

LIPOFUELS: BIODIESEL & BIOKEROSENE



Biofuels from Vegetal and
Animal Oils as Methyl or Ethyl
Esthers

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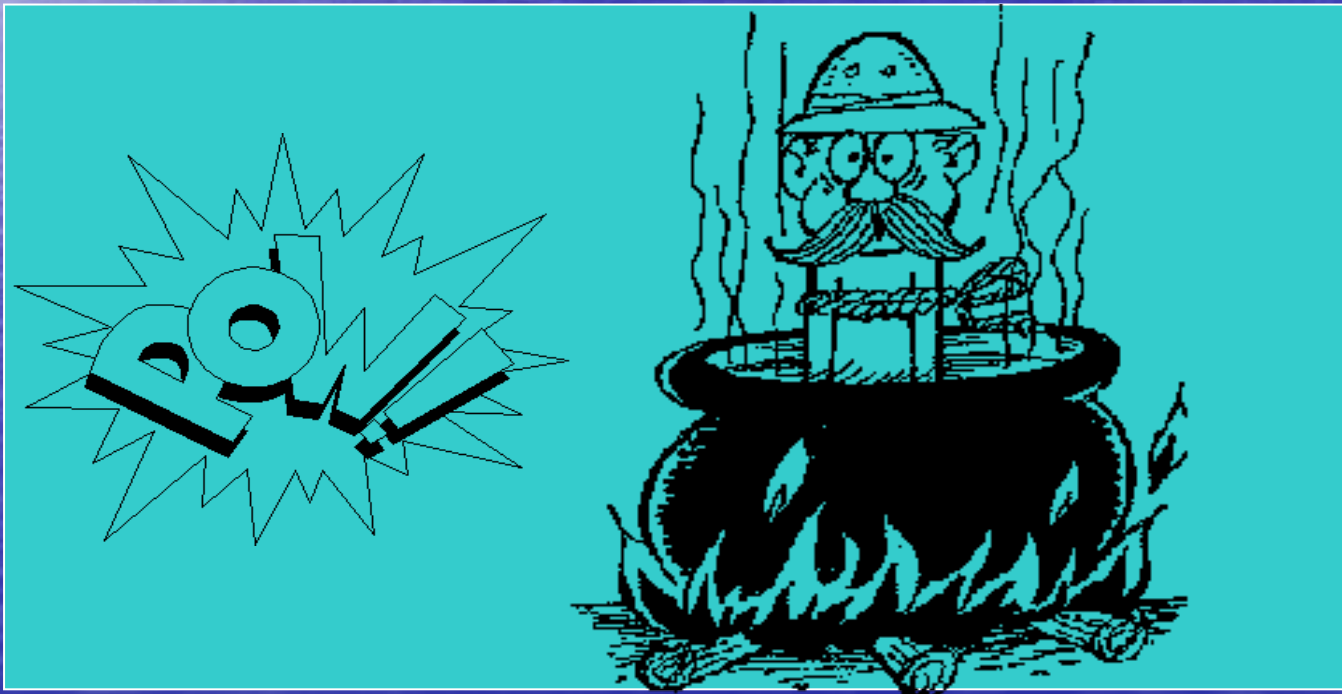
EXPEDITO PARENTE

President of TECBIO

Fortaleza, Brazil

Petroleum: Strategic Points to Consider

- Petroleum: a Finite Raw Material for Fossil Energy Generation.



Petroleum: Strategic Points to Consider

- The increasing competition of Chemical and Energetic Applications of Petroleum.

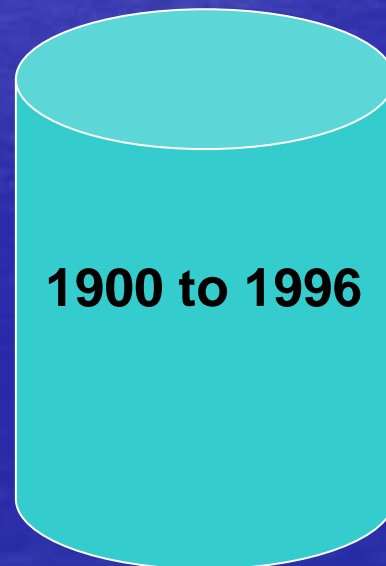


Petroleum: Strategic Points to Consider

- Extraordinary Aspects of Petroleum Demand: The China Case; The Social Inclusion in the World; The Vulnerability of Europe.

I'm Chinese...

I want to be included ...



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FUELS FROM BIOMASS

BIOFUELS:

Biogas

Bioethanol

Biokerosene

Biodiesel

Others

LEARNING FROM THE BRAZILIAN BIOETHANOL PROGRAM

- Evolution in the Industrial Processes
- Increases in the Agricultural Productivity
- Exploitation of By-Products

**Lipofuel Production
Always Means
Foods Offering**

A Gift from Nature:

**ALL FATTY GRAINS AND ALMONDS POSSESS
TWO PORTIONS:**

- **A LIPIDIC PORTION**
- **A PROTEIC PORTION**

**As a result, biomass has the capacity to
simultaneously generate food for humans,
livestock, plants, and machines.**



A GLOBAL VIEW OF BIOMASS ENERGIES

**Biomass =
Biofuels + Biofertilizer + Foods**



**Food for
machines**



**Food for
plants**



**Fuel for
men and
animals**

Lipofuel Production

BIOKEROSENE & BIODIESEL

Both are fatty acid methyl or ethyl esters.

Biokerosene is constituted of ester fraction of selected molecular weight.

