

Clean Energy Ministerial and collaboration opportunities between MI and RD20 – Brazilian perspectives

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MINISTÉRIO DE
MINAS E ENERGIA

GOVERNO FEDERAL
BRASIL
UNIÃO E RECONSTRUÇÃO

New Delhi, December 2024



Clean Energy Ministerial and collaboration opportunities between MI and RD20 – Brazilian perspectives

Research and Development 20

For clean energy technologies

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Oil Products and Biofuels Department

New Delhi, December, 2024

About Energy Research Office - EPE



Empresa de Pesquisa Energética

www.epe.gov.br/en



Federal policy institute, **attached to the Ministry of Mines and Energy.**

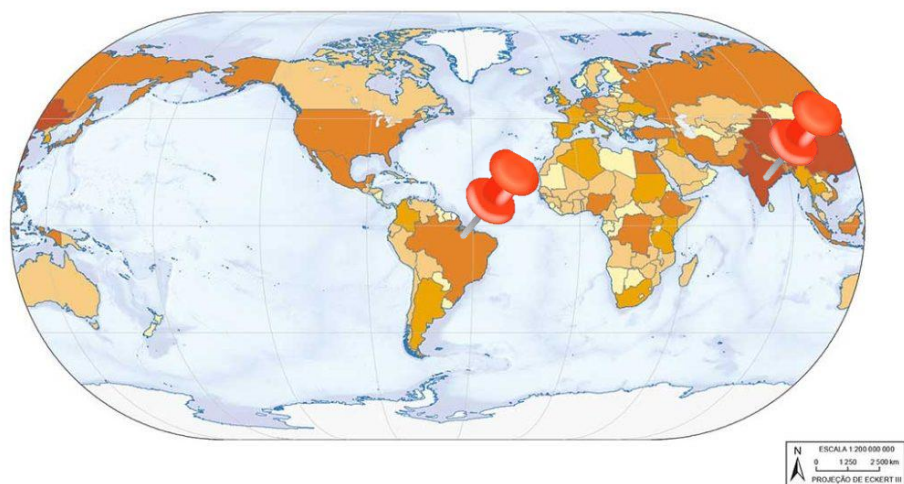


The purpose of **EPE** is to provide energy **information, studies and research** that support the **national energy planning.**

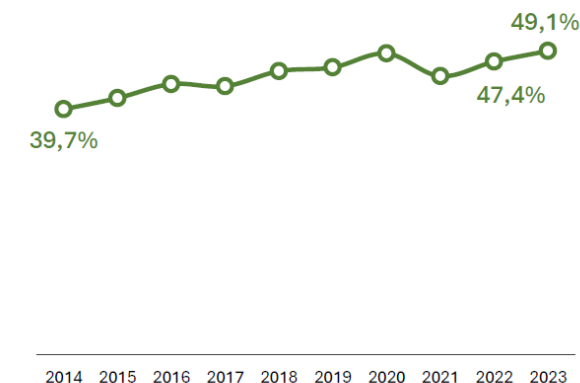
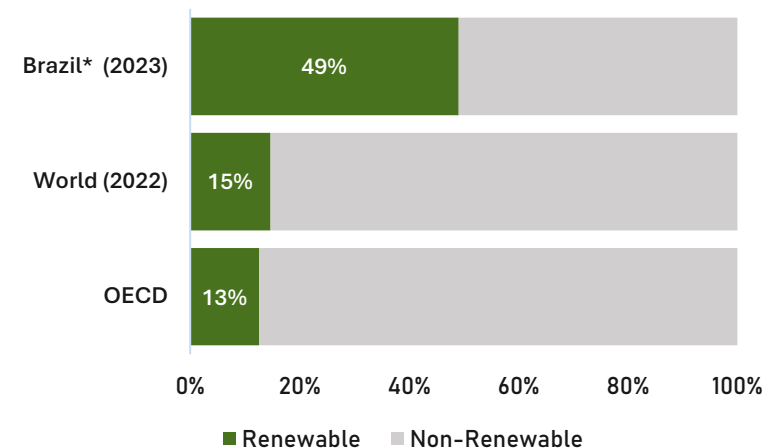


EPE's expertise areas cover **electricity, oil, natural gas, coal, nuclear, renewables and energy efficiency.**

