ANEEL
AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA

FIEP SESI SENAI IEL
SENAI

Country Report: Brazilian Energy Sector

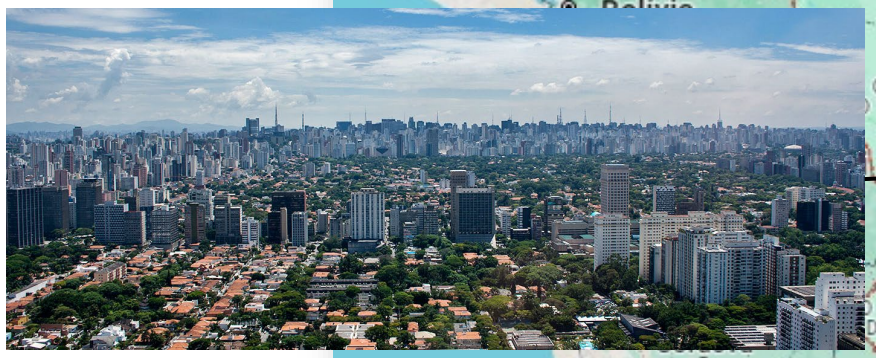
2024
Jun 24rd

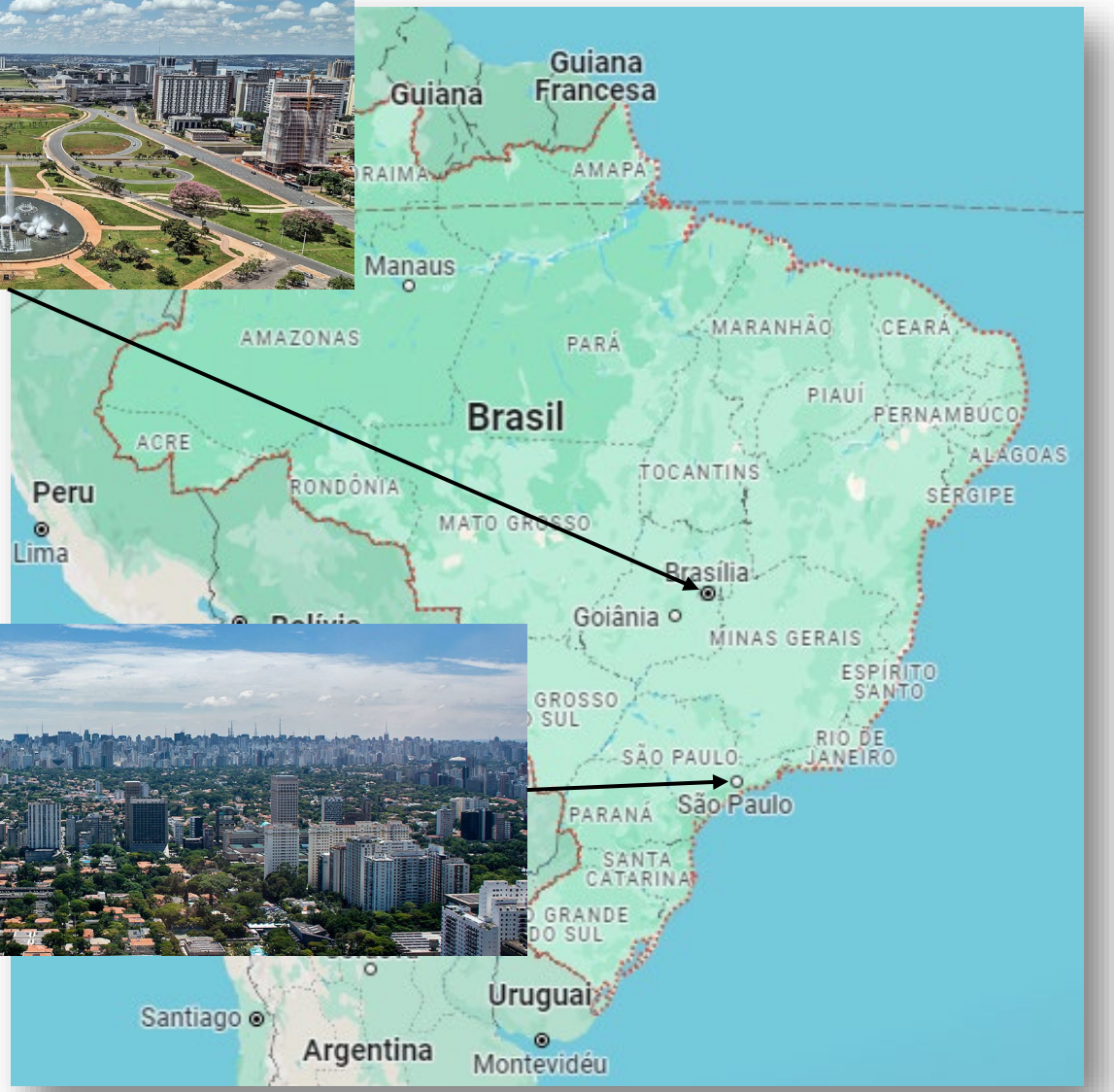
Alexandre Gouveia and
Bruno Nascimento

General Information

Federative Republic of Brazil
República Federativa do Brasil

Capital	Brasília
Largest city	São Paulo
Official language	Portuguese
Government	Presidential republic
Legislature	National Congress: • Federal Senate • Chamber of Deputies
Area	8,515,767 km^2
Coast	7,637 km





General Information

Economy	
Currency	Brazilian real (BRL, R$)
GDP	$2.173 trillion (8th)
GDP growth	3.0% (2022) 2.9% (2023) 2.2% (2024) - est
GDP per capita	$11,352 (78th)
GDP by sector	Services: 58.91% Industry: 20.7% Agriculture: 6.81% 2022
Population below poverty line	24% on less than $6.85/day 2022

Salvador - BA

Rio de Janeiro - RJ

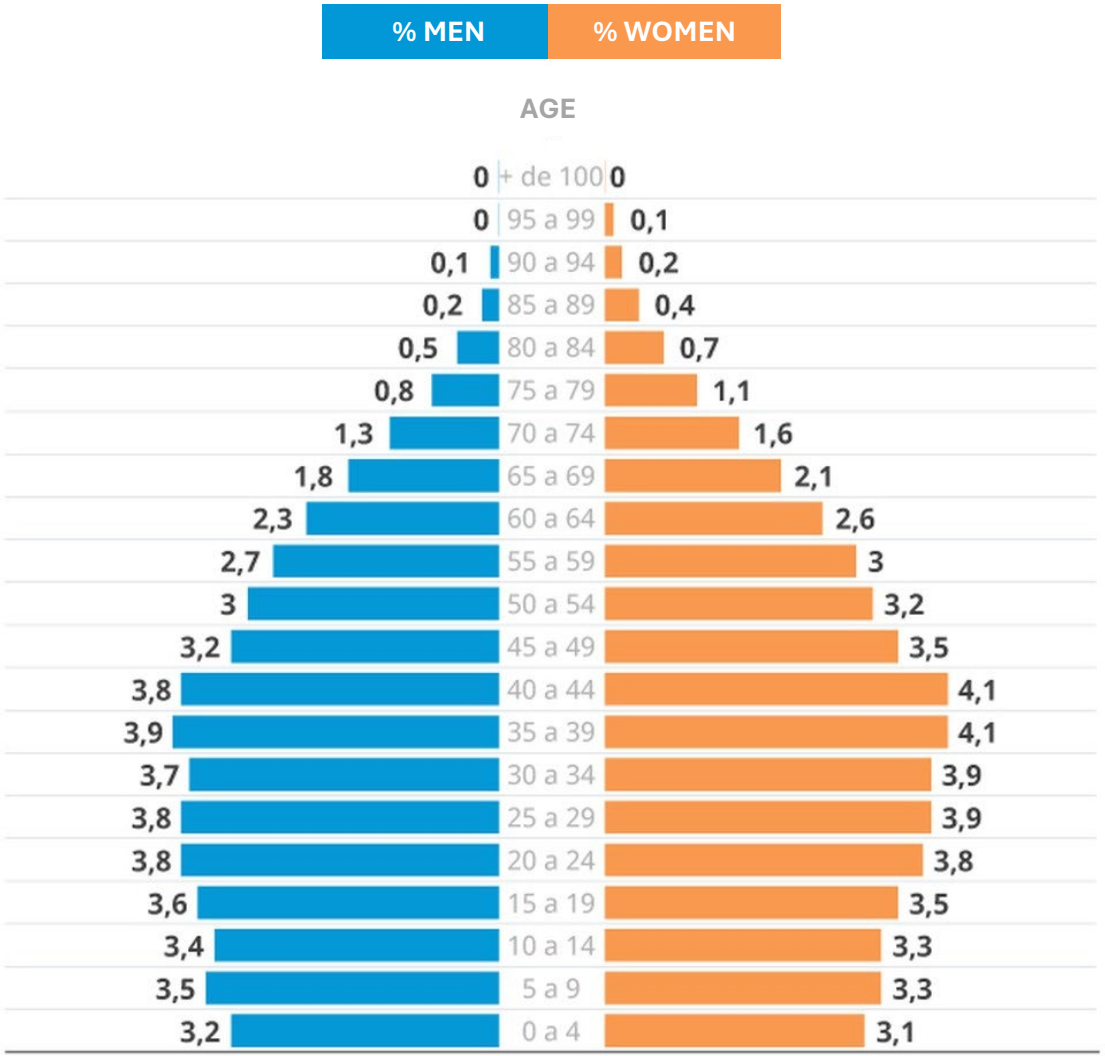
Chapada Diamantina National Park - BA

Natal - RN

General Information

Social	
Population	203,080,756 • Urban: 84.36% • Rural: 15.64%
Race	• Mixed: 45,3% • White: 43,5% • Black: 10,2%
HDI	0.760
Literacy rate aged 15 and over	94.60%
School enrollment aged 6 to 14	99.40%
Access to electricity	99.5%

