

**PROJECT INFORMATION DOCUMENT (PID)
CONCEPT STAGE**

Report No.: AB6531

Project Name	ENERGY AND MINERAL SECTOR STRENGTHENING
Region	LATIN AMERICA AND CARIBBEAN
Sector	General energy sector (80%);Mining and other extractive (20%)
Project ID	P126537
Borrower(s)	BRAZIL
Implementing Agency	
Environment Category	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined)
Date PID Prepared	April 13, 2011
Estimated Date of Appraisal Authorization	
Estimated Date of Board Approval	November 1, 2011

1. Key development issues and rationale for Bank involvement

Country Context

1. Brazil is the largest country in South America, bordering every country with the exception of Chile and Ecuador. With a population of 191 million, it is the fifth most populous country in the world, and has one-third of the population of the Latin America and the Caribbean Region (LCR). Brazil has been enjoying a period of economic stability over the past ten years, and has made very good progress in improving income distribution and access to basic services. However, the average per capita income of \$10,325 (2008) masks the challenges of increasing the level of national investment and its share in GDP, ensuring continued development in an environmentally and socially sound manner, expanding the provision of basic services, and promoting inclusive growth to address the needs of millions of Brazilians with poor access to basic services in many regions of the country.

Sectoral and Institutional Context

B.1 Energy Sector overview

2. The Brazilian energy sector is one of the largest and most sophisticated in the world, combining a number of private national and international companies with two large publicly owned industrial champions: PETROBRAS in the oil and gas sector and ELETROBRAS in the power sector. Its large territory is endowed with abundant energy and mineral resources that remain still largely untapped. Thanks to recent discovery of giant offshore oil fields in the “pre-sal” geological layer (a set of oil deposits off the southeastern coast of Brazil in deep water under a salt layer of up to 2,000 meters), potential resources have dramatically increased. Once exploited, these resources are expected to boost Brazilian petroleum production from the 14th to the 7th largest volume in the world. Moreover, the country has immense potential for biomass, as well as for wind and solar energy. Brazil is also one of the world leaders in biofuels, having accumulated large experience in bioethanol, grounded on strong comparative advantages. Lastly,

the hydropower system is one of the largest in the world, providing over 80% of the electricity consumed in the country.

3. **Electricity.** Since the 1970s, Brazil has implemented a successful energy policy aimed at diversifying its power generation matrix. In the 1990s, radical reforms have been implemented, in particular in the power sector to overcome the limitation of public sector finance. Since then, the country has been putting the political and institutional mechanisms in place to harness national energy resources effectively. The main steps included: privatization of most of the electricity distribution systems; unbundling of the vertically integrated companies; and, creation of a wholesale market for competition among generation companies. A national operator was established to develop and operate the interconnected power system (ONS). The sector is regulated by a well-established body, the Agência Nacional de Energia Elétrica (ANEEL). Transactions on the daily power market are finalized by a settlement entity (CCEE). In 2004, EPE (Empresa de Pesquisas Energéticas), the public energy planning entity, was created and assigned the responsibility to develop energy planning nationwide.

4. However, the power sector still faces a series of challenges to enable it to effectively contribute to environmentally sustainable growth, as well as to improve living standards of the poorest. In particular, Brazil's plan for accelerated economic growth is one of the most critical challenges that the power sector will have to tackle in the coming decades. Following the global economic crisis, Brazil underwent a recession that lasted only two quarters; the economy is now recovering at a fast pace, requiring the quick development of reliable energy supply. Brazil's large, integrated multi-source power system has become very complex, requiring more sophisticated regulation, planning, technologies, and institutional capacities. The development of the generation subsector is driven by a highly intricate multifaceted auctioning system, which involves coordinating the activities of 176 generation companies, 31 trading companies and 49 distribution companies. Specific auctions have been designed for renewable energy, including for windfarms and biomass-based cogeneration, and for mega-hydropower projects in the Amazon region. Large energy blocks have to be transported long distances by 47 different transmission companies.

