

INNOVATION

ENERGY

AGRIBUSINESS

SANITATION

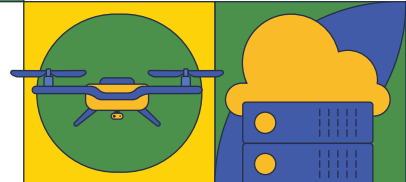
INFRASTRUCTURE

The map to the most strategic sectors of one of the most promising economies in the world (and why invest in them)

example.



Why



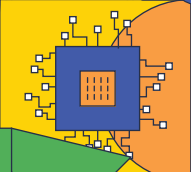
Brazil? 



apexBrasil

MINISTRY OF DEVELOPMENT, INDUSTRY, TRADE AND SERVICES

BRAZILIAN GOVERNMENT
BRAZIL
UNITING AND REBUILDING





**Procurando
um ponto de
partida
para investir
no Brasil?
A ApexBrasil
oferece
vários.**



Conte com todo apoio da ApexBrasil para investir com confiança e segurança no Brasil. Oferecemos assessoria dos nossos especialistas espalhados pelo Brasil e por todo o mundo, tanto nos escritórios ApexBrasil como em parceria com os Setores de Promoção Comercial e Investimentos das embaixadas e dos consulados brasileiros no exterior. Eles estão prontos para auxiliar a sua empresa em todas as etapas do processo de tomada de decisão. Da indicação das melhores oportunidades ao assessoramento para o estabelecimento da sua empresa no Brasil. Conte com a ApexBrasil e invista no Brasil.



-  Escritórios ApexBrasil
-  Setores de Promoção Comercial e Investimentos (SECOM)



7 **LETTER TO THE READER**
The country of soccer, carnival, and natural beauty is also a source of opportunities in key sectors of the economy

8 **PANORAMA**
The fall in the country-risk Brazil – and the main reasons to believe in the country

14 **INTERVIEW**
Executive Director of the ministry responsible for Brazilian neo-industrialization, Márcio Elias Rosa, lists the main reasons for investing in the country

16 **OPPORTUNITY MAP**
Brazil moves up as a global player and offers a variety of thriving sectors with high investment potential

18 **THE STRENGTH OF AGRICULTURE**
Brazil leads commodity exports – such as corn and soybean – representing 24.8% of the country’s GDP

20 **A PROMISING HORIZON**
Development in exports and opening of markets will dictate the direction of agriculture in the next decade

22 **FERTILE SOIL**
With record harvests, favorable climate Brazil will depend on the import of inputs such as fertilizers to continue growing

Consumer market:
7th most populous country
in the world, Brazil
attracts startups and other
foreign investors

LEANDRO FONSECA



SUMMARY



Agriculture: country leads global exports of strategic commodities like soybean and corn



CRISTIANO MARIZ

26 **AGTECHS**

Startups revolutionize productivity in the field and support companies' commitment towards ESG goals

30 **ENERGY MATRIX**

With abundant natural resources and investments in traditional sources, Brazil is moving towards diversification of its energy matrix

32 **OIL AND GAS**

In a country that stands out as a strength in renewable energy, oil and gas should play an role

36 **GREEN HYDROGEN**

How Brazil is training to become a global hub for this emerging source of clean energy

40 **DECARBONIZATION**

With CO₂ capture and storage technologies, such as CCU systems, the country is committed to reducing emissions

44 **INFRASTRUCTURE**

Brazil is investing in the expansion of its logistics and transport networks

47 **GREEN MINING**

The role of Brazil in supplying key minerals for the energy transition

50 **SANITATION**

By providing for universalization of water and sewage services, the Basic Sanitation Legal Framework opens doors for private companies

54 **INNOVATION**

With 203 million inhabitants, Brazil attracts thousands of startups and stands out as the largest innovation hub in Latin America

58 **OPINION**

Silvia Massruhá, Ana Euler, Clenio Pillon and Judson Valentim, from Embrapa, highlight the challenges of bioeconomy in the Amazon

exame.

Editor-in-Chief

Lucas Amorim

Editors

Gabriella Sandoval, Ivan Padilla, Karla Mamona, Leo Branco, Luciano Pádua, Mariana Martucci, Natalia Viri and Rodrigo Caetano

Assistant Editors and Reporters

André Lopes, André Martins, Antonio Souza, Antonio Temóteo, Beatriz Quesada, Daniel Giussani, Fernanda Bastos, Gabriel Rubinsteinn, Gilson Garrett Jr., Guilherme Guilherme, Isabela Rovaroto, Janize Colaço, Júlia Storch, Juliana Pio, Karina Souza, Laura Pancini, Layane Serrano, Leticia Furlan, Luiza Vilela, Marcos Bonfim, Mariana Grilli, Marina Filippe, Mateus Omena, Rafael Balago, Raquel Brandão and Rebecca Crepaldi

Collaborators

Carla Zimmerman, Daniel Salles, Leandro Becker, Lilian Rambaldi, Livia Andrade and Marcus Lopes

Art: Carolina Gehlen (head) and Estúdio Cosmo (collaborator)

Photos: Leandro Fonseca (editor) and Julio Gomes

Coordination: Júlio Alves

Revision: Maurício José de Oliveira and Raquel Siqueira (colaboradora)

Translation: Anna Maria Dalle Luche

Advertising and Special Projects: Rafael Davini and Daniela Serafim

www.exame.com

Editorial and Correspondence: Av. Presidente Juscelino Kubitschek, 1830, 3º andar, Itaim Bibi, CEP 04543-900, São Paulo, SP

Advertising and advertising representatives' information in Brazil and abroad: publicidade@exame.com

PRINTED AT ESDEVA INDÚSTRIA GRÁFICA LTDA.

Av. Brasil, 1405, Poço Rico, CEP 36020-110, Juiz de Fora, MG

CONTACT US

Corporate sales, projects
Specials and batch sales:
publicidade@exame.com

SERVICE

Customer Services and Magazine Sales for
final consumers: atendimento@exame.com

Phone Services (From Mondays through
Fridays, from 10 am to 6 pm) WhatsApp:
(55+11) 3003-9343

Access your digital magazine here:
<https://exame.com/edicoes/>

EXAME FOR COMPANIES

empresas@exame.com

CONTENT LICENSING

To obtain reproduction rights of contents
and images, send an e-mail to:
licenciamento@exame.com

PREVIOUS EDITIONS

Exclusive sale at newsstands
cover price of the last edition published
plus shipping expense.

RELEASES

releases@exame.com

CORRESPONDENCE

Comments on EXAMES's editorial contents,
suggestions and criticisms:
redacao@exame.com

Letters and messages must bear full name,
complete address and telephone number of
the author. For reasons of space or clarity,
they may be published in reduced form.

ADVERTISING

Advertise on EXAME and talk to
the most qualified reader in Brazil:
publicidade@exame.com
(55+11) 3787-8300

DATA PROTECTION (LGPD)

meusdados@exame.com



BETTY IMAGES

Rio de Janeiro, Brazil: the country is the largest economy in Latin America, with GDP expected to grow some 3% this year

A country of opportunities

When thinking of Brazil, one usually thinks of carnival, soccer, and beautiful natural landscapes. In fact, all these elements make up Brazilian culture — and are a source of national pride. But the country goes much further: with one of the largest agricultural production in the world, the country performs the role of being a global food reserve. It is the undisputed leader in innovation among the 33 countries in Latin America, a region which is by far the largest economy with a GDP) of US\$ 1.6 trillion.

With solid institutions, a democratic regime and monetary stability, the country stands out among other emerging nations as a safe haven for investments.

In the following pages, the team from EXAME magazine — the largest business and economics magazine in Brazil — joined the Brazilian Export and Investment Promotion Agency (ApexBrasil) to unravel the primary areas in which investments can be invested in the country. For EXAME that deals with

A country of opportunities matter on a daily basis it is a golden opportunity to be

able to hear from the government what the priorities are and what needs to be stimulated in the economy — in addition to showing the world the opportunities that the country presents in a global scenario of energy transition, innovation and focus on food security.

This year, the economy surprised even the most pessimists. The GDP growth projection went from 0.8% in January to 2.9% in October. Economists have already been debating revising their macroeconomic parameters. The government is responsible for tackling a challenging agenda: guaranteeing the proposed fiscal adjustment and approving of structural reforms like a general reformulation in the Brazilian tax system. All this

to ensure efficient distribution of wealth among citizens and to prevent deforestation of native forests, in the Amazon and other biomes.

In fact, the last few years have been extremely hard: from 2010 to 2020, GDP growth saw its lowest average in history. On the one hand, there is a lot to recover from. Also, the growth in recent years was enough for the International Monetary Fund to project that Brazil will end 2023 as the 9th largest economy on the planet. ●

LUCIANO PÁDUA,
Macroeconomy Editor,
Exame



GERMANO LÜDBERS



Consumer market:
with more than 203
million inhabitants,
Brazil attracts
foreign investors

SAFE HAVEN FOR INVESTMENTS

With a stable economy, the country moves forward with reforms and gains positive assessment from rating agencies

MARCUS LOPES

Brazil among the hottest economies

United Nations ranking classifies country among the five most attractive hubs for investment

Amidst the political and economic turbulence occurring around the planet, aggravated by war situations in Ukraine and the Middle East, Brazil is emerging as a reliable safe haven and an opportunity for new business and foreign investment. After a challenging period as a result of the Covid-19 pandemic, the country seeks to regain the helm of sustainable development presenting significant improvement in the performance of economic indexes, such as: controlling inflation, falling interest rates, increasing consumption by the population, growth in Gross Domestic Product (GDP) and a medium-term plan to reduce the public deficit.

“The macroeconomic scenario presents a little more predictability and stability. These are factors that bring more confidence to foreign investors, both the speculative ones who bring capital to invest in financial assets in Brazil, and the large economic agents that really invest in the development of industry, agribusiness development and in services”, evaluates consultant Acilio Marinello, MBA coordinator at Trevisan Escola de Negócios.

Part of Brazil's potential recognition can be seen in a recent statement by the International Monetary Fund (IMF) that the country should return to the ranking of the ten largest economies in the world in 2023, ending the year in ninth position. “There is a clear eco-

Brazil is currently the fifth largest global destination for Foreign Direct Investment (FDI). Last year, the country had 86 billion dollars in FDI, behind only the United States, China, Singapore and Hong Kong - and ahead of countries such as Australia, Canada and France. Compared to 2021, Brazil rose one position in the general FDI ranking. That year, foreign investments in national territory totaled US\$ 51 billion. The data is in the 2023 edition of the World Investment Report, prepared by the United Nations Conference on Trade and Development (UNCTAD). The document points out that, after a strong recovery in 2021, global FDI fell 12% in 2022, totaling US\$ 1.3 trillion, compared to US\$ 1.5 trillion in 2021. The drop, driven by factors as the war in Ukraine and rising food and energy prices, was felt mainly in developed economies, where FDI fell 37% between 2021 and 2022. On the other hand, investment flows to countries in development rose 4%.

omic policy, an independent Central Bank that has firmly acted to avoid hyperinflation and, even with all the social programs, there is a project to reduce the government deficit. This is very important for economic agents,” says Marinello.

In 2022, Brazilian economy grew 2.9% and the Gross Domestic Product (GDP) closed at US\$ 1.6 trillion, according to IBGE data. For 2023, the

Ministry of Finance's projection points to a GDP growth of 3.2% — the market estimates 2.9%. At the beginning of the year, economic agents projected GDP growth of 0.8%. Brazil also stands out as a global destination for foreign direct investment (FDI), and totaled US\$ 86 billion in FDI in 2022, the fifth largest beneficiary in the world, according to data from the United Nations Conference on Trade and Development (UNCTAD).

With more than 203 million inhabitants, according to the latest IBGE Census, the country has seen an increase in the consumer market — despite persistent social inequalities. In the first half of 2023, sales recorded in Brazilian supermarkets increased by 2.47%, according to a survey by the Brazilian Supermarket Association (Abrás). In the month of June alone, the increase was 0.5% compared to May and almost 7% compared to June last year. “It is an economically active population. Despite great social inequality, even the lowest strata consume products and services. Therefore, it is a consumer market that attracts foreign investors,” says Marinello.

THE DEVELOPMENT OF REFORMS

In the National Congress, the federal government is speeding up with an agenda of structural reforms, with emphasis on tax reform promising to simplify the complex Brazilian tax system, one of the obstacles to the country's development. After

being approved by the Chamber of Deputies in July this year, the text went to the Federal Senate. Final approval is expected to occur this year.

With favorable winds, within a few months the country was back on investors' radar and risk rating agencies raised Brazil's ratings. The movement began in June this year when Standard & Poor's Global Ratings (S&P) revised Brazil's ratings from "stable" to "positive." According to the agency, one of the three largest risk ratings in the world, the change was motivated by the economic results obtained in the first half of the year, such as continued GDP growth, and what the agency called the "organization of fiscal policy" on the part of government economic team.

A month later, in July, another important risk agency, Fitch Ratings, raised Brazil's sovereign credit rating the country from "BB-" to "BB," with a stable outlook. In addition to the arguments already cited by S&P, Fitch highlighted the progress of tax and social security reforms approved in 2019 and predict savings of up to R\$ 1 trillion in ten years, and the independence of the Central Bank.

"Brazil has made progress in important reforms to face economic and fiscal challenges," says an excerpt from Fitch, who also highlighted the fact that political polarization has not contaminated the economic agenda. "Political tensions persist but have not culminated in adverse economic or political outcomes and reflect the effective functioning of checks and balances."

Another member of the select group of significant risk rating agencies, Moody's, prefers to adopt caution and, for now, has maintained Brazil's rating

– Ba2, with a stable outlook. Speaking to the press, however, Moody's vice-president and senior sovereign risk analyst, Samar Maziad, expressed optimism and stated that the tax reform and new fiscal framework proposed by the government open positive prospects for the country.

"It is always important for economic fundamentals that a rating agency recognizes the work of implemented reforms, such as the new fiscal framework and the first phase of tax reform. This has an impact on the attractiveness of the country and its numerous investment projects," assesses Ricardo Martins, chief economist at Planner Corretora.

For Mara Limonge, director of Relations with Companies and Events

at the Association of Analysts and Investment Professionals of the Brazilian Capital Market (Apimec Brasil), as other risk rating agencies review these grades — if the improvement trends are maintained —, foreign investment starts to be directed to the country. She highlights that the largest international investors, such as endowments and pension funds, have restrictions in their investment policies on countries that are not well classified in international ratings. "Upon



LULA MARQUES



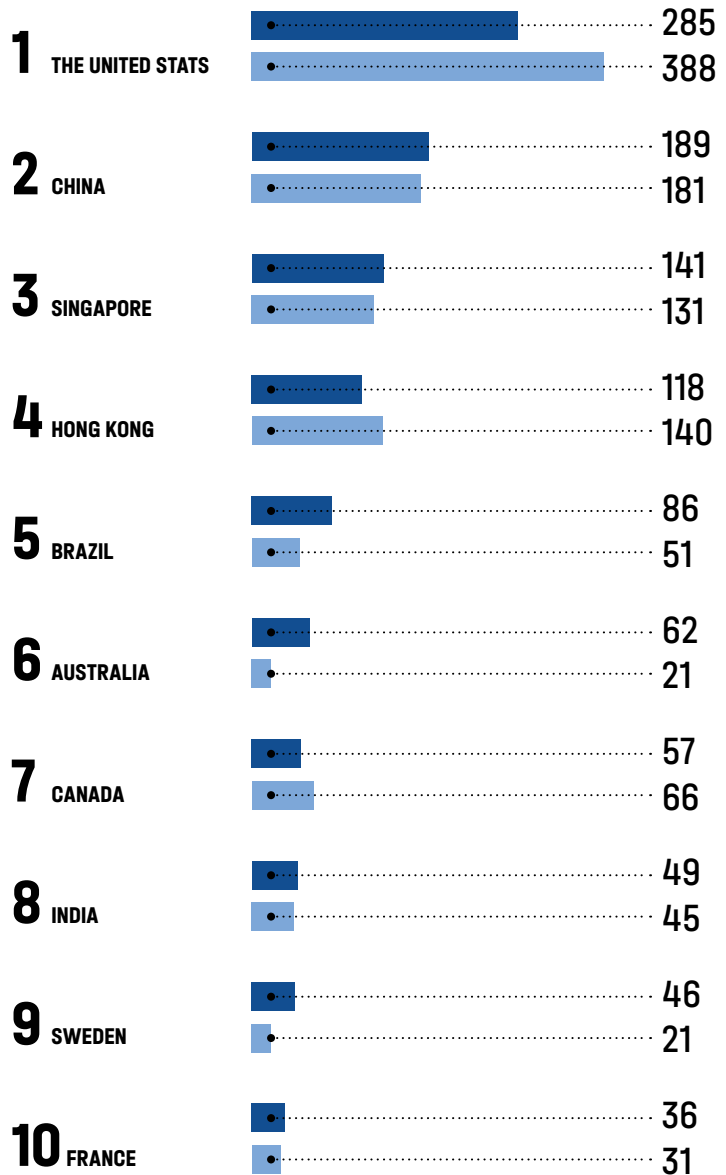
↓ National Congress: in progress, Tax Reform promises to simplify tax collection

Countries that attracted the most foreign direct investments

In Brazil, funding was US\$ 86 billion in 2022 compared to US\$ 52 billion in 2021

(in US\$ billion)

● 2022 ● 2021



Source: UNCTAD

reaching investment grade again, Brazil will have a significant volume of resources authorized to invest," she says.

