

# THE BRAZILIAN POLICIES FOR BIOFUELS

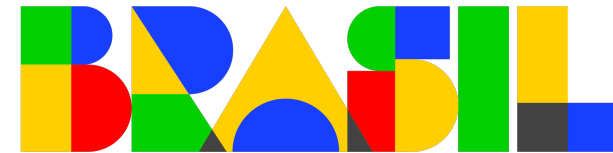
## THE FUTURE OF SUSTAINABLE MOBILITY RENOVABIO AND FUEL OF THE FUTURE

WORKSHOP – BIOENERGY IN A NET ZERO FUTURE

---

**MINISTÉRIO DE  
MINAS E ENERGIA**

**GOVERNO FEDERAL**



**UNIÃO E RECONSTRUÇÃO**

**Marlon Arraes Jardim**  
Director – Biofuels Department



**IEA Bioenergy**  
*Technology Collaboration Programme*

# RenovaBio

## The National Biofuels Policy



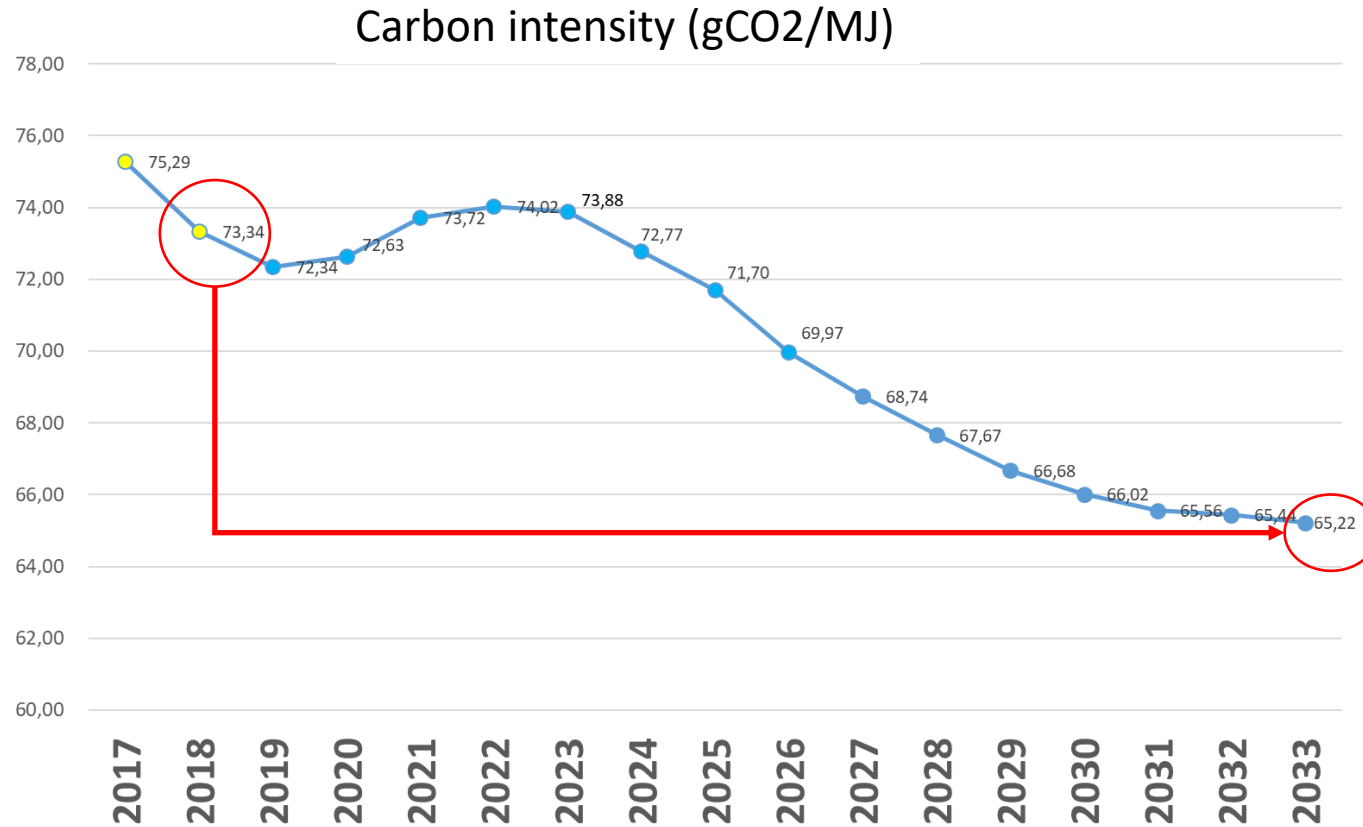


# RENOVABIO CONCEPT: 3 AXES

- **Axis 1: The national target for reducing emissions for the fuel market over a period of 10 years.**
  - ✓ This target is broken down (by ANP) into individual targets for fuel distributors based on their fossil market share from the previous year.
- **Axis 2: Individual certification of biofuel production**
  - ✓ Certification is based on a life cycle analysis, through which biofuel producers receive an efficiency score in terms of net emissions per unit of energy.
- **Axis 3: CBIO (Decarbonization Credit)**
  - ✓ CBIOs issued by the biofuel producer must be purchased by distributors on the stock exchange market. The CBIOs acquired will be the only way to prove compliance with the goals.

