance support
- Multilateral and bilateral donors to support countries in adapting international standards to the local context

Strategy

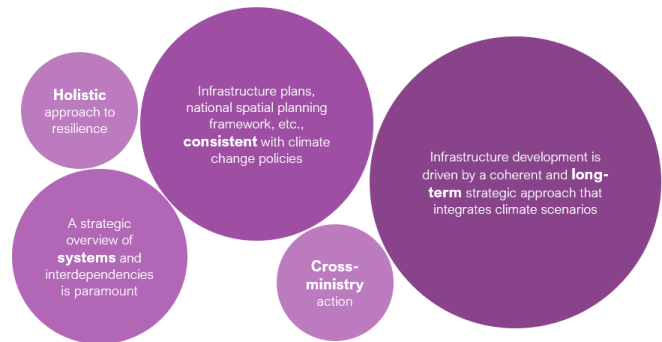


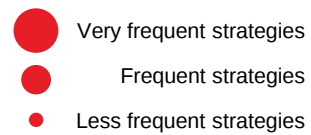
Figure 6: Thematic analysis of strategies categorised under ‘strategy’

Among several key organisations and academic institutions, there is consensus on the need for infrastructure development to be driven by a long-term strategic approach and supported by a consistent policy and strategic environment. The OECD and the Smith School of Enterprise and Environment at the University of Oxford are both of the view that post COVID-19 green recovery policies and investments must be aligned with long-term climate positive outcomes. According to Arup and the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science, it is best practice to have a coherent set of policies and strategies across sectors that considers long-term climate scenarios.

There is also some consensus around the need for a paradigm shift from asset-level to systems thinking to support low-carbon and climate resilient infrastructure. In terms of mitigation, the Institution of Civil Engineers has called on the UK HM Treasury to take a systems thinking approach to the development of its net zero infrastructure plan. This involves looking at the whole system in which infrastructure sits instead of focusing solely on the requirements of a specific sector. In terms of adaptation, World Bank has committed to increase collaboration across sectors and government institutions so that its developing member countries can benefit not only from individual climate-smart projects, but also from systemic resilience and disaster preparedness.

Applicability to the Philippines

- Short-term thinking among administrations remains a challenges but longer term commitments to climate targets may change this



3. International best practice

Theme deep dives

Investment and finance

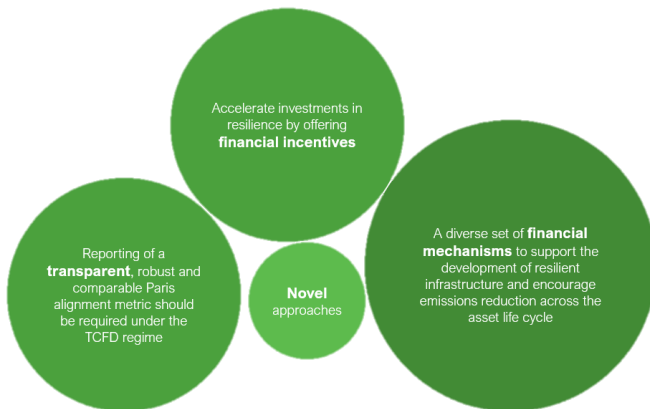


Figure 7: Thematic analysis of strategies categorised under ‘investment and finance’

The financial case for mitigation projects is often clearer than for adaptation projects as they have more direct revenue streams associated with them. For this reason, financing risks and investing in resilient infrastructure effectively is a significant area of interest among all stakeholders involved in infrastructure development. This includes the development and promotion of novel financial incentives and mechanisms. Many of these incentives and mechanisms provide enhanced insurance (e.g. insurance-linked loans, parametric insurance solutions), require better resilience outcomes (e.g. resilience impact bonds, resilience tax credits/loans/grants) and address the risks associated with investments (e.g. national risk pooling facilities, financial risk management products).

Transparency in the measurement, valuation and disclosure of climate risks to better guide financial allocations and investments is important. Climate risks need to be identified with costs appropriately allocated in the CAPEX and OPEX at early stages of projects to demonstrate that investors can generate attractive and secure returns on investment on resilient infrastructure. In New Zealand, reporting on climate-related financial disclosures was recently made a requirement for large financial institutions. The intention is to make the risks known to investors, and to provide information to the market as to how the reporting entity will address the risk, thereby, managing that risk.

Applicability to the Philippines

- Data limitations for monitoring and reporting might affect access to finance
- Government could explore resilience bonds as main issuer in the domestic bond market
- Multilateral banks to link loan repayments to climate considerations in project financial models

Commercial

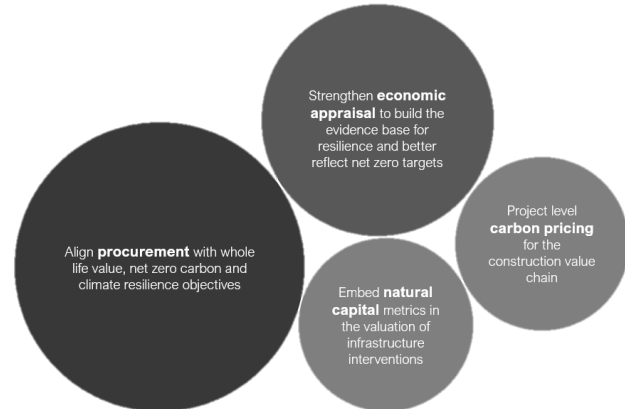


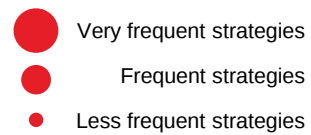
Figure 8: Thematic analysis of strategies categorised under ‘commercial’

There is a growing need for embedding natural capital metrics in the valuation of infrastructure interventions. This not only prioritises land regeneration as an infrastructure outcome but is also a departure from the traditional commercial methods towards more whole-life and net zero centric infrastructure practices. The UK Infrastructure and Projects Authority uses the Natural Capital Committee’s Green Book guidance to embed it into public policy appraisal processes. Additionally, the Environmental Act was recently passed in the UK, which includes a mandatory requirement for new developments in England to provide a 10% biodiversity net gain. Consultations are currently taking place to confirm whether national infrastructure projects should be included under this requirement.

There is a significant opportunity to embed climate resilience and GHG emissions reduction into the procurement process. Doing so ensures that potential projects take climate considerations into account. The UK Green Building Council states that carbon needs to be baked into commercial and contractual solutions thus creating a commercial environment in which innovation can thrive. The International Finance Corporation claims that an integrated carbon pricing mechanism (CPM) for the construction value chain at the project scale has the potential to incentivise carbon management early in the project planning stage with cascading requirements for the wider value chain. Thus, having a significant effect on the infrastructure industry.

Applicability to the Philippines

- Natural capital accounting bill being processed, recognising the country’s megadiverse status
- Carbon market still in early stages so mechanism specific to construction would be challenging



3. International best practice

Theme deep dives

Governance

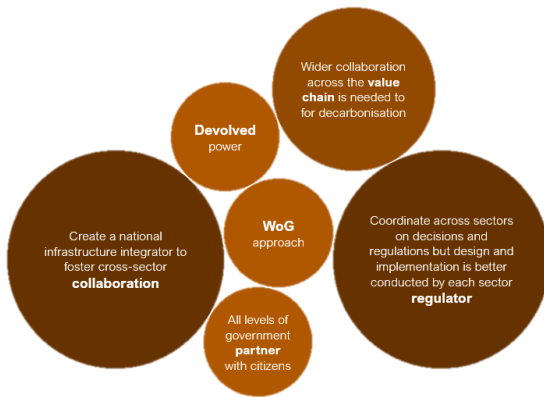


Figure 9: Thematic analysis of strategies categorised under ‘governance’

Governments have a key role to play in low-carbon and climate resilient infrastructure development. There is a consensus among experts that multi-level and cross-sectoral collaboration is key to the development of infrastructure project pipelines that align with national climate objectives. The most common method to ensure a whole-of-government (WoG) approach is to make an existing or new multi-departmental body responsible for exchanging information, coordination, performing assessments and imposing actions.

It is important that the economic opportunities of the net zero transition are well-distributed, which could be the responsibility of an existing multi-departmental body. A new role and entity could be created altogether to help cultivate a systems thinking approach within the infrastructure sector, as recommended by the Green Construction Board. This national infrastructure integrator could be tasked with aligning the infrastructure pipeline with national net zero targets.

In addition to government-wide collaboration, there is an opportunity to engage with the private sector, academia and civil society on decarbonisation and resilience efforts. In New Zealand, for example, the Urban Growth Partnership was created to facilitate collaboration between central government agencies, local government and citizens on spatial planning and climate resilience.

Applicability to the Philippines

- Independent climate coordinators (CCAM-DRR and CCC) established but overlapping mandates
- Vertical and horizontal integration across government, public and private sector is needed for information sharing and strategic planning

Measurement

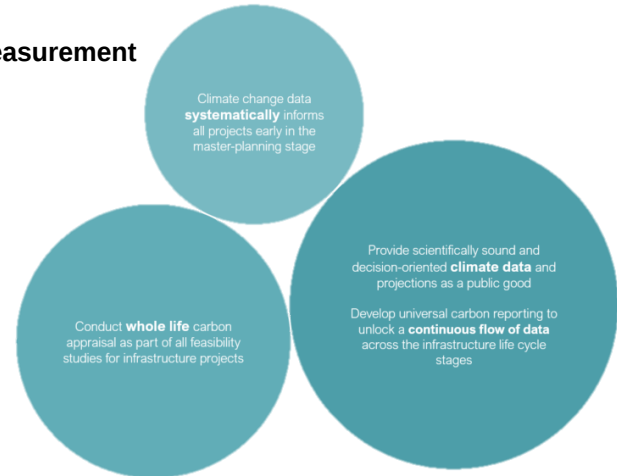


Figure 10: Thematic analysis of strategies categorised under ‘measurement’

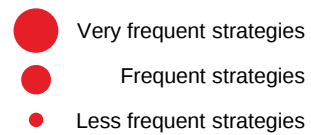
Many assessments and tools have emerged or are under development to support climate-driven infrastructure project pipelines. This ranges from assessments on the current and emerging climate risks facing different infrastructure typologies and measuring whole life carbon, to tools that integrate national risk exposure with investment prioritisation and other tools that measure the alignment of corporate bonds, loans and listed equities with international climate objectives such as the Paris Agreement.