INFLATION UNDER CONTROL

Unlike neighboring countries, such as Argentina, Brazil has managed to control inflation and keep it within the established

targets. The Central Bank (BC) revised its projections in October and the estimate is that the Broad National Consumer Price Index (IPCA) that measures Brazilian inflation, will end 2023 at 4.65% per year. If the BC's projections come true, the country will end the year within the inflationary targets established by the government at the beginning of the year, that is 3.25%, with a tolerance of 1.5% more or less.

For 2024, the BC's projection points to inflation of 3.88%, also with a tolerance margin of 1.5% up or down.

The government's target for IPCA in 2024 is 3%, that could reach 4.5% with the tolerance margin. The dollar price, which suffered in 2022 with fluctuations resulting from the international scenario, such as the Ukrainian War, returned to acceptable levels and should end the year practically stable, at around R\$ 5 for US\$ 1 a factor which points to greater stability in the Brazilian economy.

The effects of inflation have an impact on basic interest rates (Selic), which are expected to remain high in 2024, but with a clear downward trend. According to the Central Bank, basic interest rates should reach 11.75%, in a cycle of cuts that began in August, when the Selic was at 13.75% per year. The federal government stands for the reduction of interest rates to encourage the country's growth.

The Central Bank, in turn, evaluates that the drop in interest rates directly depends on the behavior of inflation. "The Central Bank maintained extremely high rates and was often questioned by government agents and important businesspeople, but the result proved that, despite the bitter medicine, the effect was positive. Inflation has been slowing down month after month," says Marinello, from Trevisan.

For next year, experts warn that the country must continue to pay special attention to reforms, controlling inflation and public spending. Even more so in a scenario of major international conflicts in Ukraine and the Middle East. "The global moment of tension may have repercussions on the country. The tax issue remains as a focus of attention. But not at the levels of concern that the market initially predicted, given that the

10 reasons to believe (and invest) in Brazil

- 1 • The largest economy in Latin America, the country has repositioned itself in the world's main risk rating agencies, such as Fitch and S&P.
- 2 • Broad consumer market and labor supply.
- 3 • Abundance of energy diversity and environmental sustainability. More than 85% of the Brazilian electrical matrix is made up of renewable and are considered clean sources, such as hydroelectric, wind and solar.
- 4 • Balance in public accounts: inflation under control, advancement of major structural reforms, such as taxes, and plans to reduce the public deficit.

- 5 • Highly diversified economy, with emphasis on agribusiness that contributes to 24.8% of Brazilian GDP. One of the world's largest suppliers of commodities, such as grains and ores.
- 6 • The country is the 5th largest beneficiary of foreign direct investment in the world.
- 7 • Growth in investments committed to reducing carbon emissions, in projects such as wind and solar energy, green hydrogen and biomass. In total, 7% of global renewable energy production comes from Brazil.
- 8 • Safe capital market and regulation equivalent to large economies.
- 9 • Good relationship with other economies.
- 10 • Brazil's prominence and commitment to the UN Sustainable Development Goals (SDGs).

Brazil in big numbers

The country has the largest population, the largest economy and the largest territory in Latin America

POPULATION

203 million

GDP RECORDED IN 2022

US\$ 1.6 trillion

ECONOMY GROWTH IN 2022

2,9%

DIRECT FOREIGN INVESTMENT

(IED) in 2022: US\$ 86 billion

7% OF WORLD'S

renewable energy comes from Brazil.

1.2 BILLION

tons of cargo transported in Brazilian ports in 2022.

10TH

largest oil producer in the world

4TH

agricultural producer in the world

Sources: ApexBrasil, IBGE e UNCTAD



S&P headquarters in New York: risk rating agency has revised Brazil's rating this year

GETTY IMAGES

fiscal rule has triggers to prevent public debt from rising,” says Mara Limonge, from Apimec.

For Marinello, from Trevisan, attention should be focused on a possible escalation in the conflict in the Middle East that could have impacts on the world oil market. “Perhaps Brazil has a little more resilience because it is a diversified economy, has an also diversified energy plant and because we still have international

reserves that give us a certain protection to get through a moment of global turmoil, if this conflict should extend,” evaluates the consultant.

Furthermore, after an extended period of economic uncertainty, the scenario is one of stability and growth. Great signals for international investors. ●

TRANSLATION BY ANNA MARIA DALLE LUCHE

MÁRCIO ELIAS ROSA

WHY BRAZIL?

EXECUTIVE SECRETARY TO THE MINISTRY RESPONSIBLE FOR BRAZILIAN NEO-INDUSTRIALIZATION LISTS THE REASONS WHY IN HIS OPINION MAKE INVESTING IN THE COUNTRY WORTHWHILE

The Ministry of Development, Industry, Commerce and Services (MDIC), led by Vice-President, Geraldo Alckmin, has quite a challenge ahead: implementing the country's neo-industrialization agenda. In the assessment of the department's executive secretary, Márcio Elias Rosa, Brazil has the best conditions to incorporate sustainable practices in attracting investments, based on macroeconomic data, recent measures to stimulate credit, simplification of standards, in addition to the ongoing tax reform and the forecast of an increase in public and private investments. "Brazil now just hopes to get good investments," he says.

Why invest in Brazil?

Brazil is currently experiencing a period of frank political and economic stability, has always pointed out Geraldo Alckmin Vice-President and Minister. Growth resumed at rates higher than initial expectations — it is estimated that GDP should grow 3.2% in 2023, and not 2.5% as previously estimated. We had an increase in the projected harvest, an improvement in the availability and conditions of access to credit that positively impacts all sectors of the economy. In the agriculture segment, the growth

projection rose from 13% to 14%, in the industry sector from 0.8% to 1.5% and in the services area, from 1.7% to 2.5%. Three other aspects contribute to attracting investments: President Lula's commitment that there will be no measures without prior announcement and discussion that creates legal and economic security and investments were resumed — I am referring to the new Growth Acceleration Program (PAC), budgeted at R\$ 1.7 trillion — and, finally, Brazil is a potential leader in the march towards ecological transition, as stated by President Lula. It certainly has the best conditions for any other country to migrate to a sustainability paradigm.

Within the scope of the MDIC, what programs and projects are underway to improve the business environment?

The MDIC has adopted several measures to reduce bureaucracy: for example, the Foreign Trade Bureau (SECEX) implemented the Flex License (a standard that allows a single authorization to be used in several international commercial transactions, reducing export and import costs); the reduction in clearance time for imports by air transport; progress in the program to implement one single portal for foreign trade; expansion of access to cheaper credit for exports — previously aimed at companies with revenues of up to R\$600 million, now reaches those with revenues of up to R\$1.3 billion. Furthermore, we are following very closely the tax reform already under discussion in the Congress. It will simplify tax, thus causing relief from investments and imports and reduction of legal disputes. It also replicates in Brazil tax models used in the rest of the world.



DANIELA TOVANSKY



Márcio Elias Rosa, Director of MDIC:
"Brazil is economically stable, has reforms coming ahead and is committed to the energy transition agenda."

What exactly is neo industrialization and what specific actions does it involve?

The focus is to modernize and strengthen the industry, especially manufacturing, based on the three dimensions of sustainability combined. It encourages investment in technology and innovation, increases qualified international economic participation and generates the jobs and income that our people need, always with an environmental engagement. It means moving towards a green and inclusive economy.

What concrete results do you expect? Are there already visible results?

We have concrete examples: the strengthening of the Amazon Bio Business Center, with autonomy to capture public and private resources and expand its activities. It will be a vector for attracting investments to Brazil that will research and develop lines of business generation using the standing forest. We should achieve a surplus of US\$ 93 billion in the trade balance this year and, in these ten months, we have generated 1.4 million formal jobs. Inflation is under control. Brazil now just hopes to be granted with good investments. ●

With an upward revision in GDP growth, a drop in unemployment, controlled inflation, a diversified economy, and one of the largest consumer markets in the world, Brazil once again has emerged among the top ten economies on the planet — a level that had not been reached since 2019, before the pandemic.

In addition to the favorable scenario, the Brazilian government is searching a position as a relevant player in attracting international business. “Brazil has been absent from important markets in recent years. We are building a new investment map and trade opportunities”, says Jorge Viana, president of ApexBrasil.

Opportunities emerge on several fronts. “The new Growth Acceleration Program (PAC), launched by President Lula, for example, is a great opportunity for domestic and international partnerships,” says Viana. PAC — a government investment program in partnership with the private sector — will inject R\$ 1.7 trillion in areas that are critical to the country's growth. Agribusiness — responsible for a quarter of the country's GDP, is another frontier to be explored.

The country also offers op-

portunities in sanitation, due to the new legal framework for the sector provides for the universalization of water and sewage services throughout the country by 2033; logistics, in view of the need to modernize ports, airports, highways and railways; and energy, a topic in which Brazil is one of the great leaders in the transition to a low-carbon economy.

“Our energy matrix, mostly renewable, puts Brazil in an incomparable position in relation to the world” says the president of ApexBrasil. “We have opportunities in green hydrogen, ethanol, biofuels, wind and solar energy,” he adds.

Opportunities can be leveraged upon approval of reforms capable of improving the Brazilian business environment — tax reform, currently under discussion in the Congress, is one of the Brazilian government's main bets in this regard.

In the edition you have in your hands now, EXAME depicts, in partnership with the Brazilian Export and Investment Promotion Agency (ApexBrasil), the areas with the greatest potential to attract investments. What we want is to answer why the country is a strategic choice for new projects. ●

THE OPPORTUNITY MAP

Brazil moves towards becoming a global player and offers a robust and varied list of thriving sectors with high potential for foreign investment

GABRIELLA SANDOVAL

Strategic sectors

Agribusiness

24.8% of GDP

40% contribution to global food production by 2050

266% increase in production of the main agricultural crops in 40 years

Logistics and Mining

1,7 million kilometers of kilometers of highways

1,2 million tons of cargo transported from ports in 2022

500 million useful tons transported by rail in 2022

Energy security

Largest oil producer in Latin America

15th largest proven oil reserve

10th largest oil producer in the world

Renewable energy

7% of all renewable energy production in the world comes from Brazil

3rd in the world in share of renewable energy in the energy matrix

80% of the country's energy generation capacity comes from renewable energy

Venture capital

More than **22,000 startups**

More than **220 fund managers**

66% of capital comes from international investors

BRAZIL





North

North
East

Center-
West

Southeast

South

5th largest country in territorial extension

US\$ 86 billion in IED

5th biggest destination of Direct Foreign Investments

214.3 million inhabitants

One of the most consuming markets in the world

8.515.767 km²

TRANSLATION BY ANNA MARIA DALLE LUCHE



THE RESERVE OF GLOBAL AGRICULTURE

The exponential growth of Brazilian agribusiness has consolidated the industry as an economic and social pillar for Brazil and a food reserve for the world

LEANDRO BECKER

DIVULGAÇÃO/AXIAL-FLOW

Agriculture has always been strong in Brazil. But the 474% increase in grain production since 1990 has taken the country to another level globally. The result came from the combination of the opening of new agricultural areas and a leap in productivity — 3.18% per year, on average, between 2000 and 2019, ahead of China (2.03%) and the United States (0.5%) —, winning new international markets, and the strategic

development of being able to use 27.1 million hectares more than once in the same harvest year — some crops, such as corn, have up to three harvests per year. Such dynamic performance translates into many investment opportunities.

This has transformed agriculture into an engine for the domestic economy, to the point where its Gross Domestic Product (GDP) will stand for 24.8% of the national total in 2022, according to the Center for Ad-



Soybean harvesters, in Mato Grosso: production Brazilian agriculture has grown 474% since 1990. Country produces 57% of global

vanced Studies in Applied Economics (Cepea-Esalq/USP).

Brazil today is one of the world leaders in the cultivation of strategic commodities such as soybean (41% of the global total), coffee (37%) and sugar (21%). The Ministry of Agriculture estimates that the gross value of agricultural production will reach the unprecedented mark of R\$ 1.15 trillion in 2023.

EXPORT ENGINE

In the last ten years, agriculture's export revenue has grown 66.1% and reached US\$ 159.1 billion last year, i.e., 47.6% of the country's total. Furthermore, the trade balance of US\$142 billion made Brazil the largest net exporter in global agriculture.

Today, the country is internationally at the forefront in sales of soybean (57% of the global total), corn (28%), coffee (28%), sugar (41%), orange juice (72%), tobacco (31%), beef (25%) and chicken meat (34%). And it should close the 2023/24 cycle as the world's largest grain exporter, with 156.4 million tons.

The year of 2023 promises even more records. In the first seven months, Brazil shipped 19.7% more soybean than in 2022. Corn sales jumped 52.9%, making the country surpass the USA as the largest international seller of that grain.

From January to July, there has also been an increase in the quantity traded of soybean meal (+6.1%), rice (+121.1%), chicken (+9.9%), pork (+13.7%), sugar (+12.5%) and cellulose (+4.6%). Another highlight was that the share of agriculture in Brazilian exports reached 50% for the first time, with China being the main destination (37.2%).

INVESTMENTS IN TECHNOLOGY

The massive investment in technology and inputs is one of the reasons for such a success. Between 1990 and 2022, the demand average annual growth was 5.2% for fertilizers and 8.6% for agricultural pesticides, according to the consulting firm Cogo Intelligence in Agribusiness.

According to Helena Bonna Brandão, investment manager at ApexBrasil, Brazil currently ranks 4th in the world for global fertilizer consumption. "The estimate is that 85% of fertilizers used in Brazil are imported and the idea is to reduce international dependence to 50% by 2050", she says. "This will only be possible with innovative solutions, stimulation of research and investment in technologies suited to our soil and climate."

Data from Crosara Consulting reinforce this scenario: the turnover in the Brazilian pesticides market grew 94.8% since 2018 and reached US\$ 20.5 billion in 2022. The increase is similar in inputs for foliar nutrition (+96.3%), totaling US\$2.99 billion. Biological revenue more than tripled in the period and reached US\$828.3 billion.

The vigor of Brazilian agribusiness also boosts the machinery and equipment industry. Brazil sold 931,000 tractors and 130,000 grain and sugarcane harvesters between 2021 and 2022 alone, according to Cogo. Revenue from sales of agricultural machinery and implements rose 45.1% from 2020 to 2022, reaching R\$ 91.7 billion, according to the Brazilian Association of Machinery and Equipment Industry (Abimaq). But this does not mean that there is no prospect for new investments. Today, 68% of the 1.45 million tractors and 72% of the almost 250,000 harvesters used in the country are more than 11 years old.