# AXIS 1: NATIONAL TARGET FOR EMISSIONS' REDUCTION

Recommended by an **Interministerial Council** and defined every year since 2018 by the **CNPE**



Defined after  
a Public  
Consultancy  
process

Established a **11 % reduction target** (gCO<sub>2</sub>eq/MJ)  
in relation to 2018 for the **next 10 years**

# AXIS 2: CERTIFICATION OF BIOFUELS' PRODUCTION



- 💧 **Life Cycle Assessment**  
from well to tank
- 💧 **Efficiency Notes (scores)**  
per producer

It doesn't  
choose the  
technology

MJ / gCO<sub>2</sub>eq

↑ Energy

↓ CO<sub>2</sub> eq

↑ Score

↑ CBIOs

↓ Energia







↑ CO<sub>2</sub> eq

↓ Score

↓ CBIOs

**Certified Biofuel Units: Ethanol (277/357); Biodiesel (32/56) and Biomethane (3/4)**

# AXIS 3: CBIO – DECARBONIZATION CREDITS

-  It is **traded in the Brazilian stock exchange market**
-  **One CBio** corresponds to a reduction of **one ton of carbon dioxide** equivalent (CO<sub>2</sub>eq), in comparison to fossil fuel emissions
-  It is based on the volume of each **invoice of biofuel sold** by producers or importers
-  **Fuel distributors** may **buy CBIO** in order to comply their individual targets; otherwise they are liable to **penalties and sanctions**
-  **Investors** (Individuals, Enterprises, Funds etc.) will also be able to trade CBio, what improves its liquidity and fungibility
-  CBio implies an **additional income** to producers and importers, in addition to the revenues from biofuels sales in fuel market

# AXIS 3: CBIO – DECARBONIZATION CREDITS

## CBIO – CRÉDITO DE DESCARBONIZAÇÃO 2023

CBIOs ESCRITURADOS na posse de CADA participante do Mercado (B3 S.A.)

Meta anual 37,47 Milhões



2023



Emissor  
8.275.236  
(22,08%)



Parte obrigada (Distribuidora)  
20.373.886  
(54,37%)



Parte não obrigada  
1.137.400  
(3,04%)

Média do ano (até 08/09/2023)

R\$ 112,78

Média do mês (Set/2023)

R\$ 124,28

Variação semanal:

Média últ. semana  
(28 Ago – 01 Set)

R\$ 121,08

vol. negociado

726.403

Preço

2,85%

Média semana  
(04 – 08 Set)

R\$ 124,53

vol. negociado

646.285

Volume

-11,03%

### BALANÇO 2022

- ✓ Meta: 35.976.384 CBIOs
- ✓ CBIOs Emitidos: 31.227.303 (86,80%)
- ✓ CBIOs Disponíveis no ano (Emitidos + Estoque de 2021): 41.674.653 (115,84%)
- ✓ CBIOs Aposentados (Parcial até Dez/22): 16.824.904 (46,77%)
- ✓ Valor médio do CBIO: R\$ 111,63
- ✓ Volume financeiro movimentado (Bilhões de R\$): 3,4