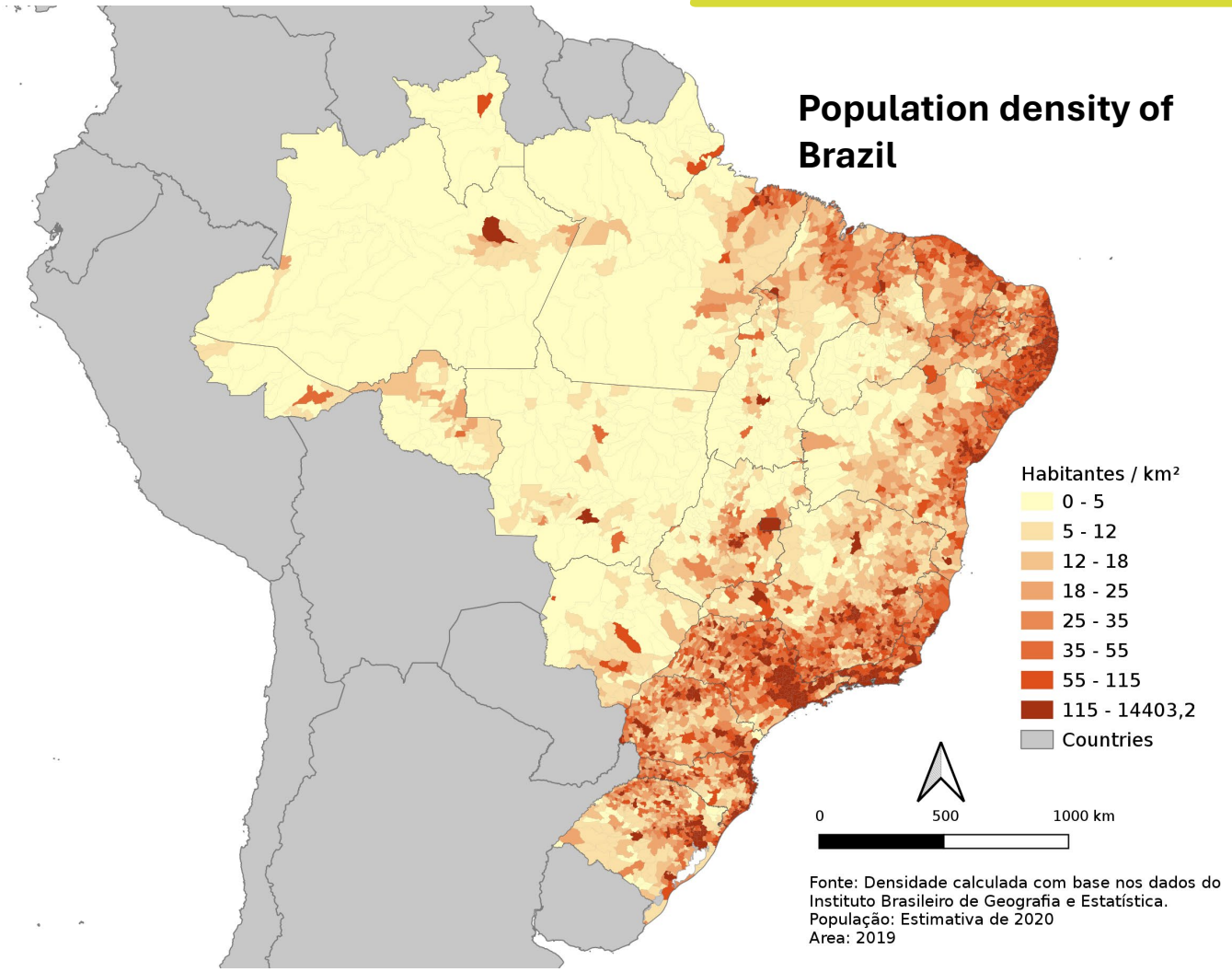
Age Pyramid – Brazil 2022



Fonte: IBGE - Censo Demográfico

General Information

Social	
Population	203,080,756 • Urban: 84.36% • Rural: 15.64%
Race	• Mixed: 45,3% • White: 43,5% • Black: 10,2%
HDI	0.760
Literacy rate aged 15 and over	94.60%
School enrollment aged 6 to 14	99.40%
Access to electricity	99.5%



The Brazilian Energy Sector

SECTORAL POLICY

NATIONAL CONGRESS ⟷ PRESIDENCY (CC/SPPI) ⟷ CNPE / CMSE / MME

REGULATION, SUPERVISION, AND MEDIATION

ANEEL · anp (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis) · ANM (Agência Nacional de Mineração)

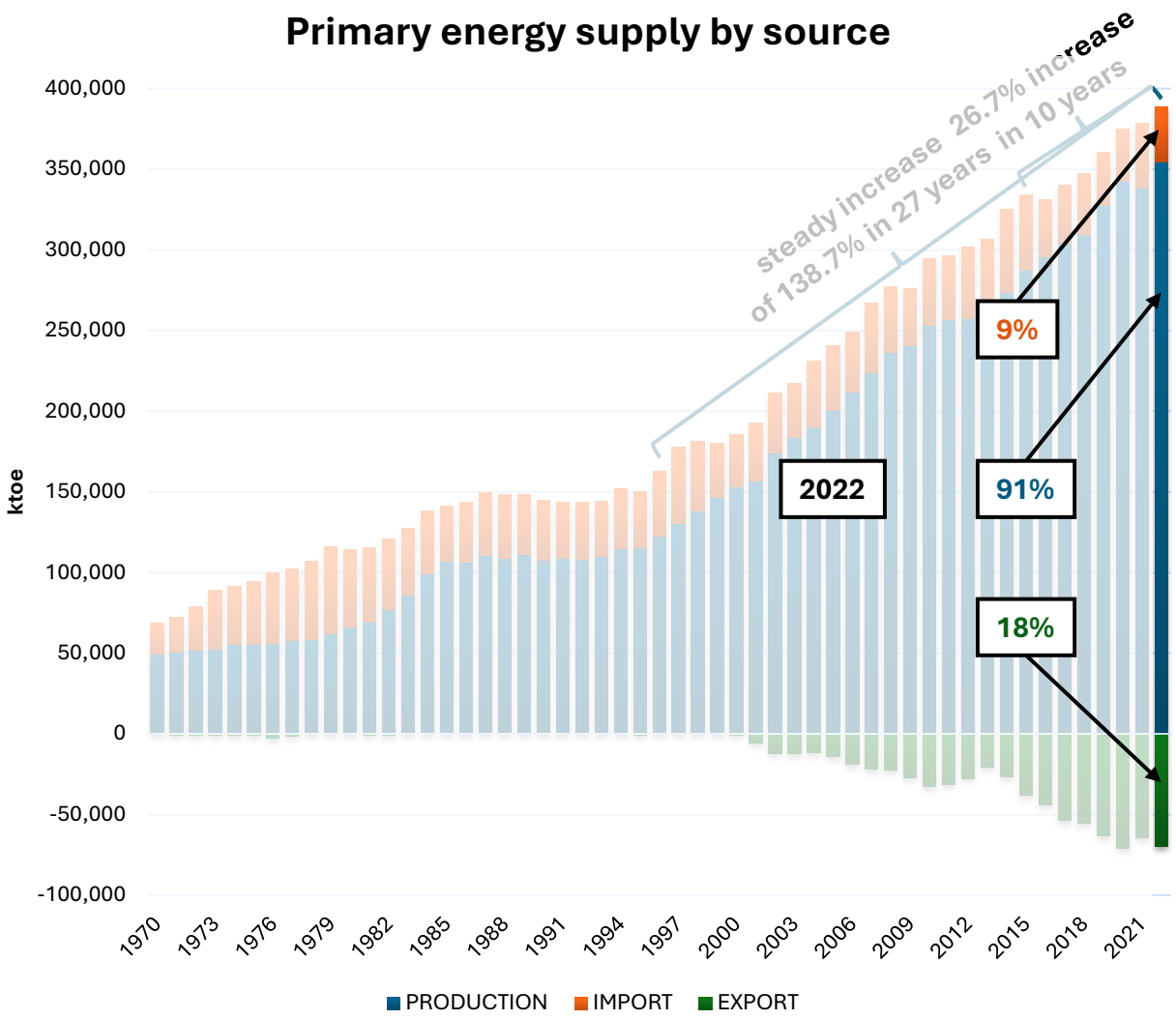
MARKET AND SYSTEM OPERATION

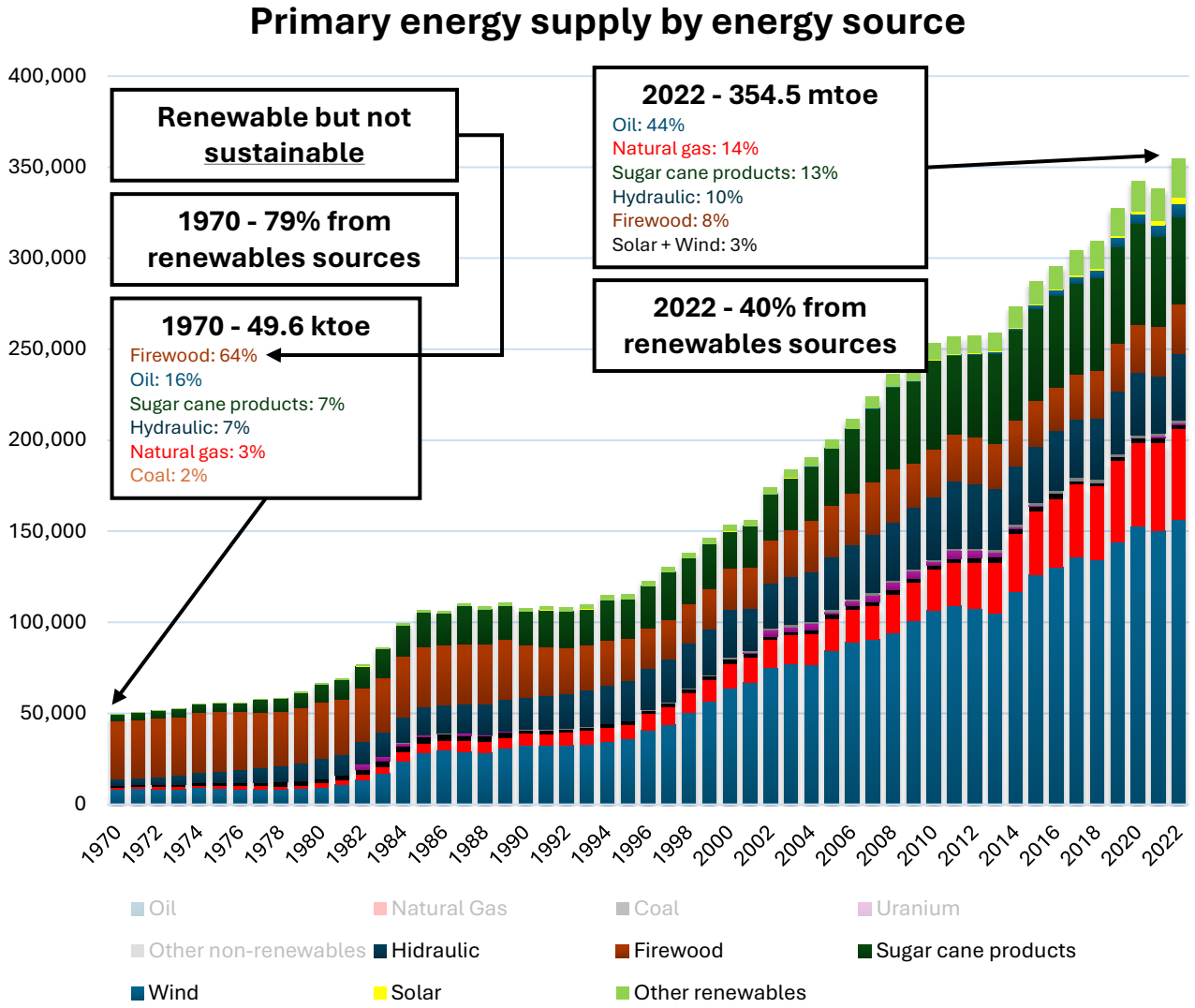
ONS — G GENERATION · T TRANSMISSION · D DISTRIBUTION · C COMMERCIALIZATION — ccee