Whole life carbon assessments have gained the most traction over the last decade as a comprehensive way of identifying and ultimately achieving carbon reductions over an asset’s entire life cycle. In view of this, the UK Infrastructure and Projects Authority plans to introduce these assessments for all government infrastructure projects within the next two years. The Institution of Civil Engineers aims to support wide-scale adoption by sharing data collected to facilitate engagement and benchmarking.

Fundamental to this, is easily accessible, readily available, usable and quality data. Initiatives such as the development of open climate databases for all infrastructure actors to access and common data standards to ensure a continuous flow of data along the project life cycle. The data and information derived from these assessments and tools needs to systematically inform projects at the early stages of master-planning.

Applicability to the Philippines

- Infrastructure clients tend to be less interested in lowering embodied carbon but including it as an extension to ESIA’s could institutionalise it



3. International best practice

Theme deep dives

Knowledge and awareness



Figure 11: Thematic analysis of strategies categorised under ‘knowledge and awareness’

An informed workforce can facilitate discourse and innovation that can benefit the infrastructure industry in the short and long-term. The UK Department for Transport aims to put this into practice in the next few years by requiring all staff to undergo carbon literacy training. The OECD also recognises the need for carbon literacy training within industries that require significant decarbonisation, calling on governments and policymakers to provide such support.

Infrastructure actors are increasingly aware of the importance of taking a whole life perspective, through accessible end-to-end guidance is still required to put this into practice and align complex multiple stages and actors in a clear manner. End-to-end guidance can facilitate a golden thread of systems thinking, from policy through to asset management, according to the International Coalition of Sustainable Infrastructure.

Across the infrastructure sector, innovation and best practices also need to be shared at the organisational, supply chain and sectoral levels. Currently in the UK, the Infrastructure Operators Adaptation Forum – a network coordinated by the Environment Agency, Climate Change Committee and National Infrastructure Commission – enables best practice sharing on actions to reduce vulnerability to climate impacts and realise opportunities around interdependencies between infrastructure systems.

Applicability to the Philippines

- Professional associations and civil society groups might be well-placed as some are already leading discussions on climate (e.g. Green Architecture Advocacy Philippines)

Design

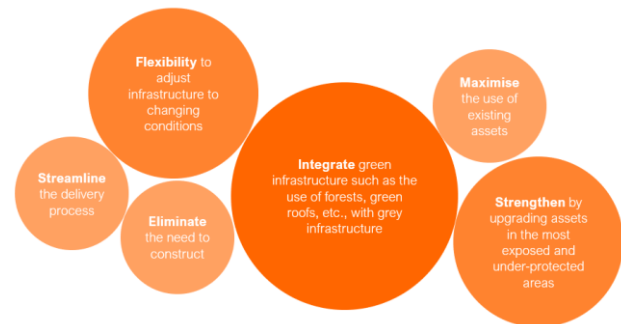


Figure 13: Thematic analysis of strategies categorised under ‘design’

One of the more prominent topics in recent years is the concept of designing with nature. Nature-based solutions (NbS) is now a widely used term and the International Union for Conservation of Nature defines it as ‘actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.’ It is essentially an umbrella concept for ecosystem-related approaches, in which design is a key part of. One example is the use of NbS to reinforce traditional ‘grey’ infrastructure. The Asian Development Bank integrated NbS with conventional flood control infrastructure in a project in China’s Jiangxi province. This helped to increase the space and flow capacity provided to rivers, maintain or rehabilitate wetlands and allow natural and seasonal fluctuations in water levels.

Low-carbon and resilient design features must be considered from earliest stages of physical planning and master-planning, to concept and detailed design and construction. Data and information is acquired, such as through assessments to identify plausible hazards and main sources of emissions, to inform design decisions. Broadly speaking, some of the key design principles include flexibility, robustness and redundancy. Flexible design strategies can allow for future adaptation. Existing infrastructure can be updated to further strengthen its adaptive capacity. Maximising the use of current assets can help to eliminate the need to build new.

Applicability to the Philippines

- Developing local NbS case studies (e.g. River Zone Plan for New Clark City) to signpost how to make the case and influence wider adoption

4. Catalysts, constraints and proposals

Catalysts: 18 key achievements and recent developments

Overview

This section provides further detail on the key catalysts and constraints related to low carbon and climate resilient infrastructure development in the Philippines. The catalysts reflect enablers that the Philippines is excelling in or has recently adopted to drive change; these should be celebrated and built upon. The constraints represent key opportunities for change with proposals developed for each constraints.

Catalysts

From the review, there are already 18 noteworthy climate-related achievements in the Philippines, which are described below and are akin to the best practices laid out in Section 3.



Institutional architecture

1. **CCAM-DRR was established in 2011 as a platform to align and complement programmes,** activities and projects for delivering the national vision on climate change mitigation and adaptation. According to the United Nations Framework Convention on Climate Change in the *Institutional Arrangements for National Adaptation Planning and Implementation*, integration is needed to enhance climate action. One of the possible institutional measures to enhance the effectiveness of integration is to set up a central coordinating body.



Legal and regulatory framework

2. **The Climate Change Act, enacted in 2009, sets the mandate to mainstream climate change** into government policy formulations, and to establish the CCC as the lead policy-making body. According to GLOBE International and the Grantham Research Institute on Climate Change and the Environment, the passing of flagship legislation marks a step change in a country's approach to climate change. It serves as a comprehensive, unifying basis for climate change policy.
3. **Climate-Smart Buildings standards are being developed** by CCC in partnership with the United Nations Development Programme. These standards will be used as inputs to DPWH's Philippine Green Building Code. This is similar to an ongoing project led by the New Zealand Ministry of Business, Innovation and Employment to review evidence on how building regulations could support the country's climate change objectives.



Policy, planning and strategic environment

4. **Minimum Energy Performance (MEP) standards are mandated** by the Department of Energy, requiring compliance from private sector and energy service companies. According to the International Energy Agency, improving the minimum level of building energy efficiency has been demonstrated to be a cost-effective policy tool to reduce GHG emissions.
5. **A substitute bill for a 30-year National Infrastructure Programme** has been approved by the House Committee of Public Works and Highways to ensure continuity in infrastructure development over the next 30 years despite changes in administrations to minimise disruptions.
6. **Climate change is a national priority and there are well-established policy frameworks** supporting the agenda including the National Framework Strategy on Climate Change and the National Climate Risk Management Framework. In the World Bank's *Reference Guide to Climate Change Framework Legislation* report, national framework legislation is required to establish effective institutional arrangements, enshrine stable and ambitious targets, create mechanisms for realising such targets and to ensure oversight.
7. **The Philippine Development Plan 2017-2022 and Results Matrices are grounded in the UN SDGs.** The plan serves as the main implementation mechanism of the SDGs and the 17 goals are integrated across the Plan. In the *Enabling Better Infrastructure* report, the Institution of Civil Engineers recommends that a national vision include UN SDG-related objectives as these provide a good baseline for articulating wider goals.
8. **Public sector alignment with the Paris Agreement.** DOE recently announced a moratorium on endorsements for greenfield coal-powered plants in favour of natural gas and renewable energy projects. In *Aligning Finance with the Paris Agreement*, J. Rydge of the Grantham Research Institute on Climate Change and the Environment states Paris Agreement alignment will likely mean an end to financing coal activities.
9. **Public transport system modernisation roll-out nationwide.** The DOTr is spearheading the Public Utility Vehicle Modernisation Programme, including replacing traditional polluting jeepneys with cleaner vehicle technologies and rail system developments. Upgrading mass transit systems could substantially reduce carbon emission considering transport represents 34% of GHG emissions nationwide.

4. Catalysts, constraints and proposals

Catalysts: 18 key achievements and recent developments



Technology uptake, affordability and private sector financing

10. Philippine Construction Industry Roadmap 2020-2030 includes technology incentives. DTI plans to provide fiscal incentives to construction companies employing low-carbon and zero-carbon technologies in construction. In the *Policies for Scaling Up Low-Emission and Resilient Investment* report published by the OECD, specific investment incentives to promote GHG emissions in the infrastructure sector can help to address market barriers such as split incentives, asymmetric information and innovation dependence.

11. Industry framework for e-mobility through the Electric Vehicle Industry Act, sets out mandates and supporting incentives to grow the electric vehicle (EV) market, develop charging infrastructure, and develop the local industry. E-mobility forms a key part of the NDC transport programme. According to OECD, investment in EVs is a key opportunity for recovery packages.



Data and information for decision-making

12. Climate change expenditure tagging is used to identify and track climate investments as part of the annual budget. The data and information it generates is used for assessing trends, tracking budget execution and monitoring the performance of climate programmes, activities and projects. This is one of the proposed tools for integrating climate change policy into budget preparation and approval processes and accountability, according to the United Nations Development Programme.

13. Development of centralised climate data and information platforms. One example is GeoRisk Philippines, a multi-agency initiative funded by DOST to develop a national exposure database system, consolidate public data required to conduct risk assessments, develop data standards and guidelines and produce map products. Another example is the Oscar M. Lopez Center, which is a civil society initiative that disseminates the latest science-based climate adaptation and disaster risk management information to aid policy makers, local government units (LGUs) and other stakeholders in decision-making processes. The need for accessible climate change databases to inform decision-making is proposed by the Coalition for Climate Resilient Investment in the *Addressing Physical Climate Risks in Infrastructure Investment* report and by the World Bank in *Lifelines: The Resilient Infrastructure Opportunity*.