5. As a consequence, some inefficiencies occur. For example the largest dam, Itaipu, spilled water while expensive and carbon intensive thermal plants were dispatched; several thermal power plants had to be de-rated because of their inability to secure gas in a timely fashion; and significant delays have been observed in the development of planned new hydropower plants and gas pipelines. More importantly, the country has recently experienced several black-outs of small and medium-impact; while the service was quickly restored, thanks to its large hydro-base; the ghost of the 2001 power rationing looms. As a result, the perceived fragility of the power sector has raised many questions, ranging from the inadequacy of the new institutional model to the country's ability to host the World Cup and the Olympics a few years from now.

6. Regarding social and environmental sustainability, Brazil compares well with other countries in the region, both in terms of energy access and carbon footprint. As regards the former, the "Luz para Todos" electrification program has been successful at increasing the electricity access rate from below 90% in the early 2000's to 97% in 2010. As regards the latter,

the carbon intensity of the Brazilian energy matrix is only half of world average and 1/6 of OECD average. In addition, the Government of Brazil (GOB) has adopted the “Política Nacional sobre Mudança do Clima – PNMC” as a federal law (Lei nº 12.187) on December 29, 2009, under which Brazil has voluntarily committed to reduce national emissions 36.1% to 38.9% by 2020 compared to a “business as usual scenario”, including 6.1 to 7.7% through emissions reductions in the energy sector. However, there remain 3%, or 6 million people, without access to even a basic level of electricity service. In addition, the recent WB Brazil Low Carbon study indicates that energy-based emissions could increase 97% over the 2010-2030 period.

7. **Oil and Gas and biofuels fuels.** Although Petrobras enjoys a de facto monopoly as the only domestic producer and importer of oil and gas, state gas distribution companies have been privatized in Sao Paulo and Rio de Janeiro. A national regulator, Agência Nacional de Petróleo (ANP), has been established to regulate the activities of the sector and to implement a bidding process for exploration. Prices for petroleum products and city-gate natural gas have been gradually deregulated to allow for market competition. A new public company, PETROSAL, has recently been created to manage the large pre-sal fields. Regarding bio-fuels, two major programs have been launched and have reached industrial scale: (i) the four decades-old PROALCOOL program, which has developed a large national industry able to compete with gasoline to fuel the 100% flex-fuel Brazilian fleet of individual vehicles; (ii) the National Program for Biodiesel Production and Use (NPBPU), launched in June 2004, which is progressively expanding under a detailed legal and regulatory framework and is expected to reach successive milestones to increase percentages of diesel mix from 3% to 20% (known as B3, B5, B10 and B20). While individually, certain sub-sectors face development challenges, the unique overall diversity of fuel options protects the country from major energy security issues. Moreover, the unique and successful experience in developing a biofuel industry has become a considerable asset for the Brazil in its south-south cooperation efforts.

B.2 Mineral Sector overview

8. The strong growth in Brazil over the last four years has been driven to a significant extent by developments in the mineral sector and related industries. Production, value added, and exports in mining have risen very rapidly since 2003—primary mining exports quadrupled in value—and in 2008, the mining and transformation sector was responsible for 5.8% of GDP, 28.3% of exports, and 70% of the large balance of payments surplus. Currently, Brazil is one of the top three producers in the world of iron ore, manganese, bauxite, columbium, and tantalum. It is also an important producer of nickel, copper, zinc, and gold.

9. Since 1967, the Mining Code, as amended, governs all aspects of the mining industry, from exploration and production to the end use of mineral resources. The Ministry of Mines and Energy (MME)’s National Department of Mineral Production (DNPM) is responsible for the management of mineral resources and for the inspection of mineral activity in the country. MME’s Companhia de Pesquisa de Recursos Minerais (CPRM) is the country’s geological survey agency, involved in programs for (i) basic geological mapping, (ii) geophysical, metallogenetic, and hydrogeological mapping, and (iii) prospecting in areas of potential development. CPRM is also developing programs for environmental geology, hydrogeology, and geological hazards, and maintains the country’s geological database.

10. While the country is expected to remain a world leader in the production of mineral commodities, the sector is facing a number of serious limitations in terms of economic, social and environmental impacts. The procedures for the granting of mineral rights and the monitoring of operations need to be improved to reduce speculative investments. A series of substances and issues require a more direct state supervisory role, such as rare fossils, mineral water, mining in indigenous land and mining in frontier zones. There is an urgent need to improve the quality of life in mining areas, notably those affected by artisanal and small-scale mining, and to tackle gender issues. A series of environmental issues needs to be addressed, including impacts of atomized exploration for construction materials, management of health and safety risks, and abandoned mines. The government wants now to focus more on the domestic agendas of value added and environmental and social management, as well as on increased tax revenues.

