



COUNTRY ASSESSMENT REPORT BRAZIL

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1.1 Country Assessment Report Template

Country Name	Brazil
Introduction	Brazil is the largest country in South America, covering vast portions of the continent's North, East, and Central regions. It shares borders with nearly all South American nations, including Uruguay, Argentina, Paraguay, Bolivia, Peru, Colombia, Venezuela, Guyana, Suriname, and French Guiana. With a population of approximately 220 million and a GDP of over USD 2.17 trillion, Brazil experienced 3.5% economic growth in 2024, driven by strong domestic demand and investment.

1.2 Electrical Generation and Demand

Generation	Technology	(GWh)
	Hydro power	421.799
	Natural gas	47.792
	Wind power	107.654
	Biomass (Includes firewood, sugarcane bagasse, biodiesel and back liquor)	58.027
	Nuclear	15.767
	Steam Coal	10.247
	Oil products (Includes diesel oil and fuel oil)	5.960
	Solar PV	70.665
	Other (Includes other primary sources, coke plant and other secondary sources)	13.425
	Total	751.335
Consumption	Sector	(GWh)
	Energy Sector	37.129
	Commercial	111.500
	Public Sector	48.000
	Residential Sector	183.300
	Agriculture and Livestock Sector	35.500
	Transportation Sector	2.200
	Industrial Sector	233.800
	Total	651.400

*Data collected from 2024. Source: EPE

https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-885/topico-767/BEN_S%C3%ADntese_2025_EN.pdf

<https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/balanco-energetico-nacional-2025>

https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-885/topico-771/Relat%C3%B3rio%20Final_BEN%202025.pdf

1.3 Electrical Interconnection and Import/Export

Complete for all interconnected countries based on the latest available data.

Connected country	Annual import from country (MWmed)	Annual export to country (MWmed)
Argentina	39,677	292,4
Uruguay	21,345	0,2

Data collected from January to November 2025. Source: ONS (National Electric System Operator).

Available at: Pag 12 - [boletim-especial-consolidacao-2024_snebe-ddos-vfinal.pdf](#)

1.4 Market Structure

Prior to power sector reforms, Brazil operated a vertically integrated electricity system dominated by large public utilities owned by the federal government, primarily under the Eletrobras group. However, following the debt crisis of the late 1980s, this model became unsustainable, leading to a series of reforms aimed at liberalizing, commercializing, and partially privatizing the power sector.

Despite these changes, the sector initially struggled to attract sufficient investment due to regulatory uncertainties and market risks. This led to the enactment of the 2004 New Industry Law (Law No. 10,848/2004), which effectively unbundled the power sector by separating generation, transmission, and distribution activities. While full privatization was put on hold, the law introduced incentives for private sector participation, leading to the growth of Independent Power Producers (IPPs) and increased private investment in generation capacity, particularly in renewable energy.

As of 2025, Brazil's National Interconnected System (Sistema Interligado Nacional - SIN) is divided into four regional subsystems: South (S), Southeast/Central-West (SE/CO), Northeast (NE), and North (N). The SIN is managed by the independent National System Operator (Operador Nacional do Sistema Elétrico - ONS) and regulated by the National Electric Energy Agency (Agência Nacional de Energia Elétrica - ANEEL). The Wholesale Electricity Market (Mercado de Energia Elétrica) facilitates electricity trading, balancing supply and demand among generators, distributors, and consumers.

In recent years, Brazil has witnessed a substantial increase in renewable energy penetration, with hydropower still dominant but complemented by fast-growing wind, solar photovoltaic (PV), and biomass generation. By 2024, renewables accounted for over 88% of electricity generation, a world-leading share. The energy transition is supported by government policies, auctions for new capacity, and incentives for distributed generation and energy efficiency.

