

Sustainable Pathways

Addressing Infrastructure Needs in the Caribbean

DEVELOPMENT BANK
OF LATIN AMERICA
AND THE CARIBBEAN

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Prologue

Since its establishment in 1970, CAF's DNA has been defined by its commitment to regional integration and sustainable development in Latin America and the Caribbean. Our original mission focused on financing infrastructure to strengthen connectivity and regional competitiveness. Over time, this mission has evolved to support productivity, innovation, social inclusion, and environmental sustainability, but infrastructure remains at the core of our actions as an enabler of growth, development, and regional integration.

CAF's relationship with the Caribbean started in 1994 when Trinidad and Tobago signed the agreement to become a Series C CAF Member to later become a full member in 2016. The same steps were followed by Dominican Republic in 2004 and 2021, respectively. Meanwhile, Jamaica, Barbados, The Bahamas and Antigua and Barbuda became Series C shareholders in 1999, 2004, 2024 and 2025, respectively.

In March 2024, the CAF Board of Directors authorized the expansion of the shareholder base and validated the incorporation of Dominica, and Grenada as Series C Shareholders. Within a year of the establishment of the CAF's Caribbean Regional Management Office, 8 additional CARICOM Member States formally expressed interest in becoming shareholders of CAF.

Currently, CAF's portfolio in the Caribbean region reaches USD 1,560 million (considering Trinidad and Tobago, Barbados and Jamaica), or 4.5% of CAF's total loans, which is complemented with technical assistance to the countries and knowledge products.

Also, in April 2025, Trinidad and Tobago assumed the presidency of the CAF Board of Directors for the 2025 period, becoming the first CARICOM country to hold this role.

Infrastructure is a cornerstone for boosting productivity and fostering economic growth in the Caribbean, where fragmented geographies and small market sizes pose unique challenges. However, the region is among the most vulnerable in the world to climate change-driven natural disasters. These events inflict severe losses in human lives, food and health security, and the destruction of infrastructure and economic assets.

For example, when comparing the impact of disasters on the Caribbean and other regions—such as South and Central America—the death rate relative to the population is 260 times higher, the destruction of housing is 3 to 12 times higher, and economic damage in terms of GDP is nearly 12 times greater.

The disproportionate impact of these challenges places a heavy financial and social burden on Caribbean countries, forcing them to divert scarce resources to address pressing vulnerabilities. By integrating sustainability and resilience into infrastructure development, the Caribbean can address its unique vulnerabilities, attract foreign investment, and unlock long-term growth while safeguarding its communities and natural resources for future generations.

This report *Sustainable Pathways: Addressing Infrastructure Needs in the Caribbean* examines the opportunities that resilient infrastructure presents for fostering economic and social development in the Caribbean. It provides insights into infrastructure investment needs and proposes strategies to address resource constraints and promote sustainable practices.

To address the overarching challenges of infrastructure development in the Caribbean, a concerted effort is required to integrate climate mitigation and adaptation strategies, mobilise private resources, and enhance regional cooperation. Mitigation efforts—such as incorporating renewable energy and decarbonising infrastructure sectors, can reduce costs, improve service quality, and contribute to climate resilience.

Adaptation measures, including climate-resilient design, construction, and maintenance of infrastructure assets, are necessary to withstand and recover from climatic shocks, minimising from an intertemporal perspective the costs associated with climate change.

This is crucial to avoid an underdevelopment trap in which scarce financial resources are devoted to recovering from disasters instead of financing improvements that potentiate economic and social development.

Mobilising private capital through an enabling institutional and legal framework is needed to bridge the funding gap, attract international green financing, and support sustainable infrastructure investments. This cannot be done without regional coordination and cooperation. CAF, with its expertise in financing and technical support, is uniquely positioned to guide the Caribbean towards a more resilient and sustainable future.

By fostering partnerships, facilitating access to green financing, and promoting innovative infrastructure solutions, CAF aims to enhance economic stability and social progress across the region. By increasing collaboration among regional stakeholders and mobilizing its technical and financial capacities, CAF aims to accelerate the Caribbean's journey towards a resilient, inclusive, and sustainable future.

Sergio Díaz-Granados
Executive President of CAF — Development Bank of Latin America and the Caribbean —

Acknowledgments

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Preface

CAF has progressively expanded the scope of its operations, recently incorporating more Caribbean countries to increase its geographic impact and promote the dissemination of best practices for inclusive social and economic development. With the recent incorporation of The Bahamas and Antigua and Barbuda, there are already 6 CAF's member countries from the Caribbean (Trinidad and Tobago, Dominican Republic, Jamaica, Barbados, The Bahamas, and Antigua and Barbuda), while Dominica and Grenada are already approved to be incorporated as Series C shareholders, transforming CAF into the multilateral bank with the greatest presence in the Caribbean Community (CARICOM).

Unlike continental nations, the Caribbean consists largely of small island states, with exceptions such as Belize, Guyana, and Suriname. The defining characteristics of these islands—limited land area, small domestic markets, and a lack of economies of scale—add a layer of complexity to the provision of high-quality infrastructure services. Furthermore, the region is highly vulnerable to the impacts of climate change. This vulnerability, coupled with fiscal constraints and external dependence, makes the development of sustainable infrastructure both a necessity and a considerable challenge.

To effectively undertake this task, it is crucial to establish a comprehensive diagnosis of the region's infrastructure sectors, identifying areas for improvement—whether through quick wins or leapfrogging opportunities—and charting an actionable roadmap to overcome identified weaknesses. Generating this knowledge is indispensable for guiding policymakers and stakeholders towards more effective and sustainable infrastructure solutions.

Strengthening the resilience of infrastructure services in the Caribbean will require mobilizing substantial public and private resources, alongside innovative financing mechanisms to make adaptation and sustainable development feasible. CAF's dual role as financier and technical partner uniquely positions it as a key ally for Caribbean nations, leveraging its expertise to support the region's transition towards resilient infrastructure systems.

This report aligns with CAF's vision as a green bank and a key partner in the recovery, sustainable development, and integration of Latin American and the Caribbean. It showcases the institution's ongoing efforts to achieve these objectives. This report focuses on four key sectors—energy, transport, ICT, and water and sanitation—and tries to identify the main opportunities for promoting resilient economic and social development. The geographical coverage includes all 15 CARICOM member states, targeting both current and potential CAF partners. These states are a diverse mix of islands and continental nations, each facing unique productive, social, and environmental challenges.

The report is structured as follows: Chapter 1 examines the economic context in which the Caribbean region must develop resilient infrastructure, focusing on how the region's macroeconomic conditions, geography, and economic structure influence feasible outcomes. Chapter 2 provides an in-depth analysis of the state of infrastructure in the region across various subsectors, assessing performance in terms of accessibility, quality, affordability, and sustainability. It also reviews the status of institutional and regulatory frameworks to address the identified challenges. Finally, Chapter 3 highlights intervention opportunities to improve asset construction and infrastructure service provision—recognising the heterogeneity of cases in the region—not only from a sectoral perspective but also acknowledging the cross-cutting challenges and opportunities.

In this way, the report contributes to CAF's objective of generating timely and specialised knowledge to facilitate the formulation and adoption of concrete, realistic strategies aimed at promoting sustainable and resilient infrastructure services, recognising the central role these services play in fostering inclusive economic and social development in LAC.

Christian Asinelli
Corporate Vice President of Strategic Programming
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Abbreviations

ACS	Association of Caribbean States
AEO	Authorised Economic Operator
ANZIP	Australia and New Zealand Infrastructure Pipeline
BESS	Battery Energy Storage Systems
BLPC	Barbados Light and Power Company
CAF	Development Bank of Latin America and the Caribbean
CARCIP	Caribbean Regional Communications Infrastructure Program
CARICOM	Caribbean Community
CARILEC	Caribbean Electric Utility Services Corporation
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDB	Caribbean Development Bank
CMA-CGM	Compagnie Maritime d'Affrètement - Compagnie Générale Maritime
ECLAC	Economic Commission for Latin America and the Caribbean
ECTEL	Eastern Caribbean Telecommunications Authority
EDH	Électricité d'Haïti (Electricity of Haiti)
EMBI	Emerging Markets Bond Index
EM-DAT	Emergency Events Database
ESG	Environmental, Social, and Governance
EU	European Union
FCCA	Florida-Caribbean Cruise Association
FEU	Forty-Foot Equivalent Unit
GDP	Gross domestic product
GHG	Greenhouse Gas
GW	Gigawatt
GWANs	Government Wide Area Networks
ICT	Information and Communication Technology
iRAP	International Road Assessment Programme
IATA	International Air Transport Association
IDB	Inter-American Development Bank
IMF	International Monetary Fund
IoT	Internet of Things
IRENA	International Renewable Energy Agency
IRP	Integrated Resource Planning
ITC	International Trade Centre
ITU	International Telecommunication Union
IWRM	Integrated Water Resource Management
IXPs	Internet Exchange Points
JMD	Jamaican Dollar
JPS	Jamaica Public Service Company
J-SRAT	Jamaica Systemic Risk Assessment Tool

KWh	kilowatt-hour
LAC	Latin America and the Caribbean
LCL	Less than Container Load
LPI	Logistics Performance Index
LSCI	Liner Shipping Connectivity Index
LUCF	Land Use Change and Forestry
MNOs	Mobile network operators
MWh	Megawatt-hour
ND-GAIN	Notre Dame Global Adaptation Initiative
NDCs	Nationally Determined Contributions
NRW	Non-Revenue Water
NWC	National Water Commission
OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
OLADE	Latin America and the Caribbean Energy Organization
PAJ	Port Authority of Jamaica
PPPs	Public-Private Partnerships
PUC	Public Utilities Commission
SAIFI	System Average Interruption Frequency Index
SAIDI	System Average Interruption Duration Index
SIDS	Small Island Developing States
SLASPA	St. Lucia Air and Sea Ports Authority
TEU	Twenty-Foot Equivalent Unit
UNCTAD	United Nations Conference on Trade and Development
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
USD	United States Dollar
USF	Universal Service Fund
WASA	Water and Sewerage Authority (Trinidad and Tobago)
WBES	World Bank Enterprise Surveys
WHO	World Health Organization
WTTC	World Travel & Tourism Council
ZIM	ZIM Integrated Shipping Services

Stakeholder Interviews

Name	Position	Country
Rasona Davis- Crumps	Financial Secretary, Ministry of Finance and Corporate Governance	Antigua and Barbuda
Ted Lewis	Senior Economic and Financial Analyst, Ministry of Finance and Corporate Governance	Antigua and Barbuda
Darwin Telemaque	Port Manager, Antigua and Barbuda Port Authority	Antigua and Barbuda
Cheryleann Pemberton	Permanent Secretary, Ministry of Information, Communications, Technology and Posts	Saint Kitts and Nevis
Ophelia Blanchard	Director, Department of Technology, Ministry of Information, Communications, Technology and Posts	Saint Kitts and Nevis
Auren Manners	Director, Department of Public Sector Investment Programme, Ministry of Sustainable Development	Saint Kitts and Nevis
Andrew Satney	Consultant, Former Executive Director, St Kitts-Nevis Chamber of Industry and Commerce	Saint Kitts and Nevis
Calvin Duggins	Chief Operations Officer, St. Christopher Air and Sea Ports Authority	Saint Kitts and Nevis
Joseph Wilson	Seaport Manager, St. Christopher Air and Sea Ports Authority	Saint Kitts and Nevis
Don Grant	Airport Manager, St. Christopher Air and Sea Ports Authority	Saint Kitts and Nevis
Imran Williams	Director of Finance, Ministry of Finance, Economic Development and Youth	Saint Lucia
Marlon Narcisse	Director, Division of Public Sector Modernization	Saint Lucia
Leslie Jn. Baptiste	President, Shipping Association of Saint Lucia	Saint Lucia
Carl James	Chief Executive Officer (Ag.), St. Vincent and the Grenadines Port Authority	St. Vincent and the Grenadines
Phillip Jackson	Science and Technology Coordinator, Ministry of Finance, Economic Planning and Information Technology	St. Vincent and the Grenadines
Edmund Jackson	NDC Partnership In-Country Facilitator, Department Environment and Sustainable Development	St. Vincent and the Grenadines
Candice T. Mc Kenzie	Senior Economist, Environmental Management Authority	Trinidad and Tobago
Ronald Alfred	Director, Maritime Services Division Ministry of Transport	Trinidad and Tobago
Stacy Mohamed Roopchand	Senior Planning Officer (ag.), Ministry of Planning and Development	Trinidad and Tobago
Brithney Wright	Team Lead, Business Development Unit, Trinidad and Tobago Manufacturers' Association	Trinidad and Tobago
Rion Murray	Facilities Manager, Airports Authority of Trinidad and Tobago	Trinidad and Tobago
Wayne Koylass	Chief Planning Officer, Ministry of Works and Transport; and Director of Board, Public Transport Service Corporation (PTSC)	Trinidad and Tobago
Astrid Casimire	Government Communications Specialist, Office of the Prime Minister - Communications	Trinidad and Tobago
Michelle Mulcare	General Manager, Shipping Association of Trinidad and Tobago	Trinidad and Tobago

1

A region with multiple challenges

The Caribbean comprises islands and continental countries bordering the Caribbean Sea and part of the Atlantic Ocean. The states and territories are characterised by limited territorial extension, geographic remoteness from both neighbouring countries and major consumption centres, and high exposure to extreme climatic events. Moreover, the region shares with other developing nations challenges related to infrastructure development, such as resource scarcity, limited financing options, weak infrastructure governance, and insufficient availability of human capital, all of which impact the effectiveness of public policies. These characteristics bring specific challenges to the development and maintenance of resilient infrastructure.

Infrastructure is essential for boosting productivity and fostering economic growth in the Caribbean, where fragmented geographies and small market sizes pose unique challenges. However, in a region highly vulnerable to natural disasters, prioritising sustainable and resilient infrastructure is vital. Enhanced transport networks, such as ports and roads, not only improve connectivity and reduce logistics costs but also support disaster preparedness and recovery by enabling the swift movement of goods and services during emergencies. Investments in renewable energy systems and climate-resilient digital infrastructure reduce dependence on fossil fuels, lower carbon emissions, and ensure continuity in critical services during extreme weather events. By integrating sustainability and resilience into infrastructure development, the Caribbean can address its unique vulnerabilities, attract foreign investment, and unlock long-term growth while safeguarding its communities and natural resources for future generations.



States analysed in the report

Of all states and territories bordering the Caribbean Sea, 20 are members (15) or associate members (5) of the Caribbean Community (CARICOM) and 11 are protocol members (7) or associate members (4) of the Organisation of Eastern Caribbean States (OECS).[1] This report focuses on 14 states and one territory (see Table 1.1 and Figure 1.1), which share the common characteristic of being either member states or territories of CARICOM or protocol members of OECS. These selected countries represent a diverse mix of islands and continental nations of varying sizes. This selection reflects a range of productive, social, and environmental challenges, effectively capturing the region's heterogeneity. The report refers to these countries under study as "Caribbean countries", unless clarification about other non-studied countries is required.

Table 1.1
Selected states and territories of the Caribbean region.
Source: Authors based on World Bank (n.d.), IMF (n.d. b), Organisation of Eastern Caribbean States – OECS (n.d.), and Eastern Caribbean Central Bank (n.d.).

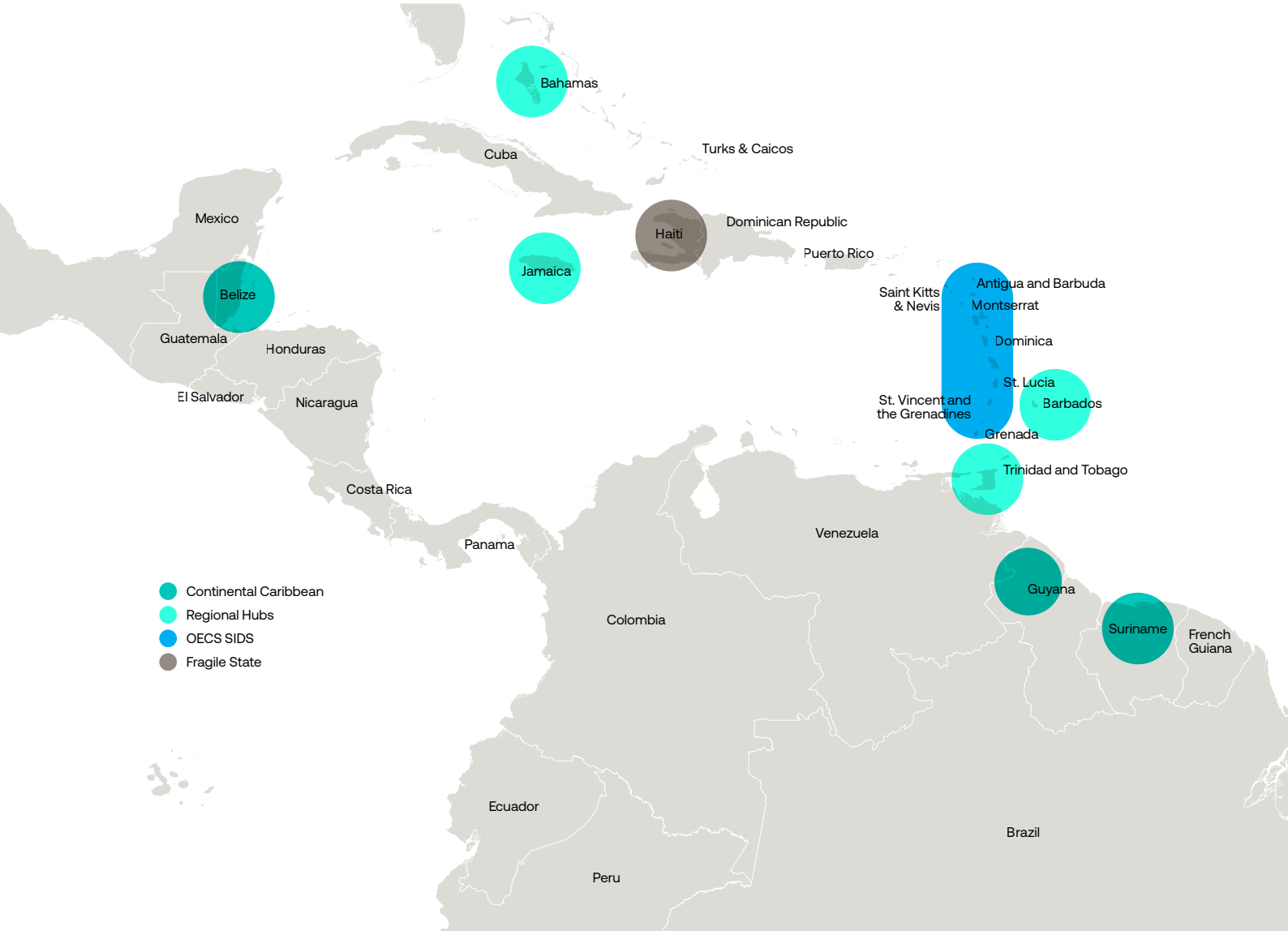
Country	Surface area (sq. km)	Total population, 2023	GDP, 2023 (current USD bn)	GDP per capita, 2023, (USD purchasing power parity 2021)	CARICOM	OECS
OECS SIDS						
Antigua and Barbuda	440	94,298	2.0	28,666	MS	PM
Dominica	750	73,040	0.7	15,863	MS	PM
Grenada	340	126,183	1.3	15,913	MS	PM
St. Kitts and Nevis	260	47,755	1.1	30,108	MS	PM
St. Lucia	620	180,251	2.5	22,650	MS	PM
St. Vincent and the Grenadines	390	103,698	1.1	17,915	MS	PM
Montserrat (territory)	104	4,294	0.1	26,440*	MS	PM
Regional Hubs						
Bahamas	13,880	412,623	14.3	32,048	MS	
Barbados	430	281,995	6.4	17,448	MS	
Jamaica	10,990	2,825,544	19.4	10,343	MS	
Trinidad and Tobago	5,130	1,534,937	28.1	28,458	MS	
Continental Caribbean						
Belize	22,970	410,825	3.3	12,795	MS	
Guyana	214,970	813,834	16.8	49,812	MS	
Suriname	163,820	623,236	3.8	18,971	MS	
Fragile State						
Haiti	27,750	11,724,763	19.9	2,934	MS	

Notes: MS: Member State; PM: Protocol Member. * GDP Montserrat valued at region average. Except for the territory of Montserrat, all states also belong to the Association of Caribbean States (ACS).

1 The CARICOM Community is a grouping of 20 member and associated states pursuing four sets of goals: economic integration; foreign policy coordination; human and social development; and security. The OECS is an International Intergovernmental Organisation dedicated to regional integration in the Eastern Caribbean. See details in their respective websites. Other countries facing the Caribbean Sea belong to North America, Central America or South America, or are states and territories in the Caribbean that are not members of CARICOM.

The Caribbean faces unique challenges in infrastructure development due to limited land area and economies of scale, geographic remoteness, and high vulnerability to extreme climate events.

Figure 1.1
Selected states and territories of the Caribbean region on the map.
Source: Authors



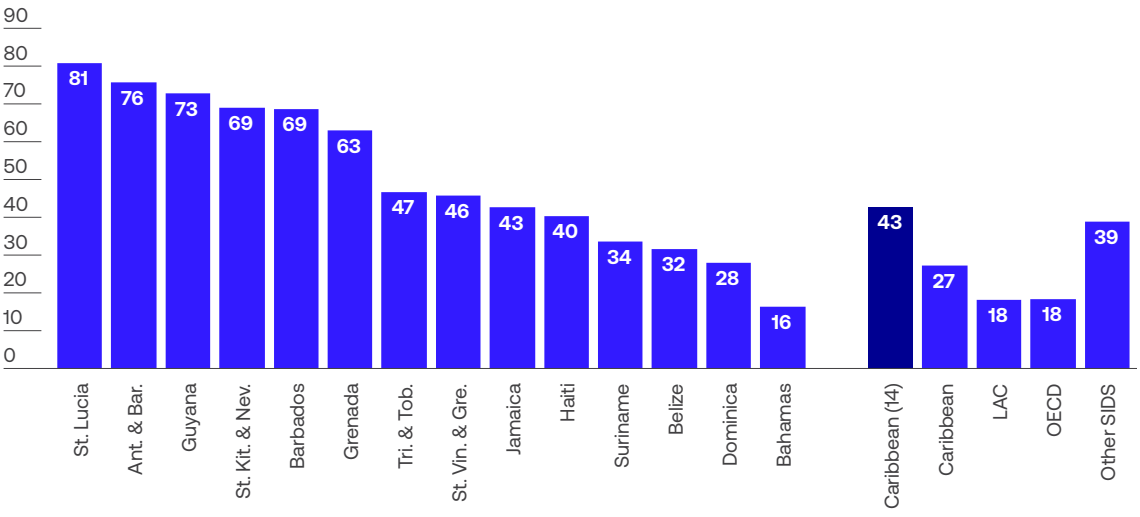
These countries are all small economies, but there are significant variations in their economic size. Trinidad and Tobago is the largest economy, with a GDP at market prices amounting to USD 28.1 billion (see Table 1.1). Compared globally, Trinidad and Tobago ranks as the 109th largest economy in the world (among 185 countries with GDP data for 2023). Its GDP represents about 0.1% of the world's largest economy (USA) and 1.3% of the largest economy in LAC (Brazil). Guyana has become the country with the highest GDP per capita (in purchasing power parity) in LAC given the recent growth of petroleum oil extraction and export activities. On the other hand, Dominica is among the smallest economies, with a GDP of USD 0.6 billion in 2023—about 43 times smaller than that of Trinidad and Tobago. Haiti has the lowest current GDP per capita in LAC and is the only fragile state included in the sample.

The cases of individual countries are presented in Boxes: Trinidad and Tobago (Box 1.1), Barbados (Box 1.2), Jamaica (Box 1.3), and countries that recently joined CAF (Antigua and Barbuda, The Bahamas, Grenada, and Dominica; Box 1.4)

The Caribbean countries in our analysis sample represent less than 3% of the LAC population and are characterised by a more rural share than other regions: countries such as Saint Lucia (81%), Antigua and Barbuda (76%), Guyana (73%), Saint Kitts and Nevis (69%), and Barbados (69%) have the highest shares of rural populations (Figure 1.2). The regional average for the countries analysed (43%) is significantly higher than that of LAC (18%), the OECD (18%), and other Small Island Developing States (SIDS) (39%). This pattern highlights the importance of analysing urban-rural disparities when addressing infrastructure and development gaps in the region.

The islands studied in this report are small territories, ranging in size from 260 km^2 to 28,000 km^2. This geographic limitation correlates with small populations and small domestic markets—which hinder the generation of economies of scale and competition—dependent on imports, and with poor export diversity. Additionally, the resource base is constrained (in terms of stock and quality of agricultural land) with reduced diversity and productivity—which affects food security—and limited natural resources, which exacerbates external dependency. Moreover, the geographical distance between states imposes additional constraints on connectivity with the rest of the world, among states and, in some cases, among islands of the same state. This leads to longer travel times and lower transport frequencies, resulting in high transport costs, restricted market access, and reduced focus on the construction, maintenance, and operation of infrastructure, among other critical areas.

Figure 1.2
Rural population shares in the Caribbean (% of the total population), 2023.
Source: Authors based on World Bank (n.d.).



Note: Caribbean (14) corresponds to the average of the 14 countries shown in the figure. Caribbean represents the whole Caribbean region, including Cuba and the Dominican Republic. In particular, these two countries have a higher urbanisation rate than the rest of the Caribbean. The rural population indicator is not a precise measure due to national differences in the characteristics that distinguish urban from rural areas. As a result, the distinction between urban and rural populations cannot be universally defined in a way that applies to all countries.

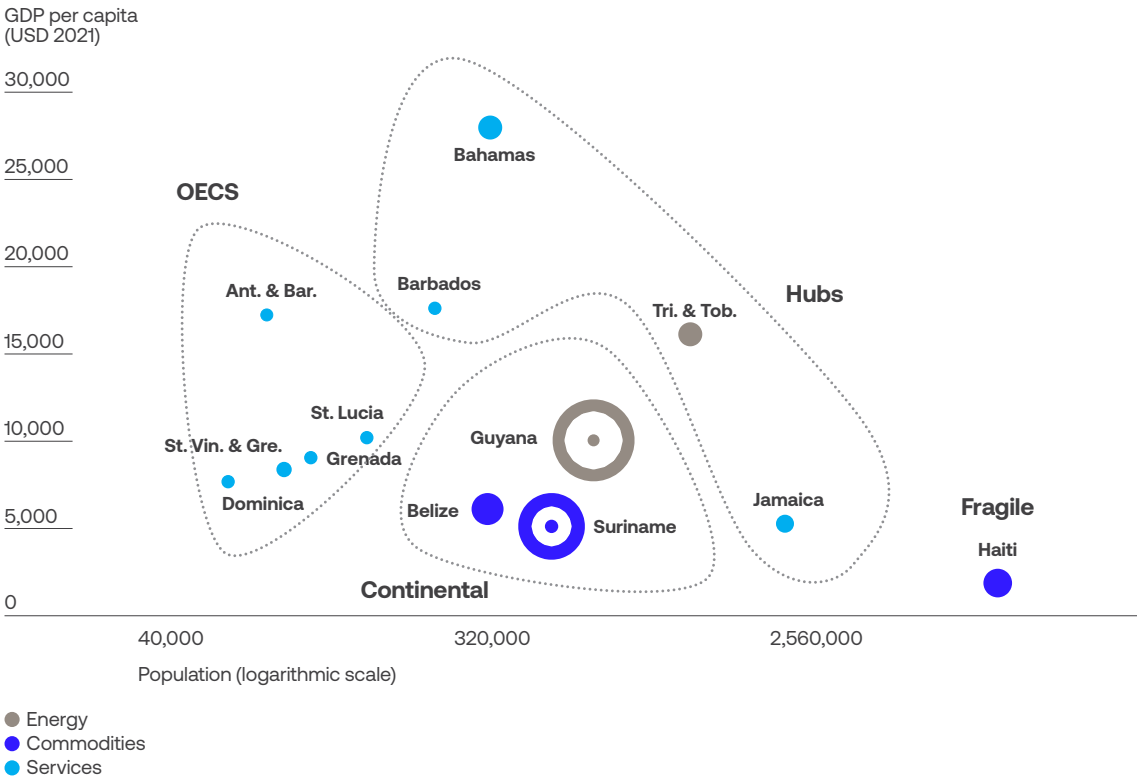
States with diverse economic landscape

Land and population size, geographic location, geological origin, history, and relative resource richness interact to shape the economic composition of each Caribbean country. Examining the region's integration into global trade reveals three distinct groups: (i) fossil-fuel exporters; (ii) service exporters; and (iii) other commodity exporters.

Fossil fuel exporters are a small but growing group. These countries are located on or near the northern coast of South America, specifically in the Maturin and Guyana-Suriname basins. Together with Colombia and Venezuela—two South American countries with extensive Caribbean coastlines—Trinidad and Tobago (23.4 trillion cubic feet of gas), Guyana (11 billion barrels of oil), and Suriname (2.4 billion barrels of oil) hold significant proven oil and gas reserves.

Trinidad and Tobago has a long history as an energy producer, dating back almost a century, initially exporting crude oil. However, the country transitioned to gas production and export in the 1990s. Over the past decade, the energy sector has accounted for close to 80% of exports, 40% of fiscal revenue, and 30% of GDP (see Box 1.1).

Figure 1.3
Population, land area, and GDP per capita
Source: Authors based on World Bank (n.d.).



Note: Bubble size represents country surface, measured in square kilometres.

Box 1.1
Trinidad & Tobago: From energy dependence to economic resilience

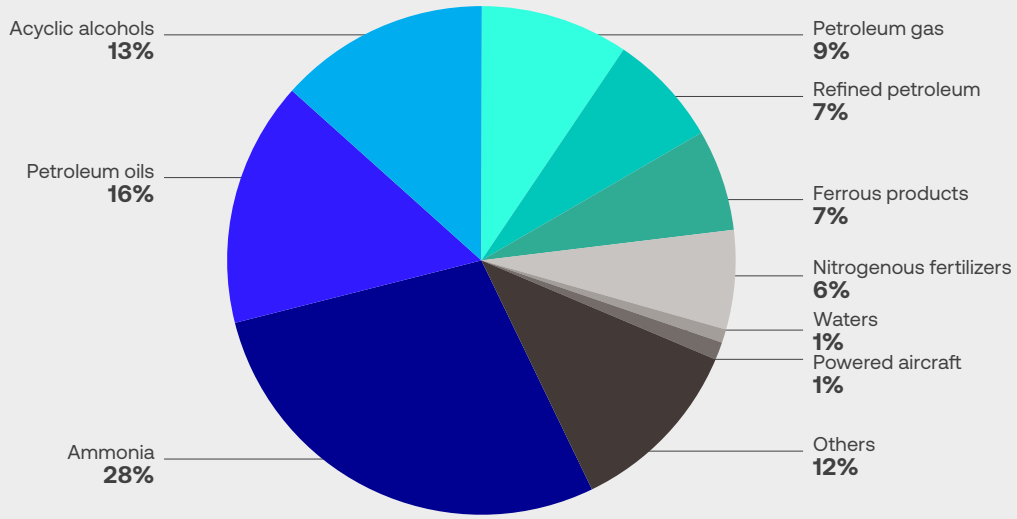
Economic Structure: Trinidad and Tobago, with a population of about 1.5 million and a GDP per capita of USD 18,333 (in 2023), is one of the wealthiest economies in the Caribbean. The economy is heavily reliant on oil, gas, and chemicals, with the energy sector contributing 36% of GDP, nearly 55% of government revenue, and 81% of total exports in 2022. The country's exports are dominated by four main energy commodities—ammonia, petroleum oil, acyclic alcohols, and petroleum gas—which make up two-thirds of total exports. When refined petroleum products and fertilizers are added to the mix, energy products account for around 90% of exports, underscoring the country's limited economic diversification.

Current Economic Policy: Trinidad and Tobago is undergoing a gradual economic recovery, with real GDP growing by 1.1% in 2023, supported by a robust non-energy sector, especially in trade and repairs. GDP is projected to increase by 1.6% in 2024, driven by growth in non-energy sectors and a modest recovery in energy production from new field developments. The IMF (n.d. a) estimates a fiscal deficit of 1.1% of GDP for 2023, with a larger deficit of 6.7% anticipated in 2024, reflecting a decline in energy revenues.

Macroeconomic Challenges: The country has traditionally financed a large public sector through oil and gas revenues. However, recent fiscal reforms aimed at rationalising subsidies and broadening the tax base have become necessary. Despite these efforts, rising public debt remains a concern, requiring further fiscal consolidation amidst declining energy prices.

Development Challenges: Trinidad and Tobago faces structural challenges, including vulnerability to external shocks and the need for economic diversification. The heavy dependence on the energy sector makes the economy susceptible to price fluctuations. While the Heritage and Stabilization Fund exists to buffer against such risks, it has not been enough to fully mitigate them. A more competitive real exchange rate and policy reforms are essential to diversify the economy and adapt to global decarbonisation trends.

Figure B1
Trinidad and Tobago. Composition of exports, 2022
Source: Authors based on ITC (n.d.).



Tourism is a critical sector, contributing 11.4% of regional GDP on average, with even higher percentages in small island countries like Antigua and Barbuda (87.1%).

Guyana has recently discovered substantial deepwater oil fields off the Atlantic coast. Oil production has surged from zero to 600,000 barrels per day in the last few years and is projected to reach 1 million barrels per day before the end of the decade. This projected rapid growth positions Guyana to become the world's biggest per capita oil exporter. The country's oil boom has fuelled extraordinary economic growth in recent years, a trend expected to continue into the medium term. Over the next decade, Guyana is forecasted to become the wealthiest country in the region in terms of GDP per capita.

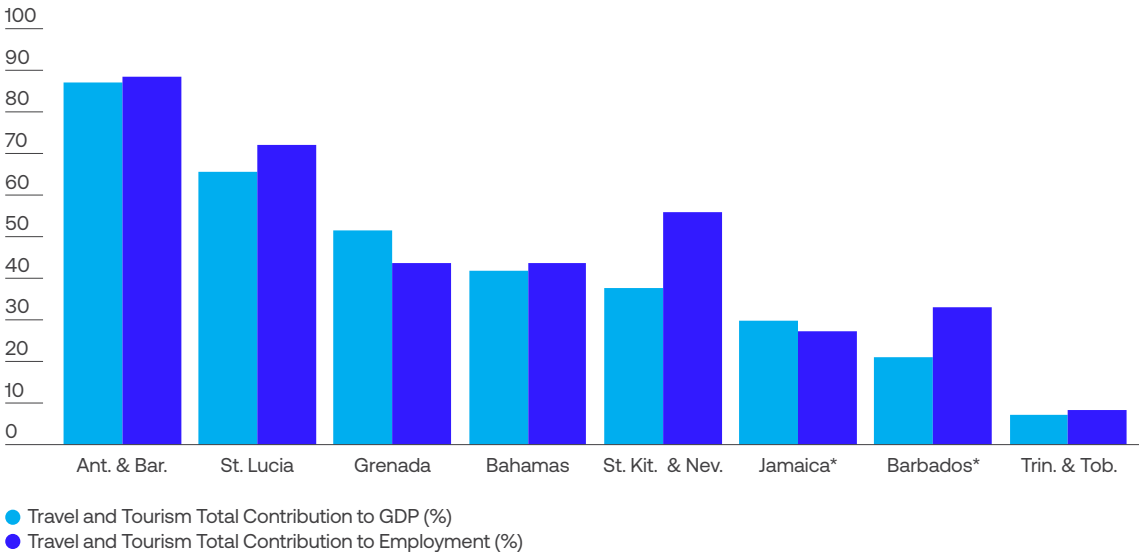
Suriname is still in the early stages of development of the energy industry but could potentially follow Guyana's path if it grants favourable conditions to potential investors and addresses its macroeconomic imbalances. Barbados and Grenada have significant geological potential for oil extraction, but such potential is more uncertain given the geological conditions and the global trend towards energy transition.

Non-resource-rich countries in the Caribbean Basin specialise in services, mainly tourism and financial services oriented towards a global market. As shown in Figure 1.4, Travel and Tourism is the backbone of the economy in many Caribbean islands. On average, this sector contributes 11.4% of regional GDP (based on 2023 data).[2] However, it plays an even more critical role in small island countries like Antigua and Barbuda (87.1% of GDP), St. Lucia (65.7% of GDP), Grenada (51.7% of GDP), the Bahamas (41.9% of GDP), and Barbados (21.1% of GDP). It also accounts for more than a quarter of overall employment in seven of the eight economies presented in Figure 1.4.

Moreover, Jamaica and Bahamas—and to a lesser extent Barbados and Trinidad and Tobago (noted for its fossil fuel exports)—serve as important regional hubs. Together, Jamaica and the Bahamas account for 78% of the total container traffic among the Caribbean countries analysed in this report, with Trinidad and Tobago contributing an additional 10% (see Table 2.4 in Chapter 2). While Barbados handles relatively little container traffic, its combined airport and port facilities are crucial for cruise ship passengers/operations.

2 Data retrieved from WTTC (n.d.). The world average in 2023 was 9.1%.

Figure 1.4
Travel and tourism services contribution to GDP and employment (%), 2023
Source: Authors based WTTC (n.d.).



Note: Countries marked with an * indicate values for 2022.

Financial services also represent a vital sector in the region. In countries like The Bahamas, the industry has a long-standing tradition, established as early as 1936, compared to its introduction in the Eastern Caribbean in 1982. Financial services contribute between 10% and 15% of GDP in The Bahamas, with more than half (9% of GDP) directly tied to offshore operations. In Barbados, offshore operations generate 6.8% of GDP.

Countries that do not export energy or services tend to be among the poorest in the region. Suriname, Haiti, and Belize are in this group. In Suriname, while mining generates nearly half of public sector revenue and gold accounts for over 80% of total exports (Apapoe, 2023), poverty levels have not significantly diminished.

Belize, in contrast, is primarily an agricultural product exporter with very low per capita exports. This country, which specialises in sugar and banana crops, is in the bottom quintile of per capita exporters in the world.

Haiti presents a distinct economic profile, with almost 40% of its working population in the agriculture sector, mostly dedicated to subsistence agriculture. Haitian exports are concentrated in light manufacturing, particularly textiles, which comprise close to 87% of total exports. The sector's growth was spurred by international donor interventions beginning in 2006, notably led by the United States through duty-free access to its domestic market and USAID financing to promote the textile and garment industry for export.

Long-term average growth in the Caribbean has been low, trending downward from 7% in the 1960s to 1.4% between 2010 and 2020.

Macroeconomic context

Long-term average growth in the Caribbean region is low and has been trending downward. Between 1970 and 2010, the region's annual growth rate averaged 2.0–2.3%, well below the growth rates in the 1960s (7%) (see Figure 1.5). Slower growth in the last decade (2010–2020) is linked to less favourable demographic trends—such as an ageing population and fewer young people entering the labour market—alongside significant debt overhangs in many countries of the region and a less dynamic global economy, particularly in Europe, a key trade partner in services.

The COVID-19 pandemic hit the subregion particularly hard. In 2020, real GDP contracted by 9.5%—a sharper decline than the 6.9% contraction experienced by Latin America. Global lockdowns disproportionally affected service industries, particularly tourism, as international travel came to an almost complete halt in 2020 (see Figure 1.6, panel A).

Figure 1.5
Caribbean: Average GDP growth rate (%)
Source: Authors based on World Bank (n.d.).

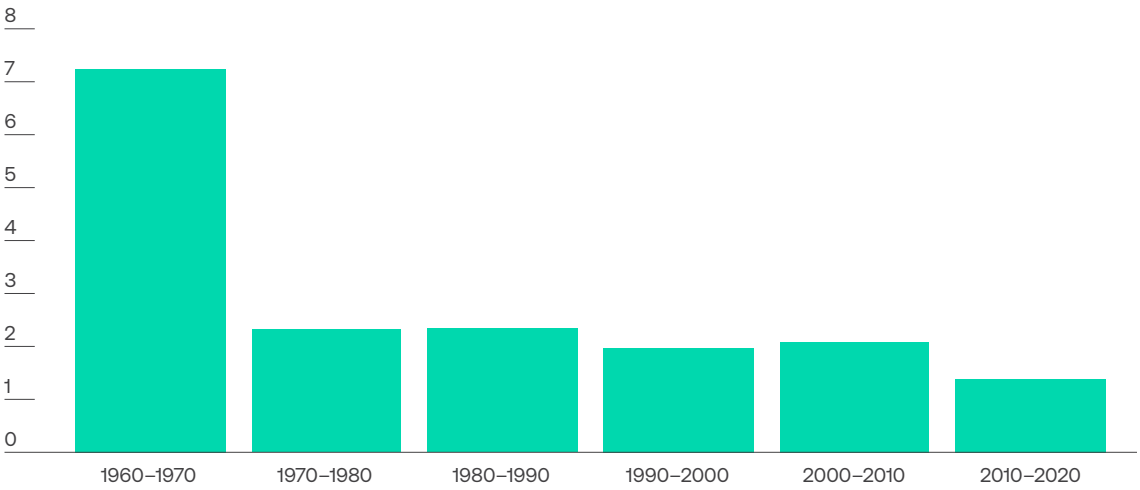
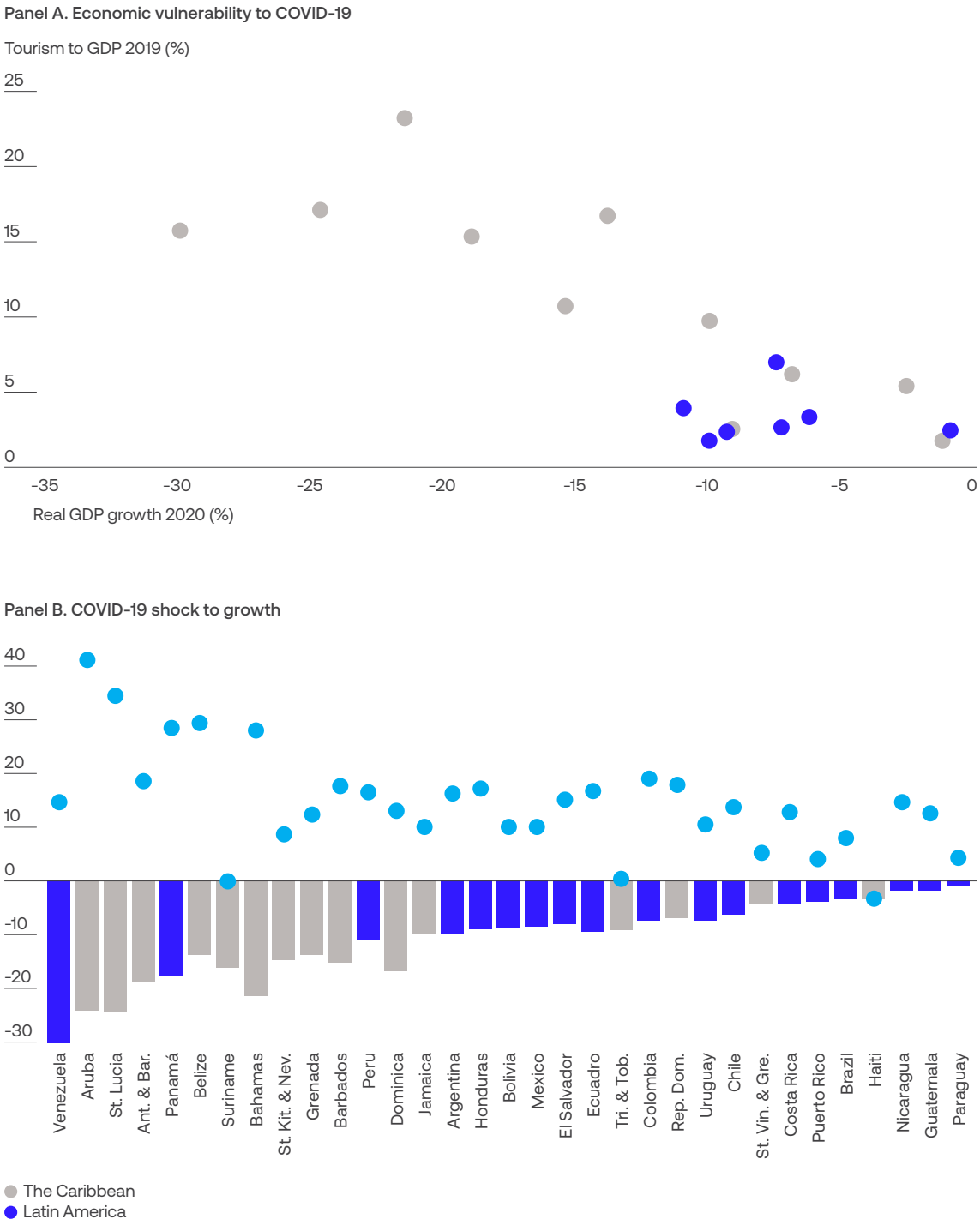


Figure 1.6
Relative size of Covid-19 shocks
Source: Authors based on IMF (n.d. b) and WTTC (n.d.).



