THE BRAZILIAN POLICIES FOR BIOFUELS

THE FUTURE OF SUSTAINABLE MOBILITY
RENOVABIO AND FUEL OF THE FUTURE

TRADE AND ENVIRONMENTAL SUSTAINABILITY STRUCTURED DISCUSSIONS (TESSD)

Marlon Arraes Jardim
Director – Biofuels Department
KEY QUESTIONS:

• WHAT ARE **KEY GOODS AND SERVICES** TO SUPPORT THE PRODUCTION, TRADE AND USE OF BIOFUELS?

• WHAT ARE **OPPORTUNITIES FOR DEVELOPING COUNTRIES** TO PARTICIPATE IN BIOFUEL SUPPLY CHAINS?

• HOW CAN **TRADE POLICY AND TRADE-RELATED TECHNICAL ASSISTANCE AND CAPACITY-BUILDING** HELP OVERCOME CHALLENGES TO EXPLOIT THESE OPPORTUNITIES?
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

11% reduction target (gCO2/MJ) in relation to 2018 in 10 years

Defined after a Public Consultancy process
Life Cycle Assessment
from well to tank

Efficiency Notes (scores)
per producer

Energy
CO₂ eq
Score
CBIOs

Energia
CO₂ eq
Score
CBIOs

MJ / gCO₂eq

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 (CO2eq), 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.)

<table>
<thead>
<tr>
<th>CBIOs emitidos</th>
<th>CBIOs aposentados</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.558.057</td>
<td>17.626.584</td>
</tr>
<tr>
<td>(60,20%)</td>
<td>(47,04%)</td>
</tr>
</tbody>
</table>

Meta anual 37,47 Milhões

Emissor
8.275.236 (22,08%)

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

Parte não obrigada
1.137.400 (3,04%)

22,56 Milhões de toneladas de CO₂ eq mitigados

Média do ano (até 08/09/2023)
R$ 112,78

Média do mês (Set/2023)
R$ 124,28

Variação semanal:

<table>
<thead>
<tr>
<th>Média últ. semana</th>
<th>Média semana</th>
</tr>
</thead>
<tbody>
<tr>
<td>(28 Ago – 01 Set)</td>
<td>(04 – 08 Set)</td>
</tr>
<tr>
<td>R$ 121,08</td>
<td>R$ 124,53</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>vol. negociado</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>726.403</td>
<td>646.285</td>
</tr>
<tr>
<td>-11,03%</td>
<td></td>
</tr>
</tbody>
</table>

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

Extra income for etanol producers of nearly R$ 0,15/liter ~ 5%
RENOVABIO CONCEPT: 3 AXES

Axis 1

National Target for Emissions’ Reduction
Fuel Market

Individual Targets
Fuel Distributors (blenders)

Compliance

Axis 2

Certification of Biofuels’ Production
Lyfe Cycle Analysis

Biofuel Producers
Efficiency Scores (↑energy ↓CO₂eq)

Axis 3

CBIO
Decarbonization Credits

 Investors (Individuals, Enterprises, Funds etc.)

Stock Market

Buy

Income

Buy

Sell

Penalties and Sanctions

CBIO

Buy

otherwise

Income

Buy

Penalties and Sanctions

CBIO

Sell
PROJETO DE LEI
Nº 4.516/2023
<table>
<thead>
<tr>
<th>FUEL OF THE FUTURE MAIN ASPECTS</th>
<th>Objetivo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUEL OF THE FUTURE</strong></td>
<td>Integration of the National Biofuels Policy (<em>RenovaBio</em>), the <em>Rota 2030</em> Program - Mobility and Logistics, the Air Pollution Control Program for Motor Vehicles (<em>PROCONVE</em>), and the Brazilian Vehicle Labeling Program.</td>
</tr>
<tr>
<td><strong>ROTA 2030 (AUTOMOTIVE REGIME)</strong></td>
<td>Inclusion of the <em>well-to-wheel</em> based life cycle analysis concept in goal setting for the automotive industry.</td>
</tr>
<tr>
<td><strong>PROCONVE</strong></td>
<td>Harmonization of the <em>Rota 2030</em> schedule with those of the Air Pollution Control Program for Motor Vehicles (<em>PROCONVE</em>).</td>
</tr>
<tr>
<td><strong>NATIONAL SUSTAINABLE AVIATION FUEL PROGRAM (PROBIOQAV)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>CARBON DIOXIDE CAPTURE AND STORAGE TECHNOLOGY REGULATION</strong></td>
<td><em>Voluntarily</em> allow the use of <em>carbon dioxide capture and storage technology</em> by companies or consortiums of companies regulated and supervised by the ANP.</td>
</tr>
<tr>
<td><strong>NATIONAL GREEN DIESEL PROGRAM (PNDV)</strong></td>
<td>Promote the production and use of Green Diesel to reduce the country’s external dependence on Diesel.</td>
</tr>
<tr>
<td><strong>INCREASING THE LIMITS OF ETHANOL MIXTURE IN GASOLINE: FROM (E18 - E27.5) TO (E22 - E30)</strong></td>
<td>Evaluate the expansion of the maximum and minimum limits for the mixture of anhydrous ethanol with gasoline, <em>subject to the verification of its technical feasibility</em>.</td>
</tr>
</tbody>
</table>
GOVERNMENT SPENDING ON ELECTRIC VEHICLES

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

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, CO₂ 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.

