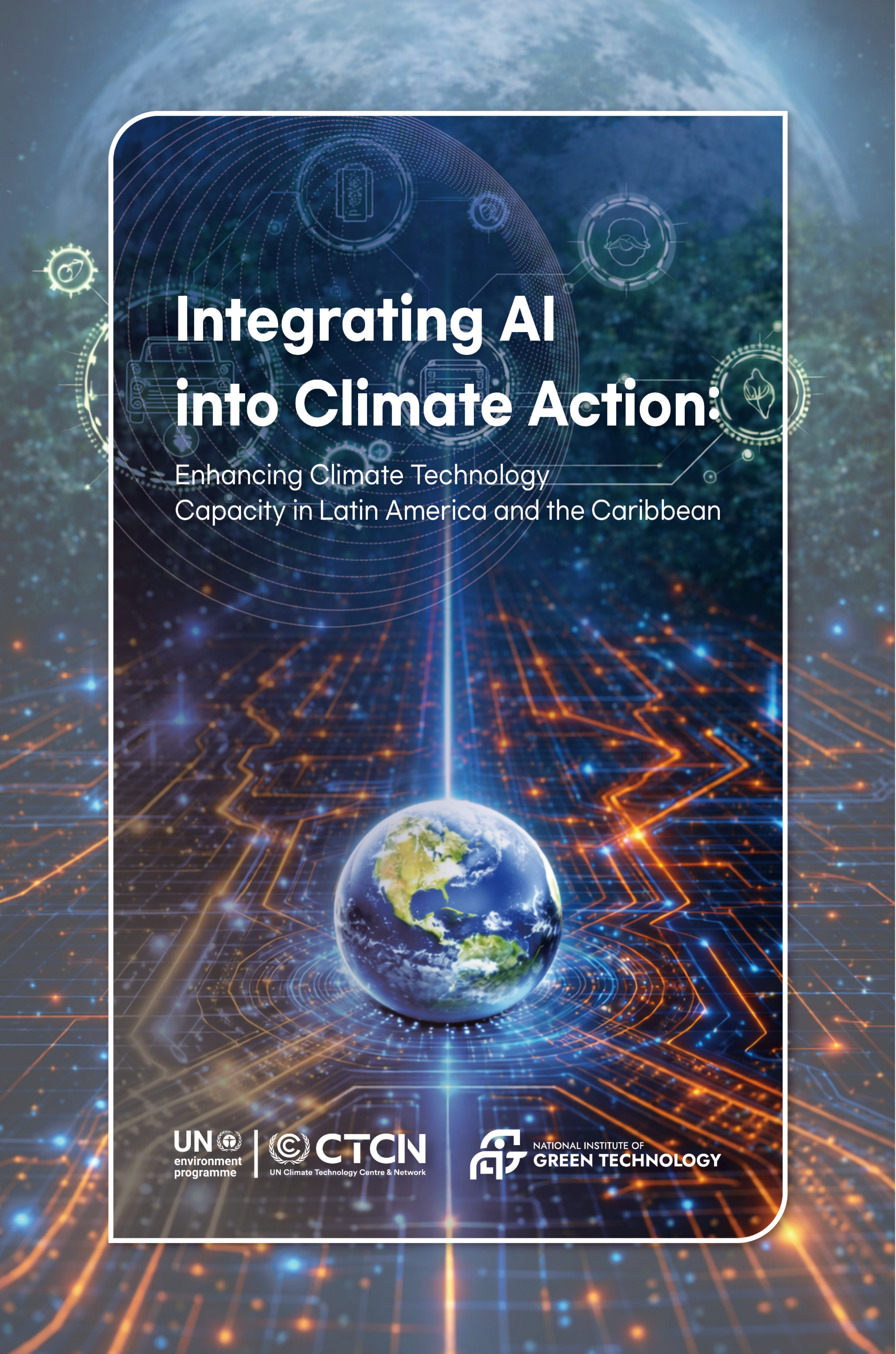
Integrating AI into Climate Action:

Enhancing Climate Technology Capacity in Latin America and the Caribbean



UN environment programme | CTCN UN Climate Technology Centre & Network

NATIONAL INSTITUTE OF GREEN TECHNOLOGY


AI

Contents

Foreword

Digital innovation is rapidly reshaping how countries design, implement, and scale up climate solutions. Among these innovations, artificial intelligence is emerging as a powerful tool to help governments improve decision-making, strengthen climate planning, and accelerate the delivery of mitigation and adaptation actions. This is particularly true in developing country contexts where resources, data, and technical capacity are often constrained. For National Designated Entities (NDEs), for example, understanding how AI can be practically applied to national priorities is increasingly relevant as they work to connect domestic needs with international climate technology support.

Recognizing this growing importance, Parties at COP28 requested the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN) to enhance awareness of AI and its potential to support countries in accelerating climate action. In response, the TEC and CTCN are implementing the *#AI4ClimateAction Initiative*, which provides a space for policy dialogue, awareness raising, capacity building, and the exchange of knowledge and experience on developing and deploying climate solutions powered by AI.

As part of this effort, in 2025 the CTCN delivered capacity-building activities for the UNFCCC Technology Mechanism's NDEs, supporting them to better understand and apply AI in strengthening national and regional climate action. These activities included webinars on AI applications for gender-responsive climate action and for enhancing energy sector transformation. It also included curated online learning materials building on AI-focused capacity-building sessions initiated in 2024 and the *AI for Climate Action Forum* held in Tanzania. In parallel, 10 Technical Assistance (TA) projects with strong AI components are under implementation at the request of NDEs.

Complementing these activities, I am pleased to introduce this compilation of national climate projects with a strong AI component from countries in Latin America and the Caribbean (LAC). This publication builds on the Asia-Pacific edition released in 2024.

Compiled by the CTCN in partnership with the National Institute of Green Technology (NIGT) in Korea for the second time, this brief highlights pioneering national efforts to applying emerging AI technologies to climate action. With case collections now spanning Asia-Pacific and Latin America and the Caribbean, this knowledge series will continue to expand to other regions, with Africa to follow.

We hope these case studies will inspire countries - particularly developing countries - to explore how digital solutions and AI technologies can support the achievement of their nationally determined contributions under the Paris Agreement, and support accelerate inclusive, sustainable, and locally grounded climate transitions.

Ariesta Ningrum
Director, CTCN

Foreword

The reality we face today can no longer be adequately described by the neutral term “Climate Change.” The “Climate Crisis” has become our daily reality, and the goal of limiting global temperature rise to 1.5°C - a promise made for the sustainability of our planet - is becoming an increasingly elusive challenge. This implies that humanity's efforts to rescue the Earth from this crisis must be more urgent and intense than ever before.

Fortunately, humanity is keeping the ember of hope alive through technological innovation. Highly advanced Climate Technology is being continuously developed to reduce, capture, and recycle carbon emissions. Above all, the emergence of Artificial Intelligence (AI), which is reshaping the global industrial landscape, marks a new inflection point in our response to the climate crisis. AI’s data analysis capabilities and efficiency optimization technologies are breathing unprecedented speed and precision into climate solutions - capabilities that were previously unimaginable.

I am honored to introduce this joint publication, ‘Integrating AI into Climate Action: Enhancing Climate Technology Capacity in Latin America and the Caribbean.’ Building upon the foundations of our previous Asia-Pacific study, the National Institute of Green Technology (NIGT), in collaboration with the CTCN, has expanded its analytical lens to the LAC region, surveying national policy commitments and on-the-ground applications across key sectors. Currently, this region faces a complex situation where the causes of the climate crisis and its damages are intertwined. Brazil, for instance, is a major emitter, ranking 5th worldwide. However, unlike other major nations where industrial emissions dominate, Brazil has the distinct characteristic that deforestation is the primary driver of its emissions. At the same time, between 2024 and 2025, the LAC region endured a severe “Double Whammy” of El Niño combined with the climate crisis. Extreme weather events - including heatwaves, droughts, floods, and hurricanes - struck in succession, causing massive economic losses and human casualties. This serves as a stark illustration of “Climate Inequality,” where countries with relatively less responsibility for carbon emissions suffer the most severe consequences.

Therefore, the solution required for this region is clear. A two-pronged approach must be pursued simultaneously: “Mitigation” technologies to curb emissions from deforestation, and “Adaptation” technologies to protect lives and assets from increasingly frequent climate disasters. In this process, the role of AI is indispensable - as demonstrated by the diverse applications showcased in this brief.

NIGT firmly believes that technology cooperation must transcend the mere transfer of technology. The true value of cooperation lies in building the “substantial capacity” for the region to respond to crises on its own. It is my sincere hope that this brief serves as a valuable knowledge-sharing resource, inspiring countries in Latin America, the Caribbean, and beyond to explore how these AI applications can be adapted to their own contexts - ultimately helping communities build safe, sustainable lives in a changing climate.

Sanghyup Lee
President, National Institute of Green Technology

Abbreviations and Acronyms

AFOLU	Agriculture, Forestry, and Other Land Use
AI	Artificial Intelligence
AI4SIDS	AI for Small Island Developing States
ANEEL	Agência Nacional de Energia Elétrica (National Electric Energy Agency)
BMS	Building Management System
BRT	Bus Rapid Transit
CALAC+	El Programa Clima y Aire Limpio en Ciudades de América Latina (Climate and Clean Air in Latin American Cities Program)
CCTV	Closed-Circuit Television
CDEMA	Caribbean Disaster Emergency Management Agency
CO_2	Carbon Dioxide
CONAGUA	Comisión Nacional del Agua (National Water Commission)
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
ELD	Electronic Logging Device
EV	Electric Vehicle
EWS	Early Warning Systems
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
GPRS	General Packet Radio Service
GW	Gigawatt
HMCI	Hazard Management Cayman Islands
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
I-RECs	International Renewable Energy Certificates
LAC	Latin America and the Caribbean
LDCs	Least Developed Countries
LoRaWAN	Long Range Wide Area Network

MRV	Monitoring, Reporting, and Verification
MW	Megawatt
NAP	National Adaptation Plans
NB-IoT	Narrowband Internet of Things
NDC	Nationally Determined Contribution
NDE	National Designated Entities
NIGT	National Institute of Green Technology
NRW	Non-Revenue Water
OECD	Organization for Economic Co-operation and Development
ONS	Operador Nacional do Sistema Elétrico (National Electric System Operator)
P2P	Peer-to-Peer
PPA	Power Purchase Agreement
PUE	Power Usage Effectiveness
SCADA	Supervisory Control and Data Acquisition
SIDS	Small Island Developing States
SMS	Short Message Service
TA	Technical Assistance
TB	Terabyte
TEC	Technology Executive Committee
TNA	Technology Needs Assessments
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlements Programme
UTE	Usinas y Transmisiones Eléctricas
UWI	University of the West Indies
VRE	Variable Renewable Energy


UN environment programme
CTCN
UN Climate Technology Centre & Network
NATIONAL INSTITUTE OF
GREEN TECHNOLOGY

Chapter

01

The Global Imperative for AI in Climate Action

1. The Global Imperative for AI in Climate Action

The global response to climate change has entered a critical phase where incremental improvements are no longer sufficient to meet the temperature goals of the Paris Agreement. In this context, Artificial Intelligence (AI) has emerged as a disruptive force with the potential to catalyze the systemic transformations required to decarbonize the global economy and build resilience against inevitable climate impacts. This chapter analyzes the evolving discourse on AI within the United Nations Framework Convention on Climate Change (UNFCCC) process and establishes an analytical framework that guides subsequent regional analysis.

1.1. #AI4ClimateAction Initiative: A Global Policy Framework

As the importance of AI for climate action has gained international prominence, the UNFCCC Technology Mechanism has taken concrete steps. The #AI4ClimateAction initiative, jointly led by the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN), was officially launched in June 2023 to meet this contemporary demand. This initiative represents a departure from viewing technology solely as hardware transfer (such as solar panels and wind turbines) toward a more holistic understanding that includes "soft" technologies like data analytics, algorithmic decision-making, and digital capacity.

In alignment with this shift, the core objective of this initiative is to explore AI as a powerful tool for developing and scaling up transformative solutions for climate change mitigation and adaptation efforts in developing countries, particularly Least Developed Countries (LDCs) and Small Island Developing States (SIDS). The #AI4ClimateAction initiative can be understood through three interconnected workstreams - policy dialogue, knowledge exchange, and capacity building - derived from TEC-CTCN plans.[1]

1. **Awareness Raising (Policy Dialogue):** The initiative promotes high-level exchanges among National Designated Entities (NDEs), policymakers, and technology experts through COP events, forums, and engagements to raise AI awareness and integrate it into technology priorities like Technology Needs Assessments (TNAs), with a logical extension to support National Adaptation Plans (NAPs) and NDCs.

2. **Implementation Support (Knowledge Exchange):** The initiative acts as a clearinghouse for successful case studies and technical knowledge through technical papers, briefs, and application hubs, documenting how AI is applied in diverse contexts - from flood and drought forecasting to optimizing renewable energy integration in weak grids - thereby lowering barriers for other nations to replicate these successes.

3. **Capacity Enhancement (Capacity Building):** Recognizing that climate technology transfer requires human capital, the initiative emphasizes training and skill development through webinars, AI Grand Challenges, and Application Hubs, equipping local stakeholders with the ability to understand, procure, and manage AI solutions so that developing nations become active participants rather than mere consumers of foreign technology.

This framework provides the necessary international scaffolding for the regional activities analyzed in this publication. It validates the focus on digital technologies not as futuristic luxuries but as pragmatic solutions for developing countries to leapfrog carbon-intensive development pathways.

[1] Climate Technology Centre & Network (CTCN) (2024), Intro to #AI4ClimateAction Initiative, Presented at NDE Forum, 29 August 2024, https://www.ctc-n.org/sites/default/files/2024-08/Intro%20to%20AI4Climate Action.pdf; UNFCCC Technology Executive Committee (TEC) (2025), Technology Mechanism Initiative on AI for Climate Action, https://unfccc.int/ttclear/artificial_intelligence; TEC (2025), AI for Climate Action: Advancing Mitigation and Adaptation, Technical Paper, https://unfccc.int/ttclear/tec/AI4climate.html

1.2. The Opportunity Landscape: Accelerating Mitigation and Adaptation

While the global discourse acknowledges risks, the primary focus of the Technology Mechanism is on the immense opportunities AI presents for accelerating climate action.[2] AI functions as a force multiplier,[3] enhancing the efficiency and effectiveness of existing technologies and enabling new solutions that were previously computationally impossible. For developing countries in the LAC region, where the pressure to pursue economic development while building climate resilience is most acute, these capabilities are particularly significant. AI opens concrete opportunities on two fronts: cutting emissions through smarter systems, and protecting lives and livelihoods through better prediction of and preparedness for climate hazards.

Mitigation Opportunities: Optimization and Decarbonization

In the realm of mitigation, AI's primary contribution lies in its ability to optimize complex systems. The energy sector, which accounts for the largest share of global greenhouse gas emissions, stands to benefit most significantly.[4] AI algorithms can predict renewable energy generation from solar and wind with high precision, balancing these intermittent sources against demand patterns in real time. This capability is crucial for grid stability as countries move toward higher penetrations of variable renewable energy (VRE).[5] Furthermore, AI enables demand-side management, allowing smart grids to automatically adjust energy consumption in buildings and industrial processes to match supply, thereby reducing the need for fossil fuel-based peaking plants.[6]

Beyond energy, AI is revolutionizing industrial efficiency. In sectors like cement and steel production, notorious for their high carbon footprints, AI-driven process

---

[2] TEC & CTCN (2024), Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-20 27, CTCN/TEC Joint Document, https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/artificial_intellige nce_cms_ lot/1673478d26041fb84b40a1b4c0ddb5d/cc306226d72e4dc9b52a1604bdf49a09.pdf

[3] TEC (2025), AI for Climate Action: Advancing Mitigation and Adaptation, Technical Paper, https://unfccc.int/ttclear/artificial_intelligence

[4] IPCC (2022), Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report, Chapter 16: Innovation, technology development and transfer, https://www.ipcc.ch/report/ar6/wg3/chapter/chapter-16/

[5] TEC (2025), AI for Climate Action: Advancing Mitigation and Adaptation; TEC & CTCN (2024), Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-2027

[6] IPCC (2022), Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report

control can optimize combustion and chemical reactions to minimize fuel consumption and emissions.[7] In transportation, AI powers intelligent traffic management systems and optimizes logistics supply chains, reducing fuel burn and congestion.