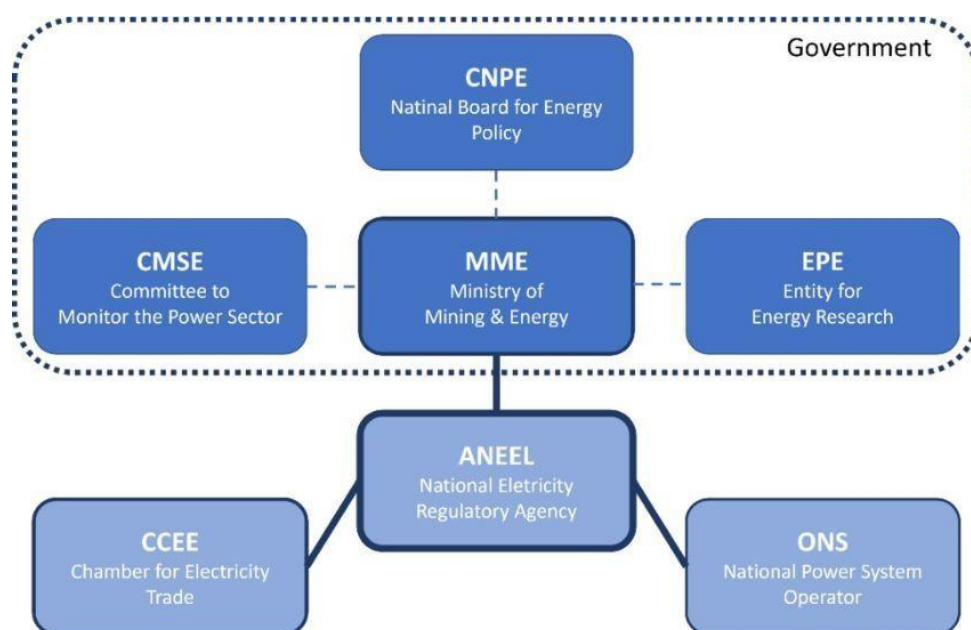
Challenges remain, including system reliability during periods of drought affecting hydroelectric output, transmission bottlenecks, and the need for modernization of grid infrastructure. Investments in battery storage and smart grid technologies are gradually being implemented to improve system flexibility and resilience. The government also continues efforts to foster market competition and expand access to the free energy market, enabling large consumers to negotiate

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contracts directly with generators.

Overall, Brazil's power sector combines a large-scale, mostly renewable generation fleet with an increasingly competitive and modernized market structure, aiming to ensure affordable, secure, and sustainable electricity supply amid growing demand and environmental commitments.



1.5 Responsible Government Department

Ministry of Mines and Energy (MME)

The MME is the main government body overseeing the power sector. It is responsible for formulating national energy policy, supervising and regulating the sector, and promoting development opportunities across the energy value chain.

National Council for Energy Policy (CNPE)

The CNPE is an inter-ministerial advisory body chaired by the Minister of Mines and Energy. It advises the President of the Republic on energy policy matters, with a particular focus on energy security and the strategic development of Brazil's energy resources.

Energy Research Office (EPE)

EPE is a public company under the MME, tasked with conducting technical, economic, and environmental studies to support government energy planning. It plays a key role in long-term policy design and provides technical support for generation and transmission auctions.

National Electric Energy Agency (ANEEL)

ANEEL is the federal regulatory agency responsible for overseeing generation, transmission, distribution, and commercialization of electricity in Brazil. It sets tariffs, issues concessions, monitors performance, and resolves administrative disputes among sector agents.

Chamber of Electric Energy Commercialization (CCEE)

CCEE is a non-profit private entity regulated by ANEEL. It is responsible for the operation of the electricity market within the National Interconnected System (SIN). CCEE manages the contracting environment, executes regulated energy auctions, and keeps track of bilateral and spot market transactions.

National System Operator (ONS)

ONS is an independent, non-profit private legal entity regulated by ANEEL. It is responsible for real-time operation of the SIN, including dispatch of generation based on economic merit, grid constraints, resource availability, and weather forecasts. It also contributes to transmission planning and operational improvements.

Source: Ministry of Mines and Energy, National Energy Policy (MME) Para v. 1.0 documento de planejamento

Although not directly involved in the electricity market, the ANP plays an important role in Brazil's broader energy policy. It regulates oil, gas, and biofuels sectors and is a permanent member of the Electric Sector Monitoring Committee (CMSE), contributing to supply security assessments and emergency response planning.