Expected financial volume of more than USD 700 million

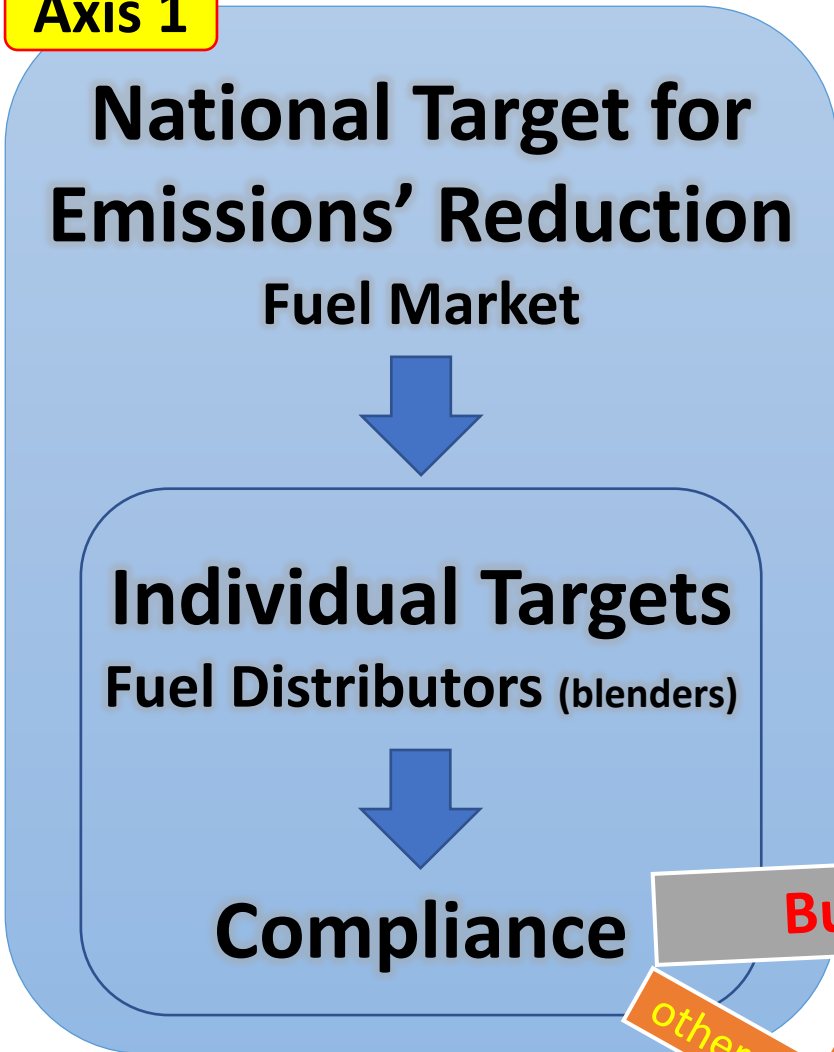
USD 23.30

Extra income for ethanol producers of nearly R\$ 0.15/liter

~ 5%

# RENOVABIO CONCEPT: 3 AXES

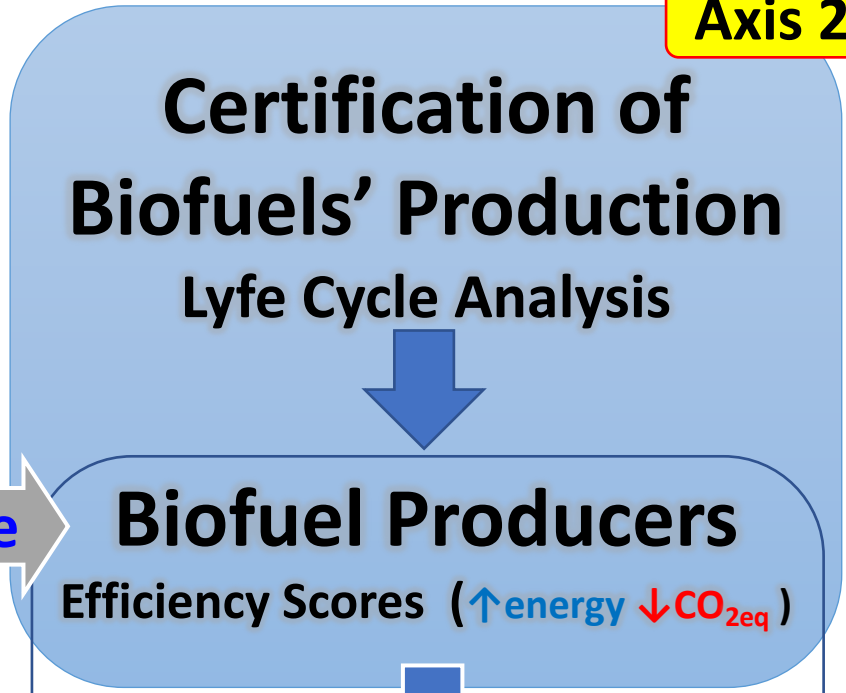
## Axis 1



Investors (Individuals, Enterprises, Funds etc.)



## Axis 2



## Axis 3



Penalties and Sanctions



# TRANSIÇÃO ENERGÉTICA

## COMBUSTÍVEL DO FUTURO

GOVERNO FEDERAL

MINISTÉRIO DE  
MINAS E ENERGIA



COMISSÃO E REGULAMENTAÇÃO

PROJETO DE LEI  
Nº 4.516/2023



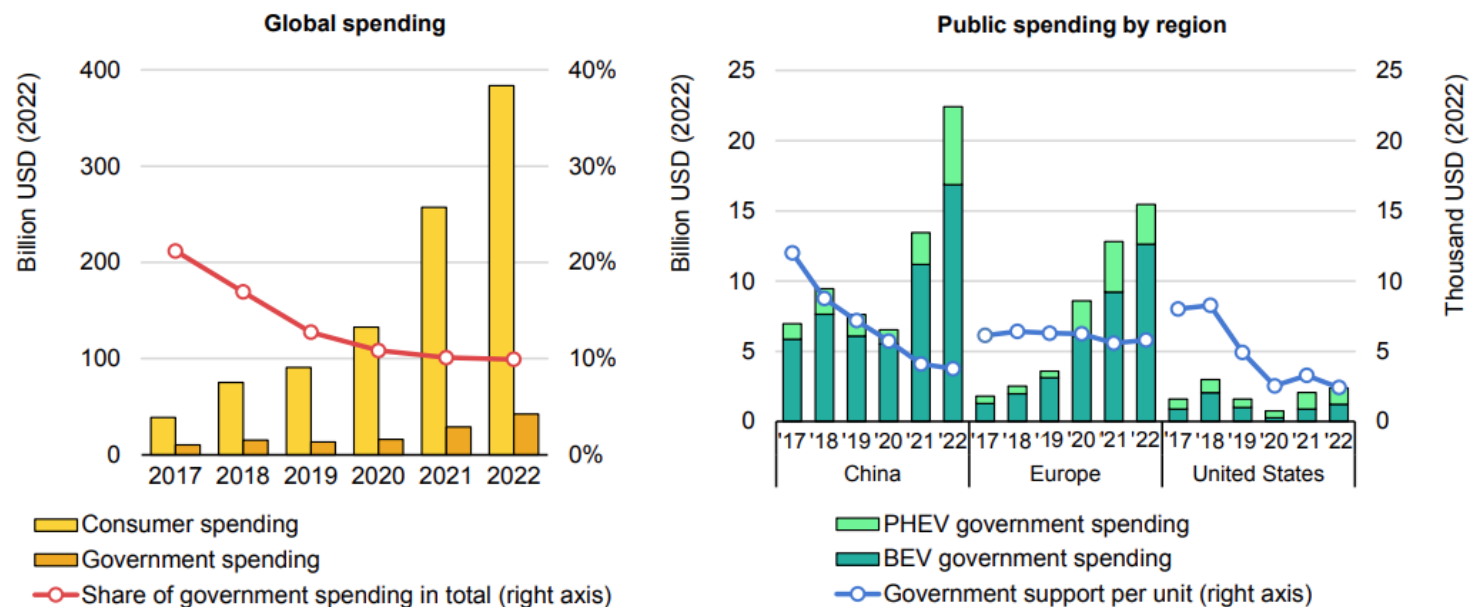
# FUEL OF THE FUTURE MAIN ASPECTS

	Objetivo
FUEL OF THE FUTURE	Integration of the National Biofuels Policy ( <b>RenovaBio</b> ), the <b>Rota 2030</b> Program - Mobility and Logistics, the Air Pollution Control Program for Motor Vehicles ( <b>PROCONVE</b> ), and the Brazilian Vehicle Labeling Program.
ROTA 2030 (AUTOMOTIVE REGIME)	Inclusion of the <b>well-to-wheel</b> based life cycle analysis concept in goal setting for the automotive industry.
PROCONVE	Harmonization of the <b>Rota 2030</b> schedule with those of the Air Pollution Control Program for Motor Vehicles ( <b>PROCONVE</b> ).
NATIONAL SUSTAINABLE AVIATION FUEL PROGRAM (PROBIOQAV)	Promote production and introduce sustainable aviation fuel (SAF) into the Brazilian energy matrix. Establish targets for reducing carbon dioxide emissions by air operators for the period 2027-2037.
CARBON DIOXIDE CAPTURE AND STORAGE TECHNOLOGY REGULATION	<b>Voluntarily</b> allow the use of <b>carbon dioxide capture and storage technology</b> by companies or consortiums of companies regulated and supervised by the ANP.
NATIONAL GREEN DIESEL PROGRAM (PNDV)	Promote the production and use of Green Diesel to reduce the country's external dependence on Diesel.
INCREASING THE LIMITS OF ETHANOL MIXTURE IN GASOLINE: FROM (E18 - E27.5) TO (E22 - E30)	Evaluate the expansion of the maximum and minimum limits for the mixture of anhydrous ethanol with gasoline, <b>subject to the verification of its technical feasibility.</b>



# GOVERNMENT SPENDING ON ELECTRIC VEHICLES

Figure 2.8. Consumer and government spending on electric cars, 2017-2022



IEA. CC BY 4.0.