Adaptation Opportunities: Prediction and Resilience

AI's potential in adaptation and weather prediction is even more critical for areas highly vulnerable to extreme weather events. Machine learning models excel at pattern recognition, making them ideal for processing vast amounts of meteorological and satellite data to predict climate hazards.[8] AI-enhanced Early Warning Systems (EWS) can forecast floods, hurricanes, and droughts with greater lead times and spatial resolution than traditional models, allowing communities to take preemptive action.[9]

In agriculture, AI-driven precision farming tools analyze soil data, weather forecasts, and crop health imagery to advise farmers on optimal irrigation and fertilization.[10] This not only increases yields - vital for food security - but also builds resilience against changing precipitation patterns. Similarly, in biodiversity conservation, AI analysis of acoustic data and satellite imagery enables real-time monitoring of deforestation and ecosystem health, facilitating rapid interventions to protect carbon sinks like the Amazon rainforest.[11]

1.3. Analytical Framework: The Five System Transformation Areas

CTCN's "Five System Transformation Areas" was adopted to provide a structured analysis of how these global concepts translate into regional reality. This framework acknowledges that climate action requires systemic change

[7] Carbon Re (2025), AI Process Control for Cement, https://carbonre.com/cement-ai-process-control; ABB (2024), ABB and Carbon Re agree joint approach to enhance low-carbon cement production with artificial intelligence, https://new.abb.com/news/detail/119831/abb-and-carbon-re-agree-joint-approach-to-enhance-low carbon-cement-production-with-artif

[8] UNFCCC (2024), Draft technical paper on AI for climate action, https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/tn_meetings/0ec396b0ba7b4d0d853b77c7b83dc172/3ebbf2e8e7834a7f873b0ae9a86262f7.pdf

[9] Skoubris & Hloupis (2023), An AI-Powered, Low-Cost IoT Node Oriented to Flood Early Warning Systems, Eng. Proc. 58, 44, https://doi.org/10.3390/ecsa-10-1602

[10] University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) (2025), UF scientists to develop AI technology to help growers assess crop damage after hurricanes, https://blogs.ifas.ufl.edu/news/2025/06/30/uf-scientists-to-develop-ai-technology-to-help-growers-assess-crop-damage-after-hurri

[11] TEC (2025), AI for Climate Action: Advancing Mitigation and Adaptation

across interconnected sectors rather than isolated technological fixes.[12] In the LAC context, this structure is particularly useful because the region's climate vulnerabilities, spanning energy poverty in rural areas, deforestation-driven emissions, and extreme weather events, cut across all five domains simultaneously. Mapping AI applications against this framework therefore, helps identify not only where solutions are already in use, but where gaps in technology access and capacity most need to be addressed.

1. **Water-Energy-Food Nexus:** This area addresses the complex inter-dependencies between these three critical resources. AI applications here can focus on maximizing resource efficiency - using energy to pump water more efficiently, using water to grow food with less waste, and using biomass for energy without compromising food security.

2. **Buildings and Infrastructure:** This sector focuses on the built environment. AI can be used to design climate-resilient structures, optimize energy use in buildings through smart thermostats and management systems, and plan urban expansion in a way that minimizes carbon footprints and exposure to climate risks.

3. **Sustainable Mobility:** This area covers the transition to low-carbon transport. AI applications can range from optimizing public transit routes and managing electric vehicle (EV) charging infrastructure to enabling autonomous logistics that reduce fuel consumption.

4. **Energy Systems:** This is the backbone of decarbonization. The focus is on smart grids, renewable energy integration, and predictive maintenance of energy assets. AI can allow for the transition from centralized, fossil-fuel-based systems to decentralized, renewable-heavy networks.

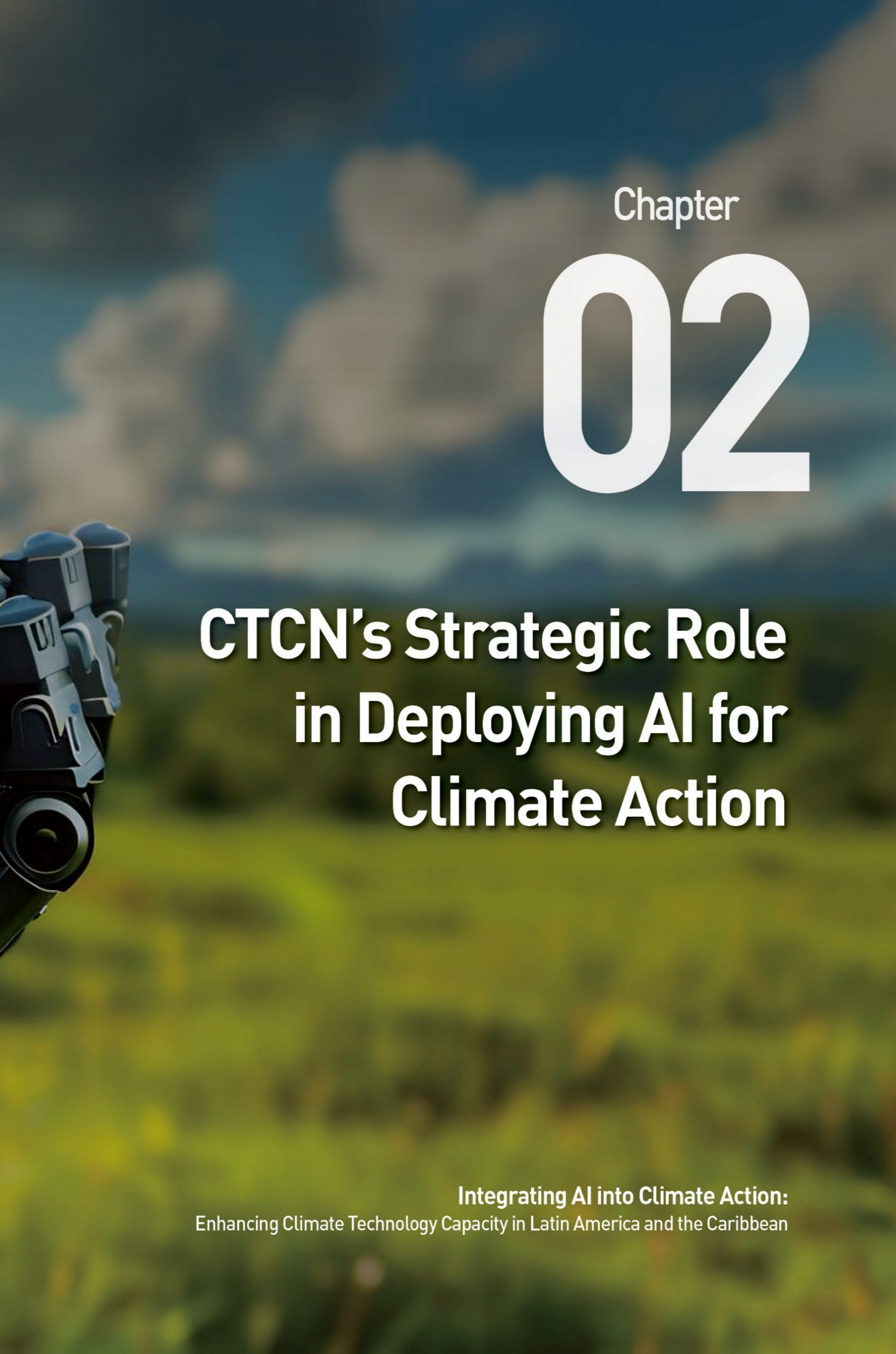
5. **Business and Industry:** This area targets the production side of the economy. It can involve using AI to improve material efficiency, reduce waste through circular economy models, and optimize industrial processes to lower emissions intensity.

By mapping the LAC region's AI applications against these five areas, the

[12] CTCN (2023), CTCN Taxonomy of Climate Technologies, https://www.ctc-n.org/sites/www.ctc-n.org/files/resources/CTCN%20Technology%20Taxonomy.pdf; TEC & CTCN (2023), Technology Mechanism Joint Work Programme 2023-2027, https://unfccc.int/sites/ default/files/resource/TM_JWP_2023-2027.pdf

chapters that follow identify where AI is already delivering measurable value and where significant potential remains untapped. The case studies presented in Chapter 4 are organized along this same structure, allowing for a direct connection between the analytical framework and on-the-ground implementation.


UN environment programme
CTCN
UN Climate Technology Centre & Network
NATIONAL INSTITUTE OF
GREEN TECHNOLOGY



Chapter

02

CTCN's Strategic Role in Deploying AI for Climate Action

2. CTCN's Strategic Role in Deploying AI for Climate Action

The transition from policy ambition to tangible climate action requires robust implementation mechanisms. The CTCN, as the implementation arm of the UNFCCC Technology Mechanism, serves as a key vehicle for translating these commitments into action.[13] This chapter delineates how the CTCN is actively facilitating the deployment of AI technologies in developing countries, providing concrete country-level support across technical assistance, capacity building, and knowledge sharing.

2.1. From Policy to Practice: The Joint Work Plan (2024-2027)

The Joint Work Plan on #AI4ClimateAction initiative (2024-2027), the TEC and CTCN are mandated to together create a direct path from policy commitment to country-level implementation. Three workstreams are:

- **Support for Technology Implementation:** This workstream focuses on responding to direct requests from developing countries for TA. The CTCN draws on its global network - comprising private companies, research institutions, and NGOs - to design and implement specific AI solutions. This demand-driven approach ensures technology transfer is aligned with national priorities and local contexts.[14]

- **Stakeholder Capacity Building:** The "digital divide" is often a skills divide and this workstream directly addresses the human and institutional capacity of stakeholders. This involves training government officials, NDEs, and local technical experts in the fundamentals of AI, data governance, and technology management. Special emphasis is placed on LDCs and SIDS,

[13] TEC (2025), Technology Mechanism Initiative on AI for Climate Action, https://unfccc.int/ttclear/artificial_intelligence
[14] TEC &CTCN (2024), Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-2027

ensuring they have the necessary knowledge to sustain AI projects after the initial assistance concludes.[15]

- **Awareness Raising and Knowledge Sharing:** The third workstream aims to build a shared understanding of AI's practical applications in climate action. Through regional fora, webinars, and publications, the CTCN disseminates knowledge about what works, what doesn't, and how to scale up successful pilots. This creates a feedback loop where lessons learned in one region can accelerate adoption in another.[16]

2.2. Regional Capacity Building and Technical Assistance

The CTCN's approach is best illustrated through its specific TA projects in the LAC region. These projects demonstrate how data-driven tools can support climate action at the country level.

A key example is the ongoing TA project in Suriname, titled "Enhance the resilience of Suriname's water supply system". This project addresses the country's growing vulnerability to drought and water scarcity, driven by reduced rainfall and rising demand from agriculture and tourism. Using GIS-based risk mapping, the project identifies drought-prone areas and suitable aquifer recharge sites, and designs an integrated water management system to sustain groundwater resources during drought periods. It also includes training for national officers in drought prevention modelling, building the in-country capacity needed to manage water resources independently over time.[17]

Furthermore, the CTCN facilitates regional fora for NDEs, creating a community of practice where LAC representatives can discuss common challenges - such as data scarcity or regulatory hurdles - and share locally-developed solutions. These fora are instrumental in building a regional consensus on the importance of digital transformation in climate policy.[18]

[15] TEC & CTCN (2023), Technology Mechanism Joint Work Programme 2023-2027, https://unfccc.int/sites/default/files/resource/TM_JWP_2023-2027.pdf

[16] TEC & CTCN (2024), Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-2027

[17] CTCN (2024), Enhance the resilience of Suriname's water supply system by modelling drought risks and developing a roadmap of prioritized alternatives for aquifer recharge, https://www.ctc-n.org/content/enhance-resilience-suriname-s-water-supply-system-modelling-drought-risks-and-developing

[18] CTCN (2024), LAC NDE Forum 2024 & Capacity Building Programme on AI4Climate Action, https://www.ctc-n.org/whats-happening/events/lac-nde-forum-2024-capacity-building-programme-ai4climate-action

2.3. Fostering a Global Innovation Ecosystem

Beyond direct technical assistance, the CTCN acts as a catalyst for a broader ecosystem. It recognizes that governments alone cannot develop the necessary technologies; the private sector, academia, and civil society are the engines of innovation.

The 'AI for Climate Action Award' (TEC/CTCN - KOICA) is a flagship initiative in this regard. By identifying and celebrating open-source AI solutions that are applicable in developing country contexts, the award incentivizes the global tech community to focus on climate challenges. The 2025 award cycle provided valuable insights into current trends: notably, over a third (37%) of the submissions focused on climate adaptation, with nearly half (48%) addressing cross-cutting themes. This reflects the urgent priorities of the Global South, in contrast to the global commercial AI market, which tends to skew towards mitigation or non-climate applications.

Moreover, the high participation of women innovators (39% of submitters) highlights the initiative's role in promoting gender-responsive climate action. By highlighting these solutions, the CTCN not only rewards innovation but also connects these innovators with potential funders and government partners, helping to close the gap between prototype and scale-up. This ecosystem-building function is critical for creating a sustainable market for climate AI solutions in the LAC region.[19]

[19] Kim & Rudloff (2025), Update on the implementation of the workplan of the Technology Mechanism Initiative on AI for Climate Action (2024-2027), TEC 31/CTCN AB 26 Joint Session, https://www.ctc-n.org/sites/default/files/2025-09/AB_2025_26_5.1_Technology%20Mechanism%20Initiative%20on%20AI%20for%20Climate%20Action.pdf


AI
AI


UN environment programme
CTCN
UN Climate Technology Centre & Network
NATIONAL INSTITUTE OF
GREEN TECHNOLOGY

Chapter

03

The Digital Dimension of Climate Ambitions in Latin America and the Caribbean

3. The Digital Dimension of Climate Ambitions in Latin America and the Caribbean

This chapter focuses on the core region of the report, LAC, to conduct an in-depth analysis of how countries in this region are integrating digital transformation into their national climate commitments. Through this analysis, we assess how digital transformation is being integrated into national climate commitments, and examine the gap between policy objectives and actual technology application.

3.1. Regional Context: The Dual Challenge of Climate Vulnerability and the Digital Divide

While Chapter 1 highlighted the global opportunities of AI for climate action, the LAC region illustrates how these opportunities are mediated by a dual reality of climate vulnerability and uneven digital development.[20] This region is home to globally important ecosystems like the Amazon rainforest, but it is also directly exposed to the severe impacts of climate change, including threats to coastal areas from sea-level rise, agricultural and water security issues due to extreme droughts and floods, and biodiversity loss.[21]

---

[20] OECD (2023), Towards Climate Resilience and Neutrality in Latin America and the Caribbean: Key Policy Priorities, OECD Publishing, Paris, https://doi.org/10.1787/278e52e8-en; World Bank (2024), Vulnerability to Climate Risk–Induced Poverty in Latin America and the Caribbean, https://openknowledge.worldbank.org/entities/publication/3464ca4c-ccad-48a4-ab2b-329ab478c2b8; UNDP (2024), Missed Connections: An incomplete digital revolution in Latin America and the Caribbean, https://www.undp.org/latin-america/blog/missed-connections-incomplete-digital-revolution-latin-america-and-caribbean-0

[21] WWF (2023), Severe drought in the Amazon worsened by deforestation, https://www.wwf.org.br/en/?87020/Climate-crisis-severe-drought-in-the-Amazon-is-worsened-by-deforestation-and-fire; World Bank (2021), Poor digital access holding LAC back, https://blogs.worldbank.org/en/latinamerica/poor-digital-access-holding-latin-america-and-caribbean-back-heres-how-change-i

In this climate crisis, digital technology can be a crucial solution, but the digital landscape in the LAC region presents both opportunities and challenges. On one hand, there is potential to leapfrog traditional development paths.[22] On the other hand, the significant 'digital divide' that exists within and between countries remains a problem. Pushing for technology adoption without addressing this gap risks further exacerbating existing socioeconomic inequalities.