Note: Panel A excludes Guyana (real GDP grew 43.5% in 2020 and accumulated 94.8% between 2020 and 2022). In Panel B, dots represent the accumulated % change 2020–2022, while bars represent the % change in real GDP for 2020.

Many Caribbean nations found it difficult to compensate for the contraction through countercyclical fiscal policies due to already very high debt levels. For instance, Jamaica chose to adhere to its pre-existing IMF fiscal targets, forgoing the option of a more expansionary fiscal approach to mitigate the shock. Meanwhile, unemployment in the subregion increased by 1.4 percentage points (pp) even though labour force participation contracted by 3.0 pp, due to a combination of discouraged workers exiting the labour force and reduced economic activity.

Post-COVID recovery has been slow, uneven, and protracted (see Figure 1.6, panel B). It took three years (until 2022) for the region to return to pre-pandemic GDP levels. Unlike the global recovery trend, four of the 13 Caribbean countries studied for this report experienced negative growth for at least two consecutive years during the pandemic: Barbados, Haiti, Suriname, and Trinidad and Tobago).

During that period, increases in energy prices and post-pandemic restructuring of air traffic routes drove up airfares, further depressing international travel. Additionally, real exchange rate appreciation—particularly in countries with currencies fixed to the US dollar, such as Barbados, Trinidad and Tobago, and the Eastern Caribbean Currency Union—combined with an economic downturn in key global markets limited tourist flows. This dynamic had severe consequences for tourism-dependent economies in the region.

By 2022, seven out of the 13 countries listed in Figure 1.6 (Antigua and Barbuda, Dominica, Grenada, Haiti, St. Kitts and Nevis, Suriname, and Trinidad and Tobago), had not yet returned to the pre-pandemic GDP levels. In some cases, specific domestic factors contributed to the underperformance. In Trinidad and Tobago, contraction in the energy sector due to insufficient investment negatively affected economic growth. Haiti continued to face longstanding political instability and security issues, significantly disrupting economic activity. Suriname experienced slower growth as a result of an economic adjustment programme aimed at restoring macroeconomic stability.

In other countries, tourism (Bahamas, Barbados, Belize, Saint Lucia, St. Vincent and the Grenadines) and energy (Guyana) sector performance drove GDP recovery. However, those dependent on European tourism (such as Barbados and the Eastern Caribbean) were hit harder due to slower economic recovery in European markets.

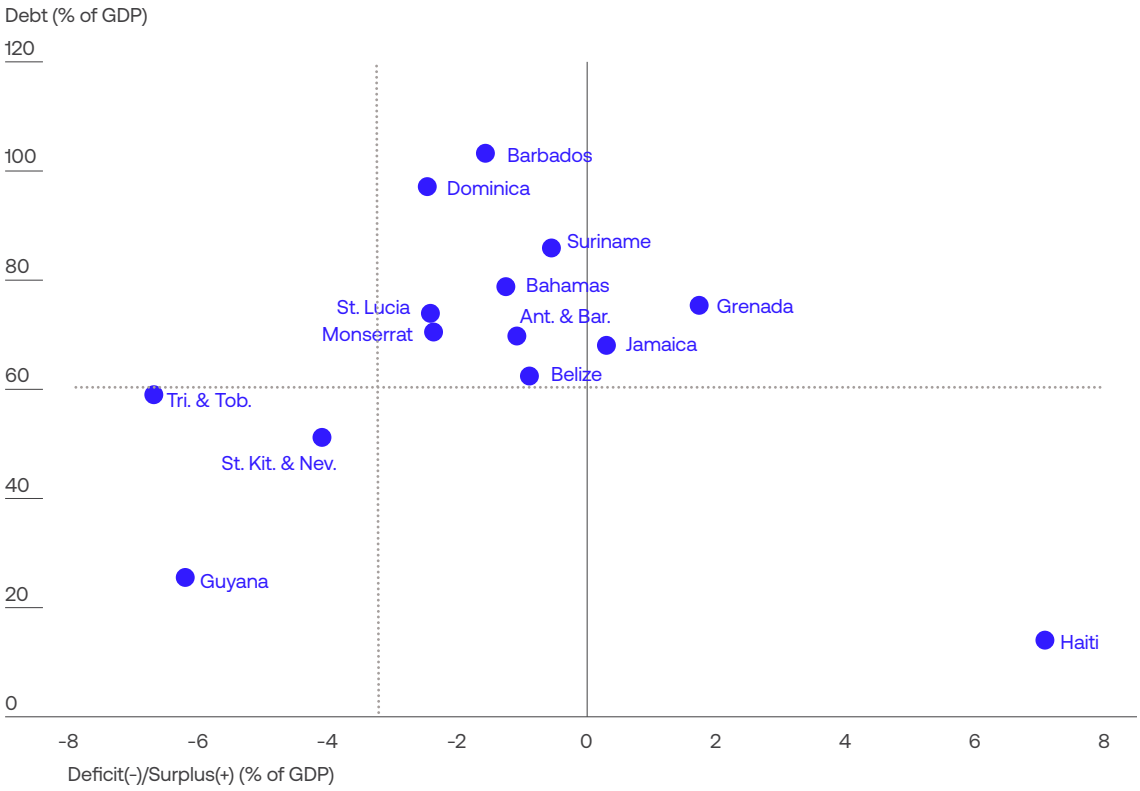
Fiscal situation

The collapse in GDP and the widening of fiscal deficits across the Caribbean during the pandemic significantly increased public indebtedness, prompting fiscal consolidation processes in several countries. In Trinidad and Tobago, the debt-to-GDP ratio rose by 7 pp from 61.2% in 2019 to 68.2% in 2020, to later recover to 59% in 2024. In Barbados, which was already undergoing a process of fiscal consolidation (see Box 1.2), debt-to-GDP deviated from the downward trend and surged 19.2 pp in 2020 reaching 136.5% before subsequently declining to 103.2% in 2024; and in Jamaica, the debt-to-GDP ratio stood at 85% in 2013 and almost 68% in 2024 (having evolved in an inverted-U fashion with a peak of over 100% in 2020) (see Box 1.3). Fiscal prudence in most countries, coupled with favourable prices for energy-exporting economies, has helped bring economies back to a more solid footing in fiscal terms. For Barbados, Jamaica, and Trinidad and Tobago, the average fiscal deficit expected for 2024 is 2.7% of GDP, below the average for Latin America, and well within the threshold needed to maintain debt sustainability (see Figure 1.7).

External financing continues to be a challenge. With tourism flows still on the rebound, current account deficits have widened in several countries, making it more difficult to bridge the foreign financing gap. Excluding Trinidad and Tobago and Guyana, where energy exports play a significant role, current account deficits were, on average, over 10% of GDP between 2020 and 2022. While tourism receipts are helping narrow these deficits, foreign reserves and other external assets have been partially depleted in recent years, according to official national accounts data. Access to international financing continues to be challenging, particularly in the current high-interest environment.



Figure 1.7
Fiscal balance and public debt, 2024 estimates (% of GDP)
Source: Author based on estimates by IMF (n.d., retrieved November 2024).



For the region, international financing institutions (IFIs) remain crucial, often serving as the primary or sole funding source. For instance, multilateral funding accounts for 0.6% of GDP for LAC. This figure increases to 2.8% on average in Barbados, Jamaica, and Trinidad and Tobago,[3] out of 4.6% of external financing. This is the case in countries that have experienced balance of payment crises in recent years and have active IMF programmes (Jamaica, Barbados and Granada, among others).

The easing of US monetary policy promises positive prospects for the region. Lower international interest rates will make it easier for countries in the region to continue with their fiscal consolidation process. As interest rates in developed markets go down, investor risk appetite for emerging markets could increase, allowing Caribbean countries to more easily finance their current account deficits without having to rely so heavily on IFI funding. Furthermore, as the global economy averts a recession and instead lands softly on a path towards long-term growth, demand for energy and tourism services will be spared a negative shock, mitigating external macroeconomic risks for the region.

However, energy prices remain a first-level macroeconomic risk**.** While a few countries in the region, such as Trinidad and Tobago, are energy exporters, most economies continue to rely heavily on imported oil. In some cases, oil bills account for up to 7% of GDP. Although markets do not anticipate an imminent risk over energy prices, conflicts in the Middle East and Ukraine remain sources of concern for the region.

3 The source of LAC and Caribbean averages is the Directorate of Macroeconomic Studies' Fiscal Monitor, based on national data. LAC includes all CAF members in the region.

Box 1.2
Barbados: Navigating a demanding but necessary fiscal consolidation

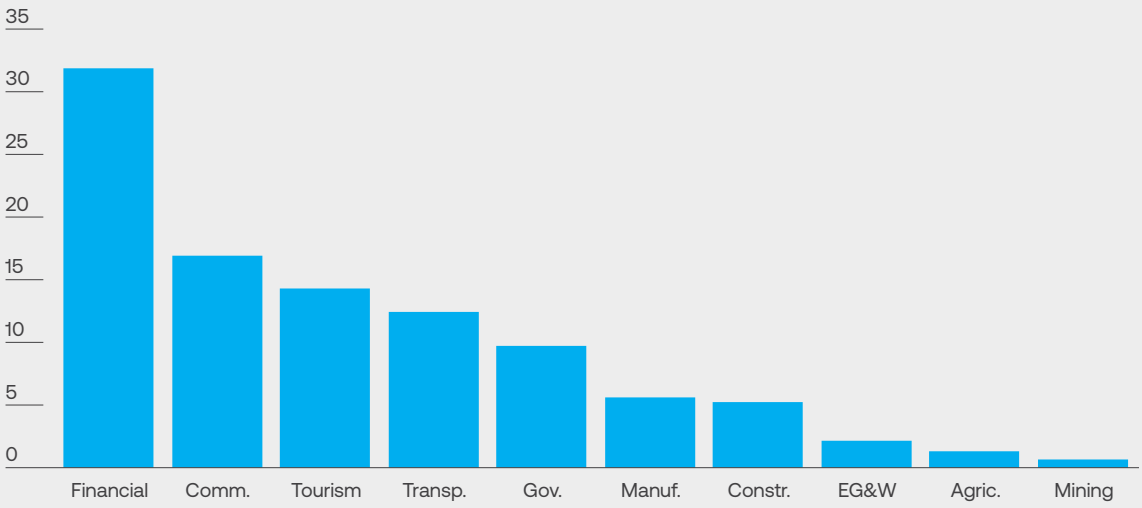
Economic Structure: Financial and other services represent the largest sector in Barbados' economy, accounting for 31.8% of GDP as of early 2024. This is followed by commerce (16.9%), tourism (14.3%), and transport (12.4%). Government services contribute 9.7% of GDP. Together, these service-oriented sectors represent three-quarters of the economy (see Figure B2).

Current Economic Policy: In 2022, the government launched the Barbados Economic Recovery and Transformation Plan (BERT 2022), a four-year strategy focusing on growth through sustainable investment, fiscal sustainability (with a target debt-to-GDP ratio of 60% by 2035/36), debt management, and social cohesion via public investment. The main focus is fiscal consolidation, with a target primary surplus of 4% of GDP for the current year and 4.5% for the next.

Macroeconomic Challenges: Managing public sector finances remains the main challenge. The current account deficit, though narrowing, is still at 9% of GDP, with a target to reduce it to 6.2% by 2025. Inflation has decreased to 4.4% from a peak of 6.7%, with expectations of a further drop to 3.1% by the end of 2024.

Development Challenges: No official poverty estimates have been published since 2017. However, in 2016, about 25% of the population lived below the basic needs threshold. By 2021, 55.3% benefited from social protection programmes. The government aims to enhance social investment to combat poverty and maintain social cohesion.

Figure B2.
Barbados. Participation of sectors in GDP (%, first quarter of 2024)
Source: Authors based on Central Bank of Barbados (n.d.).



EG&W: Electricity, Gas and Water

Box 1.3
Jamaica: Vulnerability to external shocks and limited fiscal space

Economic Structure: Jamaica's economy is heavily reliant on the services sector, which accounts for about 70% of GDP. Key industries include tourism—a major source of foreign exchange—and financial services. Manufacturing and industrial activities contribute around 21% of GDP, with agriculture representing approximately 9%. The country's primary exports include refined petroleum, aluminium oxide, aluminium ore, and hard liquor, while imports mainly consist of refined petroleum, crude petroleum, petroleum gas, cars, and medicines. Remittances make up about 20% of GDP.

Current Economic Policy: Jamaica has struggled with high debt for years; however, fiscal consolidation since 2013 has reduced the public debt-to-GDP ratio by over 60 pp to 67.9% (2024 estimate), the lowest level in 25 years. Robust revenues and stringent control over spending have contributed to this improvement. The Bank of Jamaica (BOJ) has maintained a disciplined monetary policy, keeping inflation within the target band of 4–6%. The BOJ raised the policy rate to 7.0% in November 2022 but reduced it slightly in August 2024 after inflation stabilised.

Macroeconomic Challenges: Fiscal consolidation efforts limit economic growth by limiting government spending on critical investments. Jamaica's reliance on imports and tourism renders the economy highly susceptible to external shocks, especially in the agriculture sector, which employs over a third of the labour force.

Development Challenges: Historically, Jamaica's growth has been affected by financial crises and natural disasters. Productivity is hampered by resource misallocation and a lack of skilled labour, with low productivity in services. The pandemic increased the poverty rate from 11% in 2019 to 16.7% in 2021, underscoring the country's ongoing economic challenges.

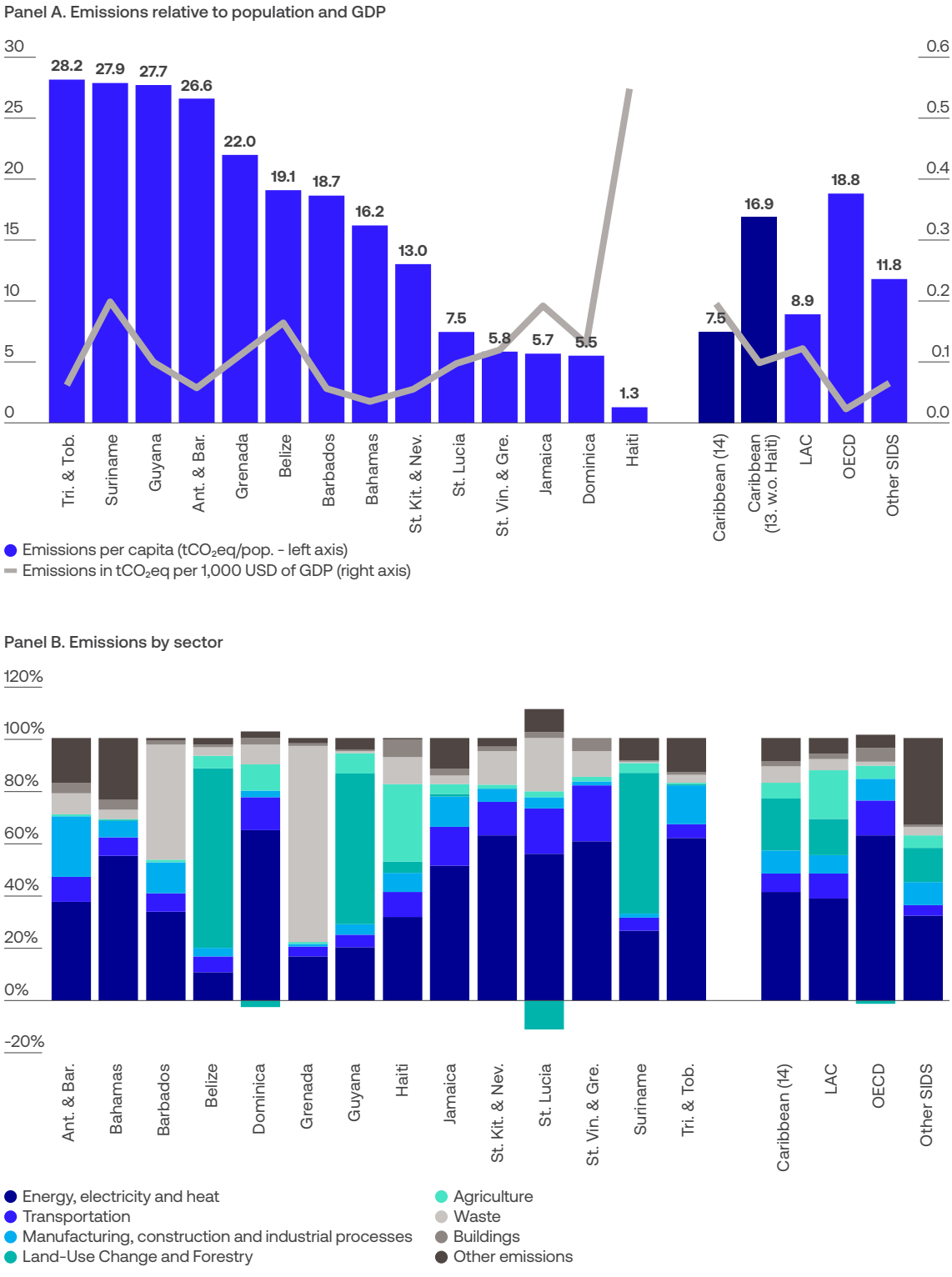
Impact and exposure to climate change

The Caribbean is particularly vulnerable to the impacts of climate change, despite contributing only 0.5% of global greenhouse gas (GHG) emissions. However, this small contribution is significant relative to the region's size: excluding Haiti (which skews the regional average due to its current socioeconomic situation), per capita GHG emissions in the Caribbean region exceed those in LAC and other SIDS, while emissions per unit of GDP exceed those in OECD and other SIDS (see Figure 1.8, Panel A), indicating significant potential for decarbonisation. The region's energy system is mainly powered by oil and natural gas, leading to greater GHG emissions compared to systems that use renewable energy sources like hydro, solar, or wind.

The sector analysis underscores energy, electricity, and heat (including HVAC systems) as the main contributors to GHG emissions in Caribbean countries, accounting for 41% of global emissions (see Figure 1.8, Panel B). The Land Use Change and Forestry (LUCF) sector follows although continental countries are the main emitters, with Caribbean SIDS contributing negatively. Other sectors like Manufacturing, Construction, and Industrial Processes (9%) and Transportation (7%), rely heavily on gasoline and diesel, compounding environmental degradation. The contribution of transport is exacerbated by inadequate public transport and congestion.

Figure 1.8
Total greenhouse gas emissions in the Caribbean, 2021

Source: Authors based on Climate Watch (n.d.) and World Bank (n.d.). Caribbean (14) includes the countries listed in the figure; Caribbean (13, w.o. Haiti) in Panel A excludes Haiti from the regional average.



The environmental toll of these sectors goes beyond direct GHG emissions. They contribute to air, water, and soil pollution, as well as inefficient resource use, threatening ecosystems and biodiversity. GHG emissions aside, infrastructure sectors also contribute to other forms of pollution, including particulate matter and solid waste. The transport sector is a major source of air pollution. As shown in Figure 1.9, the countries analysed experience higher exposure to air pollution (22.1 micrograms per cubic meter) compared to LAC (18.7), other SIDS (16.1), and OECD countries (11.7), with direct consequences for public health.

Figure 1.9
Mean annual exposure to air pollution in the Caribbean (micrograms per cubic meter), 2020
Source: Authors based on World Bank (n.d.). Caribbean (14) includes the countries listed in the figure.



Despite these challenges, Caribbean nations are making meaningful progress towards sustainable infrastructure. According to the World Bank (2023b), many CARI-12 countries have set overly ambitious renewable energy targets. Several aim for 100% renewable electricity by 2030, despite currently having minimal renewable energy in their mix. Others, like Saint Lucia and Suriname, have set more moderate goals, with the latter already achieving its target. However, countries like St. Vincent and the Grenadines have missed past targets and lack updated objectives, reflecting the challenges in aligning ambition with progress (World Bank, 2023b).

A similar situation is observed in the Nationally Determined Contributions (NDCs) of some Caribbean countries, which reflect their commitment to mitigation goals. For instance, Grenada, Barbados, and Dominica have set highly ambitious targets, requiring emission reductions of 94%, 66%, and 50% by 2030 compared to 2015 levels. However, others, such as Haiti and St. Vincent and the Grenadines, have adopted much less restrictive goals, skewing the regional average to a modest -14% (see Table 1.2).

Additionally, due to its geographical location, the Caribbean is one of the developing regions most at risk from climate change-related natural disasters relative to their economic size. Hurricanes, flooding, and rising sea levels pose significant threats to infrastructure and economies. These climate phenomena result in devastating losses, including loss of lives, human capital, food and health insecurity, and damage to infrastructure and economic assets (Adeoti et al., 2020).

Table 1.2
Ambition of mitigation targets in NDCs relative to 2015 emissions in the Caribbean region

Source: Authors based on UNFCCC Secretariat (2022) and Climate Watch (n.d.). Caribbean (5) includes the countries listed in the figure. Caribbean includes the list of countries included in UNFCCC and Climate Watch.

Country/region	GHG emissions target in 2030 (in $MtCO_2eq.$)	GHG emissions in 2015 (in $MtCO_2eq.$)	GHG difference between 2015 and 2030 (in $MtCO_2eq.$)	GHG difference between 2015 and 2030 (in percentage)
Barbados	1.3	3.7	2.5	66%
Dominica	0.1	0.2	0.1	50%
Grenada	0.1	2.3	2.2	94%
Haiti	17.8	10.7	-7.0	-65%
St. Vin. & Gre.	0.5	0.3	-0.1	-42%
Caribbean (5)	19.8	17.3	-2.4	-14%
Caribbean	67.2	52.7	-14.5	-28%
LAC	3,001.8	3,350.1	348.3	10%
OECD	9,465.0	14,194.2	4,729.2	33%
Other SIDS	70.4	49.4	-21.1	-43%

When compared with South America and Central America, the Caribbean suffered significantly greater impacts from natural disasters during the period 2010–2024 (Table 1.3): the loss of lives (per capita) in the Caribbean was 260 times that in South and Central America during the same period despite lower occurrence of natural disasters. The number of people left homeless was equally disproportionate at a staggering 471,407 individuals—a per capita rate 3.4 times the magnitude registered in South America and 12.6 times that of Central America. Total damages (measured as a percentage of GDP) were 12.3 times higher than South America and 10.9 times greater than Central America. For a relatively small region, reconstruction costs totalled USD 17.8 billion, similar to that of South America, which experienced 150% more disasters during the same period.

Table 1.3
Disasters in Latin America and the Caribbean, 2010–2024

Source: Authors based on EM-DAT (n.d.).

Indicator	South America	Central America and Mexico	The Caribbean*[1]
Number of disasters	509	276	203
Most frequent disasters	Floods, landslides and earthquakes	Storms, floods, and earthquakes	Storms, floods, and epidemics
Deaths	11,531	4,491	235,078
per million inhabitants	27.6	25.2	6,987.6
People left homeless	1,101,692	129,883	471,407
per million inhabitants	2,696	729	9,179
Total damage (in billion USD)	100.8	53.8	126.5
Relationship to GDP*[2]	26.8	30.2	329.1
Insured damage (in billion USD)	13.5	11.2	40.8
Cost of reconstruction (in billion USD)	19.0	1.3	17.8

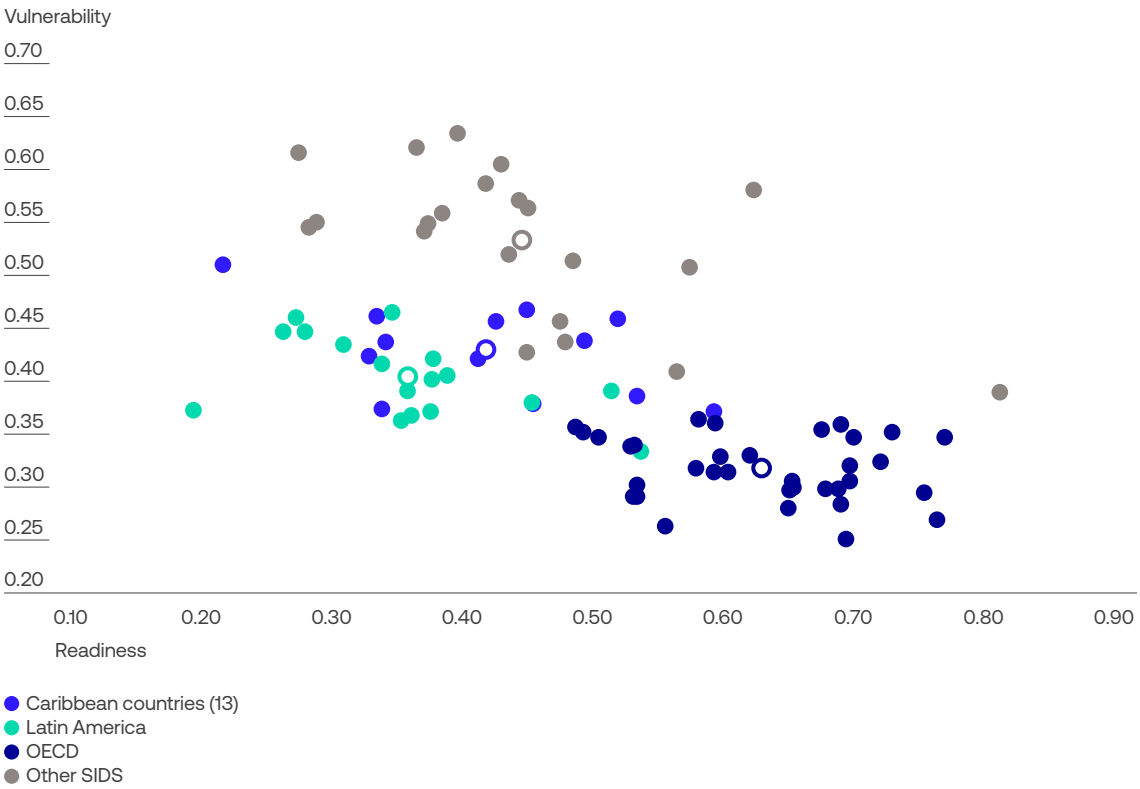
Note: “People left homeless” reflects the number of persons whose home was destroyed or severely damaged, and who needed shelter after the disaster. “Total damage” includes the destruction of physical assets (infrastructure, production, the environment, and others). “Insured damage” refers to the proportion of total damage covered by insurance companies. “Cost of reconstruction” includes expenditure on replacing destroyed assets and investment in preparation and mitigation for future events. Damage is measured in 2022 constant values. *1 Caribbean includes all states from Table 1.1 plus the Dominican Republic and the rest of the Caribbean. South America excludes Suriname and Guyana (included in Caribbean). Central America and Mexico exclude Belize, included in Caribbean). *2 Ratio between Damages (USD billion) and GDP (USD trillion).

According to information from EMDAT (n.d.), between 2010 and 2024, storms accounted for 54% of natural disasters in the region and flooding 35%, illustrating the area's susceptibility to extreme weather events.

This vulnerability highlights the need to assess the region's exposure and adaptability. The University of Notre Dame Global Adaptation Index (ND-GAIN) evaluates resilience through two dimensions: vulnerability and readiness.

Vulnerability measures exposure and sensitivity to the negative impacts of climate change across sectors like food, water, and infrastructure. Readiness assesses a country's ability to attract investment for adaptation measures. The Caribbean countries tend to cluster in the middle range of vulnerability and readiness, more vulnerable than countries in Latin America but less so than other SIDS (Figure 1.10). In contrast, OECD countries typically exhibit low vulnerability and high readiness.

Figure 1.10
ND-GAIN vulnerability and readiness scores in the Caribbean, Latin America, OECD, and other SIDS, 2022
Source: Authors based on Notre Dame (n.d.).



Note: vulnerability and readiness indicators range from 0 to 1. Empty circles represent regional averages for Caribbean countries (13), Latin America, OECD and other SIDS.



The Caribbean is vulnerable to natural disasters, with a per capita loss of life 260 times higher than in South and Central America, underscoring the urgent need for investment in resilient infrastructure.

To enhance vulnerability and readiness assessments in the Caribbean, adaptation efforts should focus on strengthening infrastructure. Many systems lack the durability to withstand extreme weather, resulting in higher recovery costs and extended disruptions (see Chapter 3). Resources are often allocated to immediate damage control rather than strengthening systems to prevent future losses. Moving from reactive recovery to proactive planning can address these vulnerabilities. Investing in climate-resilient infrastructure can lower disruption frequency and severity and support long-term economic stability and growth.

The data presented in this section (Figure 1.8 and Table 1.2, in particular) aim to provide evidence of a significant climate imbalance affecting Caribbean countries. These nations emit far less greenhouse gas relative to their contribution to historical global emissions, yet they bear a disproportionate burden of the consequences of climate change. While the LAC region accounts for 11% of accumulated carbon emissions, the Caribbean specifically contributes a mere 0.5% of global emissions. Despite this minimal contribution—albeit significant in terms of population and GDP—the region is highly vulnerable, suffering disproportionately from extreme climate events. Additionally, some Caribbean countries, such as Suriname, the Bahamas, and Guyana, are particularly susceptible to sea level rise, as 90% of their populations live in low-lying areas (Brassiolo et al., 2023). This stark contrast between the region's minimal emissions and its extreme vulnerability underscores the injustice faced by Caribbean nations in the global climate crisis.

Long-term growth performance and challenges

The region faces several important challenges to sustain long-term growth. Except for specific spurts mostly associated with the expansion of energy sectors in Trinidad and Tobago in the 1990s and 2000s and Guyana in the last few years, growth in the region has been dismal for several decades, averaging less than 2% a year (see the cases of Antigua and Barbuda, The Bahamas, Grenada, and Dominica in Box 1.4). This growth fails to promote convergence with higher-income countries. It has also been insufficient to fund the infrastructure upgrades needed to address the impacts of climate change in this disaster-prone region. Among the main factors behind the low economic growth are the demographic transition (the ageing population that increases the dependency ratio), low labour market

participation rates (particularly among women), high levels of informality, extensive state interventions and low productivity growth, underperforming trade and lack of regional integration, and high exposure to climate-related shocks.

The demographic transition represents a significant challenge. The Caribbean started this transition much earlier than Latin America. As of today, the demographic window of opportunity is already closing as the dependency ratio (non-working age population over working age population) has already started to grow. This issue is compounded by outward migration, particularly among highly educated youth. This limits the availability of human capital and the savings needed to finance investments while also making fiscal sustainability harder to achieve, especially in countries with non-contributory pension systems. This is the case of Trinidad and Tobago, which is already facing significant deficits in its social security systems, expected only to grow larger in years to come.

Box 1.4
Antigua & Barbuda, The Bahamas, Grenada, and Dominica—Charting a path to recovery and resilience as new CAF members in 2024

Source: Authors based on EIU (n.d.), Oxford Economics (n.d.), IMF (2024), and IMF (n.d. a).

Economic Structure: The economies of Antigua & Barbuda, The Bahamas, Grenada, and Dominica are primarily driven by the services sector, especially tourism. In **Antigua & Barbuda**, tourism accounts for over 85% of GDP, supported by construction activities linked to the Citizenship by Investment Program. **The Bahamas** relies heavily on tourism and financial services, particularly offshore banking, and faces significant imports due to limited domestic agriculture and manufacturing. **Grenada** has a more diversified economy with tourism, construction, and agricultural exports like nutmeg. **Dominica** traditionally focused on agriculture but is now shifting towards tourism, infrastructure, and renewable energy, particularly geothermal projects.

Recent Performance: These countries are experiencing a steady recovery post-pandemic, primarily driven by tourism and construction. **Antigua & Barbuda**'s GDP grew by an estimated 4.2% in 2023, with a strong forecast of 5.8% for 2024, bolstered by infrastructure investment and robust tourism activity. **The Bahamas** recorded GDP growth of 4.3% in 2023 but anticipates a moderation to 2.3% in 2024. **Grenada** achieved 4.8% growth in 2023 and is projected to grow by 4.1% in 2024, driven by tourism recovery. **Dominica** saw 4.9% GDP growth in 2023, with a forecast of 4.6% in 2024, supported by public investment. Inflation has started to ease after peaking in 2022.

Macroeconomic Challenges: High public debt, limited fiscal space, and vulnerability to external shocks are challenges shared by all four countries. **Antigua & Barbuda**'s debt is projected at 69.6% of GDP for 2024. **The Bahamas** has reduced its debt from over 100% during the pandemic to 78.7%. **Grenada**'s debt increased to 75.3% of GDP, influenced by the Fiscal Responsibility Act. **Dominica**'s debt is slightly below 100% of GDP. Fiscal reform and diversification are essential for all four nations to build more resilient revenue streams.

Development Challenges: These Caribbean nations face structural issues, including climate vulnerability and social inequality. **Antigua & Barbuda** is at high risk from hurricanes and has been slow to transition to renewable energy. **The Bahamas** grapples with high inequality, youth unemployment, and climate-related risks. **Grenada** has reduced poverty from 15.6% in 2022 to 13.9% in 2023 but remains disaster-prone. **Dominica**—highly exposed to climate risks—is focusing on geothermal energy and infrastructure for future growth. To achieve sustainable development, these countries require improved social protection programmes, vocational training, and investments in climate resilience.

Labour force participation in some Caribbean countries is particularly low, even compared to Latin America's standards. In many cases, this disparity is driven by lower participation among women. In Trinidad & Tobago, labour force participation is 55.6%, 6.9 pp below Latin America's average, with women labour force participation rates reaching just 47.0%. In service-based economies, the gap tends to be less pronounced, as the hospitality industry tends to generate high demand for female labour. While social norms may play a role, other factors such as small markets, gaps in the provision of household services, congestion and bad quality of public transport could also contribute significantly to these differences. Closing these gaps offers a substantial gender bonus, as women in the region tend to have higher educational attainment than men. Fully understanding these challenges and opportunities remains a critical task.

Regarding informality, Amos (2017) estimates that it varies between 25.0% of GDP in The Bahamas and about 40% in Jamaica and Suriname. Since the informal sector is, on average, less productive than the formal one, its share in employment is even higher. Informality undermines access to social security, taxation, and state capabilities while also restricting productive units' access to financing and limiting firms' ability to innovate and grow.

Most Caribbean countries exhibit a high level of trade, which is expected given their size, with much higher trade-to-GDP ratios than the Latin American average. However, some components of trade costs remain steep. For instance, applied tariffs in the Caribbean average 11.5%, significantly higher than Mercosur's 7% on average (Allub and Schliesser, 2023). The Caribbean's international trade and participation in value chains remain low within the region but are markedly higher in extra-regional markets, denoting an ample scope to promote trade facilitation within the region. Participation in global value chains is mainly through backward linkages, that is, as users of foreign inputs. Greater coordination and renewed integration efforts within the region and between the Caribbean and Latin America could improve input quality, strengthen regional value chains, and enhance overall efficiency.

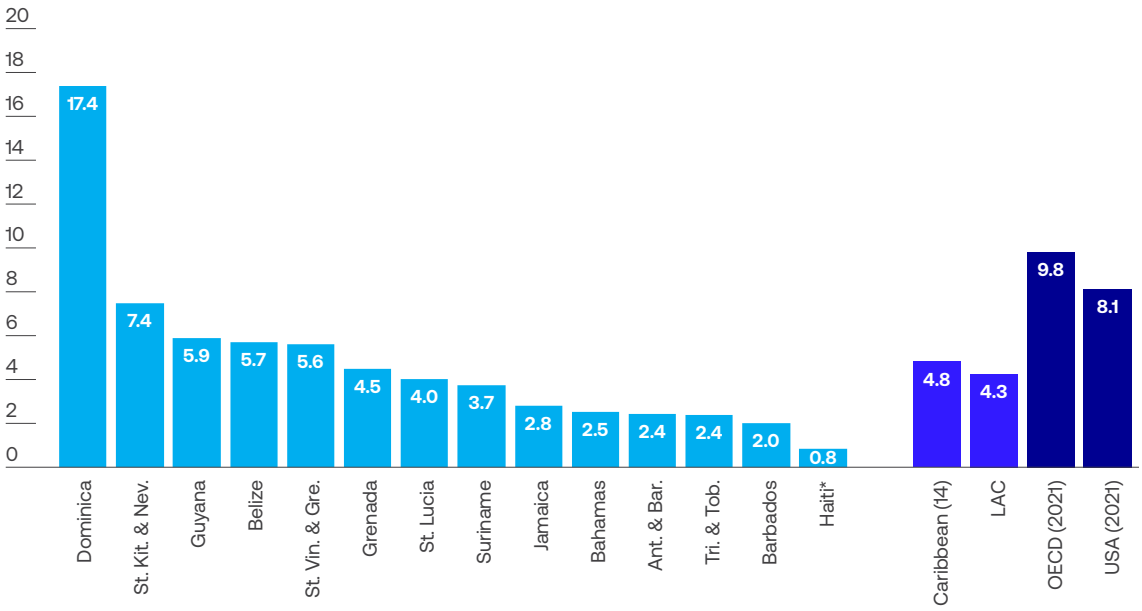
Implications of the macroeconomic landscape for infrastructure services

Many of the pressing economic, social, and sustainability challenges the Caribbean is grappling with are intricately linked to infrastructure. Key issues include limited access to essential services, insufficient quality and high costs, and weak resilience to extreme weather events and climate change—all of which pose risks to vulnerable communities and economies. These challenges are further exacerbated by fragmented regulatory frameworks, institutional weaknesses, and constrained fiscal capacities, which limit the ability to implement necessary improvements. Addressing these deficits is critical for fostering productivity, economic integration, and inclusion across the Caribbean.

The current state of public finances in the Caribbean, characterized by high levels of debt and fiscal constraints, limits governments' capacity to independently undertake transformative infrastructure investments.

These challenges are compounded by the additional financial burdens associated with frequent climate-related disasters, which further strain national budgets. On average, Caribbean countries allocate 4.8% of their GDP to capital expenditure, similar to the LAC average of 4.3%. This share, however, is significantly lower than that of advanced economies. Moreover, this figure is skewed by countries with exceptionally high levels of capital expenditure, such as Dominica (the only country in the sample that allocates a higher share of GDP on capital expenditure than developed countries). Notably, eight out of 14 Caribbean nations—Haiti, Barbados, Trinidad and Tobago, Antigua and Barbuda, the Bahamas, Jamaica, Suriname, and Saint Lucia—fall below the LAC average (see Figure 1.11).

Figure 1.11
National government capital expenditure as a percentage of GDP. Average value, 2016–2020
Source: Authors based on data from ECLAC (n.d.).



Note: Haiti's value corresponds to the average from 2016 to 2018. OECD and USA data from OECD (2023).

Given these constraints, governments in the region need to adopt strategies that effectively leverage private capital and international financial support to fund critical infrastructure projects. Additionally, efficient investment in sustainable and resilient infrastructure offers a pathway to address some of the region's most pressing developmental constraints. Alongside direct investment, prioritizing improvements in the "soft" aspects of infrastructure —such as institutional capacity and regulatory frameworks— can play a pivotal role in closing existing gaps. Exploring actionable measures to unlock the transformative potential of infrastructure is essential to drive sustainable growth. The final chapter of this report identifies opportunities to improve the provision of infrastructure sectors, delving into the actions that governments can take to alleviate these constraints. By addressing these challenges, the region can harness infrastructure's potential as a catalyst for sustainable and inclusive growth.

2

Infrastructure services in the Caribbean: Status and challenges

This chapter examines critical infrastructure sectors essential for sustainable development in the Caribbean: **energy, logistics and transport, digital communications, and water and sanitation**. These are key sectors to foster productivity gains and economic integration, while also promoting social inclusion—particularly in energy and water and sanitation services. The chapter analyses infrastructure services received by users in terms of coverage, quality, and efficiency. Additionally, it explores how these sectors intersect with climate change in terms of mitigation and resilience, identifying gaps that hinder economic growth and social inclusion.

Recent studies underscore the need to pay more attention to infrastructure services (Fay et al., 2017; Cavallo et al., 2020; and Cont et al., 2021). This approach not only addresses immediate needs but also builds a foundation for long-term sustainable development. The chapter also identifies infrastructure deficits and explores multiple interventions, including increased investment, stronger institutions, and enhanced regulation.

To conduct the sectoral assessment of infrastructure sectors, this report relies on both quantitative and qualitative analyses. The qualitative approach includes a thorough review of relevant documents—such as diagnostic studies and strategic planning documents—as well as interviews with key stakeholders from the public and private sectors. The quantitative analysis draws on available data, allowing comparisons across Caribbean countries and with benchmarks such as Latin America and the Caribbean (LAC), OECD nations, and other Small Island Developing States (SIDS). It also builds on reports that perform quantitative exercises (such as the benefits of investing in non-revenue water (NRW) reductions or the potential of non-conventional renewable energy in the region). These diverse sources provide a comprehensive understanding of the infrastructure landscape, combining objective data with in-depth insights from those directly involved in shaping and implementing policies across these sectors.