11. In sum, Brazil is now developing a comprehensive sector reform, including the update of the legal and regulatory framework, the creation of new public mineral sector institutions and the strengthening of existing ones. In particular, the new legal and regulatory framework will require the creation of a new Advisory Board, the National Council of Mineral Policy (Conselho Nacional de Política Mineral), the transformation of the Mining Directorate (DNPM) into the sector's regulatory agency, the reinforcement of the activities of Brazil's Geological Survey (CPRM) and the modernization of its laboratories, as well as changes in the procedures for the granting of mineral rights and monitoring activities and social and environmental impacts. It also requires the upgrading of Brazil's geological and mineral sources database (GEOBANK) and to facilitate access by the private sector to geophysical, geochemical and geological data. A series of studies are needed to assist in the implementation of the recent twenty year plan (Plano Duodécenal de Geologia, Mineração e Transformação Mineral – PDGMT 2010-2030), the elaboration of which was supported by the Energy Sector Technical Assistance (ESTAL) project¹. There is also an interest in evaluating carbon capture and storage (CCS).

B.3 Dynamic expansion of South-South cooperation in the Energy and Mineral Sectors

12. Due to strong progress over the last decade, Brazil has been recognized as a leader in the developing world in the design and successful implementation of public policies and programs in numerous areas, including in reducing vulnerability to and national dependence on foreign petroleum-based liquid fuels, and reducing poverty and social exclusion through access to electricity.² In the area of geology and mining, Brazil is seen as one of the most advanced and experienced developing countries and a front runner in institutions and regulations to enable sustainable and efficient economic development. Nevertheless, the MME and other energy sector entities are interested in accessing experiences and best practices from other emerging economies (among other countries) that could help improve the efficiency of the energy and mineral sectors in Brazil.

² Classic examples are the extensive experience with (i) hydroelectricity, (ii) the bio-ethanol program, PROALCOOL, which combines the key objectives of energy matrix diversification and mitigation of GHG emissions, and (iii) in the area of poverty reduction, the Luz para Todos program, the large scale program for universal access to electricity.

13. In promoting this knowledge exchange, MME has been frequently providing information and other support for diplomatic and business development initiatives to promote South-South cooperation in the areas of energy and mining, in particular in Latin America, the Caribbean and Africa. So far, this increasing demand has been satisfied on an ad-hoc, piecemeal and sometimes uncoordinated manner by different agents in the energy sector. Currently, MME seeks to ensure a better preparation and orchestration of these activities by systematically organizing relevant information, assigning means and responsibilities to relevant agencies to ensure properly continuity, and consolidating Brazil's international leadership in south-south cooperation in these areas.

14. The World Bank has been supporting the Government of Brazil in addressing several of these challenges, particularly through the recently completed ESTAL project. Some of the successful sub-projects included:

- studies on the mega hydropower plants on Rio Madeira, including an assessment of alternative bidding strategies for the site (which resulted in a large reduction in the price of energy (down from initial expected price of R\$140/MWh to R\$78/MWh);
- a diagnosis of the Environment Licensing Process for large hydropower plants, which pointed out major causes of delays and institutional conflicts and proposed a series of policy and procedural recommendations which were adopted through ministerial decrees;
- the road testing of the phasorial measurement technology, a new product that provides a high degree of precision in measuring perturbations and flux of the high voltage over the lengthy transmission system, allowing for better management and dispatch of energy (this has been successfully tested and has the potential to save hundreds of millions of dollars in investment and black-out related losses); and,
- financing of a number of local experts to strengthen MME's capacity in its core areas of responsibility, in particular energy planning to develop the Plano Nacional de Energia 2030.