Since 1960, even with the increase in the planted area in the country, the ratio of hectares per tractor has fallen from 410 to 123 in 2022. Nevertheless, the ratio of machinery in the Brazilian field is still below the rates found in the United States, with 33 hectares per tractor, in the European Union, with 16 hectares per tractor, and in India, with 64

hectares for each tractor unit. In short, productivity above the world average in the Brazilian field can be further encouraged – and there is a clear opportunity for market to reach the mechanization levels of other grain producing countries.

FUTURE AND SUSTAINABILITY

The sustainable potential of production has also been developed for at least four decades. The country has successfully consolidated practices such as direct planting and biological nitrogen fixation and encouraging the adoption of more efficient production systems, such as Crop-Livestock-Forest Integration (ILPF).

These factors, added to the fact that Brazil is one of the countries with the largest arable land area and has the riches of the Amazon in its territory, make Brazil to be seen as a strong international player to meet the growing global demand for food and also to lead emerging markets linked to sustainability, such as carbon, and initiatives that aim to keep the forest standing and contain the effects of climate change.

The efficient use of freshwater reserves – the country has 12% of the world's total – and the access to energy favor irrigated agriculture. Its use jumped from 800 thousand hectares in 1970 to 8.2 million in 2022, but with potential to reach 47.7 million hectares, according to the consulting firm, Cogo, mainly in the Mid-West (16.3 million hectares).

In the following pages, each of these dimensions are explained in detail.

A PROMISING DECADE ON THE HORIZON

Production growth in and development in exports, with the opening of new markets promise to further strengthen Brazilian agriculture by 2033

LEANDRO BECKER

A leap in the production of grains planted area (24.1%) and meat (22.4%), associated with double-digit growth in the main exported commodities, are a sign of a very promising and profitable future for Brazilian agribusiness in the next decade. A study conducted by Embrapa technicians, and the Ministry of Agriculture and Livestock with projections for the sector until 2033 demonstrates this.

The outlook is that grain production should increase 2.4% per year, on average, and reach 389.4 million tons in an area of 92.3 million hectares. Soybean will lead this expansion with 12.1 million more cultivated hectares in the country. In terms of meat production, an increase of 6.6 million tons is estimated in the comparison between 2022/23 and 2032/33, with emphasis on chicken (+28.1%) and pork (+23.2%).

The increase in productivity, associated with modern technologies in the field, will play a key role in the process, even though Brazil still

has room to expand the area dedicated to agriculture. The forecast is that total factor productivity (TFP) will increase, on average, by 1.48% per year – lower than the 3.32% recorded between 1976 and 2021.

REGIONAL POTENTIAL

The survey also identifies that the strengthening of agriculture in some regions will support expansion over the next 10 years. In Mato Grosso, for example, almost 10 million hectares will be incorporated into the planted area for grain production, resulting in an increase in corn (+47.6% or 22.3 million tons), driven by the ethanol industry that currently has 21 plants in operation.

Another highlight is the Matopiba region (covering agricultural areas in the States of Maranhão, Tocantins, Piauí, and Bahia), where grain production has increased by 93% in the last 10 years. The prognosis is that, in 2032/33, the four states should reach 48 million tons (+37.1%) in an area of 11 million hectares (+17.1%).

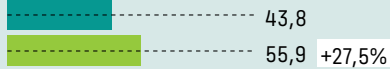
PLANTED AREA

Million hectares

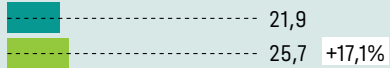
Total



Soybean



Corn



Soybean and corn should account for 88.4% of the cultivated area in a decade

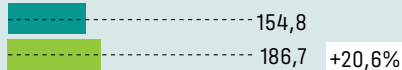
GRAIN PRODUCTION

Million tons

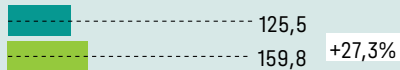
Total



Soybean



Corn



Soybean and corn should account for 89% of grain production in a decade

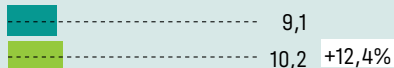
MEAT PRODUCTION

Million tons

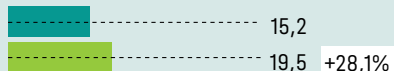
Total (beef, chicken and pork)



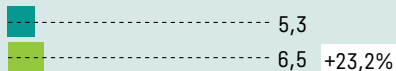
Beef



Chicken



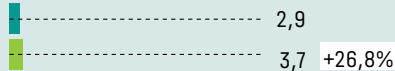
Pork



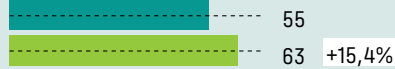
PRODUCTION OF OTHER COMMODITIES

Million tons *Million bags

Feather Cotton



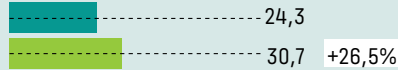
Coffee*



Sugar



Cellulose



EXPORTS

Million tons *Million bags

Soybean



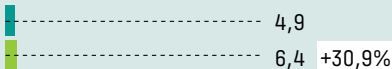
Corn



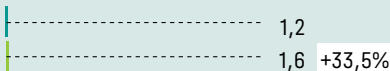
Beef



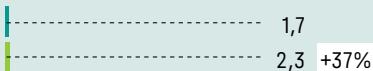
Chicken



Pork



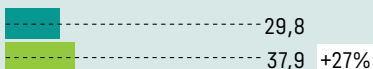
Feather Cotton



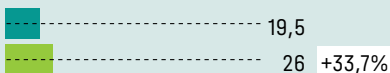
Coffee*



Sugar



Cellulose



NEW MARKETS

The advance in exports promises not only the strengthening of Brazil's ranking at global level but also opening opportunities for national agriculture in the coming years. A sign that this trend has already been consolidating is that, from January to September 2023 alone, the country won 51 new markets for agricultural products in 28 countries.

22 **America** markets in 9 countries
Argentina, Canada, Mexico, Dominican Republic, Uruguay, Ecuador, Colombia, Chile and Panama

14 **Asia** markets in 8 countries
Indonesia, Singapore, China, India, Malaysia, Armenia, Kazakhstan, and Kirgizstan.

7 **Africa** markets in 4 countries
Egypt, Algeria, Angola, and South Africa

4 **Oceania** markets in 3 countries
French Polynesian, New Caledonia, and Vanuatu

2 **Europe** markets in 2 countries
Russia and Belarus

2 **Middle East** markets in 2 countries
Israel and Saudi Arabia

TRANSLATION BY ANNA MARIA DALLE LUCHE

From food importer until the 1960s, Brazil has become one of the largest agricultural producers in the world — and has done so while preserving more than 60% of its territory. To illustrate: national grain production went from 31.3 million tons in 1990 to 322.8 million tons in 2022, according to the National Supply Company (Conab). With increasing productivity combined with a Forest Code that is one of the most restrict on the planet, the spotlight turns to the Brazilian experience. “There is a global demand for food and perhaps Brazil is the country with the greatest capacity to expand production, in a sustainable manner, in the world,” says Luiz Caruso, General Coordinator of Promotion of Foreign Investment and Cooperation at the Bureau of Trade and Relations International from the Ministry of Agriculture, Livestock and Supply (MAPA).

Numbers do not lie. Brazil is an agri-environmental strength. From being a food importer until the 1960s, the country has turned out to be one of the largest agricultural producers in the world — and it does so while preserving more than 60% of

its territory. To illustrate: national grain production went from 31.3 million tons in 1990 to 322.8 million tons in 2022, according to the National Supply Company (Conab). With increasing productivity and a Forest Code that is one of the most demanding on the planet, the spotlights are all here. “There is a global demand for food and perhaps Brazil is the country with the greatest capacity to expand production, in a sustainable manner, in the world,” says Luiz Caruso, General Coordinator of Promotion of Foreign Investment and Cooperation at the Bureau of Trade and Relations International, of the Ministry of Agriculture, Livestock and Supply (MAPA).

According to data from the UN, with 2010 as a starting point, global agricultural production will have to grow 56% to eliminate hunger around the world with some 10 billion people by 2050. This scenario explains why the sector attracts so many investors. “They want safe return and can see the competitiveness and high growth rates of Brazilian agriculture,” says Caruso. In addition to sustainable agricultural practices, recognized worldwide, such as direct planting and the Crop-Livestock-Forest Integration system (ILPF), the federal government has a plan, estimated at US\$120 billion, to convert 40 million hectares of degraded or low-productivity pastures into high-yield crops or livestock in 10 years. For this purpose, Carlos Fávaro, Minister of Agriculture, has been talking to foreign funds to get investments for the project. In accordance with the internationally defended anti-deforestation environmental argument, the plan has received positive feedback from Eximbank, a South Korean bank, the Saudi Agricultural



GETTY IMAGES

FERTILE SOIL FOR INVESTMENTS

With record harvests, favorable climate and territorial size, the country attracts more and more investors every day

LÍVIA ANDRADE



Soy: With one of the largest agricultural productions in the world - which will continue to expand - the country will need contributions to areas such as bioeconomy, storage and machinery

and Livestock Investment Company (Salic) and from Japan International Cooperation Agency (Jica).

The plan proceeds with already consolidated policies, such as the ABC plan, for Low Carbon Agriculture, and is aligned with the new global economic dynamics linked to the ESG agenda, of best environmental, social and economic practices. "We call it the green factor: the ability of an economy to shelter natural resources and generate income and wealth with

Fertilizer production: a strategic need

As the fourth largest food producer in the world, Brazil depends on the import of fertilizers to continue producing more and better. But the pandemic and geopolitical problems in the world have shown some vulnerability in depending on the import of foreign inputs. In 2021, the political crisis in Belarus, one of the main potash producers in the world, combined with the closure of potash mines in Canada, caused an increase in the price of fertilizers, impacting the cost of production. The Brazilian government is putting into practice the National Fertilizer Plan (PNF), whose goal is to increase national fertilizer production and reduce dependence on imported inputs from 85% to 50% by 2050. This should open an opportunity. This means doubling the national industry, requiring investments of around R\$120 billion in production capacity", says Bernardo Mendes Silva, executive director of the National Union of Raw Materials Industries for Fertilizers (Sinprifert). To strengthen coordinated action, the Government restructured the National Fertilizer Council (Confert) and revised the PNF as to execute it efficiently. "In the initial months of Confert, national fertilizer production increased by 6% after facing 30 years of decline", says José Carlos Polidoro, advisor for Strategic Programs at the MAPA Executive Bureau. Also contributing to the result was the decision of the Finance Policy Council

(Confaz) that brings together the Finance Secretaries of the Brazilian states - to establish a plan for tax equality between imported and national fertilizers until 2025. Previously, the exemption for imported products destroyed competitiveness of the national product. Dependence extends to other South American countries that import 70% of their needs. Therefore, Brazil seeks to align with the other countries across the region. "We are working with governments and businesses in those countries to attract investments and increase production and distribution, thus reducing the cost of fertilizers and improving producer competitiveness throughout the region," adds Polidoro. Additional incentives are under debate in the Congress. The proposal to create the Fertilizer Industry Development Program - Profertst (bill 3,507/2021) is being analyzed Chamber of Representatives and it should establish a policy to encourage fertilizer industries and relieve up to a quarter of investment costs. Bill 4,338/2023, currently being debated in the Chamber of Representatives, creates a temporary economic subsidy policy for natural gas. The raw material is essential for nitrogen fertilizer plants, but its cost needs to fall from US \$14 per million BTU to US\$6 to be viable. If approved, the measures should generate more investment opportunities in the sector.

reduced environmental impact,” says Daniel Vargas, Coordinator of the Bioeconomy Observatory at Fundação Getúlio Vargas (FGV). In this context, the bioeconomy has all it needs to revolutionize national agriculture, promoting new markets. One example is S.Oleum – a company dedicated to large-scale production of sustainable raw materials (many of them replacing fossil sources) for multiple segments, from the food industry to the energy sector.

To begin with, the company is focusing on macaúba, a Brazilian biodiversity tree, rich in oils, fibers, protein and biomass with many usage possibilities. Vegetable milk, proteins, fats for various purposes, pyrolytic oil (considered vegetable oil) and biokerosene (aviation fuel) are produced from the fruit. Biomass is a source of hydrogen, 2nd generation ethanol and fertilizers (biochar). By 2029, S.Oleum should implement 180,000 hectares of macaúba in degraded or low-fertility areas of the Savanna (Cerrado) in ILPF systems. To achieve its goal, the company has partnered with several universities, companies and research centers to develop each link in this new production chain. “We are working with genetic improvement, cloning, field handling, new fertilizers, mechanization. It is a universe that ranges from biological products to the forest digitalization,” says Francisco de Blanco, CEO of S.Oleum.

For the plan to get off the ground, US\$4 billion will be needed by the end of the decade. “We will build five production clusters, made up of planting and industrial areas. Each cluster will cost US\$ 800 million, half of which should come from private equity, the other half from debt. We have already received investment from a global company, and we are at the

second round of funding to get the first cluster up and running,” says Blanco.

Aside from bioeconomy, the dizzying growth of agriculture requires more and more investments in traditional sectors. Storage is one of them. “Historically, Brazil increases grain production by around 10 million tons per year, but storage has grown by 5 million tons per year”, says Paulo Bertolini, president of the Chamber of Grain Storage Equipment of the Brazilian Association of the Machinery and Equipment Industry (ABIMAQ). The result is a storage deficit of 126 million tons.

With no place to dry, clean, sort and store grains, producers are forced to dispose of the harvest. “The harvest season is coincident; everyone needs trucks at the same time. With such concentrated demand, freight prices soar, because trucks have turned out to be warehouses. This results in higher logistical costs that end up being paid by producers,” says Bertolini. Furthermore, oversupply causes the price of commodities to depreciate in relation to international prices. According to Bertolini, two fronts are necessary to overcome the bottleneck: increasing financing lines and a volume of resources allocated to storage and investing in silos in rural properties. “In the United States, more than 60% of warehouses are on farms and they have the capacity to store 1.5 of crops. In Brazil, only 15% of the capacity is inside the gate. The majority (85%) are in urban, industrial centers and ports”, he says.

The meeting bore fruit that year: the two groups signed a joint venture for the production and sale of planters and seeders in Brazil. The partnership resulted in Aliança Crucianelli and Piccin, a company that is building a new factory to manufacture their machinery in São Carlos, in the state of São Paulo. “Arriving in Brazil is a yearning for many years of work and effort, with plans of becoming a relevant player in the world market,” says Gustavo Crucianelli, CEO of the Argentine Group that along with Piccin, plan to invest US\$ 9 million in five years. “This month we started selling planters with 80% of parts manufactured here and 20% in Argentina. From 2024 onwards, manufacturing will be 100% national”, says Camilo Ramos, CEO of Grupo Piccin. The forecast is to manufacture 4,000 planting lines by 2027, date in which the plant will reach a production capacity of 2,000 lines per



GETTY IMAGES

Agriculture and the ESG agenda

The prove that they follow ESG criteria, agribusiness companies and producers have certifications, undergo audits, incorporate traceability tolls and environmental aspects



Coffe farm, in Minas Gerais: Council of Coffee Exporters in Brazil travels the world showing data that prove the sustainability of Brazilian production

In Brazil, the ESG agenda is already part of the investment protocol in several segments. In the financial system, the bank BTG Pactual (from the same control group as EXAME magazine), for example, announced the decision to incorporate ESG criteria into the bank's investment recommendations. In agriculture, Brazilian giants such as Amaggi, Marfrig, JBS, Klabin, Suzano have reinforced ESG criteria in their sustainability reports by issuing bonds linked to projects with a positive environmental impact - sustainability-linked with performance indicators like metrics such as commitment to reducing greenhouse gas emissions - and results in the social sphere,

with contributions to improve people's housing and income. Producers have invested in certifications, audits, incorporation of traceability tools and participation in sectoral initiatives to evaluate and monitor social, environmental and governance aspects. These are efforts that guarantee transparency and prove to the final consumer the sustainability of their products. The work of the Brazilian Coffee Exporters Council (Cecafé) is a good example. The directors travel the world showing public data on coffee growing in the country, as well as national and regional studies proving sustainability of Brazilian coffee. Furthermore, the Council participates in pre-competitive initiatives such as the Global Coffee Platform's social welfare collective action to improve living and working conditions of producers and workers in Brazil's most important coffee growing regions.

year. The largest agro market in Latin America, Brazil is also an opportunity in the machinery and implements sector. The Argentine group Crucianelli, leader in the planters and seeders segment in their country. Fifteen years ago, they rehearsed a landing in Brazilian ground. They opened a unit in Rio Grande do Sul to import their machinery and put them on sale in Mato Grosso — a large Brazilian agricultural producer, but the closing price was not competitive. In 2022, the Crucianellis attended Agrishow — the largest international agricultural and technological exhibit in Latin America, in Ribeirão Preto, São Paulo, and there they were introduced the Piccin Group, a Brazilian company with a 60-year experience and vast know-how in manufacturing and marketing of soil preparation implements that was expanding the business and their product line.