With this information, the report presents the situation of infrastructure in the Caribbean across five dimensions: access, quality, affordability, environmental friendliness, and resilience. Figure 2.1 summarises the results using a heatmap format.

Five dimensions

Access to infrastructure services in the Caribbean has improved significantly but persistent disparities remain. Energy access is near-universal, except in Haiti (49%) and some rural areas that rely on costly diesel generators. Road network density is higher on islands but remains below the average for other SIDS, with rural areas facing connectivity issues. Major hubs like Jamaica and The Bahamas boast well-connected ports, but smaller nations struggle with connectivity. While larger islands have international airports with strong connectivity, intra-regional air links are limited. Access to information and communications technologies (ICT) is growing, yet rural areas lag. Water access is widespread (95%), whereas sanitation coverage (87%) is still low, with rural-urban disparities.

Quality issues persist across all sectors. Frequent outages and outdated grids impact energy reliability, while poor road maintenance and weather vulnerability undermine transport. Major ports are modern, but smaller ones face delays and inefficiencies. Airports in countries like Jamaica and Barbados have high-quality facilities, but smaller nations grapple with operational challenges. ICT services are hindered by low speeds and high latency, especially in Haiti and Suriname. Ageing water and sanitation infrastructure results in low sewer connectivity and limited wastewater treatment.

Affordability and environmental concerns are pressing. High energy costs, costly transport, expensive broadband, and inefficiencies in water systems create burdens for consumers. Fossil fuel reliance dominates energy, while emissions from road transport, high NRW, and inadequate e-waste management exacerbate environmental pressures.

Resilience remains critical. Infrastructure across sectors is highly vulnerable to climate change. Investments in resilient energy grids, climate-adapted roads, and disaster-ready ports and airports are essential. Progress in ICT resilience and water infrastructure is being made but it remains uneven, with smaller nations facing greater obstacles.

The rest of the Chapter moves forward to look at the detailed results by sector.

Figure 2.1
Sectoral assessment

	Access	Quality	Affordability	Environmental Friendlines	Resilience
Energy	🟢	🟡	🔴	🔴	🟡
Road transport	🟢	🟡	🟢	🟡	🔴
Maritime transport	🟡	🟡	🔴	🟡	🟡
Air transport	🟡	🔴	🟡	🟡	🟡
ICT	🟡	🟡	🔴	🟡	🟡
Water & sanitation	🟡	🟡	🟡	🔴	🔴

🔴 Poor
🟡 Regular
🟢 Good

Note: Summary of the sector-specific findings throughout the Chapter.



Energy

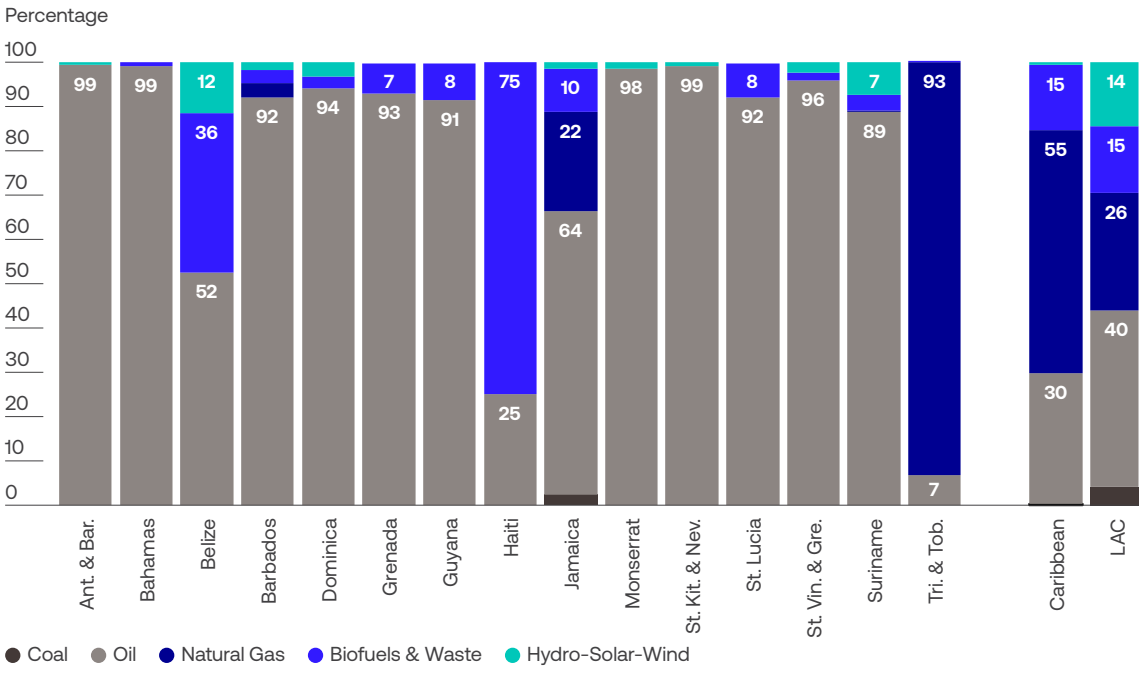
The Caribbean region faces significant challenges in energy infrastructure and services, impacting economic development and environmental sustainability. While access is generally widespread, affordability and environmental friendliness are the weakest areas. Quality and resilience, though better, remain at moderate levels (see Figure 2.1). Major challenges include ageing infrastructure, underdeveloped regulatory environments, high dependence on imported fuels, and low penetration of renewable energy.

High energy costs have a detrimental effect on the competitiveness of Caribbean economies, particularly for industries crucial to the region, such as tourism and manufacturing. Financing constraints are also significant, with many Caribbean countries facing difficulties in funding large-scale energy investments due to economic constraints and high levels of national debt.

The region's **energy landscape** is primarily characterised by a heavy reliance on imported fossil fuels, especially petroleum products, used for electricity generation and final consumption. Exceptions include Belize, Haiti, and Trinidad andTobago (see Figure 2.2). Although renewable energy sources such as solar, wind, geothermal, and hydropower have significant potential, their current contribution to the overall energy mix remains limited. Notable exceptions include Belize (12% of energy supply) and Suriname (7%). Trinidad and Tobago and Jamaica are the only countries using natural gas, with Trinidad and Tobago producing it domestically and Jamaica importing it.

Trinidad and Tobago's domestic oil and gas production has met most of the country's energy needs for well over four decades. Suriname has also met most of its energy needs from domestically produced fossil fuels for over four decades. Guyana, which became a major crude oil exporter in 2019, is increasingly meeting its energy demands through domestic production. Barbados and Belize export small quantities of crude oil but largely depend mostly on imported processed fossil fuels for their domestic needs.

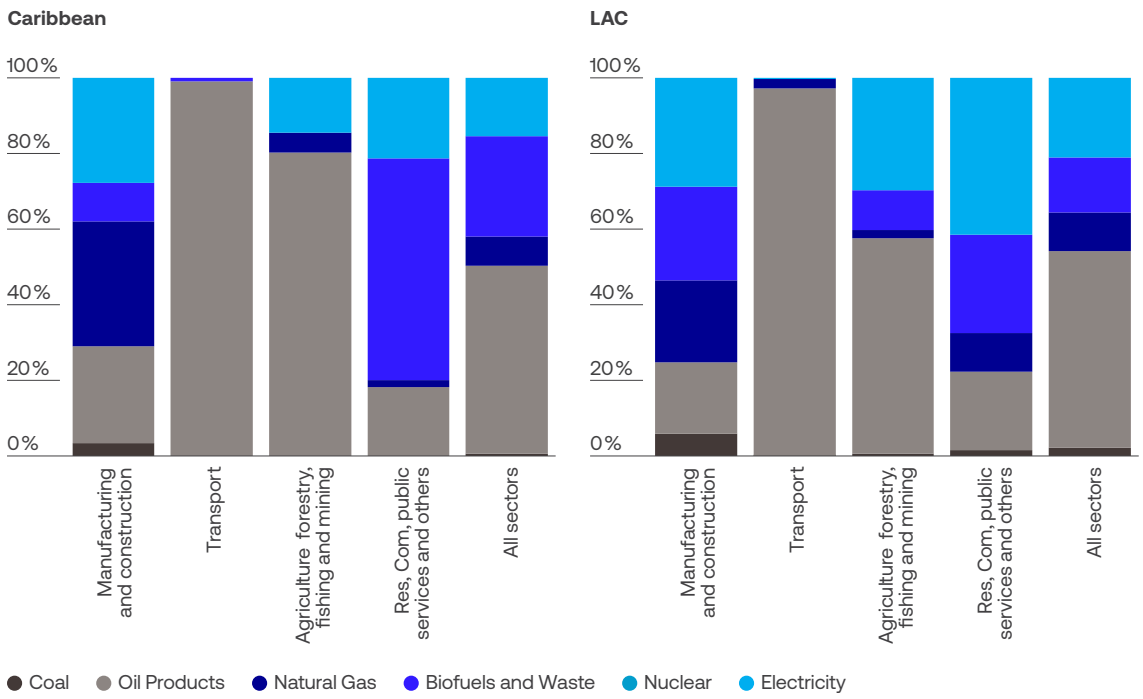
Figure 2.2
The energy matrix, breakdown by country and regional averages, 2021
Source: Authors based on UNSD (n.d.) and OLADE (n.d.).



The Caribbean's energy sector is heavily reliant on imported fuels, with high prices and a low share of renewables posing significant challenges.

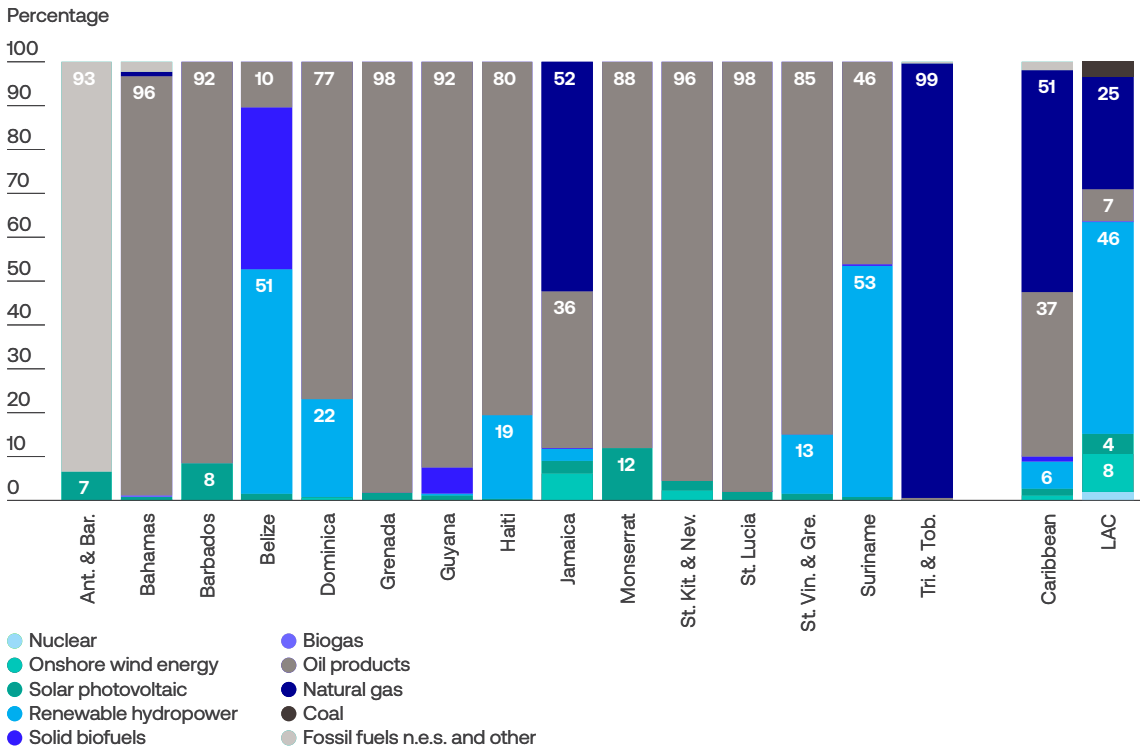
Figure 2.3 shows that end users in the Caribbean rely on different energy sources to meet their needs. Despite progress in terms of the energy transition, the transport sector heavily relies on fuels (a situation also seen in LAC). Agriculture is more dependent on oil products, and both the industry and residential sectors (buildings, in general) use a mix of different energy products.

Figure 2.3
Energy consumption, by sector and energy source, the Caribbean and LAC, 2021
Source: Authors based on UNSD (n.d.) and OLADE (n.d.).



At the regional level, electrification is 15% of energy consumption in the Caribbean, 5 percentage points (pp) below the level in LAC (see Figure 2.3). Most countries in the Caribbean generate electricity based on fuels (see Figure 2.4). The situation is more noticeable in the small islands. Except for Montserrat, unconventional renewable sources represent a small share of generation (less than 10%). Belize and Suriname have an important share of hydropower, and Trinidad and Tobago and Jamaica are also outliers as their mix includes a significant share of natural gas.

Figure 2.4
The electricity matrix in the Caribbean
Source: Authors based on IRENA (n.d.) and OLADE (n.d.).



Most Caribbean countries have achieved near-universal **access** to electricity (see Table 2.1). At the national level, most countries have an adequate supply of electricity, and a high percentage of the population has access to modern cooking technologies. Haiti is an exception. The country faces substantial challenges regarding energy access. As of 2022, only 49% of the population had access to electricity, with significant disparities between urban (83% access) and rural areas. Access in the region—mainly comprised of small islands—generally surpasses other SIDS globally.

Table 2.1
Access to electricity, 2022 (% of Population)
Source: Authors based on World Bank (n.d.).

Country/region	Total	Rural	Urban
Antigua and Barbuda	100	100	100
Bahamas	100	100	100
Barbados	100	100	100
Belize	98.6	97.1	98.4
Dominica	100	100	100
Grenada	94.2	n/a	n/a
Guyana	93.0	91.6	98.0
Haiti	49.3	n/a	83.0
Jamaica	100	100	100
St. Kitts and Nevis	100	100	100
St. Lucia	100	100	100
St. Vincent and the Grenadines	100	100	100
Suriname	99.0	98.0	100
Trinidad and Tobago	100	100	100
Caribbean (14)	**95.3**	**98.9***	**98.4***
LAC	**97.7**	**97.8**	**99.4**
OECD	**100**	**100**	**100**
Other SIDS	**88.5**	**85.4**	**93.6**

Note: Real averages are lower than the values reported because disaggregated data in some countries is lacking. Caribbean (14) includes the countries listed in the table.

There are still significant challenges in ensuring reliable access in remote and underserved areas. In several countries (see Box 2.1), rural and geographically isolated communities struggle with inconsistent or limited energy services, often relying on inefficient and costly diesel generators.

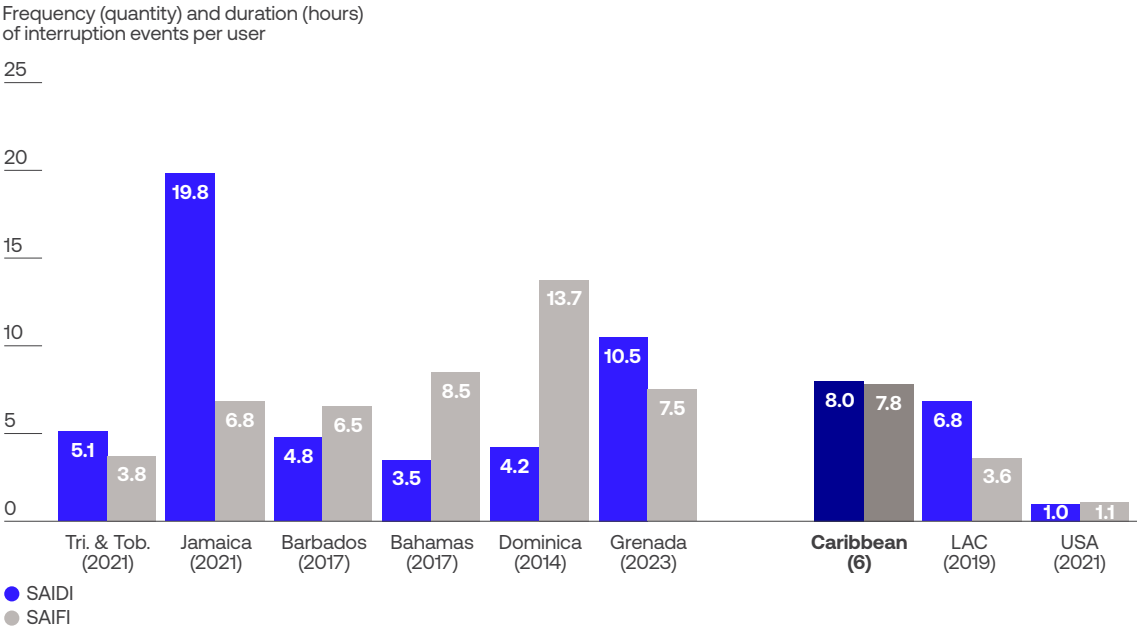
The **quality of energy services** remains a pressing issue throughout the region. Frequent power outages and service interruptions disrupt productivity and competitiveness, particularly in key sectors such as tourism and manufacturing. Figure 2.5 shows the variability in the frequency (quantity) and duration of service interruptions per user. On average, the frequency of outages in the Caribbean is more than double that of LAC and is seven times that of the USA.

Moreover, the World Bank's Enterprise Surveys reveal that electrical outages are one of the major binding constraints for Caribbean businesses, with estimates of an average of 2.7 outages per month vs 1.6 in Latin America, each lasting, on average, 1.2 hours vs 0.2 hours in Latin America. Also, from this source, 36% of Caribbean enterprises cite electricity as a major or very severe constraint (a proportion comparable to other SIDS and Latin America).

Electricity losses in the region affect the overall availability of energy to end-users and provision costs. Small islands report low electricity losses, mainly because their grids are small and system management is easier. Continental countries and Jamaica, on the other hand, have transmission and distribution losses ranging from 12% to 26% of energy generation, while Haiti's losses reach a staggering 60% of generation (see Figure 2.6).

Figure 2.5
Quality of electricity service, selected countries

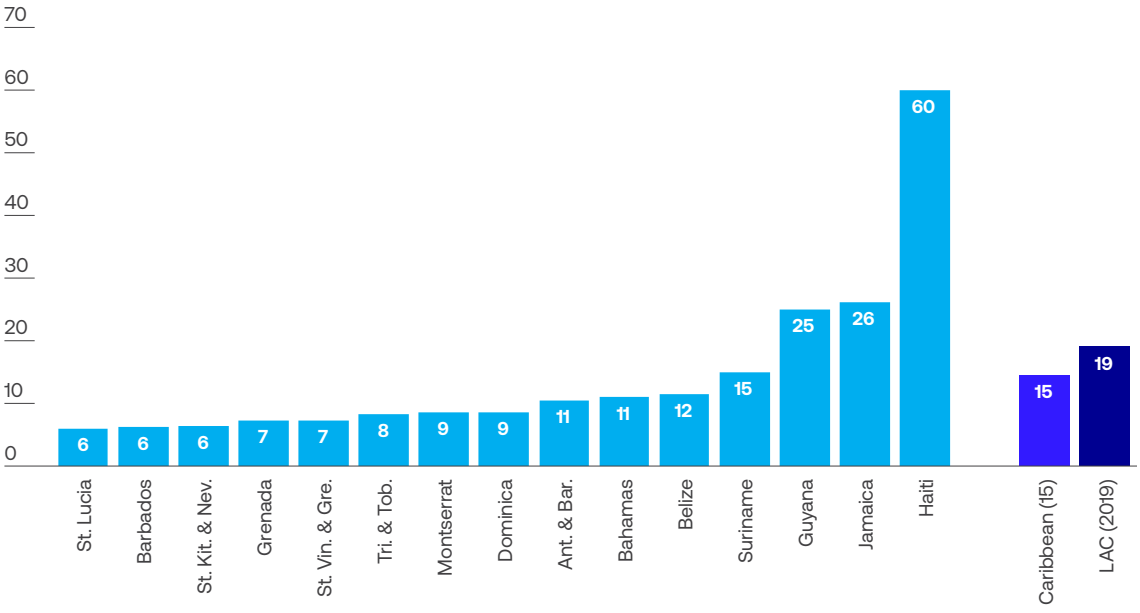
Source: Authors based on companies' information (Caribbean countries and the USA), and Cont et al., 2021 (LAC).



Notes: Quality is identified by two indicators of interruptions in service supply: the system average interruption frequency index (SAIFI), which refers to the average number of interruptions per user, and the system average interruption duration index (SAIDI), which refers to the duration of interruptions per user. Data for Jamaica corresponds to events excluding force majeure. The year 2021 was unusual, with the country experiencing general adverse weather conditions as well as the impact of Tropical Storms Grace and Ida. SAIFI was 7.7, and SAIDI was 31.0 when including force majeure events.Caribbean (6) includes the countries listed in the figure.

Figure 2.6
Electricity losses, % of generation, 2022

Source: Authors based on data from Hope Economics (2024a) and Cont et al. (2022). Caribbean (15) includes the countries and territories listed in the figure.



Box 2.1
Pending challenges for adequate electricity access in the region. The cases of Suriname and Haiti

Progress has been made towards universal electricity access across the Caribbean over the past two decades. However, as of 2022, 5% of the Caribbean population (when Haiti is considered) lacks basic electricity services, and the quality and reliability of service remain a concern even for those with access.

In Suriname, the rural access rate is 98%. However, these areas face challenges due to significant geographical distances, remote locations, low population density, and limited infrastructure, making electricity scarce and expensive compared to the national grid. For instance, remote communities in Suriname's hinterland, around 130 villages, are served with small diesel generators, designed to operate an average of six hours a day. However, this is often disrupted by irregular diesel supply. In 2019, the estimated generation cost for these remote communities in 2019 was USD 0.63/kWh and could increase to USD 1.00/kWh, compared to the national grid's average cost of USD 0.11/kWh (Hope Economics, 2024a).

This lack of reliable and affordable electricity hampers rural productivity, as efficient crop irrigation and post-harvest activities are highly dependent on it. Limited community experience in diesel generator operation and renewable energy technologies presents challenges for the successful long-term deployment of electricity service in these areas. Recent developments in Suriname's oil and gas sectors have the potential to improve reliability and reduce costs.

Similarly, Haiti faces significant challenges in generating and distributing reliable energy. The lack of access to affordable and reliable power significantly hinders investment and business development. Even for those with access to electricity, reliability is inconsistent, leading many businesses and larger households to install diesel generators. EDH (Électricité d'Haïti, the national electric utility) reported that it was only able to supply 4 to 6 hours of electricity a day to its customers in the Port-au-Prince metropolitan area, operating on a rotational distribution schedule.

Access to clean cooking fuels is particularly low in Haiti, with only 4.3% of the population having access as of 2021. This disproportionately impacts vulnerable populations such as women and children and significantly deteriorates indoor air quality. The heavy reliance on biomass fuels, such as wood and charcoal, poses health risks and contributes to deforestation, greenhouse gas emissions, and environmental degradation. Government initiatives are being implemented to increase access to clean cooking fuels, including the promotion of cleaner energy sources like liquefied petroleum gas (LPG), biogas, and renewable energy technologies.

While some Caribbean countries like Trinidad and Tobago and Suriname manage to maintain relatively low **energy costs** and **affordable** bills due to domestic resources, others, including OECS member countries—The Bahamas, Barbados, and Jamaica—face challenges with high electricity prices driven by their reliance on imported fuels. Haiti, on the other hand, struggles with both high costs and limited access to energy services.

The cost of energy services in the Caribbean varies significantly across different countries, influenced by factors such as the energy mix, reliance on national or imported fuels, and the efficiency of utility services. The region's heavy

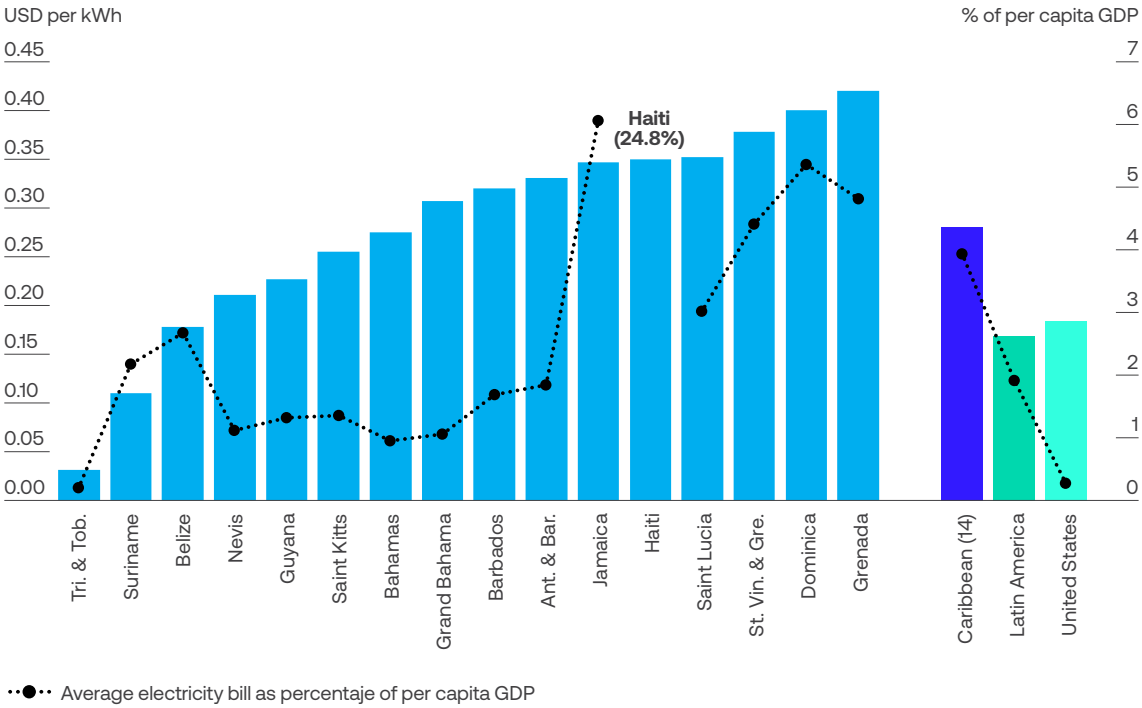
reliance on imported fuels makes it particularly vulnerable to price shocks, with Grenada and St. Lucia among the most affected (Hope Economics, 2024a; see also details in Box 2.2). Figure 2.7 shows the average electricity residential prices in 2023. Trinidad and Tobago benefits from its domestic oil and gas production, maintaining lower electricity prices (USD 0.03 per kWh) compared to the USA (USD 0.18 per kWh), Latin America (USD 0.17 per kWh), and other Caribbean nations (USD 0.27 per kWh). This has enabled the country to sustain more affordable energy services. The other continental countries—Suriname and Belize—also have low electricity costs.

By contrast, OECS member countries have an average energy price of USD 0.33 per kWh, among the highest in the region, reflecting the challenges the bloc faces in maintaining low-priced energy services. However, in terms of average income, services are relatively more affordable than in the rest of the Caribbean (3.2% of GDP vs 3.9% of GDP, respectively). Jamaica's electricity prices are comparable to those of the OECS, but a 100-kWh bill per month represents 6% of GDP, highlighting the significant burden on consumers and businesses. To address this, the government is exploring various initiatives to enhance energy efficiency and reduce overall costs.

Electricity prices in Barbados (USD 0.32 per kWh) are higher than those in Belize (USD 0.18 kWh), largely due to the island's dependence on imported fossil fuels (95% of its energy mix), compared to Belize's more diversified energy sector (73.4% fossil fuels in energy mix). In Haiti, prices are particularly high due to the limited access to reliable electricity. Many households rely on expensive alternatives, such as kerosene and biomass, which can consume a significant portion of their income. The affordability crisis is further exacerbated by the lack of infrastructure and investment in the energy sector.

Figure 2.7
Average electricity residential prices for Caribbean countries, Latin America, and the United States, 2023, USD/kWh

Source: Authors based on CARILEC (2023), Global Petrol Prices (n.d.), and World Bank (n.d.).



Note: Values for consumption of 100 kWh/month and per cent of GDP (annualised value of monthly consumption of 100 kWh). Caribbean (14) includes the countries listed in the figure (Saint Kitts and Nevis; and Grand Bahama and Bahamas).

Energy infrastructure is a vulnerable sector in the Caribbean. In Jamaica, while the electricity distributor JDS reported improvements in power outage metrics in 2021 compared to previous years, severe disruptions during Tropical Storms Grace and Ida in August caused significant damage and accounted for 36% of the total outage duration (JPS, 2022). In contrast, Saint Lucia has taken proactive measures to improve its energy infrastructure by undergrounding power lines, enhancing its capacity to maintain service during storms. Similarly, Barbados has made advancements in solar energy initiatives, decentralising energy systems and reducing reliance on centralised grids (Hope Economics, 2024a).

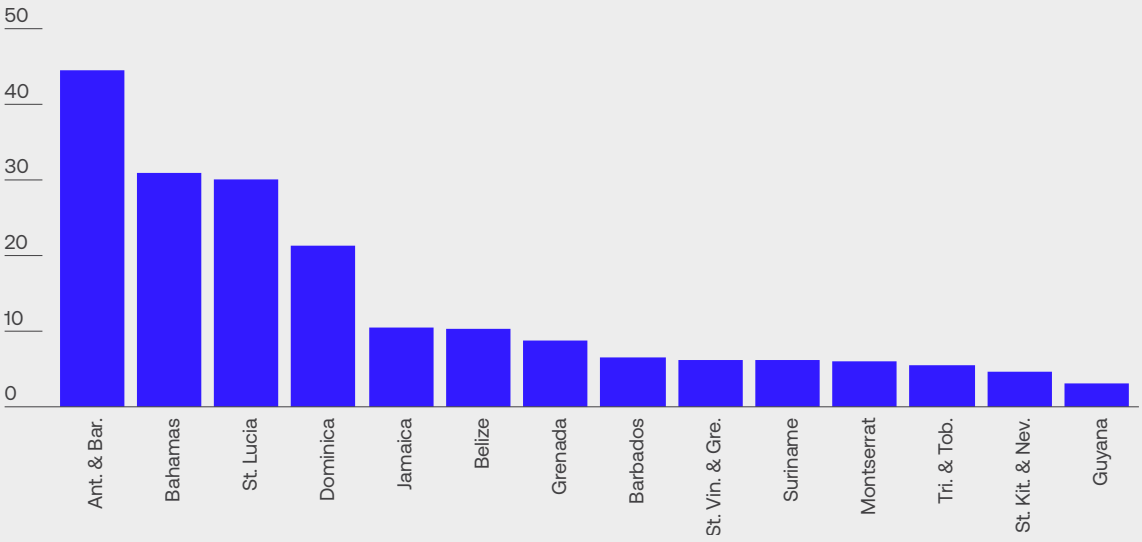
As the sector analysis in Chapter 1 illustrates, energy, electricity, and heat are the main contributors to GHG emissions in Caribbean countries, accounting for 41% of global emissions (Figure 1.8, Panel B). Transitioning to cleaner energy sources such as solar and wind, modernising grid infrastructure, and promoting solutions like electric vehicles and renewable-powered public transit are essential for reducing emissions and fossil fuel dependence.

Box 2.2
OECS energy and fuel prices

The Caribbean faces a major challenge due to its reliance on imported fuels, which account for 87% of energy consumption in the Eastern Caribbean. This dependence on volatile global energy markets leaves the region vulnerable to price shocks, particularly Antigua and Barbuda, The Bahamas, Dominica, and St. Lucia. Despite abundant renewable energy resources, these countries generate less than 6% of their electricity from renewables (solar, wind, and hydro), and rely mostly on diesel (and in some cases, natural gas).

This reliance on imported fuels results in high electricity costs, increased production costs for businesses, and price volatility, as crude oil prices range from USD 66 to USD 100 per barrel. In 2022, oil imports represented 7% of GDP, although this figure varies by country.

Figure B3
Imports of oil and oil products, 2022, % of GDP.
Source: IMF (n.d. b).





Physical connectivity remains a major hurdle in the Caribbean, where the absence of land connections between small islands contributes to low logistics performance and high costs.

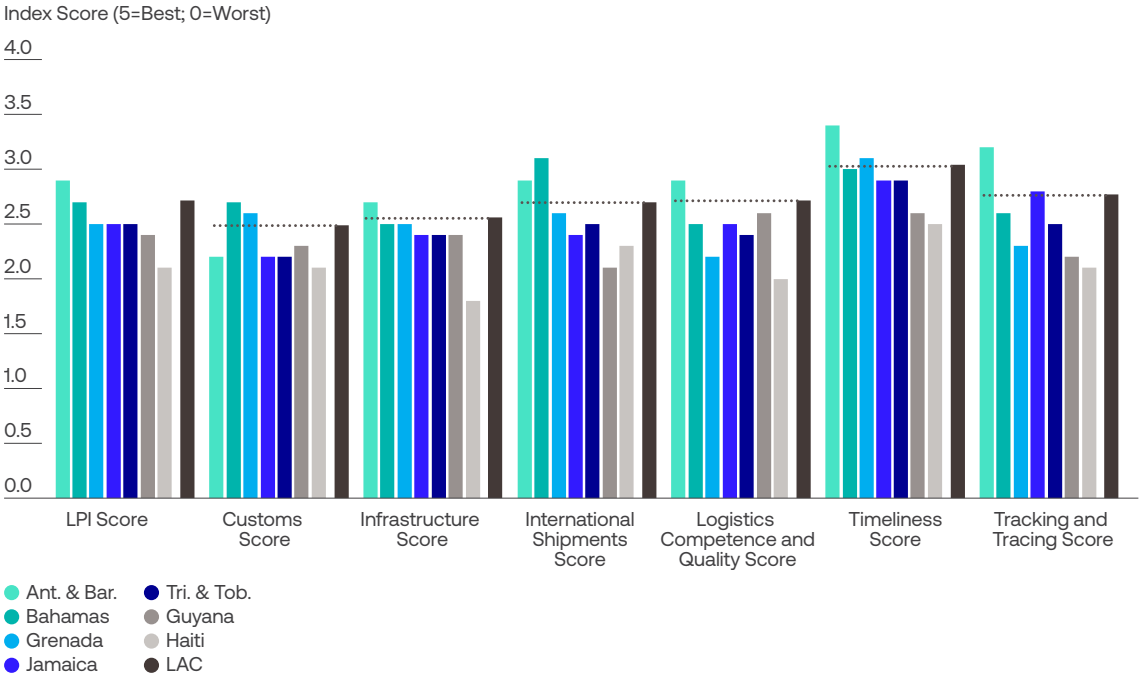
Transport and physical connectivity

Physical connectivity is a significant challenge in the Caribbean, owing to its composition of small islands where land connections are non-existent. In this context, transport infrastructure must establish links within countries and between these island nations and the global market, facilitating the import and export of essential goods and commodities. This scenario is further complicated by low productivity in logistics services, which drives up transport costs across the region.

The low scores of Caribbean countries on the World Bank's Logistics Performance Index (LPI) reflect these challenges. Most countries in the region included in the sample, except for Antigua and Barbuda and, to some extent, The Bahamas, demonstrate performance levels below the average for LAC (see Figure 2.8). The deficient provision of transport services is perceived by businesses as a significant obstacle to their operations: 19% of Caribbean enterprises identify transport as a major or very severe constraint, 4 pp above the average in OECD countries (Figure 2.8).

This report analyses the gaps in transport sector services for roads, ports, and airports. As illustrated in Figure 2.1, the primary bottlenecks include insufficient resilience standards for roads, high costs stemming from inefficient port operations, and limited connectivity in air transport. While these challenges are common across the region, they become even more pronounced when analysing country-specific issues. Two distinct groups emerge: regional hubs, with more developed infrastructure, and other countries, where the challenges are more fundamental.

Figure 2.8
Countries in the region underperform in the Logistic Performance Index, 2021
Source: Authors based on World Bank (n.d.).



Roads

Road infrastructure plays a crucial role in promoting economic and social development in the Caribbean. It enables the efficient movement of goods and individuals within countries, thus enabling access to core services such as commerce, education, healthcare, and housing. By improving mobility, well-developed and maintained transport networks also support economic growth by enhancing business operations, workforce connectivity, and the distribution of goods across regions.

In particular, Caribbean SIDS face geographic challenges, including limited space for road infrastructure development, which restricts options for creating an efficient road network. This impacts connectivity in certain areas, exacerbates congestion issues, and undermines economic competitiveness. Moreover, climate risks disproportionately affect road infrastructure in many of the Caribbean SIDS, requiring a need for resilient road networks.

Finding ways to increase the quantity and quality of investments in road infrastructure, appropriately planned to withstand the impacts of climate change, is key to fostering sustainable development in the region. However, embarking on this task requires assessing the varying starting points of countries regarding access, quality, and affordability of road transport services, enabling the design of strategies tailored to each nation's needs and realities.

Access to road infrastructure in the Caribbean varies significantly across countries. According to the indicator measuring kilometres of roads per square kilometre (Table 2.2), continental nations lag behind island nations,[4] primarily due to their larger territorial extent. However, the road density indicators for the islands fall well below the average for other SIDS, demonstrating that access to road infrastructure remains a critical issue in the Caribbean.

4 This is partially explained by the high proportion of unpopulated territory.

Transport infrastructure, particularly roads, is highly vulnerable to disruptions from climate events.

Table 2.2
Road network density and paved roads in the Caribbean, 2022
Source: Authors based on IRF (n.d.). Caribbean (14) includes the countries listed in the table.

Country	kilometres by square kilometres	Total (km)	Paved Roads (%)
Ant. & Bar.	2.65	1,170	34%
Bahamas	0.19	2,700	59%
Barbados	3.87	1,700	100%
Belize	0.14	3,281	18%
Dominica	2.02	1,512	50%
Grenada	3.27	1,127	80%
Guyana	0.02	3,995	20%
Haiti	0.15	4,266	24%
Jamaica	2.01	22,121	75%
St. Kit. & Nev.	1.42	383	43%
St. Lucia	1.96	1,210	70%
St. Vin. & Gre.	2.82	1,040	70%
Suriname	0.03	4,304	26%
Tri. & Tob.	1.87	9,592	51%
Caribbean (14)	**1.60**	**58,401**	**51%**
LAC	**0.90**	**1,117,294**	**28%**
OECD countries	**1.31**	**5,779,994**	**58%**
Other SIDS	**5.24**	**15,391**	**82%**

The **quality** of current road infrastructure services in the Caribbean varies across countries and is influenced by factors such as maintenance practices, investment levels, climate conditions, and traffic volumes. While the majority of roads are paved in some countries, such as Barbados, Grenada, Jamaica, Saint Lucia, St Vincent and the Grenadines, in others, such as Antigua and Barbuda, Belize, Guyana, Haiti, and Suriname, paved road rates are well below 50% (see Table 2.2). Other factors such as pavement quality and resistance to weather are also crucial considerations, especially in the Caribbean setting. Urban areas in the Caribbean

generally have better access to good quality road infrastructure, with well-developed networks of highways, arterial roads, and urban streets supporting transport within cities and towns. In contrast, rural and remote areas face road connectivity challenges, with unpaved roads and transport barriers affecting mobility and socio-economic development.

Road infrastructure in CARICOM countries is deficient in several key areas, including the quality of road surfaces, narrow roadways with limited lanes, and inadequate road safety infrastructure. Many roads are ageing and heavily exposed to the impacts of hurricanes and tropical storms, leading to the deterioration of road surfaces.

Furthermore, many roads were not designed in adherence to adequate quality and resilience standards, which contributes to quicker deterioration of roads from wear and tear and the impact of heavy rains. Road designs have often been influenced by cost considerations, influenced by fiscal constraints, but institutional weaknesses in project appraisal and a lack of human resources have also contributed to poor design (Hope Economics, 2024b).

With climate change expected to intensify tropical weather systems, and much of the region's economic activity, including tourism, concentrated in vulnerable coastal areas, the need for resilient road infrastructure has become increasingly critical.

To enhance the resilience of road infrastructure, governments in the Caribbean are increasingly integrating climate resilience into infrastructure planning and design. A recent analysis of multilateral-financed road projects in CARICOM (Hope Economics, 2024b) noted that several countries—Barbados, Jamaica, Trinidad and Tobago, and Haiti—have incorporated resilience in their road infrastructure by investing in climate-resilient design, drainage systems, slope stabilisation, coastal protection measures, enhanced maintenance practices, asset management, and community engagement. For example:

- Jamaica has incorporated disaster risk reduction measures, early warning systems, and emergency response plans into its transport policies and programmes.
- Trinidad and Tobago has adopted new standards, certification processes, and procurement approaches to ensure the quality and durability of transport assets. The country has also collaborated with international stakeholders, multilateral development banks, and private sector partners to finance infrastructure projects and promote sustainable investments in road networks.
- Haiti has implemented road safety initiatives, maintenance programmes, and capacity-building activities to improve road resilience, enhance connectivity, and support sustainable mobility. Similarly, Haiti has recognised the importance of applying the United Nations Office for Disaster Risk Reduction (UNDRR) principles for resilient infrastructure, strengthening its institutional framework to promote quality infrastructure investments and integrate resilience into road projects.

Road congestion is another aspect that affects the quality of land transport services. Over the past two decades, a rapid increase in vehicle numbers in Caribbean states such as Barbados, Jamaica, and Trinidad and Tobago (Phillips et al., 2023a and 2023b) has exacerbated congestion, particularly in urban areas and during peak hours. Efforts to address congestion have included widening roads, adding lanes, and building complementary infrastructure such as overpasses and traffic lights. However, deficits persist across most countries.

The small size of some CARICOM-member countries, high population density in urban areas, and challenging topography often make it difficult and costly to create alternative routes to alleviate congestion.

Based on ownership and population measures, Table 2.3 presents statistics on registered vehicles and road traffic mortality rates for selected Caribbean states. The number of vehicles per 1,000 people is quite high in Trinidad and Tobago (582), Antigua and Barbuda (400) and Barbados (420), which can be largely attributed to the higher GDP earnings per capita for these countries compared to others, such as Jamaica (193), Belize (189) and Guyana (21).

Table 2.3
Global Status Report on Road Safety, Caribbean countries

Source: World Health Organization (WHO) (n.d.) and Our World in Data (n.d.). Caribbean (14) includes the countries listed in the table, except for those where data is not available (N/A).