Stakeholder engagement

14. National Panel of Technical Experts includes scientists, engineers, economists, doctors, etc. A group of 16 members were recently appointed by the CCC to advise on climate science and green technologies, among other topics. Stakeholder engagement is an integral part of the Climate Investment Fund's work. Similarly in the UK, an extensive team of experts and specialists across climate, business, economics, etc., were brought together to form the Climate Assembly, to make the best possible evidence available to policymakers.



Human capacity and construction industry uptake capability

15. PSA is providing training on natural capital accounting to national government entities. In collaboration with the United Nations Statistics Division, the Environmental-Economic Accounting for Evidence-Based Policy in the Philippines seeks to remove technical and institutional barriers to the compilation of national natural capital accounts. Wealth Accounting and Valuation of Ecosystem Services (WAVES) considers capacity building and demonstrating the benefits to policymakers as the main challenges. WAVES supports countries in implementing natural capital accounting, notably through providing guidance and capacity building.

4. Catalysts, constraints and proposals

Catalysts: 18 key achievements and recent developments



Financial governance

- 16. Landbank and DBP have joined the UN's Green Climate Fund (GCF)**, joining 112 other accredited entities able to provide Paris Agreement aligned financial support. Two state-owned financial institutions in the Philippines, in effect, now have direct access to GCF finance. This will likely support increasing adaptation finance to the local level and raising the sustainability standard of the wider financial industry with regards to the policies, procedures and systems of other local financial institutions, according to the World Resources Institute.
- 17. BSP is tightening requirements for banks to assess and disclose their climate-related risks.** BSP will publish more detailed requirements on the integration of climate-related risks in banks' credit and operational risk management frameworks, which will complement its existing Sustainable Finance Framework on climate-related disclosure. The Framework is loosely based on the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFDs), which is likely to make reporting more consistent with the global standard.
- 18. Appropriate carbon pricing instruments (CPI) for the Philippines are being studied** by DOF and World Bank. A CPI suitable for domestic implementation has been developed, though public and private sector engagement and legislation is likely needed to promote buy-in for implementation. A variety of CPIs can be applied to the construction value chain including but not limited to internal carbon price, emissions reduction credit scheme, hybrid, carbon tax, command and control. This has the potential to incentivise carbon management during the earliest stages of project planning, which could lead to a cascade effect on emissions across the entire value chain, according to the International Finance Corporation in the *Greening Construction: The Role of Carbon Pricing* report.

4. Catalysts, constraints and proposals

Overview

Constraints and proposals

A gap analysis of the current infrastructure and climate governance arrangements against best practice climate strategies for infrastructure point to eight main areas of further work in the Philippines. For each area, the current constraint and proposals to address it are provided. Five constraints are at the strategic level (regulations, standards, strategies, policies, project and programme selection, budgeting) while three constraints are at the project level (feasibility, physical planning, concept design, detailed design etc.).

A group of individuals from four government agencies were consulted to validate the constraints and proposals and to identify the main opportunities for FCDO. This was the National Economic and Development Authority (NEDA), Department of Finance (DOF), Department of Transportation (DOTr) and Department of Public Works and Highways (DPWH). Overall, there was consensus that this section captured the critical constraints facing these government agencies and it includes useful information on how, when and who could address it.



4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Constraint 1: Limited ownership and mechanisms to enforce shared responsibility for sustainable infrastructure

Climate change is a national priority for the Philippine Government and as such, there are well-established legislative and policy frameworks supporting the agenda. Notably, the Climate Change Act, National Framework Strategy on Climate Change and the National Climate Risk Management Framework are the key frameworks for systematically integrating climate change in policy formulation, national planning and investment programming.

The Climate Change Act mandated the establishment of the Climate Change Commission (CCC), an autonomous policy-making body for coordinating, monitoring and evaluating government programmes and action plans relating to climate change. The CCC plays a coordinating role ensuring that climate change is mainstreamed into development plans at all levels and recommending investments in climate-sensitive sectors, including infrastructure. The CCC has the mandate to guide implementing agencies, but there are limited mechanisms available to encourage agencies to prioritise climate measures. Furthermore, the CCC does not have the regulatory power to correct implementing agencies if actions are not taken.

The Cabinet Cluster on Climate Change Adaptation, Mitigation and Disaster Risk Reduction (CCAM-DRR) also plays a key role. It is chaired by the Department of Environment and Natural Resources (DENR) and consists of executive departments that convene to develop and integrate programmes on climate risk management and disaster risk reduction. NEDA, DBM, DPWH and DOF form part of the Cluster, though some key departments for infrastructure development are not present such as the Department of Transportation (DOTr), Bases Conversion and Development Authority (BCDA) and Department of Human Settlements and Urban Development (DHSUD).

Like the CCC, the CCAM-DRR has a coordinating function. While the CCC and CCAM-DRR share a vision for sustainable infrastructure, it is less clear who owns it. Section 5 of Executive Order. 24, s. 2017 lays out that the role of the CCAM-DRR is to ‘lead effective integration of policies and programmes on climate risk management, disaster risk reduction and sustainable development’. Section 4 of the Climate Change Act of 2009 similarly mandates the CCC ‘to coordinate, monitor and evaluate the programmes and action plans relating to climate change’.

During consultations, NEDA shared that policies remain siloed still. The limited effectiveness of these bodies in harmonising could be due to overlapping mandates. To conclude, the building blocks for the climate change agenda are in place in the Philippines. It has been identified as a national priority and a good policy environment has been created. However, overlapping mandates and minimal mechanisms available limits the ability of key coordinating bodies to effectively align, coordinate and hold implementing agencies accountable for sustainable infrastructure development.

Proposal 1: Improve strategic alignment, oversight, accountability and coordination

What: There is an opportunity to improve strategic alignment, oversight, accountability and coordination across oversight agencies and implementing agencies that are responsible for infrastructure planning, land use planning, climate risk and carbon management across the infrastructure life cycle.

How:

 **Institutional architecture** Clarify strategic oversight and coordination functions of the CCC and CCAM-DRR. Clearly define roles and allocate responsibilities to key infrastructure and sectoral agencies. Include key infrastructure entities in the CCAM-DRR including DOTr, BCDA and DHSUD.

Who: Office of the President

 **Policy, planning and strategic environment** Consolidate policy goals for the low-carbon transition and climate resilience across the Nationally Determined Contribution, National and Local Climate Change Action Plans, National Disaster Risk Reduction and Management Plan, National Physical Framework Plan, Comprehensive Land Use Plan, Philippine Development Plan, regional and city masterplans. This proposal was also identified by the Oscar M. Lopez Centre to be led by DENR, the chair of CCAM-DRR, in a study on “Implication of Intergovernmental Panel on Climate Change’s Special Report on Global Warming of 1.5°C to Plans and Programs of the DENR”.

Who: CCAM-DRR (lead), CCC

 **Policy, planning and strategic environment** Consolidating policy goals might be difficult to achieve in practice. An alternative proposal would be to create a policy that cross-references existing strategies, policies and plans. While elements of policy consolidation can be seen in the CCAM-DRR’s Performance and Projects Roadmap 2018-2022 as it cites the PDP and National Strategic Framework on Climate Change, the CCC is likely best placed to carry out this proposal as it is the main policy-making body on climate change.

Who: CCC (lead), CCAM-DRR

4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Constraint 2: Limited mechanisms to implement a systems approach to resilient infrastructure

Globally, a paradigm shift in the traditional approach to resilience is needed given the many interactions and interdependencies that exist across sectors to form the overall system (see Figure 11). One of the main shortcomings of the sector and asset-driven approach is that it does not consider cascading risks that arise as each asset has a role to play within the broader system. In the event of a typhoon, for example, any disruptions to energy will typically affect transport provision as these are interdependent urban systems.

A new approach would be to promote the development of infrastructure that is both resilient and delivers resilience outcomes across sectors and systems. This means that project pipelines are informed by overarching climate resilience policy guidance, and strategic decisions can be taken on a system of infrastructure. The benefit of this approach is that it acknowledges disruptions and seeks to minimise their impact on the overall system performance of a country.

The Philippine Government recognises the interdependencies of planning resilience measures across sectors, though there is a need for mechanisms to implement this new approach. Elements of systems thinking is reflected in the National Climate Change Action Plan (NCCAP) 2011-2028, the Eco-Town Framework and the Risk Resiliency Programme. For example, the Eco-Town Framework was formed to guide the integrated development of projects towards a resilient community and economy. Another example includes the Risk Resiliency Programme that was created to improve the resilience of the country's natural systems, urban built environment and communities.

The current process for identifying, prioritising and budgeting for major infrastructure projects might not support a systems approach as it is done at a sector level and it does not consider climate risk. Currently, government agencies each submit a list of priority programmes and projects for inclusion in the Public Investment Programme, a key programming document. These lists are evaluated against three main criteria, one of which is consistency with the goals and targets of the Philippine Development Plan (PDP). In addition to the PDP, all agencies are expected to consider other inputs such as the National Spatial Strategy, Harmonised Gender and Development Guidelines, among others. However, there is no mention of a national climate risk assessment.