3.2. Systemic Review of Nationally Determined Contributions (NDCs)

To understand how Latin America and the Caribbean countries are reflecting digital technology in their climate goals, this report systematically analyzed the latest NDC documents submitted to the UNFCCC NDC Registry by all LAC Parties (33 countries as of 2025). The analysis was conducted by identifying explicit and implicit references related to climate action, focusing on keywords such as

inteligencia artificial (Artificial Intelligence), *tecnología* (technology), *datos* (data), *innovación* (innovation), *digital*(digital), and *inteligente* (smart)[23].

The analysis reveals significant variation in digital technology integration across countries. Leaders like Colombia, Costa Rica, The Bahamas, and El Salvador specify AI and digital tools as core implementation means for sectoral targets. Colombia details climate-smart agriculture with precision irrigation, intelligent building energy management, route optimization software for logistics, and smart grid infrastructure for demand management. Costa Rica commits to transforming agricultural production, integrated water management, and a 2030 traffic data platform for resource optimization.

[22] OECD (2019), Shaping the Digital Transformation in Latin America, https://www.oecd.org/latin-america/publicationsdocuments/reports/6/

[23] Since NDCs in the LAC region are submitted in the official language of each country, the analysis covered documents in Spanish, Portuguese, English, and French. Keywords were identified and searched in each respective language as follows: Spanish (*inteligencia artificial, tecnología, datos, innovación, digital, inteligente*), Portuguese (*inteligência artificial, tecnologia, dados, inovação, digital, inteligente*), English (*artificial intelligence, technology, data, innovation, digital, smart*), and French (*intelligence artificielle, technologie, données, innovation, numérique, intelligent*).

The Bahamas emphasizes climate-smart food security with meteorological data integration, smart traffic/e-mobility, smart grids, industrial technologies, and tourism planning to address energy-intensive hotels. El Salvador prioritizes digital water security monitoring, urban refrigeration systems, logistics management, and advanced smart grids with Supervisory Control and Data Acquisition (SCADA) and demand response.

Small Island Developing States (SIDS) in the Caribbean demonstrate distinct digitalization priorities reflecting their climate vulnerabilities. Saint Kitts and Nevis explicitly commits to SMART aquaponics and aquaculture systems alongside retrofitting public buildings with climate-smart technology. Dominica emphasizes a comprehensive digital agriculture strategy, digitalized land management systems, and climate-smart building codes. Saint Vincent and the Grenadines prioritizes a digital platform for farmers integrating climate data and adaptation strategies.

A common thread across Caribbean SIDS is the emphasis on early warning systems (EWS). Antigua and Barbuda focuses on disaster prediction through climate modelling, while Saint Lucia highlights improved data management and EWS for fisheries. Suriname commits to nationwide EWS for floods, droughts, and heatwaves, combined with geospatial monitoring for precision agriculture and smart grid infrastructure deployment.

Grenada stands out with its explicit reference to “smart cities,” though details remain limited. These patterns suggest that SIDS are strategically targeting digital solutions for food security, disaster preparedness, and building resilience - areas where their small scale and climate exposure create both urgency and opportunity for technology leapfrogging.

3.3. Mapping the Landscape: The Intersection of Digital and Climate Action

To map the digital climate action landscape in the LAC region, the following matrix was constructed based on the NDC analysis results. This table illustrates in which areas each country recognizes the importance of digital technology and serves as a basis resource for identifying the strengths and gaps of the region as a whole.

Table 3.1 illustrates digital integration levels across the CTCN's five core sectors for 28 LAC countries whose NDCs reference digitalization, derived from the full review of 33 NDCs. Colombia demonstrates the most comprehensive coverage with explicit digital plans across four sectors (Water-Energy-Food Nexus, Buildings, Sustainable Mobility, Energy Systems), while The Bahamas and El Salvador each identify initiatives in four domains, including smart grids and climate-smart agriculture. The Water-Energy-Food Nexus emerges as the strongest region-wide domain with eight countries specifying digital tools, whereas Business & Industry shows limited integration beyond climate-smart industrial processes.

Table 3.1. Digitalization Integration Matrix in LAC Nationally Determined Contributions (NDCs)

Country	Water-Energy-Food Nexus	Buildings & Infrastructure	Sustainable Mobility	Energy Systems	Business & Industry
Antigua and Barbuda	Soil management for restored watersheds and sustainable food systems; Prediction of disasters through climate modelling			Promotion of smart grid solutions	
Argentina	Development of early warning systems and comprehensive disaster risk management		Smart Transport Programme		
Bahamas	Climate-smart food security programmes; Climate-smart agriculture practices		Smart traffic management systems and e-mobility policies	Smart grid infrastructure	Climate-smart technologies in industrial processes; Smart tourism planning
Barbados	Agriculture, Forestry, and Other Land Use (AFOLU) policy guided by the Climate-Smart Agriculture (CSA) approach				
Bolivia	Sustainable agroforestry systems (SAF); Reduction of forest fires; Real-time monitoring of deforestation; Fire monitoring and early warning systems				
Belize	Climate-smart and sustainable agriculture solutions (CSSA); Climate-smart irrigation systems; Agroforestry and climate-smart crop practices; Development of a centralised and automated multi-hazard national early warning system for climate-related disaster risk reduction				Development of data management system for waste management

Country	Water-Energy-Food Nexus	Buildings & Infrastructure	Sustainable Mobility	Energy Systems	Business & Industry
Brazil	Formulation of inter-institutional strategies for prevention, mitigation, preparedness, warning systems, management, and response to disasters and extreme climate events		Green Mobility and Innovation Program	Digital transformation and strategic minerals for the energy sector	
Chile	Innovation and Institutional Strengthening Program for Food Security; Disaster risk management with development of early warning systems				
Costa Rica	Transformation of the national agricultural production system; Integrated water resources management; Operation of a network of automatic weather stations integrated with open data systems for climate monitoring and early warning systems		Digitalization of the transport sector		
Columbia	Climate-smart agriculture with water-efficient practices, precision irrigation, and sustainable soil and crop management; Multi-hazard early warnings, risk-based planning, and articulation of Disaster Risk Management (DRM)	Implementation of intelligent energy monitoring and management systems in buildings	Implementation of route optimization and climate risk management software; Automation of logistics processes and efficient energy and refrigeration systems	Smart infrastructure for demand management	
Cuba	Strengthening of monitoring, surveillance, and early warning systems to systematically assess the condition and quality of coastal zone water, drought,				

Country	Water-Energy-Food Nexus	Buildings & Infrastructure	Sustainable Mobility	Energy Systems	Business & Industry
	forest, human, animal, and plant health				
Dominica	Establishment of Integrated Coastal Zone and Watershed Management Planning Framework; Digital agriculture strategy; Development of digitalized land management system; Establishment of community-based early warning systems	Implementation and enforcement of climate-smart building codes			
Dominican Republic	Climate-smart agriculture; Climate-smart livestock management; Management of water supply through improvement and construction of hydraulic infrastructure and equipment; Development of Early Warning Systems (EWS) incorporating climate change projections	Introduction of energy efficiency standards in new constructions			
Ecuador	Strengthening of early warning systems; Development of strategies for promotion, prevention, surveillance, control, and response to climate-sensitive diseases				
El Salvador	Digital platforms for monitoring implementation of climate-resilient water security plans; Strengthening of the early warning system	Implementation of digital systems for urban monitoring, refrigeration, and air conditioning equipment	Improvement of freight transport efficiency; Digital logistics management systems	Advanced digital grid management systems (smart grid, advanced SCADA) and demand response	

Country	Water-Energy-Food Nexus	Buildings & Infrastructure	Sustainable Mobility	Energy Systems	Business & Industry
Grenada		Climate Smart Cities Development Programme			
Guatemala	Creation of the national early warning system				
Guyana	Development and implementation of early warning systems				
Mexico	Strengthening of early warning systems and hazard prevention and action protocols			Programs and actions for optimization of energy consumption	
Nicaragua	Modernization of the country's hydrometeorological services for accurate forecasts and early warning systems				
Panama	Strengthening of the national system for monitoring and assessing losses and damages for science-based decisions and rapid responses in all territories				
Paraguay	Strengthening of monitoring and early warning systems				
Peru	Sustainable management systems; Early warning systems; Risk management				
Saint Kitts and Nevis	Expansion of SMART aquaponics and aquaculture systems; Development of information access points for early warning systems	Retrofitting of public buildings and infrastructure with climate-smart technology			

Country	Water-Energy-Food Nexus	Buildings & Infrastructure	Sustainable Mobility	Energy Systems	Business & Industry
Saint Lucia	Adoption of climate-smart agriculture (CSA) for increased resilience; Enhancement of fishers' and other actors' capacity to manage climate risks through improved data management and early warning systems				
Saint Vincent and the Grenadines	Digital platform for farmers integrating climate data and adaptation strategies; Multi-hazard Early Warning Systems (MHEWS)				
Suriname	Scaling up of geospatial monitoring and precision agriculture technology; Nationwide early warning systems for floods, droughts, and heatwaves fully operational and tested annually			Facilitation of transfer and deployment of utility-scale solar PV, BESS, and smart grid infrastructure	
Venezuela	Promotion of climate-smart agroforestry systems in the Venezuelan Andes; Implementation of early warning systems in reservoirs; Strengthening of the National Information System for prevention and management of forest fires				

** Note: Countries were excluded from this analysis where their NDCs did not explicitly reference artificial intelligence (AI) or digitalization within sector-specific targets. Blank entries reflect a lack of sector-specific digital commitments rather than the absence of strategies. For instance, Brazil references its 2024-2028 AI Plan but lacks qualifying NDC sectoral details. Linguistic diversity and translation limitations may cause unintentional omissions*

3.4. AI as an 'Implicit Enabler': The Gap Between Policy and Reality

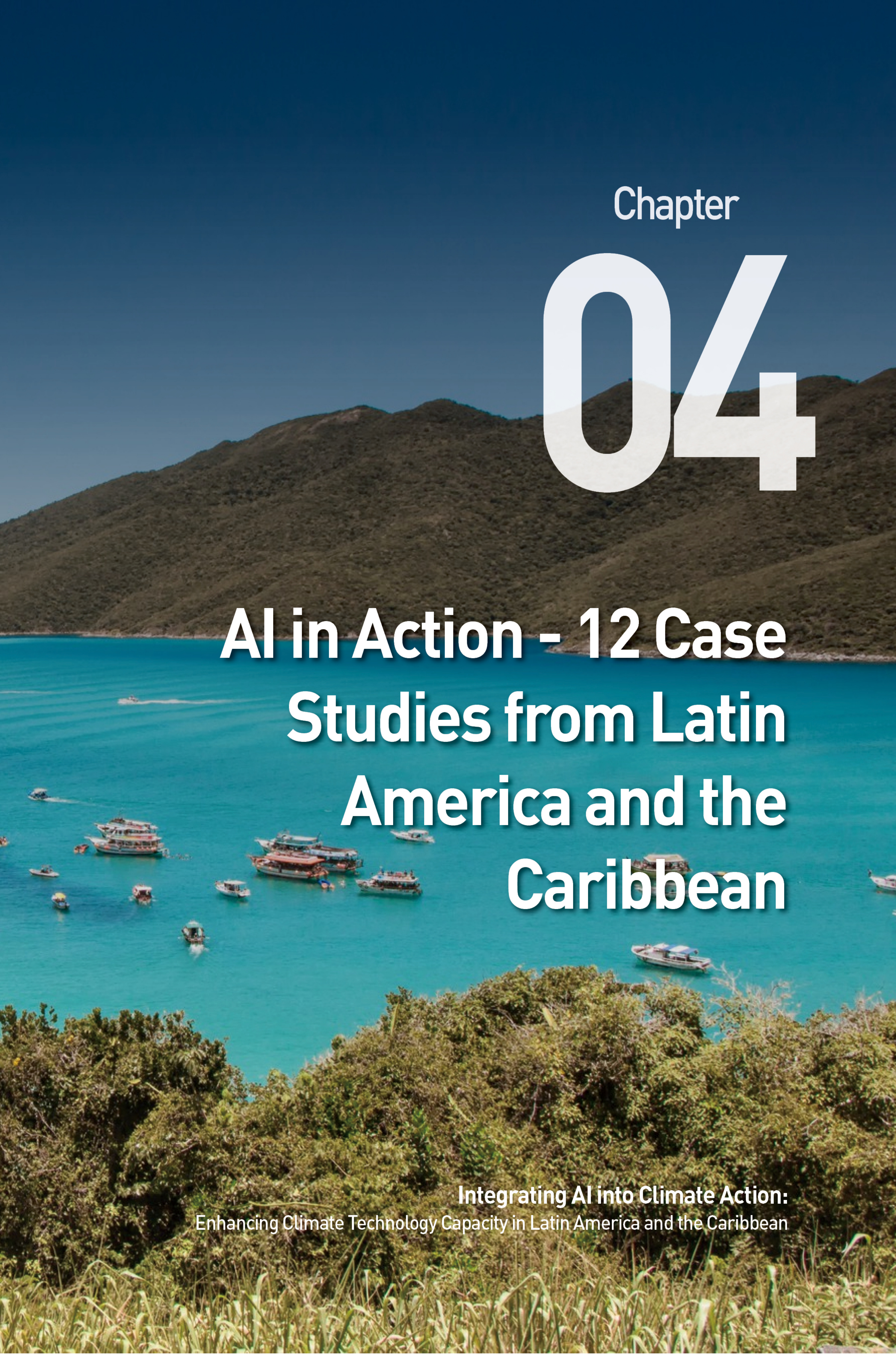
The matrix analysis above suggests that for countries in LAC, AI is still perceived as an 'implicit enabler' that can accelerate the achievement of existing policy goals, rather than an explicit policy tool. For example, many countries have set goals (What) such as 'building climate-resilient infrastructure' or 'efficient water resource management', with limited information on actionable plans (How) for applying AI to achieve these goals.[17]

It is at this point that a gap between policy and reality occurs. The case studies to be introduced in Chapter 4, such as Cayman Islands' IoT-based flood early warning pilot, Brazil's Eletrobras AI grid management, Santiago's electric bus life-cycle optimization, and Vale's autonomous mining logistics, show the concrete 'how' to achieve the broad goals stated in the NDCs.

UN environment programme

CTCN UN Climate Technology Centre & Network

NATIONAL INSTITUTE OF GREEN TECHNOLOGY



Chapter

04

AI in Action - 12 Case Studies from Latin America and the Caribbean

4. AI in Action - 12 Case Studies from Latin America and the Caribbean

While policy frameworks evolve, AI is already delivering tangible climate results across the LAC region, concretely addressing the 'how' identified in Chapter 3's NDC analysis. From smart flood early warning systems in small island states, low-carbon mobility optimization, AI-enabled grids, urban digital platforms, to industrial decarbonization, this chapter presents twelve evidence-based case studies categorized by CTCN's five system transformation areas.

4.1. Water-Energy-Food Nexus[24]

CASE 1

Predicting Hydrological Extremes: Cayman Islands Smart Flood Early Warning Pilot

Hazard Management Cayman Islands (HMCI), in partnership with the University of the West Indies (UWI), is piloting an IoT sensor network to monitor flood depths in vulnerable communities, improving real-time flood detection amid rising sea levels and intense storms.