Country	Registered vehicles (per 1,000 population), 2017	Road traffic mortality rate (per 100,000 population), 2021
Ant. & Bar.	400	7.5
Bahamas	N/A	16.2
Barbados	420	10.0
Belize	189	17.5
Dominica	514	11.0
Grenada	237	6.4
Guyana	21	15.2
Haiti	N/A	31.3
Jamaica	193	17.8
St. Kit. & Nev.	N/A	23.1
St. Lucia	203	8.9
St. Vin. & Gre.	N/A	4.8
Suriname	393	16.2
Tri. & Tob.	582	5.0
Caribbean (14)	**315**	**13.6**
LAC	**280**	**14.4**
OECD	**492**	**5.9**
Other SIDS	**98**	**12.5**

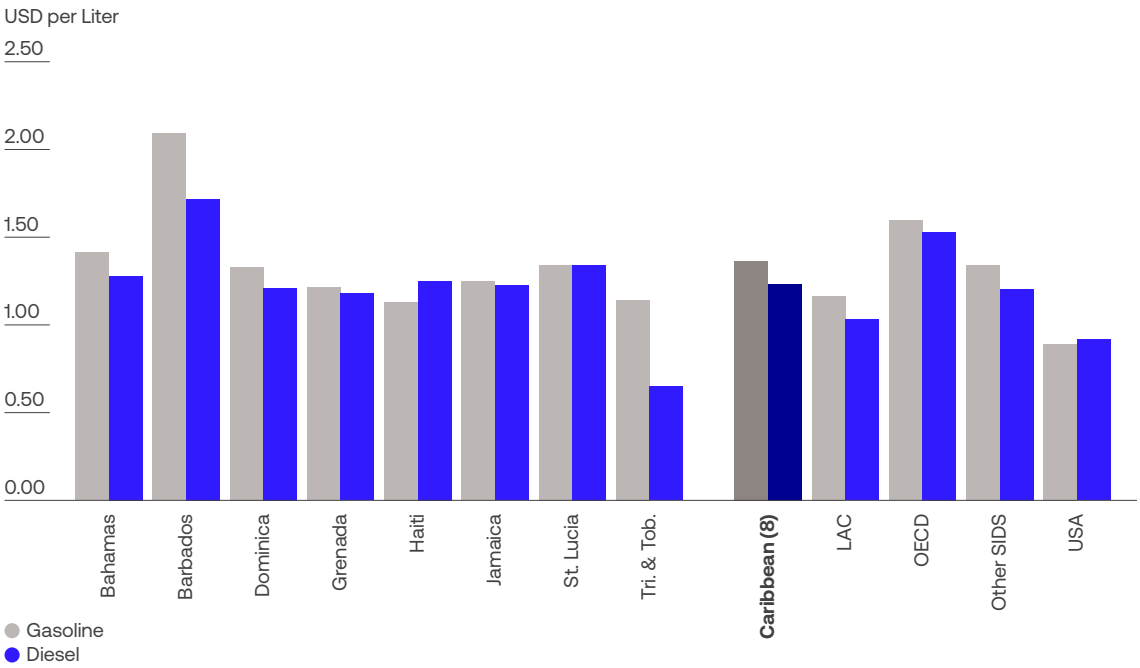
According to the latest WHO (n.d.) data, road traffic accident fatality rates in Caribbean countries are similar to those in LAC but higher than those of the OECD and other SIDS. Fatality rates were highest among the lower-income CARICOM countries such as Haiti at (31.3 deaths per 100,000 population), Saint Kitts and Nevis (23.1), Belize (17.5), and Jamaica (17.8). Small islands, however, reported lower rates (between 5 and 11), resulting in a regional average of 13.6, comparable to the average for LAC (14.4) and other SIDS (12.6). Road accidents in CARICOM-member countries are often linked to deficient road conditions, including insufficient road furniture (such as guardrails, lighting, signs, and markings).

The WHO's Status Report on Road Safety (2023) indicates that only 21% to 23% of the roads worldwide meet the minimum acceptable standard—a three-star rating on the iRAP star-based system—for road safety for pedestrians, motorcyclists, and cyclists. In LAC, this figure is 19.8% for pedestrians and 38.8%–54.1% for wheeled vehicles (Beaujon Marin et al., 2023). These statistics underscore the critical need for safer road infrastructure. They also highlight the existing deficiencies in many countries, particularly for vulnerable road users like pedestrians and cyclists, and the importance of better global legislation, standards, and targeted investments to improve road safety.

Part of the solution to address congestion in urban areas is related to improving public transport systems in the region. The public transport systems in the Caribbean are characterised by their heavy reliance on paratransit modes, which often fill gaps left by limited formal transport services. Wright et al. (2021) show that in Jamaica, St. Lucia, Barbados, Guyana, and Trinidad and Tobago shared taxis and minibuses play a crucial role in providing mobility to the population. These semi-informal systems operate alongside or, in some cases, as the sole public transport option. Integrating these semi-formal systems into broader transport planning frameworks offers an opportunity to enhance the efficiency and accessibility of transit in the Caribbean.

The majority of transport services in the Caribbean are provided by private operators. Fuel costs are a critical determinant in assessing the cost and **affordability** of transport services.

Figure 2.9
Gasoline and diesel prices by country, 2024
Source: Global Petrol Prices (n.d.).



Note: Caribbean (8) includes the countries listed in the figure. The data for Gasoline and Diesel Prices correspond to December 9, 2024.

Figure 2.9 compares the cost of gasoline and diesel across Caribbean countries, with other regions. In the case of diesel, primarily used for the transport of goods, the price of a litre of fuel in most Caribbean countries surpasses that of both LAC and the USA. However, the regional average in the Caribbean is similar to that in other SIDS and is lower than in the OECD. This price disparity directly impacts the affordability of logistics and transport services, raising operating costs for businesses and reducing the overall competitiveness of the region's supply chains.

Similarly, gasoline prices across the Caribbean are also higher than in LAC and the US, further influencing the cost of private passenger transport. In the absence of robust public transport systems, this imposes a financial burden on individuals and households reliant on private vehicles for mobility. High gasoline prices exacerbate affordability challenges, particularly in countries where alternative transport options are limited.

Public transport in CARICOM countries, while often limited and inefficient, plays a crucial role in reducing transport expenses for the population, particularly for low-income households. Challenges in public transport vary across the region and include inefficiencies in public sector service delivery, weak regulatory frameworks, and poorly organised services, particularly in cases where direct government involvement is absent. Despite these shortcomings, public transport systems provide a sustainable alternative to private transport, alleviating financial burdens for many residents and reducing local congestion and pollution (when operating with electricity or natural gas). However, these benefits come at a cost to public finances.

For example, in Trinidad and Tobago, a one-way trip using public transport costs around

USD 0.88. Public transport fares and routes are often regulated, and government subsidies[5] or fiscal incentives, such as concessions for vehicle purchases by private operators, help to contain service costs. These measures ensure that, where public transport systems exist, they contribute significantly to reducing the cost of mobility for the population. Alternatively, reducing the subsidy to the sector has a significant impact on fares, such as in the recent case of Barbados, where a single bus trip costs approximately USD 1.75, regardless of the distance travelled, almost twice the cost of a bus ride in Trinidad and Tobago.

Port infrastructure

Port infrastructure plays a pivotal role in the economic development and connectivity of the Caribbean. As gateways for international trade, ports serve as crucial links between these island nations and the global market, facilitating the import and export of essential goods and commodities. This infrastructure supports key industries such as tourism, fisheries, and agriculture, which form the backbone of many SIDS economies (Adeoti et al., 2020). Efficient port facilities enhance both inter-island and international connectivity, improve accessibility, and reduce transport costs, boosting trade competitiveness and fostering economic integration with neighbouring countries.

Caribbean countries' port infrastructure includes various types of ports, such as specialised terminals for specific commodities (e.g., sugar, bauxite, petroleum), public ports for general and containerised cargo, and trans-shipment ports. The trans-shipment ports are categorised into global, regional, and inter-island centres, with Kingston (Jamaica), Freeport (The Bahamas), and Port of Spain (Trinidad and Tobago) being notable trans-shipment hubs. These strategic locations facilitate both east-west and north-south traffic flow, attracting frequent direct services from major global shipping lines such as CMA-CGM, ZIM, and MSC.

The Caribbean's maritime trade relies on a symbiotic relationship between major trans-shipment hubs and the informal sector, each serving distinct but complementary roles. While global shipping lines dominate large-scale operations through key ports, the informal sector continues to play a vital role in maintaining inter-island connectivity and serving niche markets.

The diversity of port types and management models in CARICOM reflects the region's complex maritime needs and varied economic landscapes. The trend towards more dynamic management models, such as landlord ports, public-private partnerships (PPPs), and corporatisation, indicates a shift towards greater efficiency and competitiveness. However, the success of these models hinges on the development of robust regulatory frameworks and integrated management approaches.

As CARICOM continues to evolve its maritime infrastructure, the focus should be on leveraging the strengths of each port type while addressing infrastructure gaps, harmonising regulations, and embracing technological advancements. By doing so, the region can strengthen its position in global trade networks, foster economic growth, and ensure the sustainable development of its vital maritime sector.

Over the past decade, Caribbean countries have made significant strides in expanding the **availability and capacity of port infrastructure** to support their maritime freight transport sectors. Most countries in the region are net importers, relying heavily on containerised imports for consumables, foodstuffs, and supplies for the tourism industry.

5 In Trinidad and Tobago, where fuel prices are low (see Figure 2.9), subsidies to the transport sector amount to USD 25 million annually, following water and energy subsidies (Government of the Republic of Trinidad and Tobago, 2024).

The maritime freight transport sector in CARICOM is undergoing a major transformation, with a clear shift towards containerisation. Approximately 95% of finished consumer goods are now transported in containers, reflecting global changes in shipping practices. While this trend in container traffic has important positive implications for the region's economy, particularly its tourism-dependent industries, challenges remain in areas such as inter-island transport costs and maritime logistics.

Currently, the average traffic through the region (countries included in Table 2.4) represents about 8% of traffic in LAC, 2% of traffic in OECD countries, and 12% of trade through other SIDS.

Table 2.4
Container port traffic (20-foot equivalent units - TEUs, '000)
Source: Authors based on World Bank (n.d.).

Country/region	Last available year
Ant. & Bar.	27,657
Bahamas	1,724,000
Barbados	97,000
Belize	20,259
Dominica	7,409
Grenada	12,343
Guyana	58,543
Haiti	177,076
Jamaica	2,137,500
St. Kit. & Nev.	13,629
St. Lucia	39,238
St. Vin. & Gre.	18,222
Suriname	103,874
Tri. & Tob.	498,544
Caribbean (14)	**352,521**
LAC	**59,079,530**
OECD	**273,637,512**
Other SIDS	**41,388,126**

Notes: Caribbean (14) includes the countries listed in the table. The latest available data is from 2019 for Antigua and Barbuda, Belize, and St. Lucia; 2020 for Dominica, Guyana, Haiti, St. Kitts and Nevis, and St. Vincent and the Grenadines; 2021 for Grenada; and 2022 for The Bahamas, Barbados, Jamaica, Suriname, and Trinidad and Tobago.

Information from Sanchez and Barletta (2020) indicates that Kingston (Jamaica) was ranked 9th, while Freeport (The Bahamas) was ranked 12th among the top ports in LAC in terms of throughput (TEUs). Both Kingston and Freeport have positioned themselves as highly competitive global logistics hubs, primarily through trans-shipment operations (see Table 2.5, and Box 2.3 for details on Jamaica).

Barbados, in contrast, has relatively low container traffic (see Table 2.4) but benefits from a combination of airport and port infrastructure that supports its cruise tourism industry, particularly at the port of Bridgetown, which handles significant passenger departures and arrivals.

Ports in Trinidad and Tobago serve as sub-regional hubs, while the remaining ports in the region are classified as service ports.

Table 2.5
Latin America and the Caribbean: Top 10 trans-shipment ports, 2019 (TEUs and percentages of total throughput)
Source: Sanchez and Barletta (2020), tables 9 and 10. Both tables list the top 20 ports according to throughput and trans-shipment.

Rank	Country	Port	Throughput	Rank (through-put)	Trans-shipment (TEUs) 2019	Rank (trans-shipment)	Trans-shipments% of Total 2019
1	Panama	Colón/Cristóbal/ Manzanillo (Caribbean)	4,379,477	1	3,804,511	1	86.9
2	Panama	Balboa/Rodman (Pacific)	2,898,977	5	2,600,683	2	89.7
3	Colombia	Bahía de Cartagena	2,933,808	4	2,118,642	3	72.2
4	**Bahamas**	**Freeport**	**1,396,568**	**12**	**1,354,671**	**4**	**97.0**
5	**Jamaica**	**Kingston**	**1,647,609**	**9**	**1,319,760**	**5**	**80.1**
6	Mexico	Manzanillo	3,069,072	3	1,103,098	6	35.9
7	Brazil	Santos	3,904,566	2	1,093,440	7	28.0
8	Dominican Republic	Caucedo	1,263,991	14	581,795	8	46.0
9	Brazil	Port of Manaus	578,779	20+	512,400	9	88.5
10	Brazil	Suape	476,353	20+	499,800	10	104.9

Box 2.3
Jamaica – A major Caribbean trans-shipment hub

The Port of Kingston, particularly the Kingston Container Terminal, serves as a major trans-shipment hub with well-developed road and rail connections. Recent investments in modern cargo handling equipment and automated systems have improved efficiency and competitiveness. However, the terminal faces unique challenges and opportunities:

- Access roads to port facilities are susceptible to flooding, which can disrupt staff access and overall functionality. Heavy rainfall can halt operations, requiring debris removal interventions. Climate change may exacerbate these challenges, leading to longer downtimes.

- While design specifications for ports like the Historic Falmouth Cruise Port feature elevated pier structures to mitigate flooding risks, concerns persist regarding their adequacy in the face of rising sea levels. Ongoing upgrades and capital improvement programmes are essential for maintaining quality performance and adapting to changing environmental conditions.

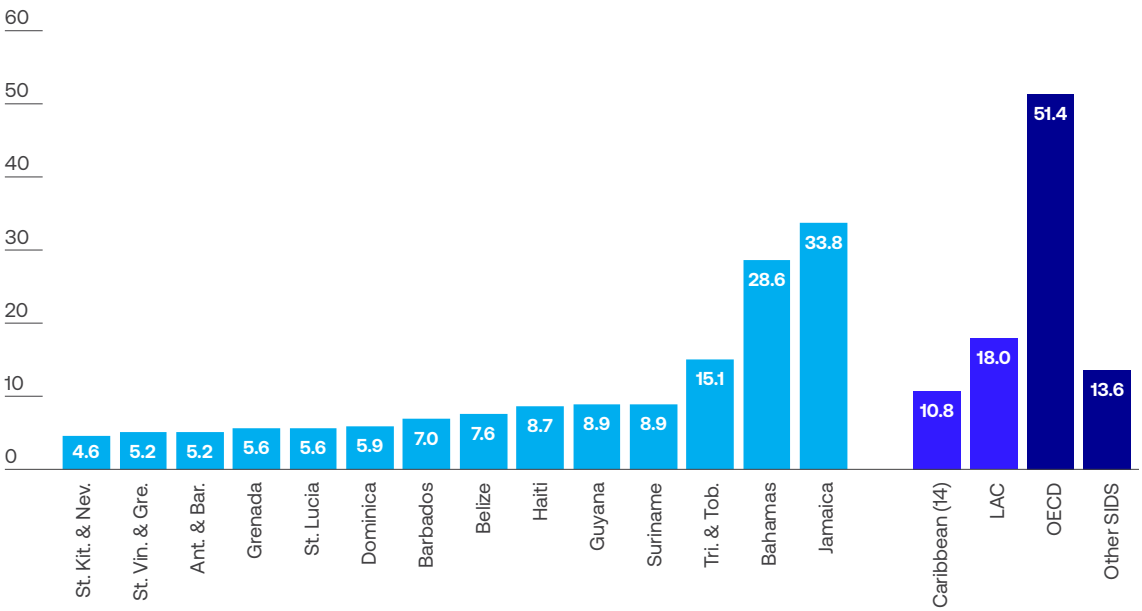
- The concession agreement for the Kingston Container Terminal includes plans for capital dredging and strengthening quay walls, highlighting the need for future expansion and optimisation.

CARICOM ports exhibit considerable variation in **efficiency and infrastructure quality**. Port productivity across the Caribbean depends largely on the availability of suitable equipment, such as gantry cranes in major hubs versus mobile cranes in smaller ports. While facilities like Kingston, Jamaica, operate at efficiency levels comparable to global standards, others face significant challenges. Ports in countries such as Guyana and Suriname struggle with inadequate infrastructure, insufficient navigational aids, and weak regulatory frameworks, resulting in higher costs and longer service times. These inefficiencies directly impact maritime transport expenses, with ripple effects on national economies by driving up prices across multiple sectors (Hope Economics, 2024c).

The impacts of those differences in the availability of modern infrastructures can be seen in the Liner Shipping Connectivity Index (LSCI) presented in Figure 2.10. The LSCI serves as a vital tool for assessing and improving the maritime transport infrastructure and connectivity of countries, especially in regions like the Caribbean where shipping plays a crucial role in economic development. The LSCI measures the connectivity of a country's ports to global shipping networks based on factors such as the number of shipping companies, services offered, and the capacity of deployed vessels. Higher LSCI scores indicate better connectivity, which can enhance trade opportunities and economic growth.

Among CARICOM countries, Jamaica and The Bahamas lead the LSCI rankings, reflecting their role as trans-shipment hubs. This is further corroborated by the volume of cargo and container throughput at their respective ports. The other countries rank in the bottom 25th percentile globally. Ports in the OECS face significant connectivity challenges due to internal issues rather than the capacity of shipping liners (see example in Box 2.4). Factors such as ageing infrastructure, inefficient operations, and labour inefficiencies contribute to limited port calls and reduced shipping services. For example, in Saint Lucia, limited cargo volumes, reliance on smaller vessels, and high operational costs negatively impact the LSCI, making it difficult to attract shipping services and investors (Hope Economics, 2024c).

Figure 2.10
Liner Shipping Connectivity Index, 2021
Source: Authors based on World Bank (n.d.). Caribbean (14) includes the countries listed in the figure.



Box 2.4
The connectivity challenge for smaller destinations

Despite the robust operations at major hubs, smaller Caribbean destinations face significant connectivity challenges including insufficient container traffic between transhipment ports and smaller islands making direct services economically unfeasible for global carriers. This gap in service is filled by specialised regional carriers focusing on intra-regional traffic and Less than Container Load (LCL) cargo.

While major ports dominate headlines, a vibrant informal shipping sector plays a crucial role in inter-island connectivity, particularly in the Leeward and Windward islands. The persistence of informal shipping, particularly in St. Vincent, underscores its importance in serving niche markets and maintaining inter-island connections. The informal shipping sector specialises in small-parcel size and break-bulk cargo movements and is characterised by local ship owners and operators, small ships of various types and capacities and converted fishing boats or small roll-on/roll-off (ro-ro) ships. The primary cargo types are the exports of agricultural products and, the imports of wholesale goods, general cargo and construction materials.

Notwithstanding the importance and success of the informal shipping sector, smaller destinations continue to face issues with direct access to global shipping networks, highlighting the need for innovative solutions to improve connectivity. The informal sector could benefit from targeted investments in vessel upgrades and operational efficiencies, potentially expanding its role in regional trade. Regional governments and trade bodies should consider policies that support both the growth of major hubs and the sustainability of shipping networks to ensure comprehensive maritime connectivity while transitioning to the formalisation of the services.

Guyana, Belize, and Suriname also face challenges in maritime connectivity. Guyana ranks low on the LSCI, primarily due to the absence of deep-sea ports and inefficient national logistics infrastructure. Guyana's road network is sparse, creating a bottleneck effect that hinders the efficient movement of goods between ports and inland destinations. Belize also scores poorly, with an LSCI of 7.6 as of 2021, reflecting its limited port infrastructure. In Suriname, while the Dr Jules Sedney Port handles 90% of non-oil seaborne trade, high cargo volumes combined with operational bottlenecks exacerbate efficiency issues.

Cruise infrastructure, given its economic significance, requires special attention in the region. Modern, well-planned cruise port facilities play a critical role in facilitating the entry of millions of tourists annually. They serve as gateways to cruise tourism, a key driver of economic activity in the Caribbean These facilities enhance the visitor experience, stimulate local economies, and create significant employment opportunities through sectors such as hospitality, retail, and transport. While the importance of cruise tourism varies across the region, the potential economic impacts of improving port infrastructure are substantial, as evidenced by three destinations with yearly direct expenditures exceeding USD 100 million (Table 2.6):

- The Bahamas had the highest level of direct cruise sector expenditures at USD 655 million, generating 13,846 jobs and USD 250 million in wages annually.
- Jamaica had the second-highest level of direct expenditures at USD 198 million, with 1.2 million onshore passenger visits, 6,322 jobs created, and USD 53 million in wage income.
- Saint Kitts and Nevis obtained USD 113 million from direct expenditures, registering the third-highest volume of visits in the Caribbean.

Table 2.6
Cruise tourism by destination, 2024
Source: Authors based on FCCA (2024).

Country/region	Passengers Onshore Visits (Thousands)	Direct Expenditures (USD Millions)	Total Employment	Total Employee Wages (USD Millions)
Antigua and Barbuda	712	89	1,521	16
Bahamas	3,914	655	13,846	250
Barbados	611	83	2,211	33
Belize	738	89	2,293	23
Dominica	254	21	497	4
Grenada	257	22	604	5
Jamaica	1,196	198	6,322	53
St. Kitts and Nevis	562	113	1,679	20
St. Lucia	646	73	1,754	16
St. Vincent and the Grenadines	195	19	477	4
Trinidad and Tobago	66	5	196	3
Caribbean (11)	**832**	**124**	**2,855**	**39**

The small economies of CARICOM-member states face significant challenges due to limited shipping connections and high shipping costs, which act as major bottlenecks for regional firms and the **affordability of maritime logistics**.

Table 2.7 presents approximate shipping freight rates between selected Caribbean countries and major international maritime transport hubs. While rates at Caribbean hub ports (like Kingston, Jamaica) are comparable to global standards, those in Caribbean SIDS, like Grenada, are significantly higher, due to limited shipping options, the lack of direct routes between Caribbean and international destinations, and inadequate consolidated shipping services, including refrigerated cargo.

These high costs stem from a unique set of interrelated challenges, including outdated and inefficient port infrastructure, limited flexibility in working hours, labour-intensive operations, and high customs and excise taxes (as stated in Chapter 1).

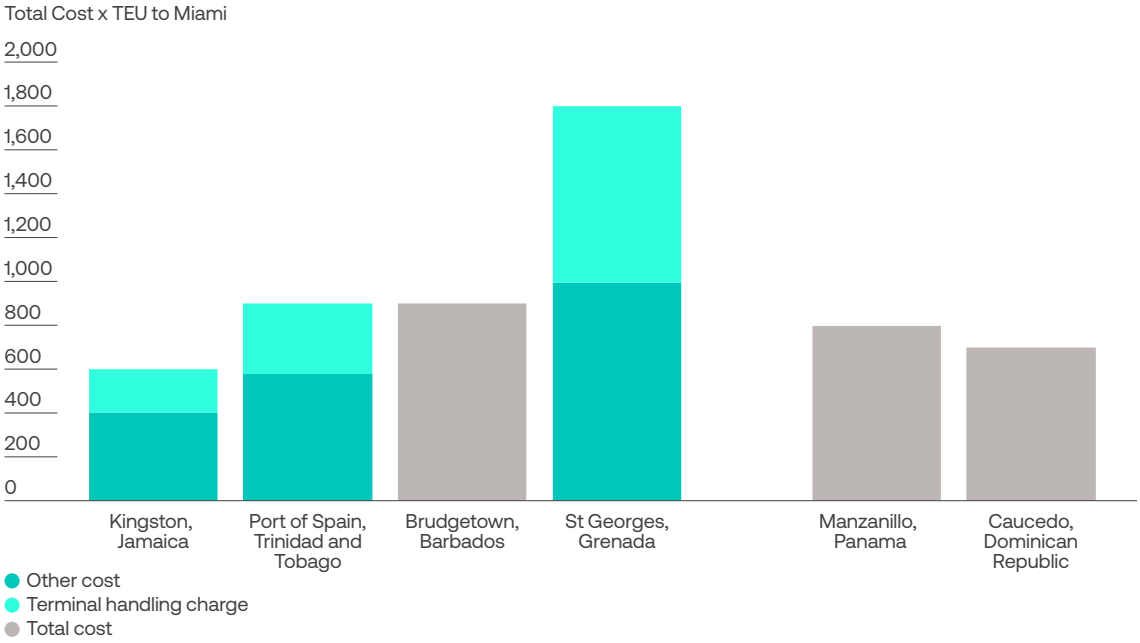
Table 2.7
Approximate shipping freight rates for containers in selected countries
Source: Authors based on Sea Freight Calculator (n.d.).

Port	Kingston, Jamaica	Port of Spain, Trinidad and Tobago	St Georges, Grenada	Bridgetown, Barbados
Rotterdam, The Netherlands				
TEU	USD 2,000	USD 1,900	USD 2,500–3,000	USD 1,900
FEU	USD 3,000	USD 2,800	USD 4000–6000	USD 2,700
Miami, USA				
TEU	USD 600	USD 900	USD 1,800–2,500	USD 900
FEU	USD 800	USD 1,300	USD 2500	USD 1,300
Shanghai, China				
TEU	USD 3,200	USD 3,000	USD 3,500	USD 2,900
FEU	USD 4,900	USD 4,700	USD 10,000+	USD 4,700


SYMPHONY of the SEAS

Stakeholders in the OECS member countries have raised concerns about expensive port charges, attributed to labour arrangements. Figure 2.11 illustrates that differences in terminal handling charges account for a significant portion of the variability in container shipping costs between ports in the region and Miami, a major regional hub. These cost disparities have clear implications for the competitiveness of economies that rely heavily on maritime transport as their primary trade channel with the rest of the world.

Figure 2.11
Total costs of transport from selected ports to Miami for a TEU
Source: Authors based on Sea Freight Calculator (n.d.) and CMA-CGM (n.d.).



Port tariffs were designed for breakbulk cargo and have not been amended to accommodate containerisation. They are an important revenue source for port authorities and can be used to finance facility redevelopment, purchase equipment, and contribute to national projects (CDB, 2024). However, expensive port charges can undermine the port's attractiveness and potentially hinder trade. In cases where there are no alternative seaports, high tariffs can become a key source of inefficiency in the supply chain.

Landing charges in the OECS analysed in this report are among the most expensive in the Caribbean region, with some exceptions such as Martinique or Guadalupe (see Table 2.8). For example, terminal handling charges in Grenada, Antigua and Barbuda, and Saint Lucia were the most expensive per TEU and FEU, when compared to the hubs (Jamaica and Trinidad and Tobago) or even Guyana (one of the continental Caribbean territories). For example, the handling charge for a TEU in Grenada was USD 805, four times more than Jamaica (USD 195)—or six times the cost for a FEU, between comparator countries). When compared to its neighbours in terms of proximity, the handling cost for TEU in Grenada was two times (four times for a FEU) that of Trinidad and Tobago.

Table 2.8
Terminal handling charge for the Caribbean region
Source: CMA-CGM (n.d.). TEU: twenty-foot equivalent unit, FEU: forty-foot equivalent unit.

Port of discharge	TEU	FEU	FEU High Cube	45-Footer
St. George's, Grenada	USD 805	USD 1250	USD 1250	USD 1250
St. John's, Antigua and Barbuda	USD 725	USD 1125	USD 1125	USD 1125
Castries, St. Lucia	USD 480	USD 960	USD 960	USD 960
Miami, USA	USD 500	USD 675	USD 675	USD 700
Fort-de-France, Martinique	USD 302	USD 417	USD 417	USD 417
Pointe-a-Pitre, Guadalupe	USD 248	USD 378	USD 378	USD 378
Port of Spain, Tri. & Tob.	USD 320	USD 320	USD 320	USD 320
Port-au-Prince, Haiti	USD 210	USD 210	USD 210	USD 210
Kingston, Jamaica	USD 195	USD 195	USD 195	USD 195
Georgetown, Guyana	USD 100	USD 150	USD 150	USD 150

Using the example of Grenada, importers are burdened with expensive port charges which are approximately USD 1,200 per FEU, making it among the most expensive in the region (CDB, 2024). If duties, customs surcharge, and VAT are included, these additional costs could go up to 100% of the shipping freight charges. In other words, these additional charges can double the costs of imports for the country. This ultimately increases the cost of business in Grenada, rendering it expensive. For example, getting parts for machinery, semi-manufacturing for assembly into final products, or importing food items can result in companies having to incur higher costs compared to the region. This can undermine the attraction of doing business and competitiveness in international trade for the country.

Airport infrastructure

Airports facilitate international and domestic trade, create employment, and support tourism and business activities, which are critical for the region's integration and connectivity. In addition to tourism, air transport also plays a significant role in facilitating regional trade, with freight volumes increasing substantially in recent years. However, Caribbean SIDS face challenges in securing adequate resources for airport infrastructure, despite growing passenger and cargo volumes. These challenges are compounded by economic crises, such as the 2008/09 global financial crisis and the COVID-19 pandemic, which demonstrated the vulnerability of the sector to external shocks.

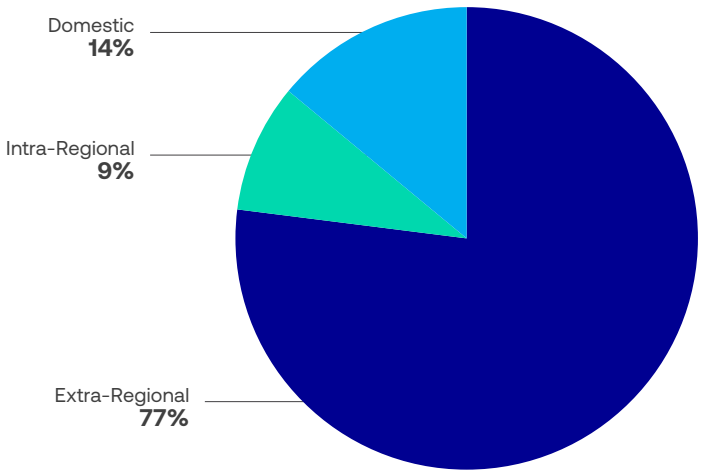
The aviation and tourism sectors in the Caribbean form a mutually reinforcing virtuous cycle. The region's appeal and availability of air services drive tourist traffic, which stimulates investments in tourism infrastructure, such as hotels and resorts. These investments enhance the region's attractiveness, further increasing tourist traffic and creating demand for modernised airport infrastructure. Improved air transport services, in turn, strengthen the competitiveness of the tourism sector, ensuring continued growth. The Caribbean, with its 68 international terminals, has made strides in advancing aviation, including plans for the region's first aerotropolis in Trinidad and Tobago.

Air connectivity plays a vital role in linking smaller islands to major international hubs in North America and Europe. Larger islands like The Bahamas, Dominican Republic, and Jamaica serve as gateways, with regional carriers such as Caribbean Airlines and Air Antilles providing onward connections. This connectivity is crucial for fostering both economic and social integration within the region.

Connectivity in the region is characterised by three components: (1) long-haul routes focused on enabling inbound tourist traffic; (2) a regional intra-Caribbean network comprised mainly of several short, low-capacity routes between island countries; and (3) domestic routes. Caribbean airports typically require substantial investments in safety compliance required by the International Civil Aviation Organization, connectivity-enabling enhancements, and climate/disaster resilience, which exceed their available financial and human capital resources.

It is estimated that 77% of the Caribbean's destination markets, in terms of passengers, were extra-regional in 2017, as shown in Figure 2.12, highlighting the importance of air connectivity outside the region. An important reason for this low intra-regional connectivity has been the high risk of operational disruptions experienced by Caribbean airlines that focus on intra-regional routes. For example, intra-regional tourism flows represented 9% in 2017 and did not recover completely after the impact of the COVID-19 pandemic (Allub and Schliesser, 2023). The main drivers of slow recovery were the reduction in flights within the region, notably after LIAT (the most important regional airline) closed down in 2020, and expensive intra-region travel costs (due to limited scale and high travel taxes). Decisions to delay, divert, or cancel flights are more likely in an environment with relatively less sophisticated aircraft navigational aids and inadequate investment in operational safety. Caribbean airlines with a focus on intra-regional operations face a higher risk of long-term disruptions to airports in their operating networks. Losing passenger traffic and associated revenue from a country for an extended period, as occurred in Dominica following Tropical Storm Erika in 2015, can be financially disruptive to an airline, weakening its financial health and ability to provide strong intra-regional connectivity.

Figure 2.12
Destination markets from the Caribbean by passengers, 2017
Source: Authors based on CDB (2018).



Many Caribbean countries are highly dependent on air transport, as demonstrated by aviation intensity—the volume of air passenger journeys relative to the population size. On average, travel intensity in the Caribbean is double the LAC average (see Table 2.9). For freight, Trinidad and Tobago leads with 41.1 million tonne-km, followed by Suriname (33.2), while The Bahamas and Guyana have the lowest values (0.17 and 0.11, respectively). For passengers, The Bahamas stands out with 4.6 passengers carried per capita, while Guyana (0.03), Jamaica (0.06) and Suriname (0.42) report the lowest figures. On average, the Caribbean records 13.8 for freight and 2.01 for passengers, surpassing LAC in passengers (1.03) but far below its freight average (316). Both metrics remain much lower than the OECD averages of 3,770 for freight and 3.15 for passengers. Notice, however, the low quantity of transported passengers: an average Caribbean country moves 7.6% of passengers relative to an average LAC country, and 1.2% of an average OECD country. Most flows pass through hubs (Trinidad and Tobago, and The Bahamas). Moreover, according to the latest information provided by IATA (2024), during 2024 air traffic—measured by available seats/km—grew by 8.1% p.a. in LAC, higher than global growth (6.5%), as well as more developed markets like North America (2.4%) and Europe (7.3%).

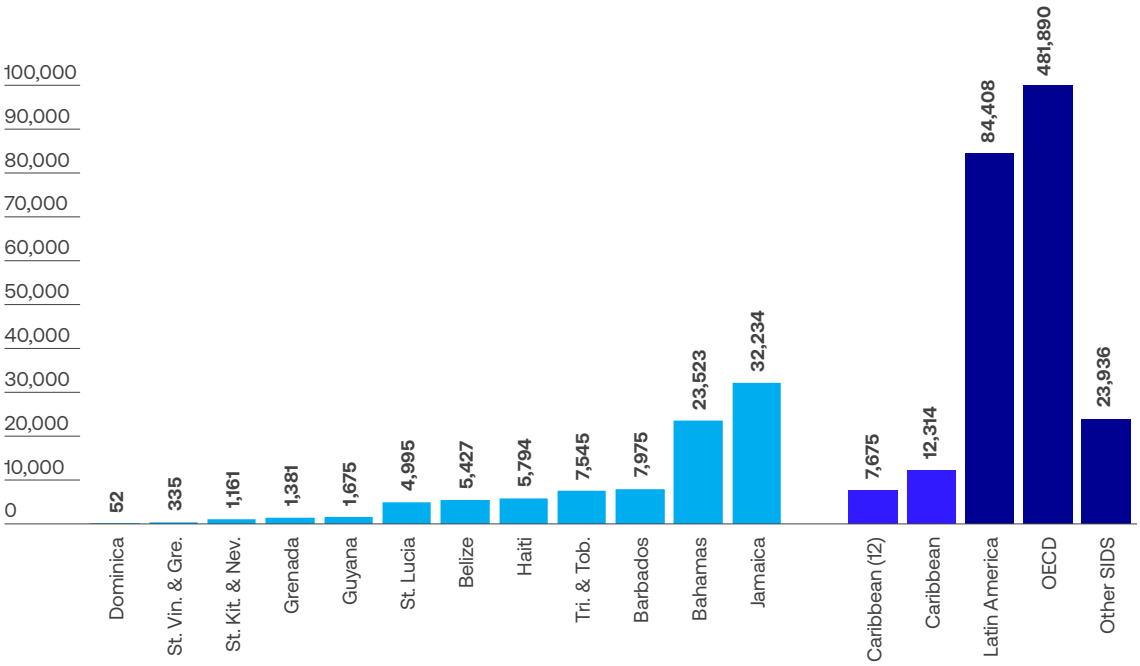
International indicators on the **quality and availability** of air transport services, such as the IATA Air Connectivity Index, reveal that apart from the regional hubs of Jamaica and The Bahamas—which themselves score above the LAC average—most countries in the region display very low scores (Figure 2.13). These low rankings highlight the severe lack of connectivity across the Caribbean, representing a significant weakness, especially for economies heavily reliant on tourism. The limited air connectivity undermines the region's ability to attract and efficiently accommodate international visitors, thereby constraining economic growth and reducing competitiveness in the global tourism market.

Table 2.9
Freight and passenger transport by air, average 2018–2019
Source: World Bank (n.d.). Caribbean (8) includes the countries listed in the table.

Country/region	Freight (million tonne-km)	Passengers carried per capita	Passengers per country
Ant. & Bar.	0.32	6.01	553,254
Bahamas	0.17	4.56	1,843,470
Belize	3.75	3.31	1,287,860
Guyana	0.11	0.03	27,383
Haiti	n/a	0.00	23,119
Jamaica	4.59	0.06	166,139
Suriname	33.20	0.42	254,474
Tri. & Tob.	41.14	1.66	2,520,889
Caribbean (8)	**13.8**	**2.01**	**874,762**
LAC	**316.3**	**1.03**	**11,517,758**
OECD members	**3,770.3**	**3.15**	**70,256,098**

Note: Freight (million tonne-km) refers to the volume of freight, express, and diplomatic bags transported on each flight stage, measured as metric tonnes multiplied by kilometres travelled. Passengers carried per capita represents the total number of domestic and international aircraft passengers of air carriers registered in the country (which are presented as Passengers per country), divided by the population. Data corresponds to the average of 2018–2019, before the COVID-19 pandemic.

Figure 2.13
IATA Air Connectivity Index, 2019
Source: IATA (2020). Caribbean (12) includes the countries listed in the figure. Caribbean includes the full list of Caribbean countries in IATA.



Despite the low average scores, there is heterogeneity within the region. Barbados has developed its air-access infrastructure to serve its tourism industry, facilitating international connections to major tourist source markets in North America and the UK. Specifically, the Grantley Adams International Airport has undergone significant upgrades to meet the country's needs and offer modern facilities, including air bridges and spacious departure lounges, in order to consolidate its air-cruise local hub. However, air connections are limited, affecting competitiveness for non-tourism businesses. Recent projects include apron construction, LED lighting, and car park rehabilitation funded by the Caribbean Development Bank (CDB), aiming at improving infrastructure and energy efficiency. Ongoing projects involve a new terminal and runway expansion through a PPP, enhancing airport capacity and passenger experience.

Jamaica has also a relatively well-developed air-access infrastructure. Continuous upgrades are part of the capital improvement programmes, including runway lengthening and facility enhancements to accommodate growing passenger and cargo traffic. On the other hand, Trinidad and Tobago's air-access infrastructure has made strides in efficiency, scoring above the halfway mark in air transport efficiency, indicating a relatively good quality of service despite connectivity challenges.

The Bahamas' airport infrastructure is key for its tourism-driven economy and international trade. Major airports like Lynden Pindling International Airport and Grand Bahama International Airport offer direct flights to various destinations. Regional airports like Exuma and Marsh Harbour improve inter-island travel and connectivity. However, ongoing investments are needed to address infrastructure challenges and enhance the overall travel experience. Sustainability initiatives are also being explored.

The Eastern Caribbean States exhibit varying levels of airport infrastructure development, with some making significant progress. Most OECS countries have at least one international airport serving as their main gateway. Connectivity varies significantly, with larger islands like Antigua and Barbuda and Saint Lucia offering more international connections. Smaller islands like Dominica and Montserrat face limitations in direct international access (corroborated by their ranking on the IATA Air Connectivity Index). Recent upgrades have improved facilities in several countries (e.g., Antigua and Barbuda, Grenada,

Saint Lucia). Ongoing investments are needed across all countries to maintain standards and meet growing demands. Dominica and Montserrat require significant infrastructure improvements.

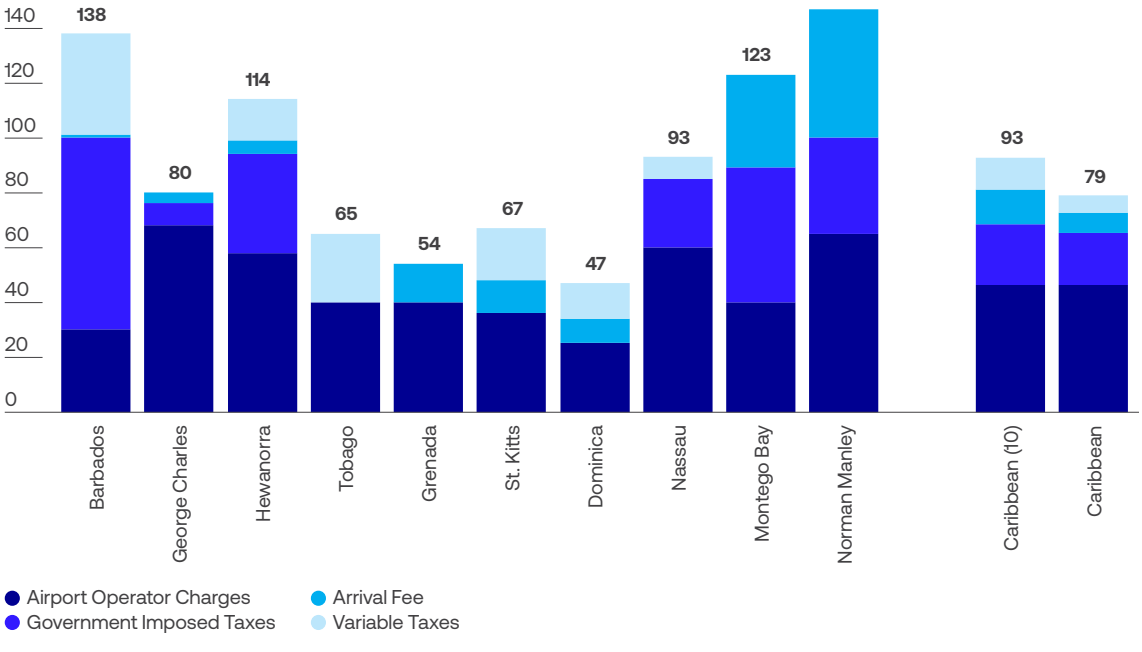
The **affordability of airport services** in the Caribbean is a critical issue that affects both the aviation sector and the broader economy. Key factors influencing this affordability include cost recovery models, investment needs, economic constraints, public-private partnerships (PPPs), regulatory environment, competition and market dynamics, tourism, and sustainability considerations.

Cost recovery models focus on recovering operational costs, which can limit small and medium-sized airports' ability to invest in necessary upgrades and expansions. Investment needs for airports, particularly those in low-income countries and SIDS, often exceed the limited fiscal and human capital resources available. Economic constraints, such as limited financial resources and high levels of public debt, can constrain governments' ability to subsidise airport infrastructure services, leading to higher costs for users.

