WESTERN HEMISPHERE READINESS SERIES

HRS RESILIENCE FOUNDATION

SECTOR READINESS ASSESSMENT 05

Energy Security & Strategic Power Infrastructure

Energy Security, Infrastructure Resilience and Western Hemisphere Readiness

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Research integrity. This is an independent HRS Resilience Foundation research output. It does not represent the position of the U.S. Government or any foreign government. Public sources are used as evidence and analytical inputs; the HRS framework and synthesis are original to this publication.

Evidence discipline. The analysis is intended to support evidence-based institutional decision-making. It does not prescribe a universal generation mix or endorse a political program, and it respects each sovereign country's authority over its own energy policy.

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About this series. The Western Hemisphere Readiness Series is an independent body of research published by the HRS Resilience Foundation, examining the structural conditions that determine hemispheric readiness across critical sectors. Each assessment applies the HRS-developed readiness framework to a specific domain, drawing on government and institutional sources while presenting original synthesis and analysis.

EXECUTIVE SUMMARY

Energy Security & Strategic Power Infrastructure

Energy security is not limited to the availability of fuel. It also depends on the ability to generate, transmit, store, move, protect and restore energy under stress.

Electricity now functions as a critical operating layer for industry, telecommunications, data centers, transportation, health systems, water infrastructure, agriculture and defense-supporting activities. The 2026 U.S. policy environment places strong emphasis on reliable and abundant energy, grid reliability, infrastructure capacity, transmission and domestic production. This assessment treats that environment as a factual policy context rather than as a political position.

CENTRAL HRS FINDING

Western Hemisphere energy security is best understood as a distributed resilience architecture rather than dependence on a single energy source, country, or infrastructure corridor. Each sovereign country retains authority over its resources, energy policy, and infrastructure decisions, consistent with its laws and applicable international obligations; the strategic objective is to increase the range of options available when normal conditions fail.

The HRS framework evaluates six dimensions — Availability, Reliability, Redundancy, Security, Recoverability and Sovereign Choice — and is deliberately technology-neutral: it does not prescribe a universal generation mix. For U.S. government stakeholders, the relevance is direct. A more resilient hemisphere can reduce exposure to external supply shocks, strengthen critical infrastructure, support industrial capacity, improve continuity during emergencies, and create additional options for U.S. economic and security interests.

Key Findings

- **Electricity is the strategic operating layer.** Loss of power can rapidly affect digital infrastructure, hospitals, water systems, logistics, manufacturing and communications.
- **Demand growth is becoming a reliability issue.** Data centers, advanced manufacturing and other large loads are increasing pressure on generation, transmission and interconnection capacity.
- **Transmission is a strategic bottleneck.** Generation capacity has limited value when electricity cannot reliably reach demand centers.
- **North American energy systems are already interconnected** through extensive natural gas, electricity and refined-product trade among Canada, the United States and Mexico.
- **South America adds major supply diversity.** Brazil, Argentina and Guyana contribute significant oil, gas, hydropower and biofuel capabilities.
- **Resilience requires alternatives** — multiple generation sources, routes, suppliers, storage assets and restoration options reduce the effect of any single failure.
- **Sovereignty is a design principle.** Stronger regional resilience does not require uniform energy policies or any loss of national control.

SECTION 01

Scope and Analytical Premise

This assessment examines energy security across the Western Hemisphere from a readiness perspective, covering electricity generation, transmission and distribution; oil and natural gas; LNG; refining; pipelines; storage; hydropower; nuclear power; renewable generation; biofuels; strategic reserves; interconnections; ports and logistics; operational technology; cybersecurity; workforce capacity; and restoration capability.

Rather than attempting to predict a single energy future, the assessment asks whether systems possess sufficient optionality to withstand disruption and adapt to changing demand.

> *Core question: Can the Western Hemisphere maintain reliable access to energy and electric power under disruption, demand growth, infrastructure stress, or external pressure?*

Energy security is a system property, not merely a commodity property.