Background and Challenges

The Cayman Islands faces acute flood risk from its low-lying terrain, coastal development, and climate-driven heavy rainfall and storm surges. Climate change is altering rainfall patterns across the Caribbean region, and when rain occurs, it is more frequently associated with brief but torrential events linked to storms. This, combined with a greater frequency of tropical cyclones and rising sea levels, is increasing the likelihood of flooding events in the Cayman Islands. Traditional flood management relies on manual observations and broad forecasts, which struggle to capture localized flash floods. HMCI's 2021 Annual

[24] The three cases under the Water-Energy-Food Nexus were submitted to the 2024 AI Innovation Grand Challenge hosted by the TEC, with Trinidad and Tobago's AI4SIDS announced as the winner at COP29. The AI Innovation Grand Challenge served as a precursor to the AI for Climate Action Award described in Chapter 2. Case descriptions incorporate inputs from lead implementers (via structured questionnaire) supplemented by document review and web research

Report identifies improving flood analysis and early warning capabilities as a strategic priority for building community resilience.[25]

System Concept and Key Technologies

In 2021, HMCI began exploring ways to measure the depth and extent of flood waters through an intelligent IoT sensor network, developing a concept paper covering pilot site selection, hardware requirements, and flood sensor market research. Through stakeholder consultations involving the Cayman Islands National Weather Service (CINWS), Department of Environment, National Roads Authority, and Department of Planning, two flood-prone areas in Grand Cayman were identified as pilot sites: Randyke Gardens and Washington Boulevard. IoT flood sensors are scheduled for installation in Q1 2025, supported by a Memorandum of Understanding (MoU) developed with key stakeholders. In partnership with UWI, the system integrates machine learning algorithms to identify patterns in real-time rainfall, water level, and environmental data, and applies GeoAI (geospatial artificial intelligence) to provide location-specific flood warnings. The system feeds into HMCI's GIS dashboards and National Emergency Operations Centre (NEOC) operations, while the National Emergency Notification System (NENS) delivers targeted alerts through mobile app, SMS, and email, moving beyond island-wide warnings to neighborhood-specific guidance.[26]

Key components

- IoT Water Level Sensors: Real-time inundation monitoring at Randyke Gardens and Washington Boulevard
- Machine Learning: Pattern identification for flood prediction from sensor data
- GeoAI: Location-specific flood warnings and geospatial analysis
- NEOC/NENS Integration: GIS dashboard feeds and targeted community alerts

---

[25] Hazard Management Cayman Islands (HMCI) (2021), HMCI Annual Report 2021, https://parliament.ky/wp-content/uploads/2023/08/2021-HMCI-Annual-Report.pdf

[26] HMCI (2024), HMCI Annual Report 2024, https://cigarchives.gov.ky/publication-detail/hmci-annual-report-2024; HMCI and UWI (2025), Smart Flood Early Warning System for the Cayman Islands, Survey Response submitted to CTCN/NIGT, September 2025; Codling, Ramlal & Davis (2024), Examining the Feasibility of GeoAI and IoT for Smart Flood Early Warning Systems in Local Communities for Caribbean Urban Spaces, The West Indian Journal of Engineering, Vol.46 No.2, https://journals.sta.uwi.edu/ojs/index.php/wije/article/view/8974

Observed and Anticipated Benefits

Real-time flood data has been integrated into emergency management systems to support early detection and recovery, with long-term cost savings achieved through proactive infrastructure investment. The pilot fills a gap in localized flood monitoring by providing neighborhood-level data to HMCI's operational systems, reducing reliance on manual reporting and enabling faster decision-making during flood events. Community awareness campaigns and visible sensor signage are planned to build local trust and encourage residents in flood-prone areas to take proactive measures. As a locally-led initiative developed with modest initial investments and starting with an initial deployment of three sensors, the pilot offers a model for other Small Island Developing States (SIDS) seeking to build digital early warning capacity. HMCI notes the system's potential to contribute to the global Early Warnings for All initiative.[27] -

[27] World Bank, WMO & UNDRR (2024), CREWS Caribbean Final Report: Strengthening Hydro-Meteorological and Early Warning Services, CREWS Initiative, https://crews-initiative.org/wp-content/uploads/2024/06/ CREWS-Caribbean-Final-Report.pdf

CASE 2

Safeguarding Food Security: Suriname's KLIMALERT Early Warning App

Aurae Opus Foundation's KLIMALERT application provides flood and drought warnings and seasonal climate forecasts with location-specific precision for communities in Suriname.

Background and Challenge

Suriname's low-lying coastal zone, home to 87% of the population and the majority of agricultural activity, is highly vulnerable to flooding and drought.[28] Climate variability driven by La Niña and El Niño conditions has intensified the frequency of extreme wet and dry spells, and the 2022 flooding season caused widespread damage across coastal farming areas. Despite this exposure, smallholder farmers and vulnerable communities have had limited access to timely, location-specific climate warnings, a gap the Foundation's work directly addresses.[29]

[28] Solaun et al. (2021), State of the Climate Report: Suriname, Inter-American Development Bank, https://doi.org/10.18235/0003398

[29] AF (2025), Adaptation Fund Board Secretariat Technical Review of Project/ Programme Proposal - Climate Resilient Food System Transformation in Suriname, https://www. adaptation-fund.org/wp-content/uploads/

System Concept and Key Technologies

The Aurae Opus Foundation is a Suriname-based non-governmental organization for climate, environment, and sustainable development, founded in 2019 by climate professionals with extensive regional experience. Since 2022, the Foundation has produced regular monthly climate outlooks covering temperature and precipitation forecasts, flood and drought risk assessment, and guidance for communities on preparedness measures. KLIMALERT is designed to continue and enhance this work through an AI-supported application, delivering 3 to 6 month seasonal forecasts and flood and drought warnings with location-specific precision[30]

Key components

- Location-Specific Alerts: Precision flood and drought warnings
- Seasonal Forecasting: 3 - 6 month climate outlooks
- AI-Supported Application: Continuation and enhancement of existing climate outlook services

2025/02/CCCCC_Suriname_CN-1.pdf; Aurae Opus Foundation (2022–2024), Climate Outlook for Suriname series, https://www.auraeopus.org/blog/

[30] Aurae Opus Foundation and CTCN/NIGT (2025), Survey Response submitted to CTCN/NIGT

Observed and Anticipated Benefits

Between 2022 and 2024, the Aurae Opus Foundation published monthly climate outlooks projecting temperature and precipitation conditions 3 to 6 months in advance, alongside flood and drought warnings with location-specific precision. KLIMALERT aims to continue and enhance this work through an AI-supported application, strengthening prevention efforts and helping reduce the impacts of extreme weather events on Suriname's agriculture sector and small-scale economy, where farmers often lack the resilience to withstand prolonged droughts, floods, and other hazards that can result in harvest losses. As KLIMALERT continues to evolve, it offers meaningful potential as a scalable model for community-level climate early warning across Suriname and the wider Caribbean

.[31]

[31] GCF (2023), Readiness Proposal with Food and Agriculture Organization of the United Nations (FAO) for Suriname, https://www.discover-suriname.com/downloads/improving-capacity-ministry-agriculture-suriname-build-resilience-climate-change-agriculture-sector.pdf; World Bank, WMO & UNDRR (2024), CREWS Caribbean Final Report: Strengthening Hydro-Meteorological and Early Warning Services

CASE 3

Enhancing Island Resilience: Trinidad and Tobago's AI4SIDS

University of the West Indies' AI4SIDS integrates multi-source data into predictive AI for SIDS disaster preparedness.

★ UNFCCC TM's 2024 AI Innovation Grand Challenge Award Winner

The University of the West Indies (UWI), led by Dr. Letetia Addison from Trinidad and Tobago, developed AI4SIDS as an AI-powered platform to enhance climate resilience in Small Island Developing States (SIDS) by autonomously processing real-time data from IoT devices, social media, and weather reports to deliver localized alerts and actionable insights. This proposal was selected as the Grand Winner of the UNFCCC Technology Executive Committee's 2024 AI Innovation Grand Challenge at COP29, from 114 entries across 62 countries, recognizing its potential for disaster preparedness in data-scarce island contexts.[32]

[32] The University of the West Indies (2024), UWI Researcher wins AI Innovation Grand Challenge at COP29, News Releases (Global & St. Augustine Campuses), http://global.uwi.edu/media/news/uwi-researcher-wins-

Background and Challenge

SIDS face high climate vulnerability but lack data infrastructure and analytical tools needed for timely disaster action, particularly for hurricanes, floods, and rising sea levels threatening coastal communities. Limited historical and real-time datasets present significant challenges for AI model development, requiring integration with existing early warning protocols. Regional frameworks administered by the Caribbean Disaster Emergency Management Agency (CDEMA) provide institutional context, but effective adoption requires sustained buy-in from national disaster management offices.[33]

System Concept and Key Technologies

AI4SIDS enhances traditional early warning systems by integrating data from IoT sensors, social media, and weather forecasts into predictive and agentic AI tailored for SIDS contexts. Real-time hazard processing supports earlier and more accurate event forecasts, enabling faster decisions by emergence management professionals. Alerts are disseminated via mobile, SMS, and radio in local languages and automated feedback loops allow governments to refine disaster response strategies over time.[34]

ai-innovation-grand-challenge-cop29; AI4SIDS Project Team (2024), AI4SIDS: AI-driven climate resilience platform for Small Island Developing States, Trinidad and Tobago Laboratory for Data Science (TTLAB), The University of the West Indies, https://climate.lab.tt/index.php/featured_projects/ai4sids/; TEC (2024), UN Climate Change Technology Executive Committee and Enterprise Neurosystem announce AI Innovation Grand Challenge 2024 Grand Prize Winner, https://unfccc.int/news/un-climate-change-technology-executive-committee-and-enterprise-neurosystem-to-award-grand-prize-for

[33] TEC (2024), Capacities for Climate Innovation: Artificial Intelligence (AI Session Deck), COP29 Capacity Building Hub, https://unfccc.int/sites/default/files/resource/All-in-one AI Session Deck final.pdf; CDEMA (n.d.), Early Warning Systems (EWS) Project, https://www.cdema.org/ index.php/early-warning-systems-ews-project; Addison et al. (2024), AI4SIDS: AI-Driven Climate Resilience Platform for SIDS (AI Innovation Grand Challenge 2024 Winner), UNFCCC TEC & Enterprise Neurosystem at COP29, http://global.uwi.edu/media/news/uwi-researcher-wins-ai-innovation-grand-challenge-cop29

[34] Universities for Climate (2024), Enhancing climate resilience in Small Island Developing States (SIDS), https://universitiesforclimate.org/enhancing-climate-resilience-in-small-island-developing-states-sids/; The University of the West Indies (2024), UWI Researcher wins AI Innovation Grand Challenge at COP29, News Releases (Global & St. Augustine Campuses), http://global.uwi.edu/media/news/uwi-researcher-wins-ai-innovation-grand-challenge-cop29; AI4SIDS Project Team (2024), AI4SIDS: AI-driven climate resilience platform for SIDS, Trinidad and Tobago Laboratory for Data Science (TTLAB), https://climate.lab.tt/index.php/featured_projects/ai4sids

Key components

- Multi-Source Data Fusion: IoT sensors, social media, and weather forecasts
- Predictive and Agentic AI Forecasting: Earlier and more accurate hazard event prediction
- Inclusive Alerts: Mobile, SMS, TV and radio in local languages
- Feedback Loops: Government disaster response strategy improvement

Observed and Anticipated Benefits

Strengthens disaster preparedness by enhancing early warning with predictive AI, providing earlier localized forecasts for faster professional decisions. Inclusive communication empowers vulnerable groups through multilingual channels. Modular platform demonstrates Caribbean-wide scalability despite data/integration challenges.[35]

[35] The University of the West Indies St. Augustine Campus (2024), UWI Researcher wins AI Innovation Grand Challenge at COP29, News Release, https://sta.uwi.edu/news/releases/release.asp?id=22941; The University of the West Indies (2024), UWI Researcher wins AI Innovation Grand Challenge at COP29, News Releases (Global & St. Augustine Campuses), http://global.uwi.edu/media/news/uwi-researcher-wins-ai-innovation-grand-challenge-cop29

4.2. Building and Infrastructure

CASE 1

Designing Sustainable Digital Cities: Brazil's Scala AI City

Scala Data Centers deploys its AI City in Rio Grande do Sul, Brazil, targeting double-digit energy efficiency gains through waterless liquid cooling powered entirely by certified renewable energy.

Background and Challenge

Scala AI City is located in Eldorado do Sul, in the metropolitan region of Porto Alegre, Rio Grande do Sul. The campus is designed to achieve a Power Usage Effectiveness (PUE) — a metric of energy efficiency where a value closer to 1.0 indicates optimal performance — not exceeding 1.2, the lowest in Latin America, with zero water consumption in cooling system.[36] Brazil generates approximately 90% of its electricity from renewable sources, providing a strong foundation for sustainable digital infrastructure. Brazil's renewable energy advantage, however, is being tested by the scale of emerging AI infrastructure demand. The rapid

[36] Pasquini (2024), Scala AI City: A huge bet in the future of Artificial Intelligence in Brazil, Frost & Sullivan, https://www.frost.com/growth-opportunity-news/scala-ai-city-a-huge-bet-in-the-future-of-artificial-intelligence-in-brazil/

growth of AI workloads is driving demand for hyperscale data center capacity that traditional facilities — designed for server rack densities of 20 kW or less, where server racks are the standardized cabinets that house computing equipment — are not equipped to handle. Hyperscale AI training workloads require server rack capacities exceeding 150 kW, demanding fundamentally different cooling and power infrastructure. Rio Grande do Sul, located in southern Brazil, offers an underutilized energy load capacity and a milder climate that enables greater cooling efficiency compared to other regions. In September 2024, Scala Data Centers and the government of Rio Grande do Sul signed a letter of intent to develop Scala AI City, the largest and most advanced digital infrastructure project in South America, positioned to establish Brazil as a central hub in the global AI revolution.[37]

System Concept and Key Technologies

Scala AI City employs a FutureProof design architecture that supports AI training workloads through server racks with capacities exceeding 150 kW - far surpassing the 20 kW standard in conventional data centers. Liquid cooling systems provide superior energy efficiency for high-density GPU (Graphics Processing Unit, the specialized chips that power AI computing) workloads while achieving zero water consumption - measured by Water Usage Effectiveness (WUE), where zero means no water is used in cooling. The campus is powered exclusively by 100% certified renewable energy through long-term Power Purchase Agreements (PPAs) with wind and hydro generators, with supply partnerships extending through at least 2039, matched with International Renewable Energy Certificates (I-RECs) that certify the renewable origin of electricity. The site in Eldorado do Sul was selected following intensive due diligence for its resilience to natural disasters, abundant energy supply, and capacity for continuous expansion over decades.[38]

[37] Palacios & Ayala (2023), Financing the Energy Transition in Latin America and the Caribbean: An Incomplete Puzzle, Center on Global Energy Policy at Columbia SIPA, https://www.energypolicy.columbia.edu/publications/financing-the-energy-transition-in-latin-america-and-the-caribbean-an-incomplete-puzzle/; Scala Data Centers (2024), With an initial investment of USD 500 million, Scala Data Centers and Rio Grande do Sul Government Sign Agreement for Largest Digital Infrastructure Project in the State of Southern Brazil, Press Release, https://scaladatacenters.com/en/with-an-initial-investment-of-usd-500-million-scala-data-centers-and-rio-grande-do-sul-government-sign-agreement-for-largest-digital-infrastructure-project-in-the-state-of-southern-brazil/

[38] GlobalData (2024), Rio Grande do Sul government signs deal with Scala Data Centers, Yahoo Finance, https://finance.yahoo.com/news/rio-grande-sul-government-signs-141333122.html; Scala Data Centers (n.d.), Data Centers, https://scaladatacenters.com/en/data-centers-en/

Key components

- FutureProof Architecture: 150 kW+ server rack capacity for AI training workloads
- Liquid Cooling: Waterless systems achieving WUE of zero
- Renewable Energy: 100% I-REC certified hydro and wind PPAs through 2039