Note: Government spending is the sum of direct central government spending through purchase incentives and foregone revenue due to taxes waived specifically for new electric cars. Only central government purchase support policies for electric cars are taken into account. Spending on charging is not included. Consumer spending is the total expenditure based on model price, minus government incentives. Excludes incentives for company cars. Values and trends may change slightly relative to previous publications following methodology improvements and better coverage of government support schemes.

Source: IEA analysis based on EV Volumes and country policy documents.

**Total global spending on electric cars stood at USD 425 billion in 2022, increasing by 50% relative to 2021, with government support accounting for a stable 10% share of the total.**

## Global spending on electric cars continues to increase

Global spending on electric cars was up 50% in 2022 relative to 2021, reaching about USD 425 billion. Most of this was directly spent by consumers when buying a vehicle, while governments spent around USD 40 billion through direct purchase incentives. These include subsidies and tax deductions such as VAT exemption, and bonuses related to weight, CO<sub>2</sub> emissions or range. The increase in global spending on electric cars means that carmakers – including incumbents – are generating more revenues from EV sales, and particularly from SUVs and large car models, thereby progressively helping to reduce reliance on ICE sales to finance EV manufacturing, R&D and new model development. While there is still a long way to go, this is an important step for EV growth and the transition to fully electrified road transport.

**Gastos governamentais não incluem aqui os investimentos necessários em infraestrutura ou outros gastos tributários de incentivo à indústria**

**Subsídios governamentais são da ordem de 10% do valor dos veículos elétricos**

# RENOVABIO + ROTA 2030

## Reduction in CO2 emissions in Brazil compared to Europe

$$T_{GEE} = IC \text{ (gCO}_2\text{/MJ)} \cdot Ce \text{ (MJ/km)} = \text{gCO}_2\text{/km}$$

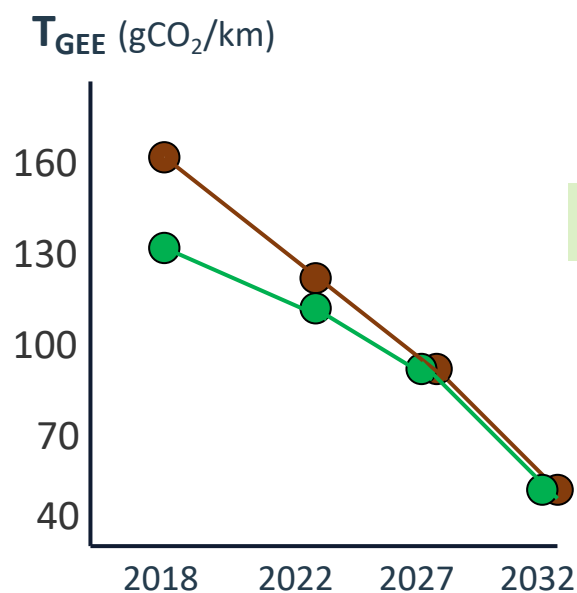
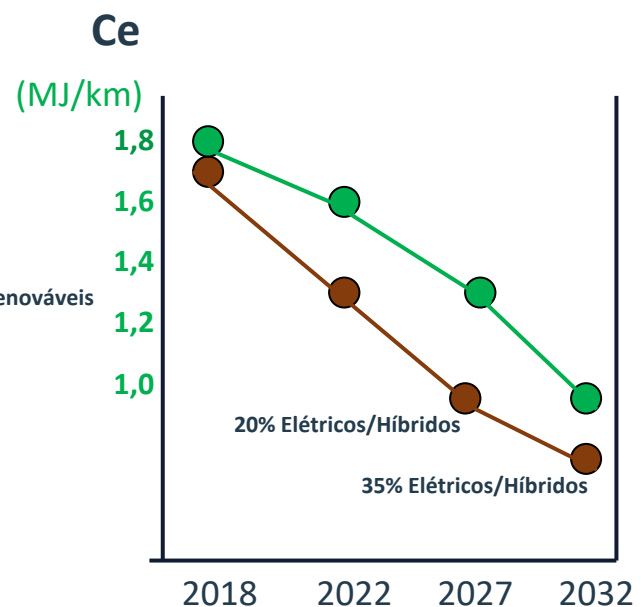
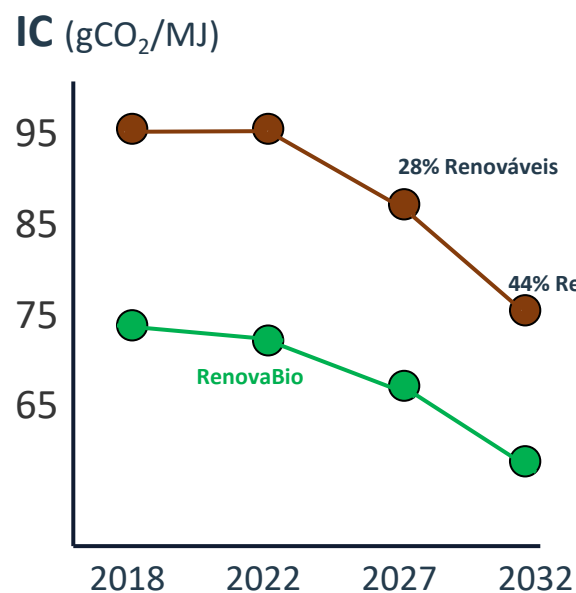
Poço à roda