SECTION 02

The HRS Energy Readiness Framework

DIMENSION	DEFINITION
Availability	Sufficient dependable energy and generation capacity for normal and stressed demand.
Reliability	Ability to maintain stable operations during expected operating conditions and peak demand.
Redundancy	Multiple sources, routes, suppliers, interconnections, storage assets and restoration options.
Security	Protection against physical, cyber, operational and supply-chain disruption.
Recoverability	Ability to restore service rapidly following outages, attacks, equipment failures or natural hazards.
Sovereign Choice	Preservation of each country's authority to select its own energy mix, suppliers, investments and operating arrangements.

SECTION 03

The 2026 U.S. Strategic Energy Environment

Current U.S. policy places energy production, electricity reliability and infrastructure capacity close to the center of economic and national-security policy. Executive Order 14154 identifies reliable energy availability, domestic production and infrastructure as national priorities.[1] Executive Order 14156 connects constraints on energy production, transportation, refining and generation to economic and national-security interests.[2] Executive Order 14262 focuses specifically on the reliability and security of the U.S. electric grid.[3]

The Department of Energy's 2026 transmission work emphasizes the relationship among load growth, new generation, large loads, congestion, interconnection and transmission capacity — particularly relevant to the expansion of data centers, advanced manufacturing and other electricity-intensive activities.[4,5]

The HRS assessment does not endorse a political program. It identifies the operating environment in which reliable energy, infrastructure capacity, industrial capability and security are increasingly connected.

SECTION 04

The Electricity–Industry–Digital Nexus

The growth of artificial intelligence, data centers and advanced manufacturing has created a new class of electricity demand. North American reliability assessments identify large commercial and industrial loads, including data centers, as important drivers of projected demand growth.[6]

This connects energy security directly with earlier HRS assessments on telecommunications and digital infrastructure.[13,14] Digital infrastructure requires dependable power, while modern electricity systems increasingly depend on communications, sensors, control systems and data.

> *Energy resilience and digital resilience are mutually dependent.*

SECTION 05

Strategic Infrastructure Layers

- **Generation** — oil, natural gas, nuclear, hydropower, solar, wind, biomass and other sources.
- **Transmission** — high-voltage lines, interconnections, substations, transformers and controls.
- **Distribution** — local networks, feeders, substations, microgrids and backup systems.
- **Fuel infrastructure** — pipelines, refineries, LNG terminals, storage, ports and transport connections.
- **Energy storage** — petroleum reserves, natural-gas storage, batteries, pumped hydro and other strategic assets.
- **Operational technology** — control centers, sensors, protection systems, communications and cybersecurity.
- **Restoration** — spare transformers, mobile generation, black-start capability, trained crews and logistics.
- **Institutional capacity** — regulation, planning, emergency coordination, procurement, financing and workforce readiness.

SECTION 06

Western Hemisphere Energy Architecture

The hemisphere combines large energy resources, industrial capacity, geographic access and existing infrastructure. The strategic opportunity is to strengthen resilience without requiring identical national policies.

- **North American production and power** — the United States and Canada provide major oil, natural-gas, electricity, nuclear and hydroelectric capabilities.
- **North American cross-border infrastructure** — pipelines, electricity interconnections, LNG and refined-product trade create established channels for energy movement.
- **South American supply diversity** — Brazil, Argentina, Guyana and other producers contribute oil, gas, hydropower, biofuels and industrial capabilities.
- **Central American and Caribbean resilience** — smaller systems can benefit from stronger storage, distributed generation, fuel logistics, ports, interconnection and restoration capacity.
- **Strategic logistics** — ports, shipping routes, pipelines, refineries, terminals and transmission corridors determine whether physical resources become usable energy.

HRS TEST: SUBSTITUTABILITY

The architecture should be evaluated by substitutability: if one supplier, route, plant, pipeline, terminal or transmission corridor becomes unavailable, how many credible alternatives remain?

