



# BIODIESEL

December/2010

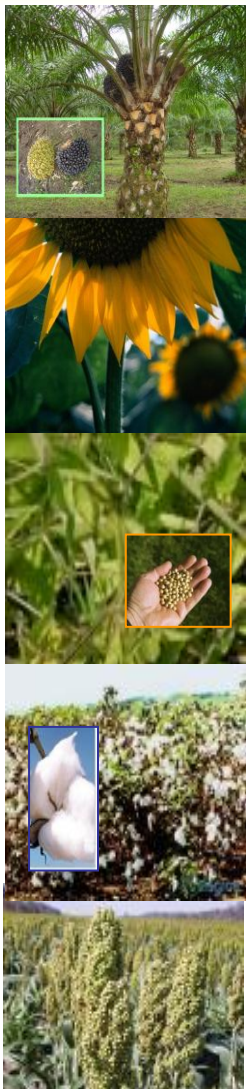
# Biodiesel in Brazil



- 1960/70: Records of studies on production of biodiesel in the world (BR).
- 1970/80: Release of PRO-ALCOHOL.
- 1980: 1st Deposited Patent of Biodiesel in Brazil - Dr. Expedito Parente.
- 1988: Production of biodiesel in Austria and France.
- 1977: U.S. - Congress passes biodiesel as alternative fuel.
- 1988: Sector R & D projects in Brazil to incorporate the use of biodiesel.
- 2002: Germany Surpasses 1 million ton / year of production.

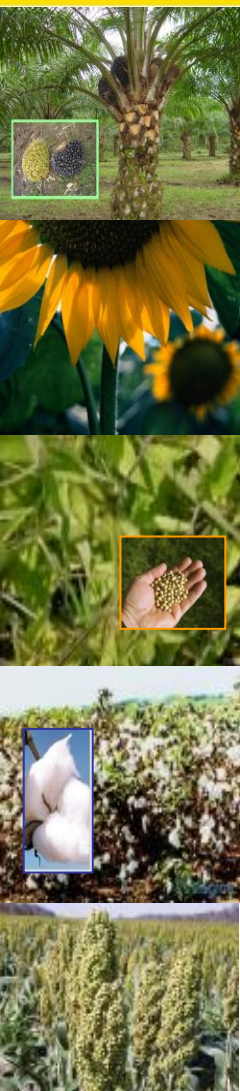
## Characteristics and Objectives PNPB – I

- ☐ Inter-ministerial Program of the Federal Government;
- ☐ Aims to introduce and consolidate in a sustainable way, both technically and economically, the biodiesel in the Brazilian energy matrix;
- ☐ Focus on social inclusion and regional development by generating employment and income.



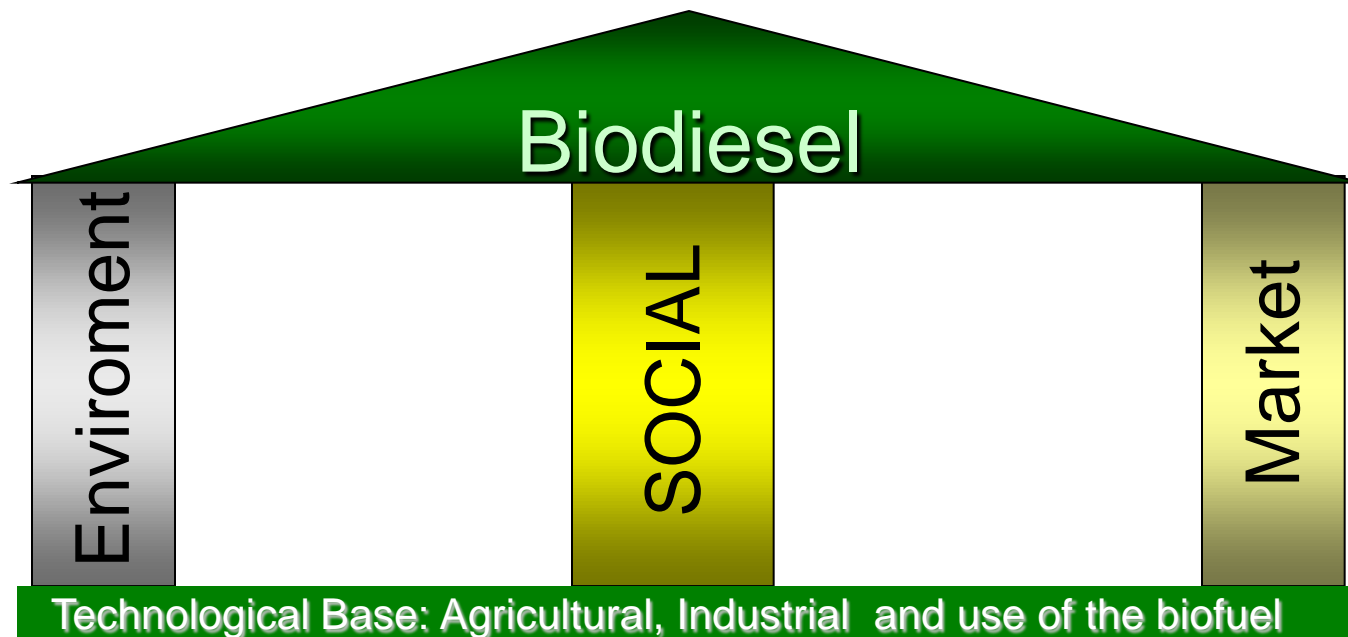
## Characteristics of the PNPB and Objectives – II