Observed and Anticipated Benefits

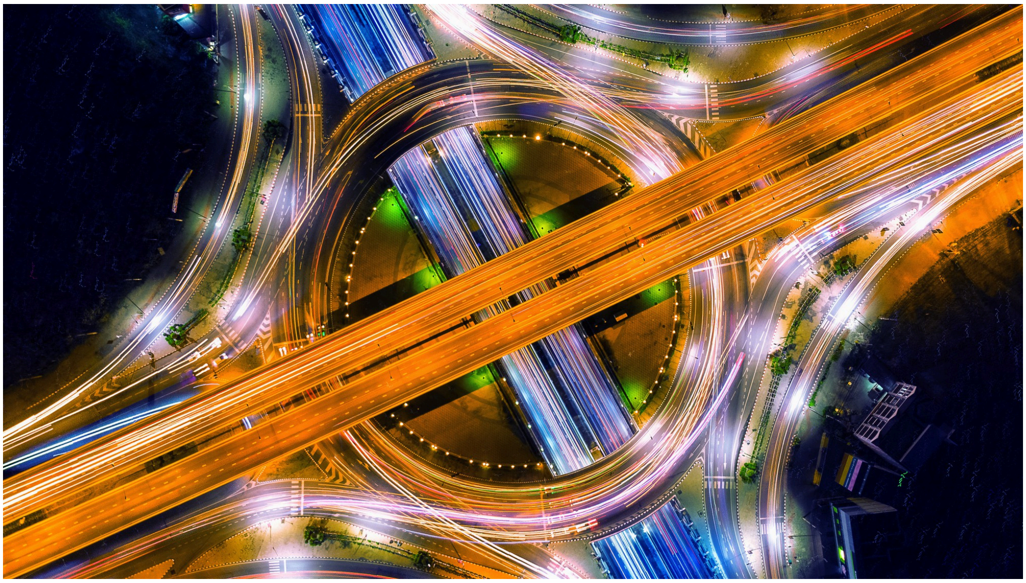
Phase 1 is designed to deliver 54 MW of IT capacity, referring to the power allocated to servers, storage, and networking equipment. The campus is projected to achieve a PUE not exceeding 1.2 - the lowest in Latin America - with zero water consumption in cooling systems. Phase 1 alone is projected to create more than 3,000 direct and indirect jobs, stimulating growth across energy, construction, and telecommunications sectors in Rio Grande do Sul. With an expansion potential of up to 4,750 MW across a 10 million square metre site, and a 5 GW energy authorization secured from the Brazilian government in 2025, Scala AI City is set to become Latin America's largest data center complex, contributing to Brazil's emergence as a hub for sustainable AI infrastructure in the region.[39]

[39] Nolan (2025), Scala Data Centers' AI City Secures 5 GW Approval in Brazil, Telco Magazine, https://telcomagazine.com/news/scala-data-centers-ai-city-secures-5-gw-approval-in-brazil; Jackson (2025), Scala Secures 5GW Authorisation for Scala AI City Project, DataCentre, https://datacentremagazine.com/data-centres/honeywell-outlines-data-centre-infrastructure-challenges

CASE 2

Improving Urban Inclusivity: Colombia's Bogotá SafetiPin

Bogotá's Secretariat for Women deploys SafetiPin, a technology-based social enterprise, across 17,700+ street points. The initiative aims to enhance women's walkability through computer vision safety audits integrated into municipal planning, thereby supporting climate goals by promoting low-carbon, non-motorized transport.



Background and Challenge

In Bogotá, women's safety in public spaces is a recognized barrier to sustainable urban mobility. SafetiPin - a technology-based social enterprise originally developed in India - was adapted to the Colombian context in partnership with Bogotá's Secretariat for Women and UN-Habitat, combining computer vision safety audits with geospatial mapping integrated into municipal planning. A 2017 survey found that 90% of female respondents felt unsafe on public streets, and 86% reported feeling unsafe while using public transportation. This safety gap directly undermines the city's sustainable mobility objectives: women's fear of public spaces discourages walking, cycling, and access to the

TransMilenio Bus Rapid Transit (BRT) system, limiting the potential for a shift away from private vehicles. Traditional safety audits were conducted manually, covering only portions of the city's 400 km bike path network and lacking the geospatial precision needed for targeted infrastructure investment. According to the IPCC, improving public transit access can reduce vehicle miles traveled, with potential urban transport emission reductions of 2–10%.[40] Women's safety in public spaces is therefore a practical condition for achieving these mobility and emissions outcomes.[41]

System Concept and Key Technologies

The SafetiPin Nite app mounts a smartphone on a moving vehicle, automatically capturing photographs every 30 meters as the vehicle travels through the city. These images are analyzed against nine safety parameters: lighting, openness, visibility, crowd presence, walking path condition, proximity to public transport, and gender diversity. The analysis produces geo-referenced safety scores that are mapped across the city. The resulting data is integrated into Bogotá's official GIS platform, where it is accessible to all municipal departments for infrastructure planning.[42]

[40] IPCC (2022), Climate Change 2022: Mitigation of Climate Change, Chapter 10: Transport, Working Group III Contribution to the Sixth Assessment Report, Intergovernmental Panel on Climate Change, https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_10.pdf

[41] UNFCCC (2020), Transport: Executive Summary, Decarbonizing Transport Special Report, https://unfccc.int/sites/default/files/resource/ExecSumm_Transport_3.pdf; UNEP (2022), Mapping Street Safety for Women and Girls in Bogota, Colombia, https://www.neighbourhoodguidelines.org/mapping-street-safety-bogota-colombia; Cities Alliance (2018), Award-winning Safetipin Continues to Scale Up Activities, https://www.citiesalliance.org/newsroom/news/spotlight/award-winning-safetipin-continues-scale-activities-and-make-women-around; UN-Habitat (n.d.), Creating Engagement in Public Spaces for Safer Cities for Women, https://unhabitat.org/public-spaces-for-safer-cities-for-women; Impakter (2019), Bogotá's Fight for Gender Equality and Safe Public Transport, https://impakter.com/bogotas-fight-for-gender-equality-and-safe-public-transport/

[42] Ibid.

Key components

- 9-Parameter Scoring: Metrics including lighting, openness, and gender usage to quantify urban safety
- SafetiPin Nite: Vehicle-mounted automated image collection covering large areas of the city
- Geospatial Mapping: 17,700+ geo-referenced points prioritizing high-risk intersections for infrastructure investment
- Municipal GIS Integration: Data feeds into official city planning systems across departments

Observed and Anticipated Benefits

SafetiPin data has directly informed municipal investments in street lighting, CCTV camera placement, and bike path improvements across Bogotá. The city used the data to audit all 400 km of its bike path network - the first time bicycles were used for SafetiPin audits - and implemented targeted safety measures including fixed lights and bike racks at identified unsafe points. SafetiPin data was incorporated into Bogotá's official GIS platform, enabling ongoing, evidence-based decision-making across city departments. The initiative supports Bogotá's goal of making walking and cycling safe and accessible for all residents, contributing to low-carbon urban mobility.[43]

[43] Ibid.

4.3. Sustainable mobility

CASE 1

Optimizing Urban Transit: Santiago's CALAC+ EV Bus AI

CALAC+ leverages AI-driven lifecycle analysis to validate the environmental benefits of Santiago's electric bus transition, achieving 99% energy prediction accuracy.

Background and Challenge

Chile's National Electromobility Strategy targets 100% electric public transport by 2040, positioning Santiago as a global leader with one of the largest e-bus fleets outside China. While the fleet is growing rapidly, collecting the precise, real-time operational data required to validate the environmental benefits of electric buses over traditional diesel ones remains a significant challenge. To address these data gaps, the CALAC+ program - regional initiative under the Climate and Clean Air Coalition (CCAC) - utilizes advanced sensor networks to support AI modeling. This ensures that comparisons between electric vehicles (EVs) and diesel alternatives are based on accurate, evidence-based performance data rather than generalized estimates.[44]

[44] Global Drive to Zero Coalition (2025), Chile's supercharged e-buses: Santiago's path to zero-emission public transport, Case Study, https://globaldrivetozero.org/casestudy/chiles-supercharged-e-buses; CALAC+ Programme (n.d.), Using Artificial Intelligence to evaluate the environmental impact of electric or diesel buses in public transport in Santiago de Chile, Climate and Clean Air Coalition, https://programacalac.com/en/using-artificial-intelligence-to-evaluate-the-environmental-impact-of-electric-or-diesel-buses-in-public-transport-in-santiago-de-chile

System Concept and Key Technologies

The system integrates engine sensors enabled by General Packet Radio Service (GPRS) - a mobile data service for continuous wireless communication - with neural network algorithms. These algorithms analyze vehicle brands, weights, distances, and speed profiles to predict the battery's state-of-charge with 99% accuracy. Remote data loggers enable comprehensive lifecycle costing, comparing total ownership costs and emissions between electric buses and Euro VI diesel alternatives. These findings support evidence-based procurement decisions for sustainable urban mobility transformation across Latin America.[45]

Key components

- Neural Network Energy Prediction: 99% state-of-charge accuracy
- GPRS Real-time Data Collection: Engine performance monitoring
- Lifecycle Costing Framework: EV vs. Euro VI diesel comparison

Observed and Anticipated Benefits

Electric fleets demonstrate significantly lower lifecycle emissions - up to four times less - when paired with Chile's increasingly renewable grid. Despite higher upfront capital expenditure, electric buses offer a lower total cost of ownership over their lifecycle. AI-validated environmental benefits strengthen the justification for green policies. The AI-driven lifecycle costing methodology validated in Santiago offers a transferable framework for evidence-based e-bus procurement decisions across Latin American cities planning similar fleet transitions. These investments in data infrastructure also enhance regional capacity for sustainable transport planning.[46]

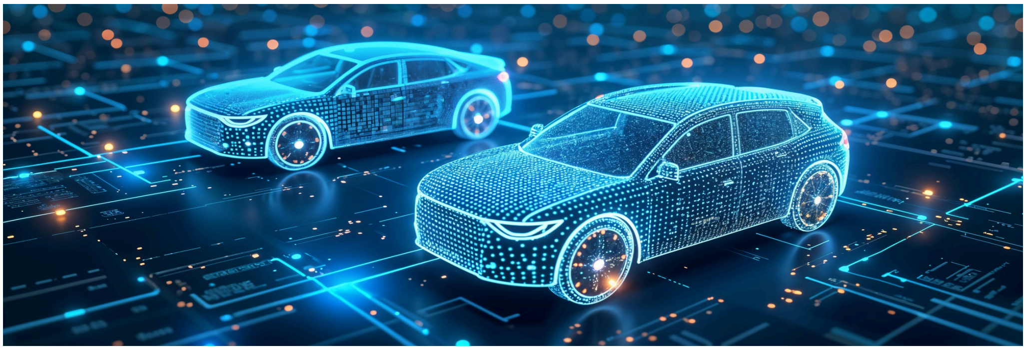
[45] Ibid.

[46] Leal & Casas (2025). Towards Decarbonising Transport: Chile 2025 – A Stocktake on Sectoral Ambition. Factsheet No. 130-2025-EN (v2.0), Agora Verkehrswende, https://www.agora-verkehrswende.org/publi cations/towards-decarbonising-transport-chile-2025; Peltier, Briceno-Garmendia, & Qiao (2023), Reality Check: Getting the Finance Flowing – Case Study 21: E-buses in Santiago de Chile, NDC Partnership & World Bank, https://transparency-partnership.net/system/files/migrated_document_files/chileebusesworldbank2023. pdf

CASE 2

Revolutionizing Logistics: Mexico's Samsara Fleet AI

Samsara's AI-powered fleet management platform delivers real-time safety interventions and fuel optimization, supporting Mexico's freight sector in reducing crashes and emissions.



Background and Challenge

Mexico's transport sector accounts for roughly a quarter of national greenhouse gas emissions, with freight transport playing a central role as the country relies heavily on road-based logistics. Mexico records among the highest road fatality rates within OECD-tracked countries, driven by distracted driving and inadequate fleet monitoring. Against this backdrop, Mexico's 2023 National Electric Mobility Strategy has intensified regulatory pressure on the freight sector to adopt digital tools that improve safety and reduce emissions. Global fleet telematics data corroborates this urgency. Samsara, a Connected Operations platform operating across Mexico, finds that crash rates and mobile phone usage among Mexican drivers are highest within its global coverage area – 60% and 238% above baseline, respectively.[47]

[47] Samsara Inc. (2025), New Samsara Safety Report Shows AI-Enabled Fleets Reduce Crash Rates by Nearly 75% Over 30 Months, Press Release, https://www.samsara.com/company/news/press-releases/fleet-safety-report; ITF (2024), Mexico: Road Safety Country Profile 2023, OECD Publishing, https://www.itf-oecd.org/sites/default/files/mexico-road-safety.pdf; Climate Action Tracker (2025), Mexico, https://climate actiontracker.org/countries/mexico/

System Concept and Key Technologies

Deployed across commercial truck fleets in Mexico, Samsara's platform utilizes AI dash cams that deliver 360° hazard detection for pedestrians, cyclists, and other vehicles, providing real-time audio and visual alerts. The system includes automated coaching that analyzes over ten risky behaviors per trip, such as harsh braking, rapid acceleration, and lane departure. Dynamic route optimization integrates vehicle telemetry, live traffic, and weather data while ensuring compliance with Electronic Logging Devices (ELDs) - automated hardware that records a driver's driving time to ensure safety and regulatory compliance - resulting in supporting fuel efficiency through reduced idling and optimized routing. A cloud analytics platform enables fleet-wide emission tracking and continuous risk scoring.[48]

Key components

- AI Dash Cams: 360° hazard detection + alerts
- Automated Safety Coaching: Risky behavior analysis
- Dynamic Routing: ELD-compliant fuel/emission optimization

[48] Business Wire (2025), Samsara Announces New Safety and AI-Powered Technology for Physical Operations, Yahoo Finance, https://finance.yahoo.com/news/samsara-announces-safety-ai-powered-160000512.html?guc counter=1&gucereferrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&gucereferrer_sig=AQAAAE0AnqkyIAx2XXIEfz5Gw7YMQH61wwj2zv3HK3POLeJorczIDwoinIPuFHoOuVIOIYu0toYJypbFIwQTdNvGS2zuCK7kb2ey2_ZIG3zcmpjDnoXKBsD4yaW1Fngfov6p4APm-OKYaBiuwoIQJAkrL7UH_2DZP4JJ9ms K33NMfvC4; T21 (2025), Samsara supports AI solutions that address needs in Mexico, https://t21.us/samsara-supports-ai-solutions-that-address-needs-in-mexico/; Samsara (2025), Fuel Management System: Increase efficiency, reduce costs, https://www.samsara.com/guides/fuel-management-system

Observed and Anticipated Benefits

Samsara's 2025 Safety Report, drawing on anonymized data from more than 2,600 fleets globally, including Mexico, found that larger fleets (175+ vehicles) implementing the full AI safety solution achieve a ~75% reduction in crash rates over 30 months. Across these fleets, harsh driving events decreased by 69% and mobile phone usage by 96%. Given Mexico's disproportionately high baseline risk – the highest crash rate and mobile phone usage within the platform's coverage area – these interventions offer especially significant safety gains for Mexican freight operators. Fuel efficiency gains directly support Mexico's NDC transport targets, providing a scalable model for trucking corridors in Brazil and Colombia.[49]

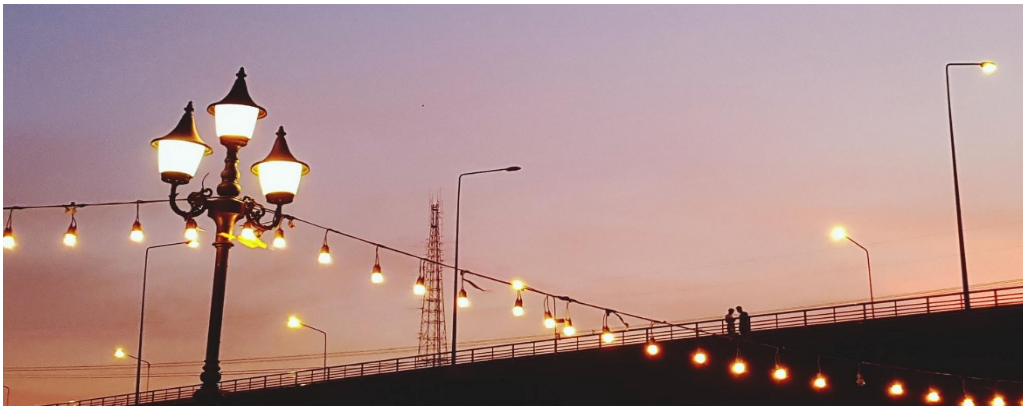
[49] Samsara Inc. (2025), New Samsara Safety Report Shows AI-Enabled Fleets Reduce Crash Rates by Nearly 75% Over 30 Months

4.4. Energy Systems

CASE 1

Modernizing Grid Operations: Brazil's Eletrobras AI Grid Management

Eletrobras deploys C3 AI Grid Intelligence across Brazil's vast continental transmission network, achieving fault response times of under 10 seconds to serve Latin America's largest power grid reliably.



