

HRS Resilience Foundation

STRATEGIC REPORT 02

Resilient Infrastructure Investment in the Western Hemisphere

Building Trusted Private-Sector Capacity for Long-Term Regional Resilience

PUBLICATION TYPE

Independent strategic research report

PRIMARY ENVIRONMENT

Western Hemisphere

EDITION

August 2026

SERIES POSITION

Strategic Report 02

AUTHOR

André Vieira

INSTITUTION

HRS Resilience Foundation

Research integrity. Public research publication. Independent analysis. No U.S. Government endorsement or sponsorship. Not a procurement request, an endorsement of a vendor, or a representation of partnership with any government or private organization.

Evidence discipline. This report presents an analytical framework. It does not represent the views, positions, endorsements or commitments of any government, international organization, university, donor or private company.

CONTENTS

— Executive Summary	3
01 Why Infrastructure Resilience Has Become an Investment Problem	3
02 The HRS Investment Thesis	4
03 From Readiness Assessment to Project Origination	4
04 The Critical Infrastructure Investment Gap	5
05 Strategic Dependency: Concentration, Control and Substitutability	6
06 Nominal Redundancy vs. Effective Redundancy	6
07 The Role of Private Capital	7
08 The Role of the Private Sector	7
09 Trusted Infrastructure Ecosystems	7
10 Sector Application	8
11 Digital Infrastructure as a Strategic Investment Layer	9
12 Health Infrastructure and Operational Continuity	9
13 Energy, Logistics and Critical Nodes	9
14 Financing Architecture for Resilient Projects	10
15 From Project Concept to Bankable Resilience	10
16 Brazil as the Initial Reference Environment	11
17 Western Hemisphere Applicability	11
18 Sovereignty, Competition and Market Integrity	12
19 The 50-Year Infrastructure Horizon	12
20 The HRS Resilience Investment Framework	12
21 Policy and Investment Implications	13
22 Conclusion	14
— Selected Sources and Research Basis	15

About this series. This is the seventh publication in the HRS Resilience Foundation's Western Hemisphere Readiness Series. It extends the HRS Readiness Cycle (Strategic Report 01) and the Country and Sector Readiness Assessments into an investment framework — the HRS Resilience Investment Framework — connecting readiness analysis to project origination, financing and sustained operational capacity.

Executive Summary

Resilience is not achieved by infrastructure construction alone. It is the sustained capacity of essential systems to continue operating, adapt to disruption, recover critical functions, and remain governable and maintainable over time.

In the Western Hemisphere, energy, telecommunications, digital infrastructure, healthcare, transportation, ports, logistics, finance and industrial supply chains form interdependent systems. A failure in one layer can propagate into others. The investment challenge is therefore not simply to add capacity, but to reduce consequential dependencies and increase the ability to substitute, recover and adapt.

This report develops the HRS approach for moving from readiness assessment to resilient investment. It proposes a disciplined sequence: Assess → Prioritize → Structure → Finance → Integrate → Implement → Measure → Sustain.

The framework is vendor-neutral and sovereignty-preserving. It does not prescribe a particular national procurement decision or technology provider. It provides criteria for evaluating resilience, dependency, substitutability, financing, implementation and lifecycle sustainability.

The framework is also compatible with a current U.S. Government emphasis on infrastructure, private-sector capability and commercial engagement. State Department Deal Teams are designed to help U.S. companies identify and pursue overseas opportunities; USTDA describes its role as advancing critical infrastructure development while creating opportunities for trusted U.S. solutions; and DFC describes private capital as a core instrument of American economic statecraft.^[1,2,3]

SECTION 01

Why Infrastructure Resilience Has Become an Investment Problem

Infrastructure systems increasingly combine physical assets, software, communications, energy, specialized components, cloud services, financial systems and human expertise. The operational performance of one system may therefore depend on the continued availability of another.

Traditional capital planning can understate this exposure when projects are evaluated primarily by construction cost, capacity or near-term economic return. A resilient investment framework must additionally ask what happens when a critical dependency fails.

Three characteristics make this particularly important: concentration, interdependence and long asset lives. Concentration occurs when a small number of suppliers, routes, technologies or facilities carry a disproportionate share of an essential function. Interdependence occurs when sectors depend on one another. Long asset lives mean that decisions made today can determine strategic dependencies for decades.