● EUROPA  
● BRASIL

### Assumptions:

Average fleet profile (BR and EUROPE) with:

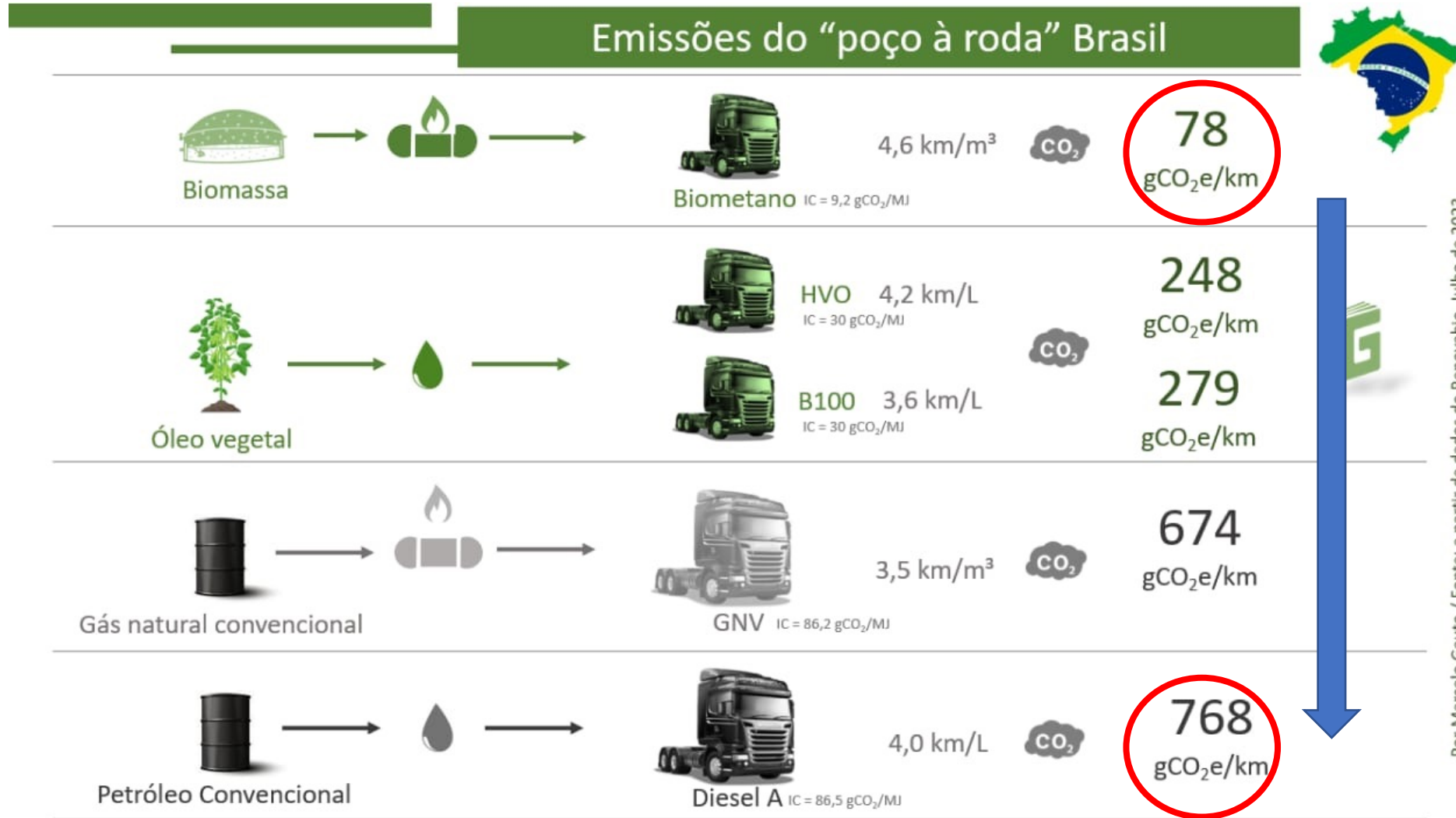
1. Characteristics of energy sources;
2. Expected average efficiency;
3. Penetration of electrified vehicles (EUROPE);
4. Compliance with current/proposed policies.