The affordability of airport infrastructure services in the Caribbean is a significant concern due to high operational costs and low passenger volumes (hubs being an exception). Figure 2.14 displays the costs charged to international passengers in various Caribbean airports, based on a base airfare of USD 200. It breaks down these costs into four components: airport operator charges, government-imposed taxes, arrival fees, and variable taxes. The average total cost across the Caribbean airports is USD 79.

Significant variation is observed among the airports. For instance, Barbados (USD 138), Norman Manley (USD 147), and Montego Bay (USD 123) in Jamaica stand out for their high passenger charges, which exceed the regional average by a wide margin. These costs are largely influenced by government-imposed taxes, despite airport operator charges being in line with other airports in the region. In contrast, airports such as Grenada (USD 54), and Dominica (USD 47) have significantly lower costs, with minimal variable taxes and arrival fees. This variation highlights the economic burden on passengers and underscores the importance of efficient pricing policies to balance revenue generation with maintaining competitiveness, particularly for tourism-dependent economies in the Caribbean.

Figure 2.14
Benchmarking of total international passenger charges in the Caribbean airports, 2022
Source: Author based on TCIAA (2023).



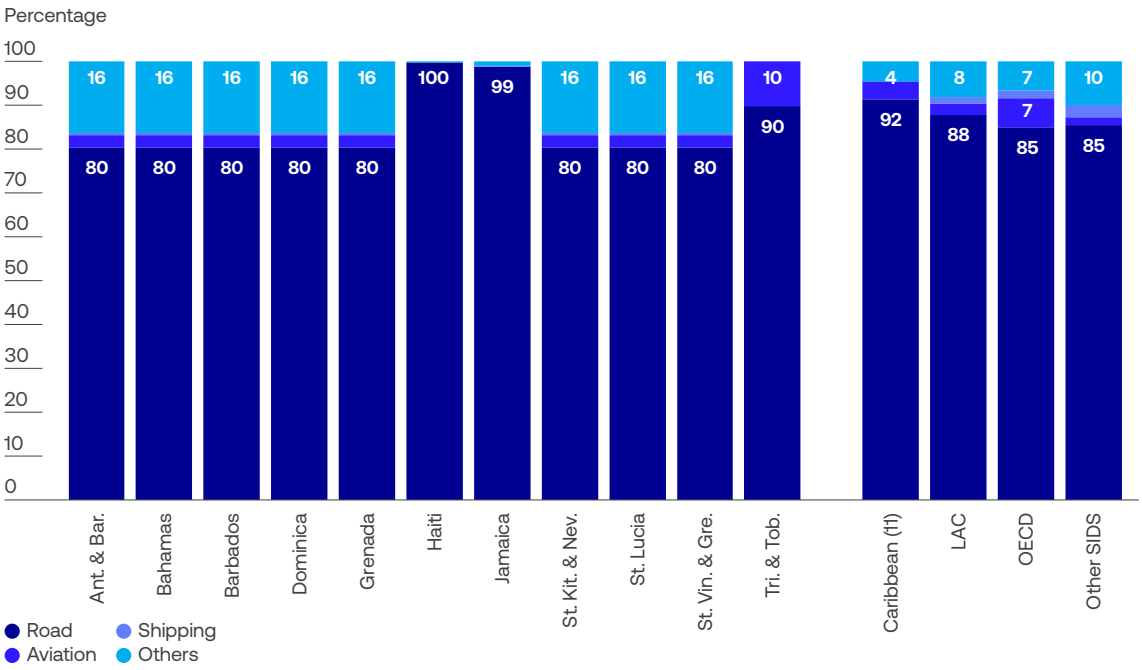
Changing the tariff structure is challenging since small passenger loads at many Caribbean airports often require higher taxes to support air transport infrastructure, making them less competitive compared to larger tourism destinations. Other operational costs include airport handling fees, air navigation costs, and administrative expenses, which further impact the competitiveness of air travel in the Caribbean.

Because of high air transport costs, several governments in the region find it necessary to get involved. Due to low passenger volumes (except for hubs), the maintenance of essential air services often falls on the public sector, straining government resources and affecting the overall affordability of air transport services.

High logistics costs, market concentration, and inefficiencies in the air transport network also contribute to the challenges of affordability in the Caribbean. Inefficiencies in customs systems and document preparation processes can also significantly impact the overall costs of airport services. The high concentration of the air transport market in the Caribbean can lead to higher prices for air travel and airport services due to limited competition. Suboptimal routing can result in unsustainable routes and higher operational costs, potentially passing on to consumers, affecting not only tourism but also the mobility of the local population (to pursue better business or educational opportunities).

As stated in Chapter 1, the transport sector represents 7% of **GHG emissions** across Caribbean countries (vs 10% in LAC and 13% in OECD; see Figure 1.8 - Panel B). Moreover, road transport accounts for 80% or more in most cases (Figure 2.15). Haiti and Jamaica stand out with road transport contributing 100% and 99% of emissions, respectively. The average of analysed countries (92%) exceeds the averages of LAC (84%), OECD (85%), and Other SIDS (85%), highlighting the region's heavy reliance on road transport. Therefore, promoting solutions like electric vehicles and renewable-powered public transit helps to reduce emissions and reliance on fossil fuels. Some Caribbean nations are making strides: Barbados aims to electrify all public buses and fleet vehicles by 2030; Jamaica is introducing electric buses and charging stations; and Bermuda is advancing electric mobility to achieve 85% renewable energy by 2035.

Figure 2.15
Contribution of transport modes to sector-specific greenhouse gas emissions, 2020
Source: Authors based on Minx et al. (2021).



Note: Others include railway, non-road transport, and off-road machinery for agriculture/forestry emissions. Caribbean (11) includes the countries listed in the figure.

On the other hand, the road transport sector is particularly susceptible to **climate change impacts,** with extreme weather causing significant damage. Enhancing the resilience of roads and bridges can mitigate physical damage and prevent economic losses while maintaining operational connections. Recent initiatives include a multi-year bridge assessment and reconstruction project in Trinidad and Tobago, which rebuilt 40 bridges with seismic measures and international design standards. In the Dominican Republic, road infrastructure design incorporates varying wind loads to withstand flooding and high winds associated with hurricanes (World Bank, 2021).

Other transport modes are also at risk. Hurricane Irma (2017) inflicted USD 173 million in damage to St. Maarten's airport, while a 2010 earthquake severely impacted Haiti's main airport, hindering relief efforts. Additionally, a volcanic eruption in Saint Vincent and the Grenadines in 2021 disrupted airport operations in nearby Barbados and Saint Lucia due to ash fallout (Espinet, Lunsford, and Dehghani, 2023). Ports face substantial risks as well, with over 50% of the region's economic assets located in coastal areas vulnerable to sea-level rise and intensified storms. However, Caribbean countries are working to enhance resilience in both airports and ports (Espinet, Lunsford, and Dehghani, 2023; UNCTAD, 2024).

ICT

In today's increasingly digitalised world, investment in robust information and communication technology (ICT) infrastructure has emerged as a potent catalyst for economic development. ICT infrastructure serves as an enabler of economic growth by enhancing business capabilities, allowing enterprises to increase production capacity, reduce operational costs, and optimise supply chains through improved data management. The development of comprehensive digital infrastructure is key for modernising other economic sectors such as public services, logistics, commerce, tourism, and agriculture. Furthermore, ICT infrastructure is interconnected with other types of infrastructure, such as transport and energy networks. Finally, ICT also enables progress in social and environmental dimensions by providing access to education, healthcare, and financial inclusion, as well as supporting the implementation of agendas related to decarbonisation, adaptation, and natural capital preservation.

Like other sectors, the unique composition of numerous small island states and territories in the Caribbean complicates the deployment of ICT infrastructure. Additionally, factors such as mountainous terrain and dispersed archipelagos create financial challenges for mobile network operators (MNOs) to provide comprehensive broadband coverage across the region.

Despite these obstacles, CARICOM-member countries are equipped with—and increasingly investing in—modern telecommunication infrastructure, including advanced digital technology, fibre optics and 5G networks. For instance, recent fibre-optic infrastructure upgrades in the eastern Caribbean have improved the capacity and reach of networks (see Box 2.5). In Barbados, it is recognised that the infrastructure stock needs upgrading, and the country has been taking steps to digitally transform its economy, including an investment of USD 40 million that was secured in recent years from the Inter-American Development Bank to bridge the digital gap. Similarly, Jamaica has made significant advancements in its ICT infrastructure, particularly with investments in high-speed internet connectivity through fibre-optic networks. The Universal Service Fund (USF) was established to expand bandwidth access and improve connectivity across the island, including public Wi-Fi initiatives.

Box 2.5
Caribbean Digital Transformation Project

The Caribbean Digital Transformation Project encompasses several beneficiary countries in the Eastern Caribbean region. The Commonwealth of Dominica has been allocated SDR 20.5 million (approximately USD 28 million) in funding for the project. Additionally, Grenada (USD 8 million), St. Lucia (USD 2 million), and St. Vincent and the Grenadines (USD 30 million) are also slated to receive funding allocations. Furthermore, a grant of SDR 5.9 million (around USD 8 million) is proposed for regional initiatives under the auspices of the Organisation of Eastern Caribbean States (OECS).

The overarching objective of the project is to enhance digital services and infrastructure across these countries, thereby fostering economic growth and improving the delivery of public services. By investing in the modernisation of digital capabilities and infrastructure, the project aims to create an enabling environment for sustained economic development and better service provision to citizens and businesses in the Eastern Caribbean region.

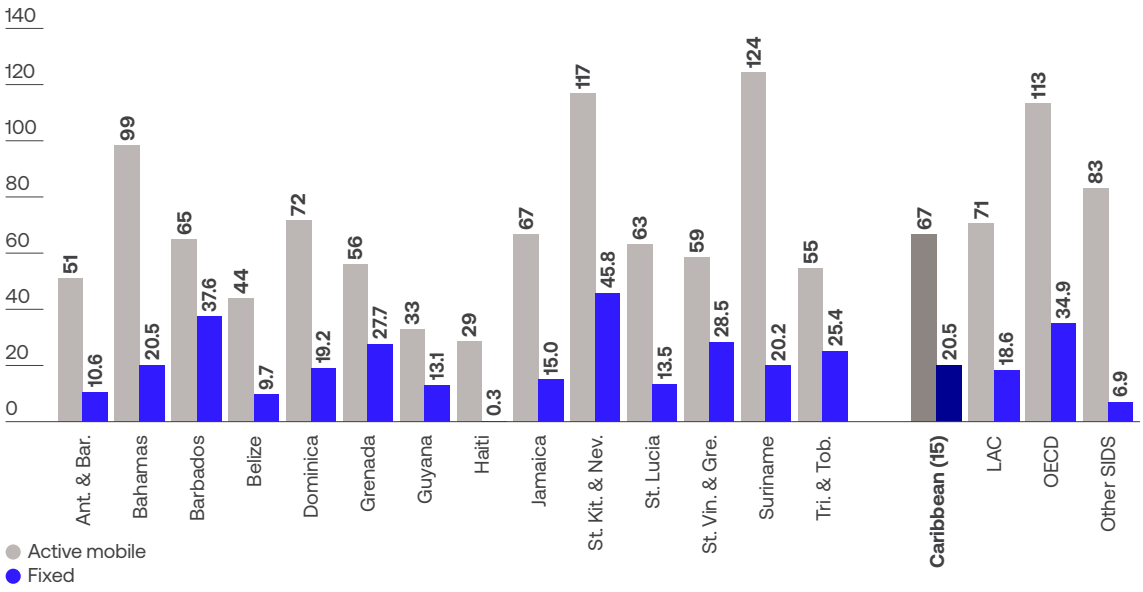
Also, a key emphasis is placed on modernising the legal and regulatory environment for telecommunications, fostering competition, investment, and innovation within the digital economy. The project is anticipated to yield significant positive economic impacts, contributing to GDP growth and long-term government cost savings. Estimates suggest that for every 10-percentage point increase in fixed broadband penetration, there could be a corresponding GDP increase of 1.3–1.5 per cent, with legislative and regulatory reforms expected to improve broadband affordability and drive higher penetration rates.

However, infrastructure service gaps remain a challenge. **Broadband access** varies across countries (Figure 2.16). In general, the Caribbean has an average number of mobile subscriptions per 100 inhabitants similar to that in LAC, but it lags behind more advanced economies. St. Kitts and Nevis stands out as the only country with subscriptions per 100 inhabitants comparable to OECD countries. Additionally, Suriname and The Bahamas have a high level of active mobile broadband connections per 100 population, while Barbados is a positive outlier in fixed broadband subscriptions. Conversely, access to these ICT services is a significant challenge in Haiti, Guyana, Belize and Antigua and Barbuda.

Disparities in access exist not only between countries but also within them. Rural areas often experience lower internet penetration rates compared to urban centres. For example, in Barbados, the urban-rural gap in internet usage stands at 25 pp of the population. Trinidad and Tobago exhibits a similar value, with a gap of 23 pp. In comparison, Haiti and Jamaica have smaller urban-rural disparities in this indicator, with differences of 15 pp and nearly 11 pp, respectively. Disparities in access to ICT infrastructure can exacerbate the “digital divide”, hindering certain regions from fully participating in and benefiting from the digital economy. Addressing these gaps, particularly in the aftermath of economic shocks like the COVID-19 pandemic, helps ensure that all segments of the population can leverage the opportunities presented by digital transformation.

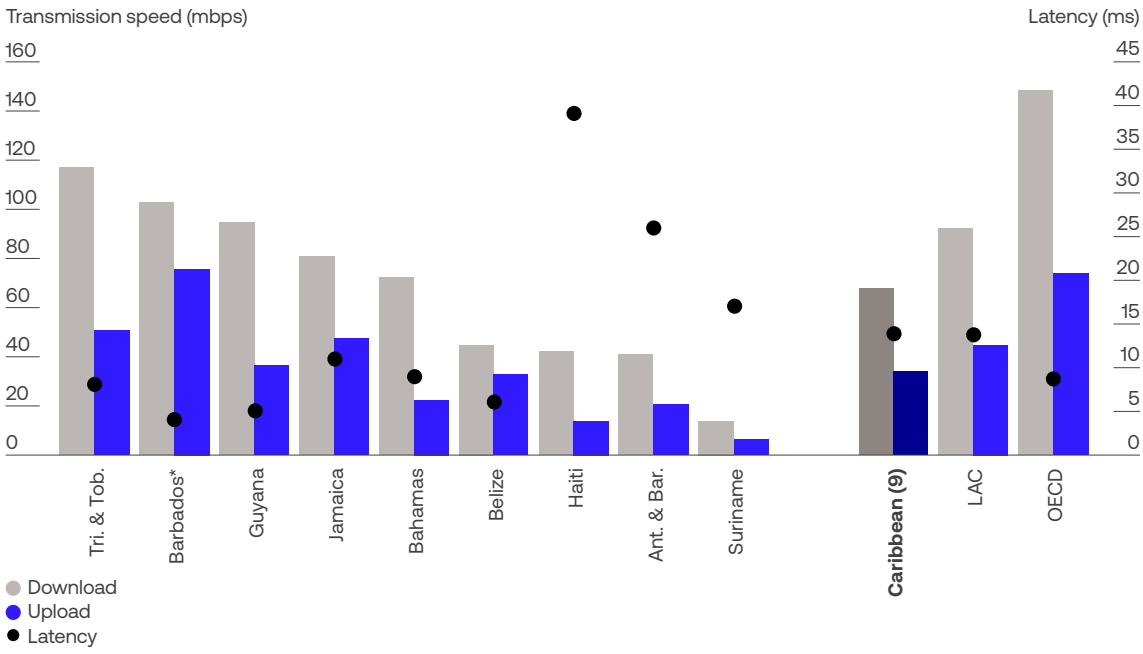
The **quality of ICT infrastructure** across the Caribbean region also exhibits substantial variations. On average, transmission speed is lower than in LAC and well below the OECD average. For latency, the Caribbean countries achieve values nearly 60% higher than the OECD’s. Figure 2.17 shows the different challenges the countries face in order to improve the ICT services quality. Particularly, the quality of this service is a problem in some countries like Suriname, Antigua and Barbuda, Haiti, Belize, The Bahamas, and Jamaica.

Figure 2.16
Fixed and active mobile broadband subscriptions per 100 inhabitants, 2022
Source: Authors based on ITU (n.d. a).



Note: Caribbean (12) includes the countries listed in the figure.

Figure 2.17
Fixed broadband download and upload speed, and latency, October 2024
Source: Authors based on Ookla (n.d. a).



Note: * Barbados data is from September 2024. Caribbean (9) includes the countries listed in the figure.


ERMARKET
MAGNUM
FINN SUPERMARKET
FALMOUTH STREET

The high cost of mobile and broadband services poses a significant barrier to digital access in the Caribbean, with prices averaging 3.5% of per capita GDP.

Similar to the situation in LAC, the primary barrier preventing Caribbean countries from fully leveraging the potential of digital technologies is the high cost of mobile and broadband services (see Figure 2.18). This **affordability gap** disproportionately impacts lower-income populations, leading to disparities in digital access both within and between countries. Prices of services as a percentage of per capita GDP are in line with the LAC average but are significantly higher than the OECD's level.

Taking as reference the target set by the Broadband Commission for Sustainable Development, which is less than 2% of GDP by 2025,[6] the Caribbean countries (except The Bahamas, Guyana, and Trinidad and Tobago) are far from reaching this goal, highlighting the affordability issue that the region needs to address. Many Caribbean countries, such as Haiti and Jamaica, grapple with high costs for ICT services (relative to income), posing a significant barrier for low-income households and small businesses. Particularly in Haiti, access to broadband remains cost prohibitive. The structure of the telecommunications market plays a role, as limited competition among service providers in some nations can lead to higher prices and lower service quality.

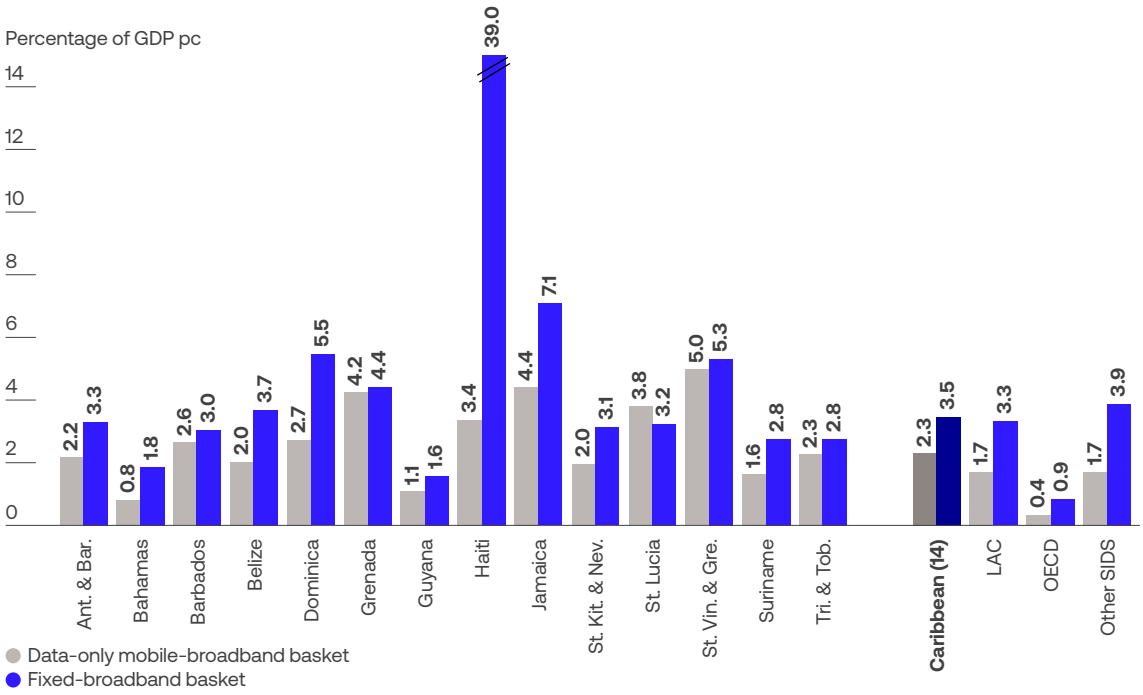
Governments have initiated programmes to subsidise internet access for low-income households or expand broadband infrastructure in underserved areas, aiming to improve affordability and accessibility. However, the effectiveness of these initiatives varies based on implementation and funding. The high cost of building and maintaining ICT infrastructure due to geographical challenges and the need for advanced technology also contributes to higher service prices, underscoring the importance of investments to improve service quality and reduce costs over time.

Affordability extends beyond pricing; users also consider the benefits obtained from service usage when deciding to subscribe. However, to leverage those benefits, consumers must develop the ability to effectively utilise ICT services, highlighting the need for programmes to enhance digital literacy.

To assess the level of development of the digital ecosystem in various countries, the CAF Observatory of the Digital Ecosystem (2024) has its own index composed of seven pillars: digital infrastructure, public policies and regulation, household digitalisation, digital economy, State digitalisation, human capital and workforce, and green digital economy. Specifically for four Caribbean countries, Figure 2.19 shows the results of this index and its components compared to LAC and OECD averages.

6 Broadband Advocacy Target 2 – Broadband Commission. According to the Broadband Commission for Sustainable Development, broadband services should cost less than 2% of monthly Gross National Income (GNI) per capita in developing countries by 2025. When comparing world GNI and GDP, this target does not differ significantly (1.9%) when GDP is used as the reference for income.

Figure 2.18
Data-only mobile-broadband basket and fixed-broadband basket, 2023 (% of GDP per capita)
Source: Authors based on ITU (n.d. a) and World Bank (n.d.).



Note: Caribbean (14) includes the countries listed in the figure.

The Caribbean countries analysed exhibit values like the LAC average, with countries like Barbados and Trinidad and Tobago achieving higher scores in the overall index and certain pillars. Haiti stands out as an exception, with values significantly below the regional average across all dimensions. When compared to the OECD average, Caribbean countries still have considerable progress to make to reach the level of more developed nations, particularly in areas related to ICT adoption, such as household and government digitalisation and the digital economy. There is also a significant gap in the dimension of public policies and regulation, which will be analysed further. These results are aligned with the diagnosis of the Caribbean ICT sector outlined in this report.

Figure 2.19 also shows that countries like Jamaica or Barbados rank with the LAC average in the green digital economy pillar, although far from OECD, while Haiti and Trinidad and Tobago lag behind. Moreover, solid waste management in the Caribbean faces significant challenges. In the ICT sector, only 38.5% of electronic waste is managed—with huge differences between countries—which, although similar to the LAC average, is much lower than the levels in other SIDS and OECD countries (see Figure 2.20). Strengthening recycling and disposal systems and transitioning to a circular economy that emphasises repair, reuse, and recycling are essential for improving sustainable waste management practices.

Figure 2.19
CAF's Digital Ecosystem Index for some Caribbean countries
Source: Authors based on data CAF Observatory of the Digital Ecosystem (2024).

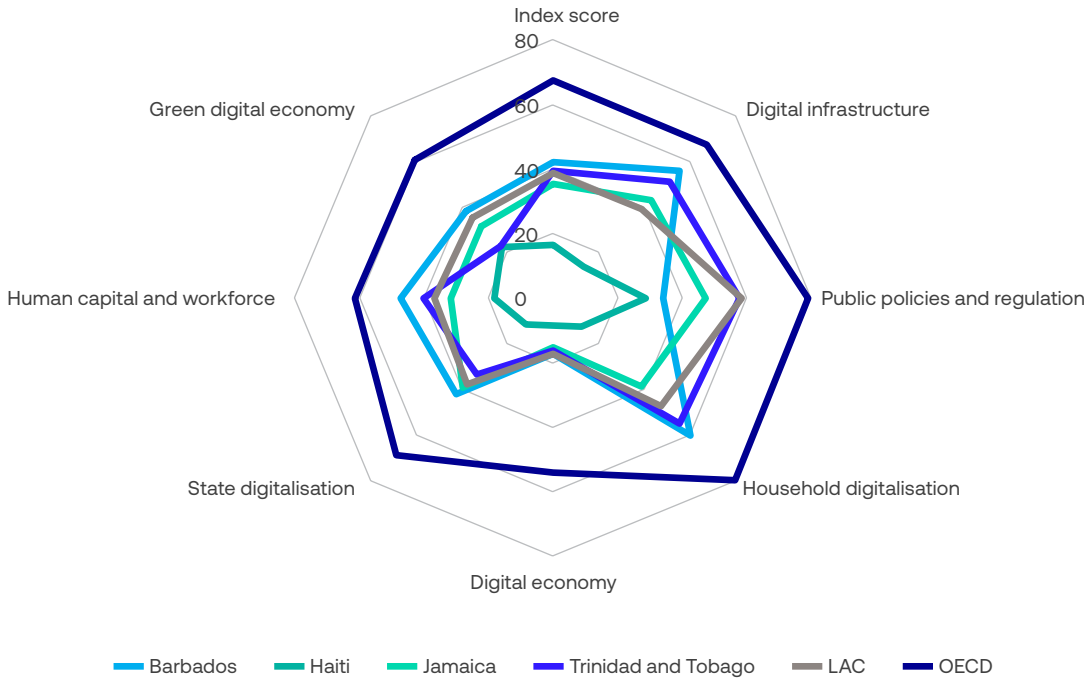
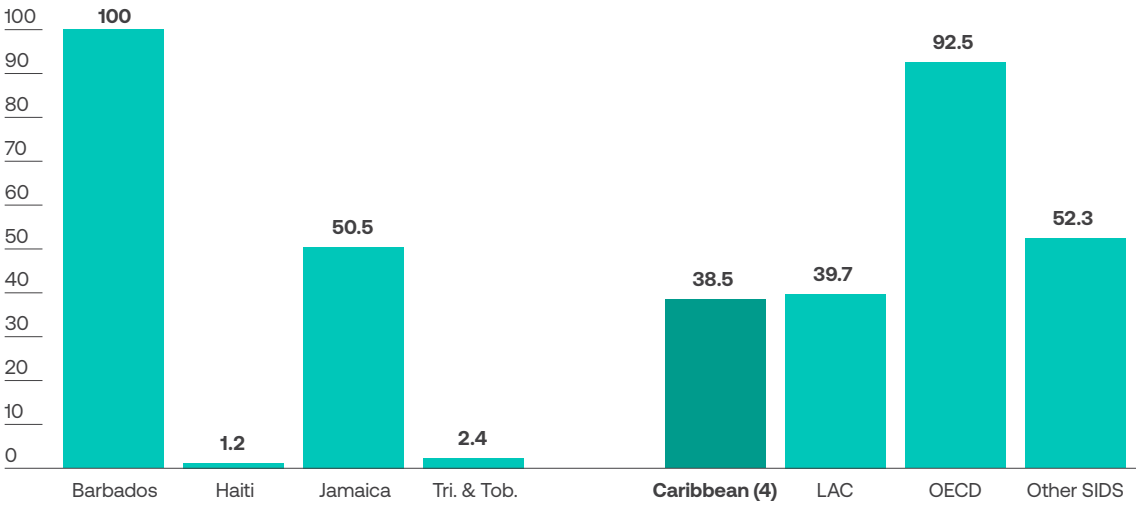


Figure 2.20
Proportion of controlled solid waste from the digital economy in the Caribbean, 2023
Source: CAF Observatory of the Digital Ecosystem (2024). Caribbean (4) includes the countries listed in the figure.



Also, enhancing the **resilience of ICT** infrastructure is essential for maintaining telecommunications and digital services, which are highly susceptible to hurricanes and extreme weather. Key strategies include implementing robust designs with redundant systems, alternative data pathways, and durable materials. Additionally, comprehensive disaster preparedness plans, advanced technologies like cloud computing, and strong cybersecurity measures are important for further strengthening this sector's resilience (Hope Economics, 2024e).

Water and sanitation

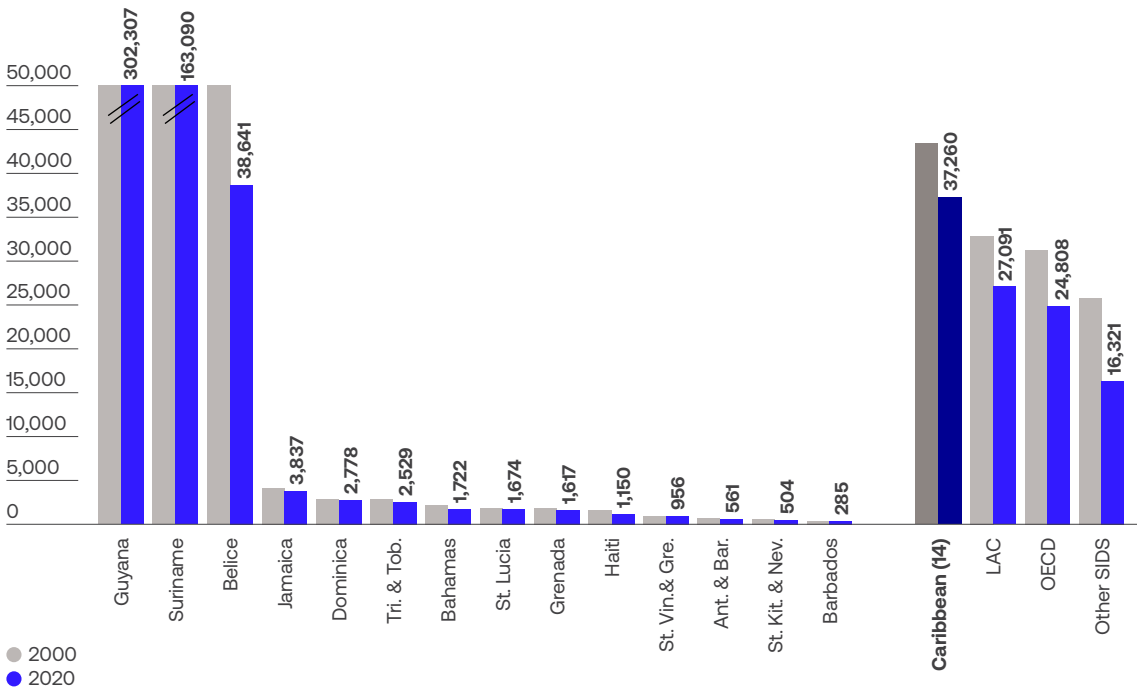
The water sector is a fundamental driver of economic growth, underpinning crucial industries such as agriculture, energy, and manufacturing. Reliable access to clean water and effective sanitation services also has social benefits, as they enhance public health, reduce healthcare costs, and increase workforce productivity, ultimately boosting economic performance.

A water security gap is a disparity between the demand for water and the available supply, particularly in the context of ensuring all populations have access to sufficient, safe, and reliable water resources. In the Caribbean, several factors contribute to this gap, including declining freshwater availability, increasing demand, infrastructure challenges, financial constraints, climate change impacts, socioeconomic disparities, and governance issues. Many countries experience high non-revenue water rates and inadequate wastewater treatment and sanitation facilities which contribute to environmental degradation, marine pollution, and heightened public health risks. As climate change intensifies, scarcity increases, and the region's water infrastructure becomes even more susceptible to damage, further disrupting essential services and recovery efforts. These challenges and factors are key determinants shaping the gaps in access, quality, and affordability that this sector continues to face.

Strategic investment in water infrastructure can help address these challenges while reducing inequalities between urban and rural areas, and across socio-economic groups. Moreover, well-developed water infrastructure creates a more stable and attractive environment for both domestic and foreign investments, reducing operational risks for businesses and stimulating economic growth. However, limited economies of scale, weak regulatory frameworks, and inadequate disaster preparedness hinder progress, contributing to financial and logistical barriers to achieving these goals.

The scarcity of water resources in the Caribbean islands represents the primary challenge faced by these nations. Analysing the **availability of renewable internal freshwater** resources per capita reveals two distinct realities among the countries examined in this report: one for the continental nations and another for the islands (see Figure 2.21). In the first case, their relatively low population levels combined with abundant water resources position them among the six nations in the LAC region with the highest water availability (although they have faced a pronounced decline in the last two decades). Notably, Guyana and Suriname rank first and second, respectively. On the other hand, the Caribbean SIDS experience the lowest water availability in the LAC region. To put this issue into perspective, the combined water availability of the islands included in this study is comparable to that of Paraguay alone.

Figure 2.21
Renewable internal freshwater resources (cubic metres per capita)
Source: Authors based on data from FAO (n.d.). Caribbean (14) includes the countries listed in the figure.

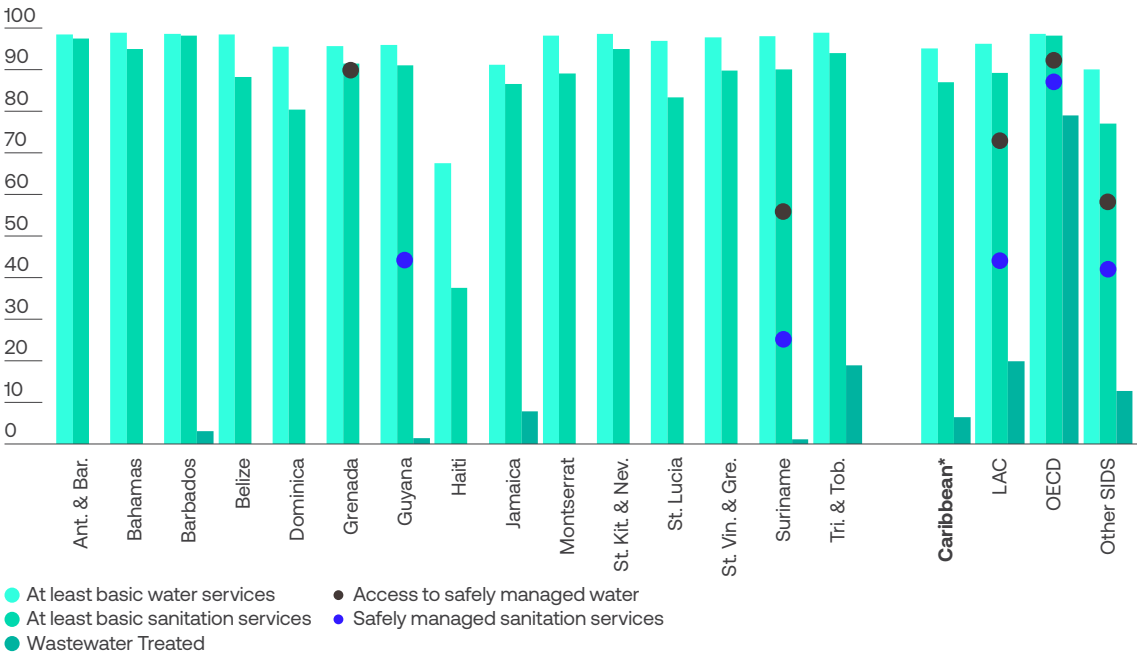


Despite this situation, many Caribbean nations, like their counterparts around the globe, aspire to achieve universal **access to potable water and sanitation**. An analysis of access to at least basic water and sanitation services (Figure 2.22) reveals that, on average, Caribbean countries are close to achieving the goal of universal water access (95%) but remain significantly behind in the case of sanitation, with only an 87% coverage rate. Limited access to sanitation services across the region adversely affects public health, economic productivity, and social equity. A related issue stemming from this sanitation gap is the region's low rate of wastewater treatment, which lags behind the averages for LAC, OECD countries, and other SIDS. Additionally, there are urban-rural disparities in access to water and sanitation services, with gaps of approximately 8 pp for water and 4 pp for sanitation. In some countries, these differences are far more pronounced, with countries in which the gap is 40 pp like water service in Haiti or close to 10 pp like water service in Jamaica and sanitation service in Suriname and Belize.

Ageing and poorly maintained infrastructure can lead to **service disruptions and water quality issues**. The access gap becomes even more pronounced when considering access to safely managed services. For instance, in Suriname, access to safely managed water and sanitation services is 42% and 65% lower, respectively, than access to at least basic services. This gap widens further when examining rural areas. In rural Suriname, access to safely managed water services stands at just 40.8%, 23 pp below urban levels (see Figure 2.22). Service interruptions are a critical issue. As shown in Figure 2.23, nearly one in four Caribbean residents, on average, lack access to water when it is required, with the situations in Jamaica and Dominica of particular concern.

Figure 2.22
Access to services of water and sanitation, 2022*

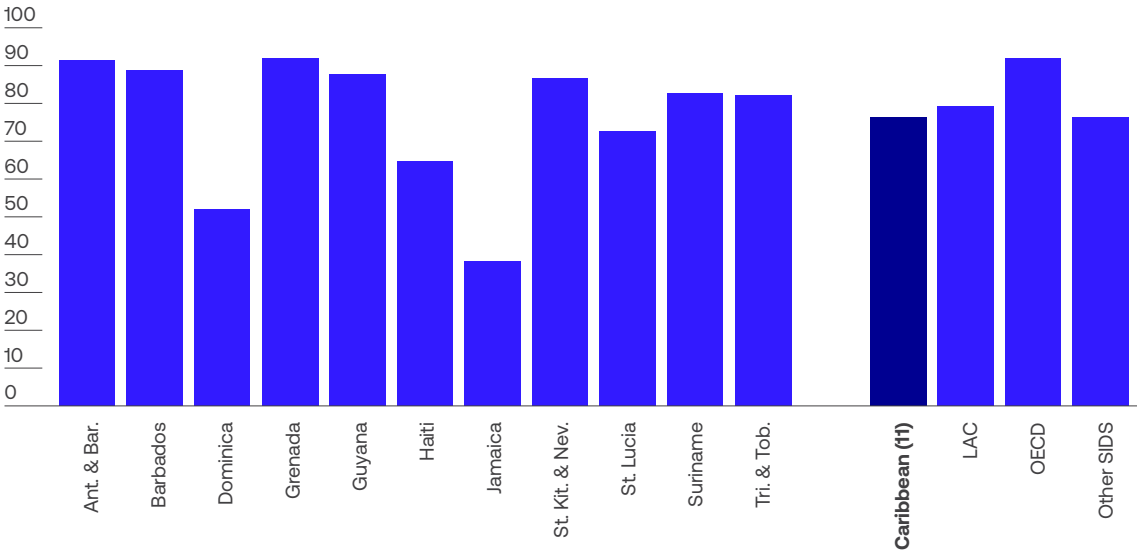
Source: Authors based on UNICEF (n.d.) and Jason et al. (2021). Caribbean* includes the countries listed in the figure: At least basic water services and at least basic sanitation services (15); Wastewater treated (5).



Note: * The data corresponds to the most recent value available from the source. For most countries, this is from 2022, except for The Bahamas, which is from 2019, and Dominica, Grenada, and Saint Kitts and Nevis, which are from 2017.

Figure 2.23
Percentage of population with a water service available when needed, 2022*

Source: Authors based on UNICEF (n.d.). Caribbean (14) includes the countries listed in the figure.



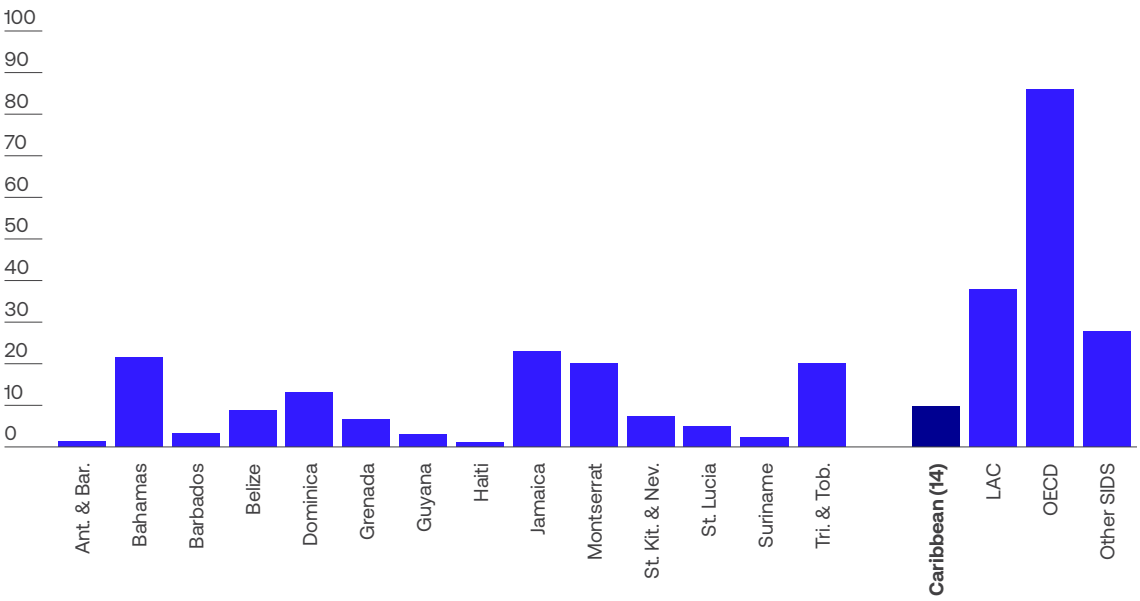
Note: * The data corresponds to the most recent value available from the source. For most countries, this is from 2022, except for The Bahamas, which is from 2019, and Dominica, Grenada, and Saint Kitts and Nevis, which are from 2017.

Water utilities in the Caribbean struggle with high non-revenue water (NRW) rates, often exceeding 50%, resulting in substantial financial losses, inefficiencies, and threats to water resource conservation.

Figure 2.24 illustrates the percentage of the total population with access to sewer connections, delivering a clear message: Caribbean countries significantly lag in service quality compared to LAC, OECD, and even other SIDS averages. In the Caribbean, less than 10% of the population has access to safe sewage systems, and in five countries—Antigua and Barbuda, Barbados, Guyana, Haiti, and Suriname—this figure falls below 5%. This low access to sewer connections also reflects the region's inadequate levels of wastewater treatment, as shown in Figure 2.22.

Figure 2.24
Percentage of the population with sewer connections, 2022*

Source: Authors based on UNICEF (n.d.). Caribbean (14) includes the countries listed in the figure.



Note: * The data corresponds to the most recent value available from the source. For most countries, this is from 2022, except for The Bahamas, which is from 2019, and Dominica, Grenada, and Saint Kitts and Nevis, which are from 2017.

Operational efficiency—one of the biggest challenges for water service providers in the Caribbean—plays a crucial role in mitigating resource constraints and addressing deficiencies in service quality. High NRW rates lead to substantial financial losses, distribution inefficiencies, and wastage of natural resources. NRW levels average 40% in Latin America and 45% in the Caribbean (well below the international recommendation—20% according to Sanchez Tracon et al., 2024—and OECD average of 25%), significantly contributing to the financial difficulties faced by utilities (Janson et al., 2021). In the Caribbean, this equates to over 450 million cubic metres of water supply lost annually, costing utilities an estimated USD 612 million per year (Table 2.10). These challenges are compounded by outdated infrastructure, limited maintenance, and insufficient investment, which restrict the sector's capacity to provide reliable services.