Resilience investment therefore requires a lifecycle perspective that begins before procurement and continues through operations, maintenance, recovery and eventual replacement.

A resilient infrastructure decision is not only a question of what should be built? It is also a question of what must remain possible if the original system fails?

SECTION 02

The HRS Investment Thesis

The central HRS thesis is that readiness and investment should be connected through a repeatable decision framework. Country and sector assessments identify where readiness gaps exist. Investment analysis then determines which gaps are consequential, which can be reduced through feasible projects, and which projects can be financed and sustained.

The framework is deliberately broader than financial return. A project may create resilience value by reducing downtime, increasing redundancy, preserving supply-chain options, strengthening local capability, or protecting essential services even when these benefits are not fully captured in conventional financial models.

READINESS QUESTION	INVESTMENT QUESTION
What must continue?	What capability must be financed?
What can fail?	What dependency should be reduced?
What has no substitute?	Where should redundancy be created?
What recovers slowly?	Where can investment shorten recovery?
Who can operate it?	What workforce and institutional capacity is required?
What changes over time?	How should the project preserve future optionality?

This converts resilience from an abstract objective into an investment discipline.

SECTION 03

From Readiness Assessment to Project Origination

The HRS Research Series is designed as a progression from strategic analysis to applied assessment. The Country Readiness Assessment establishes a national baseline. Sector Readiness Assessments examine critical systems. A project-origination layer can then convert identified gaps into candidate interventions.

Project origination should not begin with a preferred vendor. It should begin with a defined resilience problem and measurable outcome. The proposed pipeline is:

STAGE	PRIMARY OUTPUT
Country readiness	National institutional and infrastructure baseline
Sector readiness	Sector-specific dependency and continuity baseline
Gap prioritization	Ranked resilience gaps and consequences
Project concept	Defined objective, scope and operating model
Feasibility	Technical, legal, commercial and risk analysis
Financing	Capital stack, risk allocation and lifecycle funding
Partner integration	Qualified technology, engineering and operating capabilities
Implementation	Governed delivery with measurable milestones
Measurement	Continuity, recovery and readiness outcomes
Sustainment	Operations, maintenance, training and adaptation

SECTION 04

The Critical Infrastructure Investment Gap

Critical infrastructure resilience frequently competes with other public and private investment priorities. The result can be a gap between what an infrastructure system requires for long-term continuity and what is financed under conventional project criteria.

This gap is not uniform. Some systems require new physical capacity; others require redundancy, cybersecurity, backup connectivity, replacement inventories, workforce development, maintenance capability or alternative suppliers.

Resilience investment should therefore distinguish between capacity expansion and continuity capacity. A system may have adequate nominal capacity while remaining highly vulnerable to disruption.

The HRS framework prioritizes investments that improve one or more of the following: continuity, recovery, redundancy, substitutability, supply-chain diversity, local operating capability, cyber resilience, or institutional adaptability.

SECTION 05

Strategic Dependency: Concentration, Control and Substitutability

Dependency is not synonymous with foreign ownership, and nationality alone is not an adequate measure of resilience. A dependency becomes strategically significant when its interruption, failure or loss of control cannot be mitigated within an acceptable period.

HRS proposes three complementary questions:

- **Concentration** — How much of an essential function depends on one supplier, route, platform, facility or technology?
- **Control** — Who controls the asset, technology, data, maintenance, software, access, financing or replacement pathway?
- **Substitutability** — Can another provider, route, technology or operating model be activated without unacceptable disruption?

These questions should be applied across hardware, software, cloud services, energy, telecommunications, logistics, finance, specialized personnel and critical components.

SECTION 06

Nominal Redundancy vs. Effective Redundancy

Multiple providers do not automatically create resilience. If all providers depend on the same upstream component, route, cloud platform, energy system or geographic node, the apparent redundancy may fail simultaneously.

HRS therefore distinguishes between nominal redundancy — the existence of multiple assets or providers — and effective redundancy — the demonstrated ability to switch, operate and recover under a realistic disruption. Effective redundancy should be tested through exercises, failover procedures, alternative supply arrangements, recovery plans, inventories, workforce readiness and contractual mechanisms.