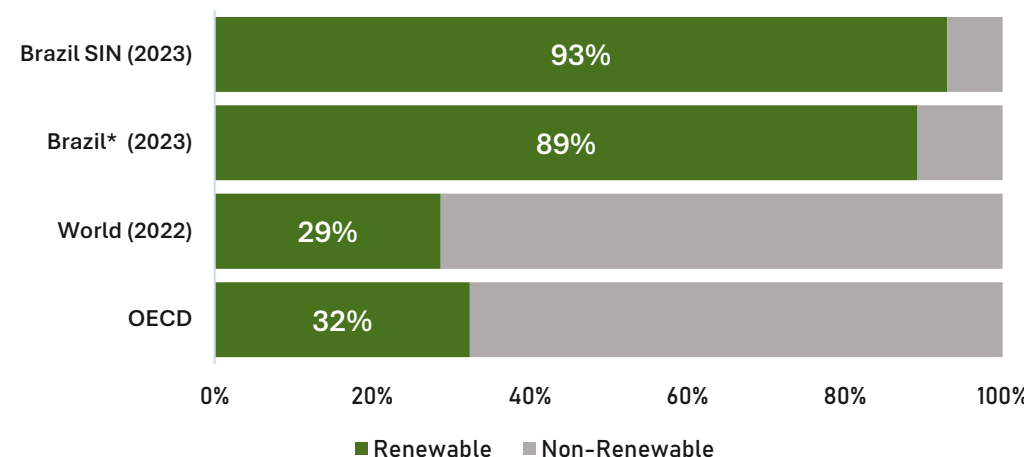
Brazil in the world map



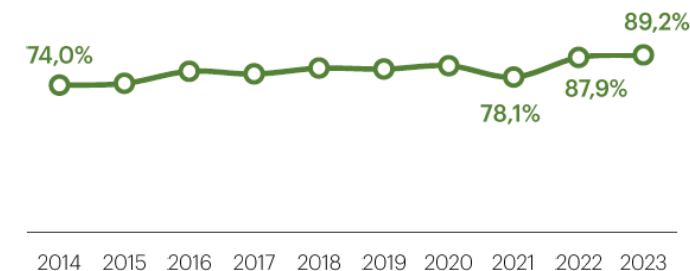
Total Primary Energy Supply



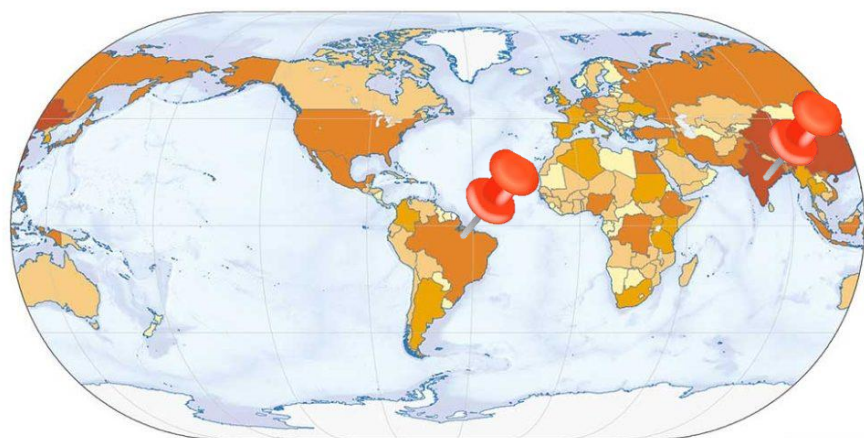
Electricity Mix



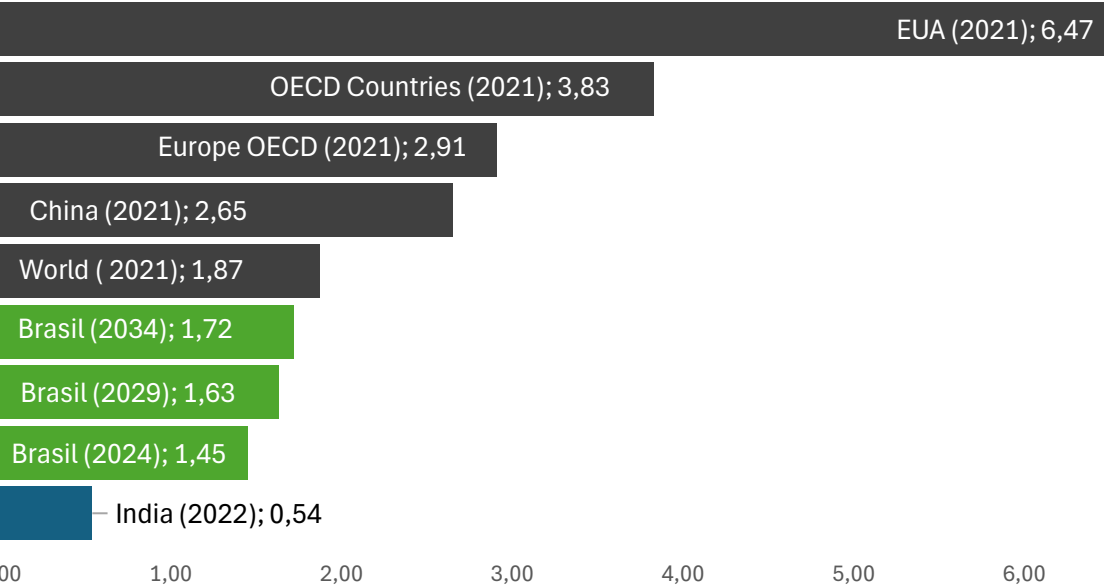
The renewability of the National Interconnected System (SIN) calculation excludes Isolated Systems, Electricity Imports, Self-production not injected into the grid and MMDG.