Headquartered in Santa Fé, Argentina, and with revenues of US\$ 165 million, the Crucianelli Group focuses on the mid-west market and is expected to initially sell two models in Brazil. A planter already sold in Argentina and a new model that is being developed for the Brazilian market. "In Brazil, the closed machine needs to be 3.2 meters long, which is a standard for highways and to be transported by some trucks. Furthermore, Bahia and Maranhão need machinery that can plant crops with deep fertilization, something not necessary in Argentina," says Ramos. For now, production is focused on meeting domestic demand. "But we do not rule out the possibility of expanding in the future and exporting from Brazil," says Crucianelli.

Investment opportunities in Brazilian agribusiness are as fertile as the crops that abound throughout the country.

TRANSLATION BY ANNA MARIA DALLE LUCHE

The latest UN reports are conclusive: the world needs to reinvent agricultural production to feed the global population, going to 10 billion people by 2050, and – at the same time – reduce greenhouse gas emissions to mitigate the effects of the increase in global temperature. But how to do this? Besides universities, companies and research centers, the answer to this question comes from AgTechs or Agritechs, as agricultural startups are best known, creating technologies to increase and optimize the productive capacity of agriculture in Brazil and around the world.

These are companies with disruptive solutions, a scalable business model working with fast development methodology. According to the survey “Mining Report AgTech 2023” by the innovation platform, Distrito, Brazil currently has 598 AgTechs that have raised more than US\$490 million in investments since 2008. “Last year, 59 deals were conducted, accounting for an amount of US\$ 244.92 million, representing 73.6% of the volume invested in AgTechs in Latin America”, says Eduardo Fuentes, Distrito’s chief research executive. By far, Brazil is the largest market in the region, followed by Argentina and Colombia. Even this year, in which the entire universe of startups records significant drops in investments, the national agribusiness has already estimated contributions of US\$22 million in 19 business rounds.

Over the last three years including the pandemic period, the segment has been one of the favorites for capital ventures.



THE BOOST FOR NATIONAL AGRICULTURE

With disruptive solutions, AgTechs revolutionize productivity at home and shield the industry with blockchain and other guarantees that ensure commitments to the ESG agenda

LÍVIA ANDRADE



RICARDO TELLES

“The good performance is due to many factors: greater acceptance of technologies; improving the internet signal in the countryside, although it still has a long way to go; government support, and the approach of large companies, such as Raízen, Basf and Bayer that have increasingly invested in technologies and come closer to the innovation ecosystem”, says Fuentes.

Raízen — a sugar-energy giant in the industry with more than 1 million hectares of sugarcane crops, including its own and third-party areas, and 30 bioenergy parks focused on the pro-

↑ Mechanized harvesting at Raízen: giant in the sugar-energy sector created an open innovation hub to attract disruptive solutions

duction of ethanol, sugar, biogas, energy cogeneration, electromobility and sugarcane derivatives — clearly explains this two-way street between the private sector and startups. Six years ago, the company created Pulse, an open innovation hub, to address bottlenecks in the company's agricultural operations and which has now expanded to all areas of Raízen. Pulse screens startups, opens the doors to field tests and, if the

result is good and the business is viable, the services of AgTechs are hired. Today, the hub has partnerships with 58 startups out of the more than 1,000 in its database. It is even sought after by foreign AgTechs who want to come to Brazil. “Arable, an American agrometeorology startup, is an example. She wanted to validate her technology for sugar cane in Brazil. As a major player in the segment, we were decided to evaluate it and today the solution is being used by producers in the Araçatuba region, who suffers from water scarcity,” says Ricardo Campos, Digital Innovation Coordinator at Raízen and Pulse Manager.

The Israeli AgroScout is another AgTech that has recently landed in Brazil. It attended the program ScaleUp in Brazil resulting from the partnership between the Brazilian Export and Investment Promotion Agency (Apex-Brazil) and the Brazilian Association of Private and Venture Capital (ABVCAP). “With the program I have found out that Brazil is one of the countries with the largest agricultural area in the world. Today it is our focus market and not only as a customer, but as a basis for developing technologies for other crops, because we don't have coffee or sugar cane in Israel”, says Simcha Shore, founder and CEO of AgroScout, a startup in Brazil that has clients such as São Martinho mill, the largest sugarcane processor in the world, and PepsiCo. The startup offers solutions for crop management, captures data from satellites, commercial drones, the weather and uses artificial intelligence to analyze and give best recommendations to help farmers and food pro-

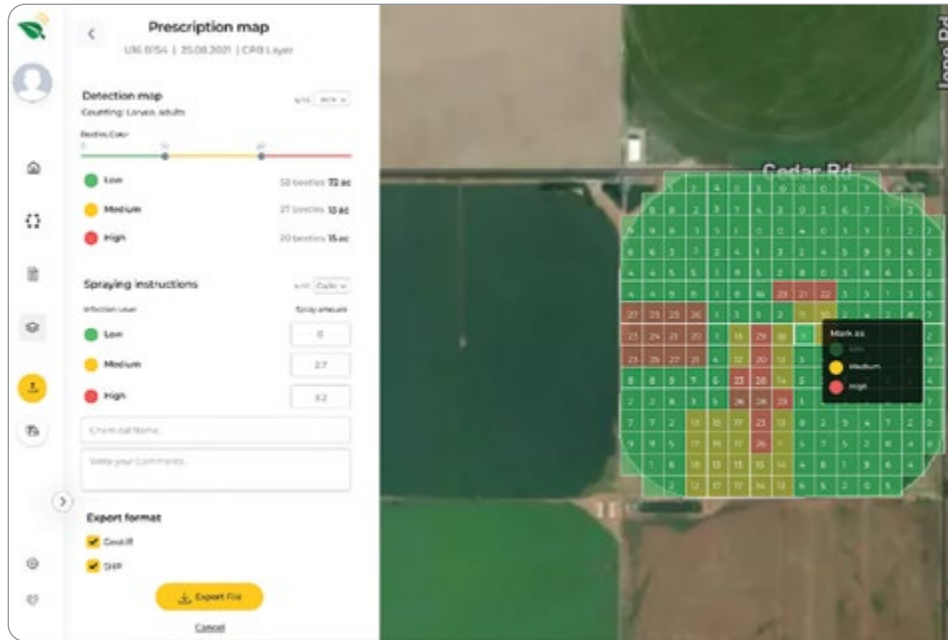
↓ Agrottools digital tool: Startup measures the socio-environmental risk of rural producers for banks to certify that they do not finance deforestation

cessors in decision making. The objective is efficiency and sustainability: greater productivity per area using fewer inputs.

Among the startups canvassed by Distrito, the categories that most stand out are: precision agriculture, that offer solutions that improve the monitoring and management of farms, resulting in gains in productive efficiency; agricultural market, marketplace solutions focused on agricultural services; Agri-smart machinery, startups that develop innovative equipment, including devices that use IoT; and Agfintechs, companies that offer credit to cooperatives and farmers.

There are already a series of Brazilian startups (Agrottools, Nagro, TerraMagna and Solinftec) tipped to become the first national Agri unicorn — a company to reach a market value of more than US\$1 billion. One of the candidates is Agrottools, founded in 2006, when storing data was expensive and limited to countries and large corporations. “I created Agrottools with the dream of using data to make decisions. Today we have the largest agricultural database in the world, with more than 1,300 tiers from multiple sources with solutions aiming at rural financing, sales efficiency, ESG, compliance, brand protection, rural insurance and supply chain intelligence”, says Sérgio Rocha, founder and CEO of Agrottools.

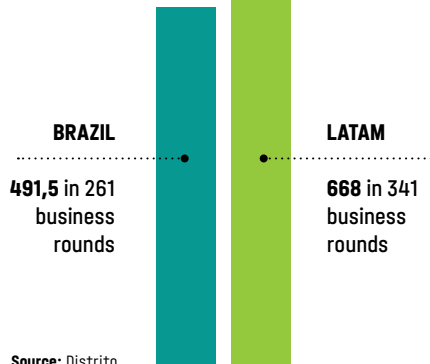
Pioneering the use of remote sensing, AI, blockchain and APIs for the development of digital solutions based on a proprietary platform developed exclusively for agribusiness that has given Agrottools a customer base of 200 corporations, from

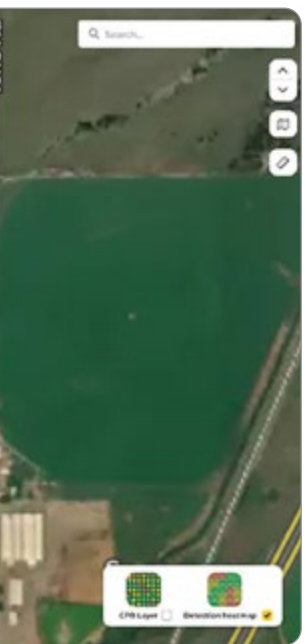


The x-ray of Agtechs

Distrigo research mapped the agro startup ecosystem in Latin America

Investment history, since 2008, according to Distrigo (in millions of dollars)





agribusiness to finance, such as McDonald's, Nestlé, Carrefour, Agrogalaxy and Rabobank. Among the analyses, the startup measures the socio-environmental risk of rural producers so that banks can be sure that they are not financing deforestation or work similar to slavery. “We have conducted more than 30 million socio-environmental analyzes in the last two and a half years. In 2006, it took 7 hours to complete an analysis, today it takes less than 1 second”, says Rocha. “In the past, the socio-environmental agenda disrupted market dynamics. Today it is an opportunity, a way to show buyers around the world that the origin of the supply chain is clean.”

Caramuru is one customer. A Brazilian grain processing company specializing in exotic markets, such as Norway, with a very demanding consump-

tion pattern. “They are protected by Agrotools technologies. Therefore, the Norwegian producer buying soybean meal from Caramuru to feed their salmon can be sure that the product did not come from a deforested area and uses this information to sell their fish,” says Rocha.

With large-scale solutions, Agrotools analyzes more than 4.5 million rural territories, monitors R\$ 15 billion in commodities and more than R\$ 50 billion in rural financing portfolio with at least one of the company's solutions. Furthermore, it has tools for the reinsertion of small and medium-sized producers into the agribusiness chain. “We have the Reconecta Platform for producers to learn about the socio-environmental status of the property, according to the criteria analyzed by slaughterhouses and trading companies, opening a possibility for them to join an adaptation plan and reinsertion into the formal market,” he explains. Currently, the platform is used by the JBS slaughterhouse and by the Reinsertion and Monitoring Program (PREM) of the Instituto Mato-Grossense da Carne (IMAC). It is no coincidence that Agrotools was selected by Apex-Brazil to participate in a business acceleration and investment attraction program in the Silicon Valley and this year, it officially entered the American market. In addition to Brazil, the company has operations in Argentina, Australia and Paraguay.

Another trend that came to light in Distrito's report is regenerative agriculture, that is, AgTechs with climate-smart solutions help producers to produce more and better, increasing productivity in the same area, capturing carbon and contributing to the mitigation of climate change. It is technology in favor of food safety and the environment.



Sugar cane harvest, at the São Martinho plant: the Israeli startup AgroScout arrived in Brazil and serves the largest sugar processor in the world with technological solutions



BALANCED TRANSITION

Brazil is emerging as a force in renewable energy, but the transition to a low-carbon economy is an expensive and gradual process — in which oil and gas still play a relevant role

GETTY IMAGES

Brazil stands out as one of the leaders in clean energy on the planet. In 2022, the share of renewable sources in the country's energy matrix reached 47.4%, according to data from the most recent “National Energy Balance”, prepared by the Energy Research Company (EPE). In comparison, the global average of renewables in the energy matrix is 14.1%, according to the International Energy Agency (IEA). When considering only the energy sources used to generate electricity, the country's advantage stands out even more: clean energy represents 87.9% of the Brazilian electricity matrix, compared to the average of 26.6% in the world.

There is no shortage of attributes to make the country into a global force in renewable energy and lead actions to reduce greenhouse gas emissions that cause climate change. The country has a large amount of renewable natural resources, such as solar, wind, hydroelectric and biomass energy, and offers conditions to reach a prominent position in new frontiers of clean energy generation, such as the production of green hydrogen, obtained from electrolysis of water. “In the energy sector, we can say that we are a great success story, given the range of international players present in Brazil, both in oil and gas and renewable energy”, says Ana Paula Repezza, Business Director at ApexBrasil. “Interest in the country is on the rise and we need to take advantage of this opportunity to be global leaders in the energy transition.”

INVESTMENTS PULLED BY DEMAND

In the second quarter of 2023, electricity consumption in Brazil grew 3.4% compared to the same quarter of 2022 — following the expansion of GDP that also increased 3.4% in the same period. According to the Ten-Year Energy Expansion Plan (PDE), by the Ministry of Mines and Energy, the plan outlines the scenario for the sector over the next ten years, electricity consumption could grow 3.4% per year between 2022 and 2032. To sustain this expansion, planned investments in energy exploration and production activities in Brazil could reach US\$489 billion by 2032. More investments, according to Repe-



Oil platform in Guanabara Bay: investments in energy production should amount to US\$ 489 billion by 2032

zza, will make it possible to lower the cost of energy, increase competitiveness, create jobs and income, promote regional development and generate royalties and revenue for the country, States and Municipalities. In the extremely globalized energy sector, it is crucial for rules to be clear and stable, that contracts are predictable as well as a business environment favorable to reinvestment.

OIL AND GAS

While moving towards a matrix with an increasing share of renewable sources, Brazil cannot lose sight of the fact that the energy transition is not a process that happens overnight. It requires time and investment to develop infrastructure, technology and production capacity to meet growing demand. In this scenario, exploring traditional non-renewable sources is a strategic path for the country to meet the growing energy demand while developing clean alternatives. "It is important to emphasize that the energy transition process does not exclude the world's need to continue using oil and gas. A decarbonized world is not a world without hydrocarbons," says Roberto Ardenghy, president of the Brazilian Oil and Gas Institute (IBP). He says that, since various estimates indicate that demand for oil and gas will continue to grow for at least one decade, it is essential to maintain production and the discovery of new oil frontiers — not only for the oil and gas industry, but also for the Brazilian economy as well as for the energy transition to be fair and inclusive, without leaving anyone behind. "We see

transition as a process in which all sources will coexist, guaranteeing the energy that the world needs," says Ardenghy. Currently, Brazil is the 9th largest producer and 8th largest oil exporter and oil products in the world, with revenues exceeding US\$ 56 billion in 2022. It has potential for much more. "Projections by the ANP, the National Petroleum, Natural Gas and Biofuels Agency, indicate that, if investment plans in the sector are maintained by operators already in the country, especially Petrobras, Brazil will rank to the fifth position among the world's main producers of oil by the end of the decade", highlights Repezza, from ApexBrasil. "This is a sector that represents around 12% of the country's industrial GDP, developing cutting-edge technologies, generating quality jobs and income and guaranteeing energy supply for the economy's growth."