- ☐ National specification facing the physical and chemical characteristics and end application, regardless of the feedstock origin;
- ☐ High expectations and doubts about the product;
- ☐ Insertion in the energy matrix with positive and promising results;
- ☐ Few raw materials used in commercial scale: soybean, tallow, cotton, palm, sunflower;



## Pillars of Biodiesel in Brazil

**CHALLENGE:** Implement a self-sustainable energy project, considering price, quality and guaranteed supply of biodiesel, providing income generation and social inclusion.





# ***Biodiesel***

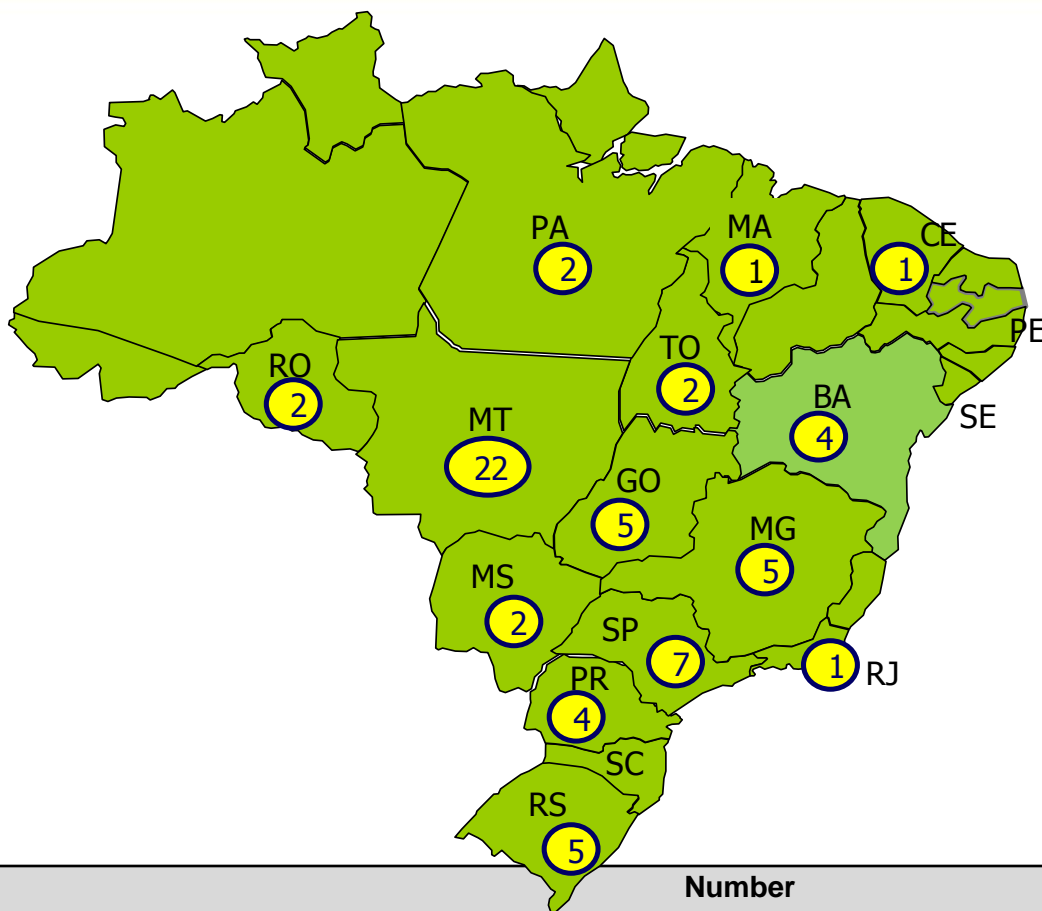
- ❑ 63 authorized plants
- ❑ Nominal capacity of 5,486 million m<sup>3</sup>/year\*  
(\* considering 360 days of operation)