DIMENSION	NOMINAL REDUNDANCY	EFFECTIVE REDUNDANCY
Providers	Two or more vendors	Tested ability to switch vendors
Connectivity	Multiple links	Physically/technologically diverse routes
Energy	Backup generator	Tested critical-load continuity
Cloud	Multiple accounts	Portable workloads and tested recovery
Supply chain	Multiple suppliers	Qualified alternatives with lead-time validation

SECTION 07

The Role of Private Capital

Long-term infrastructure resilience requires capital beyond a single funding source. Public investment, private capital, corporate investment, commercial finance, export finance, political-risk insurance and development-finance instruments can play different roles.

The objective is not to privatize sovereign responsibility. It is to structure appropriate interfaces between public priorities and private capability.

DFC's June 2026 announcement states that its Board approved \$2.5 billion in new strategic investments and describes debt, equity and political-risk insurance as tools used to advance strategic objectives.^[3] USTDA describes itself as a first mover on critical infrastructure in emerging markets and states that it funds upfront technical work that helps projects attract financing and procure U.S. goods and services.^[2]

The financing question should therefore be: what combination of capital, risk allocation and technical preparation can make the resilience outcome achievable and sustainable?

SECTION 08

The Role of the Private Sector

Private-sector participation can contribute technology, engineering, operating expertise, supply chains, capital, workforce development, maintenance and innovation. It can also create competitive alternatives where a market has become overly concentrated.

However, private participation should be governed by transparent qualification criteria. A company should not be considered "trusted" simply because of its nationality or brand. Trust should be demonstrated through ownership transparency, compliance, technical performance, security, financial capacity, supply-chain integrity and lifecycle support.

Governments should retain sovereign authority over regulation, licensing, procurement and public policy. Private partners should be accountable for the obligations defined in contracts and applicable law.

SECTION 09

Trusted Infrastructure Ecosystems

A resilient infrastructure project is rarely delivered by one organization. It typically requires an ecosystem of owners, operators, engineers, technology providers, financial institutions, insurers, local contractors, research institutions and public authorities. The HRS concept is therefore an ecosystem model rather than a single-vendor model.

ECOSYSTEM LAYER	FUNCTION
Sovereign / public	Policy, regulation, procurement, public priorities and oversight
Owner / operator	Asset ownership, service delivery and lifecycle accountability
Engineering / delivery	Design, construction, integration and commissioning
Technology	Core systems, software, communications and digital infrastructure
Finance	Capital, insurance, guarantees and risk allocation
Research / training	Standards, workforce development and institutional learning
Local capacity	Maintenance, operations, emergency response and continuity
Regional coordination	Cross-border learning, interoperability and shared resilience objectives

SECTION 10

Sector Application

The HRS approach can be applied across the sectors already examined in the Western Hemisphere Readiness Series.

SECTOR	ILLUSTRATIVE RESILIENCE INVESTMENT
Health	Hospital continuity, medical supply chains, emergency readiness and resilient health infrastructure
Telecommunications	Route diversity, backup connectivity, network continuity and resilient communications
Data Centers / Cloud / AI	Power continuity, cooling, connectivity, compute portability, recovery and cyber resilience
Energy	Distributed generation, storage, critical-load continuity and recovery
Ports / Logistics	Alternative routes, critical-node continuity, maritime and supply-chain resilience
Cyber / OT	Protection and recovery of industrial and critical-infrastructure systems
Mobility	Fleet continuity, charging resilience and transportation-system recovery
Critical Minerals	Diversified sourcing, processing capacity and strategic supply-chain continuity

SECTION 11

Digital Infrastructure as a Strategic Investment Layer

Telecommunications, cloud infrastructure, data centers and AI systems increasingly function as foundational infrastructure for finance, health, logistics, government services and industrial operations.

Digital resilience therefore depends on more than cybersecurity. It requires power continuity, diverse connectivity, hardware availability, software portability, cloud recovery, cooling, skilled personnel and alternative operating arrangements.