Fonte: AIE Global EV Outlook 2023

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

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.
RENOVABIO + ROTA 2030

Reduction in CO2 emissions in Brazil compared to Europe

\[ T_{GEE} = IC \text{ (gCO}_2\text{e/MJ)}.Ce \text{ (MJ/km)} = \text{gCO}_2\text{e/km} \]

Poço à roda

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!!!**

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Distance (km/L)</th>
<th>GHG Emissions (gCO₂e/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>4.6 km³</td>
<td>78</td>
</tr>
<tr>
<td>Biogas</td>
<td>4.2 km/L</td>
<td>248</td>
</tr>
<tr>
<td>Vegetable Oil</td>
<td>3.6 km/L</td>
<td>279</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>3.5 km³</td>
<td>674</td>
</tr>
<tr>
<td>Diesel A</td>
<td>4.0 km/L</td>
<td>768</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>86.2 gCO₂/MJ</td>
<td></td>
</tr>
<tr>
<td>Biogas</td>
<td>30 gCO₂/MJ</td>
<td></td>
</tr>
<tr>
<td>Vegetable Oil</td>
<td>30 gCO₂/MJ</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>86.5 gCO₂/MJ</td>
<td></td>
</tr>
</tbody>
</table>

**Emissões do “poço à roda” Brasil**

- **Biomass**: 4.6 km/m³, 78 gCO₂e/km
- **Biogas**: 4.2 km/L, 248 gCO₂e/km
- **Vegetable Oil**: 3.6 km/L, 279 gCO₂e/km
- **Natural Gas**: 3.5 km/m³, 674 gCO₂e/km
- **Diesel A**: 4.0 km/L, 768 gCO₂e/km

**Source:** Marcelo Gusmão / Credit: Ministry of Mines and Energy, Brazil
### WELL TO WHEEL EMISSIONS IN LIGHT DUTY VEHICLES

<table>
<thead>
<tr>
<th>Source of Fuel</th>
<th>CO₂ Emission (gCO₂e/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>23,8</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>59,6</td>
</tr>
<tr>
<td>Ethanol 1G</td>
<td>78,9</td>
</tr>
<tr>
<td>GNV</td>
<td>215,9</td>
</tr>
<tr>
<td>Diesel A</td>
<td>248,2</td>
</tr>
<tr>
<td>Gasolina A</td>
<td>260,9</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Ano</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
<th>2031</th>
<th>2032</th>
<th>2033</th>
<th>2034</th>
<th>2035</th>
<th>2036</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentual Mínimo de Redução das Emissões</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>8%</td>
<td>9%</td>
<td>10%</td>
</tr>
</tbody>
</table>
**PROBIOQAV**

### CO₂ Reduction versus QAV (%)

<table>
<thead>
<tr>
<th>Rota</th>
<th>Raw-Material</th>
<th>gCO₂/MJ</th>
<th>CO₂ Reduction versus QAV (%)</th>
<th>Necessary volume for 1% Emission reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEFA</td>
<td>Soya Oil</td>
<td>67,4</td>
<td>↓ 24%</td>
<td>4,1%</td>
</tr>
<tr>
<td>ATJ</td>
<td>Ethanol</td>
<td>32,8</td>
<td>↓ 63%</td>
<td>1,6%</td>
</tr>
<tr>
<td>HEFA</td>
<td>UCO</td>
<td>13,9</td>
<td>↓ 84%</td>
<td>1,2%</td>
</tr>
</tbody>
</table>

### Impact on Air Flight Tickets

<table>
<thead>
<tr>
<th>Mandate: 1%</th>
<th>Mandate: 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,1%</td>
<td>11,4%</td>
</tr>
<tr>
<td>0,4%</td>
<td>4,4%</td>
</tr>
<tr>
<td>0,3%</td>
<td>3,3%</td>
</tr>
</tbody>
</table>

**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.
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, Abracícolo, INT and experts from the government and private sector followed the tests.
- All tests were carried out with mixtures E22, E25, E27.5 and E30.
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.)

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.
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