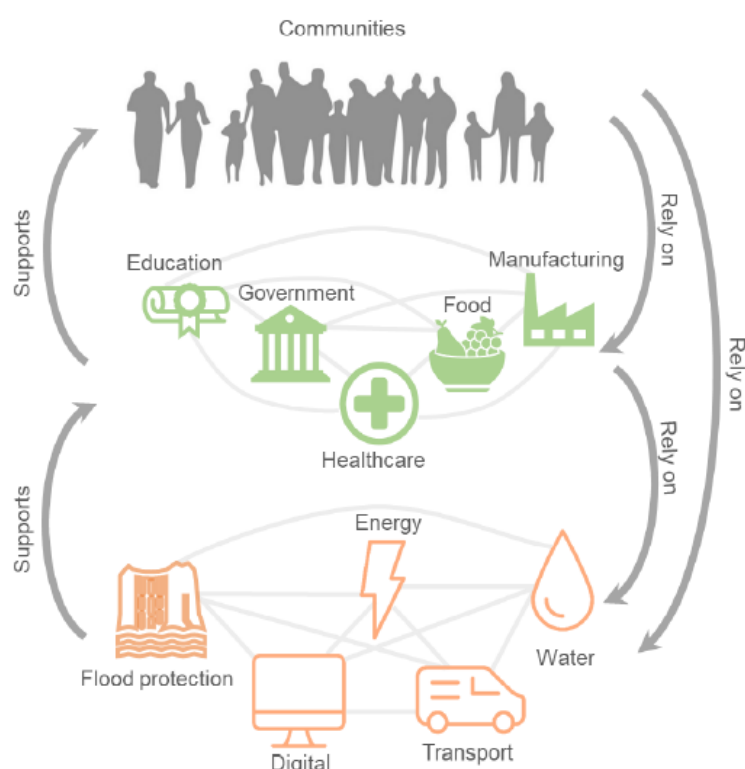


Figure 14: Infrastructure and community interaction and support (source: Arup, 2020)

4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Proposal 2: Develop a strategic pipeline of infrastructure projects that is climate risk driven

Taking a programmatic approach where projects are not managed separately with separate objectives but rather their interactions and contribution towards common objectives is considered together to create a pipeline of climate resilience infrastructure projects informed by an overarching national risk assessment.

How:

-  **Policy, planning and strategic environment** Adopt place-based (or regional) planning and approaches that look at the broader system of land use, the infrastructure network and assets, and the community. This can help to achieve resilience outcomes in ways that sector and asset-driven planning cannot.

Who: NEDA (lead), DPWH, DOTr, DOE, DA, DOT

-  **Policy, planning and strategic environment** Overlay a draft pipeline of ‘Build Build Build’ infrastructure projects with a climate risk assessment that covers an appropriate time horizon and different climate scenarios. A comparison of the two can be used to revise the pipeline so that climate risks are systematically and consistently accounted for in the infrastructure pipeline. This could be similar to the Systemic Resilience Assessment Tool developed by Oxford University’s OPSIS research group for Jamaica. The approach could be mainstreamed by NEDA’s Investment Coordination Committee.

Who: NEDA (lead), DPWH, DOTr

-  **Data & information for decision-making** Climate risk is considered ahead of infrastructure needs. It is recommended to conduct a national climate risk assessment, separate to local climate risk assessments, to support national strategic decision making and align priorities on climate resilient infrastructure as government agencies would work off one climate risk assessment instead of several.

Who: DOST

-  **Data & information for decision-making** Conduct criticality analyses and interdependency assessments to identify the cascading effects of climate risks in connected and interdependent infrastructure systems. These analyses involve simulating disruptions in a network and modelling loss of functionality of the entire system. Input-output disruption assessments could be undertaken to determine risk interdependencies across sectors. In this way, resilience of infrastructure services and networks are considered. This could be similar to the NISMOD developed by the UK Infrastructure Transitions Research Consortium.

Who: DOST (lead), NEDA, DPWH, DOTr, DOE, DA, DOT, academia

4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Constraint 3: Quality, accessibility, usability of data remains limited

As previously mentioned in Section 2, the Philippines has worked to develop data and information on climate change, especially for adaptation and disaster risk management. Expert interviews suggest that while climate data to support decision-making is increasingly available, the quality, accessibility and usability of such data remains limited.

Firstly, there is limited consistency in data gathering and organising methods used across government, which affects the quality and usability of data. For example, the Implementation Oversight Division of the CCC has faced data limitations in the creation of its national GHG inventory. This includes missing activity datasets, inconsistent data collection, processing and/or management approaches, and limited alignment of activity data with best practice methodology (e.g. Intergovernmental Panel on Climate Change’s Guidelines on National Greenhouse Gas Inventories).

Secondly, the accessibility and usability of data to inform decision-making and planning processes is limited by the lack of vertical data sharing (and horizontally for other types of planning) within government. The CCC has reported that there are limited data sharing arrangements within government and with the private sector for GHG accounting. LGUs are not systematically passing data on local vulnerabilities up to the national government so that these can be factored into national planning, according to the OECD in *Common Ground Between the Paris Agreement and the Sendai Framework*.

While LGUs are not sufficiently passing information up, data consolidation efforts by national government is equally needed. Major steps towards consolidated climate data and information have been taken, notably with the establishment of the CCC’s National Integrated Climate Change Database Information and Exchange System in 2018. However, it is limited to the national and local GHG inventories and climate investments as well as sectoral, national and local mitigation and adaptation priorities.

Proposal 3: Adopt monitoring, reporting and verification practices on climate and asset data

Decision-makers need better quality, accessible and usable data in order to coordinate actions and make informed decisions. Further research is needed to identify the most effective interventions but broadly, there is an opportunity to support monitoring, reporting and verification of GHG emissions, climate risk and asset performance.

How:

 **Legal and regulatory framework** Increase adoption of common data standards laid out in the Philippine eGovernment Interoperability Framework (PeGIF) to create consistency in data gathering and organising methods employed across government levels.

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Who: DICT

 **Institutional architecture** Increase coordination between LGUs and national government on climate data and asset performance by strengthening any existing coordination structures.

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Who: CCC (lead), PSA, RDCs, LGUs

 **Data & information for decision-making** Develop climate vulnerability maps plotting socioeconomic impacts of climate risks to highlight the urgency of climate-resilient infrastructure investments.

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Who: DOST

 **Human capacity and construction industry uptake capability** Upskill the construction industry on the use of climate data and information through national level training or professional associations.

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Who: DOST

 **Technology uptake, affordability and private sector financing** Use digital twin technology to create a central and consolidated repository on assets. Digital twins are real-time virtual models of physical assets, which allows for dynamic and adaptive modelling of climate impacts on infrastructure. It also allows for automated and intelligent identification of deterioration and damage to assets.

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Who: DOST, DTI, private sector

4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Constraint 4: GHG emissions reduction targets for key sectors have yet to be updated and supporting mechanisms are limited

The Philippines' latest Nationally Determined Contribution (NDC) in 2021 sets a GHG emissions reduction and avoidance target of 75%. Of this, 72.29% is conditional to international support, while 2.71% is achievable using nationally mobilised resources. The NDC accounts for all sectoral contributions, which are each based on detailed background studies. In the latest NDC, however, not all sectors have updated their analyses and GHG emission reduction contributions to reflect new programmes and developments in industry. For example, the latest NDC does not refer to sectoral developments or upcoming masterplans in transport and energy such as the Public Utility Vehicle Modernisation Programme and the E-Mobility Masterplan, respectively.

Through the NDC Partnership, the CCC and NEDA aim to align the NDC commitments with the national planning and policy frameworks including the Philippine Development Plan (PDP) 2017-2022. The GHG emissions for various sectors has been included in the PDP's monitoring and evaluation system, otherwise known as the Results Matrices. However, sectoral targets are not published.

Proposal 4: Clarify long-term vision for mitigation so that industry can plan accordingly

Building on recent developments in the Philippines, such as the institutionalisation of reporting GHG inventories and the development of a domestic carbon pricing instrument (CPI), the following interventions are recommended.

How:

Policy, planning and strategic environment Establish a long-term vision for carbon pricing so that the market can plan accordingly. As the country looks to implement a domestic CPI, businesses need clarity on how carbon prices might evolve over time and at what point it targets in the infrastructure life cycle.

Who: DOF (lead), NEDA

Policy, planning and strategic environment Update sectoral GHG emission reduction targets to inform carbon budgets for maximum GHG emissions generation that each sector should aim for. It is important that these top-down targets are specific and achievable based on the expected impact of the climate mitigation projects from these departments.

Who: CCC (lead), DOE, DOTr, DA, DENR, DPWH

Legal and regulatory framework Strengthen NDC compliance by making it a key factor in the evaluation of projects as part of the Public Investment Programme.

Who: NEDA

Human capacity and construction industry uptake capability Signpost the green financing mechanisms available to different government agencies to give them confidence in developing more ambitious GHG reduction trajectories.

Who: BSP (lead), DOF, CCC, NEDA

Data & information for decision-making Establish annual sectoral GHG emissions reporting requirements and consolidate the data in a national database such as the National Integrated Climate Change Database and Information Exchange System.

Who: CCC

4. Catalysts, constraints and proposals

Constraints and proposals: strategic level

Constraint 5: Competing priorities for government funding

The Philippine Government recognises the need to mobilise domestic funding for climate action, allocating 4% of the National Government Budget in 2021 for climate change-tagged programmes. This amounts to around PHP 181.9 billion (GBP 2.6 billion). It is promising that a greater budget for climate actions in 2022 has been proposed, amounting to around PHP 284 billion (GBP 4.1 billion). However, the budget allocated for climate programmes is limited as it competes with a wide-range of other national priorities. Climate action could take a further backseat to economic recovery, particularly in view of the post-COVID-19 economic outlook and amidst the Government’s fiscal constraints.

The Government sets its NDC largely conditional to international support. This signifies that the country has rationalised its resources and considering local economic realities, intends to pursue climate action mainly through multilateral cooperation with developed countries. The PPP Center emphasised the importance of private sector participation in unlocking sources of finance for infrastructure projects during consultations. However, more could be done to nudge private partners towards green financing mechanisms and green technologies to be incorporated on projects.

Proposal 5: Capitalise on co-benefits of climate actions to access support

In a discussion with NEDA, it was revealed that the Government requires support in determining what to allocate finance towards. Support could be provided to identify the opportunities with the greatest co-benefits. A key co-benefit of climate action is energy security. This translates to significant economic benefits, which is largely significant for the Philippines as a net energy importing country and may therefore be leveraged to access larger financing streams. A co-benefits approach to climate action could also deliver green economic growth and green job creation.

How:



Policy, planning and strategic environment Develop a framework of co-benefits that can be used to evaluate and prioritise infrastructure projects as part of the Public Investment Programme at the infrastructure planning stage.