SECTION 07

Selected Country Roles

COUNTRY	ROLE
United States	Major producer, technology center, capital market and industrial base with substantial oil, natural-gas, refining, nuclear and electricity capabilities.
Canada	Major North American energy producer with significant oil, natural-gas and hydroelectric resources and extensive electricity and pipeline connections with the United States.
Mexico	Critical North American integration node given its geographic position, industrial capacity and deep energy connections with the United States.
Brazil	Diversified energy platform combining deepwater oil, hydropower, biofuels, transmission and a large integrated electricity system.
Argentina	Emerging oil and natural-gas growth platform centered in part on Vaca Muerta and associated infrastructure expansion.
Guyana	Rapidly expanding Atlantic oil producer whose strategic importance is accompanied by growing logistics and institutional requirements.
Chile and Peru	Pacific-facing industrial and mining economies in which electricity reliability, transmission and logistics carry strategic importance.
Colombia	Diversified Andean energy and logistics node combining hydrocarbons, hydropower and important geographic access.
Paraguay and Uruguay	Important contributors to South American electricity connectivity, with significant hydropower and regional trade capabilities.
Central America and the Caribbean	Systems where fuel logistics, storage, distributed generation, grid stability and emergency restoration carry particular importance.

SECTION 08

Principal Risks

- External supply disruption affecting fuel, equipment, transformers, turbines or specialized services.
- Concentrated supplier dependence on a single country, route, technology provider or processing center.
- Transmission congestion that prevents available generation from reaching critical demand.
- Generation retirement without dependable replacement or adequate reserve margins.
- Large-load acceleration that outpaces generation, transmission and interconnection development.
- Cyber and physical disruption affecting control systems, substations, pipelines, terminals and communications.
- Extreme weather and natural hazards affecting generation, transmission, fuel supply or restoration.
- Logistics interruption affecting ports, pipelines, railways, roads or maritime routes.
- Workforce and restoration constraints that extend outages after major events.
- Permitting, financing and project-execution delays that prevent needed capacity from arriving on schedule.

SECTION 09

Strategic Reserves and Emergency Readiness

Strategic reserves should be treated as a resilience layer rather than a substitute for production and infrastructure. Depending on the system, reserves may include petroleum, natural gas, spare transformers, mobile generation, control equipment, batteries, replacement components or other assets whose scarcity would prolong an outage.

> *The relevant question is not whether every country should maintain identical reserves — it is whether each critical system has an identified emergency buffer and a credible replenishment pathway.*

SECTION 10

Investment Priorities

- Transmission expansion and modernization where load growth or congestion creates reliability constraints.
- Firm and flexible generation capacity appropriate to each country's resource base and operating requirements.
- Natural-gas and LNG infrastructure where it improves reliability, diversification or industrial competitiveness.
- Hydropower modernization and interconnection where existing assets can provide dependable capacity and flexibility.
- Nuclear capacity and fuel-cycle resilience where national policy, economics and institutional capability support it.
- Distributed generation and microgrids for critical facilities and recovery operations.
- Energy storage and strategic reserves targeted at specific reliability and restoration gaps.
- Transformers, switchgear and critical spare equipment to reduce restoration time.
- Operational technology and cybersecurity integrated into infrastructure planning.
- Ports, terminals, pipelines and logistics corridors treated as part of one energy supply system.
- Workforce and institutional readiness, including technical training and emergency exercises.

SECTION 11

HRS Sector Readiness Questions

For a country, utility, industrial corridor or critical facility, HRS proposes seven practical questions:

1. **Capacity** — Is sufficient dependable energy available for normal and stressed demand?
2. **Access** — Can available energy physically reach critical demand centers?
3. **Substitutability** — If the primary source fails, what alternatives can operate?
4. **Protection** — Are critical assets protected against physical, cyber and operational disruption?
5. **Recovery** — How quickly can the system restore service after a major event?
6. **Institutional readiness** — Are authorities, operators, suppliers and emergency teams prepared to act?
7. **Sovereign choice** — Does the system preserve the country's authority over suppliers, technologies and operating arrangements?