**Final result (Well to Wheel)**



# WELL TO WHEEL EMISSIONS IN HEAVY DUTY VEHICLES

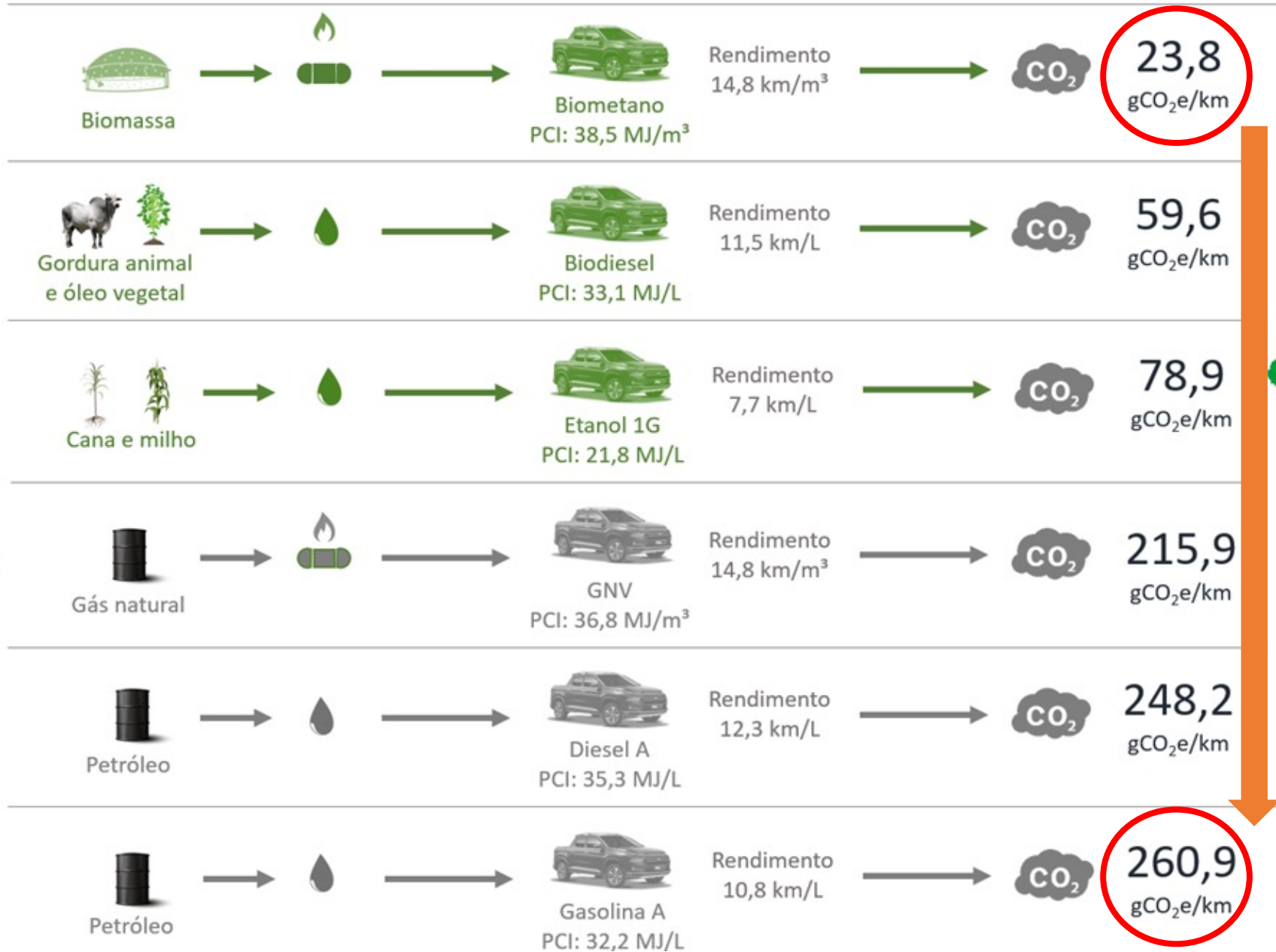


**90% REDUCTION  
IN GHG  
EMISSIONS  
WITH THE USE  
OF BIOMETHANE  
IN HEAVY DUTY  
VEHICLES!!!**

Por Marcelo Gauto / Fonte: a partir de dados do Renovabio, Julho de 2023

# WELL TO WHEEL EMISSIONS IN LIGHT DUTY VEHICLES

Por Marcelo Gauto / Fonte: a partir de dados do Renovabio, Julho de 2022



**91% REDUCTION  
IN GHG  
EMISSIONS WITH  
THE USE OF  
BIOMETHANE IN  
LIGHT VEHICLES!!!**

# NATIONAL SUSTAINABLE AVIATION FUEL PROGRAM (PROBIOQAV)

- Targets for reducing CO2 emissions for air operators, in their domestic operations, through the use of SAF on fossil QAVs.
- Alternative means to achieve the goal may be permitted, in accordance with the regulations.
- The CNPE may change the percentage at any time, for justified reasons of public interest.

## *Remarks:*

- Encouraging the production and use of SAF in Brazil
- Public Policy period: 2027 to 2037
- Favors the most efficient technological route from the point of view of reducing GHG emissions

Ano	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Percentual Mínimo de Redução das Emissões	1%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%



# PROBIOQAV



CO<sub>2</sub> Reduction  
versus QAV (%)

Necessary  
volume for 1%  
Emission  
reduction

Impact on Air Flight  
Tickets

Rota

Raw-Material

gCO<sub>2</sub>/MJ

CO<sub>2</sub> Reduction  
versus QAV (%)

Necessary  
volume for 1%  
Emission  
reduction

Mandate: 1%

Mandate: 10%

HEFA

Soya Oil

67,4

↓ 24%

4,1%

1,1%

11,4%

ATJ

Ethanol

32,8

↓ 63%

1,6%

0,4%

4,4%

HEFA

UCO

13,9

↓ 84%

1,2%

0,3%

3,3%

**Premisses:**

- QAV Producer: R\$ 5.03 / litro (ANP – 2022)
- SAF HEFA UCO: US\$ 2,500 / mt (Platts – 2022)
- Exchange: R\$ 5.10 / US\$ (Bacen – 2022)



# NATIONAL GREEN DIESEL PROGRAM

- **Aggregate volumetric mandate in the national territory established annually by the CNPE.**
- **Mandatory participation of green diesel in relation to diesel sold to the final consumer cannot exceed the limit of 3% each year.**
- **To define mandatory participation, the CNPE will observe:**
  - I - the conditions for supplying green diesel, including the availability of raw materials, capacity and location of production;
  - II - the impact of the mandatory minimum participation on the price to the final consumer; It is
  - III - competitiveness in international markets for domestically produced green diesel.