Table 2.10
NRW for Utilities in the Caribbean
Source: Authors based on data from Janson et al. (2021).

Country	Name of Utility	Non-Revenue Water (NRW) %	Cost of NRW (USD millions/year)
Jamaica	NWC (2020)	75%	350
Guyana	GWI (2019)	68%	5
St. Lucia	WASCO (2013)	56%	8
Dominica	DOWASCO (2020)	53%	9
Trinidad and Tobago	WASA (2020)	50%	275
Barbados	BWA (2018)	45%	N/A
Bahamas	WSC (2015)	37%	12
Surinam	SWM (2019)	31%	17
Grenada	NAWASA (2018)	26%	N/A
Belize	BWS (2020)	20%	6
Average		**46%**	**85**
Total			**682**

Notes: N/A: not available. Jamaica engaged in NRW programmes since 2015; so, the current level may be lower.

High levels of NRW adversely impact the **affordability** of water services. On average, the value of a cubic metre of water is USD 1.40 (Figure 2.25). When assessed relative to GDP per capita, the monthly water bill for 15 cubic metres represents approximately 2% of the monthly GDP per capita in the Caribbean. This figure is lower than the Latin America average (2.8%) but higher than the USA (1.4%), according to results from Cont et al. (2022) for the year 2021. However, affordability varies significantly between Caribbean countries. For instance, water bills are the highest in Belize, reaching 6.6% of the monthly GDP per capita, followed by Jamaica at 4.6% and Suriname at 3.8%. In contrast, countries like Trinidad and Tobago report much lower levels, with water bills representing only 0.3% of the monthly GDP per capita.

Affordability of water services varies widely across the Caribbean, reflecting significant heterogeneity in pricing and subsidy structures. In countries like Trinidad and Tobago, water systems are heavily subsidised, making access more affordable for the general population. In 2023, WASA, the national water utility, was the beneficiary of the largest central government transfer, nearly USD 181 million or 0.64% of GDP (Government of the Republic of Trinidad and Tobago, 2024).

Additionally, water tariffs in the Caribbean also vary widely among different utilities, influenced by operational costs, water sources, infrastructure, and service delivery models. For instance, Suriname and Guyana, with abundant water resources, report some of the lowest prices per cubic metre.

Disparities underscore the need for regionally tailored policies that balance affordability with financial sustainability, ensuring that all populations can reliably access safe water without compromising their economic well-being.

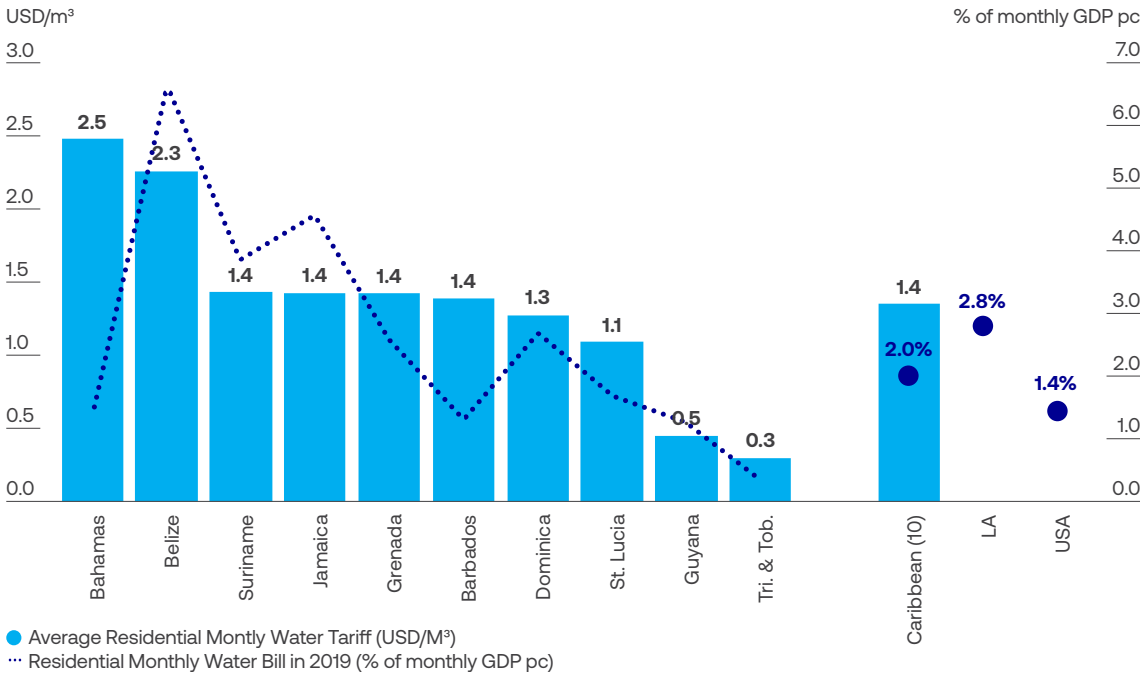
In general, high tariffs can disproportionately affect low-income households, creating barriers to accessing essential services. Most Caribbean utilities have experienced decreases in profitability and collections from customers, which may further strain their ability to maintain and improve infrastructure.

Technological barriers, particularly in smaller islands, limit the ability of Caribbean nations to innovate and improve water services. Social and gender dynamics also play a role in water access, with women often bearing the brunt of water-sourcing responsibilities during scarcity.

Despite some progress, significant challenges remain, particularly in rural areas and countries facing economic and environmental pressures. Initiatives aimed at improving water governance and infrastructure, such as the "Climate Resilient Water Sector in Grenada" project funded by the Green Climate Fund (GCF), focus on enhancing efficiency and resilience.

Figure 2.25
Tariff of water services per cubic metre and total bill for a consumption of 15 cubic metres per month as a percentage of monthly GDP per capita), 2019

Source: Authors based on Janson et al. (2021), Cont et al. (2022) and World Bank (2024).

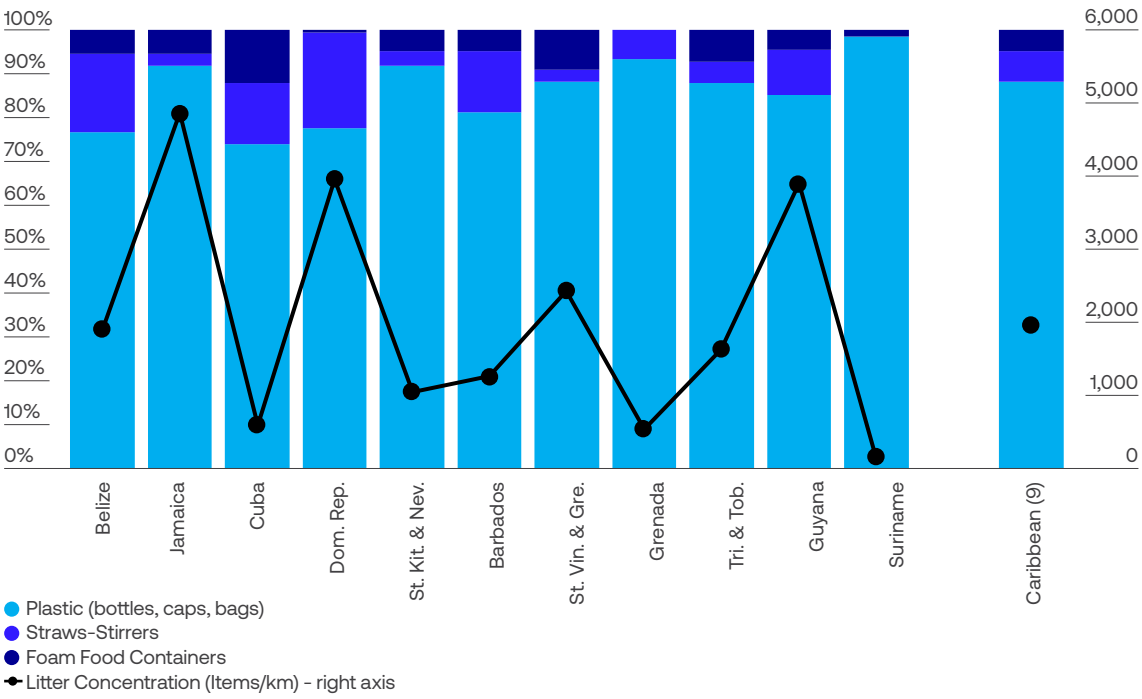


Note: The utilities used for each country are Water and Sewerage Corporation (The Bahamas), Barbados Water Authority (Barbados), Belize Water Services (Belize), Dominica Water and Sewerage Company (Dominica), National Water and Sewerage Authority (Grenada), Guyana Water Incorporated (Guyana), National Water Commission (Jamaica), Water and Sewerage Company Inc. (Saint Lucia), Suriname Water Company (Suriname), and Water and Sewerage Authority (Trinidad and Tobago). Caribbean (10) includes the countries listed in the figure. LA and USA contain data of 2021.

Besides non-revenue water, **resource management** in the Caribbean also strains limited freshwater resources. A study by Diez et al. (2019) estimates that approximately 85% of wastewater in the region is untreated (see also Figure 2.22 for a short list of countries with available information) and discharged into the oceans, with nearly 90% of ocean litter consisting of plastic (see Figure 2.26), which takes hundreds to thousands of years to decompose. Tackling these challenges requires investments in integrated planning and resilient infrastructure to ensure water security and improve resource utilisation. Enhancing wastewater treatment and enforcing stricter regulations can help mitigate impacts and protect marine ecosystems.

Figure 2.26
Litter found in coastal cleanups in selected Caribbean countries

Source: Authors based on Diez et al. (2019). Average (9): simple average for the nine countries considered in the report. Caribbean (9) includes the countries listed in the figure.



Resilience in the water sector involves reliably providing services despite external shocks and recovering quickly after disruptions (Stip C et al., 2019). The impacts of the 2017 hurricane season, combined with prolonged droughts, have exposed vulnerabilities in water infrastructure in the Caribbean. Climate resilience policies and adaptation plans are instrumental in tackling these issues. As part of the ACP-EU-CDB National Disaster Risk Management programme, tools were developed to assist Caribbean nations in designing climate-resilient actions. Case studies from Grenada, St. Kitts and Nevis, Dominica, and Antigua and Barbuda, which faced severe hurricane damage, emphasised the need for targeted efforts to enhance infrastructure durability, governance, and water resource management. For instance, Hurricane Maria severely damaged Dominica's water infrastructure, washing out key intake structures (HR Wallingford, n.d.).

Institutional and Regulatory Frameworks for Infrastructure in the Caribbean

The Caribbean faces considerable challenges in developing effective institutional and regulatory frameworks for infrastructure management. These frameworks are essential for establishing clear governance structures, ensuring effective oversight, and fostering coordination among diverse stakeholders. Institutional and regulatory gaps undermine the region's capacity to coordinate actions, enforce standards, and align investments with long-term development objectives.

A comparison of the region's institutional and regulatory frameworks with the OECD's international benchmark reveals limited progress. One major issue in the region is the considerable deficiencies in project implementation, which have persisted even before the COVID-19 pandemic. As of 2019, the region already had a relatively poor track record in executing infrastructure projects due to limited institutional capacity and fragmented information across the public sector.

Implementation challenges affect multiple sectors and have also hindered the performance of interventions from Multilateral Development Banks (MDBs). For instance, the CDB reports persistent obstacles, from prolonged project timelines averaging seven years to low disbursement ratios and large amounts of undisbursed funds (CDB, 2021). Key challenges include inadequate institutional capability within executing agencies and project implementation units, insufficient technical skills, underperformance by contractors and consultants, and external disruptions like natural disasters. These factors underscore the urgent need to bolster institutional capacity, streamline processes, and strengthen the overall governance of infrastructure projects to effectively tackle these systemic challenges.

Another significant area of concern is the outdated or non-existent legal and regulatory frameworks governing infrastructure sectors. When such frameworks are lacking or obsolete, they tend to exacerbate project implementation delays, increase project risks, and limit the ability to adapt to evolving sectoral requirements. This is especially pronounced in the energy sector, where outdated regulations often fail to meet modern challenges such as renewable energy integration, grid resilience, and sustainable energy financing. The CDB (2022) reports that, despite numerous efforts over the years, weaknesses in the enabling frameworks of Caribbean countries remain a significant impediment to large-scale private sector investment in renewable energy. Currently, many Caribbean nations lack modernised electricity legislation and regulatory structures that would foster a supportive environment for private sector engagement.

As shown in Table 2.11, the current state of **energy policies, legal frameworks, and regulatory structures** across the region reflects a patchwork of approaches, with notable variations in the adoption and implementation of sustainable energy initiatives. While some countries have made progress in establishing renewable energy and energy efficiency policy instruments—mainly since 2019—many others have yet to act or lack clarity in their commitments. This inconsistency undermines the region's ability to transition smoothly to sustainable energy systems and attract the private investments necessary to achieve ambitious renewable energy targets.

Table 2.11
Status of policy, legal frameworks, and regulatory structures in the energy sector in the Caribbean
Source: CDB (2022).

Country	Strategy Action Plan	Interconnection	Net Billing/Net Metering	Feed in Tariff	National Development Plan	National Energy Policy	Renewable Energy Policy	Electricity Act (Ammended to include RE/EE)	RE/EE Act	Transport ACT which supports EV/EE	Tax Acts which supports RE/EE
Anguilla	2012					2009					
Antigua and Barbuda	2013	2011	2017			2011			2015		
Barbados	2020	2017	2010	2019	2013	2019		2019			2019
Belize	2019				2016						
British Virgin Islands	2019	2018	2018	2018	2020		2016	2015			
Cayman Islands	2017	2018	2018	2018		2017					
Dominica	2019	2016	2016	2019	2018	2019		2006	2015 (Geothermal)		
Grenada					2019	2011		2017			
Guyana	2018	2017	2019		2019	2017			2013 (Hydroelectric)		2018
Haiti	2006				2012	2012					
Jamaica	2020	2016	2016		2009	2009	2010	2015			
Montserrat					2018	2016					2019
St. Kitts and Nevis	2017	2018			2003	2011	2021	2017			
St. Lucia	2017	2017		2017	2008	2010		2017	2011 (Geothermal)		2020
St. Vincent and the Grenadines	2021	2019	2019	2019	2013	2009		1973	2015 (Geothermal)		
Suriname	2018	2018	2018	2018	2017			2016			
The Bahamas	2018	2017	2017	2017	2017	2013		2015		2016	
Trinidad and Tobago	2020	2011			2016						
Turks and Caicos Islands	2019	2018	2018		2008						

The World Bank (2023b) corroborates the findings of the CDB, emphasising the critical role that regulatory frameworks play in facilitating renewable energy investments. The report underscores the widespread absence of independent regulators and transparent legal frameworks in the region, representing a significant constraint. In many Caribbean jurisdictions, regulatory bodies are either heavily influenced by government control or entirely absent. For example, in St. Vincent and the Grenadines, the energy regulator operates under direct government control, undermining its ability to provide impartial oversight. Similarly, insufficient separation between utilities and regulatory bodies in other nations creates conflicts of interest that stifle private investment and innovation.

The lack of effective regulation has severe implications, particularly for distributed generation and the integration of renewable energy technologies. Outdated or non-existent regulations hinder the adoption of variable

renewable energy components, battery storage, and other modern energy solutions. Countries such as Belize and Trinidad and Tobago lack clear provisions for scaling up distributed generation or establishing grid interconnections. Belize, for instance, has no defined processes for grid connections. In contrast, Barbados, Guyana, and St. Vincent and the Grenadines have implemented net billing and metering schemes; however, they lack comprehensive technical standards on interconnection loads, system stability, and safety protocols. Additionally, insufficient transparency in regulatory decision-making and perceived favouritism towards existing utilities further discourage private sector engagement through concerns about unclear methodologies for tariff setting and outdated energy action plans.

Progress across the region has been uneven, with certain jurisdictions advancing regulatory reforms. Grenada, for instance, has recently implemented regulations that address tariff-setting methodologies and independent power producer procurement. Nevertheless, gaps persist in crucial areas such as integrated resource planning (IRP), which is essential for attracting renewable energy investments. IRPs provide long-term electricity demand forecasts and outline planning measures for utilities, offering investors clarity on future opportunities. The lack of IRPs creates gaps in the regulatory landscape, hindering efforts to expand distributed generation and promote electric vehicle adoption.

Electricity generation, dominated by vertically integrated monopolies, faces additional challenges. Companies like Jamaica Public Service Company (JPS) struggle to finance infrastructure upgrades and improve system capacity, contributing to inefficiencies and system losses (OUR, 2021). Addressing these structural and regulatory gaps is essential for advancing sustainable development in the region.

Challenges in establishing robust regulatory frameworks extend beyond the energy sector, reflecting broader governance issues throughout the Caribbean.

The **water and sanitation sector** faces significant institutional, regulatory, and operational challenges, with marked disparities between countries. Dubrie et al. (2022) identify critical gaps in policies, legal frameworks, and data management related to Integrated Water Resources Management (IWRM) in SIDS. While countries such as Jamaica and Trinidad and Tobago have specific visions for IWRM, others, like Guyana, are still in the process of developing theirs. Although many countries have incorporated IWRM into sustainable development strategies linked to health, disaster management, and climate change adaptation, inconsistent implementation, fragmented legislative frameworks, and overlapping mandates limit its effectiveness.

For example, WASA of Trinidad and Tobago lacks licenses for water extraction, jeopardising the sustainable use of resources. Jamaica, with a structured framework under a dedicated ministry, exemplifies best practices, though institutional capacity and data access challenges persist.

An analysis of **state-owned enterprises** in the Caribbean highlights significant variations in governance practices. Burdescu et al. (2020) note that Belize and Jamaica have developed advanced frameworks supported by robust legal and institutional structures, while countries such as Grenada and Dominica face unclear mandates, weak monitoring, and inadequate financial planning.

Persistent systemic issues, such as water tariffs below cost, political interference, and limited managerial autonomy, affect service quality and financial sustainability. Furthermore, the lack of consistent performance reviews and incentives to reduce costs exacerbates these difficulties (Table 2.12). Hendrickson (2023) highlights additional barriers in countries such as Antigua and Barbuda, Barbados, and Saint Lucia, including reluctance to implement cost-recovery tariffs, outdated accounting systems, and restricted access to commercial financing. These issues impede efforts to improve infrastructure and sustain effective operations.

Table 2.12
Assessment of the governing environment in selected state-owned water utilities in the Caribbean[7]
Source: Burdescu et al. (2020), page 54.

Dimension	Belize	Dominica	Grenada	Jamaica	St. Lucia
Legal	4	3	3	4	3
Institutional	4	3	2	3	2
Regulatory	3	1	1	2	1
Overall	**3**	**1**	**1**	**2**	**1.6**

Note: Performance score ranges from 0 to 4, where a 4 indicates a high level of success and a 0 indicates a low level of success.

In the **transport sector**, the region faces fragmented decision-making, excessive bureaucracy, limited coordination among agencies, and inadequate regulatory frameworks. These issues significantly impact resource allocation, the implementation of regulations, private sector participation, transparency, and investment management. Furthermore, climate resilience and environmental sustainability remain insufficiently integrated into planning processes. Moreover, the limited availability and poor quality of data further constrain the region's infrastructure potential (Calatayud and Montes, 2021).

Phillips et al. (2023b) note that outdated institutional frameworks in many Caribbean countries pose significant challenges to achieving sustainable and efficient **land transport systems**. Policies often prioritise personal mobility over public transport development, supported by fiscal regimes that encourage mass vehicle acquisition. Comprehensive strategies to address economic efficiency, reliability, and environmental sustainability in transport are largely absent, and policy frameworks tend to be fragmented, with weak implementation and enforcement. While some countries, such as Barbados, have made progress in integrating sustainability goals, others, including Jamaica, lack cohesive policies to address these challenges holistically. A key issue is that transport management frameworks primarily focus on licensing and regulatory enforcement, without the adequate institutional capacity for research, planning, and implementing policies that address the sector's diverse interests.

The Caribbean's **port sector** is characterised by diverse institutional frameworks, including public service ports, landlord structures, and privatised models. Port operations highlight regional diversity and challenges. In Jamaica, the Port Authority (PAJ) acts as both regulator and operator, managing tariffs, assets such as cranes, and operational efficiency through structural separation and labour concessions. However, stevedoring and pilotage remain under a pool system. Trinidad and Tobago employs a landlord model, with the Port Authority regulating cargo handling at government-owned ports like Port of Spain. Businesses, however, favour the more efficient Point Lisas, which operates independently of the authority. In St. Lucia, the ports at Castries and Vieux Fort operate under a public utility model managed by the St. Lucia Air and Sea Ports Authority (SLASPA). Private sector involvement is limited, and trans-shipment activity is concentrated in Vieux Fort.

In the **airport sector**, institutional frameworks vary by country but typically involve a combination of government agencies, regulatory bodies, and private sector participation. The World Bank (2023a) has identified several common challenges in the region's aviation sector. The airline industry is financially fragile with unstable service levels,

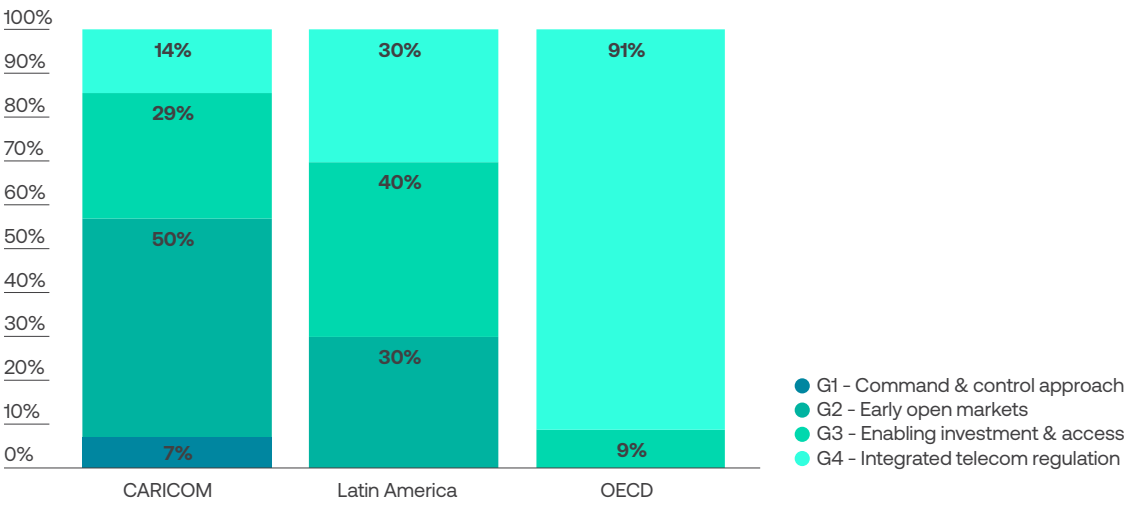
7 The conceptual foundation of this evaluation framework is elaborated in Burdescu et al. (2020). The table summarises indicators used to assess the governing environment across three dimensions: legal, institutional, and regulatory frameworks. Each dimension reflects the average score of its corresponding indicators. The institutional dimension evaluates elements such as clearly defined responsibilities in the sector, the autonomy of state-owned utilities from government influence, transparency through the availability of performance information, managerial freedom, and effective performance incentives for staff and managers. The legal dimension focuses on the establishment of state-owned utilities as independent legal entities, clearly defined service responsibilities, and public agreements on coverage and service levels. The regulatory dimension examines public participation in planning and regulatory processes, adequate financial planning (including tariffs and subsidies) to ensure cost recovery, well-equipped monitoring units, and effective enforcement of agreements with state-owned utilities. The overall dimension corresponds to results provided by the authors.



frequent flight cancellations, and unpredictable route adjustments. Limited air service liberalisation within CARICOM fragments the market, creating difficult business conditions for airlines, increasing costs, and restricting traffic growth. Airports suffer from chronic underfunding and lack the infrastructure necessary for modern, safe, and resilient operations. Inconsistent regulatory oversight leads to uneven safety standards. Competitive dynamics between countries lead to fragmented approaches that weaken the region's collective resilience.

The Caribbean **ICT sector** features diverse regulatory environments and a dynamic ecosystem of telecommunications and digital technology providers. The International Telecommunication Union's (ITU) ICT Regulatory Tracker captures the evolution of telecommunications reforms, categorised into four generations: Generation 1 (regulated public monopolies with a command-and-control approach) to Generation 4 (integrated regulation aligned with social and economic objectives). Currently, only The Bahamas and Trinidad and Tobago have achieved G4 status, while 50% of Caribbean countries remain in G2 (basic reform involving partial liberalisation and privatisation across layers), and 29% are in G3 (focusing on enabling investment, innovation, and access, with a dual emphasis on fostering competition in service and content delivery and protecting consumers). In contrast, 91% of OECD countries have already G4-status regulatory frameworks and 70% of Latin American countries are in advanced regulatory stages, spanning Generations 3 and 4 (see Figure 2.27).

Figure 2.27
Distribution of ICT Regulation Generations in CARICOM, Latin America, and OECD Regions
Fuente: Authors based on ITU (n.d.).



Note: G1 – Antigua and Barbuda; G2 – Barbados, Belize, Dominica, Guyana, Haiti, St. Kitts and Nevis, Suriname; G3 – Grenada, Jamaica, St. Lucia, St. Vincent and the Grenadines; G4 – The Bahamas and Trinidad and Tobago.

The ITU's G5 Benchmark framework provides a comprehensive assessment of policy and regulatory environments that facilitate digital transformation. Among CARICOM countries, 71% are in the transition phase, characterised by fragmented digital policies, while 29% remain in the limited phase, defined by narrow sectoral approaches and an absence of collaborative governance.

Regulatory and institutional frameworks are essential for the growth of the digital ecosystem, as they directly influence connectivity, investment, and infrastructure development. Advancements in ICT policies and regulations, particularly those fostering competition, are strongly linked to improved digital services and market growth (Maddens, S., 2023). However, disparities in

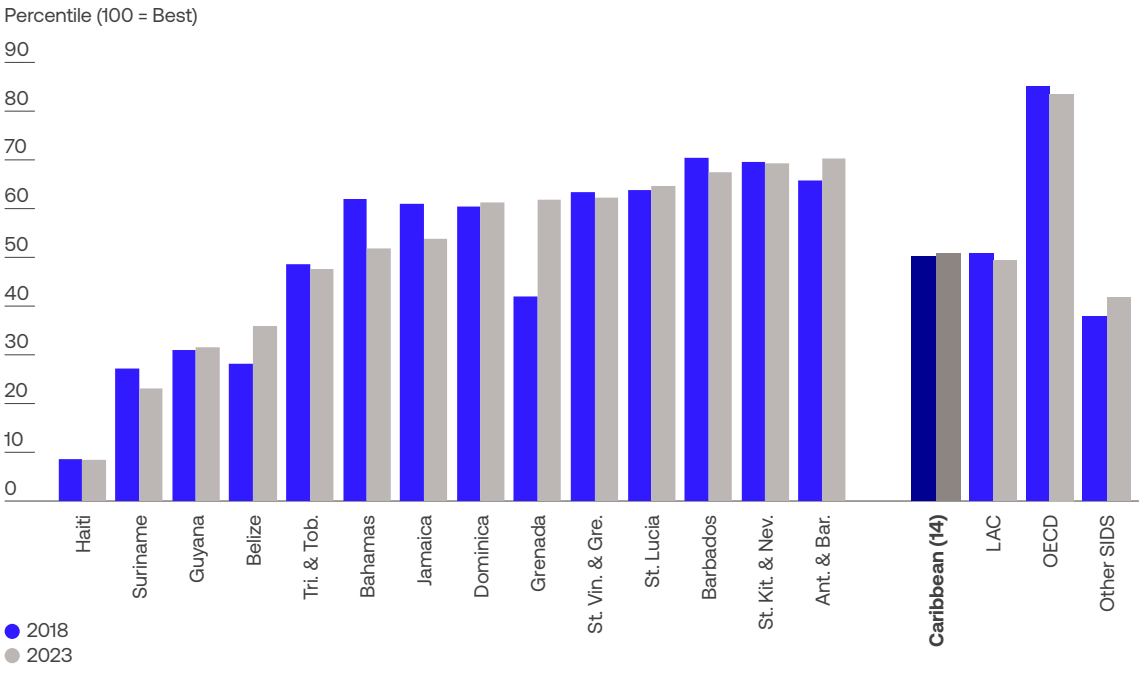
regulatory frameworks across the Caribbean create significant barriers to attracting investment and achieving economic and social development. The Caribbean Telecommunications Union (CTU) has identified legal and regulatory fragmentation as a major obstacle to cohesive ICT progress in the region. To address this, the CTU has proposed the establishment of a Caribbean Single ICT Regulatory Authority to harmonise regulations and promote digital transformation. While this initiative holds promise, it faces substantial challenges, including divergent national regulatory frameworks and concerns over sovereignty.

Additionally, the growing presence of global tech giants poses challenges for local regulators, who must balance fostering competition with safeguarding national and regional interests.

Alexander et al. (2023) highlight the need for greater awareness of regulatory frameworks for data privacy and cybersecurity, which are essential for advancing digital inclusion.

From a broader point of view, the World Bank's World Governance Indicators show that nations in the region typically rank around the median level for regulatory quality in the LAC context. While there is some variation among countries, none exceed the 70th percentile. Moreover, regulatory quality has stagnated from 2018 to 2023, with the exception of Grenada, which has shown notable improvements. This stagnation underscores systemic governance limitations that hinder the development and implementation of effective regulations across multiple infrastructure sectors (see Figure 2.28).

Figure 2.28
Regulatory Quality Indicator in the Caribbean
Source: Authors based on World Bank (n.d.). Caribbean (14) includes the countries listed in the figure.



Another foundational issue affecting the region's capacity to execute infrastructure projects efficiently is the lack of skilled technical expertise. Queyranne et al. (2019) note that many Caribbean governments face significant skills and human capital constraints critical to infrastructure project development. Projects are often initiated prematurely, without sufficient preparation, leaving unresolved risks and uncertainties that can lead to prolonged delays. Furthermore, there

is a critical funding gap for project advisory services, which could help mitigate governmental deficiencies in human capital. Comprehensive project preparation—including technical, legal, and financial analyses—is crucial to ensuring well-managed transactions and minimising fiscal risks. However, the costs of securing high-quality external support can range from 5 to 10 per cent of project capital costs, representing a significant barrier for smaller economies.

Queyranne et al. (2019) also emphasise the importance of integrating Public-Private Partnerships (PPPs) into broader Public Investment Management (PIM) frameworks. Regardless of the procurement approach, all public investment projects have similar long-term fiscal implications and should be assessed and prioritised within a cohesive framework. Unfortunately, in many Caribbean nations, PPPs are often managed on separate tracks, outside of established budgets and public investment plans. Although several countries have medium-term public investment strategies, only five integrate PPPs into their medium-term frameworks and budget documents. This misalignment reduces the transparency of resource allocation, as fiscal constraints are only loosely considered, leading to unrealistic expenditure plans. Additionally, donor-funded projects frequently bypass the budget process, further fragmenting investment planning.

International evidence highlights the advantages of governing PPPs through dedicated legal frameworks rather than relying solely on contractual agreements. Such frameworks can mitigate fiscal risks, reduce the fixed costs associated with entering new PPP agreements, and provide private sector partners with clearer terms and expectations. Nonetheless, many Caribbean countries currently rely on contract-based governance, with over 60% lacking specific legal provisions for PPPs (Queyranne et al., 2019).[8] Most countries in the region follow common law systems that favour sector-specific regulations and contractual agreements to define the relationship between partners. As of 2019, only St. Lucia and Turks and Caicos had enacted dedicated PPP laws.

8 The countries included in the survey conducted for Queyranne et al. (2019) are Anguilla, Antigua and Barbuda, Barbados, British Virgin Islands, Curacao, Grenada, Guyana, Haiti, Jamaica, St. Lucia, St. Vincent and the Grenadines, St. Kitts and Nevis, Turks and Caicos, Suriname, and Dominica.

Appendix to Chapter 2

Methodology for the Assessment of Infrastructure Performance in the Region

To provide a clear and structured assessment of infrastructure performance in the Caribbean, we applied a status classification system (green, yellow, and red) based on a comparative analysis of key indicators across different sectors and dimensions (see Figure 2.1). The indicators used for this assessment are largely the same as those presented in Chapter 2, which evaluates the state of infrastructure in the Caribbean by sector. However, where no suitable indicators were available, additional indicators were identified from public sources to ensure a more comprehensive evaluation.

The sectors assessed include energy, road transport, maritime transport, air transport, ICT, and water and sanitation, with performance assessed across the following dimensions: access, quality, affordability, resilience and environmental friendliness.

The classification of indicators into the three categories was determined using the following criteria:

- Green (Good Performance): The indicator value must be at least 85% of the average value of the benchmark group (95% in the case of access to electricity and basic water and sanitation), which includes OECD countries or selected reference countries such as the United States. For indicators where a higher value indicates poorer performance (primarily affordability-related indicators), the value must not exceed 115% of the benchmark average to qualify as green.

- Yellow (Moderate Performance): The indicator value must be at least 80% of the average (90% in the case of access to electricity and basic water and sanitation) of one of the following reference regions (in order of priority based on data availability): Latin America (LA), Latin America and the Caribbean (LAC), or All Small Island Developing States (All SIDS)[9]. For indicators where a higher value indicates poorer performance, the value must not exceed 120% of the regional reference average to qualify as yellow.

- Red (Poor Performance): If the indicator does not reach the threshold corresponding to moderate performance (yellow), it is classified as red status.

However, for a few specific indicators related to "environmental friendliness", the methodology required adjustments due to a lack of clear-cut results. In the energy sector, given that the variable is energy emissions as a contribution to total emissions by the state/region, we applied the following criteria was applied: red if the ratio is above 40%, yellow if it falls between 20% and 40%, and green if it is below 20%. For maritime transport, the base rule to the dimension of emissions per million USD of GDP resulted in a green classification for the region. However, this outcome differed from the yellow rating suggested by the qualitative analysis conducted by local experts (Hope Economics, 2024c). Given this discrepancy, we followed the expert recommendation. Finally, for non-revenue water, the classification was determined as follows: green if indicator is below 30%, yellow if it is below 40%, and red otherwise.

Another adjustment was made in the ICT sector under the quality dimension. Initially, the assessment placed the region in the red category. However, when two clear outliers—Haiti and Suriname—were excluded from the regional average, the classification improved to yellow. Given that the adjusted figure provides a more accurate representation of ICT service quality in the Caribbean, this revised classification was considered the most appropriate for use.

9 The only exception to the procedure described has been made for evaluating the affordability indicator for airports. For methodological consistency, this indicator (Benchmarking of Total International Passenger Charges in the Caribbean Airports, 2022) was compared with those of other countries in the Caribbean that are not included in this report.

For the resilience dimension, a different approach was required due to the absence of sector-specific quantitative indicators. Instead, resilience ratings were assigned based on a qualitative analysis conducted in consultation with local consultants with expertise in the field (for further details, see Hope Economics, 2024a–2024f).

This methodology classified all indicators, assigning a final status (green, yellow, or red) based on the average for each sector-dimension (see Table A.1 for an example, which serves as the input for the results presented in Table 2.1). The information is available for each state upon request.

Table A.1
Summary of indicators and traffic light classification by sector and dimension
Source: Authors.

Sector	Dimension	Indicator	Classification
Energy	Access	Access to Electricity, year 2022 (% of Total Population)	Green
Energy	Access	Access to Electricity, year 2022 (% of Rural Population)	Green
Energy	Access	Access to Electricity, year 2022 (% of Urban Population)	Green
Energy	Quality	System average interruption frequency index (SAIFI), different years	Red
Energy	Quality	System average interruption duration index (SAIDI), different years	Yellow
Energy	Quality	Electricity losses (% of generation), year 2022	Yellow
Energy	Affordability	Average electricity residential prices (USD/kWh), year 2023	Red
Energy	Affordability	Average electricity bill as percentage of per capita GDP, year 2023	Red
Energy	Environmental friendliness	Contribution of energy, electricity and heat to greenhouse gases emissions (%), year 2021	Yellow
Energy	Environmental friendliness	Share of hydro, solar, and wind energy in the energy mix	Red
Road transport	Access	Road network density (kilometres by square kilometres), year 2022	Green
Road transport	Quality	Paved roads (%), year 2022	Green
Road transport	Quality	Registered vehicles per 1,000 population, year 2017	Yellow
Road transport	Quality	Road traffic mortality rate (per 100,000 population), 2021	Yellow
Road transport	Affordability	Gasoline prices (USD per litre), year 2024	Green
Road transport	Affordability	Diesel prices (USD per litre), year 2024	Green
Road transport	Environmental friendliness	Emissions from road transport per million USD of GDP, year 2020	Yellow
Maritime transport	Access	Container port traffic (twenty-foot equivalent units - TEUs, '000) per 1000 population, different years	Yellow
Maritime transport	Quality	Liner Shipping Connectivity Index, year 2021	Yellow
Maritime transport	Affordability	Terminal Handling Charge (USD), TEU, last available year	Red
Maritime transport	Affordability	Terminal Handling Charge (USD), FEU, last available year	Red
Maritime transport	Affordability	Terminal Handling Charge (USD), FEU High Cube, last available year	Red
Maritime transport	Affordability	Terminal Handling Charge (USD), 45-footer, last available year	Red
Maritime transport	Environmental friendliness	Emissions from maritime transport per million USD of GDP, year 2020	Yellow
Air transport	Access	Passengers carried per capita, average 2018-2019	Yellow

Sector	Dimension	Indicator	Classification
Air transport	Quality	IATA Air Connectivity Index, year 2023	Red
Air transport	Affordability	Benchmarking of total international passenger charges in the Caribbean Airports, year 2022	Yellow
Air transport	Environmental friendliness	Emissions from air transport per 1000 inhabitants, year 2020	Green
Air transport	Environmental friendliness	Emissions from air transport per million USD of GDP, year 2020	Red
ICT	Access	Active mobile broadband subscriptions per 100 inhabitants, year 2022	Yellow
ICT	Access	Fixed broadband subscriptions per 100 inhabitants, year 2022	Yellow
ICT	Quality	Fixed broadband download speed, year 2024	Yellow
ICT	Quality	Fixed broadband upload speed, year 2024	Yellow
ICT	Quality	Fixed broadband latency, year 2024	Yellow
ICT	Affordability	Data-only mobile-broadband basket (% of GDP per capita), year 2023	Red
ICT	Affordability	Fixed-broadband basket (% of GDP per capita), year 2023	Yellow
ICT	Environmental friendliness	Proportion of controlled solid waste from the Digital Economy in the Caribbean, year 2023	Yellow
Water & Sanitation	Access	Renewable internal freshwater resources (cubic meters per capita), year 2020	Green
Water & Sanitation	Access	Access to at least basic water services, year 2022	Green
Water & Sanitation	Access	Access to at least basic sanitation services, year 2022	Yellow
Water & Sanitation	Quality	Percentage of population with a water service available when needed, year 2022	Yellow
Water & Sanitation	Quality	Percentage of the population with sewer connections, year 2022	Red
Water & Sanitation	Quality	Access to safely managed water services, year 2022	Yellow
Water & Sanitation	Quality	Access to safely managed sanitation services, year 2022	Yellow
Water & Sanitation	Affordability	Tariff of water services per cubic meter (USD per cubic meter), year 2019	Yellow
Water & Sanitation	Affordability	Total bill for a consumption of 15 cubic meters per month (percentage of monthly GDP per capita), year 2019	Yellow
Water & Sanitation	Environmental friendliness	Non-revenue water (implications for water availability)	Red
Water & Sanitation	Environmental friendliness	Wastewater treated, last year available	Red



3

Charting a path forward: Harnessing opportunities for the Caribbean

Bridging global trends and regional needs

The analysis in previous chapters shows that many of the challenges for the Caribbean states are shared with other developing nations in LAC and the rest of the world. However, the Caribbean can adopt unique solutions to these challenges by considering and leveraging the distinctive characteristics identified in Chapter 1.

Global trends may not align with the region's sustainable development needs and strengths. Table 3.1 outlines the main trends in each sector analysed and highlights the ones that offer short-term opportunities for the region. Trends that do not offer immediate opportunities should not be dismissed; they constitute longer-term goals that require prior investments.

The **energy** transition sets out key changes needed to achieve development models based on cleaner and more efficient systems. For the Caribbean, transitioning to renewable energy represents a clear opportunity, reducing dependence on fossil fuels, stabilising electricity prices, and enhancing system resilience through diversification in generation (see the section "Mitigation as an Opportunity"). Alongside renewable energy development, decentralised energy systems address multiple sectoral

challenges, such as improving access to remote and isolated areas and increasing resilience to central system outages, which are common challenges for the region. Additionally, renewable energy projects should incorporate gender considerations to provide women with new economic opportunities. According to Allub et al. (2024), there is evidence in LAC that gender gaps tend to widen in the green job sector. Therefore, including women in these projects presents an opportunity to leverage the gender bonus identified for the Caribbean in Chapter 1.

Table 3.1
Summary of main sectoral global trends and the identification of Caribbean opportunities
Source: Authors based on Cont et al. (2021), Cont et al. (2022), Allub et al. (2024), and Hope Economics (2024a, 20204b, 2024c, 2024d, 2024e, 2024f).

Energy	Transport	Water and sanitation	ICT
• **Transition to renewable energy sources**	• Decarbonisation of transport (electrification)	• **Integrated water resource management (IWRM)**	• **5G deployment and expansion**
• **Decentralised energy systems and distributed generation**	• Active transport	• **Non-revenue water reduction**	• **Growth of fibre optic networks**
• Electrification of energy demand	• **Adoption of smart and digital technologies**	• **Digitalisation of water systems**	• Cloud computing and data centres
• **Energy storage solutions**	• Mass passenger transport	• **Focus on wastewater treatment and reuse**	• Expansion of IoT and smart infrastructure
• **Natural gas as a transition fuel**	• **Regional and global connectivity**	• **Universal access to water and sanitation**	• **Digital inclusion and bridging the digital divide (especially for women)**
• Integration of hydrogen as an energy carrier	• **Multimodal and integrated transport networks**	• **Innovations in desalination**	• **Cybersecurity and privacy**
• **Energy efficiency**	• Safety and accessibility for women in urban mobility	• Advances in water storage	• **E-government and public services**
• Regional and global energy interconnections		• **Gender and social inclusion in water projects**	
• **Digital transformation in energy (smart grids)**		• Regional and global cooperation	
• **Women's participation in renewable and green energy initiatives**			

Note: The items in bold identify the global trends that are an opportunity for the Caribbean.