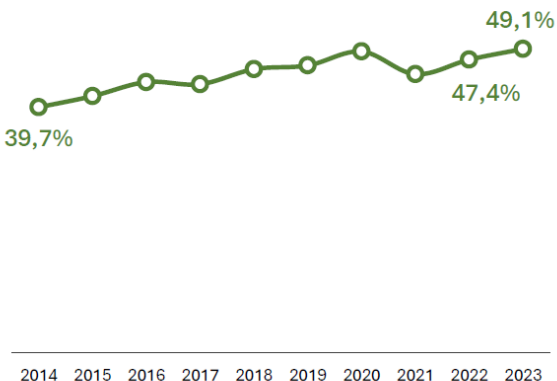
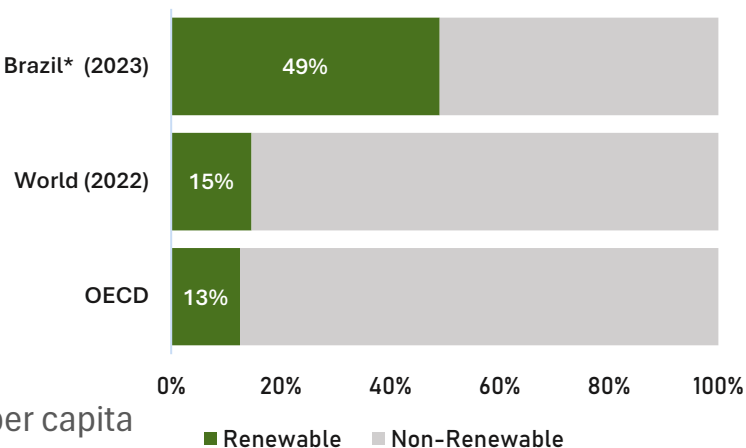
Brazil in the world map



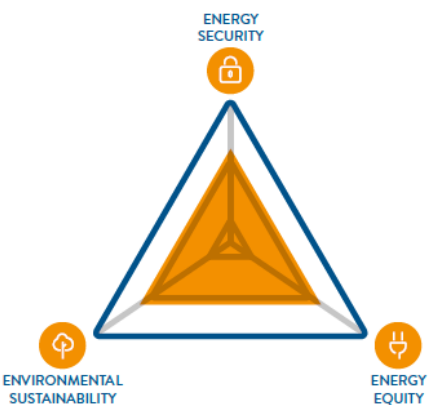
Total Primary Energy Supply per capita
toe/hab



Total Primary Energy Supply



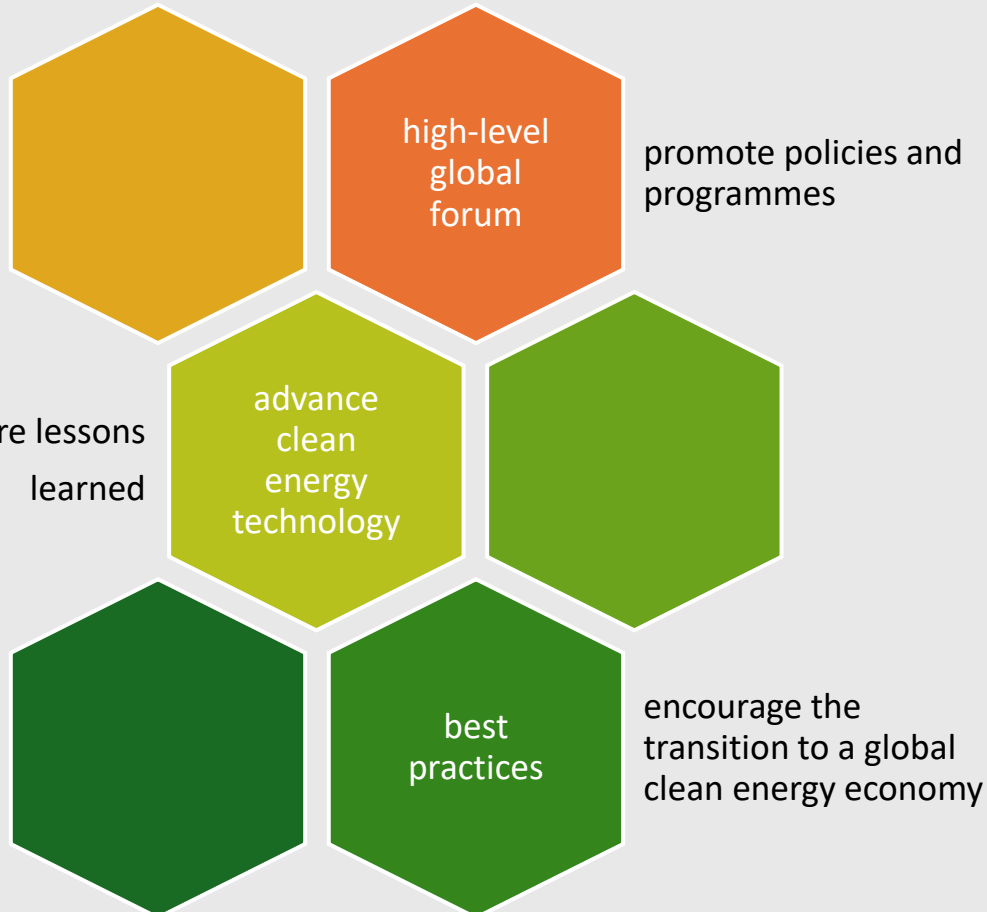
Energy trilemma is the main driver



Contextualization

- Climate change mitigation requires **world collective action to reduce greenhouse gas (GHG) emissions**
- International cooperation to establish **long-term incentives** for facilitating more “**proportionate**” policy response
- Eventhough UNFCCC remains as major framework for international co-operation on climate change, “**climate clubs**” have been created in recent years, with **small groups of countries**, to **engage international climate action beyond UNFCCC**
- At the 15th Conference of the Parties (COP15) in 2009, **USA** announced that they would **host the first CEM in 2010**
 - *Clean Energy Ministerial (CEM): a climate club seeking to promote a global energy transition away from carbon-intensive technologies and infrastructure and towards technologies for ‘clean energy’.*

Clean Energy Ministerial | CEM



CEM

Initiatives are based on **areas of common interest** among participating governments and other stakeholders

CEM

brings together a **community of the world's largest and leading countries, companies and international experts** to achieve one mission

CEM

accelerate **clean energy transitions**

The **Framework for the Clean Energy Ministerial**, reaffirmed at the twelfth Clean Energy Ministerial in 2021, defines the CEM governance structure and outlines the mission statement, objectives, membership, and guiding principles.