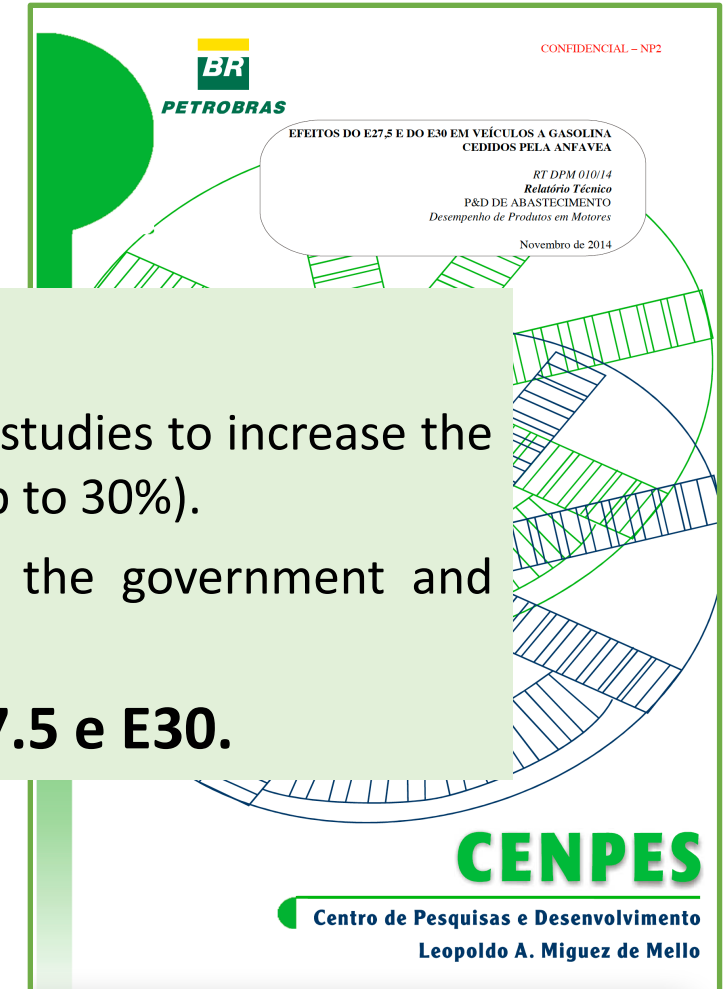
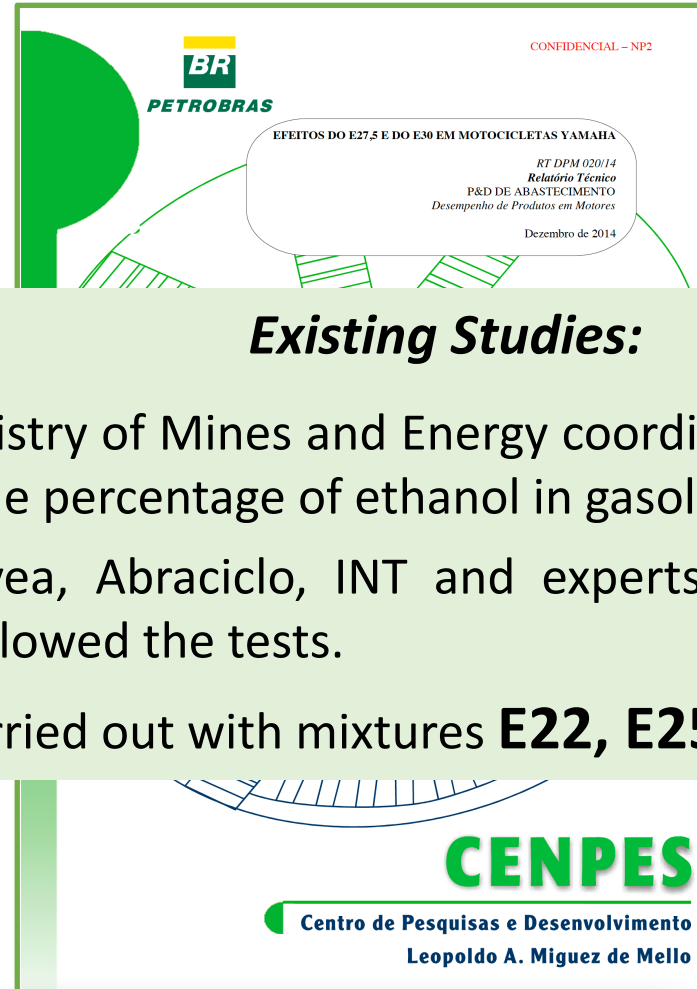
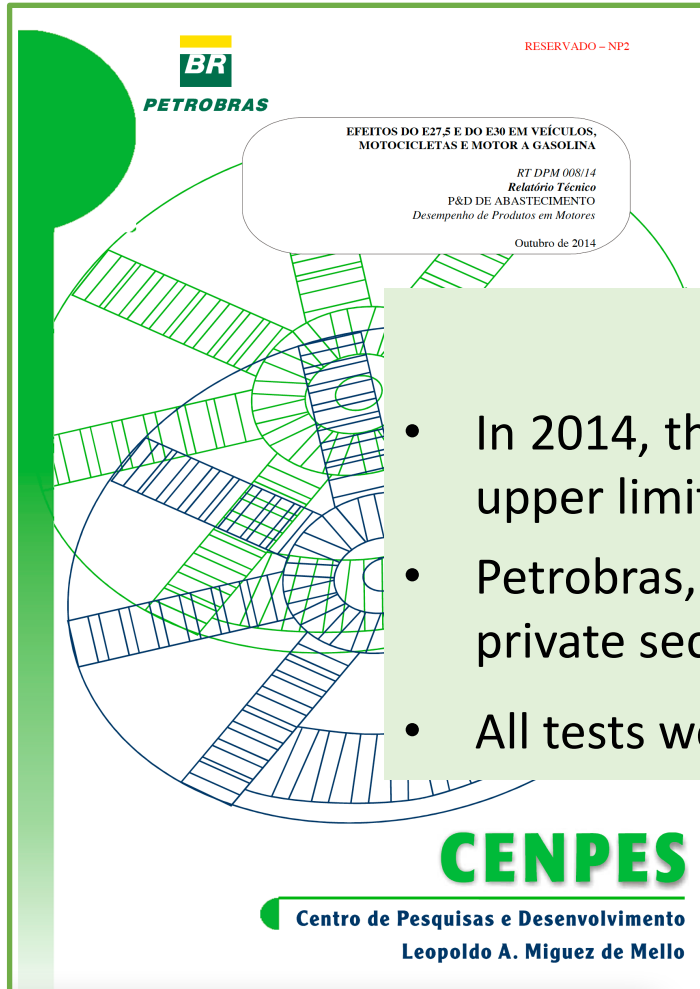
# GEOLOGICAL CO2 CAPTURE AND STORAGE (ProBioCCS)

- The activities of carbon dioxide capture and geological storage will be carried out pending an authorization by ANP.
- Any company or consortium of companies established under Brazilian laws, with headquarters and administration in the country, may request authorization to carry out activities, which will occur at the risk and expense of the interested party.
- The ANP will issue rules on the qualification of interested parties and the conditions for authorization and transfer of ownership.