15. In part given the success of the ESTAL project, the Government has recognized the large benefits of capacity building and sector strengthening in designing and implementing policies to tackle emerging challenges. Thus, the proposed project requested by the Brazilian government (with a size of US\$106.1 million over two phases) contains five main strategic axis identified for Bank support:

- (i) Strengthening planning capacity and training of key Brazilian public sector entities and associated agencies to drive the development of the energy and mineral sectors;
- (ii) Enhancing social and environmental sustainability of both sectors to ensure their contribution to reduction of poverty and social inequalities without jeopardizing the environment;
- (iii) Developing legal and regulatory frameworks to promote harmonious development of the energy and mineral sectors to maximize their contribution to economic growth;

- (iv) Promoting technology development, in particular in public sector R&D centers, which can thus generate a public good that enhances the efficiency of these sectors; and
- (v) Facilitating South-South cooperation between Brazil and other developing countries.

Relationship to CPS

16. The CPS (2008-2011) stresses that the Bank support the Government in its efforts to tackle the systemic and transformative issues of efficiency in public sector management to improve the quality of public expenditure. One of the challenges for improving the quality of public spending arises from the past discontinuation of investment and project planning in Brazil. Another one is improving the regulatory framework for infrastructure, including energy. In meeting these challenges, which have been magnified by the large investment increases under PAC I and II, the CPS notes the need (among others) to modernize information systems and processes, strengthen long-term planning, and building capacity for mainstreaming social and environmental sustainability concerns and solutions. The CPS also adopts a strengthened focus on supporting Brazil in developing “South-South” partnerships. As a result, the proposed Project is aimed at improving the efficiency of the energy and mineral sectors by responding to a strong demand from the Government for technical assistance (TA) and capacity building to support planning, reforms, and the strengthening and modernization of public institutions in these sectors.

17. As a lesson learnt from a number of small TA loans which (although effective for policy dialogue) proved to be administratively cumbersome and slow to disburse, the CPS recommends to find instruments that would package larger multi-sectoral TA approaches and investments and disburse in a more agile manner. This would be accomplished in part by relying more on the use of country systems, in particular through the now-standard use of Brazil’s financial system (SIAF) and by adopting larger procurement thresholds for national bidding procedures. Following these lessons, the proposed project would rely on the SIAF and adopt higher procurement thresholds as a way to streamline disbursement and streamline supervision costs. It also proposed to adhere to the proposed two-phase design, the second one beginning before the end of the first one, but being triggered by the progress made in the implementation of the first phase.

2. Proposed objective(s)

Proposed PDO

18. The proposed Project Development Objective is to strengthen the capacity of energy and the mineral sector agencies to support the adaptation of these sectors to the combined challenges of accelerated national economic growth and increased requirements for social and environmental sustainability in a context of globalization.

19. The principal outcome expected from the project is the further capacity building of key institutions of both the energy and the mineral sectors to ensure that they deliver the regulatory adjustments, and the planning and the modernization of their infrastructure, in particular related

to information systems and technology development, which are required for these sectors to be able to attend in a sustainable manner, from both environmental and social perspectives, to the requirements of the accelerated economic growth of the country.

Key Results

20. The key results to be achieved by the project are:

- New Planning documents adopted (Energy and Mineral sectors);
- Approval of new legal and regulatory frameworks or changes;
- Creation and capacity building of new and existing public institutions in both energy and mineral sectors;
- Development of knowledge and monitoring capacity of MME in the area of environmental and social sustainability;
- Implementation of new equipment in the following sector entities, CPRM, CEPEL and ONS; and,
- Implementation of a management system in MME for South-South cooperation and of concrete cooperative engagements with other developing countries.

Project Context

21. The proposed project results from a demand by the Brazilian Government to scale-up the partnership developed with the Bank under the previous Energy Services Technical Assistance Loan project (ESTAL), by expanding the set of beneficiary agencies in the energy and mineral sectors and the set of policy reforms to be addressed, and by focusing on specific planning and capacity issues within MME and its affiliated agencies. The concept of the new operation builds upon the experience accumulated under the ESTAL project, but also draws on the large body of analytic work done in areas of responsibility of MME and its affiliated agencies, namely energy security and diversification, energy market reform, renewable energy, energy efficiency, links with climate change mitigation and adaptation, and social and environmental sustainability in infrastructure planning, licensing, and finance.