Who: NEDA



Legal and regulatory framework The Energy Efficiency and Conservation Act in 2019 supports energy resilience as a climate co-benefit as it mandates the private sector to comply with energy efficiency targets. Mechanisms to enforce, monitor and evaluate the Energy Efficiency and Conservation Act need to be established.

Who: DOE



Data & information for decision-making Establish data requirements and methodologies to quantify and monetise energy consumption reduction impacts of infrastructure investments, which provides stronger supporting justification for financial support.

Who: DOE (lead), NEDA

4. Catalysts, constraints and proposals

Constraints and proposals: project level

Constraint 6: Climate-related financial risks are not considered or allocated during project appraisal

As previously elaborated, it is important to consider resilience at the programme level rather than just asset level. However, climate risk at the project level will remain and it requires managing. A key component of the project appraisal process is to assess whether all risks relevant to the project’s financial viability have been appropriately considered and allocated with risk management strategies developed. As a new type of investment risk, climate risk management requires innovative solutions.

DOF, DBM and NEDA jointly released the National Asset Management Plan (NAMP) 2022-2023, which prioritises climate risk considerations. Assessing climate risk exposure of major assets and proposing adaptation plans was identified as a policy priority to strengthen financial resilience to climate risks. By doing so, cost savings could be achieved as the quality of cost-benefit analysis and the evaluation of investment proposals could be enhanced, leading to more competitive risk premiums and interest rates demanded by creditors for lending.

The central bank of the Philippines, Bangko Sentral ng Pilipinas (BSP), has been working to increase transparency around risk ownership, mitigation and valuation. In compliance with BSP’s Sustainable Finance Framework, all commercial banks must embed environmental risk considerations in their corporate governance framework, risk management systems and strategic objectives. BSP is also developing climate stress testing exercises for banks.

In summary, various government entities have taken steps to account for climate risk in investment portfolios including investments on assets and on an asset-by-asset basis. NEDA is currently consulting with the ADB and OECD on project appraisal more generally and with the World Bank on specifically embedding climate change in the appraisal process. However, pricing climate risk will remain a challenge as there is a lack of tools globally.

Proposal 6: Integrate climate risks into project appraisal and promote strategies to improve climate risk management

In the best-case scenario, all stakeholders fully consider climate risks in the allocation of risks in projects. Construction clients – public or private – estimate climate risk-adjusted costs that would be incurred in delivering the project under different financing options.

How:

 **Financial governance** Contextualise the upcoming Physical Climate Risk Assessment Methodology (PCRAM) developed by the Coalition for Climate Resilient Investment once it is published in early 2022. The methodology includes the pricing of impacts on the asset’s performance indicators. Ensure that the methodology is adopted by the private sector when developing project cash flow models. Specifically for PPP projects, there is an opportunity to include the identification, sharing and mitigation of climate risks as a key component in the Generic Preferred Risks Allocation Matrix. It is due for an update.

Who: DOF (lead), NEDA, ICC, private sector

 **Stakeholder engagement** As the vetting authority, NEDA is looking at how peer-organisations utilise project appraisal frameworks that consider climate risk. However, they believe further cross discussions are required to refine existing project appraisal mechanisms towards best practice.

Who: NEDA

4. Catalysts, constraints and proposals

Constraints and proposals: project level

Constraint 7: Environmental indicators are not sufficiently incorporated into project feasibility

There is an awareness within government agencies of the need to quantify environmental impact as part of project economic and financial feasibility studies. In discussion with NEDA, this is increasingly being requested by project partners. While the Philippine Environmental and Social Impact Assessment (ESIA) requires technical consultants carrying out these assessments to consider a range of parameters from air and water to noise and biodiversity, only GHG savings and air quality improvements are currently monetised.

In the Philippine Construction Industry Roadmap 2020-2030, the Department of Trade and Industry (DTI) identified that there is a need for comprehensive assessment tools for infrastructure development and for the preservation of the environment.

This constraint goes hand-in-hand with the challenge that the country faces to quantify the economic benefits for implementing nature-based solutions as natural capital accounts are yet to be created. Progress to legislate the Philippine Ecosystem and Natural Capital Accounting System (PENCAS) that will institutionalise natural capital accounting is underway.

Minimal guidance from the government on economic analyses of projects could explain why environmental factors tend to be sidelined. In the absence of guidance documents, some project stakeholders rely on those provided by the ADB (e.g. *Guidelines for the Economic Analysis of Projects*) and the UK Government (e.g. *HM Treasury Green Book*), though these are not consistently referred to.

Proposal 7: Internalise and externalise costs of a wider range of environmental impacts during project feasibility

Environmental parameters that go beyond the ones currently covered in project feasibility are needed to evaluate projects that incorporate nature-based solutions and green technologies.

How:

Legal and regulatory framework Support the institutionalisation of other assessment tools that are more comprehensive to GHG emissions such as whole life carbon assessments.

Who: DENR

Human capacity and construction industry uptake capability Similar to the UK *Department for Environment Food and Rural Affairs Enabling a Natural Capital Approach*, develop guidance on conducting natural capital assessments and elaborate on how to apply it to economic analyses.

Who: DENR (co-lead), NEDA (co-lead)

Stakeholder engagement Creation of natural capital accounts will require a platform for policy-makers, academics and other technical experts to exchange knowledge, insights and lessons learnt from past experiences. Effective modes of collaboration are needed to strengthen accounting methodologies, identify data gaps and other concerns.

Who: Task Force on Natural Capital Accounts (lead), academia

Data & information for decision-making Establish a post-implementation review process to validate that the environmental benefits and costs determined during the project feasibility stage were accurate. A platform for sharing lessons learnt should also be created to ensure continuous improvement to projects.

Who: Infrastructure funders and financiers

4. Catalysts, constraints and proposals

Constraints and proposals: project level

Constraint 8: Operating expenditure budgets do not adequately account for potential climate impacts

Interviews with Arup experts suggest that while infrastructure operations and maintenance (O&M) is considered during project development in the Philippines, the focus is still on capital investment. Adequate budgeting and financing is needed to incorporate climate resilience into the O&M of infrastructure, beyond traditional approaches across inspections, maintenance, day-to-day operations and disaster response to address climate impacts. Additional inspection, maintenance and emergency management costs are likely needed to address future climate change impacts. While responses to climate risk assessments are made during the design phase under CAPEX budgets, OPEX budgets typically remain unchanged.

When government agencies are the asset manager, they often have insufficient O&M budgets as capital programmes are perceived to bring in the votes making it challenging to transfer cash flows from CAPEX to OPEX.

Proposal 8: Adopt a whole-life cost approach to climate resilient infrastructure

Climate change highlights the importance of maintaining infrastructure in good condition to reduce the likelihood of failures and to prevent premature deterioration triggered by climate impacts. Quantifying the financial effects of climate change can help to make the case for a whole life cost approach to resilience.

How:

Data & information for decision-making An effective O&M strategy must adequately plan for net negative climate impacts – both technically and financially. Incorporate climate impacts into asset performance models to generate a better estimate of deterioration, which then gets incorporated into design strategies and life cycle costing.

Who: DBM (lead), DBCC, DPWH, DOTr, DENR

Technology uptake, affordability and private sector financing Investment strategies are increasingly targeting the transformation from CAPEX to OPEX based business models to support the uptake of green technologies. There are an increasing amount of funds (e.g. Green Climate Fund's Green Growth Equity Fund) that seek agile OPEX models to meet investment eligibility criteria. Adopting this new financial strategy planning can support construction clients gain access to new financing options. Converting large upfront green technology investments into a smaller ongoing operating expense can bring about financial benefits. As per the time value of money concept, outgoings in the future compared to today lead to a higher net present value or internal rate of return on projects.

Who: DOF

5. Roadmap of the proposals

Summary of the proposals by timeframe and level of effort

Table 3: Summary of the proposals to address the constraints by timeframe and level of effort

Timeframe	Level of effort	Proposals
S		 Clarify strategic oversight and coordination functions of the CCC and CCAM-DRR. Clearly define roles and allocate responsibilities to key infrastructure and sectoral agencies. Include key infrastructure entities in the CCAM-DRR including DOTr and BCDA.  Consolidating policy goals might be difficult to achieve in practice so an alternative proposal would be to formulate a policy that cross-references these strategies, policies and plans.  Increase coordination between LGUs and national government on climate data and asset performance by strengthening any existing coordination structures.  Develop a framework of co-benefits that can be used to evaluate and prioritise infrastructure projects as part of the Public Investment Programme at the infrastructure planning stage.  Establish a post-implementation review process to validate that the environmental benefits and costs determined during the project feasibility stage were accurate. A platform for sharing lessons learnt should also be created to ensure continuous improvement to projects.
S		 Consolidate policy goals for the low-carbon transition and climate resilience across the Nationally Determined Contribution, National and Local Climate Change Action Plans, National Disaster Risk Reduction and Management Plan, National Physical Framework Plan, Philippine Development Plan, regional and city masterplans.  Increase adoption of common data standards laid out in the Philippine eGovernment Interoperability Framework (PeGIF) to create consistency in data gathering and organising methods employed across government levels.  Upskill the construction industry on the use of climate data and information through national level training or professional associations.  Update sectoral GHG emission reduction targets to inform carbon budgets for maximum GHG emissions generation that each sector should aim for.  Strengthen NDC compliance by making it a key factor in the evaluation of projects as part of the Three-Year Rolling Infrastructure Programme.  Establish data requirements and methodologies to quantify and monetise energy consumption reduction impacts of infrastructure investments, which provides stronger supporting justification for financial support.  Establish annual sectoral GHG emissions reporting requirements and consolidate the data in the national database such as the National Integrated Climate Change Database and Information Exchange System.  As the vetting authority, NEDA is looking at how peer-organisations utilise project appraisal frameworks that consider climate risk. However, they believe further cross discussions are required to refine existing project appraisal mechanisms towards best practice.
S		 Climate risk is considered ahead of infrastructure needs. It is recommended to conduct a national climate risk assessment, separate to local climate risk assessments, to support national strategic decision making and align priorities on climate resilient infrastructure as government agencies would work off one climate risk assessment instead of several.  Develop climate vulnerability maps plotting socioeconomic impacts of climate risks to highlight the urgency of climate-resilient infrastructure investments.  The Energy Efficiency and Conservation Act in 2019 supports energy resilience as a climate co-benefit as it mandates the private sector to comply with energy efficiency targets. Mechanisms to enforce, monitor and evaluate the Energy Efficiency and Conservation Act need to be established.
M		 Signpost the green financing mechanisms available to different government agencies to give them confidence in developing more ambitious GHG reduction trajectories.