PLENTY OF SUN AND WIND

Along with investments in traditional sources, Brazil has improved diversification of its energy matrix. One of the highlights is wind energy, which ended in 2022 with a farm of 904 plants and a capacity of 25.3 gigawatts (GW), a 18.9% growth compared to 2021. The country became the third largest installer of wind turbines in the world, supplying energy to approximately 124 million people. Solar energy also advanced, with capacity of 34 GW, corresponding to 15.4% of the electrical matrix. Projections indicate that, by 2050, solar energy will exceed the installed capacity of hydroelectricity in the country. It is also worth mentioning biomass, which comes mainly from the production of ethanol from sugarcane and corn. It is a great potential source for expansion in the country, thanks to the diversity of agricultural crops and the abundance of organic matter that can be used to generate bioenergy.

THE GREEN HYDROGEN FRONTIER

Another alternative that has been gaining ground in the search for a cleaner and more sustainable energy matrix is green hydrogen, also known as H2V. Several countries, especially in Europe, have invested in projects using this energy source. In Brazil, there are expectations of significant investments in the area, with estimates indicating a demand of 2.8 million tons of H2V per year by 2040.

However, the green hydrogen industry faces several technological, regulatory and market challenges, which require attention. Below, the reader will find articles that explore the themes exposed here. In the second quarter of 2023, electricity consumption in Brazil grew 3.4% compared to the same quarter of 2022 — following the expansion of GDP, which also increased 3.4% in the same period. According to the Ten-Year Energy Expansion Plan (PDE), planning by the Ministry of Mines and Energy that is in charge of outlining the scenario for the sector over the next ten years, electricity consumption could grow 3.4% per year between 2022 and 2032. To sustain this expansion, planned investments in energy exploration and production activities in Brazil could reach US\$489 billion by 2032. More investments, according to Ana Paula, will enable to lower the cost of energy, increase competitiveness of companies, create jobs and income, promote regional development and generate royalties and revenue for the country, states and municipalities. In the extremely globalized energy sector, it is essential that the rules are clear and stable, that there is predictability in contracts and a favorable business environment for reinvestment. "In the energy sector, we can say that we are a great success story, given the range of international players in Brazil, in oil and gas as well as in renewable energies," says Repezza. "Brazil is the focus of attention now and we need to take advantage of this opportunity to be global leaders in energy transition."

TRANSLATION BY ANNA MARIA DALLE LUCHE

BRAZILIAN OIL AND GAS: TOWARDS CARBON NEUTRALITY

Oil and natural gas are still important for companies during the energy transition period and Brazil is well ranked to take advantage of this

The Brazilian oil and gas sector has competitive advantages in relation to competitors towards carbon neutrality. To respond to the global challenge of reducing emissions, Brazilian O&G companies are already diversifying their investments to include low-carbon technologies in production process and measures to reduce emissions associated with their operations. “The industry is also part of the solution, and we have cutting-edge technology, qualified personnel and reach across the economies of different countries,” highlighted Jean Paul Prates, Petrobras CEO, last August during an event at the World Economic Forum, in Switzerland.

Oil production is characterized by a low carbon intensity per barrel produced – lower than most producing countries in the world. In the medium and long term, lower emission rates of Brazilian oil tend to benefit the country as an option to guarantee energy security for economic sectors that are difficult to decarbonize, such as maritime transport companies, airlines and heavy industry, representing an important share of countries wealth. Large global oil producers such as Canada, Iran and Iraq have CO₂ emission rates per barrel above the global average, currently around 20.4 kgCO₂/boe. Brazil, in turn, is at 16.9 kgCO₂/boe (2019), as pointed out by Instituto Brasileiro de Petróleo (IBP) showing the country's large producers in the oil and gas segment.

According to S&P Global Platts that monitors production activities in oil fields around the world, crude oil from the Tupi Field, in the Santos Basin, emits less than 15 kilograms of CO₂ per barrel of oil equivalent

(kgCO₂/ boe). From there, almost half of the volume removed from the pre-salt comes out. This data corroborates information from the Brazilian Oil and Gas Institute (IBP). In the pre-salt, the rate is even lower, close to 10 kgCO₂/boe.

In Brazil, only 18% of greenhouse gases come from the energy matrix – compared to the global average of 76%. Government, think tanks and industry representative organizations highlight that the greatest efforts towards carbon neutrality must come from policies to combat deforestation and encourage sustainable practices in the agricultural sector that currently accounts for most emissions. Again, the country has comparative advantages to deal with



DIVULGATION/PETROBRAS



Petrobras platform in the Santos Basin: carbon intensity per barrel produced is lower than the global average

the problem and an enormous potential for NBS (nature-based solutions) in its territory, accounting for approximately 20% of this global potential. And, in Brazil it is possible to reconcile food, energy and environmental objectives, through the conversion of 61 to 85 million hectares of degraded pastures into native forests, planted energy forests, and sustainable agriculture.

ECONOMIC RELEVANCE TODAY AND IN THE FUTURE

The economic relevance of traditional energy sources in Brazil is undeniable. In 2022, Brazilian sales of crude oil to trading partners reached US\$ 42.6 billion, corresponding to 12.7% of the country's total revenue from exports. Since pre-salt explora-

Only 18% of greenhouse gases come from the country's energy matrix – compared to the world average of 76%

tion began in 2008, the volume of oil shipped from Brazil has more than tripled. Revenues from oil and its derivatives ranked second and fourth respectively in the trade balance in 2022. This is an industry that develops cutting-edge technologies, generates quality jobs and income, and guarantees the supply of energy for develop-

ment of the country's economy.

A study developed by the Brazilian government in partnership with the Inter-American Development Bank (IDB) and the Brazilian Center for International Relations (CEBRI), launched last February, shows that in any of the scenarios

outlined for the transition to carbon emission neutrality in 2050, the share of oil and gas in the Brazilian energy matrix should be between 13% and 27% (compared to approximately 50% currently). In all scenarios, the sharpest drop should occur from 2040 onwards. In the intermediate hypothesis, in which the country pursues its goal in a context of low international cooperation, the segment will account for approximately 25% of the matrix. According to the same study, the country is now advanced in energy transition compared to the rest of the world. The country's matrix shows half of its primary energy coming from renewable sources (49% in 2020), well above the world average (14% in 2019).

REDUCING EMISSIONS IN O&G: SUCCESS STORIES

Using the geological carbon capture and storage technique (CCS, also known as CCUS), global giant Petrobras reported having reinjected 10.6 million tons of CO2 last year into pre-salt fields, responsible for 76% of Brazilian oil production. This represents a quarter of all carbon reinjected into the world. Since 2008, Petrobras has injected 40.8 million tons into seabed, an amount that was no longer released into the atmosphere. In short, reinjection into the reservoir itself avoids carbon emissions, allows commercial use of the gas and contributes to increasing the final oil recovery.

NATURAL GAS TRANSITION

Although Brazil is still depending on oil, natural gas presents itself as a transition fuel for industry, thermoelectric energy generation and vehicle supply. In 2019, an agreement between the Administrative Council

for Economic Defense (Cade) and Petrobras established agreements to increase the competitiveness of the natural gas market and allow the attraction of new investments. Since then, daily production has reached 140 million cubic meters and should reach 253 million cubic meters in 2029, according to a study by a working group from the Ministry of Mines and Energy, conducted in 2020. Other public policies have sought to create a fiscal environment and more stable regulation for investors.

Energy transition in the cement industry, for example, has been hampered by the production process itself that depends on the intense burning of fuels — currently, 70% of the furnace supply is petroleum coke. For the sector not to depend solely on carbon capture, an alternative would be the gradual exchange for natural gas and electri-

city, points out the document “Carbon Neutrality by 2050”. Over the years, coke should be completely replaced, with the predominance of natural gas. Cement manufacturers emit 23% of the greenhouse gases generated in the industry.

TRANSPORTATION CHALLENGE

Responsible for 80% of global trade and 3% of greenhouse gas emissions, maritime transport will go through a slower energy transition process. Ships depend on high energy density fuels to travel long distances with greater efficiency. Currently, bunker — a refined petroleum product — is dominant, but may give way to liquefied

Plane lands at Guarulhos Airport: transport sector is one of the most challenging for energy transition

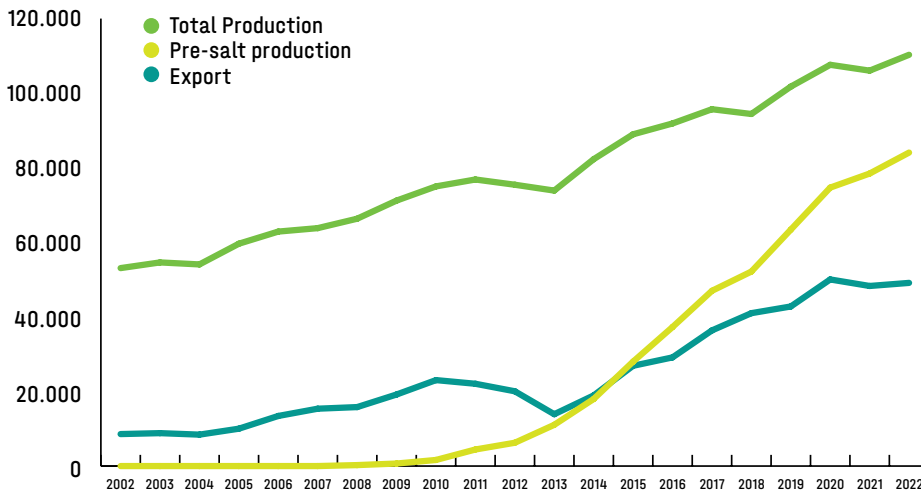


GETTY IMAGES

¹ Carbon neutrality by 2050: Scenarios for an efficient transition in Brazil; February 2023; available at PTE_RelatorioFinal_EN_5JUN.pdf (epe.gov.br) (English) and PTE_RelatorioFinal_PT_Digital_.pdf (epe.gov.br) (Portuguese)

High performance

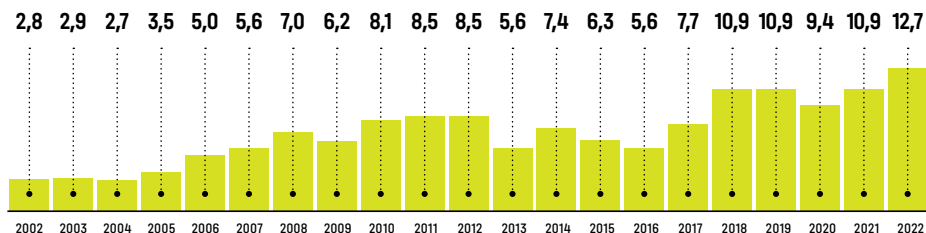
Evolution of Brazilian oil production and exports
(in thousands of barrels)



Source: ANP Agência Nacional do Petróleo (National Oil Agency).

Share of crude oil in Brazilian exports

(% of FOB value in dollars)



Source: Comex Stat/MDIC.

40.8 million tons of CO₂ have been injected by Petrobras at the bottom of the sea since 2008 [volume that was no longer released into the atmosphere].

natural gas, among other fuels.

Other investments will come from oil production in the Equatorial Margin, on the coast of Amapá to Rio Grande do Norte. By 2027, Petrobras intends to invest 2.9 billion dollars in wells research that shows itself to be promising after discoveries in the Guianas and Suriname. If confirmed, these reserves could have an effect like pre-salt. In the Guyana basin, a volume of 11 billion barrels of oil is estimated. By comparison, Brazil's entire proven reserve is estimated at 14.9 billion barrels.

Research on the equatorial border must balance care with environment and security issues, and the energy transition. "It is a unique opportunity to boost production and socio-economic development and it needs to be treated responsibly," says Ana Paula Repeza, business director at ApexBrasil. According to her, it is necessary to strategically evaluate how to adequately regulate the rhythm of this transition in the country, to guarantee access to energy for everyone at a reasonable cost. "It is crucial for us to be aware of our capabilities and competitive advantages, in addition to working to attract investments that have a significant qualitative impact" says Repeza. "This applies both to the production of renewable energy, such as wind and solar, and to the exploration of oil and gas, especially with our knowledge of technologies for deep waters exploration such as the ones in Campos and Santos basins, and now, with the perspective of the new exploratory front in the Equatorial Margin." The transition to carbon neutrality is an urgent decision. Until then, many new challenges will arise along the way.

TRANSLATION BY ANNA MARIA DALLE LUCHE

Since governments and companies began compromising to reducing emissions as per the 2015 Paris Agreement, green hydrogen — or H₂V, the abbreviation by which it is known in the market — began to receive an unprecedented level of attention. It is an especially efficient alternative to accelerate energy transition for carbon-intensive industries. More recently, different global markets, especially Europeans have begun to see the fruits of investment in innovation and development in this area.

According to the International Energy Agency, more than thirty countries have launched national plans on the matter in 2022. The truth is that many initiatives are still timid. Of the sixty-seven countries that maintain at least one green hydrogen project, 10 account for two-thirds of the initiatives. And seven are European: Germany, Spain, Holland, Great Britain, France, Denmark and Norway, in order of number of projects.

Germany, in fact, is a partner of the Brazilian Ministry of Mines and Energy (MME), in an agreement that resulted in the H₂Brasil project, developed in 2021 as part of a sustainable development program based on renewable energy. The initiative involves promoting technologies to encourage production, in addition to implementing laboratories with



IT IS TIME FOR GREEN HYDROGEN

Local and international companies invest in H₂V projects in Brazil seeking to become a global hub for this emerging source of clean energy



GETTY IMAGES



Green hydrogen plant in Europe: European countries lead the race in promoting this renewable energy alternative

infrastructure for learning and professional training efforts.

According to a report by McKinsey Consultants in Brazil, in 2040, demand for H2V is expected to reach 2.8 million tons annually. This means that there is an expectation of investments of around US\$200 billion over the next twenty years, while the number of applications tends to multiply. In the assessment of the MME's National Office for Energy Transition and Planning, the country has the potential to produce 1.8 gigatons of hydrogen per year, especially in coastal states that have easy

access to international markets, especially in the European Union.

As initiatives begin to get off the ground, national and multinational companies operating in Brazil seek to implement local solutions, with high potential to gain scale and reach the international market. The country already has announced US\$30 billion in projects on the matter, according to MME estimates.

“Green hydrogen is an important energy vector for the decarbonization journey of segments that are essential to the economy of any country,” says Roberto Noronha Santos, CEO of Unigel, a company with sixty years of experience in the chemical and petrochemical industries, in addition to

agribusiness. “We are responsible for the first green hydrogen and ammonia production initiative in Brazil, and we understand that this is the future — not only for the industry, but for society as a whole.”

Unigel announced in January the installation of an H2V plant in Camaçari (BA). The result of an initial investment of US\$ 120 million in the first phase, the unit is expected to produce 10 thousand tons of H2V per year, in addition to 60 thousand tons per year of green ammonia — numbers that should later reach, respectively, 100 thousand and 600 thousand tons per year. “We are in the engineering phase of the executive project. Civil works, electromechanical assembly, commissioning and start-up of the plant then begin. The production start is scheduled for 2024”, predicts Santos.

In this aspect, Portuguese group EDP has already produced its first H2V molecule in Brazil — more specifically, in the generation unit in São Gonçalo do Amarante (CE). The initiative is part of the development of the H2 Pilot Project at the Pecém Thermoelectric Complex (UTE Pecém), the result of an investment of R\$42 million. The H2V plant is part of a project that also includes a solar plant, with a capacity of 3 MW, and a state-of-the-art electrolyzing module to produce fuel guaranteed to be of renewable origin — an indicator

of how much H₂V production is related to the use of new sources of renewable energy, especially wind and solar.

Another company investing in this business is the French multinational Engie, that has signed a protocol of intentions with Invert Paraná last April, aiming at developing large-scale green hydrogen production projects in the state. The company adopted the global strategy of investing in this alternative — it already has seven projects underway in ten countries, with the objective of implementing production of 4 GW by 2030. And it sees its Brazilian operations to accelerate the development of H₂V, supported in the country's mostly renewable electrical matrix.