However, the most promising renewable generation technologies (solar and wind) bring challenges related to intermittency. At a global level, one solution is fostering electricity storage. At the regional level in LAC, using natural gas generation to back up renewable generation intermittencies appear to be a viable solution, serving as a transition fuel and a reliable source of energy generation (Cont et al., 2022; Allub et al., 2024). These solutions are also relevant for the Caribbean. Although storage technologies are currently not economically convenient, they could bolster system resilience against climate events that disrupt generation or transmission. Natural gas offers another pathway, especially for Caribbean producers or potential producers such as Trinidad and Tobago, Guyana, and Suriname. For these countries, natural gas represents a transition energy source, supporting renewable systems with a lower emissions footprint than traditional fuels. For the remaining countries, alongside progress in renewables, firm energy generation will be necessary, and natural gas offers a cleaner solution compared to those used by Caribbean nations.

Energy efficiency is another component of the transition. Investments in physical infrastructure like power lines, substations, generation facilities, modernised grids, and decentralised renewable energy are essential for resilience, reducing electricity losses, and enhancing efficiency. Furthermore, energy efficiency programmes that promote energy-saving technologies across residential, commercial, and industrial sectors can lower energy costs and support social and economic sustainability. For example, Jamaica focuses on enhancing the use of clean technologies to drive the competitiveness of economic sectors. This country also promotes demand-side management through public awareness, responsible energy use, and the

implementation of energy-saving devices in the medium term. The country is also promoting the use of market mechanisms to manage supply and demand, especially in the areas of net billing and net metering. Similar strategic efforts are being made or are likely to be made by other CARICOM member countries.

On the other hand, the electrification of consumption and hydrogen as an energy carrier, while promising, will require higher renewable penetration for unleashing all of its benefits. Moreover, depending on the source of primary energy, the capacity expansion will trade off against water resources (hydro generation) or land use (solar). For example, the National Energy Corporation of Trinidad and Tobago recently launched a roadmap for green hydrogen taking advantage of the existing production experience of ammonia and methanol and the potential of offshore wind (Jugessur et al. 2022). In the long term, these developments could foster greater electricity use and hydrogen production free from fossil fuels.

Similarly, regional energy integration, while enhancing system resilience in the Caribbean, demands substantial investments and inter-country cooperation, which may not be feasible in the short term. A regional interconnected electric grid would enable electricity generation from clean sources (hydroelectricity from Guyana and geothermal from some islands, including Saint Lucia and Dominica) and transmission through an interconnected grid through the Eastern Caribbean with potential extension through the Caribbean (this issue has already been studied by Nexant, 2010). Securing affordable energy sources and avoiding price and supply volatility are significant advantages of pooling geographical energy demand, that targets many of the deficits identified for electricity services in the region.

Despite the significant potential benefits of energy integration, serious challenges remain. Regulation and pricing harmonisation is the first step towards the integration of energy markets in the Caribbean. Additionally, given the limited fiscal space, the region needs to find alternative financing mechanisms to develop the required infrastructure. As mentioned by CAF's 2021 Report on Economic Development (Sanguinetti et al., 2022), those are essential issues preventing further energy integration in the whole Caribbean region. The case of Central America—the *Sistema de Interconexión Eléctrica de los Países de América Central* and the Regional Electricity Market—constitute a close experience with important lessons on how a regional market can be developed.

For the **transport** sector, addressing scale-related challenges in the Caribbean calls for developing regional multimodal networks to improve connectivity. The small populations and markets of Caribbean nations need to integrate as many countries and transport modes as possible. To this end, the EU's Global Gateway in the Caribbean aims to enhance maritime connectivity, promoting regional growth and food security while creating opportunities for EU businesses. Key priorities include increasing freight capacity, establishing a multimodal ferry system connecting Guyana, Suriname, Trinidad and Tobago, Barbados, the Eastern Caribbean states, and the French overseas territories, as well as developing ferry terminals for goods and inter-island travel (EU, 2024).

Another challenge in the sector is decarbonising transport to reduce reliance on imported fossil fuels. However, constraints remain, such as insufficient infrastructure for public transport electrification. A complementary solution, which can be integrated with the spatial planning of Caribbean cities, is the promotion of active mobility through the development of infrastructure that facilitates such movement (sidewalks, signage, bike lanes). This approach is particularly useful in small cities with limited size and population. In cases where scale allows, improving public mass transit services can provide an effective solution to the urban mobility challenges. As unsafe public transport is one of the major obstacles to women's mobility, addressing safety is a key step towards improving women's access to local resources and opportunities (Morgan et al., 2020).

In the case of **water and sanitation**, opportunities for the Caribbean lie in initiatives that help alleviate water scarcity. Implementing Integrated Water Resource Management (IWRM) can improve efficiency by coordinating utilities, industries, agriculture, and other sectors, with the tourism industry, which imposes pressure on water resources (Cont et al., 2022). An advantage in terms of simplifying the IWRM process for Caribbean countries is that water resource use does not require extensive coordination between nations. Unlike other regions, there are no shared freshwater resources and transboundary basins (except for the continental countries and Haiti; IUCN, 2016). However, there is always room for sharing best practices.

Reducing NRW is crucial in the region, where high loss levels exacerbate resource scarcity (see section "Mitigation as an Opportunity"). Although NRW reduction projects require significant effort and planning, their substantial benefits for utilities,

customers, and the environment make them a priority for both utilities and governments.

Other solutions to address water scarcity include desalination, leveraging the region's abundant seawater resources. However, this approach requires significant investment to develop cost-effective and energy-efficient methods, which may become more viable with increased renewable penetration. In LAC, the estimated total cost for building reverse osmosis desalination plants ranges from USD 10–16 million for five million gallons per day, with energy costs being a major factor. For instance, incorporating on-site solar or wind energy can lower costs by 15–30% compared to grid power (Herber, 2024). Circular economy approaches, like wastewater reuse, also hold promise (Cont et al., 2022). While advanced treatment systems remain limited, simultaneous efforts to expand sewer coverage and wastewater treatment could reduce ocean pollution and provide an alternative water source.

Despite seasonal rainfall, developing water storage systems poses challenges due to the small physical size of many Caribbean nations. Nevertheless, rainwater harvesting systems, for instance, can provide decentralised water collection and storage in areas without reservoirs and represent a low-cost and low-technology water-supply augmentation method. According to Global Water Partnership-Caribbean (2016), approximately 500,000 people in the Caribbean depend at least partially on these systems. For instance, Barbados implemented harvesting systems, which collect rainwater from rooftops and store it for various uses (Aquasure Barbados, n.d.).

Improving the efficiency and management of water resources would undoubtedly enhance access to and the quality of water and sanitation services, which remain inadequate in the region. Similarly, it would also foster greater inclusion for certain populations. For instance, access to water services often represents a disproportionate burden for women and girls, which can be alleviated by designing water infrastructure that reduces the distance and time required. According to Morgan et al. (2020), in the world, women and girls bear the responsibility of water collection in 80% of households without on-premises access. This can be a significant issue in some Caribbean countries where low percentages of the population have access to water on premises, such as Haiti (where this value is equal to 7.8%, according to UNICEF, n.d.), Antigua and Barbuda (38.2%) and Dominica (80.8%). Efforts to integrate women and other vulnerable groups into water and sanitation services—particularly in understanding water-use patterns, time spent collecting water, and the health risks associated with poor water supply and sanitation—are emphasised by the CDB (2018). Based on this, CDB recommends engaging stakeholders, including women, in decision-making processes and promoting public education on water use and sanitary practices, which are essential for improving outcomes in the water sector.

The **ICT** sector is relatively advanced in some Caribbean countries (such as Bahamas and Saint Kitts and Nevis), but sustaining progress requires continued investments in 5G expansion, fibre optic networks, and most importantly, submarine cables, as the Caribbean region relies on them for internet connectivity (CDA, 2024). Given the development of this infrastructure, the Caribbean can focus on increasing the adoption of these technologies. To achieve this, it is essential to bridge the digital divide by educating the currently excluded population on the use and management of these technologies. Particularly, it is important to address the digital gender divide because increasing access to digital communications technology for women can have significant positive outcomes in multiple dimensions of development (Morgan et al., 2020). While the digital gender divide in LAC is narrower than in other regions, some Caribbean countries still face significant gaps (GSMA, 2018). For example, in Trinidad and Tobago, women are less likely than men to report owning a mobile phone (IICA, 2020). Additionally, the digitalisation of government services can further promote their usage. These opportunities, in turn, can enhance people's perception of the benefits of using these technologies, partially offsetting the high cost of the service.

However, challenges persist, including quality and affordability issues that hinder further digitalisation. Cutting-edge technologies, such as artificial intelligence and IoT depend on high-quality, low-latency networks (C&W Business, 2024). Meanwhile, cloud computing and data centres struggle with high electricity costs, which can make up 75% of their operating expenses (Climalife, 2023). Currently, the Caribbean lacks the resilience required to establish itself as a digital hub. Furthermore, to sustain ICT sector development, the region must also adopt robust legislation on cybersecurity and data privacy.

Digitalisation is a trend observed across the various infrastructure sectors analysed in this report. Once the challenges identified in the ICT sector are addressed, the application of digital tools in these sectors can enhance system efficiency and generate the data and information

needed to improve resource management and sectoral processes. Data limitations in infrastructure sectors particularly hinder planning, regulation, and service optimisation. For instance, Calatayud and Montes (2021) note that weak data availability in the transport sector diminishes authorities' ability to regulate, plan, and supervise effectively. This lack of data also hampers transparency, discourages private investment, and prevents the optimisation of existing infrastructure.

Dubrie et al. (2022) emphasise that IWRM relies on up-to-date data on water quality and quantity. They recommend implementing institutionalised monitoring systems, certified national water quality laboratories, and real-time accessible databases for disaster planning and management—all of which require reliable ICT networks. Similarly, Burdescu et al. (2020) advocate for conducting baseline assessments to address the data gaps in water and sanitation services. These assessments would enable utilities and regulatory authorities to monitor progress, guide decision-making, and enhance service delivery.

Finally, other key cross-sectoral opportunities for the Caribbean include fostering private sector participation through public-private partnerships (PPPs) and developing resilient infrastructure. These opportunities, along with others, will be discussed in the next section, highlighting their relevance across infrastructure sectors.

Transforming cross-cutting challenges into development opportunities

The analysis of various infrastructure services across the countries covered in this report identifies common challenges that hinder efforts to address existing deficits. Despite differences in context, certain systemic issues emerge as significant barriers to improving infrastructure accessibility, quality, and affordability across the Caribbean. These challenges not only affect the performance of individual sectors but also impact the broader goals of achieving social and environmental sustainability while building resilience to climate change.

This section addresses four cross-sectoral challenges that need to be thought of as development opportunities that can drive transformative change in the region's infrastructure sectors. The themes explored here provide a roadmap for overcoming current limitations and unlocking the potential for more efficient, resilient, and inclusive infrastructure systems.

The first conceptual change is to view investments in climate change mitigation as opportunities to deliver better infrastructure services. Integrating climate considerations into infrastructure planning can help deliver innovative solutions that enhance both service quality and sustainability. The second change is to envision resilient infrastructure investments as a way to break the cycle of underdevelopment, where scarce resources are often diverted towards repairing damaged infrastructure rather than making improvements. Third, strengthening institutions, regulatory frameworks, and state capacities should be considered a fundamental and unavoidable step for improving planning processes and mobilising additional resources through private sector engagement and multilateral partnerships. Finally, the limited economies of scale that characterise infrastructure sectors in the region can brew increasing coordination and cooperation to boost efficiency, reduce costs, and make infrastructure investments more attractive to international investors.

This change of vision provides an integral plan for development that is more potent as long as significant synergies are leveraged. For instance, the opportunity to increase private investment in renewable distributed energy to improve the resiliency of services will be hindered if regulations to remunerate distributed resources and technical standards are not in place. Developing better planning frameworks to improve the resilience of infrastructure assets will have more impact if this agenda is implemented in several countries in the region, providing opportunities to learn from mistakes and spread best practices more efficiently.

Mitigation as an opportunity

While it may seem unjust to expect the Caribbean—a region that has historically contributed only marginally to global emissions and faces severe fiscal constraints—to prioritise investments in climate change mitigation, pursuing this path could represent a strategic choice that aligns with the region's own interests. Investments in mitigation offer local advantages that go beyond fulfilling international obligations. By adopting mitigation strategies, Caribbean nations can enhance their economic resilience, improve service delivery, and reduce overall costs, making this path not only feasible but necessary for sustainable development.

Investing in climate mitigation infrastructure is also a practical means to improve the standards of access, quality, and cost of infrastructure services. The transition to renewable energy sources in electricity generation serves as a prime example of how mitigation investments can deliver multiple benefits. Shifting from imported fossil fuels to local renewable sources—such as solar, wind, and geothermal—can lower energy generation costs, reduce exposure to volatile global fuel prices, and decrease dependency on external energy supplies, contributing this way to energy security. This transition enhances the resilience of energy services, ensuring more reliable and continuous service delivery, even during climate-induced disruptions. Additionally, renewable energy infrastructure can attract private investment, create a stable regulatory environment, and foster public-private partnerships, further driving economic growth and sustainability in the region.

Moreover, investments in mitigation technologies typically involve the deployment of modern infrastructure, which drives economic development through the creation of local supply chains and applied skills training. By fostering the adoption of new technologies, these investments can generate formal, higher-quality jobs, thereby strengthening the regional labour market and promoting skill development. For instance, renewable energy projects require a skilled workforce for installation, and maintenance, while water efficiency projects demand expertise in modern management techniques and technologies. Getting a labour force trained for these jobs may be challenging in the short term in the region, therefore in-job training programmes are important to overcome these difficulties. Nonetheless, mitigation strategies not only fulfil environmental objectives but also contribute to economic diversification, support sustainable growth, and enhance the region's capacity to participate in the global green economy.

Mitigation-focused investments can also improve service efficiency, leading to cost reductions for businesses and households alike. One area of action is reducing non-revenue water (NRW), which represents a significant loss of both natural and financial resources. NRW reduction involves minimising leaks, optimising distribution networks, and improving metering systems, thus conserving water, energy, and chemical use. These measures not only enhance the operational efficiency of utilities but also lower service costs, which is especially beneficial for vulnerable households. By addressing NRW, Caribbean countries can achieve meaningful cost savings, improve resource conservation, and promote social equity, making this a critical component of a broader mitigation strategy.

Finally, pursuing mitigation investments provides a pathway to access international funding opportunities, which is useful given the region's limited fiscal capacity. Climate-focused financing mechanisms, such as green bonds, concessional loans, and grants from multilateral organisations, offer significant resources that can be directed towards sustainable infrastructure projects. By aligning national infrastructure plans with global climate goals, Caribbean countries can attract the necessary funding to build more resilient systems, reduce long-term risks, and ensure that infrastructure improvements are both socially inclusive and environmentally sustainable. Given the urgency of climate impacts and the region's constrained budgetary resources, leveraging international financing is a strategic opportunity for sustainable development.

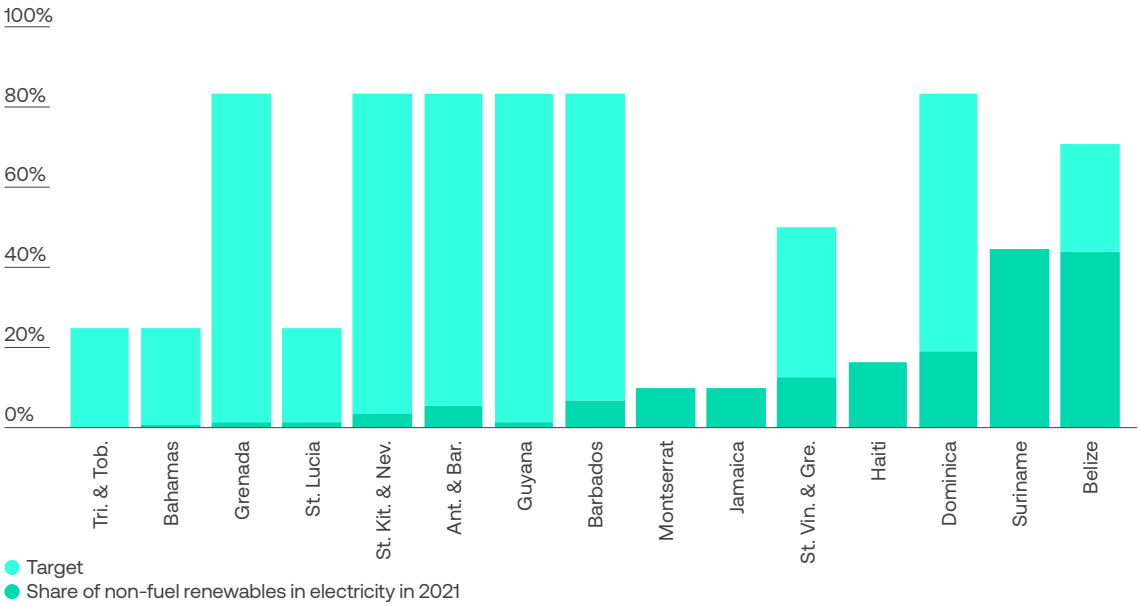
The following part of this section presents specific examples that illustrate how investments in climate change mitigation can serve as tangible opportunities for development in the Caribbean. These cases show that targeted mitigation efforts not only address environmental objectives but also enhance infrastructure quality, improve service affordability, create jobs, and attract international funding. By exploring these examples, it becomes evident that mitigation strategies can be integral to fostering sustainable economic growth, increasing social inclusion, and building resilience across the region.

The renewable energy opportunity for affordable and resilient electricity services

As shown in Chapter 2, electricity services in the region face particularly severe challenges in the areas of service affordability, environmental sustainability, and resilience. In this sense, the incorporation of electricity generation with renewable technologies (geothermal, wind and, most importantly, solar), whether centralised or distributed, has the potential to address these issues simultaneously. Policies focused on transitioning to more environmentally sustainable energy sources can generate benefits that extend far beyond reducing associated emissions.

The energy transition represents a substantial business opportunity if implemented effectively. Taking as a reference that the electricity sector is an important contributor to GHG emissions (Figure 1.8, Panel B), countries have already set targets, albeit optimistic in many cases, to fill the energy matrix with renewable sources (Figure 3.1).

Figure 3.1
Share of non-fuel renewables in electricity inputs and progress against targets
Source: Authors based on data from UNSD (n.d.) and the report World Bank (2023b).



Recent data from Lazard (2024) indicates that renewable technologies are now globally more cost-effective than even the most advanced fossil fuel generation (Figure 3.2). The potential benefits are even greater in the Caribbean, where renewable energy will displace older, high-emission, and less efficient fossil fuel-based technologies.

Figure 3.3 shows that, even under conservative assumptions on the impact of electricity generation costs on user tariffs[10], the current costs of generation with renewable technologies are lower than what users are currently paying in their tariffs. Therefore, integrating renewable generation into the electricity matrix has the potential to reduce the tariffs paid by households and businesses in the region, making electricity services more competitive.

10 The calculations were made under the assumption that generation costs account for only 50% of the total tariff paid by users in the region. Additionally, these costs reflect average generation costs; this represents an underestimation of the expected impacts since the introduction of renewable energies should displace the most emitting and least efficient sources, which have generation costs above average costs.

Figure 3.2
Levelized Cost of Energy by Technology (USD/MWh)
Source: Lazard (2024).

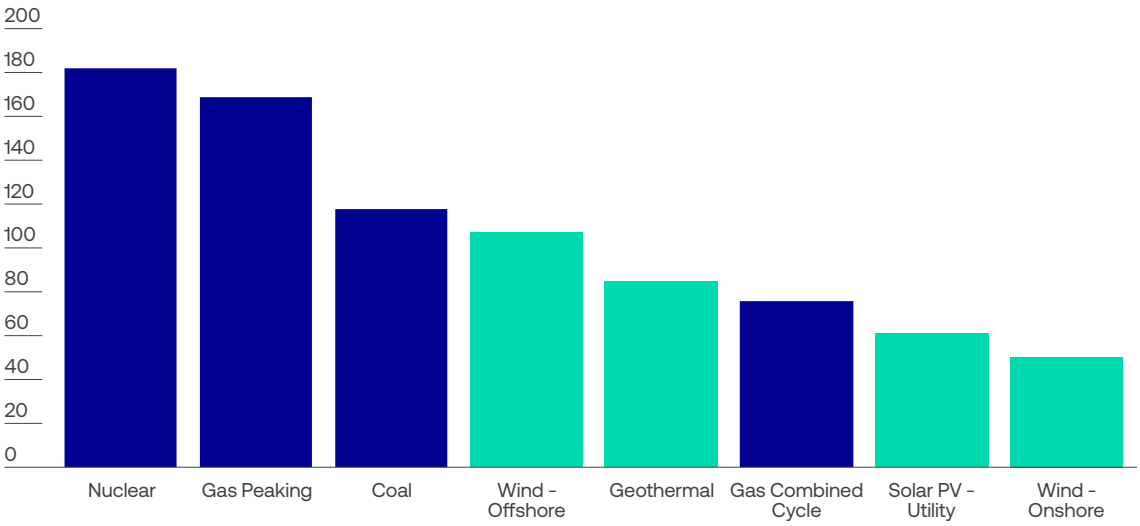
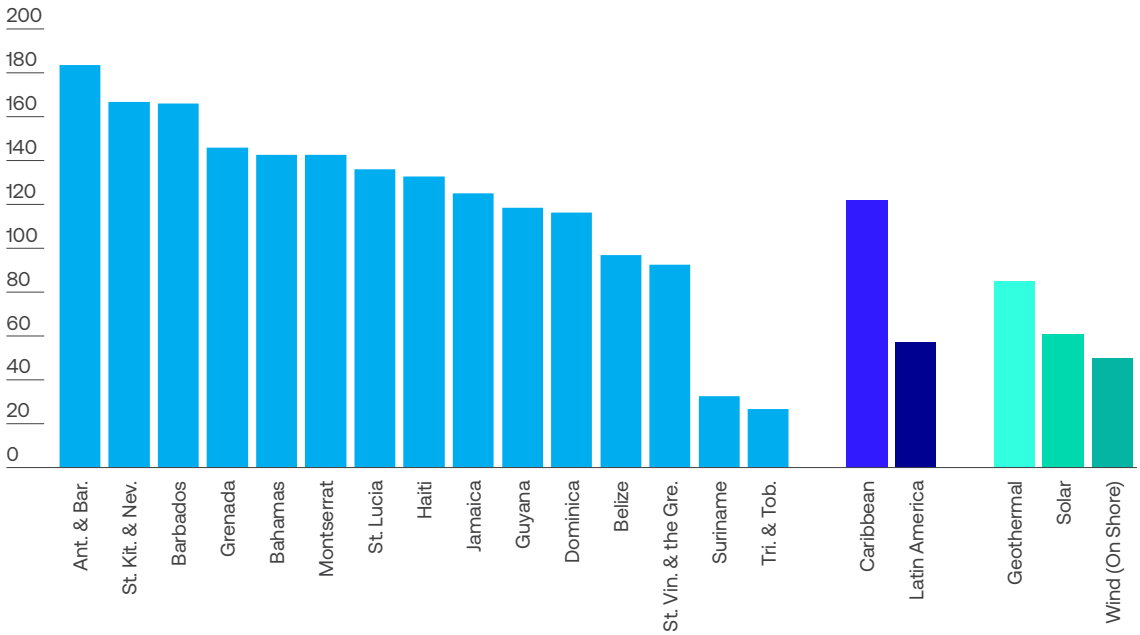


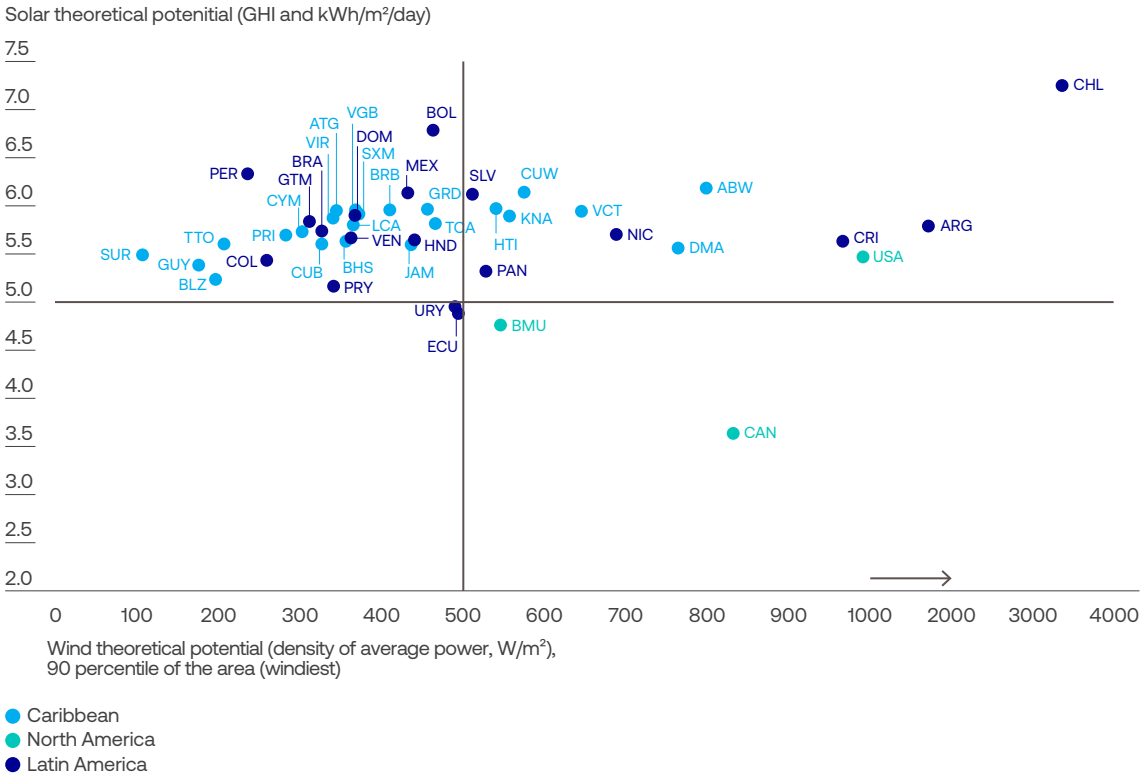
Figure 3.3
Average generation cost (USD per MWh), year 2021
Source: Authors based on information on electricity tariffs from Cable UK (n.d.).



Investing in climate mitigation presents an opportunity to enhance infrastructure access, quality, and affordability, while also unlocking valuable green financing opportunities.

Finally, the Caribbean has a strong potential to develop both wind and solar sources, as shown in Figure 3.4.

Figure 3.4
Theoretical potential in wind and solar energy
Source: Authors based on Allub et al. (2024).



Note: lines correspond to world averages.

Box 3.1
Driving resilience through distributed energy: Country insights

Source: Irigoyen et al (2023).

Barbados, Costa Rica, and Panama have embarked on initiatives to explore the benefits of incorporating renewable generation and energy storage technologies to enhance the resilience of their electricity systems. These efforts aim to address critical challenges, including service reliability, integration of intermittent renewable sources, and optimisation of energy distribution. By leveraging decentralised energy resources and advanced storage solutions, both countries seek to strengthen their electricity grids against external disruptions, promote environmental sustainability, and provide reliable energy access to their populations.

Barbados allowed for distributed generation in 2021. BLPC clients were habilitated to sell energy generated with renewable sources to the network. To do that, a Feed-in-Tariff system was put into place. As of 2022, distributed solar panels represented about 15% of system generation capacity (CCREEE, 2024), which was one of the highest penetration rates in LAC.

Costa Rica initiated a pilot project focused on Battery Energy Storage Systems (BESS) to enhance the resilience and reliability of its electricity distribution network. The project aims to address challenges like demand peaks, network congestion, and power quality while complementing distributed renewable energy generation. The pilot revealed benefits for both the supply and demand sides of electricity services:

- Distribution benefits: Postponing network investments, energy arbitrage, and flattening peaks.
- User benefits: Enabling demand management, maximising self-generated renewable energy, and ensuring backup power during outages.

While initial financial assessments showed negative net present values (NPV), sensitivity analyses indicated feasibility with declining battery costs or rising electricity tariffs. Costa Rica’s efforts emphasise the broader goal of integrating decentralised storage to enhance resilience and operational efficiency.

Panama's study assessed the feasibility of decentralised stationary energy storage systems, addressing frequent service interruptions and enhancing distribution network reliability. The evaluation highlighted:

- BESS systems primarily support distribution reliability, reduce restoration times, and help integrate renewable sources into isolated systems.
- Recommendations were developed for regulatory frameworks to facilitate BESS integration, ensuring technical and economic viability tailored to specific use cases.

Panama's approach underscores the critical role of legal and technical frameworks in leveraging storage technologies for a sustainable and resilient electricity sector.

These countries exemplify the strategic integration of distributed energy resources to mitigate disruptions, optimise renewable energy use, and bolster the resilience of power systems against climate and operational challenges.

Of course, integrating renewable energy into national grids comes with the challenge of managing generation intermittency, underscoring the need for effective energy planning to fully harness these technologies. Furthermore, developing effective regulatory frameworks is essential to translating efficiency gains into lower consumer costs, especially for the most vulnerable populations.

Moreover, by embracing an orderly energy transition, the affordability of electricity services can be significantly enhanced, by reducing exposure to external price shocks, particularly relevant for countries in the Caribbean where oil and gas prices play a pivotal role. The impacts of the pandemic and the Russian invasion of Ukraine serve as examples of how disruptive events can amplify the volatility of essential input prices for power generation. By progressively integrating alternative generation sources into energy matrices, reliance on thermal sources is diminished, thus reducing exposure to fluctuations in input costs. Consequently, this safeguards the economies of the region and shields the most vulnerable users from the adverse impacts of such price volatility.

Distributed renewable generation technologies offer also numerous benefits that significantly enhance the resilience of electricity services. By decentralising energy production and bringing it closer to the point of consumption, distributed generation reduces reliance on extensive transmission and distribution networks, which are often vulnerable to disruptions. This proximity minimises energy losses during transmission and allows for localised solutions to address power outages, ensuring a more reliable and stable electricity supply even in the face of natural disasters, equipment failures, or other unforeseen events.

Furthermore, the use of distributed generation, in combination with energy storage systems, enhances grid flexibility by storing excess energy during periods of low demand and supplying it during peak hours or interruptions. These systems contribute to smoother grid operations, reduced strain on infrastructure, and greater adaptability to fluctuating energy demands, making electricity services more robust and capable of withstanding future challenges. Moreover, once storage technologies become mature, the potential is even further, reaching off-grid areas.

Unlocking these benefits requires specific studies due to the nascent nature of some distributed generation technologies and their applications. While the Caribbean region still faces the need to conduct such assessments to tailor solutions to its unique context, examples from Barbados and nearby countries, as highlighted in Box 3.1, provide a roadmap for preliminary steps that can be undertaken. These cases illustrate how pilot projects and feasibility studies can evaluate technical and economic viability, explore regulatory adjustments, and identify best practices for integrating distributed generation and storage systems. Such efforts serve as valuable guides for the Caribbean to develop resilient, sustainable, and locally adapted energy solutions.

Non-revenue water reduction: An opportunity for affordable and sustainable water services

Non-revenue water (NRW)—the difference between the amount of water that enters the distribution system, and the amount billed to consumers—is a significant challenge for water utilities in the Caribbean due to its impact on operational efficiency, the quality of services provided, the financial performance of companies, and the conservation of natural resources. NRW originates from two main sources: (1) physical losses—water that enters the distribution system but is lost due to leakages or infrastructure deficiencies before reaching customers—and (2) commercial losses—water that reaches customers but for which the utility is unable to collect tariffs—. From an environmental perspective, reducing NRW contributes to climate change mitigation by decreasing the energy and chemical use associated with water treatment and distribution. Treating and pumping water is energy-intensive, and lowering NRW reduces the carbon footprint of water utilities by cutting unnecessary energy consumption. Similarly, the reduced demand for treatment chemicals minimises the environmental impact of their production and application, contributing to improved ecosystem health.

Most utilities in the Caribbean experience NRW levels exceeding 40%—the current average in LAC—with some as high as 75%. As stated in Chapter 2, this translates to over 450 million m^3 of water supply becoming NRW annually, at an estimated cost of USD 612 million per year for utilities in the region (see Table 2.10). Well-structured NRW reduction projects, supported by governments and international financial institutions, offer significant opportunities to deliver substantial benefits to utilities, customers, governments, the environment, and society.

The success of an NRW project hinges on the availability of reliable data. However, utilities often lack reliable information regarding their level of NRW. Moreover, the higher the percentage of NRW, the higher the margin of error for knowing the true value of NRW. Most Caribbean utilities have insufficient or inaccurate data on NRW due to inadequate metering throughout their systems. For example, customer meter inaccuracies account for 25% of NRW in Trinidad and Tobago and 28% of NRW in Dominica (Hope Economics, 2024c). Therefore, improvement of the reliability of metering and increased metering throughout the system can help utilities to have more accurate data on their NRW levels.

A way to reduce NRW is through improving management practices. The Inter-American Development Bank (IDB) conducted a training session for mid-level managers from the National Water Company (NWC) in Jamaica, focusing on financial modelling. The results showed that all Parishes in Jamaica could implement financially viable NRW reduction projects with an internal rate of return (IRR) between 17% and 84%. The total cost for ten-year NRW reduction projects in all Parishes in Jamaica would total JMD 71 billion (approximately USD 473 million) with an average IRR of 38% (Janson et al., 2021).

Performance-based contracts (PBCs) have proven to be highly effective in reducing NRW levels by incentivising contractors to achieve specific, measurable outcomes. For instance, the Bahamas Water and Sewerage Corporation (WSC) implemented a PBC to manage NWR in New Providence, successfully reducing its levels from 57.8% in 2012 to 33.4% in 2015 (Wyatt, 2018). Similarly, The National Water Commission (NWC) of Jamaica, in partnership with Miya Jamaica, launched a programme to reduce NRW in Kingston and St. Andrew. The project achieved a reduction of NRW volume of 43% from 2016 to 2021, significantly improving water efficiency and service reliability. Due to its effectiveness, the programme is also ongoing in Portmore.[11]

In the case of Barbados, CAF is currently engaging in a study to develop designs for the necessary actions to optimise the demand management in the drinking water systems in prioritised areas, focusing on reduction of Non-Revenue Water (NRW) and infrastructure modernisation. The expected areas of action are implementing a network information management system, replacing water meters, and monitoring drinking water networks.

Financing comprehensive NRW reduction projects often requires large capital investments, which entails financing. Water utilities in the Caribbean have several options for financing such as government capital contributions, concessional debt from international financial institutions (IFIs), commercial debt from IFIs, debt from commercial banks, equity from the NRW contractor, equity from private shareholders in the utility, and cash generated from operations.

Two recommendations for structuring and financing comprehensive NRW reduction projects consider, on the one hand, the provision of guarantees by governments and IFIs for most public utilities or projects to secure financing from IFIs. Public utilities need to develop NRW reduction projects in close collaboration with governments and IFIs. On the other hand, specialised NRW contractors are needed for credibility and expected effectiveness due to the size and complexity of comprehensive NRW reduction projects. Securing financing from IFIs for this type of project requires well-structured contracts, which can take time to properly develop.

In sum, reducing non-revenue water (NRW) offers significant benefits for utilities, primarily through improvements in operational efficiency and financial performance. By minimising physical losses caused by leaks and infrastructure deficiencies, utilities can reduce the volume of water that needs to be extracted, treated, and distributed, thereby lowering operational costs. Additionally, fewer commercial losses mean more accurate billing and increased revenue, which can be reinvested in infrastructure upgrades and service improvements, passed on to consumers as lower tariffs, or used to reduce government subsidies. Reducing NRW also helps utilities meet increasing demand without the need to expand water extraction or production capacity, optimising the use of existing resources and extending the lifespan of infrastructure. Hence, by conserving water and energy, NRW reduction supports sustainable water management and aligns with global efforts to combat climate change and protect and conserve natural resources. This dual impact on operational efficiency and environmental sustainability positions NRW reduction as a key strategy for utilities aiming to both reduce its environmental impacts and promote sustainable development.

11 Information retrieved from https://www.nwcjamaica.com/nrw.ph



Resilience infrastructure: Investing in the future rather than controlling damages from the past

Hurricanes have caused severe economic damage in the region. For instance, hurricane Maria—which struck Dominica in 2017—resulted in losses estimated at 226% of the country's GDP. Similarly, Hurricane Dorian in 2019 devastated the Bahamas, with damages amounting to approximately 25% of the nation's GDP.[12] The region also faces threats from rising sea levels and increased temperatures. Coastal erosion and flooding are becoming more frequent, threatening the livelihoods of those living in coastal areas. These events not only disrupt the economies of the affected countries but also have long-term impacts on infrastructure, public health, and social stability.

Until now much of the effort has been on how to develop instruments to help countries recover from catastrophic events. For instance, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) made a total payout of USD 55.6 million to the Government of Grenada (USD 44 million), Grenada Electricity Services Limited (GRENLEC, USD 9.3 million) and the National Water and Sewerage Authority (NAWASA, USD 2.2 million) after Hurricane Beryl triggered its parametric insurance policies. Other Caribbean nations have received payouts after Hurricane Beryl and the CCRIF has updated this list to now include Saint Vincent and the Grenadines, Trinidad and Tobago, Jamaica, and the Cayman Islands. Since the formation of the CCRIF in 2007, it has made 75 payouts totalling USD 385 million to 21 of its 30 members in the Caribbean and Central America.

There is an urgent need for infrastructure adaptation in the Caribbean to minimise the economic and social costs of climate change and avoid falling into an under-development trap. When resources are repeatedly diverted towards disaster recovery instead of long-term improvements, countries struggle to achieve meaningful progress. By prioritising climate-resilient infrastructure, the region can reduce the frequency and severity of service disruptions, safeguard economic growth, and shift the focus from reactive recovery to proactive development. Investing in adaptation not only protects existing assets but also lays the foundation for sustainable, inclusive growth, enabling Caribbean nations to better withstand future climate impacts while driving progress.

Establishing the scale of the investment challenge on resilient infrastructure is intrinsically difficult. Estimates in this regard are scarce. A notable exception is the study conducted by the World Bank (2021), which established cost ranges related to improving existing infrastructure assets in the region to address the impacts of climate change. As shown in Table 3.2, these ranges are significantly wide, including extreme cases such as Belize, where the costs associated with increasing the resilience of infrastructure are estimated to range between 4.6% and 21.2% of GDP, or Suriname (15.9% and 27.1%, respectively). Beyond the difficulty of establishing more precise ranges, the data reveal an evident stylised fact: ***even considering the minimum estimates, the region must significantly increase investment in its current infrastructure to adequately address the challenges posed by climate change.***

The broad range of investment estimates from the World Bank is not surprising, given the complexities of enhancing existing infrastructure resilience. Often, resilience is viewed as a binary attribute—either infrastructure is resilient, or it is not. However, a more effective approach considers what specific phenomena the infrastructure should withstand. For some low-probability events, it may not be necessary for infrastructure to be resilient, as the costs of maintaining functionality during such extremes could exceed the benefits. Consequently, demanding resilience to rare phenomena can lead to significantly higher costs, often in a non-linear way. Thus, making cost-efficient investments in resilient infrastructure requires establishing acceptable levels of failure and planning for their consequences.

This is closely related to another factor that complicates the quantification of investments in resilience: viewing resilience as a systemic feature of infrastructure services rather than as an attribute of individual assets. For instance, in the event of an extreme climatic event like a Category 4 or 5 hurricane, the resilience of road networks should prioritise restoring access for emergency services and technicians working to reestablish basic services quickly. In contrast, it is acceptable for non-critical parts of the road network to take longer to regain full functionality. While it may be desirable for the entire road system to withstand such climatic events, doing so is not technically or financially feasible. Therefore, identifying critical assets and

12 Information from EM-DAT (n.d.), converted to percentage of GDP with data from World Bank.

Prioritising climate-resilient infrastructure is essential to reducing climate change costs, minimising service disruptions, safeguarding economic growth, and shifting from reactive recovery to proactive development.

planning for infrastructure functionality under stress conditions is important for making investments in resilience both effective and affordable.

Achieving this requires detailed information about the impacts of various climatic phenomena affecting countries. At the regional level, Jamaica's Systemic Risk Assessment Tool exemplifies how this can be done and highlights the benefits of developing such information systems, as shown in Box 3.2. Jamaica Systemic Risk Assessment Tool (J-SRAT).

Table 3.2
Costs of retrofitting existing infrastructure assets exposed to hazards in selected Caribbean countries
Source: World Bank (2021).

	Low retrofit cost (% of 2019 GDP)	High retrofit cost (% of 2019 GDP)	Roads	Bridges	Power plants	Airports	Water treatment plants
Antigua and Barbuda	1.4	3.9	✓	✓	✓		
Bahamas	4.0	9.5	✓	✓	✓	✓	
Barbados	0.3	1.1	✓	✓	✓		
Belize	4.6	21.2	✓	✓	✓	✓	
Dominica	3.0	14.0	✓	✓	✓	✓	
Grenada	0.3	1.0	✓	✓	✓		✓
Haiti	1.2	3.7	✓	✓	✓	✓	
Jamaica	1.5	6.0	✓	✓	✓		✓
Saint Kitts and Nevis	0.4	1.2	✓	✓	✓		
Saint Lucia	0.0	0.4	✓	✓			
Saint Vincent and the Grenadines	1.3	2.4	✓	✓	✓		
Suriname	15.9	27.1	✓	✓	✓	✓	
Trinidad and Tobago	2.8	4.9	✓	✓	✓		

Box 3.2
Pioneering climate resilience: Jamaica Systemic Risk Assessment Tool

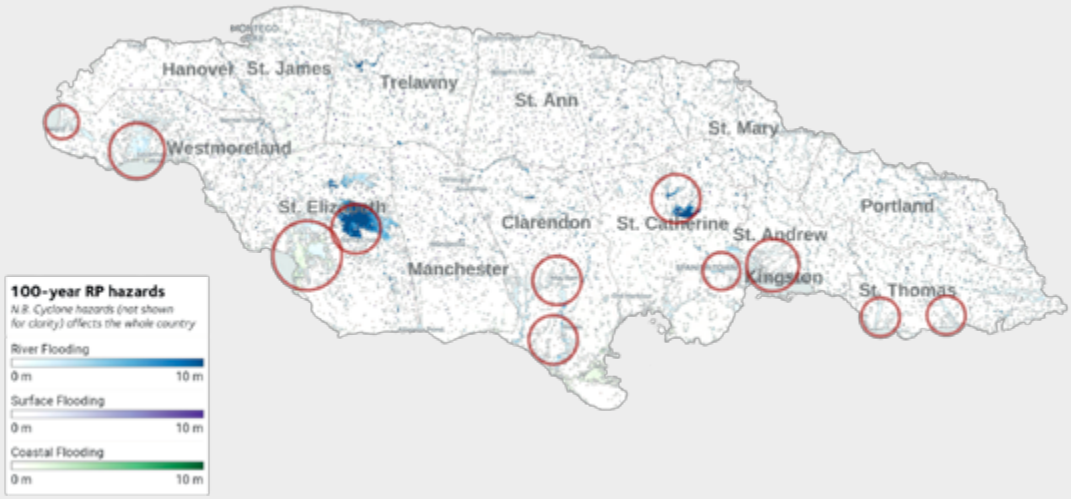
Jamaica is a global pioneer in climate resilience with the development of the Jamaica Systemic Risk Assessment Tool (J-SRAT), launched on May 3, 2022, by the Coalition for Climate Resilient Investment (CCRI). This groundbreaking technology, co-designed by Oxford University in collaboration with the Jamaican Government and supported by the UK's Foreign Commonwealth and Development Office, is the first of its kind and positions Jamaica at the forefront of adaptation strategies for extreme weather events intensified by climate change.