Concept

22. The proposed project is designed as part of a two-phase Adjustable Program Loan for \$98.2 million, with a loan for the initial phase of \$49.6 million. The separation of the program into two phases has been requested by the Ministry of Planning and the associated COFIEX Committee for Foreign Financing) to ensure that the first phase is substantially underway before the final commitment by the Government of Brazil is made to finance the second phase. The triggers for moving to the second phase would be successful implementation of the capacity building activities, commitment of 75% of the first phase's loan funds, and disbursement of over 50% of the loan. The project is structured in a flexible manner, a preliminary list of activities having been identified with participating entities, though it is anticipated that these will adjust during implementation depending on needs identified at that time.

3. Preliminary description

Description

23. The proposed Project would support a sector wide efficiency improvement in the energy and mineral sectors, by financing (i) strengthening capacity, planning activities, and sustainability (ii) institutional and regulatory development, and (iii) South-South cooperation.

24. **Component 1: Strengthening the capacity of the Government to drive the sustainable development of the Energy and Mineral sectors (US\$12.5 million, of which US\$9.2 million from IBRD and US\$3.3 million from counterpart funds).** This component would aim to strengthen the capacity of MME and affiliated entities in energy and mining in **planning, social and environment sustainability**, and in the area of management, monitoring and evaluation of activities. Targeted entities are the Executive Secretariat, the Secretariat for Planning and Energy Development (SPE), the Secretariat for Electricity (SEE), the Secretariat for Oil, Gas and Bio-fuels (SPG), the Secretariat for Geology, Mining and Mineral Transformation (SGM), the Nucleo for Environmental Sustainability Studies (NESA), and the Energy Planning Company (EPE). This component will be composed of the following subcomponents:

- i. Planning of the Energy and Mineral Sectors. This sub-component will strengthen the ability of the Ministry to formulate and implement strategies (i) for expanding the supply of cost-effective and sustainable energy to meet the evolution of demand, in the medium and long term and (ii) for developing the volume of business and added value in the mineral sector. In particular, it will finance a set of technical activities focused on the short, medium and long term planning of the energy and mineral sectors, which will contribute to the development and implementation of the various sectoral and sub-sectoral plans. This sub-component is a scaling-up of the Bank support in the area of energy and mineral planning provided under the former ESTAL project.
- ii. Strengthening capacity to design and implement policies and practices to improve the sustainability of the energy and mineral sectors. This subcomponent will finance studies and training aimed at identifying opportunities, developing policies and disseminating best practice to improve the environmental and social sustainability of both the energy and mineral sectors.
- iii. Management, monitoring and evaluation of activities. This subcomponent will finance the strengthening of the capacity of the Executive Secretary of MME to manage, monitor and evaluate technical assistance activities, in particular the TA activities supported by this project.

Activities to be financed include: (i) strategic studies and development of scenarios to support planning of the energy matrix ; (ii) studies to support the planning of the mineral sector; (iii) inventory and technical-economical analyses of low-carbon energy sources; (iv) development of information systems; (v) training and meetings aimed at improving and disseminating best practices regarding gender issues and the mitigation of social impacts on populations affected by investments in the energy and mineral sectors; (vi) TA activities management support, including procurement and safeguards and support to the Project Management Unit (PMU); and (v) M&E activities. The PMU will be financed by the Brazilian

Government counterpart funding, for an estimated value of up to US\$ 3.3 million in the first phase.

25. **Component 2: Strengthening of regulatory institutions (US\$ 7.6 million, from IBRD).** This component would aim to strengthen the legal, institutional, and oversight capacities and frameworks of the regulatory functions for the energy and mineral sectors. The proposed set of activities covers capacity building for the formulation of policies and guidelines, legislative improvements and institutional strengthening for the relevant sectoral departments and agencies. This component will benefit principally **regulatory entities** and the federal sector institutions related to the regulation and oversight of the energy and mineral sectors, in particular, the various different secretariats of MME and of ANEEL. It will also support the creation of a new regulatory agency for the mineral sector, the creation of the National Council of Mineral Policy, the restructuring of DNPM, and the modernization of CPRM. In particular, this component would aim to provide the support above described through the following three sub-components:

- i. Development of the legal and regulatory frameworks for electricity, biofuels and mining activities. This sub-component will finance activities to complement and consolidate the changes already taking place in the energy sector, as well as activities to implement the new model for the mineral sector, which includes the introduction of a separate regulatory agency.
- ii. Strengthening the monitoring and control capacity of the power sector. This sub-component will finance activities aimed at improving the capacity to monitor and manage the electricity sector to address the need to develop more efficient tools for Government to take effective regulatory action in the sector.
- iii. Institutional strengthening in the area of geology and mineral resources. This sub-component will finance activities aimed at strengthening various public agencies and entities of the mineral sector. Special emphasis will be given to restructuring the mineral sector with the creation of the Regulatory Agency and the National Mineral Policy Council and the modernization of CPRM.