1.6 Existing/Planned Legislation

Electricity Law (No. 10,848) – enacted in 2004 – established the legal framework for Brazil's power sector. It created a regulated market (ACR – Regulated Contracting Environment) for electricity distribution companies and introduced a competitive procurement scheme through public auctions for Power Purchase Agreements (PPAs), regulated by ANEEL. This model promoted transparency, planning, and long-term contracts to ensure energy supply and price stability. As of 2024 and 2025, Brazil has updated and expanded its legal and regulatory framework to accelerate the energy transition and modernize the electricity sector. Key developments include:

Law No. 14,948/2024: Establishes the legal framework for low-carbon hydrogen production in Brazil. It creates the Rehidro program and the National Low-Carbon Hydrogen Development Plan (PHBC), promoting hydrogen and its derivatives as part of the clean energy mix.

Law No. 15,103/2025: Creates the Energy Transition Acceleration Program (PATEN) to promote investments in clean technologies and sustainable infrastructure. It introduces financial mechanisms such as the Green Fund, managed by BNDES, and allows for the use of tax credits and precatory payments as guarantees for project financing. The law prioritizes sectors like green hydrogen, biofuels, energy storage, carbon capture, and waste-to-energy projects.

Provisional Measure No. 1,212/2024: Initiates a broad reform of the electricity sector, aiming to ensure tariff justice and consumer choice. It introduces social tariff exemptions benefiting millions of low-income families, expands the right for all consumers to choose their electricity suppliers by 2028, and redistributes sector charges more equitably. The measure also facilitates investments in renewable energy projects, debt settlement mechanisms to reduce tariffs by up to 3.5% annually and supports the privatization and modernization efforts in the sector.

These legislative updates reflect Brazil's strategic push toward decarbonization, renewable energy expansion, and technological innovation in the electricity sector.

Law No. 15,042/2024 (Carbon Market)

Law No. 15,042/2024 establishes the Brazilian Emissions Trading System (SBCE), constituting a regulatory framework for the control and reduction of greenhouse gas emissions in Brazil. The full scope of the law will be defined by future regulations, which will determine, among other aspects, whether the energy generation and transmission sectors will be included in the system. The main objective of the SBCE is to create a cap-and-trade mechanism for emissions, encouraging the gradual reduction of pollutants and promoting sustainable practices through economic instruments.

The Electricity Sector Reform in Provisional Measure 1,300/2025

The Provisional Measure (MP) No. 1,300/2025, published on May 21, represents a significant milestone in the evolution of the Brazilian electric sector. Its objective is to modernize the regulatory framework and promote greater efficiency, competitiveness, and transparency in the energy market.

The MP establishes guidelines for the restructuring of the energy market, with a central point being the gradual opening of the free market to all consumers. The transition begins in August 2026 for commercial and industrial low-voltage customers and extends to all residential consumers starting in December 2027. To ensure the stability of this new environment, the figure of the

Last Resort Supplier (SUI) will be created, which will temporarily provide energy to free consumers who are left without a contract.

Another important change is the end of the renegotiation of hydrological risk for hydroelectric plants in the MRE (Energy Reallocation Mechanism). The MP prohibits renegotiation 12 months after its publication, which is after May 21, 2026, with the goal of ending the cycle of lawsuits and increasing market predictability. To resolve existing liabilities, the MP creates the

Centralized Competitive Mechanism, a financial securities auction operated by the CCEE (Electric Energy Commercialization Chamber). These securities correspond to the value of debts generated by court decisions related to the GSF (Physical Guarantee Adjustment Factor). Competition occurs among hydroelectric generators in the MRE who, upon acquiring the securities, can extend their grants for up to seven years as a form of compensation.

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MP 1,300/2025 also brings significant impacts for investors in Distributed Generation (DG). The tariff flexibility and the limitation of discounts on distribution system usage tariffs (TUSD) for new energy contracts imply that the economic viability of DG projects will depend more directly on the optimization of consumption and the management of generated energy. The opening of the free energy market to all consumers represents both a challenge and a vast opportunity. New business models may emerge where energy generated by DG systems will not only be compensated but can also be traded directly in the free market.