J-SRAT addresses the country's exposure to hurricanes, tropical storms, and flooding by providing high-resolution, visual analyses of vulnerability hotspots across critical infrastructure networks, including energy, water, and transport. The tool helps decision-makers identify the most at-risk areas, ensuring that resilient investments are targeted effectively and efficiently. By accurately calculating the potential damage and economic losses from future climate risks, J-SRAT instils confidence in both public and private sector investors to prioritise infrastructure capable of withstanding these impacts. Illustration 3.2 shows an example of flooding hazards related to cyclones.

The development of J-SRAT involved collaboration with public and private sector stakeholders to gather essential national data and develop models for identifying climate vulnerabilities. Initial results were integrated into an input-output model of Jamaica's economy, enabling estimates of macroeconomic impacts, including reductions in GDP caused by infrastructure disruptions. This analysis provides a clear perspective on the financial and strategic benefits of investing in climate-resilient infrastructure and informs policymakers and investors in making evidence-based decisions.

As a cutting-edge tool, J-SRAT not only strengthens Jamaica's capacity to assess and manage climate risks but also serves as a model for other nations. The Jamaican government retains full control of the tool, and the CCRI is committed to sharing this innovative methodology globally. By accelerating efforts to design and fund climate-resilient infrastructure projects, J-SRAT contributes to safeguarding Jamaica's future while setting a global standard for resilience planning and investment.

Figure B4
View of risk assessments on J-SRAT
Source: CDRI (2023).



A final factor complicating cost and benefit estimations for resilient infrastructure investments is the uncertainty surrounding the intensity and frequency of climatic phenomena. Providing accurate estimates requires developing state capacities, appropriate institutions and regulations, and robust planning frameworks that can swiftly incorporate new discoveries and technologies. In this regard, it is important to develop data centres and regional-specific climate information, since the application of AI[13] could help to enhance predictive capabilities and the efficiency of policy responses. The ability to reassess plans and the flexibility to adjust actions and investments play key roles in maximising infrastructure resilience while keeping costs manageable for countries.

Despite these challenges, taking action is important for countries in the Caribbean, which are particularly vulnerable to climate change impacts. As illustrated in the next subsection, the advantages of appropriately developing resilient infrastructure can be significant from both sectoral and macroeconomic perspectives.

Limiting the effects of extreme climate events with resilient infrastructure in the Caribbean

This section examines the macroeconomic and fiscal impacts of extreme hydro-meteorological events using different infrastructure investment scenarios in regions with varying climate risk exposure.

Utilising a dynamic model from a CAF paper on natural disasters (Arreaza et al., 2023), the analysis compares public investment in resilient versus standard infrastructure. Resilient infrastructure mitigates disaster damage, protecting overall capital, whereas standard infrastructure, though less costly, lacks this benefit. The model highlights that resilient infrastructure generally yields higher returns and lower depreciation, boosting private capital productivity and employment, independently from the climate-shock event. Three shock scenarios are explored in Caribbean nations: Barbados (low/late impact), Jamaica (mid-level impact), and Dominica (high/quick impact), considering policy options like resilient infrastructure investment (Scenario B vs. Scenario A), concessional debt (Scenario C), and contingency funds (Scenario D). The assumptions are summarised in the Appendix. Figure 3.5 presents the results of this exercise in terms of GDP growth and public debt-to-GDP ratio, for three moments of time: the average of three years before the shock, the year of the shock and year 20 after the shock. All values correspond to differences with respect to the base year 2023. Key findings include:

a. Resilient infrastructure investment lessens GDP downturns during shocks (from an average downturn of 4% of GDP to 2.5%, Figure 3.5, middle left panel) and enhances pre-event GDP through improved productivity (up to 0.5 pp of GDP), encouraging private investment and employment, especially with concessional financing or contingency funds (see upper and middle left panels).

b. Long-term growth benefits arise from resilient infrastructure investment, with concessional funds and contingency provisions aiding full recovery in low- to mid-impact countries (Barbados or Jamaica), though recovery is slower in high-impact areas (Dominica). See scenarios C and D in the lower left panel.

c. Debt-to-GDP ratios vary by financing strategy. Commercial debt increases this ratio pre-disaster (see upper right panel), paralleling non-resilient investment patterns in the long term (see scenarios B and A in the lower right panel). All countries improve their debt dynamics over a 20-year horizon (see lower right panel).

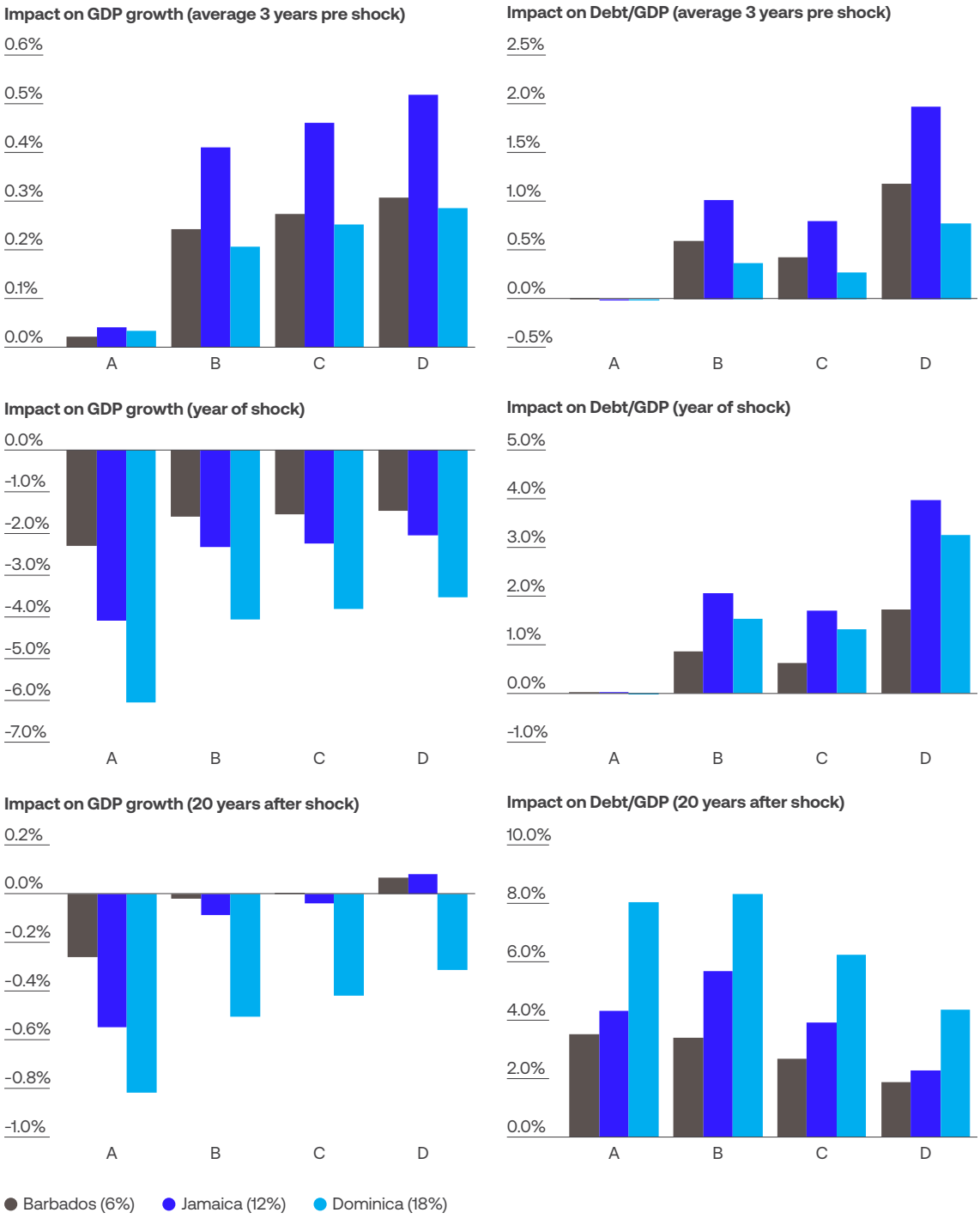
d. Concessional debt for resilient investments raises short-term debt-to-GDP ratios but improves long-term debt profiles (see scenarios C and A in upper and lower right panels).

e. Combining contingency funds with resilient infrastructure, both through concessional debt, enhances long-term debt outcomes despite short-term increases pre-shock (see scenarios D and C in upper and lower right panels). The estimates indicate a reduction in debt-to-GDP ratios of approximately 2% of GDP after 20 years.

Overall, investing in resilient infrastructure effectively reduces the long-term economic impacts of climate events and stabilises debt over time. Although initial debt may increase, these investments and emergency funds curb future debt cycles and economic disruptions, with significant long-term benefits outweighing immediate fiscal burdens. International support and innovative financing are essential to avoid adding to current debt challenges, making concessional debt a key tool in supporting resilient infrastructure initiatives.

13 AI has limitations regarding the nature of the phenomena it can predict. For a detailed discussion, see Sunstein (2023).

Figure 3.5
Impact of investment in resilient infrastructure on GDP growth and national debt
Source: Authors based on a model adapted from Arreaza et al. (2023).



Notes: The name of the country and the percentage represent a case of impact (e.g., 6% of damage in Barbados, which occurs in year 8 after the beginning of the exercise; 12% of damage in Jamaica in year 5, and 18% of damage in Dominica in year 4). Each simulation includes the impact on GDP growth and Debt/GDP in three periods of time: the average of three years before the shock, the year of the shock, and the year 20 after the shock. Scenario A corresponds to standard investment; Scenario B corresponds to investment in resilient infrastructure; Scenario C corresponds to resilient infrastructure financed with concessional funds; and Scenario D includes the creation of contingency funds. See details in the Appendix.

Strengthening institutional and regulatory frameworks enhances infrastructure services by improving transparency, efficiency, and accountability, while also fostering private sector investment.

Modernising frameworks for sustainable development

The analysis of various infrastructure sectors in the Caribbean reveals that many of the identified deficits stem from governance and institutional, legal, and regulatory shortcomings. While addressing these challenges presents significant obstacles in changing the status quo, it also represents an opportunity. Some interventions to improve governance do not require substantial financial investments but rather the implementation of best practices that can be adapted to the local context of each country. In this sense, smart reforms and interventions have the potential to enhance the quality of infrastructure services while transforming the way new investments are funded and financed.

An essential resource for establishing effective institutional and regulatory frameworks is the OECD (2020), which provides a global benchmark through its Recommendation of the Council on the Governance of Infrastructure. This recommendation outlines best practices and comprehensive guidelines concerning governance principles, institutional design, and regulatory approaches that emphasise the importance of strategic vision, fiscal sustainability, and stakeholder engagement. By aligning with these recommendations, Caribbean countries can work towards building robust frameworks that not only promote transparency and efficiency but also ensure their infrastructure sectors align with broader development goals.

Developing long-term strategies will require thorough assessments of infrastructure needs at both national and subnational levels. These assessments should be flexible to incorporate technological advances and supported by transparent, accountable institutional frameworks. Additionally, fiscal responsibility must play a cornerstone role in these frameworks, calling for robust capital budgeting, transparent reporting of expenditures, competitive procurement processes, and consideration of life-cycle costs and environmental impacts.

This encompasses leveraging independent expertise in high-investment projects, optimising risk allocation in project delivery modes, equipping officials with sufficient skills, minimising reliance on single-source procurement, and nurturing responsible supply chains. Furthermore, encouraging stakeholder participation is crucial, allowing for continuous dialogue and meaningful engagement throughout the project lifecycle. Coordinating investments across levels of government and regions can also ensure they align with local needs, promote policy innovation, and strengthen institutional capacities for effective implementation.

One final aspect of successful infrastructure governance pointed out by the OECD (2020) is the consideration of resilience and adaptability. Frameworks should advocate for methodologies

that monitor critical infrastructure, address cross-border dependencies, and integrate resilience measures into planning processes. Utilising robust data systems, digital technologies, and open data platforms enhances these efforts, making infrastructure systems more resilient in the face of various challenges.

In the Caribbean, one of the most pressing challenges highlighted by the OECD is the **limited institutional capacity** that hampers the effective implementation of infrastructure projects. This constraint manifests in prolonged project timelines, low disbursement rates, and inefficiencies in public sector coordination. To address these deficits, governments in the region should prioritise the establishment of capacity-building programmes tailored to the specific needs of infrastructure-related institutions. There have been promising actions already. For instance, Grenada has focused on capacity-building initiatives to strengthen the skills and knowledge of personnel involved in road infrastructure development, enhancing the technical capabilities of government agencies and contractors. Suriname has established monitoring systems to track the progress and quality of road construction and maintenance activities, enabling data-driven decision-making and continuous improvement in infrastructure management (Hope Economics, 2024b). At the regional level, CARICOM promotes collaboration among member states to address common challenges in infrastructure development. This includes sharing best practices, resources, and knowledge to enhance resilience across the region. By leveraging these networks, Caribbean nations can build institutional capacity while reducing costs through shared resources and expertise.

On the other hand, outdated and inconsistent **regulatory frameworks** are a significant barrier to infrastructure development across the region, particularly in the energy sector. These frameworks often fail to accommodate modern challenges such as renewable energy integration and grid resilience. There have also been advances in this area. Belize has recently designed its legal and regulatory frameworks to include clear guidelines for the installation and operation of renewable energy systems, ensuring fair access to the grid for renewable energy producers. This approach is helping to facilitate the transition towards a more sustainable energy mix (Hope Economics, 2024a).

Moreover, there are also successful examples in other infrastructure sectors: Grenada and Guyana have taken innovative approaches to address sectoral challenges. Grenada has initiated projects funded by the Green Climate Fund to integrate climate change adaptation into water management practices, demonstrating a proactive regulatory and institutional approach. Guyana's USD 29 million water and sanitation infrastructure improvement programme emphasises community-based solutions, with the regulatory framework supporting local community engagement and fostering ownership and accountability in water management. Belize and Jamaica have established comprehensive regulatory frameworks that have contributed to improved water service delivery and accountability. Belize's Public Utilities Commission (PUC) oversees water utilities, sets tariffs, and ensures compliance with service standards, while Jamaica's National Water Commission (NWC) operates under a well-defined legal and regulatory framework that outlines the responsibilities of water providers and the rights of consumers. The NWC has also implemented technology-driven measures to enhance operational efficiency and customer service.

Strengthening regulatory frameworks is crucial for improving public service performance, as evidenced by Burdescu et al. (2020). To replicate such outcomes, governments must prioritize clear legal and regulatory frameworks that define all key functions, ensure timely and credible public communication, and establish transparent accountability and oversight mechanisms. Boards should include competent members, set multi-year targets for service quality and efficiency, and secure funding to achieve these goals. Financial planning in public services should account for expansion and improvement costs, with performance-based incentives. Additionally, tariffs must cover current targets and be periodically adjusted to ensure cost recovery, supporting sustainable operations while promoting efficiency and quality improvements.

Beyond governance and regulatory reforms, integrating public **investment planning** with **public-private partnership** (PPP) frameworks can significantly improve resource allocation and project prioritisation. The separation of these processes runs the risk of creating inefficiencies and undermining fiscal transparency. Saint Lucia's approach to including PPPs within its medium-term public investment strategy serves as a best-practice model. This framework aligns public investments with fiscal constraints and strategic development goals, ensuring that all projects undergo consistent evaluation criteria. The government has taken significant steps to address these challenges and strengthen its regulatory environment to further attract the private sector. In

2015, Saint Lucia created a PPP policy framework, with technical assistance from the World Bank, establishing clear procedures for PPP projects and a steering committee with various ministries represented (Adeoti et al., 2021).

Moreover, the introduction of dedicated PPP legislation can address governance gaps and reduce fiscal risks. Jamaica has pioneered in the region the adoption of a dedicated PPP policy addressing governance gaps and reducing fiscal risks by providing a comprehensive framework for implementing public-private partnerships. Approved in 2012, the policy standardises the decision-making process across government entities, ensuring principles such as optimal risk transfer, value for money, fiscal responsibility, and transparency guide every project (Development Bank of Jamaica Limited, 2024). This framework has enabled Jamaica to attract private investment, improve infrastructure delivery, and limit fiscal exposure. Notable PPP projects like Highway 2000 and the Sangster International Airport highlight how this approach has enhanced efficiency while achieving development goals. Expanding such frameworks across the region would promote transparency, reduce administrative burdens, and attract private investment in critical infrastructure sectors.

Designing proper **fiscal incentives** can also play a role in attracting private investment, but they should consider possible impacts on public finance's sustainability. For instance, Trinidad and Tobago's tax incentives for renewable energy projects have successfully helped to mobilise private sector participation in sustainable infrastructure development. The scheme includes important incentives such as a 150% tax allowance that any registered company that engages the services of an energy service company—registered by the Ministry of Energy—to reduce their energy use (by increasing their energy efficiency or installing a renewable energy system) can claim on their expenditure for that system (PwC, 2024). Expanding these incentives regionally, while aligning them with national development and fiscal strategies, would create a more favourable investment climate.

The Caribbean's vulnerability to climate change underscores the importance of **embedding sustainability and resilience into infrastructure governance**. Saint Lucia has adopted a holistic approach to enhance the resilience of its road infrastructure. This includes conducting vulnerability assessments, using climate-resilient materials, and implementing engineering solutions such as elevation and reinforcement in flood-prone areas (Hope Economics, 2024b). Another best practice is Grenada's integration of climate resilience measures into its national development planning (Ministry of Finance, Planning, Economic, and Physical Development of Grenada, 2019). Grenada's approach includes climate risk assessments and the incorporation of resilience measures into its most important infrastructure projects. This methodology provides a replicable framework for other countries seeking to enhance the resilience of their infrastructure investments. By institutionalising these practices, governments can ensure the long-term functionality and adaptability of their infrastructure systems.

Another example of the importance of embedding sustainability and resilience into infrastructure governance comes from air transport. World Bank (2023) emphasises that a comprehensive approach to enhancing resilience in the Caribbean aviation sector should include, among other aspects, updating emergency operations plans for known threats like hurricanes, defining staff roles, safeguarding critical equipment, and coordinating protocols with agencies, airlines, and communities. Collaboration with CARICOM and regulators to liberalise air services and develop a comprehensive roadmap for resilience enhancements is essential. Additionally, fostering airport management organisations with resilience as a core mission and updating national policies to integrate resilience principles are vital to ensuring sustainable improvements in air transport connectivity and capacity.

Those examples reveal that actively strengthening governance and institutional, legal, and regulatory frameworks remains instrumental and has great potential for advancing Caribbean infrastructure services. By adopting best practices adapted to local contexts, countries stand to not only increase the quality of their infrastructure services but also reshape how new projects are financed. Indeed, targeted reforms in these areas can unlock more efficient, inclusive, and sustainable solutions—ultimately fostering resilience and long-term growth across the region.



Regional cooperation in the Caribbean has the potential to reduce costs, improve efficiency, and unlock transformative infrastructure projects that no single country could achieve alone, helping to overcome the limitations of small economies of scale.

Building regional synergy for infrastructure development policies

The geographic characteristics and relatively small populations in the Caribbean often make it difficult to achieve the economies of scale required to implement cost-effective solutions. Regional cooperation emerges as a strategy to address this challenge. By coordinating efforts and pooling resources, Caribbean nations can overcome the limitations imposed by their small individual scales. Joint projects, such as shared port facilities planning, regional air transport hubs, or interconnected energy grids, can lower costs through economies of scale and foster greater integration.

Coordinated regional initiatives increase the appeal of infrastructure investments to international investors. Larger-scale projects, or the bundling of smaller projects under unified regulatory and institutional frameworks with regional benefits, often deliver better financial returns and broader economic impact, increasing their appeal to both private and public investors. Collaborative projects further facilitate access to international funding by presenting unified, strategic plans that align with global development goals. Regional frameworks for infrastructure development could improve service delivery and ensure that resources are allocated more efficiently across the region.

Ultimately, strengthening regional cooperation in the Caribbean has the potential to reduce costs, boost efficiency, and unlock transformative infrastructure projects that no single country could achieve independently.

Initiatives in this direction are not new. Over the past several decades, the Caribbean region has undertaken substantial efforts to enhance cooperation and policy coordination among its member states, recognising effective integration as a critical component of sustainable development. Central to this endeavour is the Caribbean Community (CARICOM), an organisation established in 1973 that aims to promote economic integration, coordinate foreign policy, and foster human and social development. Comprising 15 full members and five associate members, CARICOM functions as a regional platform for countries to deliberate on collective strategies, streamline trade agreements, and advance economic and social progress. Equally significant is the Organisation of Eastern Caribbean States (OECS), founded in 1981, which focuses on promoting regional integration, collective action, and development cooperation within its member states, with closely interconnected economic and environmental interests.

While institutions like CARICOM and the OECS represent noteworthy efforts towards a more integrated and collaborative Caribbean, significant potential remains to leverage these frameworks even further. By deepening coordination, strengthening shared institutions, and embracing inclusive, long-term planning, the Caribbean can capitalise on these opportunities, ensuring a more resilient, prosperous, and unified future for the region.

One example of the potential benefits of regional cooperation is the development of a regional ferry system, often proposed as a solution to the inadequacy of shipping connections in the Caribbean (see, for instance, CPCS Transcom International Limited, 2018). Implementing a regional ferry system in the Caribbean presents significant challenges, primarily because it requires adopting a regional perspective that prioritises efficiency over preserving the status quo. Such a system would aim to address the high costs of transshipments—currently a major barrier to the region's competitiveness—by reducing the price of moving goods and people between islands. However, achieving this efficiency would likely result in a redistribution of benefits, with some countries standing to gain more from the improved connectivity and cost reductions, while others may face disadvantages, such as diminished control over their local shipping networks or reduced economic activity in their ports.

As inter-island trade volumes in the Eastern Caribbean are insufficient to justify a service exclusively dedicated to this market, a regional ferry system might need to prioritise serving larger markets, treating inter-island trade as secondary. Moreover, the directionality of shipping services remains a problem in the Eastern Caribbean. All liner services travel north-south, delivering loaded containers and picking up (mostly) empty containers on the way south. The northbound leg is non-stop back to the hub port (e.g., Kingston or Miami), making it difficult and expensive for shippers wishing to send cargo north.

This approach could exacerbate disparities in the distribution of benefits, underscoring the need for mechanisms of compensation. Establishing equitable compensation mechanisms and ensuring that all countries derive some benefit from the system will be critical to fostering regional cooperation and ensuring the long-term success of such an initiative.

Additionally, the Caribbean's tax structures hinder regional integration and short sea shipping. Many countries rely heavily on trade taxes, such as import duties, rather than personal or corporate income taxes, due to the complexity of administration and compliance challenges. This reliance not only hampers efforts to strengthen regional integration but also leads to inefficiencies in customs services.

Given these challenges, one way to improve regional cooperation is to begin with initiatives that have fewer potential negative side effects. For example, implementing a Regional Authorised Economic Operator (AEO) Programme, as highlighted in Box 3.3, could serve as a practical starting point. Such a programme would streamline customs processes, enhance trade facilitation, and improve supply chain security across the region without significantly disrupting existing trade dynamics. By simplifying administrative processes and building trust among regional stakeholders, an AEO programme could lay the groundwork for deeper collaboration and prepare the region for more complex projects, such as a regional ferry system.

These examples clearly signal that without a regional coordinated approach, isolated country policies can result in inefficiencies, redundancies, and suboptimal resource use. By adopting a holistic regional perspective, countries can enhance connectivity, reduce costs, and create a more attractive environment for international investors, ultimately improving the overall effectiveness and cost-efficiency of infrastructure investment.

Cooperation and coordination initiatives can and should be developed, as evidenced by the benefits of successful ICT policies and institutions in the region. One pioneering example of regional collaboration is the harmonisation of regulations through the Eastern Caribbean Telecommunications Authority (ECTEL).[14] Established in 2000 under the support of the OECS Telecommunications Reform Project, ECTEL is the first regional telecommunications regulatory authority in the world. Its creation marked a significant milestone in addressing market fragmentation and promoting consistent regulations across member states, including Dominica, Saint Kitts & Nevis, Grenada, Saint Lucia, and Saint Vincent and the Grenadines. By creating a transparent, competitive, and investor-friendly

14 https://www.ectel.int/ectel-history.

licensing regime, ECTEL has been instrumental in fostering fair competition and consumer protection while serving as a critical forum for coordinating telecommunications policies. This regional approach has led to expanded services, increased competition, and significant reductions in telecommunications costs, such as a 70% decrease in call charges to the U.S. during the first five years of its implementation, demonstrating the economic and social benefits of collective action (World Bank, 2006).

Another best practice in collaboration and cooperation to foster ICT development in the Caribbean was exemplified by the Caribbean Regional Communications Infrastructure Program (CARCIP). Anchored in CARICOM's regional ICT agenda, CARCIP adopted for almost a decade (2012–2021) a regionally harmonised programmatic design that provided flexibility for participating countries to tailor activities to their specific needs while aligning with a broader regional strategy. Involving Grenada, Saint Lucia, and Saint Vincent and the Grenadines, the programme facilitated the development of transformative ICT infrastructure, including submarine cable systems, domestic broadband networks, and national and regional internet exchange points (IXPs). These developments aimed to address the region's connectivity gaps and foster greater integration.

Box 3.3
Unlocking trade efficiency: The potential of a regional AEO programme

The Authorised Economic Operator (AEO) programme represents a powerful tool to enhance trade facilitation and streamline cross-border management. It is a voluntary cooperation agreement between customs agencies, other public border agencies, and private-sector firms. Participating companies receive reliability certification from their local customs agency, demonstrating compliance with internationally recognised security standards and adherence to customs and tax obligations. This certification provides significant trade facilitation benefits, including reduced inspections of goods and documentation, expedited processing of shipments, and priority treatment during inspections.

In the Caribbean, limited coordination among border agencies and inadequate automation have led to over-inspection and delays, creating barriers to efficient trade. Despite efforts to enhance risk management at the country level, private-sector actors still encounter frequent inspections by customs and other border agencies. Only a few Caribbean countries, such as Jamaica, Bahamas, and Grenada, have implemented national AEO programmes to simplify customs procedures for pre-approved parties. This lack of widespread adoption limits the potential benefits of streamlined customs processes in the region.

A regional AEO programme in the Caribbean could build on the successful experiences of Latin America. A landmark initiative in the region saw 11 countries—including Argentina, Brazil, Colombia, and Peru—sign a Regional Recognition Arrangement (RRA) for AEOs. This arrangement, the largest of its kind outside the European Union, allows companies certified in one country to have their AEO status recognised across all participating nations. This recognition simplifies customs clearance, reduces paperwork, and enables governments to focus resources on high-risk cargo, improving border security while facilitating trade.

Replicating such an initiative in the Caribbean would address key challenges related to coordination and efficiency. By harmonising standards and fostering mutual recognition of AEO certifications, a regional programme could reduce delays, lower costs for private-sector participants, and boost the competitiveness of Caribbean economies. Moreover, it would enhance the region's integration into global trade networks, creating a foundation for sustainable economic growth.

CARCIP's impact extended beyond infrastructure. By promoting regulatory reforms and policies that encourage competition, the programme helped to create an enabling environment for the growth of regional IT industries and e-services while promoting innovation and entrepreneurship. It also prioritised human capital development, with targeted initiatives to bridge the gender gap in ICT access and improve youth and women's employability. Notable projects under CARCIP included the deployment of Government Wide Area Networks (GWANs), enhanced educational networks, and new submarine fibre-optic cables connecting islands like Saint Vincent and the Grenadines and Grenada. These investments addressed longstanding issues, such as limited bandwidth, high costs, and poor service quality, paving the way for digital transformation in participating countries.

CARCIP demonstrated the power of collaboration between governments, regional institutions like the CTU and ECTEL, and private sector partners, such as Digicel. This programme exemplifies how PPPs can be leveraged to overcome resource constraints and infrastructure gaps in small island economies. These kinds of efforts are needed to overcome quality and affordability challenges that are still present in the region.

Furthermore, to increase private sector interest in infrastructure development, providing comprehensive and accessible regional information is a key component. A notable international example outside the region is the Australia and New Zealand Infrastructure Pipeline (ANZIP), highlighted in Box 3.4, which offers a centralised, transparent database of planned and ongoing infrastructure projects. This initiative has successfully attracted private investment by reducing information asymmetry, enhancing project visibility, and facilitating informed decision-making by investors. The Caribbean region should consider adopting similar initiatives across all infrastructure sectors. By creating a regional infrastructure pipeline, countries can not only increase transparency but also present a unified, strategic vision to potential investors, thereby fostering greater private sector engagement and unlocking critical funding for infrastructure development.

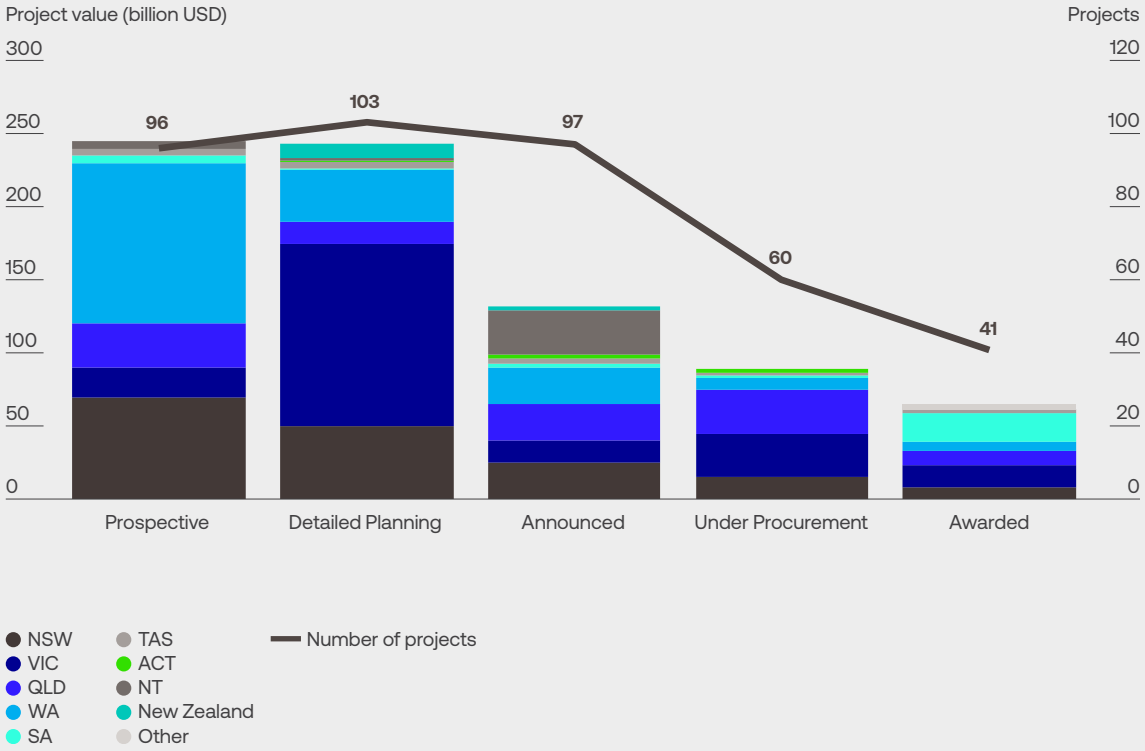
Box 3.4
Integrating infrastructure markets: Lessons from Australia and New Zealand

Infrastructure markets in Australia and New Zealand have historically faced challenges related to fragmented information and inconsistent data standards across jurisdictions. Federal, state, territory, and local governments operated independently with distinct procurement models and processes, often resulting in a lack of transparency about project scope, funding, and approval arrangements. The absence of a consolidated pipeline of information created significant barriers for market entrants, undermined competition, and masked the true scale of infrastructure investment opportunities in the region. These inefficiencies not only increased costs for stakeholders but also depressed interest from foreign investors and new market participants.

The Australia and New Zealand Infrastructure Pipeline (ANZIP) was created to address these gaps by offering a comprehensive and transparent snapshot of major infrastructure projects and contracts. ANZIP monitors projects from announcement to completion, offering stakeholders—such as investors, contractors, governments, and researchers—real-time updates and detailed analysis at every stage of development. Produced by Infrastructure Partnerships Australia, ANZIP integrates data from across both countries, presenting a complete and unbiased resource. By consolidating information into a single platform, it reduces market fragmentation, simplifies access to project data, and enables stakeholders to better understand the scale and scope of investment opportunities.

Since its launch in 2016, ANZIP has facilitated greater integration of infrastructure efforts across ten governments (both national and subnational level), attracting foreign capital and enhancing competition by lowering entry barriers for new players. ANZIP has also enabled governments to optimise procurement schedules, ensuring that projects are delivered in sequence to balance industry capacity and competition. The pipeline's real-time data proved invaluable during the COVID-19 pandemic, enabling governments and industries to adapt quickly to project delays, address challenges, and design stimulus strategies to sustain economic resilience.

Figure B5
Current projects on ANZIP platform by location and procurement status, 2024
Source: ANZIP (n.d.).



The experience of ANZIP highlights key lessons for other regions. Transparent and accessible project data is essential for maximising value-for-money outcomes and stimulating market interest. A consolidated regional infrastructure pipeline benefits both large and small jurisdictions, fostering competition, reducing duplication, and supporting sustainable economic growth. Finally, comprehensive and dynamic data tools like ANZIP not only enhance market engagement but also provide governments with the insights needed to coordinate infrastructure efforts and adapt to external challenges, ensuring long-term resilience and efficiency in the delivery of infrastructure projects.

Coordination and cooperation in policies and institutions related to infrastructure sectors represent a pivotal opportunity for the Caribbean to advance its development goals. By working together to harmonise regulations, pool resources, and implement regional strategies, countries in the region can overcome the challenges posed by limited economies of scale, fragmented markets, and resource constraints.

Strengthening collaboration not only enhances the efficiency and resilience of infrastructure systems but also unlocks new avenues for private investment and innovation. This collaborative approach is important for tackling common challenges like climate change, connectivity issues, and economic competitiveness, and is a path the region must pursue for sustainable and inclusive development.

Financing the future: Innovative approaches for the Caribbean

The Caribbean region faces a significant challenge related to fiscal constraints, which limits their ability to make the necessary investments in infrastructure sectors. Moreover, many infrastructure service providers face similar financial challenges. For instance, Caribbean water utilities have experienced decreases in profitability and collections from customers, and therefore, faced challenges to maintain and improve infrastructure. As a result, Caribbean nations must seek alternative and innovative financing mechanisms to meet the growing demand for economic infrastructure. Among the options being explored are private sector involvement, public-private partnerships (PPPs), green bonds, and international funding through development banks.

Governments are increasingly turning to private investment to meet infrastructure needs, capitalising on its efficiency, innovation, and technical expertise. The private sector plays an important role in mobilising capital for large-scale energy projects, particularly in renewable energy and energy efficiency initiatives. For instance, infrastructure projects in Jamaica have been financed by private actors under arrangements such as BOLT (build, operate, lease and transfer). Moreover, the interaction between the private and public sectors is increasingly taking place through Public-Private Partnerships (PPPs). These partnerships offer a structured framework for risk management, enabling governments to integrate climate resilience measures into project planning and execution, while also leveraging private sector capital to accelerate infrastructure delivery. As stated before, a key aspect is the coordination between public investment planning and PPP frameworks to foster efficiencies and fiscal transparency.

In addition to PPPs, other financial instruments, such as green bonds, climate bonds, and disaster risk financing, constitute available options for governments and private stakeholders. For instance, infrastructure bonds can raise funds for large-scale projects, such as ports or road infrastructure, often backed by government revenues or guarantees from international organisations.

Green and climate or social bonds, meanwhile, attract investment with Environmental Social and Governance (ESG) components, particularly in sectors like energy and water. Specifically, multilateral organisations and global climate cooperation serve as strategic allies, ensuring countries can adapt to climate change through appropriate investments. Broadening the definition of concessional debt to include more middle-income countries enables these nations to invest in necessary infrastructure without compromising fiscal stability.

Catastrophe bonds (cat bonds) offer an alternative financing mechanism to provide funding in the event of a natural disaster. These instruments provide immediate funding after such events, contributing to maintaining investments in resilient infrastructure despite adverse climate conditions. For instance, the use of cat bonds in Jamaica underscored the need for more flexible terms, as technicalities related to air pressure hindered activation (Naik et al. 2024).

At a more regional level, bilateral, multilateral, and regional funds play a critical role in financing infrastructure development in the Caribbean. Regional cooperation enables countries to pool resources, share best practices, and address common challenges, particularly in sectors such as energy, water, and transport. For example, CARICOM member states rely on development partners to fund renewable energy, energy efficiency, and climate resilience projects, which aim to reduce energy costs, improve security, and mitigate climate change. Regional financial institutions and development banks also support cross-border initiatives that enhance connectivity and economic growth.

Multilateral organizations, such as CAF, play a pivotal role in addressing the Caribbean's infrastructure financing challenges. In a region with constrained fiscal capacities and heightened vulnerability to the effects of climate change, they can provide guarantees and risk-sharing mechanisms to unlock public and private investment. They also bring technical expertise and facilitate access to innovative financial tools, ensuring projects are resilient, sustainable, and aligned with national and regional development goals. Moreover, the technical expertise can be useful to streamline processes, reduce administrative burdens and expedite fund allocation. By offering technical assistance and capacity-building support, CAF helps countries design and implement effective financial tools tailored to their specific development needs. Finally, by bridging financial gaps and bolstering investor confidence, they drive infrastructure development that strengthens economic growth, enhances climate resilience, and supports the region's long-term progress.

CAF remains committed to supporting regional integration, sustainable development, and inclusive growth in Latin America and the Caribbean. Since the establishment of the Regional Management Office for the Caribbean in 2022, CAF has been steadfast in deepening its engagement with the region by expanding its operations, technical assistance, and knowledge exchange with governments, the private sector and development partners. This focused engagement is evidenced by The Bahamas joining as a Series C Shareholder, while Antigua and Barbuda, Dominica, and Grenada are at an advanced stage in their incorporation process, thereby enhancing Caribbean representation in CAF alongside the existing Caribbean shareholders Trinidad and Tobago, Barbados, and Jamaica. Additionally, CAF and key regional institutions have signed landmark partnership agreements, including the Caribbean Development Bank (CDB), Caribbean Development Fund (CDF), The University of the West Indies (UWI), Organisation of Eastern Caribbean States (OECS), Commonwealth Secretariat, and others. CAF has also utilised its expertise and support to advance the Caribbean's green, blue, and just energy transition efforts, while strengthening its network with regional partners and addressing the unique challenges faced by Small Island Developing States (SIDS). This report, produced by CAF's Knowledge Management Department, contributes to these initiatives.

Appendix to Chapter 3

Assumptions on the dynamic model to assess the impact of a climate event (hurricane) on Caribbean states

Building on Arreaza et al. (2023), who utilise the dynamic general equilibrium model GDNAD, developed by the IMF to assess the effects of natural disasters, the model considered for this report assumes an increase in hurricane frequency starting in 2024 in three countries—Barbados, Jamaica, and Dominica. The frequency of these hurricanes is assumed to be 20% higher than the historical average for each country or region.

Damages and losses are calibrated to reflect varying levels of vulnerability. For Barbados and Jamaica, the damages are set at historically high percentiles, reflecting the occurrence of more frequent extreme events. For Dominica, the damages are estimated to be closer to the historical average, as the 2017 impact of Hurricane Maria heavily influences historical data.

Country-specific parameters, such as historical averages prior to the COVID-19 pandemic, were used to set the baseline. Additional parameters—including mitigation effects of resilient infrastructure, returns on standard and resilient infrastructure, and the additional costs of resilient infrastructure—are sourced from Arreaza et al. (2023).

The model assumes the following shocks to damages and losses: 6% for Barbados (reflecting a low-impact, late-shock scenario), 12% for Jamaica (mid-impact, intermediate-shock scenario) and 18% for Dominica (high-impact, early-shock scenario).

The exercise evaluates four scenarios for each country:

- Scenario A: no modifications are implemented; thus, the government continues to invest solely in standard infrastructure, adhering to historical patterns. For simplicity, the initial stock of resilient infrastructure in the three countries is assumed to be zero.
- Scenario B: starting in 2024 each country allocates a specific percentage of its GDP annually to resilient infrastructure, without concessional terms.
- Scenario C: Similar to Scenario B, but investments are financed through concessional loans. Investment levels are designed to ensure medium-term stability in public debt-to-GDP ratios, aligning with each country's historical public infrastructure spending patterns.
- Scenario D: In addition to the investments outlined in Scenarios B and C, a contingency fund is introduced. This fund saves an amount equal to the annual investment in resilient infrastructure. Financing terms remain consistent with those of Scenario C.

Table A.3 summarises the assumptions regarding the impact of hurricanes, damage losses, and macro estimates.

Table A.3
Assumptions used for the quantitative assessment
Source: Authors based on a model adapted from Arreaza et al. (2023).

Country	**Barbados**	**Jamaica**	**Dominica**
Disaster	Hurricane	Hurricane	Hurricane
Year	t + 8	t + 6	t + 4
Damages and losses (% GDP)	**6.0%**	**12.0%**	**18.0%**
Historical percentile	78.3	90.4	51.4
Losses	2.2%	4.4%	6.7%
Damages	3.8%	7.6%	11.3%
Public capital (Infrastructure)	1.9%	3.8%	5.7%
Private capital	1.9%	3.8%	5.7%
Scenario B (% GDP, annual)			
Investment in resilient infrastructure	0.2%	0.6%	0.9%
Concessional debt	-	-	-
Commercial debt	0.2%	0.6%	0.9%
Scenario C (% GDP, annual)			
Investment in resilient infrastructure	0.2%	0.6%	0.9%
Concessional debt	0.2%	0.6%	0.9%
Commercial debt	-	-	-
Scenario D (% GDP, annual)			
Investment in resilient infrastructure	0.2%	0.6%	0.9%
Contingency fund	0.2%	0.6%	0.9%
Concessional debt	0.4%	1.2%	1.8%
Commercial debt	-	-	-
Public debt 2023 (% GDP)	115%	75%	98%
EMBI/Spread (July 2024)	500	170	-

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