USTDA's 2026 Latin America and Caribbean digital-infrastructure project-scoping activity illustrates the practical connection between digital infrastructure development and opportunities for trusted U.S. technology, goods and services, across priority markets including Bolivia, Brazil, Colombia and Ecuador.^[5]

The HRS Sector Readiness Assessments on Telecommunications & Digital Infrastructure and Data Centers, Cloud & AI Infrastructure provide the sector-level analytical foundation for this investment approach.^[9,10]

SECTION 12

Health Infrastructure and Operational Continuity

Health systems illustrate why resilience cannot be reduced to physical construction. Hospitals depend on electricity, water, pharmaceuticals, medical devices, oxygen, communications, logistics, trained personnel, information systems and financial continuity.

A resilience investment can therefore include distributed backup power, medical supply-chain diversification, emergency logistics, interoperable information systems, workforce depth, contingency procurement and continuity exercises.

The objective is to preserve essential clinical functions during disruption and shorten recovery time when normal operations are interrupted. Health-sector projects should be evaluated through service continuity and patient-safety outcomes as well as capital expenditure.

SECTION 13

Energy, Logistics and Critical Nodes

Energy and logistics create especially important cross-sector dependencies. Data centers require power; telecommunications require energy and physical routes; hospitals require fuel, electricity and medical logistics; ports require communications, power and transportation connections.

Resilience investment should therefore identify critical nodes whose failure could propagate across several sectors. Examples include major ports, fuel distribution points, electricity substations, communications gateways, data centers, logistics hubs, hospitals and critical transportation corridors.

The appropriate response is not necessarily to harden every node equally. It is to prioritize according to consequence, dependency, recovery time and available alternatives.

SECTION 14

Financing Architecture for Resilient Projects

Project finance should be designed around the lifecycle of the resilience outcome rather than around construction alone.

FINANCING LAYER	POTENTIAL FUNCTION
Sovereign / local	Public infrastructure, regulated investment and authorized national programs
Corporate investment	Strategic capital, technology investment and vendor financing
Commercial finance	Debt, project finance and institutional investment
Export finance	Financing that supports eligible U.S. exports and projects
Development finance	Debt, equity, guarantees or political-risk insurance where authorized
Technical assistance	Feasibility, engineering, design and project preparation
Insurance	Political-risk, property, business-interruption and other appropriate coverage

The correct financing structure should be determined project by project. No particular U.S. Government instrument should be assumed to be available before eligibility and statutory authority are established.

SECTION 15

From Project Concept to Bankable Resilience

A resilience project becomes more investable when its objective, technical scope, operating model, risk allocation, revenue or public-service logic, financing structure and measurable outcomes are defined. HRS proposes a project-development gate:

GATE	MINIMUM QUESTION
1. Need	Is the resilience gap material and evidenced?
2. Consequence	What happens if the gap remains?
3. Solution	Is there a technically credible intervention?
4. Alternatives	Were competing solutions evaluated?
5. Governance	Who owns, regulates and operates the system?
6. Finance	Is there a realistic capital and lifecycle funding model?
7. Integrity	Are procurement, sanctions, anti-corruption and conflicts addressed?
8. Sustainment	Can the capability be maintained and adapted for decades?
9. Measurement	Can the resilience improvement be demonstrated?

SECTION 16

Brazil as the Initial Reference Environment

Brazil provides a useful reference environment for the HRS framework because of its geographic scale, Atlantic access, infrastructure footprint, industrial base, major ports, energy system, technology ecosystem, financial system and regional connectivity.

The HRS Country Readiness Assessment 01 examines Brazil as a strategic node and focuses on institutional readiness, critical infrastructure and health-security continuity.^[8] Its purpose in this research series is methodological: to show how national analysis can lead to sector analysis and then to project-level resilience assessment.

Using Brazil as an initial reference environment does not imply preferential procurement, exclusive market access or a predetermined vendor. It provides a concrete environment in which the HRS framework can be tested, refined and measured.

The strategic value of the reference environment is the ability to demonstrate a repeatable methodology – not to predetermine a commercial outcome.

SECTION 17

Western Hemisphere Applicability

Once a readiness methodology has been demonstrated in one operating environment, its value increases when it can be adapted to different national conditions without losing analytical consistency.