1.7 Environmental and Renewable Electricity Legislation

Federal Constitution (Article 225) - passed in 1988 provides the legal framework and provisions for all environmental protection in Brazil.

1.8 Existing/Planned Certificate or Support Systems

Existing Certificate Systems:

• **I-REC(E):**

Created by I-TRACK Foundation, operationalized by Instituto Totum which is the local Issuer of I-REC(E)s in Brazil.

• **CEMIG(REC):**

Created and operationalized by CEMIG, a public Brazilian company.

• **RECFY:**

Created and operationalized by Eletrobras, a private Brazilian company.

• **Self-Declarations:**

Even with some other schemes, some companies have decided to issue their own self-declarations, based on their own production and consumption, especially for small-scale units.

Based on the latest numbers, the I-REC(E) program is the main scheme operating in Brazil.

There are two bills still in their early stages in the National Congress that address the creation of a national clean energy certification system. The Totum Institute has been monitoring the progress of these bills to ensure they don't harm existing voluntary markets.

1.9 Extent of Engagement with Government

The strategic partnership between Instituto Totum, which operates in accordance with the rigorous traceability standards of the I-TRACK Standard Foundation, and the Electric Energy Trading Chamber (CCEE), an entity with a quasi-governmental role in managing the free electricity market, significantly enhances the credibility of energy certificates by integrating the issuance process directly into the CCEE Origins Platform.

This collaboration strengthens the transparency and integrity of the system by using the CCEE as an additional layer of auditing, validating each MWh issued based on official measurement data and eliminating the risk of double counting. In addition, the I-TRACK Standard Foundation maintains ongoing cooperation with the Totum Institute, not only in tracking certificates, but also in closely monitoring legislation and new trends and standards in the energy sector.

1.10 Expected Response from Government

The government has been developing and evaluating possible legislation to establish a guarantee of origin certification system based on the existing I-REC(E) program model. The Totum Institute continues to monitor this process to assess its impacts and possible timelines. As these are still draft bills, the timelines remain uncertain.

With the creation of the Brazilian emissions trading system, it's still unclear what role the electricity sector will play in emissions control. The Totum Institute has been monitoring the regulatory phase, which is expected to last another two or three years.

1.11 Proposed Restrictions

In Brazil, there are no restrictions on the generation of renewable energy certificates. Likewise, there are no legal or regulatory constraints on energy generation itself. However, in accordance with best practices established by leading international protocols, a specific technical assessment applies to cases of self-generation without export to the electrical grid (GRID). In such situations, energy generated and consumed internally may not be eligible for the issuance of renewable energy certificates when the company is engaged in the Renovabio Program, due to criteria related to additionality, traceability, and avoidance of double counting.

In 2025, Brazil completed the full integration of its national electricity system, which now operates in a fully interconnected manner and has established itself as one of the largest interconnected energy transmission networks in the world.

1.12 Any Other Relevant Information

Analysis of political disruptions or market risks

Brazil's harmonious relations with its neighboring countries play a crucial role in maintaining low security risks. This stability is further supported by the relative political calm in the South American region and the absence of significant conflicts between Brazil and its major trading partners. Such a favorable environment facilitates the smooth flow of goods, services, and labor —key pillars of the nation's economic dynamics.

The outlook for political stability in Brazil is positive, despite the possibility of occasional social tensions arising from economic challenges such as high inflation and persistent social inequality. However, no indications of widespread protests or unrest are expected in the near term. While fiscal pressures stemming from fluctuations in tax revenues may strain public budgets, it is anticipated that economic and policy measures will contribute to strengthening the country's fiscal position.

Current environmental reporting in energy

Environmental reports, such as sustainability reports or Greenhouse Gas (GHG) inventories, play a strategic role in communicating an organization's environmental commitments. In the context of Scope 2 emissions, which result from electricity consumption, the source of energy used is a key factor in emissions accounting.

In this context, the I-REC(E) (International Renewable Energy Certificate) stands out as the main instrument used to reduce Scope 2 emissions, particularly as reported under the GHG Protocol.