PLANNING

epe

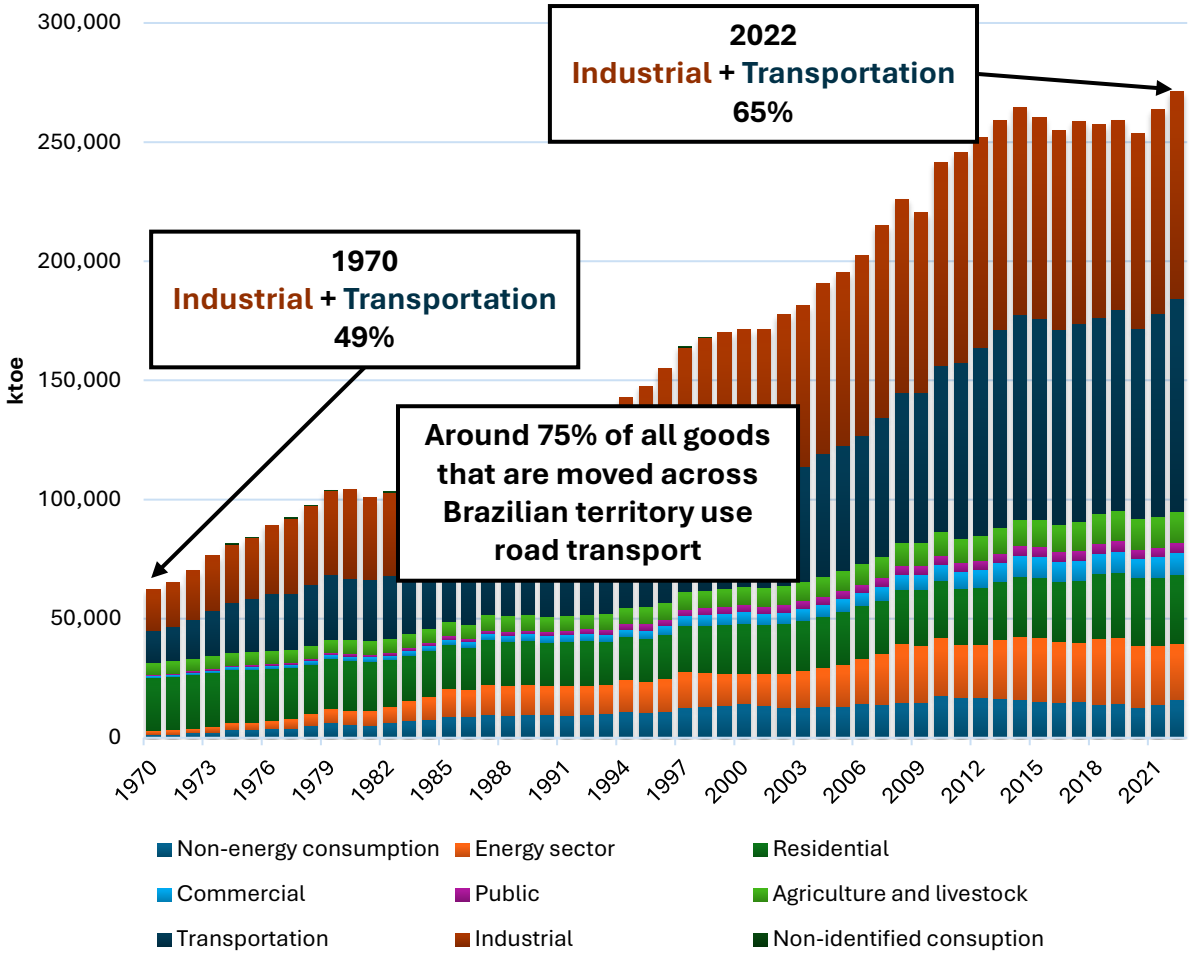
Past energy demand and supply



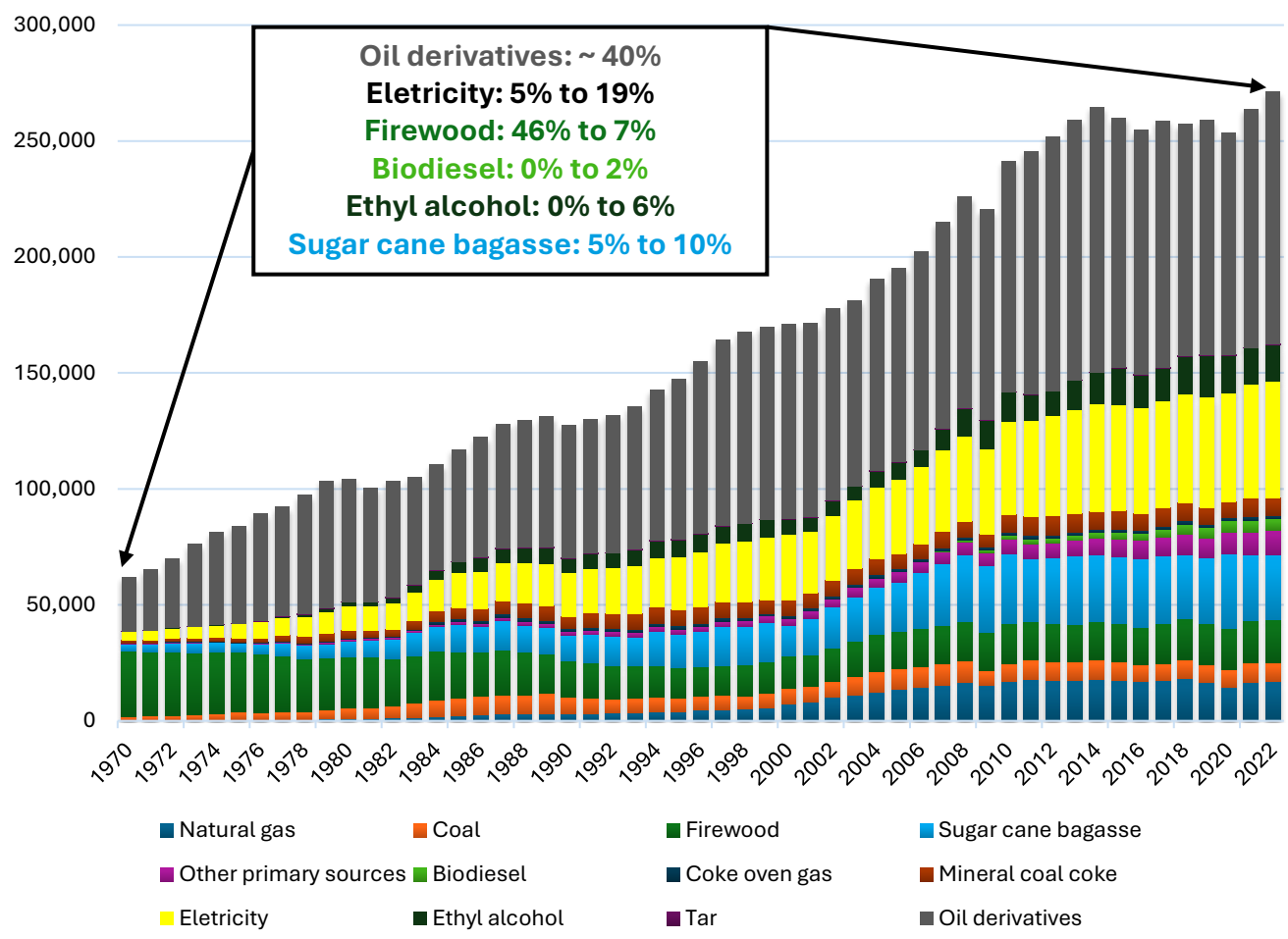


Past energy demand and supply

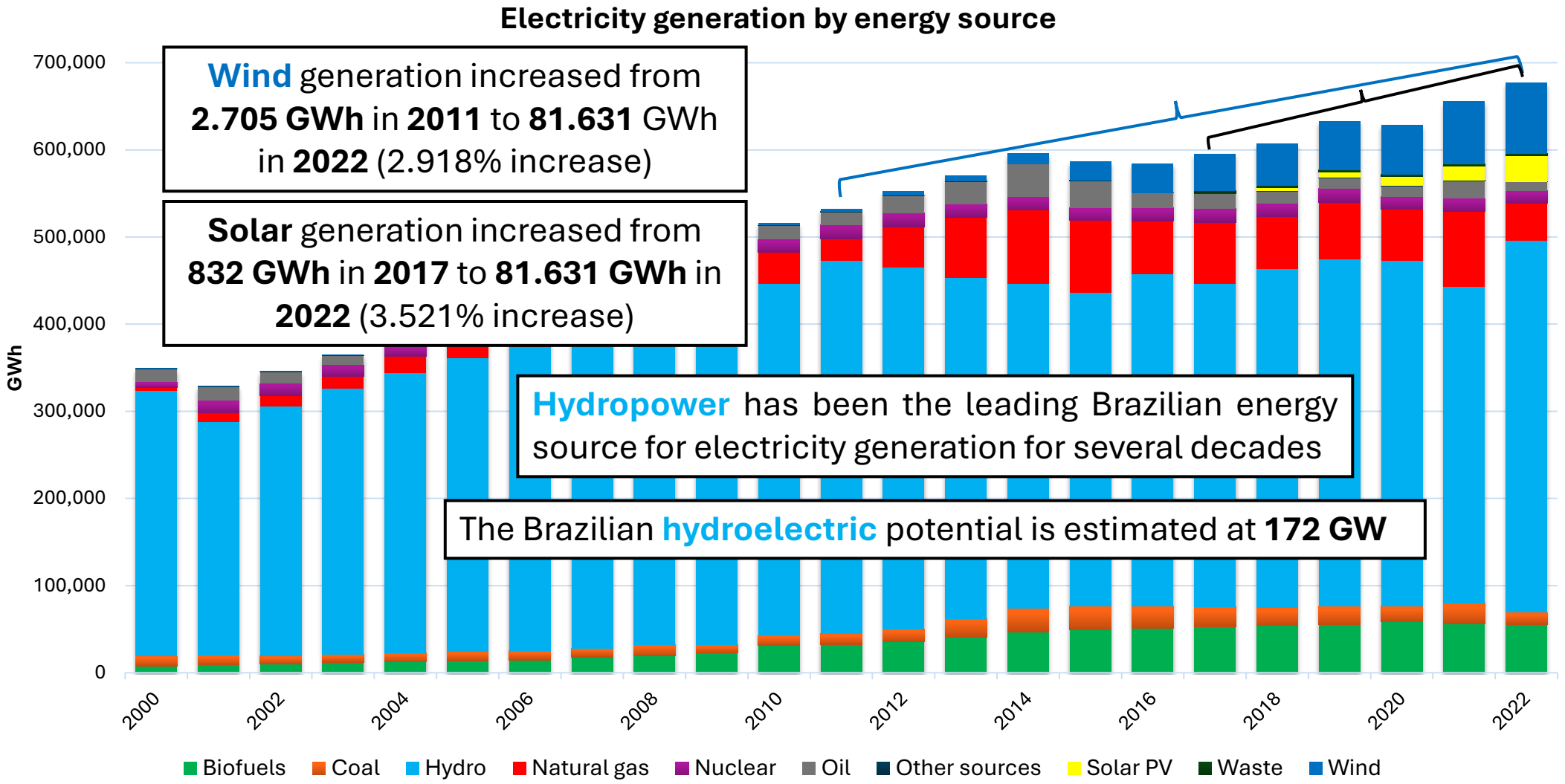
Final consumption by sector



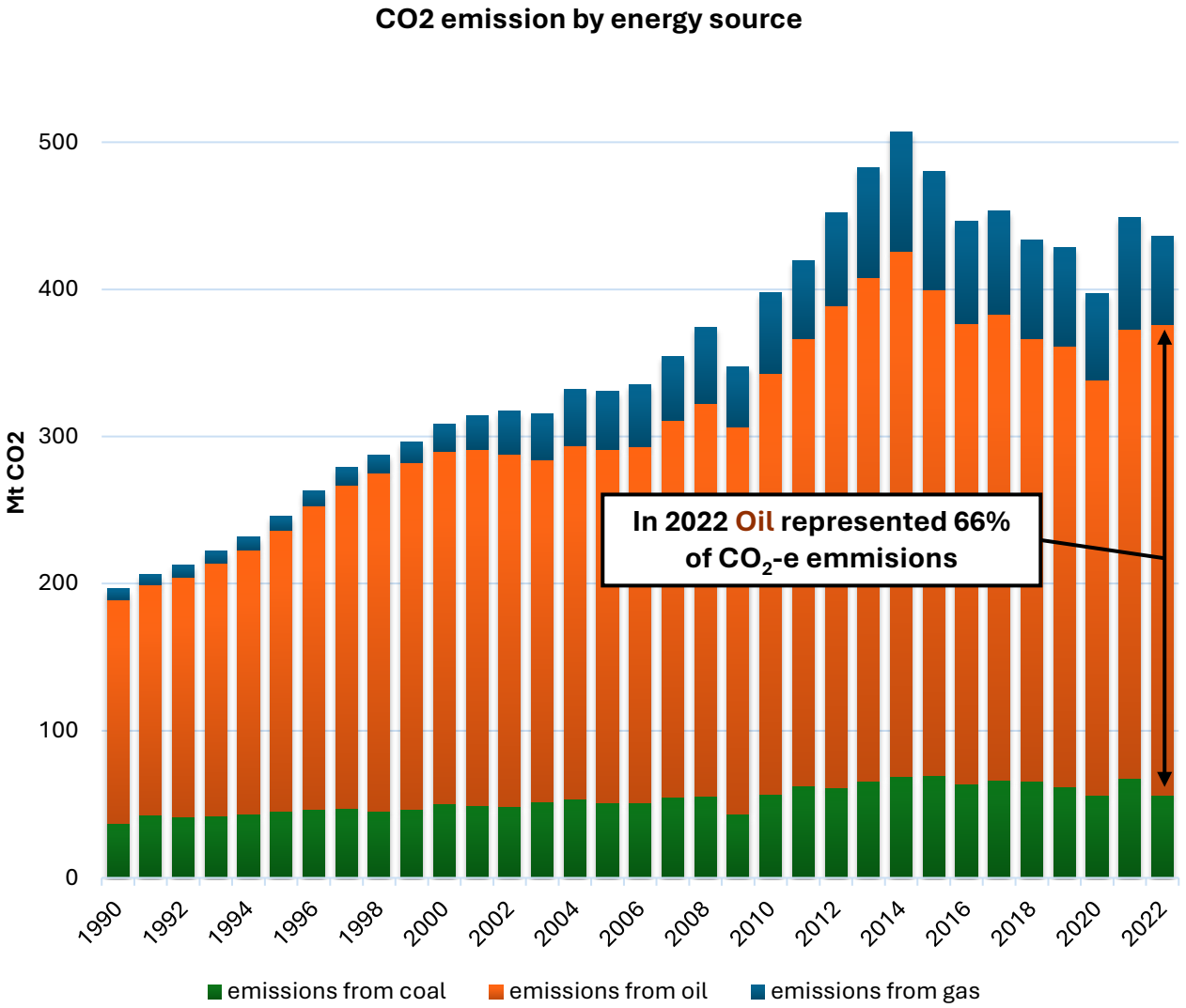
Final consumption by energy source

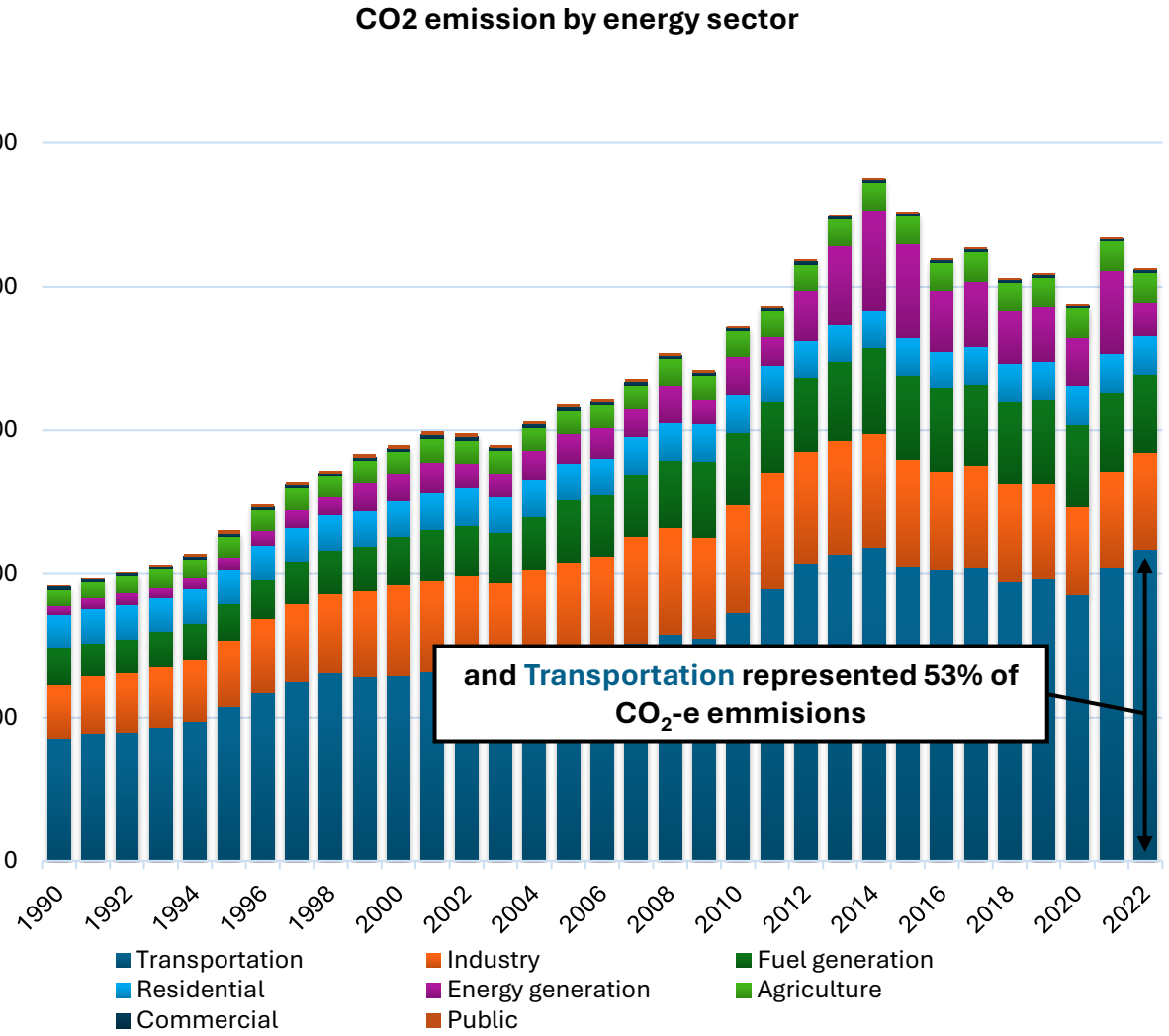


Past energy demand and supply