HRS intends to extend this methodology to additional countries across the Western Hemisphere as conditions warrant. Sequencing is deliberately not fixed in advance: each additional country would require its own separate assessment of legal conditions, institutional readiness, infrastructure, financing feasibility, security conditions, local partners and project-specific requirements before any application of the framework.

The framework should remain adaptive rather than treating geography as a fixed investment timetable.

SECTION 18

Sovereignty, Competition and Market Integrity

Resilience should strengthen sovereign capability rather than substitute for it. All infrastructure projects remain subject to the laws, regulations, procurement systems, licensing requirements and institutional authorities of the participating jurisdiction.

Competitive neutrality is equally important. The HRS framework does not require a government to select a U.S. provider. It establishes criteria through which providers can be compared on security, resilience, cost, performance, transparency, interoperability and lifecycle support.

Commercial participation should also be subject to applicable anti-corruption, sanctions, export-control, beneficial-ownership, cybersecurity, data-governance and conflict-of-interest requirements.

SECTION 19

The 50-Year Infrastructure Horizon

Infrastructure decisions made today can remain operational for decades. During that period, political administrations will change, technologies will evolve, suppliers will enter and leave markets, and geopolitical conditions will shift.

A resilient architecture therefore should not depend on predicting a single future. It should preserve the ability to adapt to several plausible futures. HRS proposes five long-horizon principles:

- Design for replacement, not permanent dependence.
- Preserve interoperability and technology portability.
- Maintain diversified critical supply chains.
- Build local operational and maintenance capability.
- Continuously reassess readiness as technology and risk change.

SECTION 20

The HRS Resilience Investment Framework

The framework developed in this report extends the HRS Readiness Cycle from analysis into investment and execution.

PHASE	CORE QUESTION	PRIMARY OUTPUT
Assess	What is the readiness gap?	Evidence-based baseline
Prioritize	Which gaps matter most?	Ranked investment priorities
Structure	What project can close the gap?	Project architecture
Finance	How can it be funded sustainably?	Capital and risk structure
Integrate	Which capabilities are required?	Qualified ecosystem
Implement	How will delivery be governed?	Operational project
Measure	Did resilience improve?	Auditable outcomes
Sustain	Can it survive disruption and change?	Lifecycle capability

FRAMEWORK PRINCIPLE

The framework is vendor-neutral. Its purpose is to improve the quality of decisions, preserve optionality and connect readiness to durable capability.

SECTION 21

Policy and Investment Implications

Governments, investors and infrastructure operators can strengthen resilience by incorporating dependency and recovery analysis into the earliest stages of project development.

- Require critical-dependency and substitutability analysis for essential infrastructure.
- Evaluate lifecycle continuity and recovery — not only construction cost and nominal capacity.
- Encourage transparent competition and objective qualification criteria.
- Integrate feasibility, financing and resilience requirements earlier in project development.
- Invest in local workforce, maintenance and operational depth.
- Require meaningful testing of redundancy and recovery arrangements.
- Measure resilience outcomes and update investment priorities periodically.
- Preserve technology portability and avoid unnecessary irreversible dependency.

SECTION 22

Conclusion

Resilience is ultimately a capacity to continue, adapt and recover.

The Western Hemisphere can strengthen resilience when readiness assessment, infrastructure investment, private-sector capability, sovereign decision-making and long-term sustainment are treated as connected parts of one lifecycle.

The HRS framework provides a bridge between research and implementation: Assess → Prioritize → Structure → Finance → Integrate → Implement → Measure → Sustain.

The approach does not require a single owner, a single technology or a single political model. It requires disciplined analysis, transparent competition, capable partners, sustainable financing and institutions that can preserve continuity across decades.

FINAL PROPOSITION

Resilience should become investable, investment should become operational, and operational capacity should become sustainable.

BACK MATTER

Selected Sources and Research Basis

Official and institutional sources used for the analytical foundation of this report. Accessed August 2026.