## *Remarks:*

- VOLUNTARILY ALLOW THE USE OF CARBON DIOXIDE CAPTURE AND STORAGE TECHNOLOGY BY COMPANIES OR CONSORTIUM OF COMPANIES WITH REGULATION AND SUPERVISION BY THE ANP.
- THE ANP WILL PROVIDE ACCESS TO PUBLIC TECHNICAL DATA ON BRAZILIAN SEDIMENTARY BASINS TO INTERESTED PARTIES FOR ANALYSIS, STUDIES AND IDENTIFICATION OF AREAS WITH POTENTIAL FOR CARBON DIOXIDE STORAGE.

# E30 APPRECIATION



## Existing Studies:

- In 2014, the Ministry of Mines and Energy coordinated studies to increase the upper limit for the percentage of ethanol in gasoline (up to 30%).
- Petrobras, Anfavea, Abraciclo, INT and experts from the government and private sector followed the tests.
- All tests were carried out with mixtures **E22, E25, E27.5 e E30**.

# E30 APPRECIATION

Log in

## Pertinent Findings and Outcomes

- E25 and E40 would achieve volumetric fuel economy parity with today's E10 with a 5 and 10% improvement in vehicle efficiency, respectively (i.e., fuel economy would be the same using HOF as today's vehicle using E10, and so every gallon of ethanol used in HOF would displace a full gallon of gasoline.)



High-Octane Fuel

## Pertinent Findings and Outcomes

- E25 and E40 would achieve volumetric fuel economy parity with today's E10 with a 5 and 10% improvement in vehicle efficiency, respectively (i.e., fuel economy would be the same using HOF as today's vehicle using E10, and so every gallon of ethanol used in HOF would displace a full gallon of gasoline.)

### Overview

In vehicles designed for its use, high-octane fuel blends have the potential to increase vehicle efficiency through improved knock suppression. When the high-octane blend is made with 25%–40% ethanol by volume, efficiency improvements of 5%–10% are sufficient to offset the reduced vehicle range often associated with the decreased volumetric energy density of the fuel (such as with flexible-fuel vehicles (FFVs) fueled with ethanol).



- The efficiency gain of HOF overwhelmingly overtakes the potential increase in refinery GHG emissions for HOF production, resulting in net GHG reductions by HOF.

The prospects for a high-octane, mid-level ethanol blend are currently on the road. Thus, the current FFV fleet could be replaced by high-efficiency vehicles designed to use it.

### Project Details

The U.S. Department of Energy (DOE) Bioenergy Technology Office (BETO) is conducting a study of high-octane fuel (HOF) to assess its potential to reduce barriers to its successful market introduction, understand barriers to its adoption, and

The project, which began in late FY 2013 and culminated in the Renewable Energy Laboratory, and Oak Ridge National Laboratory.

**MME will propose to the CNPE the creation of a working group to evaluate existing studies, in Brazil and abroad, on the use of the E30 to subsequently suggest changes to current legislation.**

- constraints for additional tanks and ethanol unloading facilities and the regulatory process for these additions are lengthy.
- An empirical model was developed to estimate fuel properties using natural gasoline as a blendstock.
- Natural gasoline is a potential low-cost hydrocarbon blendstock for FFV fuels and HOF, if blended with sufficient ethanol.

the availability of ethanol feedstocks does not limit the penetration in many scenarios. In scenarios where the cost of ethanol (including ethanol for second-generation ethanol) tends to be a significant barrier, the availability of ethanol feedstocks does not limit the penetration in many scenarios. In scenarios where the cost of ethanol (including ethanol for second-generation ethanol) tends to be a significant barrier, ethanol is available through E10 HOF. Refinery efficiency. However, if HOF market penetration is achieved without the use of higher-ethanol blends (e.g., E25 and E30), ethanol blends today, materials and equipment are available for E10 HOF, but substantially less for E25. Ethanol there are considerations including tank capacity and ethanol unloading facilities. There could be space for additional tanks and ethanol unloading facilities and the regulatory process for these additions are lengthy.



# FINAL REMARKS

1. BRAZIL HAS FAVORABLE CONDITIONS FOR THE PRODUCTION OF BIOENERGY DUE TO THE AVAILABILITY OF AGRICULTURAL LAND, A SUITABLE CLIMATE FOR THE CULTIVATION OF RAW MATERIALS SUCH AS SUGAR CANE, CORN, PALM OIL AND SOY, WHICH HAVE CONSOLIDATED OUR EXPERTISE IN THE SECTOR BIOFUELS.
2. RENOVABIO'S OBJECTIVE IS TO INDUCE THE CONCRETION OF A FUEL MATRIX THAT REDUCES CARBON INTENSITY.
3. FUTURE OF THE FUTURE WILL EXPAND THE RANGE OF OPTIONS FOR THE COUNTRY IN THE DECARBONIZATION OF THE TRANSPORTATION SECTOR.
4. ALIGNMENT AND INTEGRATION OF POLICIES ARE FUNDAMENTAL TO ENSURE THE NECESSARY INVESTMENTS FOR THE COUNTRY AND TO COMPLY WITH BRAZIL'S INTERNATIONAL COMMITMENTS RELATED TO DECARBONIZATION.





# Thank you!

E-mail: [marlon.arraes@mme.gov.br](mailto:marlon.arraes@mme.gov.br)