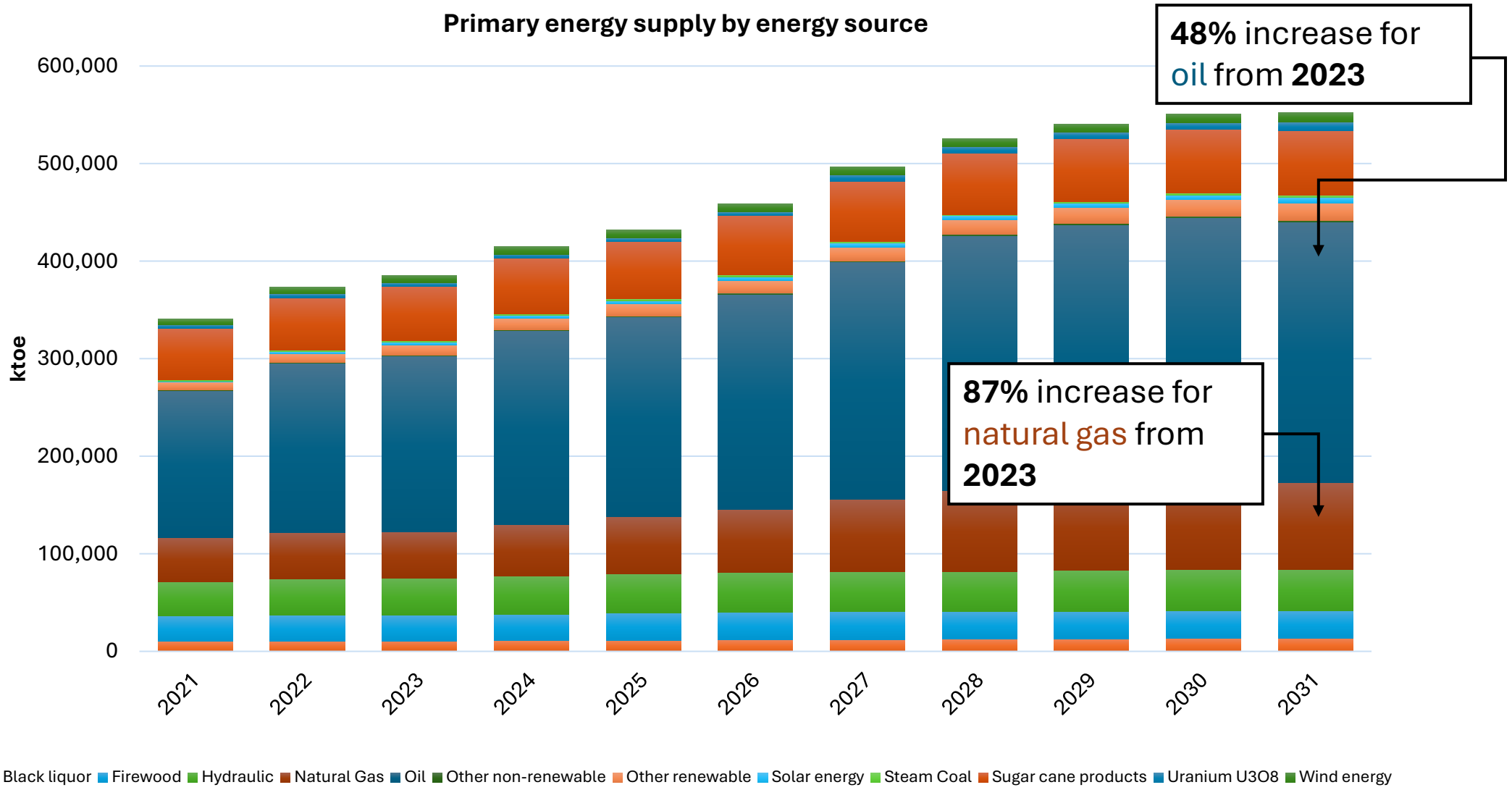


Past energy demand and supply

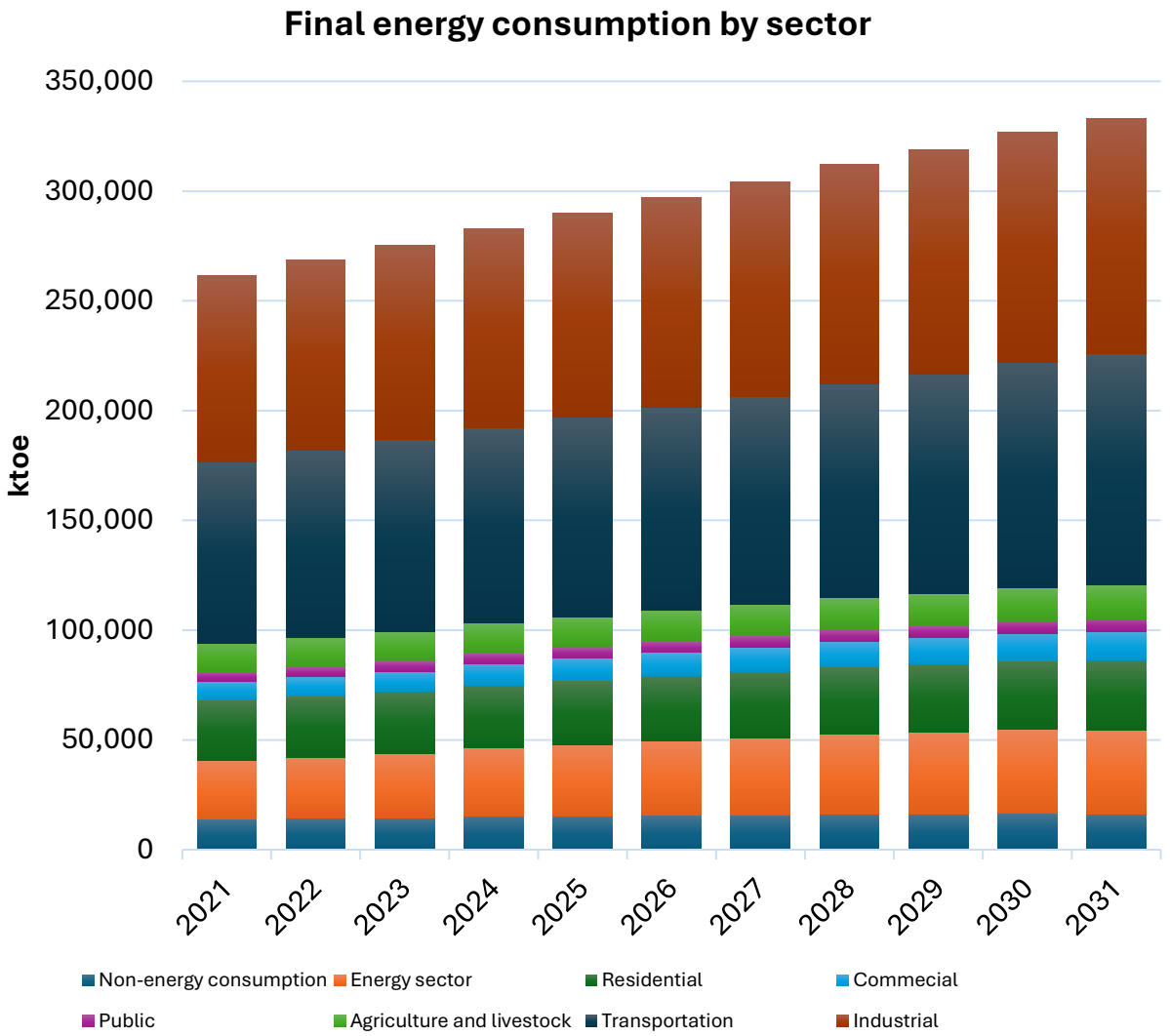


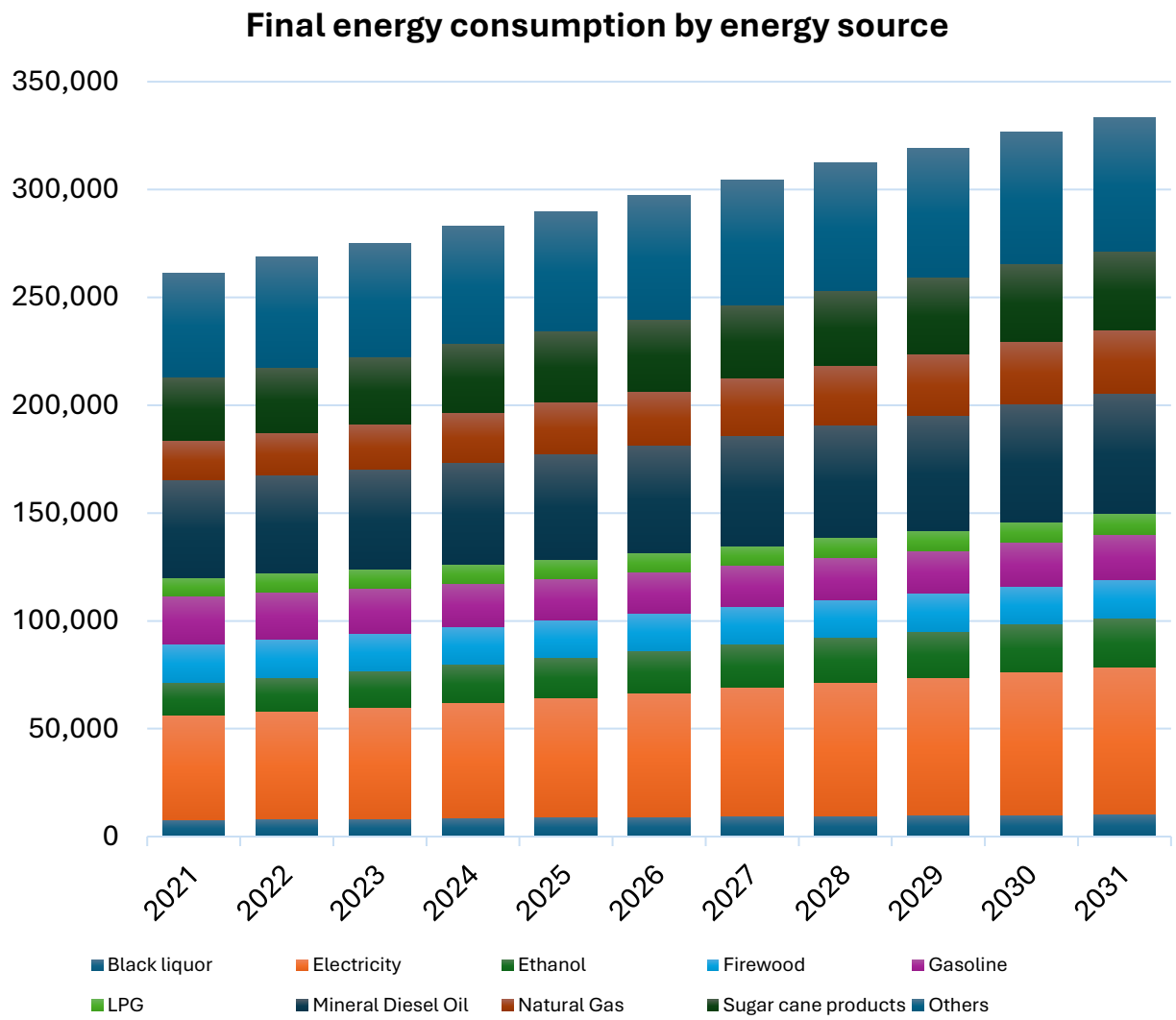


Outlook of energy demand and supply

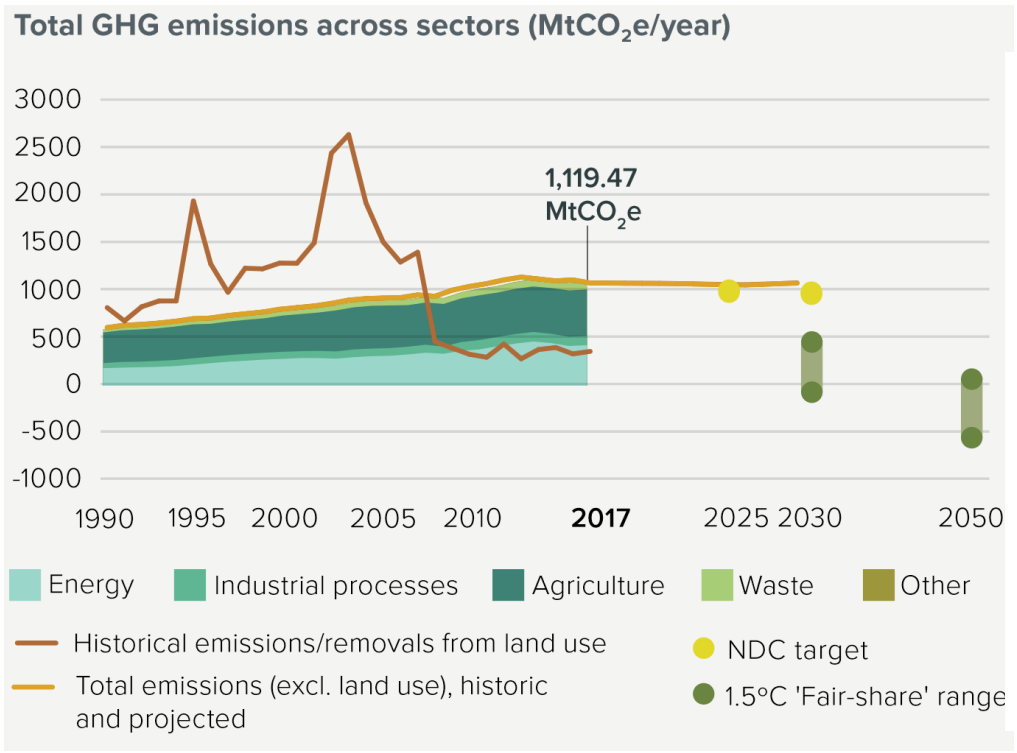


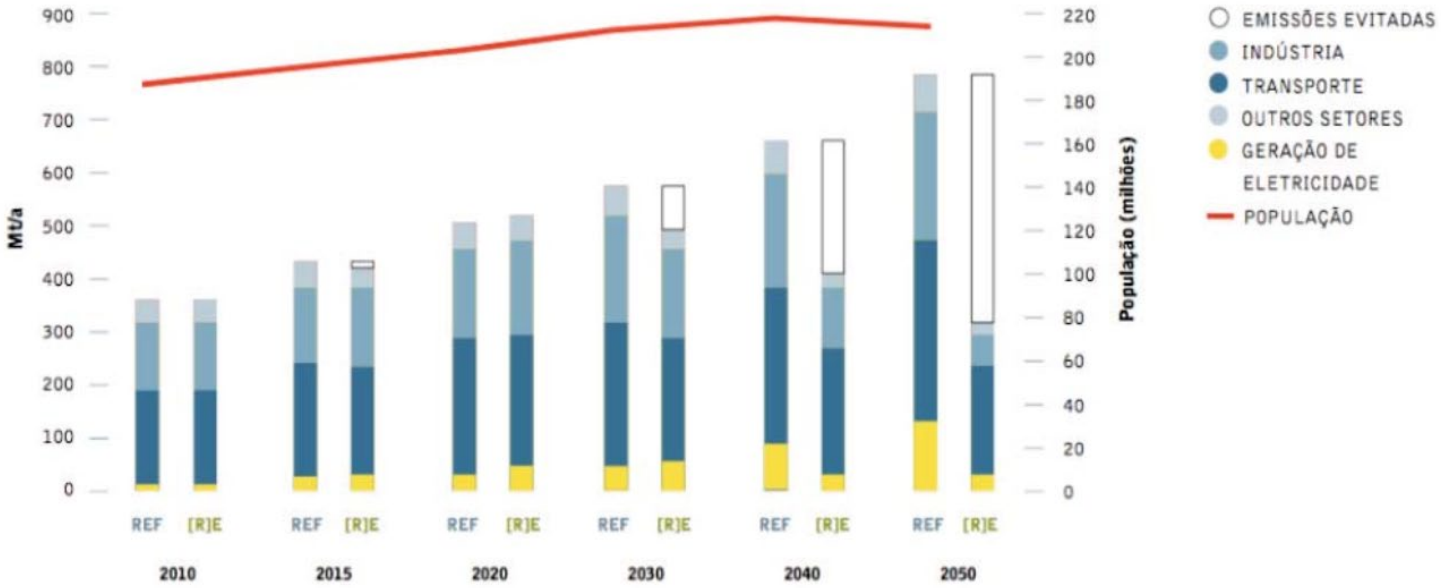
Outlook of energy demand and supply





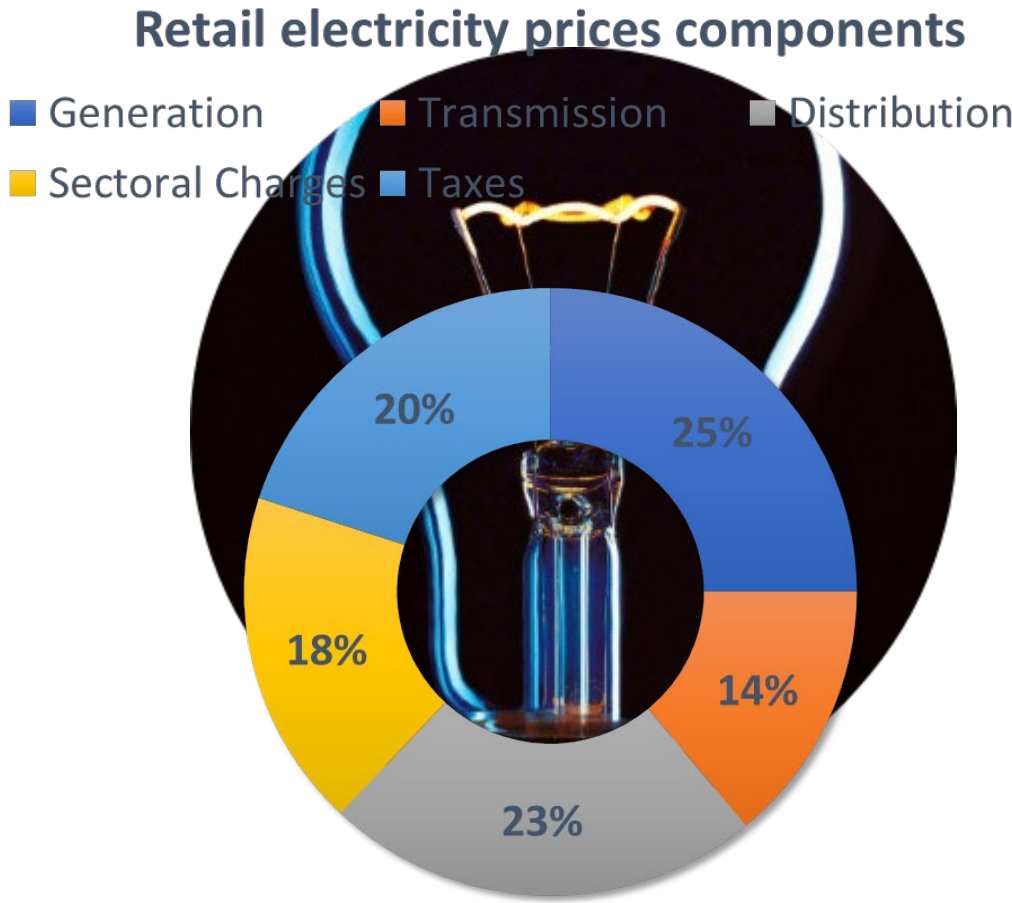
Outlook of energy demand and supply





Appendix - Energy prices: electricity

- **Wholesale prices**
  - **Regulated market price (average auctions winning bids)**
  - The regulated market's wholesale price for electricity from new powerplants averaged 46 USD per MWh over the last 2 years. It reflects the costs associated with building and starting to operate new power generation facilities.
  - **Free market price**
  - In the free market, the wholesale price for electricity is significantly lower at 26 USD per MWh, offering more competitive rates for those who are connected to high voltage grids in the electric power market.



- **Retail prices**
  - The average retail price for electricity is **0.136 USD per kilowatt-hour (kWh).**
  - A 200 kWh bill = 27,2 USD + taxes (33,5 USD)