26. **Component 3: Technology Development. (US\$ 30.5 million, from IBRD).** This component will support the development and use of cutting edge technologies to tackle a series of new challenges (i) in the power sector, in particular to develop ultra-high voltage (more than one million volts) transmission lines and phasorial measurement systems to transport efficiently large blocks of energy across continent-wide distances and (ii) in the mineral sector, in particular by installing the very first nanoscopic ionic microprobe in Latin America to better investigate the quality of mineral deposits and thus attract investments. This component will mainly finance equipment and research in the electricity sector and in the area of geological survey. The direct beneficiaries will be **R&D public entities** affiliated with MME that will generate public goods for the energy and mineral sectors, namely CEPTEL, CPRM, and ONS. Specific activities will include the following.

- i. Investments in Research and Technological Development. This subcomponent will finance (i) the refurbishment and technology development of the technical

laboratories of CPRM and CEPTEL to meet the evolving demands for research and technological development in the energy and mineral sectors and (ii) the implementation of a security technology (phasor measurement units) for the National Interconnected System operated by the ONS. This later activity is aimed at implementing recommendations that resulted from TA activities developed under the previous ESTAL project.

- ii. Studies in Research and Technological Development. The subcomponent includes studies and research in the energy and mineral sectors required for the implementation and development of new technologies in these sectors.

27. **Component 4: South-South Cooperation. (US\$0.14 million, funded by IBRD).** This component will support South-South cooperation between Brazil and developing countries, in particular Latin American, Caribbean and African countries, in the area of energy and mining. The activities will focus on the areas of regulation, renewable energy, climate change, clean energy, information systems and environmental and social sustainability. The increasing number of demands for cooperation that Brazil is receiving in these areas has been difficult for the different governmental agencies to address in a systematic and coordinated manner, and MME frequently has lacked adequate means to ensure consistency and coherence and to transform opportunities into concrete activities. This component will support the Ministry’s effort to improve the preparation and orchestration of these activities. In particular, it will support activities to systematically organize information, and to assign the necessary means and responsibilities for activities to ensure concrete results. Specific studies and consultancies will be financed to facilitate the building of results-oriented cooperative engagements in this area.

28. **Financing Plan.** The financing support provided under the IBRD loan to each component of the project will be distributed under four categories, consultancy, goods, services and works, as detailed in the table below:

Financing plan per component, Million US\$ (excluding US\$ 5.43 in unallocated)

	Component 1	Component 2	Component 3	Component 4	Total
Consultancy	\$ 8.86	\$ 1.65	\$0.38		\$ 10.89
Goods	\$0.00	\$ 0.39	\$ 20.07	\$0.00	\$ 20.46
Non-Consultant Services	\$0.00	\$ 5.93	\$1.32	\$0.14	\$ 7.39
Works			\$8.74		\$ 8.74
Sub-Total	\$ 8.86	\$ 7.97	\$ 30.51	\$0.14	\$ 47.48
Unallocated					\$ 5.43
Total					\$ 52.91

4. Safeguard policies that might apply

Safeguard Policies Triggered	Yes	No	TBD

Safeguard Policies Triggered	Yes	No	TBD
Environmental Assessment (OP/BP 4.01)	X		
Natural Habitats (OP/BP 4.04)	X		
Forests (OP/BP 4.36)	X		
Pest Management (OP 4.09)			X
Physical Cultural Resources (OP/BP 4.11)	X		
Indigenous Peoples (OP/BP 4.10)	X		
Involuntary Resettlement (OP/BP 4.12)	X		
Safety of Dams (OP/BP 4.37)		X	
Projects on International Waterways (OP/BP 7.50)		X	
Projects in Disputed Areas (OP/BP 7.60)		X	

5. Tentative financing

Source:		(\$m.)
Borrower		3.3
International Bank for Reconstruction and Development		49.6
	Total	52.9

6. Contact point

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