CEM Community today



Members

Australia	Brazil	Canada	Chile	China
Denmark	European Commission	Finland	France	Germany
India	Indonesia	Italy	Japan	Mexico
Netherlands	New Zealand	Norway	Poland	Portugal
Russia	Saudi Arabia	South Africa	South Korea	Spain
Sweden	United Arab Emirates	United Kingdom	United States	

Participants

Argentina	Austria	Costa Rica	Czech Republic	Egypt
Ghana	Greece	Hungary	Israel	Jordan
Kenya	Luxembourg	Morocco	Mozambique	Panama
Paraguay	Philippines	Romania	Switzerland	Türkiye
Uruguay				

CEM Members represent 90% of installed clean power generation capacity, 80% of global clean investments, and the majority of public research and development in clean energy technologies

Contextualization

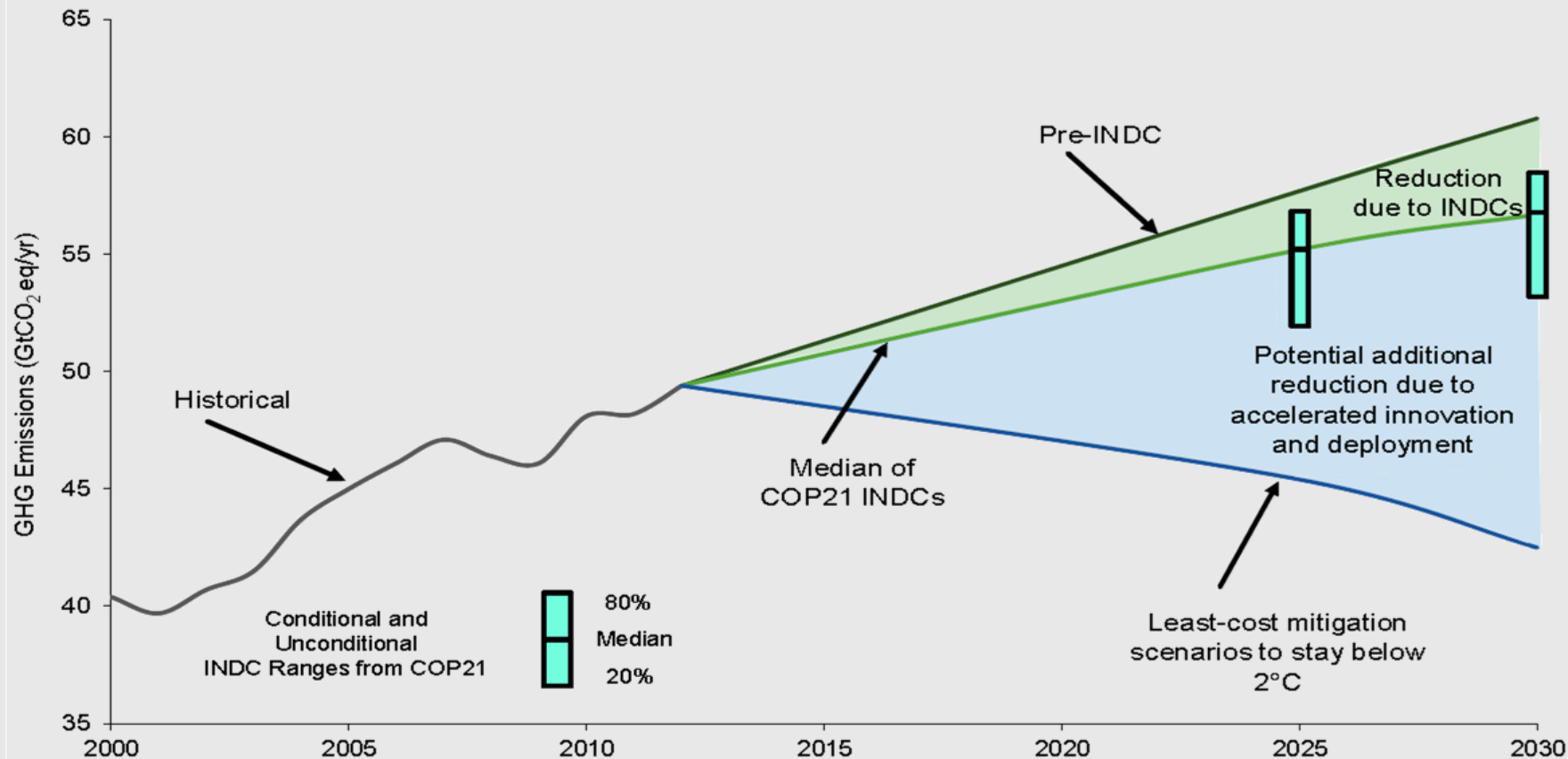


- The global community **has made** remarkable **progress** in driving down the costs and increasing the use of key clean energy options.
 - **However, these impressive gains** are still insufficient to meet our long-term **climate goals** while providing affordable, reliable and secure energy supplies. **In support of these efforts, members launched MI in 2015 with the following goal:**

In support of economic growth, energy access and security, and an urgent and lasting global response to climate change, our mission is to accelerate the pace of clean energy innovation to achieve performance breakthroughs and cost reductions to provide widely affordable and reliable clean energy solutions that will revolutionize energy systems throughout the world over the next two decades and beyond.