Background and Challenge

Brazil maintains over 210GW of installed electricity capacity serving a population of 215 million, with hydropower accounting for approximately 103GW - nearly half the total matrix - supplemented by over 33GW of wind and 50GW of solar generation. The National Electric System Operator (ONS) must manage the real-time variability of this increasingly diversified renewable mix, which is complicated by seasonal drought conditions that reduce hydroelectric output and by extreme weather events. The National Electric Energy Agency (ANEEL) imposes stringent reliability requirements, with Brazilians experiencing an average of approximately 12 hours without power per year. Critical to meeting these requirements is overcoming the challenge of data fragmentation across Eletrobras' geographically dispersed transmission assets - isolated data sets that hinder a unified, real-time view of grid health.[50]

[50] Demirkol (2025), Brazil Surpasses 210 GW in Installed Electricity Capacity, BrazilianNR, https://braziliannr.com/2025/05/11/brazil-surpasses-210-gw-in-installed-electricity-capacity/; Hein (2025), Brazilians Experience

System Concept and Key Technologies

As Latin America's largest power and transmission utility, Eletrobras launched the Eletro.ia program in 2024 with the goal of applying AI at scale across its entire operations. Under this program, Eletrobras deployed C3 AI Grid Intelligence — built on the C3 Agentic AI Platform — in a pilot across 10 substations in 2024, and is now scaling the solution to all of its transmission assets. The platform provides operators with real-time operational context, accelerates fault response, and improves grid stability and compliance. In the event of outages, C3 AI Grid Intelligence identifies alarms and clusters faults, determines affected equipment and substations, and prompts decision-making intelligence in under 10 seconds — a process that previously took several minutes to hours. Eletrobras is additionally deploying C3 Generative AI to streamline operational reporting, freeing operators to focus on higher-impact tasks.[51]

Key components

- C3 AI Grid Intelligence: Real-time fault detection and response across transmission assets
- C3 Agentic AI Platform: Operational context and decision-making support
- C3 Generative AI: Automated operational reporting

12 Hours Without Power Per Year, Canal Solar, https://canalsolar.com.br/en/Brazilians-experience-12-hours-without-power-per-year./; ITA (2025), Brazil Country Commercial Guide: Power Generation, Transmission, and Distribution Infrastructure, Country Commercial Guide, https://www.trade.gov/country-commercial-guides/brazil-power-generation-transmission-and-distribution-infrastructure

[51] Business Wire (2025), Eletrobras Selects C3 AI to Scale Enterprise AI Across Latin America's Largest Power Utility, Yahoo Finance, https://finance.yahoo.com/news/eletrobras-selects-c3-ai-scale-130000350.html; Reuters (2025), Eletrobras and C3 AI Partnership for AI-Driven Grid Modernization, World-Energy Media, https://www.world-energy.org/article/53459.html; AInvest (2025), Eletrobras & C3 AI: Strategic AI-Driven Power Grid Modernization, https://www.ainvest.com/news/eletrobras-c3-ai-strategic-ai-driven-power-grid-modernization-2508/; C3 AI (n.d.), Predictive Maintenance for Electric Grid, https://c3.ai/customers/predictive-maintenance-for-electric-grid/; C3 AI (2025), Eletrobras Selects C3 AI to Scale Enterprise AI Across Latin America's Largest Power Utility, Press Release, https://c3.ai/eletrobras-selects-c3-ai-to-scale-enterprise-ai-across-latin-americas-largest-power-utility/; Reuters (2025), Eletrobras and C3 AI Partnership for AI-Driven Grid Modernization, World-Energy Media, https://www.world-energy.org/article/53459.html

Observed and Anticipated Benefits

Implementation has improved grid reliability by dramatically reducing fault response times, supporting ANEEL compliance requirements across Eletrobras' transmission network. The AI-driven approach addresses Brazil's acute challenge of managing a complex, renewable-heavy grid under conditions of increasing climate variability and growing electricity demand. As Brazil continues to expand its wind and solar capacity, the ability to detect and resolve grid disturbances in near real-time becomes critical to sustaining the country's high renewable penetration.[52]

[52] C3 AI (n.d.), Predictive Maintenance for Electric Grid, https://c3.ai/customers/predictive-maintenance-for-electric-grid/; EIA (2025), Brazil is expanding its liquefied natural gas import infrastructure, Today in Energy, https://www.eia.gov/todayinenergy/detail.php?id=66504; ReGlobal (2024), Brazil's Transmission Outlook: Strategic plan for expanding grid over next decade, https://reglobal.org/brazils-transmission-outlook-strategic-plan-for-expanding-grid-over-next-decade/

CASE 2

Unlocking Transmission Capacity: Uruguay's Smart Metering Blockchain

The state utility UTE is deploying blockchain-integrated smart meters to support peer-to-peer(P2P) energy trading management and distributed renewable integration.

Background and Challenge

Uruguay maintains one of the world's most renewable-heavy electricity matrices with renewables accounting for approximately 98-99% of electricity generation, primarily from wind and hydroelectric sources. The state utility UTE (National Administration of Power Generation and Transmission) serves approximately 1.5 million customers and has undertaken a large-scale rollout of smart meters, enabling advanced data collection on consumption patterns, load curves, and energy quality. With distributed solar generation reaching 301 MW by 2023 and a growing prosumer base, Uruguay faces the challenge of transitioning from centralized grid management toward more dynamic, decentralized energy systems that can fully leverage the flexibility of its renewable mix.[53]

[53] ITA (2025), Uruguay - Energy, Country Commercial Guide, https://www.trade.gov/country-commercial-guides/uruguay-energy; IDB (2024), Evaluation of Smart Meters and Dynamic Tariff Structures in Electricity (UR-T1334), Inter-American Development Bank, https://www. iadb.org/en/project/UR-T1334

System Concept and Key Technologies

In 2020, UTE partnered with Energy Lab – a global nonprofit specializing in open-source blockchain platform for the energy sector – to develop blockchain-based solutions using the Energy Web Decentralized Operating System (EW-DOS). The partnership targets several innovation areas: balancing the power grid with distributed energy resources (comparable to a virtual power plant), unlocking the economic potential of electric vehicle integration, and providing enhanced algorithms support demand forecasting and response optimization for grid balancing. In parallel, the IDB's 2024 technical cooperation project (UR-T1334) is evaluating the impact of smart meter deployment and dynamic tariff structures on consumption patterns, household electricity expenditure, and utility losses.

Key components

- Blockchain Validation: Tamper-proof tracking of energy transactions and renewable attributes
- AI Forecasting: Demand-response optimization for distributed resource management
- Dynamic Tariffs: Time-based pricing structures to shift consumption and improve grid efficiency

Observed and Anticipated Benefits

The combination of near-universal smart meter coverage and blockchain-enabled energy management positions Uruguay to better integrate its growing distributed solar capacity and accommodate prosumer participation. Dynamic tariff structures are expected to reduce household electricity expenditure and operational costs of UTE, while improving overall grid flexibility in support of Uruguay's carbon-neutral goals. The model offers applicability to Chile and Argentina, where distributed energy resource integration faces similar challenges in high-renewable penetration scenarios.[54]

[54] IDB (2024), Evaluation of Smart Meters and Dynamic Tariff Structures in Electricity (UR-T1334); ITA (2025), Uruguay – Energy, Country Commercial Guide

CASE 3

Optimizing Utility Consumption: Mexico's Zensi Smart Metering

Chilean IoT startup Zensi is entering the Mexican market with an AI-powered smart metering platform for water, gas, and electricity, targeting Non-Revenue Water (NRW) reduction in a country facing acute water scarcity.

Background and Challenge

Mexico confronts severe water scarcity compounded by aging infrastructure and chronic losses in its distribution networks. Mexico City, home to nearly 22 million people, loses approximately 40% of its treated water before it reaches consumers due to leaks, theft, and metering inaccuracies — a challenge defined as Non-Revenue Water (NRW). Monterrey, Mexico's second largest city, experienced near Day Zero water supply conditions in 2022–2023, underscoring the urgency of infrastructure modernization across major metropolitan areas. The problem is intensifying: the rapid growth of data centers in northern Mexico is placing additional strain on already water-stressed urban systems, while CONAGUA (Comisión Nacional del Agua), Mexico's National Water Commission, must coordinate water management across a fragmented national network. Traditional manual metering systems lack the granularity to detect intermittent leaks or billing irregularities in real time.[55]

[55] ASTERRA (2025), Monitoring Non-Revenue Water and Wastewater Leaks in Mexico: A Critical Step Toward Sustainable Water Management, Case Study, https://asterra.io/resources/monitoring-non-revenue-water-and-wastewater-leaks-in-mexico-a-critical-step-toward-sustainable-water-management/; H2O Global News

System Concept and Key Technologies

Founded in Chile in 2024, Zensi offers a smart metering platform that retrofits existing water, gas, and electricity infrastructure using NB-IoT and LoRaWAN low-power wide-area networks, enabling real-time monitoring without requiring full system replacement. The platform is multi-brand and multi-protocol, integrating data from diverse meter types into a centralized cloud analytics dashboard powered by Google Cloud. Anomaly detection alerts flag unusual consumption patterns — such as abnormal night-time flows signaling hidden leaks — while automated billing and apportionment modules reduce manual errors. Consumers and facility managers receive real-time visibility into consumption through a dedicated interface, supporting both operational efficiency and ESG compliance.[56]

Key components

- IoT AMI (Advanced Metering Infrastructure): Multi-utility real-time monitoring for water, gas, and electricity
- Anomaly Detection: Real-time alerts for leaks, theft, and irregular consumption
- Cloud Analytics: Automated billing, demand profiling, and BI reporting

Observed and Anticipated Benefits

In 2025, Zensi entered the Mexican market through a strategic partnership with AIM Manager, a firm with established commercial operations in Mexico, which distributes and promotes Zensi's solution locally. Initial pilots are underway in commercial real estate properties, with Zensi projected to generate over USD 300,000 in revenue in the Mexican market in 2025. Systematic leak prevention enabled by real-time monitoring reduces pumping energy requirements by up to 30%, directly supporting water conservation and operational cost reduction.

(2025), Non-Revenue Water in Latam: The Role of AI in Cutting Water Losses, https://h2oglobalnews.com/non-revenue-water-in-latam-the-role-of-ai-in-cutting-water-losse; Kurrant (2025), Mexico City and Monterrey Adopt Smart Water Technologies to Cut Losses, News Article, https://kurrant.com/kurrantly-news/mexico-city-and-monterrey-adopt-smart-water-technologies-to-cut-losses/; SmartCities World (2025), Mexico City and Monterrey Launch Smart Water Upgrades, https://www.smartcitiesworld.net/water/mexico-city-and-monterrey-launch-smart-water-upgrades-11931

[56] H2O Global News (2025), Non-Revenue Water in Latam: The Role of AI in Cutting Water Losses; Optiblack (2025), Real-Time Anomaly Detection in Edge Computing, Technical Insight, https://optiblack.com/insights/real-time-anomaly-detection-in-edge-computing; Zensi (n.d.), Zensi Smart Metering Platform – IoT Solutions for Water, Energy, and Gas Management, https://zensi.ai

Zensi's scalable deployment model - applicable from pilot installations to large-scale rollouts - positions the platform as a practical tool for urban water management.[57]

[57] EntrepreNerd (2025), Zensi Begins Expansion into Mexican Market by Partnering with AIM Manager, https://www.entnerd.com/en/zensi-begins-expansion-into-mexican-market-by-partnering-with-aim-manager/; Zensi (n.d.), Zensi Smart Metering Platform – IoT Solutions for Water, Energy, and Gas Management

4.5. Business and Industry

CASE 1

Decarbonizing Mining Logistics: Brazil's Vale Autonomous Haulage

Vale deploys over 70 autonomous haul trucks across the Carajás and Brucutu mines in the states of Pará and Minas Gerais, achieving an 11% fuel reduction and zero truck accidents at Brucutu through AI-optimized fleet operations.

Background and Challenge

Vale, the world's largest iron ore producer, operates large diesel-powered trucks that generate substantial Scope 1 emissions through intensive fuel consumption. The company has a corporate commitment to reduce absolute Scope 1 and 2 emissions by 33% by 2030 from its 2017 baseline. Human drivers contribute to terrain-related safety risks, prompting Vale to establish an AI Center in 2019 specifically targeting fleet optimization and process improvements across mining operations.[58]

[58] Vale S.A. (2025), Vale, Caterpillar and Sotreq Sign Agreement to Expand Fleet of Autonomous Trucks in the Northern System in Pará, Press Releas; https://vale.com/w/vale-caterpillar-and-sotreq-sign-agreement-to-expand-fleet-of-autonomous-trucks-in-the-northern-system-in-para; Vale S.A. (2021), Vale Completes 100 Million Tons Handled by Autonomous Trucks at the Brucutu Mine, Press Release, https://vale.com/w/vale-completes-100-million-tons-handled-by-autonomous-trucks-at-the-brucutu-mine-with-safety-and-environmental-benefits; Vale S.A. (2019), Vale Creates Artificial Intelligence Center, Press Release, https://vale.com/w/vale-creates-artificial-intelligence-center; Vale S.A. (2020), Artificial Intelligence Assists in Sustainability Goals up to Safety, Press Release, https://vale.com/in/w/artificial-intelligence-assists-in-sustainability-goals-up-to-safety; Reuters (2025), Vale to boost autonomous truck fleet in deal with Caterpillar, mining.com https://www.mining.com/web/vale-to-boost-autonomous-truck-fleet-in-deal-with-caterpillar/

System Concept and Key Technologies

Caterpillar's Cat MineStar Command system enables fully unmanned truck operation at speeds up to 60 kilometers per hour, incorporating GPS guidance, radar detection, and artificial intelligence algorithms for collision avoidance and dynamic route adjustment. Onboard sensors continuously monitor truck performance parameters, feeding data into AI systems that optimize routes, speeds, and maintenance scheduling.[59]

Key components

- Autonomous Navigation: GPS/AI route planning and collision avoidance
- Fleet Optimization: Real-time dispatch and performance monitoring
- Predictive Maintenance: Sensor-based analytics

Observed and Anticipated Benefits

Autonomous trucks at Brucutu mine successfully hauled 100 million tons of material with zero accidents involving the vehicles, while achieving 11 percent lower diesel consumption equivalent to 4,300 tons of CO_2 reduced annually, alongside 11 percent higher productivity and 35 percent longer tire life. Vale and Caterpillar singed an agreement in December 2025 to expand the Northern System fleet from 14 to approximately 90 autonomous trucks by 2028, operated by Cat MineStar Command across the Serra Norte and Serra Sul units of the Carajás complex in Pará. The expansion aims to further enhance operational efficiency, safety, and sustainability across the Northern Systemplans expansion to 90 trucks by 2028 across the Northern System, targeting an additional 7.5 percent fuel savings to support broader decarbonization objectives.[60]

---

[59] Vale S.A. (2020), Artificial Intelligence Assists in Sustainability Goals up to Safety; Noriega, Pourrahimian, & Askari-Nasab (2025), Deep Reinforcement Learning based real-time open-pit mining truck dispatching system, Computers & Operations Research, Vol. 173, 106815, https://www.sciencedirect.com/science/article/abs/pii/S0305054824002879; Vale S.A. (2019), Vale Creates Artificial Intelligence Center, Press Release

[60] BNamericas (2025), Brazil's Vale will multiply its autonomous truck fleet in Pará operations, https://www.bnamericas.com/en/news/brazils-vale-will-multiply-its-autonomous-truck-fleet-in-para-operations; International Mining (2025), Vale confirms autonomous truck fleet expansion deal with Caterpillar, https://im-mining.com/2025/12/08/vale-confirms-autonomous-truck-fleet-expansion-deal-with-caterpillar/; Sullivan (2025), Vale Autonomous Truck Fleet to 150: Haul Road Design Notes for Mine

CASE 2

Revolutionizing Cement Production: Mexico's CEMEX OPTIBAT

CEMEX, headquartered in Mexico, deploys OPTIBAT AI-powerd industrial process optimization across its operations, targeting double-digit energy and production efficiency improvements in support of its net-zero commitment by 2050.