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## Biodiesel Plants



	Number	Capacity (m³/day)
Plants authorized for operation	10	325.10
Plants authorized for operation and commercialization	53	13,796.53
Total	63	14,606.64

# ANP Attributions

- ☐ Implement the National Policy for biodiesel;
- ☐ Stimulate technological advent in the industry.
- ☐ Protect consumers interests considering Supply, Quality and Price
- ☐ Regulate the units that produce biodiesel and other actors in the supply chain.
- ☐ Raise the profile of product quality, and establish its specification through regulation.
  - Support the development of laboratories for testing biodiesel.
- ☐ Establish Quality Monitoring Programs for biodiesel and diesel



# Biodiesel feedstocks



**Soy**

**Animal fat**

**Palm Oil**

**Cotton**

**Sunflower**

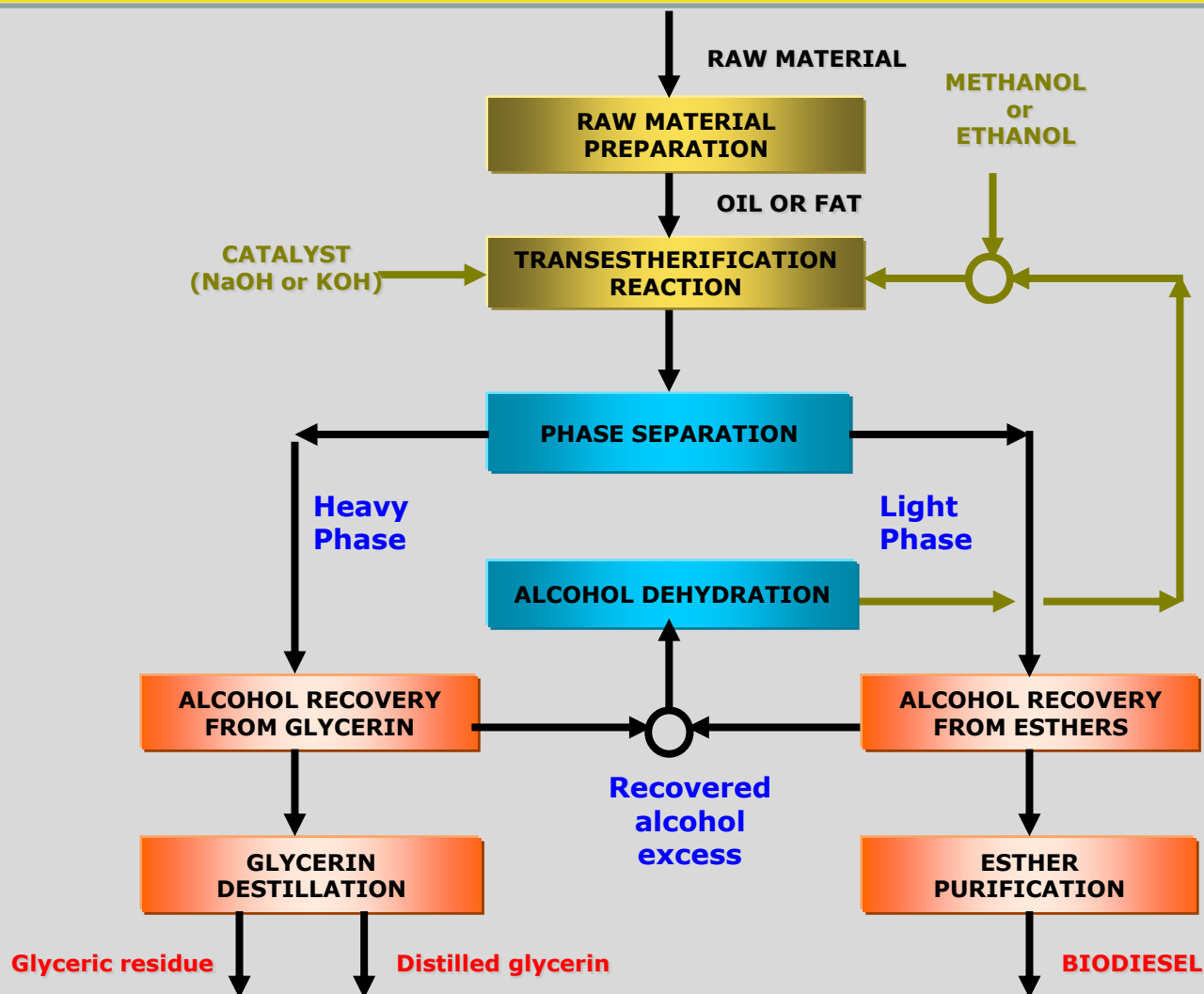
**Rapeseed**

**Babassu**

**Peanut**

**Tucumã**

# Biodiesel production process



## Biodiesel – ANP Act 7/2008 (March 19th 2008)

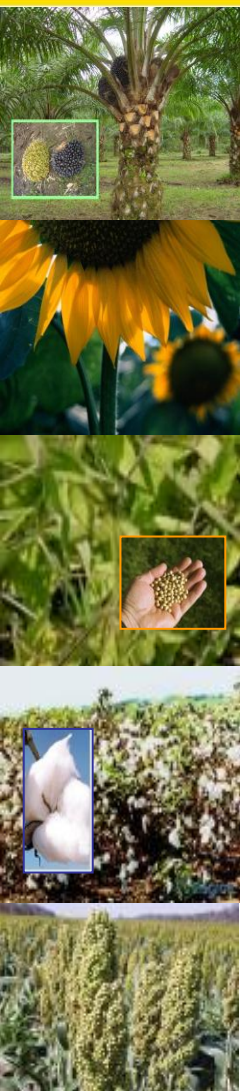
### Key points

- Takes into account regional diversity
- 
- Difference in the end uses (light and heavy vehicles);
  - Differences in composition and blends
  - Difference on legislated emissions,



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# Biodiesel specification



Property	Unity		ASTM D 6751/07	Europe EN 14214/03	Brazil ANP Act 7/08
Density at 20°C	kg/m³			0,86-0,90 (15°C)	850-900
Kinematic Viscosity, 40°C	mm²/s		1,9-6,0	3,5-5,0	3,0-6,0
Water and Sediment	%v/v	max	0,05	-	-