Since 2021, Engie Brazil has also partnered with the state of Ceará to conduct studies and projects for hydrogen units with a capacity of up to 150 MW, in an initial stage. The proposal in this northeastern state is to develop a large-scale project in the Port of Pecém, which the government of Ceará intends to transform into a global development and export hub — with the possibility of applying the product in the local market, especially for the steel industry and chemical production.

“Brazil has all the requirements to assume a prominent position in the green hydrogen industry, given its electri-

cal matrix abundant in renewable energy. Around 90% of the energy generated in the country comes from hydroelectric, wind, solar and biomass generation”, says Eduardo Sattamini, CEO of Engie Brazil Energia, a company determined to reach zero net emissions by 2045 and has already invested more than R\$20 billion in energy transition in the last six years. “We are looking for opportunities to develop projects for the production of green hydrogen and its derivatives, both for export and to meet the internal demand of Brazilian industries that aim at decarbonization of their production processes,” explains Sattamini.

Putting these initiatives into practice requires overcoming a series of challenges, points out the Engie executive. “This industry is in formation. Therefore, there are numerous challenges to enable the projects whether

from a technological point of view or for the development of a solid supply chain and a consumer market for green products.” There are also regulatory challenges. “It is necessary for Brazilian industry to follow and participate in discussions on certification of electrical energy for the production of hydrogen and biogenic carbon in Europe in order to maintain the country's competitiveness compared to other countries, such as the use of energy from hydroelectric plants and energy consumption through its transmission network.”

DIVULGATION/EDP



EDP has already produced the first H₂V molecule in Brazil — more specifically, at the generation unit in São Gonçalo do Amarante [CE]

On the national level, he emphasizes, it is important to create a regulatory framework to guarantee the projects that will be made viable now, and the ones requiring long-term implementation, adhere to the regulatory framework when they start operating. For Sattamini, Brazil can move in this direction if it closely observes initiatives such as the Inflation Reduction Act, in the United States, and policies for the use of synthetic fuels for the aviation industry, in Europe. “We need to develop similar actions in the country, in addition to studying specific



Investments on the rise

The development of green hydrogen is in the spotlight.:

131 NEW PROJECTS

have been announced worldwide since 2021¹

MORE THAN 30 COUNTRIES

have launched national plans in the area in 2022¹

67 COUNTRIES

have at least one project on hydrogen¹

2/3 OF THE INITIATIVES

are in 10 countries, 7 of which are European¹

US\$ 500 BILLION

in investments are expected worldwide by 2030²

US\$ 30 BILLION

green hydrogen projects have already been announced in Brazil³

€2 BILLION

will be invested by the European Union in low-carbon hydrogen projects in Brazil³

15 GW

of additional energy will be needed to produce 1.5 billion tons of green hydrogen per year in the country⁴

Sources: 1 International Energy Agency
2 Hydrogen Council 3 Ministry of Mines and Energy 4 National Institute of Clean Energy.

mechanisms in the electricity industry that could increase the competitiveness of green hydrogen production projects compared to other countries and therefore create and solidly develop this industry in Brazil.”

Strengthening the regulatory framework is also on the agenda of the National Confederation of Industry (CNI) that in a study detailing the H2V production scenario in the world, highlighted the need to reinforce investment security, encourage research and development of technologies, adopt the best international practices and promote studies that adequately size the potential of the industry.

On the other hand, Apex-Brasil, as well as promoting Brazilian exports, has sought to attract investments for strategic sectors of the economy. In the case of green hydrogen, Apex collaborates with several international agencies, such as Bloomberg, GIZ and AHK. In September, it took its own delegation to Gas Tech 2023, the largest global conference and exhibition for gas, LNG, hydrogen and low carbon industries. Held in Singapore, the event had more than a thousand international exhibiting companies, around forty thousand visitors and twenty international pavilions. It was an opportunity for companies operating in Brazil to meet potential consumers and interact with the most advanced technology for the sector. Presence at events like this reinforces Brazil's ties with the consumer market for a solution that has everything it needs to grow rapidly in the coming years.

TRANSLATION BY ANNA MARIA DALLE LUCHE

LEADERSHIP IN DECARBONIZATION

Technologies of capturing and storing technologies can put the country in a prominent position in the global effort to reduce emissions

DIVULGAÇÃO PETROBRAS



Platform vessel P-75, in Santos Basin: Petrobras has the largest CO₂ capture and reinjection program in the world



Brazil has a diversified energy matrix, with renewable and non-renewable sources.

Renewables, such as solar and wind, are important for the transition towards a low carbon economy but are still insufficient to meet the country's energy demand. Decarbonization technologies — an area in which Brazil has enormous potential — can complement renewable sources and reduce emissions from non-renewable sources, such as oil and natural gas.

One of the most promising technologies is the one that allows the capture, storage and use of carbon dioxide (CCUS) from the atmosphere or from sources generated by human activities, such as power plants and industries, storing the gas in a safe location, such as a geological reservoir or underground deposit.

CCUS systems are one of the essential pillars, according to the International Energy Agency (IEA) that are essential for the world to achieve net zero carbon emissions by 2050. The IEA estimates CCUS will be responsible for around 15% of the reduction in global emissions by the middle of this century. The technology is especially important for decarbonizing sectors that are difficult to electrify, such as steel and cement industries.

In Brazil, the outlook is positive. “We have enormous potential for CCUS in the country, especially in the oil and gas sector because of Petrobras’ experience in the segment,” says Roberto Ardenghy, president of the Brazilian Institute of Petroleum and Gas (IBP). The solution developed by Petrobras, known as Enhanced Oil Recovery (EOR), not only prevents emissions, but also allows the amount of oil extracted from the reservoir to be increased. The technology is already applied on the 21 platforms of Petrobras operating in the Santos Basin pre-salt.

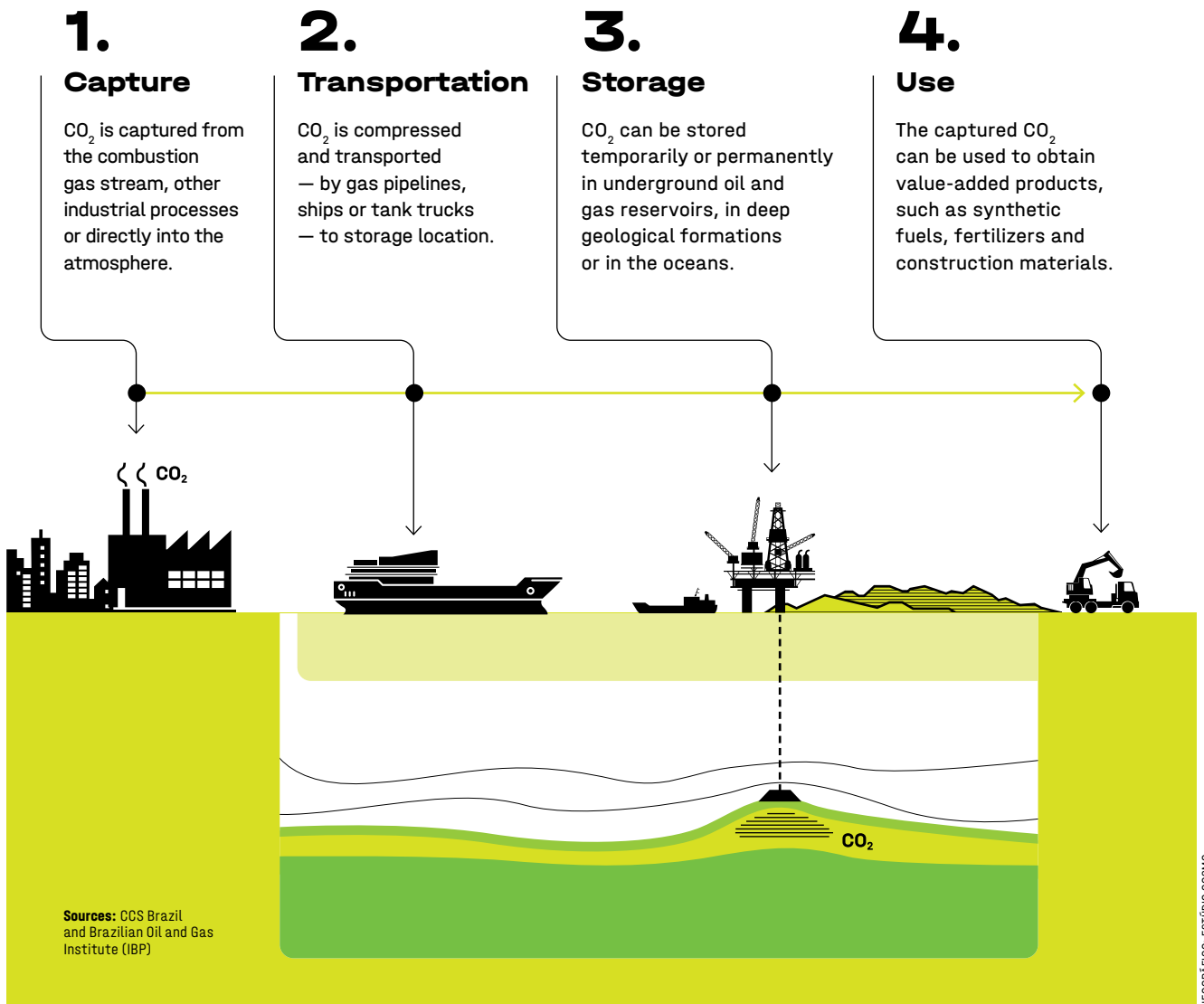
DECARBONIZATION HUBS

Petrobras is also leading a project to implement a CCUS hub at the Cabiúnas terminal, in Macaé (RJ). The idea is to reduce emissions from its own operations and involve other sectors, collecting CO₂ from cement industries, steel mills and other factories, for storage at seabed. “The development of CCUS hubs will be an important business model to open countless commercial possibilities to the different links in the chain, reducing the costs of capturing, transporting and storing CO₂ and allowing integration with other industrial sectors, known for the difficulty in decarbonizing,” notes Ardenghy.

It is estimated that CCUS could reduce 15% of global emissions by the middle of this century.

How CCU'S work

Technologies for decarbonization (carbon capture, utilization and storage, or CCUS) play a key role in Brazil's energy transition. They have four main steps:





GETTY IMAGES

In addition to emissions from fossil sources, thanks to its significant production of ethanol and other types of bioenergy, Brazil has immense potential for capturing CO₂ generated by renewable sources — a technology known as BECCS (bioenergy with carbon capture and storage). “Around the world, we currently have around 40 projects in operation, which capture and store around 45 million tons of CO₂

per year. Brazil, BECCS alone, have the potential to capture around 40 million tons per year. Considering all sources, the estimated capture potential in the country is 200 million tons per year”, highlights lawyer Isabela Morbach, co-founder and CEO of CCS Brazil, an entity that seeks to connect different agents to stimulate capture activities and carbon storage in the country.

Morbach points out to the characteristic of BECCS: by combining bioenergy production with carbon



Ethanol plant: Brazil has the potential to be one of the countries contributing the most to reducing emissions in the world

capture and storage, this technology can generate net negative emissions — that is, remove more CO₂ from the atmosphere than it emits. A project like this is being implemented in Brazil by FS Agrisolutions, that has invested R\$ 330 million to capture carbon in a corn ethanol plant in Lucas do Rio Verde (MT). “By combining the large production of bioenergy with new CO₂ removal technologies, Brazil can be one of the countries that contributes the most to reducing emissions in the world,” says Morbach.

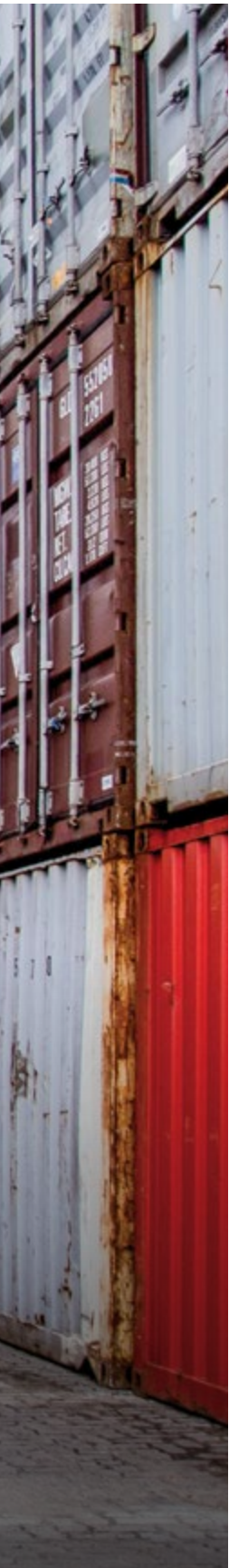
To unlock this potential, however, some challenges must be overcome. The first is the regulation of the activity in the country. Morbach recalls that three bills are currently in analysis by the National Congress that deal, the entire or in part of them, with the regulation of carbon capture and storage. “Project of Law 1,425/2022, the first that was presented and proposes the regulatory framework for the activity, has already been approved by all Senate committees and is now in the Chamber”, says Morbach. Ardenghy, from IBP, also highlights the urgency of the matter. “The biggest challenge is the consolidation of a regulatory framework to offer legal security both to the market and investors,” he states. “There are companies in Brazil with resources planned for CCUS projects, awaiting the necessary regulations to start their projects.” ●

TRANSLATION BY ANNA MARIA DALLE LUCHE



THE BASIS OF DEVELOPMENT

Numbers confirm the potential of infrastructure, logistics and sustainable mining in Brazil



MARILIA CAMELO



Pecém Industrial and Port Complex, in Ceará: site houses Brazil's first green hydrogen hub

There are plenty of reasons to convince international companies and investors to inject resources in Brazil. It is the largest economy in Latin America and the second in the Americas. And we are talking about one of the 10 largest economies in the world, owner of the 4th largest road network on the planet.

To be even more competitive and continue growing, the country is heavily investing in its logistics and transport networks. The Brazilian government hopes to attract US \$10 billion in investment from private partners to help expand them.

Partnership between Apex-Brasil and the Civil Cabinet's Investment Partnership Program (PPI) serves as incentive, as does the new PAC (Growth Acceleration Program that aims at triplicating federal public investments in infrastructure in the coming years.

For this year, 51 projects are planned related to airports, highways, ports, water infrastructure, parks and forests, urban mobility, sanitation and public lighting. All this to promote new business opportunities, and commercial advantages for companies located from North to South of the country.

Below, read more about the potential of Brazil's infrastructure and sustainable mining.

Path of no return

The growing demand for exports in Brazil opens new investment opportunities in ports — as shown by the country's first green hydrogen hub.

According to specialized consultants in business management, Roland Berger, Brazil should become the largest exporter of green hydrogen in the world. The German firm calculates that Brazilian producers of the sustainable version of gas will reach a combined annual revenue of R\$ 150 billion, from 2050 onwards. Note: R\$100 billion from the total amount should be raised by exports.

According to another consultancy, Grand View Research, the global green hydrogen market is growing at a rate of almost 40% per year. Grand View says that, in 2030, the segment is expected to generate 60.5 billion dollars — today it is around 3.2 billion dollars.

This explains the excitement caused by Brazil's first green hydrogen hub. Under development in the Pecém Industrial and Port Complex, in Ceará, where the country's first Export Processing Zone (ZPE) is also located, the new product has everything it needs to put Brazil at the forefront of the sector.

This is where the Australian Fortescue Future Industries, for example, decided to come. The company announced an investment of US\$ 6 billion to set up its green hydrogen plant here. EDP Brasil presented its own proposal, at the same hub, in January this year — with the capacity to produce 250 Nm³/h of the sustainable version of gas at a cost of R\$ 42 million.