Effects of Accelerating Innovations on Emissions Reduction

MI + CEM + Investors, Business and Industry = Accelerated Progress



Source: Adapted from UNFCCC, Synthesis report of INDCs, October 2015; <http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf>

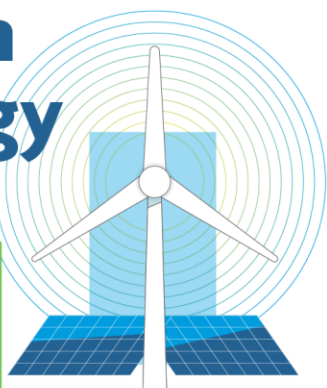
Mission Innovation | Programm



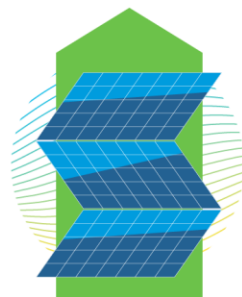
Since Mission Innovation's launch at COP21 in 2015:

Clean energy

USD\$
5.8
Bn



additional annual investment in clean energy innovation (2020)



USD\$
18
Bn

cumulative increase in clean energy innovation investments

USD\$
1.6
Bn

funding leveraged to support

157



new international collaborations

supporting clean energy innovation



21
gigatons of CO₂

emissions reduction per year by 2030, if the nearly

1,500
innovations

supported by Mission Innovation members are fully deployed



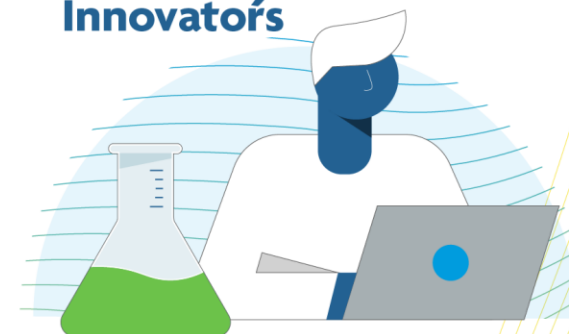
70
international publications

highlighting the work of Mission Innovation



MISSION
INNOVATION

185,400
Innovators



involved in

62 on **4**
Events Continents

Mission Innovation | Missions



GREEN POWERED FUTURE

MISSION

To demonstrate that by 2030 power systems in different geographies and climates are able to effectively integrate up to 100% variable renewable energies in their generation mix and maintain a cost-efficient, secure and resilient system.



ZERO-EMISSION SHIPPING

MISSION

For ships capable of running on zero-emission fuels to make up at least 5% of the global deep-sea fleet by 2030, We will crystalize an ambitious alliance between countries.

GREEN SHIPPING CORRIDOR HUB

showcase zero-emission fuels and technologies along maritime trade routes between two (or more) ports, can help accelerate adoption of alternatives to petroleum-based fuels in the maritime industry, which in turn can reduce greenhouse gas emissions



CARBON DIOXIDE REMOVAL

MISSION

To enable Carbon Dioxide Removal technologies to achieve a net reduction of 100 million metric tons of CO₂ per year globally by 2030.



SMART-CDR Competition, in partnership with generous sponsors to tap the creative power of university students throughout the world in helping to solve some of the most complex and impactful challenges impacting the CDR industry: monitoring, reporting, and verification (MRV).

Students are invited to form diverse and global teams to develop innovative solutions for MRV. The proposals can be a technology, approach, methodology, AI application, sensing equipment, or other creative solution applied to any CDR pathway.



Mission Innovation | Missions



To increase the cost-competitiveness of clean hydrogen by reducing end-to-end costs to USD 2 per kilogram by 2030.



By 2030, deliver at least 50 large-scale, integrated demonstration projects in urban environments around the world, providing a pathway for all cities to adopt net-zero carbon solutions as the default option



To catalyse the development and demonstration of cost competitive solutions for the efficient decarbonization of hard to abate energy intensive industries worldwide by 2030



Develop and demonstrate innovative solutions to accelerate the commercialization of integrated biorefineries, with a target of replacing 10% of fossil-based fuels, chemicals and materials with bio-based alternatives by 2030

Mission Innovation



Members



Collaborators



Mission Innovation Biorefineries- Brazil



- Policies



Mandatory addition of anhydrous ethanol to gasoline

- Analysis to increase from 27,5% to 30%

Mandatory addition of biodiesel to diesel B

- Approved the increase from 12% to 14% in March 2024, and then 15% March 2025



National Biofuel Policy (RenovaBio)

- Units Certified production capacity:

- ethanol 80% [285/355 units]
- biodiesel 62% [37/60 units]
- biogas 67% [4/6 units]



“Fuels of the Future” Program

- Integration between public policies related to the Program
- Reducing the matrix fuel carbon intensity
- Evaluation of energy-environmental efficiency through a complete LCA
- **Stimulation of innovation and technological development**
- Project Law submitted to evaluation in the Congress
 - September 2023
 - WtW, SAF, CCS, HVO, E30

Biorefineries Projects (2024-2032)

Granbio [AL]

Large scale project using energy cane and AVAP technology Platform to produce 100 million gallons of Net Zero SAF (Sustainable Aviation Fuel) at scale in 50,000 hectares



Be8 [Brazilian group in Paraguay]

Omega Green biorefinery (Paraguay)

Production capacity: 20,000 barrels per day, (mixture of HVO, SAF (SPK), and Green Naphtha.