U.S. Government Sources

- [1] U.S. Department of State. Deal Teams. The Department describes commercial diplomacy as central to foreign policy and Deal Teams as interagency mechanisms supporting U.S. companies seeking export and investment opportunities overseas.
- [2] U.S. Trade and Development Agency (USTDA). Latin America and the Caribbean. USTDA describes itself as the U.S. Government's first mover on critical infrastructure development in emerging markets and states that it funds upfront technical work to accelerate infrastructure projects and procurement of U.S. goods and services.
- [3] U.S. International Development Finance Corporation (DFC). DFC Board Approves \$2.5 Billion in New Strategic Investments Advancing Infrastructure, Energy, and Supply Chain Security. 3 June 2026.
- [4] U.S. Southern Command. 2026 Posture Statement to Congress. March 2026. The statement discusses critical infrastructure, ports, telecommunications, logistics, foreign investment, strategic key terrain and resilience.
- [5] U.S. Trade and Development Agency. Latin America and the Caribbean: Digital Infrastructure Project Scoping Services. 2026. Stated scope includes priority markets including Bolivia, Brazil, Colombia and Ecuador, and supports project preparation and U.S. industry participation.
- [6] U.S. Southern Command. Commander's Imperatives. 2026. Current imperatives include strengthening hemispheric command and control, defeating designated terrorist organizations, developing cost-effective modernized forces and securing strategic key terrain.
- [7] U.S. Southern Command. Denying Malign Influence and Securing the Hemisphere. 2026. The command identifies logistics, sustainment and collaboration on critical infrastructure projects among its initiatives.

HRS Resilience Foundation — Series Publications

- [8] HRS Resilience Foundation. Country Readiness Assessment 01 — Brazil: Institutional Readiness, Critical Infrastructure and Health-Security Continuity. August 2026.
- [9] HRS Resilience Foundation. Sector Readiness Assessment 01 — Telecommunications & Digital Infrastructure. August 2026.
- [10] HRS Resilience Foundation. Sector Readiness Assessment 02 — Data Centers, Cloud & AI Infrastructure. August 2026.
- [11] HRS Resilience Foundation. Strategic Report 01 — Health Security and Institutional Resilience in the Americas: From Preparedness to Operational Readiness. August 2026.

Suggested citation: HRS Resilience Foundation. *Resilient Infrastructure Investment in the Western Hemisphere: Building Trusted Private-Sector Capacity for Long-Term Regional Resilience. Strategic Report 02, Western Hemisphere Readiness Series.* August 2026.

Research disclaimer: This publication presents an analytical framework. It does not constitute procurement advice, an endorsement of any specific company, or a representation of partnership with any government or private organization.

About the HRS Resilience Foundation: The HRS Resilience Foundation is an independent research organization advancing institutional readiness and health security across the Western Hemisphere.

HRS Resilience Foundation

Independent research for institutional readiness, continuity, and 50-year resilience planning across the Western Hemisphere. Research Outputs span Strategic Reports, Policy Briefs, Technical Papers, Sector Readiness Assessments and Regional Assessments, translating public-source evidence into practical frameworks built to remain valid for governments, infrastructure operators, investors, and institutional decision-makers across changes in technology, suppliers, and political leadership.

RESEARCH OUTPUTS TO DATE

STRATEGIC REPORTS

Strategic Report 01 — Health Security and Institutional Resilience in the Americas

Strategic Report 02 — Resilient Infrastructure Investment in the Western Hemisphere

POLICY BRIEFS

Policy Brief 01 — Strengthening Regional Health Emergency Readiness in the Americas

TECHNICAL PAPERS

Technical Paper 01 — Building Resilient Health Supply Chains

REGIONAL ASSESSMENTS

Country Readiness Assessment 01 — Brazil

SECTOR ASSESSMENTS

SRA 01 — Telecommunications & Digital Infrastructure

SRA 02 — Data Centers, Cloud & AI Infrastructure

SRA 03 — Critical Minerals & Strategic Materials

SRA 04 — Rare Earths & Western Hemisphere Mineral Security

SRA 05 — Energy Security & Strategic Power Infrastructure

SRA 06 — Ports, Logistics & Maritime Infrastructure

SRA 07 — Food Security & Strategic Agricultural Resilience

SRA 08 — Pharmaceutical & Medical Supply Chains

SRA 09 — Advanced Manufacturing & Industrial Capacity

SRA 10 — Western Hemisphere Strategic Infrastructure & Resilience

André Vieira, MD

FOUNDER & CHAIRMAN, HRS RESILIENCE FOUNDATION