Thus, the use of I-REC(E) certificates in Brazil not only reinforces the integrity of the information disclosed in environmental reports but also positions companies in compliance with global market requirements, contributing to their reputation and competitiveness.

The Ministry of Science, Technology, and Innovation is responsible for calculating and publishing the grid's average emission factor for greenhouse gas inventory purposes. Brazil's electricity grid has shown low emissions compared to the rest of the world.

Local organizations of importance and their opinion on local I-REC(E) market development

In the Brazilian context, several institutions play a fundamental role in the development, regulation, and promotion of renewable energy, contributing strategically to the consolidation of a robust and reliable market for Renewable Energy Certificates (I-REC(E)s).

Key organizations include:

- ABEEólica (Brazilian Wind Energy Association)
- ABRAGEL (Brazilian Association of Clean Energy Generation)
- ABiogás (Brazilian Biogas Association)
- ABRACEEL (Brazilian Association of Energy Traders)
- ABGD (Brazilian Association of Distributed Generation)
- ABREN (Brazilian Association for Energy Recovery from Waste)
- FIEMG (Federation of Industries of the State of Minas Gerais)
- CCEE (Chamber of Electric Energy Commercialization)

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These entities work collaboratively to strengthen regulatory frameworks, expand private sector participation, and promote the adoption of sustainable practices within Brazil's energy sector.

Mechanisms in place to support the reliable verification and issuance of I- REC(E)s

The Instituto Totum, which strictly adheres to the traceability standards of the I-TRACK Standard Foundation, has established a strategic partnership with the Electric Energy Commercialization Chamber (CCEE) to enhance the reliability and traceability of energy certificates. This collaboration integrates the certificate issuance process into the CCEE Origens Platform, establishing a robust validation system that ensures security and transparency. By doing so, the initiative effectively addresses one of the main challenges of voluntary energy markets: eliminating the risk of double counting.

A key aspect of this alliance is the use of CCEE, the entity responsible for managing Brazil's national electricity free market, as an additional audit layer. Each megawatt-hour (MWh) of energy is verified and cross-checked against the official metering data provided by CCEE, guaranteeing a unique and indisputable backing for every certificate.

It is important to note that this process primarily applies to centralized generation data registered on the CCEE platform. Data from distributed generation remain under the direct control of Instituto Totum, ensuring accurate traceability while integrating new generation sources in a structured manner.

As the final assurance of this process, all issued certificates carry the CCEE Origens seal, confirming that the energy's origin has been validated through the official CCEE metering platform.

Curtailment and How It Is Affecting Generators in Brazil

The rapid expansion of solar and wind energy generation in Brazil, particularly in the Northeast, has introduced significant challenges to the operation of the national grid. Limited transmission capacity, combined with the intermittent nature of the sources and the mismatch between generation patterns and consumption, has created an increasingly complex scenario.

To maintain the stability of the National Interconnected System (SIN), the National System Operator (ONS) may instruct a reduction or shutdown of some renewable generation, a procedure known as curtailment. This is implemented due to system security requirements or energy surplus.

- ONS categorizes curtailments into three types:
- REL (External Unavailability): Caused by failures in external equipment to the plant, typically in the transmission network.
- CNF (Electrical Reliability): Executed to meet electrical reliability requirements in equipment outside the plant.
- ENE (Energy-Based): Occur when the energy generated cannot be allocated to the load.

Generators are compensated only for REL-type curtailments related to transmission failures. All other types are borne by the generators themselves, resulting in direct revenue losses. Between January and October 2024, the financial impact on solar and wind generators reached BRL 1.7 billion, with BRL 1.2 billion attributed exclusively to wind farms. In the third quarter of 2024, approximately 14% of renewable energy was lost due to curtailments, a significant increase compared to the same period in 2023, when losses for wind energy amounted to BRL 108 million.

Addressing this challenge requires substantial long-term investments and strategies, including:

1. Expansion of transmission infrastructure: New lines to transport energy generated in the Northeast to the Southeast, where the country's highest demand is concentrated.
2. Energy storage systems: Capturing energy during curtailment periods for later use during peak demand and higher-priced periods.
3. Promotion of energy-intensive sectors: Development of activities such as green hydrogen and data centers, which increase electricity demand and help reduce the need for curtailments.