The facility has two main technology processes:

- Pre-treatment (Crown technology) and
- Hydrotreating (Honeywell-UOP).



Mission Innovation Biorefineries- Brazil



**INTEGRATED
BIOREFINERIES**
MISSION

• Policies



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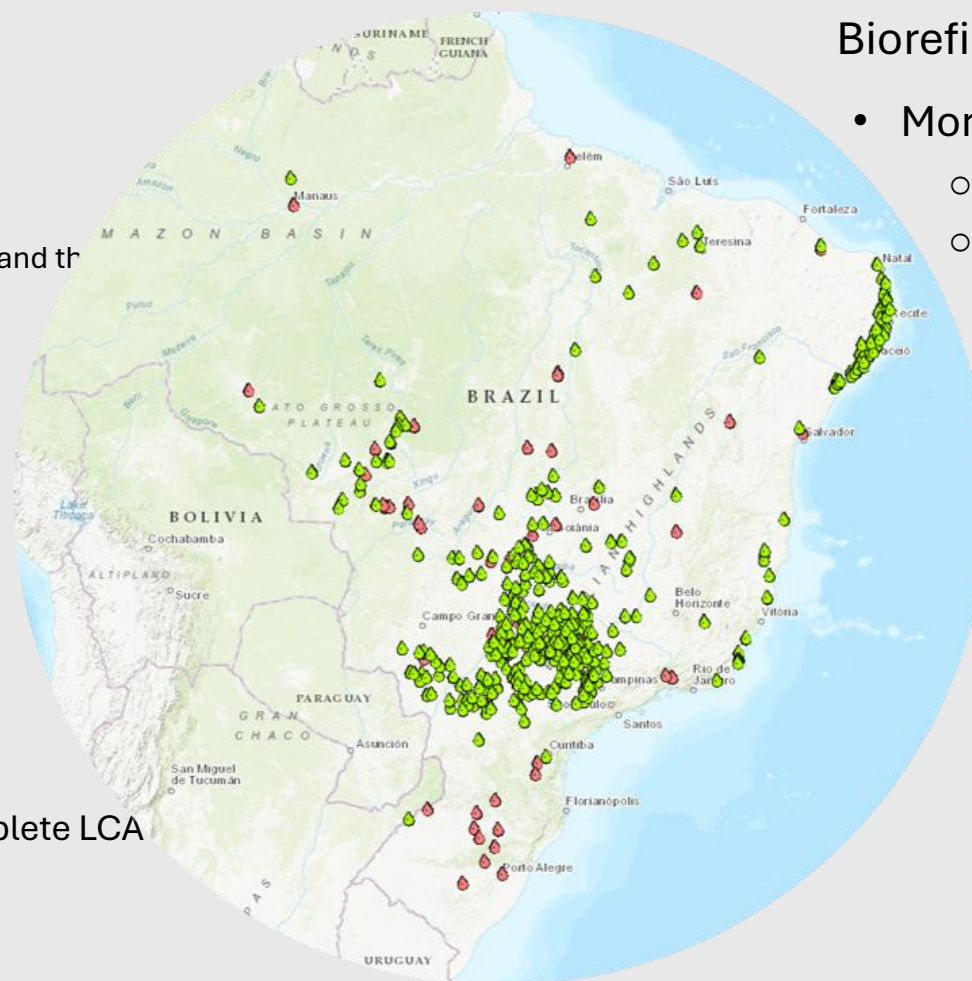


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Biorefineries in Brazil:

- More than ...
 - 360 sugarcane mills
 - 50 biodiesel plants



**Demand
Forecast**

- Ethanol
 - 2024 - 35 Bi liters
 - 2034 - 48 Bi liters
- Biodiesel
 - 2024 - 14 Bi liters
 - 2034 - 15 Bi liters

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Mission Innovation Green Powered Future- Brazil



GPFM R&I Themes



Pillar 1



Affordable and Reliable VRE

- 1.1 Novel photovoltaic
- 1.2 Offshore wind power
- 1.3 Integrated renewable energy
- 1.4 Off grid systems
- 1.5 Energy storage supply chains, recycling and re-use
- 1.6 Technologies for system stability

Pillar 2



System Flexibility and Market Design

- 2.1 Flexible generation
- 2.2 Grid flexibility
- 2.3 System stability and flexible operation
- 2.4 Energy storage integration
- 2.5 Demand side flexibility and EV
- 2.6 Advanced planning for flexible systems
- 2.7 Market design, business models & regulatory framework
- 2.8 Flexibility from energy sectors integration

Pillar 3



Data and Digitalisation for System Integration

- 3.1 Standards for interoperability
- 3.2 Secure and resilient digital energy systems
- 3.3 Integrated platforms

Mission Innovation Green Powered Future- Brazil |

Hybridization of Isolated Systems

- Three pilot projects have been proposed considering a solar plant and a battery energy storage system (BESS);
- Energy auction aimed at purchasing energy and power, in which each project must incorporate at least 20% renewable resources, in alignment with the **National Energy Transition Policy**.
- The goals of these initiatives are to attract investments, generate jobs and income, and foster development within each community. Additionally, we aim to improve dialogue with society to enhance social participation.