SECTION 12

A 50–100 Year Strategic Horizon

Energy infrastructure has unusually long operating lives. Decisions about transmission corridors, ports, pipelines, generation sites, nuclear facilities, hydroelectric assets, industrial clusters and large-load locations can shape national resilience for decades. A 50–100 year framework should avoid dependence on any single forecast; infrastructure should remain useful across multiple plausible demand and technology conditions.

- **Build for adaptability.** Design infrastructure for expansion, repurposing or integration with new technologies where practical.
- **Preserve optionality.** Avoid configurations that make any single supplier, fuel, route or technology indispensable without a credible alternative.
- **Protect the operating base.** Maintenance, workforce, spare equipment, financing and institutional knowledge are as important as construction.

DESIGN PRINCIPLE

The objective is not to predict the energy system of 2126. It is to prevent today's infrastructure decisions from creating avoidable single points of failure for future generations.

SECTION 13

Strategic Recommendations

1. Establish national energy-resilience baselines mapping critical generation, transmission, fuel, storage, logistics and restoration dependencies.
2. Identify single points of failure, focusing on assets whose loss could affect multiple sectors.
3. Accelerate high-value transmission projects that relieve congestion and connect dependable generation to demand.
4. Develop strategic equipment reserves, including transformers, switchgear, mobile generation and long-lead components.
5. Strengthen energy logistics by assessing ports, terminals, pipelines, refineries, rail and road corridors as one system.
6. Protect critical control systems by integrating cybersecurity, communications and physical security into infrastructure planning.
7. Build restoration capacity through trained personnel, emergency contracts and black-start capability.
8. Improve project execution to reduce avoidable delays in planning, procurement and interconnection, while maintaining applicable law.
9. Encourage sovereign, market-compatible investment that provides measurable reliability, economic or strategic value.
10. Develop contingency arrangements in which emergency support operates under national law and respects sovereign authority.

SECTION 14

Implications for Applied HRS Work

This public assessment is intentionally strategic rather than project-specific. It establishes an analytical foundation for future assessments of countries, energy corridors, industrial zones, utilities and critical facilities.

Future applied work can translate the framework into country readiness baselines, infrastructure dependency maps, energy-continuity assessments, investment-priority matrices, emergency-restoration plans and resilience studies. This public research does not prescribe a contractor, investor or government program; its purpose is to identify the conditions that determine readiness. Applied work can subsequently evaluate implementation options under the laws, policies and priorities of the relevant sovereign country.

> *A resilient hemisphere is not one in which every country produces everything it consumes. It is one in which sovereign countries retain meaningful choices, critical infrastructure has redundancy, energy can move through multiple routes, restoration can occur quickly, and external disruption cannot easily turn a single dependency into a systemic vulnerability.*

Energy security should therefore be measured not only by barrels, cubic feet or megawatts, but by the number and quality of alternatives available when normal conditions fail.

CENTRAL HRS PROPOSITION

Energy resilience is infrastructure resilience, and infrastructure resilience is strategic readiness.

METHODOLOGY AND SOURCE DISCIPLINE

Methodology and Source Discipline

This publication uses an evidence-led approach. Government and institutional sources are used for factual grounding; the analytical framework, readiness dimensions and synthesis are original HRS formulations.

The assessment deliberately avoids presenting one national energy model as universally applicable. Energy systems differ by geography, resources, industrial structure, grid architecture, regulation, financing and sovereign priorities.

Editorial positioning: The document is independent and non-ideological. References to U.S. policy describe the operating environment; they are not endorsements. The assessment respects national sovereignty and is intended for policymakers, infrastructure operators, investors, researchers and security professionals.

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