GREEN HYDROGEN: THE SUSTAINABLE VERSION OF GAS

R\$150 BILLION

is estimated that the Brazilian producers of such sustainable gas should achieve in annual revenues from 2050 onwards

US\$ 60.5 BILLION

This is the amount the green hydrogen segment is expected to deploy by 2030. Today, some US\$ 3.2 billion are deployed

100 BILHÕES DE REAIS

of this amount will come from exports

40%

of the estimated global green hydrogen market should grow annually

The sustainable variety of gas — unlike black, gray, and brown — is obtained without any carbon emissions. It is a byproduct of the electrolysis of clean and renewable energy sources, such as solar and wind. It can be used in fuel cell vehicles and is an alternative for producing a more sustainable type of aviation kerosene.

According to a World Energy Transition study, prepared by the International Renewable Energy Agency (Irena), green hydrogen and its derivatives should represent 12% of end use of energy by 2050. Alongside electricity, it should account for 63% of final energy con-

sumption, replacing fuels highly associated with carbon emissions like fossil fuels.

According to the Energy Research Company (EPE), green hydrogen has become a strategic item for several countries, especially those determined to let go of energy sources more harmful to the environment. In Germany and the United States, for example, among other developed nations, the sustainable version of gas is seen as fundamental for enabling decarbonization of the world economy and for achieving, in 2050, the goals established by the Paris Agreement.

The country's first green hydrogen hub covers 1,000 hectares and is open to any other companies interested in doing business there. According to the Brazilian Export and Investment Promotion Agency, ApexBrasil, this is one of the most innovative initiatives in the segment.

Not surprisingly, the expansion projects for the Pecém Industrial and Port Complex were incorporated into ApexBrasil's investment portfolio that shows countless opportunities both to Brazilian and

foreign investors. The entity emphasizes that the complex also opens a myriad of possibilities for companies exporting fertilizers and steel materials, among others — that also apply to other ports in the country.

“There are many opportunities,” says Carlos Padilla, investment coordinator at ApexBrasil. “Emphasis is given to those involving energy, natural and renewable gas infrastructure, such as the green hydrogen plant project, which already has the attention of several international investors and formalized memorandums of understanding between interested parties and the management company.”

The success story of the Pecém Complex in the production of green hydrogen is explained, in part, by location. It facilitates access to the United States, Europe and the Middle East, thus reducing logistics costs and favors more competitive prices. The hub has all the necessary infrastructure to produce a sustainable version of gas, such as on and offshore wind generators, solar panels, power transmission lines and storage space.

Porto do Açu, in Rio de Janeiro, teamed up with Toyo Setal to develop a nitrogen fertilizer production plant in the complex. With a capacity to produce 1.38 million tons of urea and 781.5 thousand tons of ammonia per year from the use of natural gas. “The partnership allows us to take a step forward in our strategy of establishing Açu as a fertilizer production hub in Brazil, contributing to expanding national production and balancing our dependence on imports,” declared José Firmo, CEO of the complex.

↓ Fortescue Future Industries truck at the Pecém Industrial and Port Complex: Australian will invest 6 billion dollars to set up its green hydrogen plant there



DIVULGAÇÃO

THE BET ON GREEN MINING

The role of Brazil in supplying crucial minerals for the energy transition

The pursuit of carbon neutrality brings opportunities for countries like Brazil that have key mineral resources for building a sustainable future, such as lithium, cobalt, nickel, and copper.

The demand for lithium, for example (essential for making batteries with good autonomy and long useful life), tends to increase tenfold before the end of the decade. According to the consulting firm, Verified Market Research, lithium mining is expected to generate US\$ 5.4

billion in 2030 — US\$ 2 billion more than in 2021. This because more and more automakers — from Tesla to Volkswagen, from GM to Volvo — invest in electric-powered vehicles. The mineral is seen by the Brazilian Ministry of Mines and Energy as an opportunity for the country to become a world-class player in yet another market. The country ranks 8th place in reserves and 5th in world production. The objective — with research and projects — is to get to the 3rd place, stated José Luiz Ubaldino, director of the

Department of Geology and Mineral Production, of the National Bureau of Geology, Mining and Mineral Transformation (SNGM), during a debate in the Congress in October.

Sigma Lithium is one of the companies that focuses on sustainable mining. With shares traded on the Nasdaq and the Toronto stock exchange, the company has invested R\$ 1.5 billion to set up a plant in two cities in Minas Gerais — Aracuaí and Itinga, in the Jequitinhonha Valley. The process they adopt recycle 100% of the used water, although 10% ends up evaporating, and the waste is stacked dry (everyone knows the risks associated with the use of dams, especially in this region of the country).

Although Sigma Lithium extracts ore, the company's focus is on processing, that is explained by the market value of the raw material around 60 dollars per ton. The estimated value of processed lithium is 100 times higher — close to US\$ 6 thousand per ton. In the first phases, the multinational expects to produce US\$ 5.1 billion in lithium. One of their customers is LG, a component supplier for Porsche, Audi and GM. To keep

ON THE MAP OF GLOBAL MINING

US\$ 5.4

billion is the amount that Brazil's lithium mining resources are expected to generate by 2030 (US\$ 2 billion more than in 2021)

US\$ 320

billion was the value generated last year by the energy transition minerals market in Brazil

R\$ 120

billion was the mineral sector revenue in the first half of this year in the country

US\$ 19.8

billion represent the volume of exports from the segment in Brazil in the first half of this year alone

the course of the Piauí River unchanged the company says to have given up 30% of its reserves. Of the stipulated royalties, 60% will be transferred to the municipalities that host the plant. As a result, it is estimated that Araçuaí's GDP should grow by 47% and Itinga's by 135%.

According to the International Energy Agency, IEA, the market for products classified as essential for the transition has doubled in size in the last five years. It involves all minerals associated with electric vehicles, wind turbines, solar panels and other technologies crucial to the global farewell to the carbon era.

From 2017 to 2022, besides lithium that tripled the demand, the search for cobalt (70% growth) and nickel (40% more) also increased. The expansion in demand is attributed to the energy industry. Last year, according to the IEA, the energy transition minerals market was worth US\$ 320 billion. Investments by companies in the sector grew some 30% in 2022, after an increase of 20% in 2021. Lithium seems to have emerged as the opportunity of the moment. It is the raw material that recorded the biggest increase in investments: 50% in 2022.

"We are encouraged by the fast growth of the market for essential minerals, crucial for the world to achieve its energy and climate goals," points out Fatih Birol, IEA executive director. "Nevertheless, we have great challenges ahead. A lot more needs to be done to ensure

that mineral supply chains are safe and sustainable."

A few weeks ago, Fitch, a risk rating agency, released a report to warn that these minerals essential for a low-carbon economy — also called critical — will be increasingly subject to regulatory barriers, market and social issues. "Regional factors, such as exposure to physical climate risks and the prevalence of social inequality, may further exacerbate the vulnerability of certain critical minerals," wrote two agency analysts, Jonathon Smith and Tamara Tisminetzky. In some regions of the world, geopolitical issues also threaten the access to these strategic items.

MORE OPPORTUNITIES

Brazil also has significant reserves of nickel (the third largest in the world) and other key ores for a more sustainable future such as bauxite and manganese. The first corresponds to 2.6% of the volume of stones extracted in the country, according to the Brazilian Mining Institute, Ibram that represents companies and institutions operating in the segment. Nickel represents 1.4% of extractions, while manganese, 0.1%. The lead is occupied by iron ore, with 58.5%, and second place belongs to gold, with 9.4%.

"The country has a high mineral calling, with mineral provinces spread throughout the territory," stated Raul Jungmann, CEO of Ibram, at the last annual convention of the Prospectors and Developers Association of Canada. "Although the country is already prominent as a player for several commodities, its true mineral potential has not yet been fully known." The growing demand for critical raw materials, in

Sigma Lithium: company invested 1.5 billion reais to set up two plants in MG, where tailings are stacked dry, avoiding risks associated with the use of dams



Jungmann's assessment, opens opportunities that deserve their own national policy. "We are working on this," he said. According to Ibram, the national mineral sector earned R\$ 120 billion in the first half of this year — oil and gas do not count. Exports from the segment totaled US\$ 19.85 billion in the same period.

With the objective of creating innovative solutions for the sector — associated with renewable energy sources, operational efficiency and water, waste and tailings management —, in 2019, Ibram set up the Mining Hub, alongside several Brazilian mining companies. It is an innovation center for startups that host, in the same physical space, entrepreneurs and companies that are part of the minerals industry supply chain.

Anglo American, AngloGold Ashanti, ArcelorMittal, Bahia Mineração, Bemisa, CSN, Gerdau, Mineração Morro Verde, Samarco, Usiminas and Vale are some of the companies associated with the innovation center that has canvassed already 270 challenges in the sector and hired 17 startups.

Indwise is one of them with the purpose to increase productivity in industry 4.0. Founded in 2017, it was sponsored by Ferrous, a mining company. At the Mining Hub, the startup created a solution enabling plants to manage water intake, the main reservoir and supply in general, in real time. It includes alerts in case of critical



DIVULGATION

situations and issues management reports to understand sectoral consumption, water reuse rate and usage.

Also in 2017, the startup Pronto was born with the objective of training women in situations of social vulnerability to work in the construction market. In 2020, it started to focus on innovation and the circular economy, with the aim of valuing waste from mineral extraction. Sponsored by CBA at the Mining

Hub, the firm was asked to create a solution to a problem facing the aluminum giant.

In the Zona da Mata region in Minas Gerais, the company extracts bauxite. The waste derived from this process is composed of alumina, silica and iron. The challenge was to transform it into the raw material for a useful product with technical and economic viability — and in addition, to be effectively sustainable and generate social

impact in the community.

What Pronto has developed is an ecologically correct agglomerate, produced from that waste. It is a substitute for crushed stone and expanded clay. It can be produced locally and shipped to distant regions. With this solution, CBA made its bauxite production even more sustainable — one of the ores is essential for the energy transition. ●

TRANSLATION BY ANNA MARIA DALLE LUCHE

THE SANITATION



GETTY IMAGES



Guanabara's Bay, in Rio de Janeiro: Cedaec concession is considered one of the largest sanitation tenders held in the country

MARKET BOOM

By providing for the universalization of water and sewage services by 2033, the Basic Sanitation Legal Framework opens doors for private companies seeking a safer and more prosperous environment to invest

CARLA ZIMMERMAN

Rarely has the basic sanitation sector generated so much money in Brazil. In the first half of the year alone, BNDES (National Bank for Economic and Social Development) allocated around R\$ 3.7 billion for investments in sanitation, a value 929% higher than the financing recorded during 2020, when the Legal Framework for Basic Sanitation was approved. A lot has changed since then. The new legislation has defined goals for improving service provision by government water and sewage companies, and a series of indicators that will be considered when renewing contracts. In practice, the legal framework opened the market to the private sector, providing several investment opportunities.

In the last three years, R\$ 64 billion have been generated in contracted investments, according to Abcon-Sindcon (National Association and Union of Private Concessionaires of Public Water and Sewage Services). At least 18 large projects have come to life since 2020, such as the Cedae (State Water and Sewa-

ge Company) auction in Rio de Janeiro generating more than R\$22 billion. The sanitation auction of the consortium formed by 61 municipalities in Alagoas and Maceió serving more than one million people, also caught the market's attention. The project was structured by BNDES, which prepared a pipeline of concessions in the sector.

Now, BNDES is once again focusing on studies related to new concessions and PPPs (public-private partnerships). There are at least 12 projects being structured, with emphasis on the auction of the Sergipe sanitation company, Deso, scheduled for the first quarter of 2024, with an estimated investment of R\$ 7 billion, and Cosanpa (Companhia de Saneamento do Pará) that should take place by the end of next year.

EXPANDING ACCESS TO SANITATION

Like other state-owned sanitation companies, Cosanpa has difficulties in making investments and expanding the reach of their services, a problem that, to a greater or lesser extent, affects other Brazilian states. In Pará, only half of homes receive drinking water and only 9% have sewage collection and tre-

A GROWTH OF 929% IN THE AMOUNT ALLOCATED BY BNDES FOR INVESTMENTS IN SANITATION IN THE FIRST HALF OF THE YEAR COMPARED TO 2020

atment, according to the National Sanitation Information Service. Across the country, half of the population does not have access to the sewage network and around 35 million people do not have access to drinking water. "These are numbers that need attention and improvement. The good news is that, since the approval of the regulatory framework, new opportunities have been emerging and the market remains strong," says Percy Neto, executive director of Abcon-Sindcon.

PRIVATIZATIONS IN SIGHT

In São Paulo, the state government completed studies on the privatization of Sabesp and forwarded a proposal to the Legislative Assembly. The expectation is that voting will take place by the end of the year. The market is also waiting for the privatization of Copasa, a sanitation company in Minas Gerais, scheduled for 2024.

These are two big fish in the sector. With a market value of R\$ 36.8 billion, Sabesp serves 375 cities, with the government of the State of São Paulo as the majority shareholder. A publicly traded company, it generated R\$ 872 million in dividends in 2022. Copasa that follows the same shareholder model as Sabesp's is valued at around R\$ 7.6 billion. One of the main objectives of the privatization proposal of both companies is to increase investment capacity.

In all regions of the country, at least 14 projects are expected to come to life in the coming years. Among those structured by BNDES, five are expected to go to market next year. Aside from the concessions for the state sanita-

tion companies of Sergipe and Pará, those for Paraíba, Rondônia and Amapá are also planned. Other auctions, such as the one for the water and sewage company in Porto Alegre, Minas Gerais and Santa Catarina, are still waiting for official dates.

The market, in general, is betting on the PPP model. Attention is focused on the Paraná market, in which the first PPP in the history of Sanepar (Companhia de Saneamento do Paraná) was conducted this year. The winning consortium of the auction, held in July, formed by the companies Aegea, Perfin and Kinea, is expected to invest around R\$1.2 billion in sewage collection and water treatment over the next few years in 16 municipalities in the metropolitan region of Curitiba and on the coast of Paraná. Sanepar has already launched two public consultations for new PPPs in the sector. The objective is to universalize the sewage collection and treatment service in 195 municipalities.

Without the participation of the private sector, the goal of extending the provision of sanitation services to 90% of the Brazilian population by 2033, as recommended by the regulatory framework, would hardly be achieved. According to a study by Abcon-Sindcon conducted in conjunction with the KPMG Consultants, investments of around R\$ 800 billion will be needed over the next ten years for the universalization of water and sewage services to be deployed throughout Brazil. It is quite a challenge, since in the last five years around R\$20 billion have been invested each year in the sector. The prospects, however, point to a positive path, with impacts including job creation and economic growth. With the implementation of investments of around R\$ 44 billion per year, on average, necessary for the

**R\$ 800 BILLION
WILL BE NEEDED
OVER THE NEXT TEN
YEARS, ACCORDING
TO KPMG, FOR THE
UNIVERSALIZATION
OF WATER AND
SEWAGE SERVICES
THROUGHOUT BRAZIL**

universalization of sanitation, GDP could grow by some R\$ 56 billion per year, according to a study by Instituto Trata Brasil, an entity formed by companies interested in basic sanitation, in addition to the creation of one million permanent jobs.

SUCCESS CASES

Companies that have been investing in the sector are reaping superior results. Aegea, winner of seven sanitation auctions since the approval of the legal framework in 2020, reported a revenue of R\$ 8.3 billion in 2022, 120% more than in 2021, and is preparing



→
Estação de tratamento de esgoto, em Manaus: investidores estrangeiros qualificados, como o CIG, que detem participação na empresa de saneamento Aegea, exploram o mercado brasileiro

DIVULGATION AEGEA

for new leaps in growth. The company that counts with help of a Singapore's sovereign wealth fund, grew 15.3% in the first quarter of the year, compared to the previous quarter, and is preparing for new leaps in growth, with an eye on PPPs and other opportunities in the sector.

Other companies in the segment, such as Iguá, have also benefited from the market boom. In June, the company finished the raising of R\$3.8 billion in debentures and is preparing a new growth plan. Options such as shareholder contributions, searching for new partners and going public are on the table. The IPO (initial share offering) has also been studied by Aegea, in a clear indication of the sector's growth that has been encouraging the financial market.