Where did it start? The beginning of the journey



Brazil's participation in the 3rd Mission Innovation Ministerial Meeting in Sweden in 2018:

Brazil was represented by the Ministry of Foreign Affairs (MRE), Ministry of Mines and Energy (MME) and Energy Research Company (EPE).



The Brazilian delegation participated in the **Enhancing Data Collection on Government and Private Sector Spending for Clean Energy Research and Innovation** event, organized by the International Energy Agency (IEA) and the European Commission.



Mission innovation is a global initiative to catalyze action and investment in research, development and demonstration to make clean energy more affordable, attractive and accessible. This will accelerate progress towards the goals of the Paris Agreement and the paths to net zero.

Diagnosis after participation in the 3rd Ministerial Meeting of Mission Innovation

Although Brazil invested significant resources, there was no integrated, comprehensive and structured database that consolidated information and made it possible to guide the formulation of policies, attract partnerships between the public and private sectors and favor the global insertion of solutions and innovations.

Energy Big Push: Structured governance for the cooperative project



Energy Big Push Advisory Committee

International
cooperation

Executive Committee

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CIÊNCIA, TECNOLOGIA
E INOVAÇÕES

MINISTÉRIO DAS
RELAÇÕES EXTERIORES



Statistics and Energy
Planning



Positive Agenda for
Climate Change and
Sustainable
Development



Big Push
for
Sustainability



Clean Energy
Transitions
Program

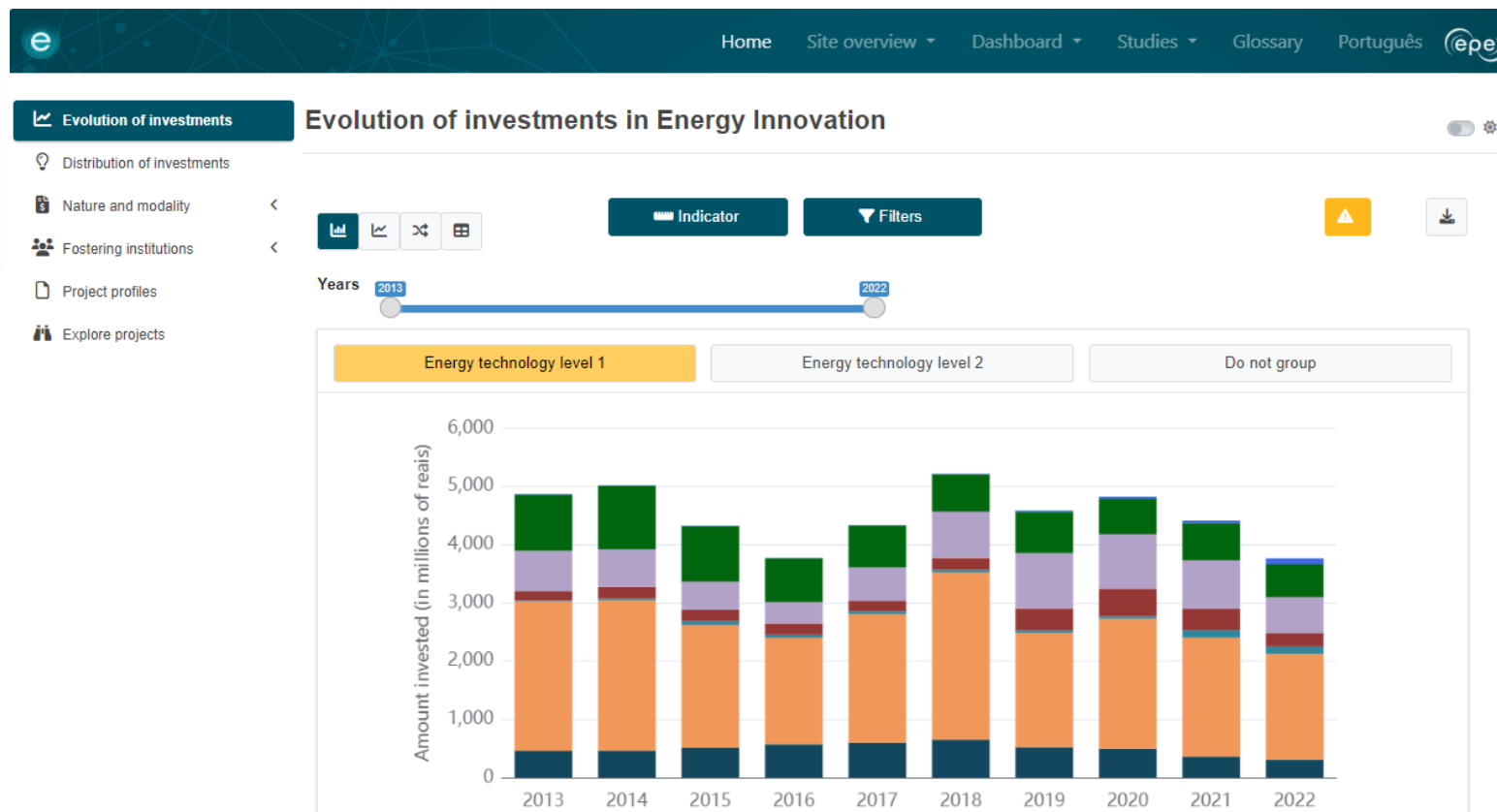
Partner institutions



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The next step: the creation of inova-e Platform



dashboard.epe.gov.br/apps/inova-e-eng/

National Hydrogen Program

Three-year work plan



National Energy Policy Council Resolution No. 2, of 2021

Technologies and energy resources relevant to the energy transition must be prioritized for the application of regulated R&D resources