5. Roadmap of the proposals

Summary of the proposals by timeframe and level of effort

Timeframe	Level of effort	Proposals
M		 Overlay a draft pipeline of ‘Build Build Build’ infrastructure projects with a climate risk assessment that covers an appropriate time horizon and different climate scenarios. A comparison of the two can be used to revise the pipeline so that climate risks are systematically and consistently accounted for in the infrastructure pipeline. This could be similar to the Systemic Resilience Assessment Tool developed by Oxford University’s OPSIS research group for Jamaica.  Contextualise the Physical Climate Risk Assessment Methodology (PCRAM) developed by the Coalition for Climate Resilient Investment once it is published. The methodology includes the pricing of impacts on the asset’s performance indicators. Ensure that it is implemented by the private sector in project cash flow models.  Support the institutionalisation of other assessment tools that are more comprehensive to GHG emissions and biodiversity such as whole life carbon and natural capital assessments.  Creation of natural capital accounts will require a platform for policy-makers, academics and other technical experts to exchange knowledge, insights and lessons learnt from past experiences. Effective modes of collaboration are needed to strengthen accounting methodologies, identify data gaps and other concerns.  An effective O&M strategy must adequately plan for climate impacts – both technically and financially. Incorporate climate impacts into asset performance models to generate a better estimate of deterioration, which then gets incorporated into design strategies and life cycle costing.
M		 Adopt place-based planning and approaches that look at the broader system of land use, the infrastructure network and assets, and the community. This can help to achieve resilience outcomes in ways that sector and asset-driven planning cannot.  Conduct criticality analyses and interdependency assessments to identify the cascading effects of climate risks in connected and interdependent infrastructure systems. These analyses involve simulating disruptions in a network and modelling loss of functionality of the entire system. Input-output disruption assessments could be undertaken to determine risk interdependencies across sectors. In this way, resilience of infrastructure services and networks are considered. This could be similar to the NISMOD developed by the UK Infrastructure Transitions Research Consortium.  Establish a long-term vision for carbon pricing so that the market can plan accordingly. As the country looks to implement a domestic CPI, businesses need clarity on how carbon prices might evolve over time and at what point it targets in the infrastructure life cycle.  Similar to the UK <i>Department for Environment Food and Rural Affairs Enabling a Natural Capital Approach</i>, develop guidance on conducting natural capital assessments and elaborate on how to apply it to economic analyses.  Investment strategies are increasingly targeting the transformation from CAPEX to OPEX based business models to support the uptake of green technologies. There are an increasing amount of funds (e.g. Green Climate Fund’s Green Growth Equity Fund) that seek agile OPEX models to meet investment eligibility criteria. Adopting this new financial strategy planning can support construction clients gain access to new financing options.
L		 Use digital twin technology to create a central and consolidated repository on assets. Digital twins are real-time virtual models of physical assets, which allows for dynamic and adaptive modelling of climate impacts on infrastructure. It also allows for automated and intelligent identification of deterioration and damage to assets.

5. Roadmap of the proposals

Next steps

Areas for potential UK support in the future

Of all the proposals elaborated in this paper, three areas of support have emerged that are most likely to align with the interests of FCDO:

1. Supporting the Philippine Government with tools that will help the next administration develop a pipeline of infrastructure projects that are climate risk driven. FCDO is currently providing similar support in Jamaica, where it is co-creating and funding a geospatial analysis platform for infrastructure risk assessment and resilient investment prioritisation for a pipeline of infrastructure projects.
2. Helping the Philippine Government identify environmental indicators to integrate into the project feasibility process. Widely recognised as best practice guidance for government project appraisal, there is an opportunity to leverage the range of environmental indicators laid out in the *HM Treasury Green Book* and the *25 Year Environment Plan*. Alongside this, guidance documents and frameworks that support quantifying the indicators could also be developed.
3. Supporting the Philippine Government to develop carbon budgets, including actions and milestones. The UK Government, being the first country to set legally binding carbon budgets, has recently set its sixth carbon budget for the 2033-2037 budgetary period.

Different scenario models were analysed to prepare these budgets including, for example, emissions and energy pathways alongside investment data.

The opportunity is now

The Philippine Government is currently at a cross-roads as it transitions to a new administration, which is set to take over in mid-2022. It represents an opportunity for the Government to reassess and renew their priorities, plans and programmes moving forward. One major step forward is that the upcoming Philippine Development Plan will likely focus more on resilient, green and smart infrastructure, according to NEDA. It is expected to be published before the end of 2022, coinciding with the finalisation of the budget for 2023.

The change in administration is also an opportunity for FCDO to develop new areas for UK support. During consultation meetings with government agencies, it was recommended that FCDO work with government agencies to flesh out these proposals to avoid duplication with other existing workstreams. If this is done before 30th June 2022 - the last date of tenure - there is a chance that these proposals can be passed on as a priority for the new administration in a transition document.



5. Appendix

Appendix A

Full glossary

Adaptation: The process of adjustment to actual or expected climate and its effects (IPCC, 2014)

Best practice: A practice/strategy/process that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption.

Capital carbon: Capital carbon, or ‘CapCarb’, refers to emissions associated with the creation of an asset.

Decarbonisation: The process by which countries, individuals or other entities aim to achieve zero fossil carbon existence. Typically refers to a reduction of the carbon emissions associated with electricity, industry and transport. (IPCC, 2018)

Disaster-risk management (DRM): Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development. (IPCC, 2018)

Greenhouse gases: Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth’s surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. (IPCC, 2018)

Infrastructure: Roads and bridges, mass transit, railways, seaports, airports, flood control, new cities and information and communications, as categorised in the Philippines’ “Build Build Build” programme.

Mitigation: A human intervention to reduce the sources or enhance the sinks of greenhouse gases (IPCC, 2014)

Nature-based solutions (NBS): Design solutions that make use of the ecosystem services that natural habitats provide, including their regulating (resilience) functions, as well as their high co-benefits, such as positive environmental impact and livelihood opportunities.

Operational carbon: Operational carbon is the term used to describe the emissions of carbon dioxide and other global warming gases during the in-use operation of an infrastructure asset.

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation. (IPCC, 2018)

Resilient infrastructure: Considers both the resilience of assets themselves and the contribution of infrastructure assets and networks to the resilience of the system. (Infrastructure Australia, 2021) Physical infrastructure assets and the wider system that these assets are part of continues to provide essential services due to its ability to withstand, adapt and recover positively from whatever shocks and stresses it may face now and in the future. (The Resilience Shift, 2022)

Risk: In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. (IPCC, 2018)

Systems resilience: Considering infrastructure as part of a wider system. It involves taking a more integrated approach to assessing climate and disaster risk and exploring beyond the individual asset alone.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. (IPCC, 2018)

Whole life cycle carbon emissions: Whole life carbon emissions are those carbon emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal. They capture a building’s operational carbon emissions from both regulated and unregulated energy use, as well as its embodied carbon emissions.

Appendix B

List of Build Build Build projects as of 12th May 2021

Revised List of Infrastructure Flagship Projects (IFPs)

As of May 12, 2021

Note: The projects marked * below were part of previous lists of IFPs approved in 2017, 2019, and 2020, and are not considered part of the current list because they have already been completed. All projects completed before the next revision are no longer included in the succeeding list.

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
Completed¹					
*	Improvement of remaining sections along Pasig River from Delpan Bridge to Napindan Channel	DPWH	1,000.00	ODA (Japan)	Urban development
*	Pulangi 4 Selective Dredging Phase 3	NPC	244.88	GAA	Power and Energy
*	Sangley Airport	DOTr	1,436.20	GAA	Transport and Mobility
*	Angat Water Transmission Improvement Project	MWSS	3,290.00	ODA (ADB)	Water Resources
*	Luzon Bypass Infrastructure Project	DICT/ BCDA	1,000.00	GAA/CPF	ICT
*	New Clark City Phase 1 a. National Government Administrative Center Phase 1A (15,000.00) b. Filinvest Mixed Use Industrial Development Phase 1 site dev't (3,000.00)	BCDA	18,000.00	PPP	Urban development
*	Clark International Airport Expansion Project Phase 1	DOTr/ BCDA	14,972.00	PPP	Transport and Mobility
1	LRT 2 East Extension	DOTr	9,759.31	ODA (Japan)	Transport and Mobility
2	Metro Manila Skyway Stage 3	DPWH/TRB	65,390.00	STOA/PPP	Transport and Mobility
3	Metro Manila Logistics Network: Bonifacio Global City-Ortigas Center Link Road Project	DPWH	5,723.90	GAA	Transport and Mobility

¹ Includes projects which are already partially open and projects for inauguration by July 2021