Main movements in 2024

Domestic Supply and Power Consumption:

- Renewable sources reach a 50% share in the Brazilian energy matrix, a historical milestone since 1990;
- The share of renewables in the electricity mix stood at 88.2% in 2024;
- Total solar photovoltaic generation grew 39.6% and its installed capacity expanded 28.1% compared to the previous year;
- Wind generation grew by 12.4%;
- The renewability of the industry stood at 64.4%, with emphasis on the sources of sugarcane bagasse and black liquor;
- The transportation sector reached 25.7% renewability in 2024, with increases of 30.1% in hydrous ethanol and 193% in biodiesel.

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GHG Emissions from the grid:

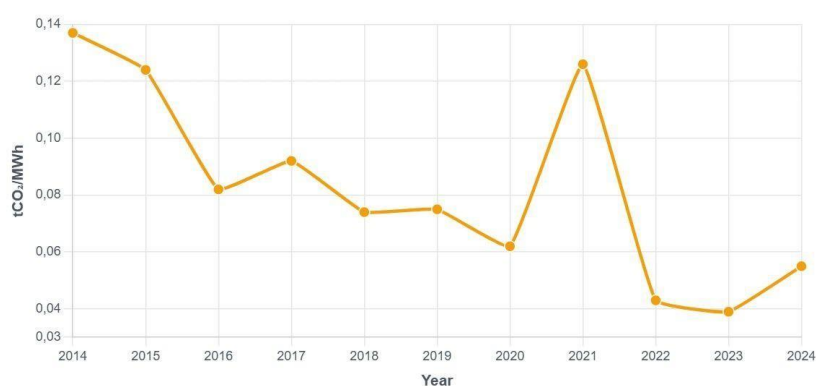
Only 20% of Brazil's total emissions were due to the energy sector, a figure below the global average of 76%.

- Brazil's per capita emissions in energy production and use accounted for 37% of the emissions of a European OECD citizen.
- Emissions from the Brazilian electricity sector remained low compared to European OECD countries, the US, and China.

The Ministry of Science, Technology, and Innovation is responsible for calculating and publishing the grid's average emission factor for greenhouse gas inventory purposes. Brazil's electricity grid has shown low emissions compared to the rest of the world. Emissions from the Brazilian Electricity Sector – MtCO₂e (Source: EPE)

System	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Self-generation	16	17	17	17	17	17	21	21	20	20
SIN	71	69	45	43	34	34	30	55	19	17
Isolated Systems	7	4	2	1	2	4	3	2	2	2
Total	94	90	65	61	53	55	54	78	41	39

Average Emission Factor of the Brazilian Grid (tCO₂/MWh) — 2014 to 2024



Top private companies with RE commitments:

1. Ambev — 100% renewable energy by 2025. (Exame)
2. Vale — 100% renewable energy in Brazil. (InvestNews)
3. Embraer — 100% renewable energy commitment in Brazil. (Embraer)
4. Gerdau — Power Purchase Agreements (PPAs) and investments to source 100% renewable energy (wind, solar, small hydro). (www2.gerdau.com.br)
5. Suzano — Self-consumption of renewable energy from biomass. (suzano.com.br)
6. Telefônica Brasil (Vivo) — 100% renewable energy since 2018 through distributed energy, free market, and I-REC certificates. (Canal Energia)
7. TIM Brasil — 100% renewable energy since 2021 through self-generation, energy renting, and I-REC certificates. (TIM)
8. Braskem — Multiple long-term PPAs (wind and solar). (braskem.com)
9. Itaú Unibanco — Agreement with Ener X to supply 80% solar energy, complemented by free market and I-REC. (Itaú)
10. Santander Brasil — 100% renewable energy commitment in Brazil until 2025. (CEBDS)

1.13 Author			
Organization Name		Instituto Totum de Desenvolvimento e Gestão Empresarial Ltda.	
Signature		Assinado eletronicamente por: Fernando Giachini Lopes CPF: *** 251 098-** Data: 24/02/2026 19:08:04 -03:00	
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DATE	24	February	2026



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