Data made available by EPE on the Inova-e⁷ platform indicate that public and publicly oriented investments in hydrogen and fuel cells in Brazil in 2020 totaled R\$29 million. Considering the vital role of these investments in strengthening early stages of innovation, boosting the hydrogen ecosystem, building national technological capabilities and stimulating private sector investments, it is proposed to increase annual investment in R&D to R\$200 million by 2025, the last year of the cycle of this Three-Year Plan, a value almost seven times greater than that recorded in 2020

CONSELHO NACIONAL DE POLÍTICA ENERGÉTICA - CNPE

RESOLUÇÃO Nº 2, DE 10 DE FEVEREIRO DE 2021

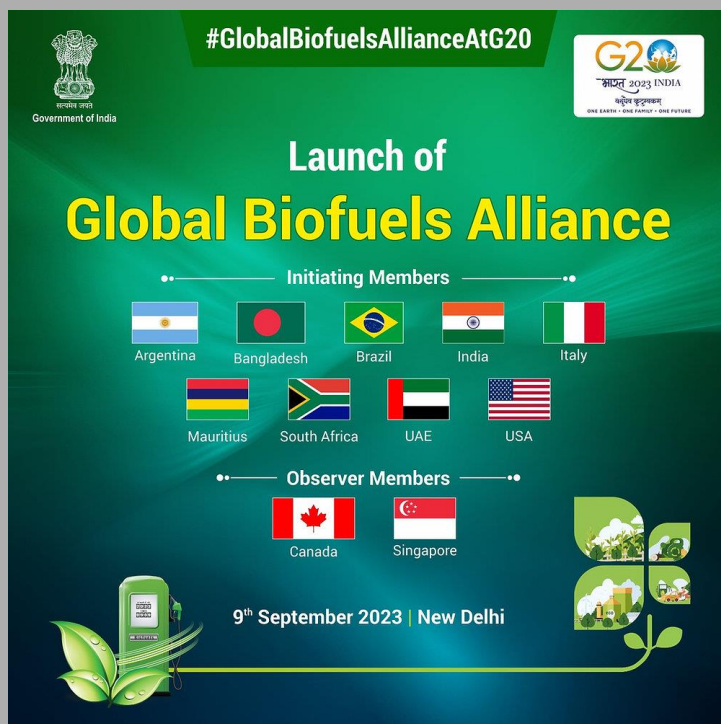
Estabelece orientações sobre pesquisa, desenvolvimento e inovação no setor de energia no País.

O PRESIDENTE DO CONSELHO NACIONAL DE POLÍTICA ENERGÉTICA - CNPE, no uso de suas atribuições, tendo em vista o disposto no art. 2º, **caput**, incisos I e IV, da Lei nº 9.478, de 6 de agosto de 1997, no art. 1º, inciso I, alínea "h", e no inciso IV, no art. 2º, § 3º, inciso III, do Decreto nº 3.520, de 21 de junho de 2000, no art. 5º, inciso III, e no art. 17, **caput**, do Regimento Interno do CNPE, aprovado pela Resolução nº 14, de 24 de junho de 2019, nas deliberações da 1ª Reunião Extraordinária, realizada em 10 de fevereiro de 2021, e o que consta do Processo nº 48330.000007/2021-59, resolve:

Art. 1º Orientar a Agência Nacional de Energia Elétrica e a Agência Nacional de Petróleo, Gás Natural e Biocombustíveis que, no âmbito de suas competências, priorizem a destinação dos recursos de pesquisa e desenvolvimento e inovação regulados por essas Agências, observadas a Lei nº 9.991, de 24 de julho de 2000, e a Lei nº 9.478, de 6 de agosto de 1997, aos seguintes temas afetos ao setor de energia:

Technical and political links

Global Biofuels Alliance



Energy Transition Working Group

- Accelerating Financing for the Energy Transitions
- Social Dimension of Energy Transitions
- Innovative Perspectives on Sustainable Fuels



Main take aways

The ongoing energy transition brings with it the need to increase investments in innovation for the decarbonization of the sector.

Mapping research, development and innovation investments in the energy sector is an important step towards:

- Be clear about the amounts invested in different technological options in the country.
- Assist in the development of public policies (seeking alignments between long-term strategy and these investments)
- Facilitate cooperations (both national and international)

The inova-e is a platform in continuous improvement and there is room for improvement.

It is necessary to maintain and deepen collaborations between institutions that foster innovation in the energy sector in the country.

President

Thiago Guilherme Ferreira Prado

Director Oil, Natural Gas and Biofuels Board

Heloisa Borges Bastos Esteves

Head of Oil Products and Biofuels Department

Angela Oliveira da Costa

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Thank you



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