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
4	Metro Manila Logistics Network: China Grant Bridges a) Binondo-Intramuros Bridge ² b) Estrella-Pantaleon Bridge	DPWH	5947.10	ODA (China)	Transport and Mobility
Ongoing projects for completion by 2021					
5	General Santos Airport	DOTr	1,096.00	GAA	Transport and Mobility
6	Bicol International Airport Development Project (New Legazpi)	DOTr	4,798.00	GAA	Transport and Mobility
7	Unified Grand Central Station	DOTr	2,783.00	GAA	Transport and Mobility
8	LTO Central Command Center	DOTr	950.00	GAA	ICT
9	Road Transport Information Technology Infrastructure Project Phase I (LTO IT)	DOTr	3,190.00	GAA	ICT
10	Motor Vehicle Recognition and Enhancement System	DOTr	750.00	GAA	ICT
11	Surallah-T'oli-San Jose Road, South Cotabato	DPWH	3,473.00	GAA	Transport and Mobility
12	Reconstruction and Development Plan for Greater Marawi (JICA grant)	DPWH	970.97	ODA (Japan)	Urban Development
13	Samar Pacific Coastal Road Project	DPWH	1,165.96	ODA (Korea)	Transport and Mobility
14	National Irrigation Sector Rehabilitation and Improvement Project (NISRIIP)	NIA	3,134.45	ODA (Japan)	Water Resources
15	Malitubog- Maridagao Irrigation Project	NIA	5,444.85	GAA	Water Resources
16	Flood Risk Management Project (FRIMP) in Cagayan, Tagoloan, and Imus Rivers	DPWH	7,504.91	ODA (Japan)	Urban Development
Ongoing projects for completion by 2022					
17	Sindangan-Bayog-Lakewood Road, Zamboanga del Sur and Zamboanga del Norte	DPWH	5,133.01	GAA	Transport and Mobility
18	Boracay Circumferential Road	DPWH	1,940.00	GAA	Transport and Mobility

² This project component will be completed by Q4 2021

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
19	NLEX-SLEX Connector Road	DPWH	23,302.00	PPP (Unsolicited)	Transport and Mobility
20	Integrated Disaster Risk Reduction and Climate Change Adaptation Measures in the Low-Lying Areas of Pampanga Bay	DPWH	6,151.00	ODA (Korea)	Urban Development
21	Cagayan de Oro Coastal Road	DPWH	3,166.53	GAA	Transport and Mobility
22	C5 Southlink Expressway Project	DPWH/TRB	12,645.00	STOA/PPP	Transport and Mobility
23	Southeast Metro Manila Expressway Project	DPWH/TRB	45,290.00	STOA/PPP	Transport and Mobility
24	Chico River Pump Irrigation Project	NIA	4,372.90	ODA (China)	Water Resources
25	Balog-Balog Multipurpose Project Phase II, Tarlac	NIA	13,370.00	GAA	Water Resources
26	Lower Agno River Irrigation System Improvement Project, Pangasinan	NIA	3,500.00	GAA	Water Resources
27	Taguig Integrated Terminal Exchange	DOTr	4,000.00	PPP	Transport and Mobility
28	Cebu Bus Rapid Transit	DOTr	16,309.00	ODA (WB)	Transport and Mobility
29	Davao Public Transport Modernization Project (DPTMP)	DOTr	18,600.00	ODA (ADB)	Transport and Mobility
30	Safe Philippines Project Phase I	DILG	20,314.00	ODA (China)	ICT
31	Flood Risk Improvement and Management Project - Cagayan De Oro River	DPWH	8,549.18	ODA (Japan)	Urban Development
32	Pasig Marikina River Channel Improvement Project, Phase V	DPWH	4,572.65	GAA	Urban Development
33	NLEX Harbor Link Extension to Anda Circle	DPWH/TRB	12,000.00	STOA/PPP	Transport and Mobility
Ongoing projects for completion by 2023 and beyond					
34	Digital Transformation Centers (Upgraded "Tech4ED" Project)	DICT	33,983.00	GAA	ICT
35	National Government Data Center	DICT	277.00	GAA	ICT

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
36	National Broadband Program	DICT	20,305.00	GAA	ICT
37	MRT 7	DOTr	75,000.00	PPP (Unsolicited)	Transport and Mobility
38	M'lang Central Mindanao Airport	DOTr	2,600.00	GAA	Transport and Mobility
39	MRT 3 Rehabilitation Project	DOTr	21,966.00	ODA (Japan)	Transport and Mobility
40	North South Commuter Railway (PNR North 1)	DOTr	149,130.00	ODA (Japan)	Transport and Mobility
41	Manila Metro Line 1 Cavite Extension (Baclaran - Niog, Bacoor) (a.k.a LRT 1 Cavite Extension Project)	DOTr	64,915.00	ODA (Japan)/ PPP	Transport and Mobility
42	Arterial Road Bypass Project Phase III (Plaridel Bypass)	DPWH	5,260.65	ODA (Japan)	Transport and Mobility
43	Davao City Bypass Construction Project	DPWH	46,805.00	ODA (Japan)	Transport and Mobility
44	Bacolod-Negros Occidental Economic Highway	DPWH	8,095.00	GAA	Transport and Mobility
45	Camarines Sur High-Speed Highway Project	DPWH	9,235.00	GAA	Transport and Mobility
46	Pasacao-Balatan Tourism Coastal Highway	DPWH	14,972.29	GAA	Transport and Mobility
47	Improving Growth Corridors in Mindanao Road Sector Project	DPWH	25,257.00	ODA (ADB)	Transport and Mobility
48	Davao City Coastal Road Project, including Bucana bridge	DPWH	28,265.00	GAA/ODA (China)	Transport and Mobility
49	Southern Luzon Expressway Toll Road 4	DPWH/TRB	13,100.00	STOA/PPP	Transport and Mobility
50	Water District Development Sector Projects (ADB-WDDSP)	LWUA	4,240.00	ODA (ADB)	Water Resources
51	Wawa Bulk Water Supply Project	MWSS	20,000.00	Private	Water Resources
52	Jalaur River Multipurpose Project - Stage II, Iloilo	NIA	11,212.00	ODA (Korea)	Water Resources
53	Philippine Identification System	PSA	26,260.00	GAA	ICT

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
54	PNR South Long Haul	DOTr	175,318.00	ODA (China)	Transport and Mobility
55	North South Commuter Railway Extension (PNR North 2, PNR South Commuter)	DOTr	628,420.00	ODA (ADB, Japan)	Transport and Mobility
56	Mindanao Rail Project Phase 1	DOTr	81,686.00	ODA (China)	Transport and Mobility
57	LRT 2 West Extension	DOTr	10,120.00	GAA	Transport and Mobility
58	New Cebu International Container Port	DOTr	9,195.00	ODA (Korea)	Transport and Mobility
59	EDSA Greenways	DOTr	8,793.45	ODA (ADB)	Transport and Mobility
60	Metro Manila Subway Project Phase 1	DOTr	356,974.00	ODA (Japan)	Transport and Mobility
61	New Manila International Airport	DOTr	735,654.00	PPP (Unsolicited)	Transport and Mobility
62	MRT 4	DOTr	49,841.00	ODA (ADB)	Transport and Mobility
63	Panguil Bay Bridge	DPWH	7,375.00	ODA (Korea)	Transport and Mobility
64	Metro Manila Priority Bridges for Seismic Improvement Project	DPWH	7,933.00	ODA (Japan)	Transport and Mobility
65	Emergency Assistance for Reconstruction and Recovery of Marawi (Output 2: Reconstruction and Development Plan for a Greater Marawi, Stage 2)	DPWH	6,835.00	ODA (ADB)	Urban Development
66	Metro Manila Logistics Network: Pasig River and Manggahan Floodway Bridges Construction Project a) North and South Harbor Bridge b) Palanca-Villegas Bridge c) East-West Bank Bridge 2	DPWH	15,845.84	ODA (China)	Transport and Mobility
67	Samal Island-Davao City Connector Bridge	DPWH	23,040.00	ODA (China)	Transport and Mobility

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
68	Road Network Development Project in Conflict Affected Areas in Mindanao	DPWH	12,862.75	ODA (Japan)	Transport and Mobility
69	Cavite Industrial Area Flood Management Program	DPWH	9,890.00	ODA (Japan)	Urban Development
70	Ambal Simuay River and Rio Grande de Mindanao River Flood Control Projects	DPWH	39,220.00	ODA (China)	Urban Development
71	Pasig-Marikina River Channel Improvement Phase IV	DPWH	33,097.00	ODA (Japan)	Urban Development
72	New Centennial Water Source - Kaliwa Dam Project	MWSS	12,189.00	ODA (China)	Water Resources
73	Aqueduct No. 7	MWSS	7,429.00	ODA (ADB)	Water Resources
74	Metro Manila BRT Line 1 (Quezon Ave)	DOTr	5,463.00	ODA (WB)	Transport and Mobility
75	Subic Clark Railway	DOTr/BCDA	50,031.00	ODA (China)	Transport and Mobility
76	Metro Manila Logistics Network: Pasig River and Manggahan Floodway Bridges Construction Project a) J.P. Rizal-Lopez Jaena Bridge (Marikina River) b) J.P. Rizal-St. Mary Bridge (Marikina River) c) Marikina-Vista Real Bridge (Marikina River)	DPWH	9,163.00	ODA (ADB)	Transport and Mobility
77	Cebu-Mactan Bridge and Coastal Road Construction Project	DPWH	76,413.00	ODA (Japan)	Transport and Mobility
78	Panay-Guimaras Negros Bridge Phase 1	DPWH	65,701.16	ODA (TBD)	Transport and Mobility
79	Health System Enhancement to Address and Limit (HEAL) COVID-19 Project	DOH	21,353.75	ODA (ADB)	Health
80	Philippines COVID-19 Emergency Response Project (PCERP)	DOH	20,090.00	ODA (WB)	Health
81	Philippines Seismic Risk Reduction and Resilience Project	DPWH	15,086.80	ODA (WB)	Urban Development
82	Metro Manila Flood Management Project (MMFMP), Phase I	DPWH	23,500.00	ODA (WB & AIIB)	Urban Development
83	Virology Science and Technology Institute of the Philippines	DOST	500.00	GAA	Health