Flash Point (closed cup)	°C	min.	130	120	100
Distillation, 90% recovered	°C	max.	360	-	-
Carbon Residue	%m/m	max.	0,050	0,30 (10% distilled)	0,050
Sulfated ash	%m/m	max.	0,020	0,020	0,020
Copper strip corrosion		max.	3	1	1
CFPP	°C	max.	Report (cloud point)	Country specific	Region specific
Acid number	mgKOH/g	max.	0,50	0,50	0,50
Free glycerin	%m/m	max.	0,020	0,020	0,020
Total glycerin	%m/m	max.	0,024	0,025	0,25
Methanol or Ethanol	%m/m	max.	-	0,20	0,20
Oxidation Stability	h	min.	3	6	6
Sulfur	%m/m	max.	0,0015/0,05	0,0010	0,005
Na+K	mg/kg	max.	5	5	5
Ca+Mg	mg/kg	max.	5	5	5
Phosphorus	%m/m	max.	0,001	0,001	0,001
Cetane Number		min.	47	51	Report
Iodine Number			-	120	Report
Mono-, Di-, Triacylglycerols	%m/m	max.	-	0,8/0,2/0,2	Report
Esther content	%m/m	min.	-	96,5	96,5
Total contamination	mg/kg	max.	-	24	24
Total Water	mg/kg	max.	-	500	500
Linolenic acid ME	%m/m	max.	12	-	-
C(x:4) & greater unsaturated esters	%m/m	max.	1	-	-



## Biodiesel Content



**National Program for Production and Use of Biodiesel**



The activity of Biodiesel Production is now regulated by ANP, including the construction, modification, expansion and operation of the production plant and biodiesel marketing, all conditioned to explicit and previous authorization by the ANP,





## Authorization in 3 STEPS:

### **STEP 1: Construction Authorization**

Analysis of industrial project and company's legal standings (tax compliance; municipal, state and federal authorizations; environmental and safety licenses; business records).