Background and Challenge

CEMEX, a global cement industry leader headquartered in Mexico, operates highly energy-intensive production facilities that generate substantial Scope 1 emissions through thermal fuel combustion. The company's "Future in Action" program commits CEMEX to becoming a net-zero CO_2 company by 2050. Managing the complex, non-linear dynamics of cement production processes presents significant challenges for energy efficiency and product quality consistency. Following years of strategic collaboration and outstanding results achieved with OPTIBAT at CEMEX facilities, CEMEX Ventures - the company's corporate venture capital and open innovation unit based in Mexico - executed an investment agreement with OPTIMITIVE in 2025, enabling global scaling of the technology through the Digital Innovation in Motion initiative.[61]

Planners, Geomechanics.io, https://www.geomechanics.io/news/article/vale-autonomous-truck-fleet-to-150-haul-road-design-notes-for-mine-planners

[61] Cemex (2025), Cemex Ventures invests in Optimitive for real-time AI process optimization, Press Release, https://www.cemex.com/w/cemex-ventures-invests-in-company-pushing-boundaries-of-real-time-industrial-

System Concept and Key Technologies

OPTIMITIVE, a Spain-based AI company founded in 2008, has developed OPTIBAT - an industrial AI platform that applies AI and machine learning algorithms to optimize continuous manufacturing processes in real time. OPTIBAT RTO(Real-Time Operation) operates as a closed-loop real-time optimizer, autonomously learning and adjusting optimal setpoints without human intervention to minimize energy consumption while improving production, quality, and equipment health. A no-code visual interface enables large-scale adoption without requiring specialized AI expertise, while continuous 24/7 operation ensures uninterrupted optimization. The platform integrates into existing plant operations without requiring hardware replacement.[62]

Key components

- OPTIBAT RTO: Real-time closed-loop AI process optimization
- OPTIBAT Studio: Historical data analytics, modeling, and optimization for process engineers
- No-code Interface: Large-scale adoption without AI expertise requirements

Observed and Anticipated Benefits

OPTIBAT deployments have achieved energy savings of up to 6% and production improvements of up to 10%, depending on the process and conditions of each facility, with payback periods frequently measured in months. CEMEX has deployed the technology as part of its digital transformation, benefiting from automated process optimization and the ability to reduce emissions without

process-optimization-with-ai-technology; Cement Optimized (2025), Cemex Invests in AI-based Optimization, Press Release, https://cementproducts.com/2025/04/22/cemex-invests-in-ai-based-optimization/; Global Cement (2025), Cemex invests in Optimitive for AI process optimisation, Press Release, https://www. globalcement.com/news/item/18691-cemex-invests-in-optimitive-for-ai-process-optimisation

[62] OPTIMITIVE (2025), Real-Time Optimization Powered by Artificial Intelligence, https://optimitive. com/solutions-real-time-optimization/; Cemex (2021), Improving cement production through Artificial Intelligence, Press Release, https://www.cemex.com/w/improving-cement-production-through-artificial-intelligence

sacrificing productivity. Building on these results, CEMEX aims to significantly reduce energy consumption at its production facilities - including those in Mexico - while increasing production efficiency by double-digit percentage points through the scaling of OPTIBAT across its global operations. These gains directly advance CEMEX's Future in Action decarbonization program.[63]

[63] Cemex (2020), CEMEX announces ambitious strategy to address climate change, Newsroom, https://www.cemex.com/w/cemex-announces-ambitious-strategy-to-address-climate-change; OPTIMITIVE (2025), What's the secret sauce behind real-time AI that's beating the cement giants?, https://optimitive.com/whats-the-secret-sauce-behind-real%E2%80%91time-ai-thats-beating-the-cement-giants/

UN environment programme

CTCN
UN Climate Technology Centre & Network

NATIONAL INSTITUTE OF
GREEN TECHNOLOGY

Chapter 05

Conclusion

5. Conclusion

The integration of AI into climate action across LAC region has moved from theoretical potential to practical application. As the region works to meet the requirements of the Paris Agreement, AI has emerged as a key enabler for accelerating both mitigation and adaptation efforts. This conclusion summarizes from the preceding chapters and their alignment with the region's NDCs and long-term climate strategies.

5.1. Synthesis of Key Findings

Adaptation as a Regional Priority

Unlike global commercial AI markets that often prioritize mitigation, AI applications in the LAC region show a strong focus on climate adaptation, reflecting the area's high vulnerability to extreme weather events. Successful pilots, such as the AI4SIDS platform in Trinidad and Tobago and the KLIMALERT application in Suriname, demonstrate that AI can provide localized early warnings even where traditional weather infrastructure is limited. CTCN technical assistance in Saint Kitts and Nevis further illustrates this trend: a completed project on drought risk modelling and aquifer management has benefitted over 52,000 people, while another ongoing project is applying GIS-based monitoring to reduce water loss, together demonstrating how digital climate tools can address water security challenges in small island contexts. These tools allow for monitoring of local climate variables, enabling communities to build resilience against floods, droughts, and storms.

Efficiency Gains in Energy and Industry

For mitigation, AI is delivering measurable results through the optimization of complex infrastructures. Eletrobras in Brazil uses AI to manage its vast national transmission network, reducing fault response times to under 10 seconds and improving grid reliability. Similarly, CEMEX is deploying AI process optimization through OPTIBAT, achieving energy savings of up to 6% and double-digit production efficiency improvements, demonstrating that digital tools can reduce carbon intensity in hard-to-abate sectors.

The Policy-Technology Gap

A critical finding of this report is the discrepancy between high-level policy ambition and technological specification. While 33 LAC countries mention “technology” and “innovation” in their latest NDCs, 4 countries (Colombia, Costa Rica, The Bahamas, and El Salvador) explicitly integrate AI and digital tools into their sectoral targets. In most national frameworks, AI currently functions as an implicit enabler rather than an explicit policy tool, which can hinder the mobilization of targeted international support and financing.

5.2. Relevance to LAC Climate Goals and NDC 3.0

As LAC countries continue updating their national climate commitments, the integration of AI remains directly relevant to meeting both current and future targets. Many countries in the region have yet to submit their next round of NDCs, and as updated commitments covering the 2035 period are finalized, the role of AI as a tool for implementation is likely to grow in significance.

Addressing the AFOLU Sector

The Agriculture, Forestry, and Other Land Use (AFOLU) sector accounts for approximately 40% of emissions in the LAC region, nearly double the global average. AI-driven climate information services and early warning tools, as seen across the region, can support more climate-resilient agricultural practices while contributing to food security.

Unlocking Climate Finance

The region requires an 8-10 times increase in climate finance to meet its current commitments. AI enhances the transparency and reliability of Monitoring, Reporting, and Verification (MRV) systems, which are essential to attract private investment and international grants. By quantifying the impact of climate projects with greater precision, AI can reduce perceived risk for investors.

Fostering a Just Transition

AI can also contribute to a just transition by addressing social inequalities. For instance, Bogotá's SafetiPin uses AI-powered geospatial scoring across nine safety parameters to improve women's walkability and safety, supporting sustainable mobility targets while promoting gender equality.

5.3. Strategic Outlook for Consideration

To realize the potential of AI, LAC countries should transition from being technology consumers to active technology managers. Here are some suggestions:

Bridging the Digital and Skills Divide: Addressing the skills gap is as important as the technology itself. National-level capacity building must ensure that local stakeholders can procure, manage, and sustain AI solutions. Sustained investment in AI literacy at the university level, combined with targeted training for government officials, will be essential for building the human capacity needed to put these tools to effective use.

Data Sovereignty and Sharing: Regional cooperation is needed to establish data sharing protocols and to improve the quality of meteorological and hydrological data, which remains a primary barrier to AI performance. Strengthening national data infrastructure and fostering cross-border collaboration on open climate datasets would expand the range and reliability of AI applications across the region.

Sustainable AI Infrastructure: As AI adoption grows across the region, countries should give consideration to the energy demands of AI systems and plan infrastructure accordingly. Leveraging the region's abundant renewable energy resources and prioritizing energy-efficient computing practices would help align AI deployment with broader decarbonization goals.

In conclusion, the case studies and technical assistance initiatives presented in this report show that AI is already delivering measurable value across adaptation and mitigation efforts in the LAC region, from early warning systems in small island states to grid management and industrial decarbonization in larger economies. At the same time, significant potential remains untapped, particularly in translating policy ambition into explicit AI integration within national climate frameworks, scaling proven pilots across borders, and ensuring that the benefits of AI reach the region's most vulnerable communities. As updated national commitments are finalized in the coming years, the cases presented here offer a practical foundation for more ambitious and technology-informed climate action across the region.

References

1. ABB (2024). ABB and Carbon Re agree joint approach to enhance low-carbon cement production with artificial intelligence. https://new.abb.com/news/ detail/19831/abb-and-carbon-re-agree-joint-approach-to-enhance-low-carbon-cement-production-with-artif

2. Aurae Opus Foundation (2022–2024). Climate Outlook for Suriname series. https://www.auraeopus.org/blog/

3. Aurae Opus Foundation and CTCN/NIGT (2025). Survey Response submitted to CTCN/NIGT

4. Adaptation Fund (AF) (2025). Adaptation Fund Board Secretariat Technical Review of Project/Programme Proposal - Climate Resilient Food System Transformation in Suriname. https://www.adaptation-fund.org/wp-content /uploads/2025/02/CCCCC_Suriname_CN-1.pdf

5. Addison et al. (2024). AI4SIDS: AI-Driven Climate Resilience Platform for SIDS (AI Innovation Grand Challenge 2024 Winner). UNFCCC TEC & Enterprise Neurosystem at COP29. http://global.uwi.edu/media/news/uwi-researcher-wins-ai-innovation-grand-challenge-cop29

6. AI4SIDS Project Team (2024). AI4SIDS: AI-driven climate resilience platform for Small Island Developing States. Trinidad and Tobago Laboratory for Data Science (TTLAB), The University of the West Indies. https://climate.lab.tt/index.php/featured_projects/ai4sids/

7. AInvest (2025). Eletrobras & C3 AI: Strategic AI-Driven Power Grid Modernization. https://www.ainvest.com/news/eletrobras-c3-ai-strategic-ai-driven-power-grid-modernization-2508/

8. ASTERRA (2025). Monitoring Non-Revenue Water and Wastewater Leaks in Mexico: A Critical Step Toward Sustainable Water Management. Case Study. https://asterra.io/resources/monitoring-non-revenue-water-and-wastewater-leaks-in-mexico-a-critical-step-toward-sustainable-water-management/

9. BNamericas (2025). Brazil's Vale will multiply its autonomous truck fleet in Pará operations. https://www.bnamericas.com/en/news/brazils-vale-will-multiply-its-autonomous-truck-fleet-in-para-operations

10. Business Wire (2025a). Eletrobras Selects C3 AI to Scale Enterprise AI Across Latin America's Largest Power Utility. Yahoo Finance. https://finance.yahoo.om/news/eletrobras-selects-c3-ai-scale-130000350.html

11. Business Wire (2025b). Samsara Announces New Safety and AI-Powered Technology for Physical Operations. Yahoo Finance. https://finance.yahoo.com/news/samsara-announces-safety-ai-powered-160000512.html

12. C3 AI (n.d.). Predictive Maintenance for Electric Grid. https://c3.ai/customers/ redictive-maintenance-for-electric-grid/

13. C3 AI (2025). Eletrobras Selects C3 AI to Scale Enterprise AI Across Latin America's Largest Power Utility. Press Release. https://c3.ai/eletrobras-selects-c3-ai-to-scale-enterprise-ai-across-latin-americas-largest-power-utility/

14. Cáceres Leal & Vidal Casas (2025). Towards Decarbonising Transport: Chile 2025 – A Stocktake on Sectoral Ambition. Factsheet No. 130-2025-EN (v2.0). Agora Verkehrswende. https://www.agora-verkehrswende.org/publications/ towards-decarbonising-transport-chile-2025

15. CALAC+ Programme (n.d.). Using Artificial Intelligence to evaluate the environmental impact of electric or diesel buses in public transport in Santiago de Chile. Climate and Clean Air Coalition. https://programacalac.com/en/using -artificial-intelligence-to-evaluate-the-environmental-impact-of-electric-or-diesel-buses-in-public-transport-in-santiago-de-chile

16. Carbon Re (2025). AI Process Control for Cement. https://carbonre.com/cement-ai-process-control

17. CDEMA (n.d.). Early Warning Systems (EWS) Project. https://www.cdema.org/index.php/early-warning-systems-ews-project

18. Cemex (2020). CEMEX announces ambitious strategy to address climate change. Newsroom. https://www.cemex.com/w/cemex-announces-

ambitious-strategy-to-address-climate-change

19. Cemex (2021). Improving cement production through Artificial Intelligence. Press Release. https://www.cemex.com/w/improving-cement-production-through-artificial-intelligence

20. Cemex (2025). Cemex Ventures invests in Optimitive for real-time AI process optimization. Press Release. https://www.cemex.com/w/cemex-ventures-invests-in-company-pushing-boundaries-of-real-time-industrial-process-optimization-with-ai-technology

21. Cement Optimized (2025). Cemex Invests in AI-based Optimization. Press Release. https://cementproducts.com/2025/04/22/cemex-invests-in-ai-based-optimization/

22. Cities Alliance (2018). Award-winning Safetipin Continues to Scale Up Activities. https://www.citiesalliance.org/newsroom/news/spotlight/award-winning-safetipin-continues-scale-activities-and-make-women-around

23. Climate Action Tracker (2025). Mexico. https://climateactiontracker.org/countries/mexico/

24. Climate Technology Centre & Network (CTCN) (2023). CTCN Taxonomy of Climate Technologies. https://www.ctc-n.org/sites/www.ctc-n.org/files/resources/CTCN%20Technology%20Taxonomy.pdf

25. Climate Technology Centre & Network (CTCN) (2024a). Enhance the resilience of Suriname ́s water supply system by modelling drought risks and developing a roadmap of prioritized alternatives for aquifer recharge. https://www.ctc-n.org/content/enhance-resilience-suriname-s-water-supply-system-modelling-drought-risks-and-developing

26. Climate Technology Centre & Network (CTCN) (2024b). Intro to #AI4Climate Action Initiative. Presented at NDE Forum, 29 August 2024. https://www.ctc-n.org/sites/default/files/2024-08/Intro%20to%20AI4ClimateAction.pdf

27. Climate Technology Centre & Network (CTCN) (2024c). LAC NDE Forum

2024 & Capacity Building Programme on AI4Climate Action. https://www.ctc-n.org/whats-happening/events/lac-nde-forum-2024-capacity-building-programme-ai4climate-action

28. Climate Technology Centre & Network (CTCN) (2024d). Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-2027. https://www.ctc-n.org/sites/default/files/AB-2024-23-5.2-Workplan%20for%20the%20Technology%20Mechanism%20Initiative%20on%20AI%20for%20Climate%20Action_FINAL.pdf

29. Climate Technology Centre & Network (CTCN) & Technology Executive Committee (TEC) (2024). Workplan for the Technology Mechanism Initiative on AI for Climate Action 2024-2027. CTCN/TEC Joint Document. https://www.ctc-n.org/sites/default/files/AB-2024-23-5.2-Workplan%20for%20the%20Technology%20Mechanism%20Initiative%20on%20AI%20for%20Climate%20Action.pdf

30. Codling, Ramlal, & Davis (2024). Examining the Feasibility of GeoAI and IoT for Smart Flood Early Warning Systems in Local Communities for Caribbean Urban Spaces. The West Indian Journal of Engineering, Vol.46 No.2. https://journals.sta.uwi.edu/ojs/index.php/wije/article/view/8974

31. Demirkol, Serhat (2025). Brazil Surpasses 210 GW in Installed Electricity Capacity. BrazilianNR. https://braziliannr.com/2025/05/11/brazil-surpasses-210-gw-in-installed-electricity-capacity/