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
84	Bataan-Cavite Interlink Bridge	DPWH	175,656.25	ODA (TBD)	Transport and Mobility
Pipeline³					
85	Iconic Bridge Projects for Socio Economic Development	DPWH	5,963.00	ODA (UK)	Transport and Mobility
86	Panglao-Tagbilaran City Offshore Connector Bridge	DPWH	6,797.96	ODA (China)	Transport and Mobility
87	Davao City Expressway	DPWH	80,650.52	ODA (China)	Transport and Mobility
88	Metro Cebu Expressway Project	DPWH	26,625.00	PPP/GAA	Transport and Mobility
89	Quezon-Bicol Expressway	DPWH	87,296.00	PPP	Transport and Mobility
90	Cavite-Tagaytay-Batangas Expressway Project	DPWH	29,918.61	PPP (Unsolicited)	Transport and Mobility
91	TPLEX Extension Project	DPWH	28,925.90	PPP (Unsolicited)	Transport and Mobility
92	New Bohol (Panglao) International Airport	DOTr	3,791.00	PPP (Unsolicited)	Transport and Mobility
93	Laguna Lakeshore Road Network Project	DPWH	177,856.10	ODA (ADB)	Transport and Mobility
94	University of the Philippines – Philippine General Hospital Cancer Center PPP Project	UP-PGH	4,498.00	PPP	Health
95	Iloilo Port	DOTr/PPA	9,919.53	PPP (Unsolicited)	Transport and Mobility
96	Davao Sasa Port	DOTr/PPA	19,894.30	PPP (Unsolicited)	Transport and Mobility
97	General Santos Port	DOTr/PPA	5,200.00	PPP (Unsolicited)	Transport and Mobility

³ Projects still completing government approvals

No.	Project Title	Implementing Agency	Total Project Cost (in PHP million)	Funding Source	Sector
98	Laguindingan Airport	DOTr	45,751.00	PPP (Unsolicited)	Transport and Mobility
99	Agus 3 Hydroelectric Power Project (225 MW)	DOE	46.37	Private	Power and Energy
100	National Interoperable Automatic Fare Collection System Project (formerly Automated Fare Collection Clearing House)	DOTr	4,723.00	ODA (Korea)	Transport and Mobility
101	Marawi Rehabilitation (China Grant) a) Bridge and Bypass Project b) Grand Padian Market and Sports Complex	DPWH/DHSUD	998.70	ODA (China)	Urban Development
102	Agus-Pulangi Rehabilitation Project	NPC	20,000.00	ODA (WB)	Power and Energy
103	Iloilo International Aripot	DOTr	4,881.80	PPP (Unsolicited)	Transport and Mobility
104	Davao International Airport	DOTr	50,745.21	PPP (Unsolicited)	Transport and Mobility
105	Bacolod-Silay International Airport	DOTr	12,115.30	PPP (Unsolicited)	Transport and Mobility
106	Kalibo International Airport	DOTr	5,513.21	PPP (Unsolicited)	Transport and Mobility
107	MRT 11	DOTr	81,793.38	PPP (Unsolicited)	Transport and Mobility
108	C5 MRT 10 Project	DOTr	112,264.22	PPP (Unsolicited)	Transport and Mobility
109	Fort Bonifacio-Makati Sky Train	DOTr	3,911.83	PPP (Unsolicited)	Transport and Mobility
110	Cebu Monorail System	DOTr	79,606.32	PPP (Unsolicited)	Transport and Mobility
111	LRT 6 Cavite Line A/ Modified LRT 6 Project Phases 1 (Niog-Dasma City) and 2 (Dasma City- Tagaytay)	DOTr	69,085.41	PPP (Unsolicited)	Transport and Mobility
112	Ninoy Aquino International Airport	DOTr	107,534.29	PPP (Unsolicited)	Transport and Mobility

Appendix C

Full existing infrastructure and climate change governance

National Economic and Development Authority (NEDA) formulates policies, plans and programmes relating to social and economic development.

Regional Development Council (RDC) coordinates and sets the direction for all regional social and economic development efforts. It also serves as a forum to integrate local efforts.

Project Facilitation, Monitoring and Innovation (PFMI) Task Force is an inter-agency task force that facilitates development, approval, and implementation of the IFPs.

Public-Private Partnership (PPP) Centre is the central coordinating and monitoring agency for all PPP projects in the country. It also provides technical assistance to government entities.

Philippine Statistics Authority (PSA) serves as the central statistical authority that collects, compiles, analyses and publishes statistical information on economic, social, demographic, etc.

Infrastructure and Utilities Development Committee (InfraCom) within NEDA Board provides the RDC with information and proposals on matters concerning regional development.

Development Budget Coordination Committee (DBCC) within NEDA Board advises on the consolidated public sector financial position and the national government fiscal programme.

Investment Coordination Committee (ICC) within NEDA Board evaluates the fiscal, monetary and balance of payments implications of major national projects.

Regional Land Use Committee (RLUC) within NEDA Board evaluates priority development areas for land conversion as identified by the DTI, DA and DOT.

Bases Conversion and Development Authority (BCDA) engages in public-private partnership projects to push forward vital public infrastructure.

Department of Public Works and Highways (DPWH) functions as the engineering and construction arm of the government, undertaking major projects.

Department of Transportation (DOTr) is the primary policy, planning and implementing entity for promotion, development and regulation of transportation systems.

Department of Budget and Management (DBM) formulates and implements the National Budget for the attainment of the country's development objectives.

Department of Finance (DOF) formulates revenue policies that ensure funding of programmes that promote welfare and accelerate economic growth.

Department of Interior and Local Government (DILG) strengthens local government capability to effectively deliver basic services to citizens.

Department of Human Settlements and Urban Development (DHSUD) responsible for the management of housing, human settlement and urban development, primarily focused on basic human needs.

Department of Trade and Industry (DTI) ensures globally competitive and innovative industry and services sectors for inclusive growth and job creation.

Department of Energy (DOE) prepares, integrates, coordinates and supervises all plans, programmes, projects relating to energy exploration, development, utilisation, distribution and conservation.

Bangko Sentral ng Pilipinas (BSP) as the central bank, it provides policy directions in the areas of money, banking and credit.

Development Bank of the Philippines (DBP) as the country's pre-eminent development financial institution, it provides financing to influence and accelerate sustainable economic growth.

Climate Change Commission (CCC) is the lead policy-making body that coordinates, monitors and evaluates programmes. It also ensures the mainstreaming of climate change in national/local development plans.

National Disaster Risk Reduction and Management Council (NDRRMC) is a working group of various government, non-government, civil sector and private sector organisations for disaster risk reduction.

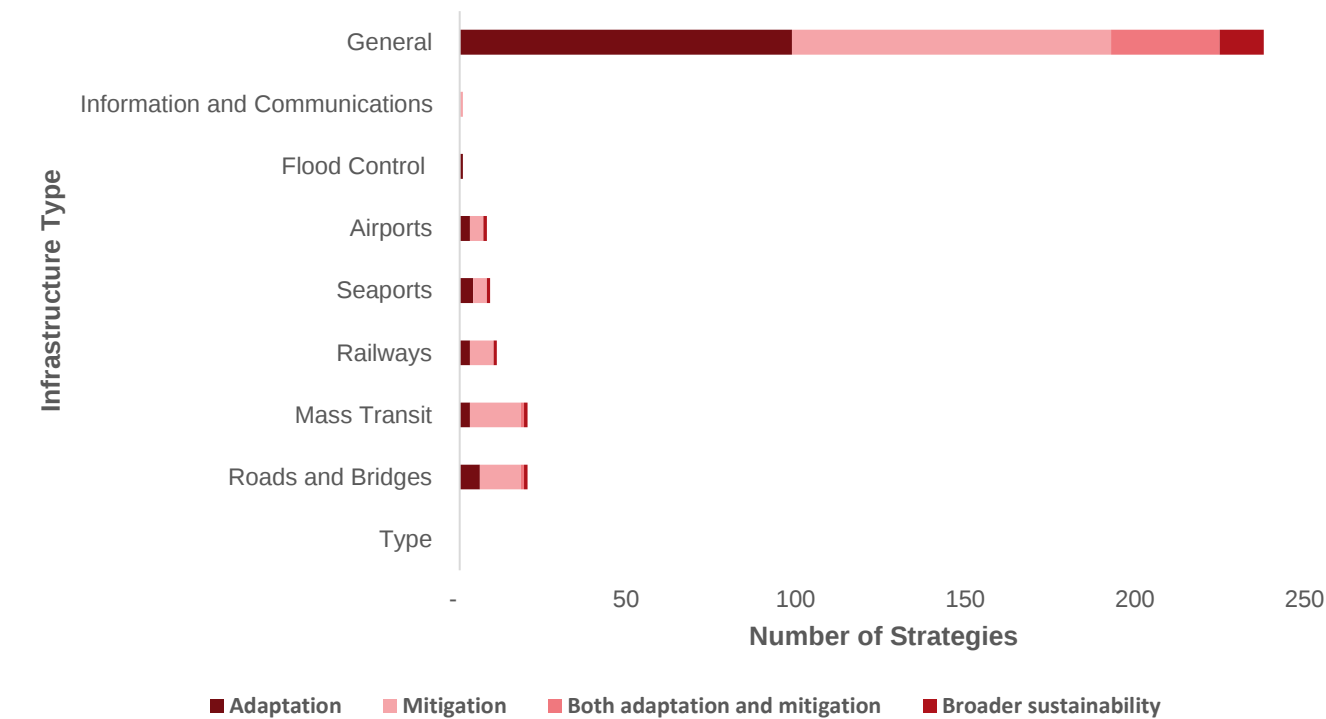
Cabinet Cluster on Climate Change Adaptation, Mitigation and Disaster Risk Reduction (CCAM-DRR) is a cross-departmental body, chaired by DENR with CCC serving as the secretariat, that ensure coordinated and complementary policies and programmes.

Department of Environment and Natural Resources (DENR) oversees conservation, management, use and development of environment and natural resources.

Department of Science and Technology (DOST) provides central direction, leadership and coordination of scientific and technological efforts.

Appendix D

Breakdown of best practices by climate strategy and infrastructure typology



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Existing infrastructure and climate change governance

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Section 4: Catalysts, constraints and proposals

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