NEW PLAYERS

There is a myriad of opportunities for growth, between auctions and PPPs by states and municipalities that are pursuing the goal of universalization set out in the legal framework. The next auctions structured by BNDES and municipalities are expected to generate at least R\$ 24 billion in the coming years, according to a survey by Abcon-Sindcon. The private sector has been playing a major role in the sector, after decades of a timid presence. The participation of private companies in water and sewage services has recently doubled, going from 9.1% of Brazilian municipalities, in 2022, to 15.3% this year.

The sector's expansion cycle should attract new players. The IFC (International Finance Corporation), the private investment arm of the World Bank, analyzes stakes in companies in the sector in Brazil. The Spanish group Aciona that competed in the Sanepar auction but did not win, has also



Sabesp water treatment plant, in Santo Amaro, in the south zone of São Paulo, state-owned that could be privatized



MARLENE BERGAMO

WITHOUT THE PARTICIPATION OF THE PRIVATE SECTOR, THE GOAL OF EXTENDING THE PROVISION OF SANITATION SERVICES TO 90% OF THE BRAZILIAN POPULATION BY 2033, AS RECOMMENDED BY THE SECTOR'S REGULATORY FRAMEWORK, WOULD HARDLY BE ACHIEVED

shown interest in studying new bids. Several other companies and investment funds would be looking at the market with interest, according to industry sources. Pátria, for example, created a new infrastructure fund this year for contributions to the transport logistics network and sanitation. The managers of the fund expect to have resources of R\$2.5 billion, should analyze PPPs such as Sanepar. The potential for gains in the segment has also motivated funds aimed at individuals, such as Vinci Partners that own Vinci Água e Saneamento, and Órama Infra. For the market, this is a scenario with good prospects – and tangible expansion opportunities. ●

TRANSLATION BY ANNA MARIA DALLE LUCHE



LEANDRO FONSECA



Rappi delivery man in São Paulo: expansion of the Colombian startup in Brazil allowed the company to become a unicorn

THE LARGEST INNOVATION HUB IN LATIN AMERICA

With more than 13,000 startups, a highly digitalized population and open doors for solutions from abroad, Brazil is the major technology hub in Latin America

LILIAN RAMBALDI

Along with the recognized power in agribusiness or renewable energy, there is also an aspect of Brazil as a leader in innovation and that is continually growing. For the third consecutive year, the country ranked high positions in the Global Innovation Index (GII), the comprehensive and most respected international ranking for evaluating countries in relation to their innovation ecosystems.

In the 2023 edition, recently released by the World Intellectual Property Organization (WIPO) responsible for the study, Brazil was the one with the most advanced in the ranking – rising five points –, consolidating the country among the fifty most innovative economies in the world and number one in the Latin America and Caribbean region.

According to Sacha Wunsch-Vincent, co-editor of the GII (Global Innovation Index), the country's innovation performance is so impressive that it has consistently surpassed its own level of development. "This is the result of Brazil's sustained efforts to convert innovation resources, such as the corporate sector's ability to boost research and development and, in general, the excellent national R&D infrastructure, which leads to results such as high-tech manufacturing, software production and the ability to produce unicorns," he argues.

In the report, the country shows high scores in indicators such as online government services (14th position) and electronic participation (11th

and is among the fifteen best-rated economies in both categories. Brazil also stands out for its intangible assets (31st), with superior results in registered trademarks (13th) and the global value of its brands (39th).

"Brazil thrives in a favorable environment of entrepreneurship, on the one hand, and with the presence of Brazilian multinationals with increasingly strong global brand value," points out Wunsch-Vincent. "And there is a high capacity for companies to generate intangible assets, such as intellectual property, software or reputation, and to transform them into business value for national growth driven by innovation," adds the WIPO expert.

A ROBUST ECOSYSTEM

The positive results in the GII reflect the fundamental role of technology in the country's relevant developments in recent years, permeating all sectors, from the inclusion of more people in the financial system to improving access to healthcare during the pandemic or increasing productivity and sustainability in agribusiness.

Today, Brazil as a more substantial and robust ecosystem, according to Eduardo Fuentes, head of research at Distrito innovation platform. "Entrepreneurs gave been increasingly empowered. We have a growing number of investors willing to invest in the country, corporations recognize open innovation as a viable way to improve their businesses and we have a government with a positive agenda related to it," he says.

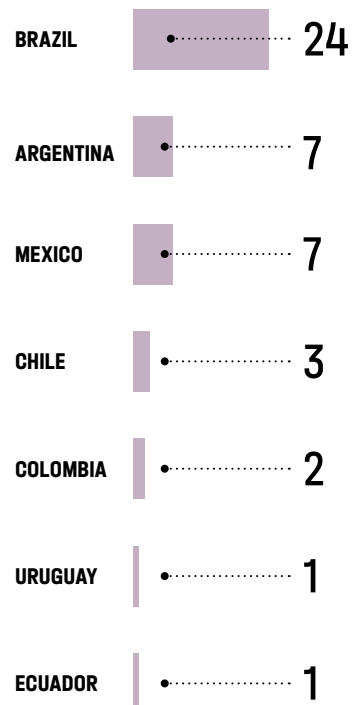
Such maturity explains Brazil's absolute leadership in the volume of startups in Latin America, establishing itself as the region's major innovation hub. There are more than 13,000 startups, representing 62.9% of the total, well ahead of Mexico's second place, with 11.7%, according to the Panorama Tech Latin America 2023 study, conducted by Distrito.

The country also ranks in first place in Latin American in number of unicorns, startups valued at US\$ 1 billion before going public: there are twenty-four companies, according to the survey, meaning that more than half of the unicorns in all Latin America, which are 45, are here.

NUMBER ONE IN UNICORNS

45

Total number of startups considered as unicorns in Latin America



Source: Panorama Tech América Latina 2023

FINTECHS STAND OUT

The financial market is historically the most solid in terms of innovation in Brazil, housing the largest number of startups and concentrating the largest volume of investments. Fuentes highlights that, despite the maturity of the segment, considerable progress has been made, especially due to a highly positive pro-innovation agenda from the Central Bank in recent years. “This approach has been fundamental in ensuring greater access to financial products by the population, which is equivalent to the inclusion of seventy-five million Brazilians in the banking system in the past few years. With a greater diversity of options, competition has intensified, raising the bar for all banking products and services.”

THE HEALTHCARE SECTOR HAS ROOM TO IMPROVE

Among the growing fields today, health is one of those with the most opportunities. The pandemic triggered a true transformation in the market, opening doors to countless possibilities. Remote care, implementation of electronic medical records and use of artificial intelligence for diagnoses are just a few examples of this movement that benefited from regulatory and conceptual developments in the country.

But there is still plenty of room for development, especially in the pharmaceutical segment. According to Norberto Prestes, executive president of the Brazilian Association of the Pharmaceutical Input Industry (Abiquifi), in-

creasing the number of deep tech startups (capable of developing new drugs) is one of the objectives ahead. An important effort in this direction is Abiquifi's Radical Innovation Program that seeks to converge government and private initiatives to develop an innovation ecosystem focused on the pharmaceutical chain.

One aspect of this strategic articulation that includes the involvement of Anvisa (National Health Surveillance Agency), is the creation of a regulatory parameter to promote radical innovation in the country, on an international level. “The discussion of regulatory standards will be decisive for the pace of expected advances with innovation. All this without forgetting the balance between the need for regulations aiming at protecting and security to people as well as support for experimentation and approval of new technologies,” highlights Prestes.

FERTILE GROUND FOR FOREIGN STARTUPS

A dynamic Brazilian market – not only as producer of technology, but as a large consumer of innovation – is an attractive destination for foreign startups aiming at becoming stronger. There is no shortage of room to grow here. With a population of 203 million inhabitants and the largest Gross Domestic Product (GDP) in Latin America, the national market is immense both in terms of number of consumers and capacity to pursue innovative solutions. “We are also well placed in terms of internet penetration, with a rate of 81% that makes the development of tech solutions rather easier here”, points out Eduardo Fuentes.

These factors draw the attention of foreign startups, many from neighboring markets, who see Brazil as an opportunity for expansion. “The phenomenon is observed in all sectors, from finance to real estate,” he points out.

This is the case of Rappi, a Colombian delivery startup that entered the Brazilian market and had a significant impact on the company re-

aching unicorn status in 2018. According to Tijana Jankovic, global vice president of business at Rappi, the largest customer base users is exactly Brazil, followed by Mexico. “Those two markets have turned the company into a major global player in Latin America,” she comments.

In the first place, because Brazil guarantees macroeconomic factors that favor the expansion and sustainability of businesses like Rappi, such as a large representation of the urban population, high digitalization of the population and a segment of users with high purchasing power. Then, in Tijana's words, because of the nine markets in which the startup operates, Brazil has, by far, the highest level of product, technology and customer service requirements. “As a result, Rappi had to invest and develop a lot in technology and operations to, in fact, serve the Brazilian user with the best possible experience. This knowledge acquired in Brazil has enabled Rappi to develop and stand out in all the markets it operates.”

SUPPORT FOR INNOVATIVE SOLUTIONS

Another successful example is Israeli DockTech. Using artificial intelligence and dynamic data, the company digitally reproduces seabed conditions in ports and shipping lanes in real time, increasing the efficiency and safety of maritime and port operations.

DockTech entered the Brazilian market with the support of Scaleup in Brazil, a UN-awarded program from ApexBrazil and the Brazilian



DIVULGATION/WILSON SONS



Wilson Sons tugboat: Israeli startup DockTech will monitor more than 754 kilometers of waterways in association with the operator

Association of Private Equity and Venture Capital (ABVCAP) that supports innovative international companies with the methodology and tools necessary to start operating in the country. “The program was essential for DockTech to be introduced to Brazilian players and understand the best way to operate in our market. The objective was to bring maturity to the company to be successful here,” explains Raquel Kibrit, who was the startup’s country manager in the process of entering the market.

Mission Accomplished. Associated with Wilson Sons, the largest integrated port and maritime logistics operator in Brazil, the Israeli company has just achieved a milestone in the country: after a technical cooperation agreement with the Port of Santos, the largest port complex in Latin America, the company signed the first commercial contract between a port authority, Portos RS, and a startup. Using Wilson Sons tugs and other vessels operating in the region, the company will monitor the bed of more than 754 kilometers of waterways managed by Portos RS, in Rio Grande, Pelotas and Porto Alegre, in southern Brazil.

These are some examples of how Brazil is not only a hotbed of startups, but also a safe haven for those who want to dock here. ●

TRANSLATION BY ANNA MARIA DALLE LUCHE

THE REVOLUTIONARY PIX

In three years, the Central Bank's innovative app became the most used payment system in Brazil - and received international awards for unprecedented financial inclusion

One of the country's greatest financial innovations is certainly the creation of Pix (Instant Payment System) in 2020 by the Central Bank. The Brazilian instant payment system is one of the most successful in the world and the success is clear: after three years since its launching, it already surpasses all other ways of transacting money in the country, such as credit, debit or bank slips. In just one day, October 6, for example, 163 million transfers were made via Pix, according to the Central Bank. For the unprecedented financial inclusion promoted by the tool, Pix has just received an international award in the United States, the Bravo Business Awards, which recognizes excellence and leadership in business and public policies.

DIVULGATION



Silvia Massruhá President of Embrapa

Ana M.C.Euler

Business Director

Clenio Pillon

Research & Innovation Director

Judson Valentim

President of the Amazon Portfolio

THE CHALLENGES OF THE BIOECONOMY IN THE AMAZON

BRAZIL IS COMMITTED TO THE DEVELOPMENT OF STATE POLICIES TO ENABLE BIOECONOMY BASED ON BIODIVERSITY, THE MAIN VECTOR OF INCLUSIVE AND SUSTAINABLE DEVELOPMENT IN THE AMAZON

In Brazil, policies promoted over the last 70 years have resulted in the conversion of around 20% and the degradation of 38% of the Amazon biome through use of fire. The result was the generation of economic benefits for a few and the maintenance of the paradox of immense environmental wealth with populations living in poverty.

At the same time, climate change is accelerating, impacting the environment and the lives of communities, with risks of irreversible changes in the Amazon.

Current discussions converge towards an agenda of actions and policies aimed at productive inclusion to enable an increase in income and quality of life for more than 28 million inhabitants of the Amazon, in line with the conservation and sustainable use of natural resources.

Here is where the Brazilian Agricultural Research Corporation (Embrapa) is inserted. The company has operated for the last 50 years in a cooperative manner with governments and different productive segments in the agricultural, forestry and agro-industrial sectors. The budget invested by Embrapa in the Amazon in 2022 was R\$477 million, with a social return of R\$895 million and the generation of more than four thousand jobs through the adoption of Embrapa's technologies.

With a focus on food security and income generation for approximately 700 thousand family producers, more than 200 technologies have been developed for 50 production chains enabling the transition from slash-and-burn agriculture to deforestation-free agriculture.

A technological example that values the standing forest is the management of native açai groves. An extractive family managing 15 hectares can generate a gross annual income of more than R\$ 37,000.

Technologies have also been generated to recover more than 55 million hectares of degraded pastures accounting for more than 80% of the deforested area in the Amazon. These technologies transform monoculture with exotic grasses into biodiverse pastures with leguminous plants native to Brazil that become natural bio factories for biological nitrogen fixation thus eliminating the need to use imported high-cost fertilizers. This has been allowing the maintenance of productive pastures over decades, shortening the production cycle and reducing greenhouse gas emissions by up to 36%.

In this context, reversing technological backwardness and increasing family farming productivity rates with technologies already available is a way of reducing pressure on deforestation and generating social inclusion.

The paths to the flourishing of an inclusive bioeconomy in the Amazon necessarily involve robust public investments in science, human capital formation and infrastructure. The strategy must be able to mobilize private actors around State policies aimed at multiple-use forest management, productive restoration, payment for environmental services, decarbonization, and sustainable and inclusive intensification.

The future of the Amazon requires attention to the social dimension with the appreciation of the work, knowledge, territories and culture of the forest people. ●

Por que o Brasil?
Descubra as
vantagens e
oportunidades de
investir na maior
economia da
América Latina.



INVEST IN BRASIL

Aponte a câmera para o
QR Code e saiba mais.

Somos a agência oficial do governo brasileiro e oferecemos suporte gratuito para investidores que buscam oportunidades no Brasil. Nosso papel é dar toda a orientação necessária para empresas e instituições que querem encontrar, expandir ou estabelecer parcerias, bem como apresentar opções personalizadas de investimentos e conexões inteligentes, seguras e prósperas no país. É assim que contribuimos para o desenvolvimento e crescimento sustentável da economia brasileira e dos investidores que buscam nossa orientação.



O QUE OFERECEMOS:

- Consultoria personalizada;
- Informações fiscais;
- Informações de mercado e setoriais;
- Fluxo de negócios de fundos e empresas;
- Introdução a parcerias;
- Tecnologia de *softlanding*;
- Suporte *in loco* a projetos;
- Oportunidades de *networking*.

**Atrair
investimentos
e crescer
sustentavelmente.
É do Brasil.
É dos brasileiros.**

A maior biodiversidade do planeta é do Brasil. A capacidade de transformar de forma sustentável o que a natureza nos dá em produtos de sucesso é dos brasileiros.

Um agro forte, que alimenta o planeta, é do Brasil. O trabalho duro, com pesquisa de ponta e desenvolvimento tecnológico, que faz nossos produtores baterem recordes de produção, é dos brasileiros.

Ser reconhecido pela matriz energética limpa, pelo maior programa de inclusão social do planeta e pelo parque industrial com grande potencial de crescimento é do Brasil. Assim como ser respeitado pela criatividade que conquista o mundo é dos brasileiros.

E é divulgando esse potencial brasileiro que apresentamos para investidores dos mais diversos países as oportunidades e o potencial dos negócios no país, que atrai cada vez mais parceiros no mercado global.

É do Brasil. É sustentável. É para o mundo todo.