### **STEP 2: Operation Authorization**

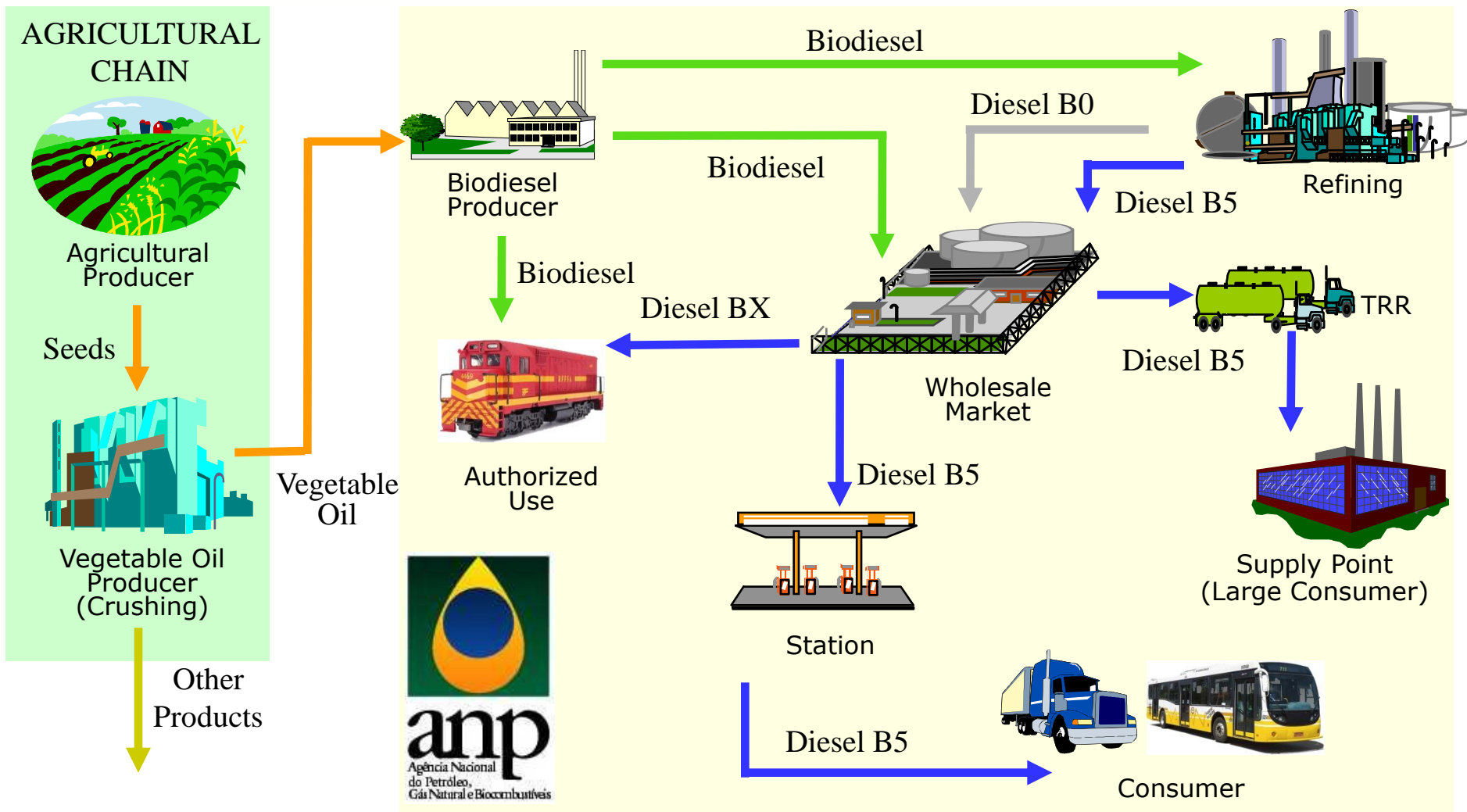
Physical inspection of the facilities by our technical experts.