Appendix - Energy investments: electricity

FROM
ANEEL INCEPTION
(1997)
UNTIL 2023

214b USD

8,3b USD per year

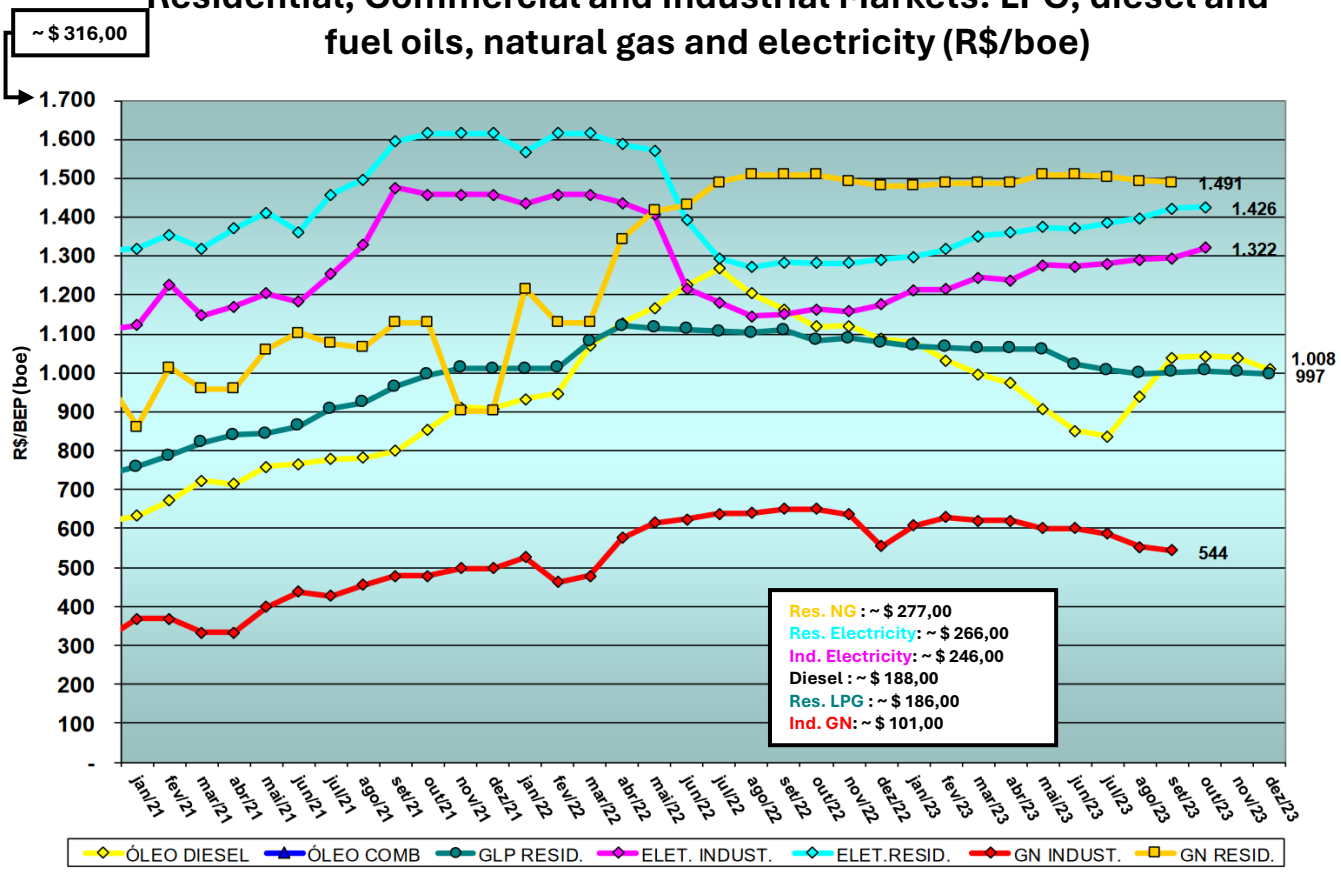
80b USD
Generation

77b USD
Distribution

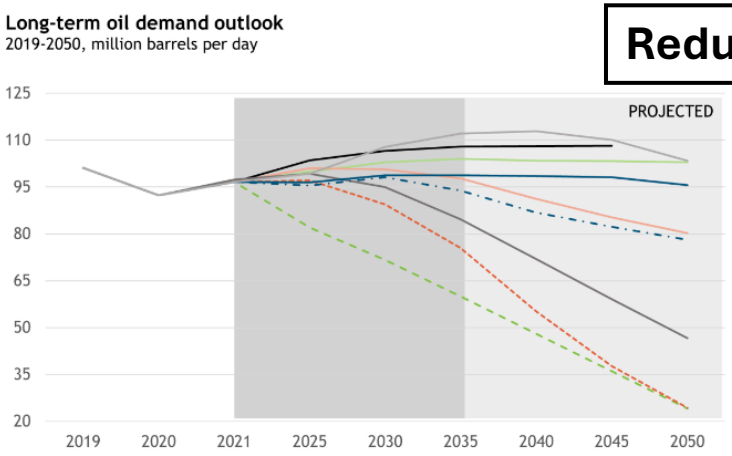
58b USD
Transmission

Appendix - Energy prices: oil

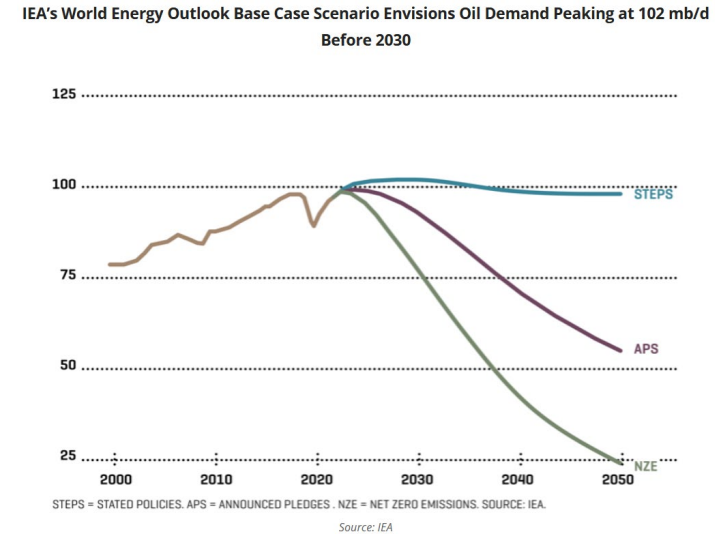
Residential, Commercial and Industrial Markets: LPG, diesel and fuel oils, natural gas and electricity (R$/boe)



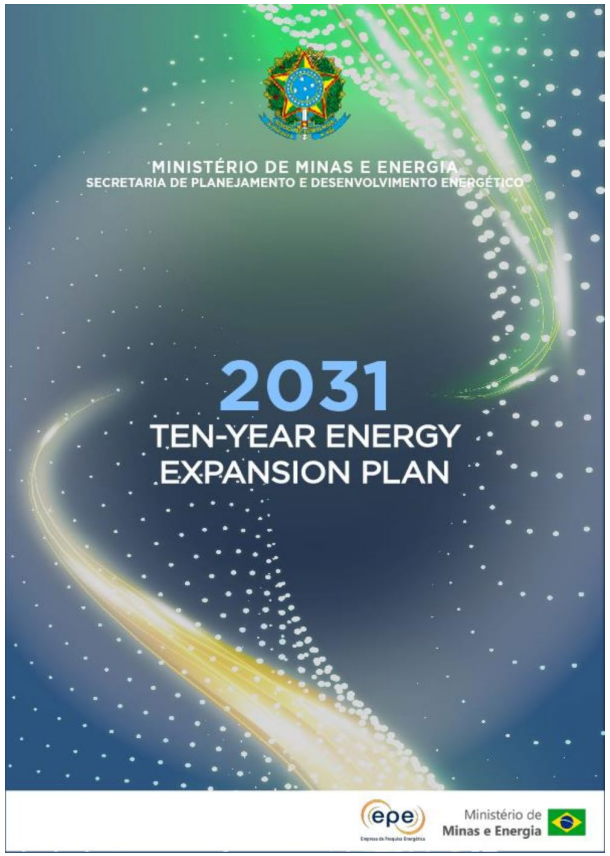
Reduced Oil demand



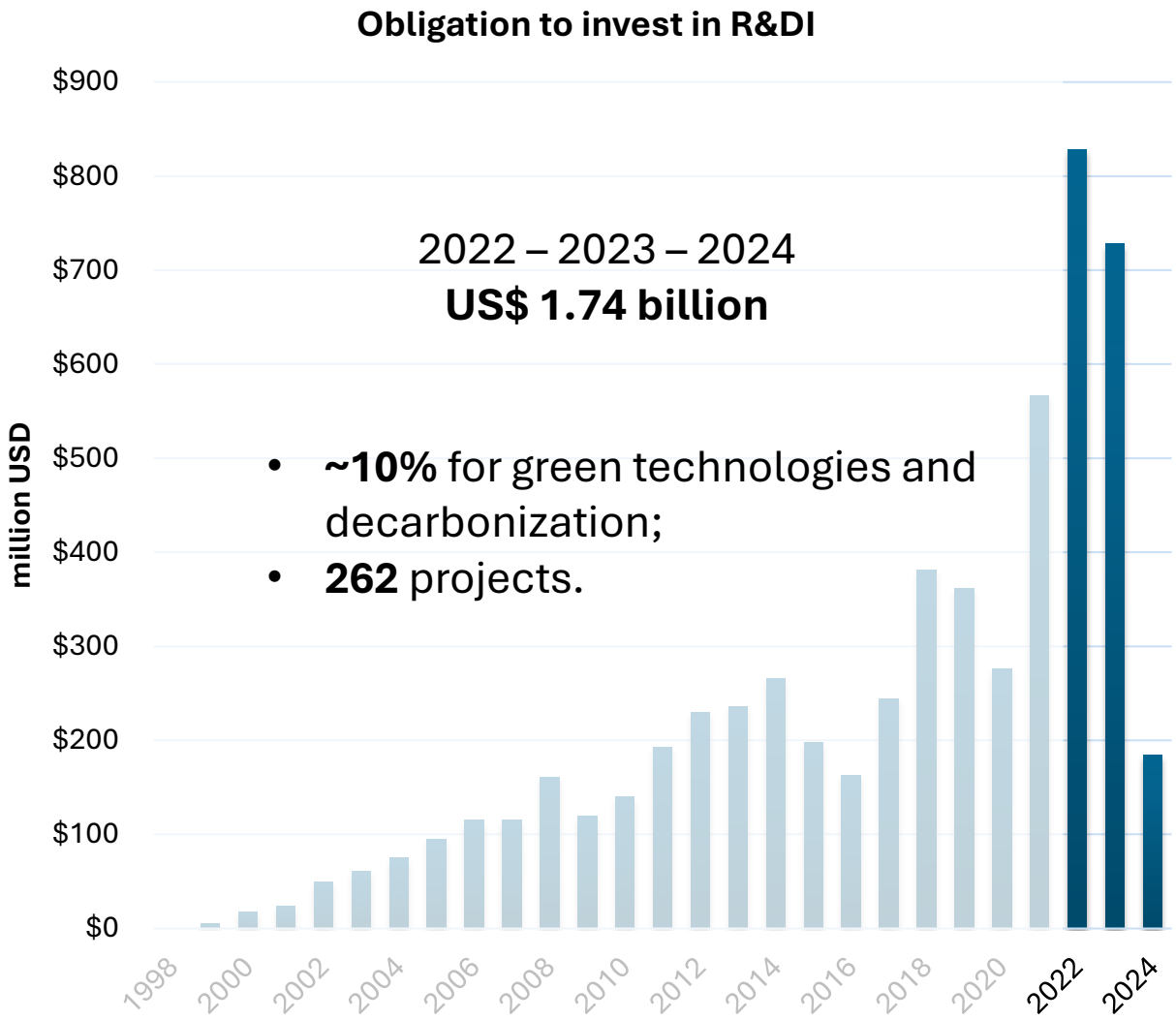
O&G Companies becoming **Energy Companies**



Appendix - Energy investments: oil



Investments will range from **US$ 428 billion** to **US$ 474 billion**



Appendix - Energy investments: oil

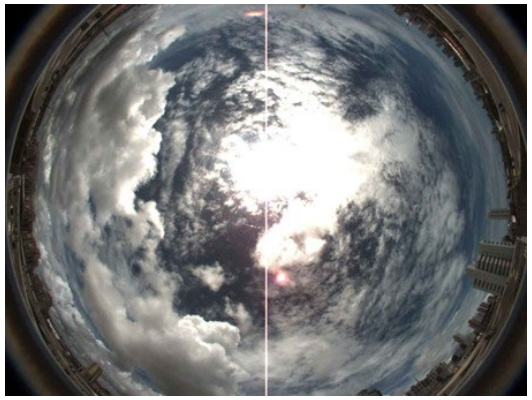
INSTITUTO SENAI DE INOVAÇÃO ENERGIAS RENOVÁVEIS

PETROBRAS TotalEnergies galp energia

Wind Offshore

CCUS

Cloud Lensing



Renewable Fuel

Thank you!

ascgouveia@aneel.gov.br

brunonascimento@isi-er.com.br

ANEEL

AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA

Country Report: Brazilian Energy Sector (items 4 and 5)

2024

Jun 24th

Alexandre Gouveia

Energy policies and its difficulties

Current energy policy and measures

Paris Agreement goals (NDCs)

Brazil has committed to significant emissions reduction targets under the Paris Agreement, but it has been falling short of these goals. From 2005 to 2022, **Brazil's Energy Sector** CO2 emissions have increased by 30%. The target set for 2030 is a 43% reduction compared to 2005 levels.

Pessimistic Scenario	Target	Optimistic Scenario
	213 mtCO2	
2025: 433 mtCO2	181 mtCO2	388 mtCO2
2030: 468 mtCO2		348 mtCO2

Major difficulties and bottlenecks

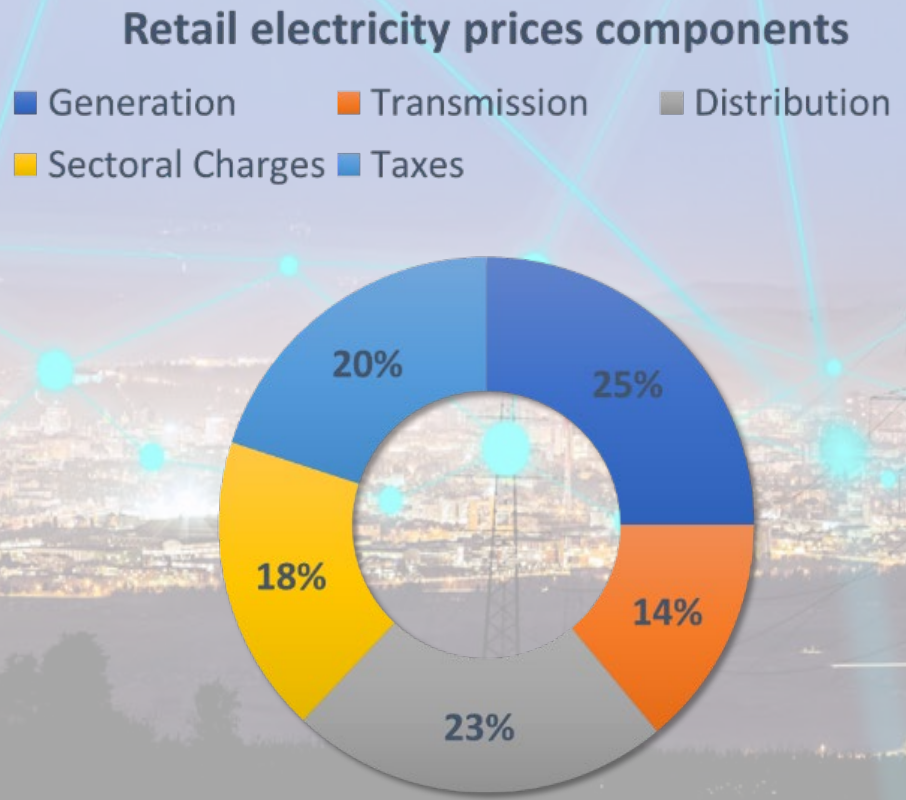
- Carbon market not implemented
- Consumers behaviour
- Lack of proper competition
- Consumers remaining under regulated prices

Energy policies and its difficulties

Current energy policy and measures

Paris Agreement goals (NDCs)

Electricity Subsidies - affordability



Major difficulties and bottlenecks

Subsidies are primarily directed towards mature and competitive technologies. A more effective approach would be to either eliminate these subsidies or redirect the funds towards emerging technologies that can provide essential attributes to the sector, such as electrical and energy security.