32. Energy Information Administration (EIA) (2025). Brazil is expanding its liquefied natural gas import infrastructure. Today in Energy. https://www.eia.gov/todayinenergy/detail.php?id=66504

33. EntrepreNerd (2025). Zensi Begins Expansion into Mexican Market by Partnering with AIM Manager. https://www.entnerd.com/en/zensi-begins-expansion-into-mexican-market-by-partnering-with-aim-manager/

34. Global Cement (2025). Cemex invests in Optimitive for AI process optimisation. Press Release. https://www.globalcement.com/news/item/18691-cemex-invests-in-optimitive-for-ai-process-optimisation

35. GlobalData (2024). Rio Grande do Sul government signs deal with Scala

Data Centers. Yahoo Finance. https://finance.yahoo.com/news/rio-grande-sul-government-signs-141333122.html

36. Global Drive to Zero Coalition (2025). Chile's supercharged e-buses: Santiago's path to zero-emission public transport. Case Study. https://globaldrivetozero.org/casestudy/chiles-supercharged-e-buses

37. Green Climate Fund (GCF) (2023). Readiness Proposal with Food and Agriculture Organization of the United Nations (FAO) for Suriname. https://www.discover-suriname.com/downloads/improving-capacity-ministry-agriculture-suriname-build-resilience-climate-change-agriculture-sector.pdf

38. H2O Global News (2025). Non-Revenue Water in Latam: The Role of AI in Cutting Water Losses. https://h2oglobalnews.com/non-revenue-water-in-latam-the-role-of-ai-in-cutting-water-losses/

39. Hazard Management Cayman Islands (HMCI) (2021). HMCI Annual Report 2021. https://parliament.ky/wp-content/uploads/2023/08/2021-HMCI-Annual-Report.pdf

40. Hazard Management Cayman Islands (HMCI) (2024). HMCI Annual Report 2024. https://cigarchives.gov.ky/publication-detail/hmci-annual-report-2024

41. Hazard Management Cayman Islands (HMCI) and The University of the West Indies (UWI) (2025). Smart Flood Early Warning System for the Cayman Islands. Survey Response submitted to CTCN/NIGT

42. Hein, Henrique (2025). Brazilians Experience 12 Hours of Power Outages per Year. Canal Solar. https://canalsolar.com.br/en/Brazilians-experience-12-hours-without-power-per-year./

43. Inter-American Development Bank (IDB) (2024). Evaluation of smart meters and dynamic tariff structures in electricity (UR-T1334). Technical Cooperation Document. https://www.iadb.org/en/project/UR-T1334

44. Intergovernmental Panel on Climate Change (IPCC) (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report. Chapter 10: Transport.

https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_ WGIII_Chapter_10.pdf

45. Intergovernmental Panel on Climate Change (IPCC) (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report. Chapter 16: Innovation, technology development and transfer. https://www.ipcc.ch/report/ar6/wg3/chapter/chapter-16/

46. International Mining (2025). Vale confirms autonomous truck fleet expansion deal with Caterpillar. https://im-mining.com/2025/12/08/vale-confirms-autonomous-truck-fleet-expansion-deal-with-caterpillar/

47. International Trade Administration (ITA) (2025a). Brazil Country Commercial Guide: Power Generation, Transmission, and Distribution Infrastructure. Country Commercial Guide. https://www.trade.gov/country-commercial-guides/brazil-power-generation-transmission-and-distribution-infrastructure

48. International Trade Administration (ITA) (2025b). Uruguay - Energy. Country Commercial Guide. https://www.trade.gov/country-commercial-guides/uruguay-energy

49. Impakter (2019). Bogotá's Fight for Gender Equality and Safe Public Transport. https://impakter.com/bogotas-fight-for-gender-equality-and-safe-public-transport/

50. International Transport Forum (ITF) (2024). Mexico: Road Safety Country Profile 2023. OECD Publishing. https://www.itf-oecd.org/sites/default/files/mexico-road-safety.pd

51. Jackson (2025). Scala Secures 5GW Authorisation for Scala AI City Project. DataCentre. https://datacentremagazine.com/data-centres/honeywell-outlines-data-centre-infrastructure-challenges

52. Kim & Rudloff (2025). Update on the implementation of the workplan of the Technology Mechanism Initiative on AI for Climate Action (2024-2027). TEC 31/CTCN AB 26 Joint Session. https://www.ctc-n.org/sites/default/files/2025-09/AB_2025_26_5.1_Technology%20 Mechanism%20Initiative%

20on%20AI%20for%20Climate%20Action.pdf

53. Kurrant (2025). Mexico City and Monterrey Adopt Smart Water Technologies to Cut Losses. News Article. https://kurrant.com/kurrantly-news/mexico-city-and-monterrey-adopt-smart-water-technologies-to-cut-losses/

54. Nolan (2025). Scala Data Centers' AI City Secures 5 GW Approval in Brazil. Telco Magazine. https://telcomagazine.com/news/scala-data-centers-ai-city-secures-5-gw-approval-in-brazil

55. Noriega, Pourrahimian, & Askari-Nasab (2025). Deep Reinforcement Learning based real-time open-pit mining truck dispatching system. Computers & Operations Research, Vol. 173, 106815. https://www.sciencedirect.com/science/article/abs/pii/S0305054824002879

56. OECD (2019). Shaping the Digital Transformation in Latin America. https://www.oecd.org/latin-america/publicationsdocuments/reports/6/

57. OECD (2023). Towards Climate Resilience and Neutrality in Latin America and the Caribbean: Key Policy Priorities. OECD Publishing, Paris. https://doi.org/10.1787/278e52e8-en

58. OPTIMITIVE (2025a). Real-Time Optimization Powered by Artificial Intelligence. https://optimitive.com/solutions-real-time-optimization/

59. OPTIMITIVE (2025b). What's the secret sauce behind real-time AI that's beating the cement giants? https://optimitive.com/whats-the-secret-sauce-behind-real%E2%80%91time-ai-thats-beating-the-cement-giants/

60. Optiblack (2025). Real-Time Anomaly Detection in Edge Computing. Technical Insight. https://optiblack.com/insights/real-time-anomaly-detection-in-edge-computing

61. Palacios & Ayala (2023). Financing the Energy Transition in Latin America and the Caribbean: An Incomplete Puzzle. Center on Global Energy Policy at Columbia SIPA. https://www.energypolicy.columbia.edu/publications/financing-the-energy-transition-in-latin-america-and-the-caribbean-an-incomplete-puzzle/

62. Pasquini (2024). Scala AI City: A huge bet in the future of Artificial Intelligence in Brazil. Frost & Sullivan. https://www.frost.com/growth-opportunity-news/scala-ai-city-a-huge-bet-in-the-future-of-artificial-intelligence-in-brazil/

63. Peltier, Briceno-Garmendia, & Qiao (2023). Reality Check: Getting the Finance Flowing – Case Study 21: E-buses in Santiago de Chile. NDC Partnership & World Bank. https://transparency-partnership.net/system/files/migrated_document_files/chileebusesworldbank2023.pdf

64. REGlobal (2024). Brazil's Transmission Outlook: Strategic plan for expanding grid over next decade. https://reglobal.org/brazils-transmission-outlook-strategic-plan-for-expanding-grid-over-next-decade/

65. Research and Markets (2024). Latin America Poised to Surge in Smart Meter Adoption by 2030. https://finance.yahoo.com/news/latin-america-poised-surge-smart-081500537.html

66. Reuters (2025a). Eletrobras and C3 AI Partnership for AI-Driven Grid Modernization. World-Energy Media. https://www.world-energy.org/article/53459.html

67. Reuters (2025b). Vale to boost autonomous truck fleet in deal with Caterpillar. mining.com. https://www.mining.com/web/vale-to-boost-autonomous-truck-fleet-in-deal-with-caterpillar/

68. Samsara (2025). Fuel Management System: Increase efficiency, reduce costs. https://www.samsara.com/guides/fuel-management-system

69. Samsara Inc. (2025). New Samsara Safety Report Shows AI-Enabled Fleets Reduce Crash Rates by Nearly 75% Over 30 Months. Press Release. https://www.samsara.com/company/news/press-releases/fleet-safety-report

70. Scala Data Centers (n.d.). Data Centers. https://scaladatacenters.com/en/data-centers-en/

71. Scala Data Centers (2024). With an initial investment of USD 500 million, Scala Data Centers and Rio Grande do Sul Government Sign Agreement for

Largest Digital Infrastructure Project in the State of Southern Brazil. Press Release. https://scaladatacenters.com/en/with-an-initial-investment-of-usd-500-million-scala-data-centers-and-rio-grande-do-sul-government-sign-agreement-for-largest-digital-infrastructure-project-in-the-state-of-southern-brazil/

72. Skoubris & Hloupis (2023). An AI-Powered, Low-Cost IoT Node Oriented to Flood Early Warning Systems. Eng. Proc. 58, 44. https://doi.org/10.3390/ecsa-10-16028

73. Solaun et al. (2021). State of the Climate Report: Suriname. Inter-American Development Bank. https://doi.org/10.18235/0003398

74. SmartCitiesWorld (2025). Mexico City and Monterrey Launch Smart Water Upgrades. https://www.smartcitiesworld.net/water/mexico-city-and-monterrey-launch-smart-water-upgrades-11931

75. Sullivan (2025). Vale Autonomous Truck Fleet to 150: Haul Road Design Notes for Mine Planners. Geomechanics.io. https://www.geomechanics.io/news/article/vale-autonomous-truck-fleet-to-150-haul-road-design-notes-for-mine-planners

76. T21 (2025). Samsara supports AI solutions that address needs in Mexico. Smart Operations 2025 coverage. https://t21.us/samsara-supports-ai-solutions-that-address-needs-in-mexico/

77. The University of the West Indies (2024). UWI Researcher wins AI Innovation Grand Challenge at COP29. News Releases (Global & St. Augustine Campuses). http://global.uwi.edu/media/news/uwi-researcher-wins-ai-innovation-grand-challenge-cop29

78. The University of the West Indies St. Augustine Campus (2024). UWI Researcher wins AI Innovation Grand Challenge at COP29. News Release. https://sta.uwi.edu/news/releases/release.asp?id=22941

79. UNDP (2024). Missed Connections: An incomplete digital revolution in Latin America and the Caribbean. https://www.undp.org/latin-america/blog/missed-connections-incomplete-digital-revolution-latin-america-and-caribbean-0

80. UNEP (2022). Mapping Street Safety for Women and Girls in Bogota, Colombia. https://www.neighbourhoodguidelines.org/mapping-street-safety-bogota-colombia

81. UNFCCC (2020). Transport: Executive Summary. Decarbonizing Transport Special Report. https://unfccc.int/sites/default/files/resource/ExecSumm_Transport_3.pdf

82. UNFCCC (2024). Draft technical paper on AI for climate action. https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/tn_meetings/0ec396b0ba7b4d0d853b77c7b83dc172/3ebbf2e8e7834a7f873b0ae9a86262f7.pdf

83. UNFCCC Technology Executive Committee (TEC) (n.d.). Technology Mechanism Initiative on AI for Climate Action. TT:CLEAR. https://unfccc.int/ttclear/artificial_intelligence

84. UNFCCC Technology Executive Committee (TEC) (2024a). Capacities for Climate Innovation: Artificial Intelligence (AI Session Deck). COP29 Capacity Building Hub. https://unfccc.int/sites/default/files/resource/All-in-one AI Session Deck final.pdf

85. UNFCCC Technology Executive Committee (TEC) (2024b). UN Climate Change Technology Executive Committee and Enterprise Neurosystem announce AI Innovation Grand Challenge 2024 Grand Prize Winner. UNFCCC News. https://unfccc.int/news/un-climate-change-technology-executive-committee-and-enterprise-neurosystem-to-award-grand-prize-for

86. UNFCCC Technology Executive Committee (TEC) (2025a). AI for Climate Action: Advancing Mitigation and Adaptation. Technical Paper. UNFCCC TTCLEAR. https://unfccc.int/ttclear/artificial_intelligence

87. UNFCCC Technology Executive Committee (TEC) (2025b). Technology Mechanism Initiative on AI for Climate Action. https://unfccc.int/ttclear/artificial_intelligence

88. UNFCCC TEC & CTCN (2023). Technology Mechanism Joint Work Programme 2023-2027. https://unfccc.int/sites/default/files/resource/TM_JWP_2023-2027.pdf

89. UNFCCC TEC/CTCN (2024-2025). AI Innovation Grand Challenge & Capacity Building Events. https://unfccc.int/ttclear/artificial_intelligence

90. UN-Habitat (n.d.). Creating Engagement in Public Spaces for Safer Cities for Women. https://unhabitat.org/public-spaces-for-safer-cities-for-women

91. Universities for Climate (2024). Enhancing climate resilience in Small Island Developing States (SIDS). https://universitiesforclimate.org/enhancing-climate-resilience-in-small-island-developing-states-sids/

92. University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) (2025). UF scientists to develop AI technology to help growers assess crop damage after hurricanes. https://blogs.ifas.ufl.edu/news/2025/06/30/uf-scientists-to-develop-ai-technology-to-help-growers-assess-crop-damage-after-hurri

93. Vale S.A. (2019). Vale Creates Artificial Intelligence Center. Press Release. https://vale.com/w/vale-creates-artificial-intelligence-center

94. Vale S.A. (2020). Artificial Intelligence Assists in Sustainability Goals up to Safety. Press Release. https://vale.com/in/w/artificial-intelligence-assists-in-sustainability-goals-up-to-safety

95. Vale S.A. (2021). Vale Completes 100 Million Tons Handled by Autonomous Trucks at the Brucutu Mine. Press Release. https://vale.com/w/vale-completes-100-million-tons-handled-by-autonomous-trucks-at-the-brucutu-mine-with-safety-and-environmental-benefits

96. Vale S.A. (2025). Vale, Caterpillar and Sotreq Sign Agreement to Expand Fleet of Autonomous Trucks in the Northern System in Pará. Press Release. https://vale.com/w/vale-caterpillar-and-sotreq-sign-agreement-to-expand-fleet-of-autonomous-trucks-in-the-northern-system-in-para

97. World Bank (2021). Poor digital access holding LAC back. https://blogs.worldbank.org/en/latinamerica/poor-digital-access-holding-latin-america-and-caribbean-back-heres-how-change-i

98. World Bank (2024). Vulnerability to Climate Risk–Induced Poverty in Latin America and the Caribbean. https://openknowledge.worldbank.org/

entities/publication/3464ca4c-ccad-48a4-ab2b-329ab478c2b8

99. World Bank, WMO, UNDRR (2024). CREWS Caribbean Final Report: Strengthening Hydro-Meteorological and Early Warning Services. CREWS Initiative. https://crews-initiative.org/wp-content/uploads/2024/06/CREWS-Caribbean-Final-Report.pdf

100. WWF (2023). Severe drought in the Amazon worsened by deforestation. https://www.wwf.org.br/en/?87020/Climate-crisis-severe-drought-in-the-Amazon-is-worsened-by-deforestation-and-fire

101. Zensi (n.d.). Zensi Smart Metering Platform – IoT Solutions for Water, Energy, and Gas Management. https://zensi.ai

The Climate Technology Centre and Network (CTCN) is the operational arm of the UNFCCC Technology Mechanism, hosted by the UNEP. Since 2013, the CTCN has been promoting the accelerated transfer of environmentally sound technologies for low-carbon and climate-resilient development at the request of developing countries. CTCN delivers technology solutions, capacity building, and advice on policy, legal, and regulatory frameworks tailored to the needs of individual countries by harnessing the expertise of a global network of technology companies and institutions.

More information on CTCN's work in global can be found at: www.ctc-n.org

The National Institute of Green Technology (NIGT), a policy research institute affiliated with Korea's Ministry of Science and ICT, serves as a key facilitator in researching climate change and responding to the climate crisis through its work to develop national green technology policies, establish international cooperation strategies for innovation in global green technologies, and build infrastructure for technology information and talent cultivation.

More information on NIGT's work can be found at: www.nigt.re.kr