### **STEP 3: Marketing Authorization**

Subject to approval of the quality of the biodiesel produced,

A Quality Certificate, issued by a registered lab, must be sent by the producer and analyzed by SBQ (Product Quality Department).

# Biodiesel Supply Chain



# ANP Specification B6 to B20 for experimental Uses

the motivations for developing an ANP specification for mixtures containing 6 % to 20% by volume of biodiesel in diesel, for experimental use in captive fleets or equipment in specific industry, was based in:

- the need for improved studies involving mixtures of diesel and biodiesel at levels higher than 5%;
- market demand;
- interests of ANP to assemble a database of test results in order to provide the data needed to support the development of a new specification according to new determinations of the Federal Government.



## Specification B6 to B20

Property	Unity	Limit			
Aspecto		S10	S50	S500	S1800
Cor		LII			
Cor ASTM		(1)			Vermelho
Massa Específica (20 C)	kg/m³	826,0 a 860,0	820,0 a 860,0	820,0 a 872,0	820,0 a 884,0
Viscosidade a 40°C	mm²/s	2,0 a 4,5	2,0 - 5,0		
Teor de Biodiesel, % vol.	% volume	6,0-20,0			
Enxofre, máx.	mg/kg	10	50	-	
		-		500	1800
Destilação / 10% vol.	C	180,0	Anotar		
Destilação / 50% vol.,	C	245,0 a 295,0	245,0 a 310,0		
Destilação / 85% vol.,	C	Anotar			
Destilação / 90% vol.,	C	Anotar			
Destilação / 95%	C	Anotar	-		

## Specification B6 to B20

Ponto de fulgor, °C, mín.	C	38		
Ponto de entupimento de filtro a frio	C	Tabela (*)		
Resíduo de Carbono – 10% amostra, máx.	%massa	0,25		
Cinzas, máx.	%massa	0,01		
Corrosividade ao cobre		1		
Condutividade elétrica, mín..	pS/m	25	Anotar	
Água	mg/kg	200		
Água e sedimentos, máx.	% vol	-	0,05	
Hidrocarbonetos policíclicos aromáticos, máx.	% massa	11	Anotar	
Estabilidade à oxidação (mín)	h	20		
Estabilidade à oxidação	mg/100 mL	2,5	Anotar	
Contaminação total	mg/kg	24	Anotar	
Índice de Neutralização	mg KOH/g	Anotar		
Número de cetano ou número de cetano derivado (NCD), mín.	-	48	46	42

## The Biodiesel Auctions

The ANP realizes since 2005, the biodiesel auctions. In the auctions, the refineries buy the biodiesel to mix it with diesel fuel from petroleum.

The initial goal was to generate the market and thus stimulate the production of biodiesel to ensure sufficient quantities so the refineries and distributors could make the mixture (BX) determined by law.

The auctions are still happening to ensure that all diesel commercialized in Brazil contains the percentage of biodiesel required by law.

The production and use of biodiesel in Brazil encouraged the development of a sustainable energy source under the environmental, economical and social aspects and also brings the prospect of reduced imports of diesel oil



# Register of Biodiesel Laboratories

The regulamentation demands:

- ✓ Technical audit of the laboratory procedures and materials that may have impact in the quality and confiability of the analysis;
- ✓ Rastreability between the Quality Certificates and the product.
- ✓ In 2013, the laboratories and institutions registered at ANP must be accredited by INMETRO according to the standard NBR ISO IEC 17025.

**29 laboratories registered  
at ANP**



## Challenges to the usage of biofuels in the global market

- ✓ Elimination of technical barriers is vital for sustainable biofuels in the world market,
- ✓ Acceptance of the biofuels in the market depends on transparency and trustworthiness of the fuel which should be obtained by standardization,
- ✓ Development of consistent terminology and reference materials,
- ✓ Deepening of standards harmonization has to take into account essentially the development of world test methods appropriate for fuels from different sources, limits of properties wherever possible and also be consistent with different engines,

To improve the international cooperation to achieve a sustainable biofuels market as well as to ensure the consolidation of ethanol and biodiesel as commodities,