Potential areas for investment include pumped-storage power plants, batteries, hydrogen technologies, and RDI.

Energy policies and its difficulties

ANEEL

Current energy policy and measures

- Paris Agreement goals (NDCs)
- Electricity Subsidies - affordability

Major difficulties and bottlenecks

- Consumers behaviour
- Lack of proper competition
- Consumers remaining under regulated prices

2022 — **2023** — **2024** — **2026** — **2028**

Group HV < 500 kw

- *170k end consumers*
- *12,9% of the country's consumption*

Group LV – Residential and Rural

- *75,2m end consumers*
- *40,1% of the country's consumption*

What I would like to learn in this program

JICA KCCP Energy Policy

How to design optimal policy incentives that align a energy competitive market with broader energy transition goals

How other countries have been making energy security viable in a context of energy transition

In a context of a developing country, how energy sector could make a low-carbon economy thrive without inflicting more financial burdens on consumers.

Thank you!

ascgouveia@aneel.gov.br

Country Report: Brazilian Energy Sector

2024
Jun 24rd

Bruno Nascimento

Current energy policy and measure

- Bill No. 725, of 2022: Regulates the inclusion of hydrogen as an energy source in Brazil and establishes parameters to encourage the use of sustainable hydrogen.

- Bill No. 2308, of 2023: Establishes the legal framework for low-carbon hydrogen; institutes incentives for the low-carbon hydrogen industry; creates the Low-Carbon Hydrogen Development Program.

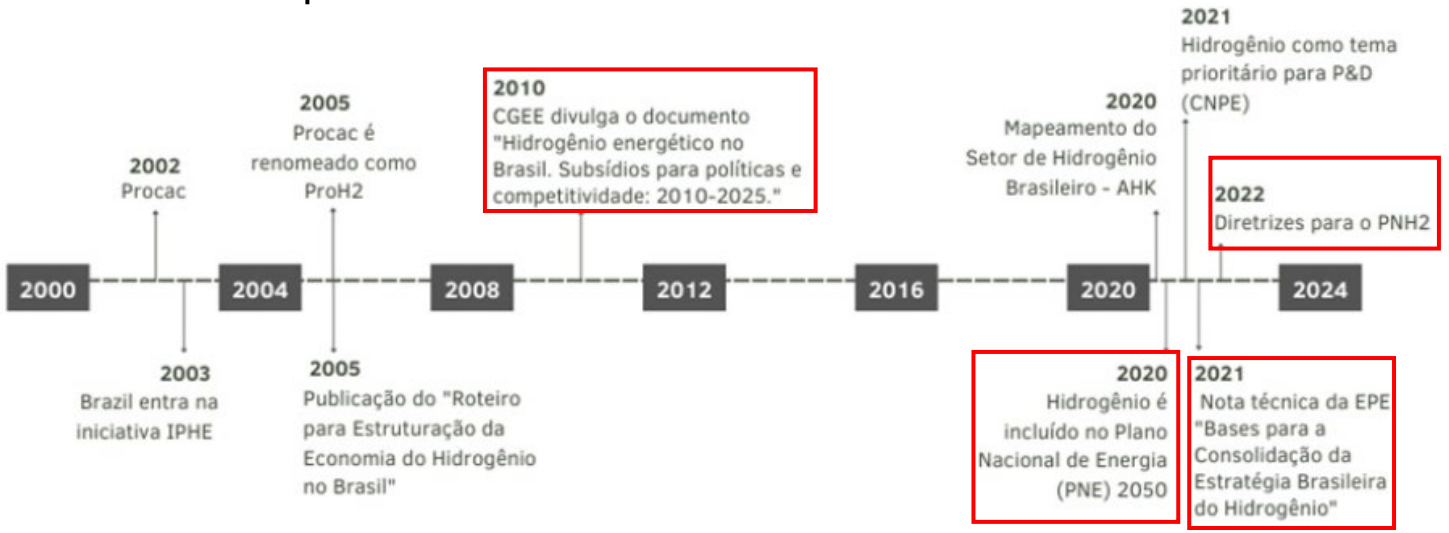
- Initiatives toward renewable H2 implementation

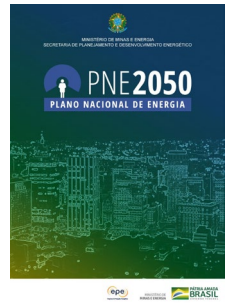
Art. 4º A adição de hidrogênio no ponto de entrega ou ponto de saída nos gasodutos de transporte seguirá percentuais mínimos obrigatórios em volume, na seguinte progressão:

I – 5%, a partir de 1º de janeiro de 2032;

II – 10%, a partir de 1º de janeiro de 2050.

§1º O volume de que trata o *caput* deverá conter proporção obrigatória de hidrogênio sustentável de no mínimo 60%, no caso do inciso I, e de no mínimo 80%, no caso do inciso II.



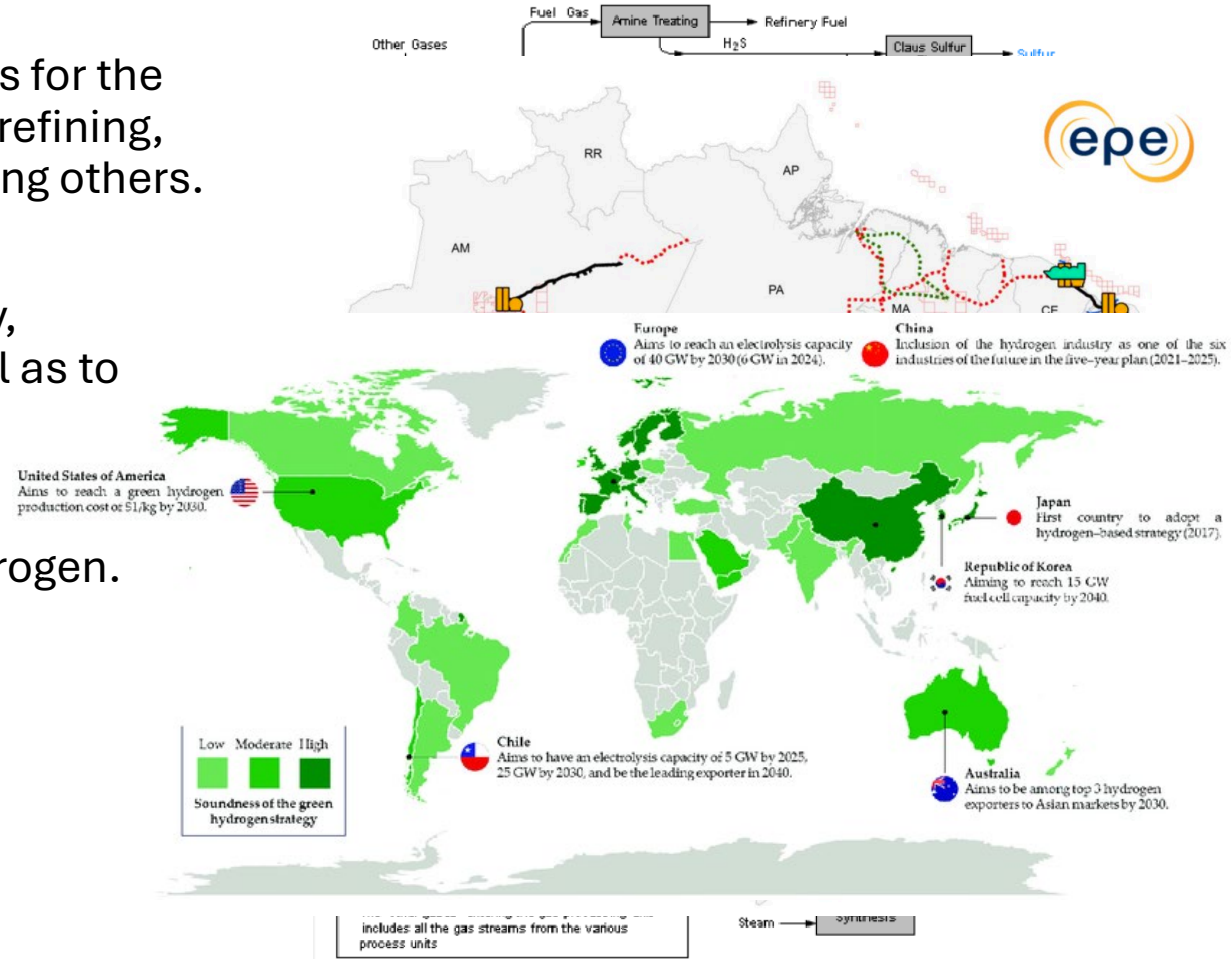


Major difficulties and bottlenecks currently faced in formulating energy policies

- Stimulate the possibilities that the use of hydrogen allows for the decarbonization of sectors such as: industry (petroleum refining, petrochemical, chemical, steel, etc.) and transport, among others.

- Design regulatory improvements related to quality, safety, transportation infrastructure, storage, and supply, as well as to encourage and to promote the use of new technologies.

- Articulate initiatives with international institutions in hydrogen.



Subjects that you especially would like to learn in this program

- Learn how the Utilization Business Model for Renewable Hydrogen is being applied in Japan:
  - Direct use of hydrogen (decarbonized steel, decarbonized chemicals, hydrogen-fuelled vessels);
  - Utilization of hydrogen compounds (fuel ammonia, carbon recycling products);
  - Hydrogen safety strategy (for the safe use of hydrogen).

• Expectation of your superior to this program:

"SENAI's expectation is to learn about the best practices adopted by Japan and the participating countries regarding the policies implemented to achieve a low-carbon economy, as well as the various technologies that can enable net zero.

Additionally, from SENAI's perspective, it aims to present the promising technologies currently being considered in Brazil that could assist other countries lacking renewable energy resources. For example, Brazil has 700 GW of potential in offshore wind energy alone."

Antonio Marcos de Medeiros
R&D Coordinator at ISI-ER

Thank you!

brunonascimento@isi-er.com.br