Biokerosene was developed in Fortaleza, Brazil, during the period of 1980 – 1985, and is now patented and registered in the public domain under number PI-8007957 (INPI).

BIOKEROSENE PRODUCTION: Raw Material

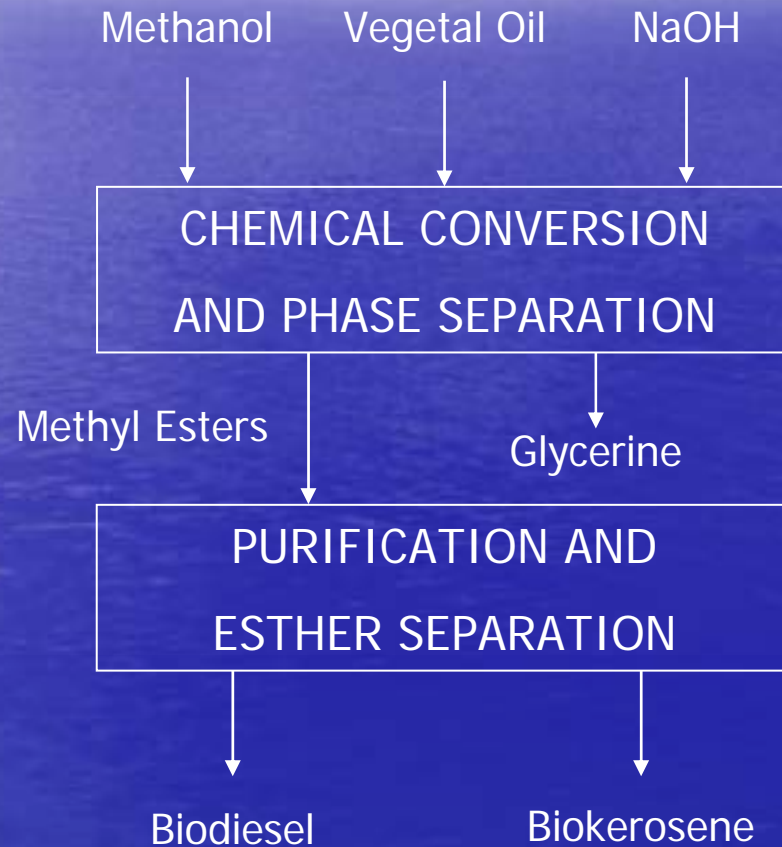


BABASSU TREE
18,000,000 hectares
in Brazil



BABASSU OIL
and OTHERS

BIOKEROSENE PRODUCTION: Industrial Process





History of Biodiesel & Biokerosene

Chronology of Biodiesel and Biokerosene Developments

- **1977** – Biodiesel conception: as fatty acid methyl or ethyl esthers.
- **Oct. 30, 1980** – Worldwide release of Prodiessel (biodiesel) to the President of the Republic and municipal, state, and world leaders, to the scientific community and manufacturers of diesel engines.

The first industrial process patent was submitted to manufacture of biodiesel by its inventor, Dr. Expedito Parente.



Biodiesel and Biokerosene History

- 1980 to 1984 – The first applicability trials using biodiesel and the development of PROSENE®, an alternative combustible lipofuel (vegetable oil) used as an alternative to aviation kerosene.

The first flight was taken using pure biokerosene in an EMBRAER turbo-prop powered aircraft, between the cities of São José dos Campos and Brasília.

This accomplishment was considered to be of strategic national interest and the results could not be published.



Biodiesel and Biokerosene History

- 1984 – The Aeronautical Ministry awards Dr. Expedito Parente with the Aeronautic Commendation Medal for his success in developing biodiesel and biokerosene technology.

At this time, efforts to go forward with the National Biodiesel and Biokerosene Program were interrupted because of lack of interest by energy and economic authorities.



Biodiesel and Biokerosene History

- **2001** –TECBIO was founded and is considered to be the cornerstone of the biodiesel business in Brazil.

TECBIO initiated the industrial production of biodiesel in Brazil.



Biodiesel and Biokerosene History

- **2005** – Dr. Expedito Parente is presented with the United Nation's Blue Sky Award in Shenzhen, with his work "Reflections on Biodiesel and Biokerosene."

10 persons receive this award and Dr. Parente is named as the first place winner of first place, which comes with the **Diploma of International Celebrity in Technology**.



深圳国际能源与环境技术促进中心

Shenzhen International Technology Promotion Center for Sustainable Development



BIOKEROSENE

Trials and Results

BIOKEROSENE PROPERTIES

- All bench and flight tests were undertaken with pure biokerosene, without the addition of mineral kerosene. In equivalent conditions and in comparison with petrokerosene, the average consumption of biokerosene was 4.5% to 6.0% superior.
- One advantage of the biokerosene was the reduction of the turbine power caused by increasing altitude. It was less than that of mineral kerosene.
This fact is explained by the presence of two atoms of oxygen in the molecule.
- The biokerosene tests were concluded on October 23th, 1984, on “Aviator’s Day”, with a flight from São José dos Campos (São Paulo) to Brasilia, with a flight time of 4 hours. The aircraft used for the trial flight was a Brazilian “Bandeirante”, manufactured by EMBRAER.
- Applicability tests using mixtures of biokerosene with mineral kerosene were not performed.

BIOKEROSENE PROPERTIES: Lubricity and Detergency

Biokerosene possesses a high level of **lubricity** and **detergency**.

This makes it possible to improve on the performance of petrokerosene and contributes to cleaning the turbines.

Characteristics of the EMB-110 Bandeirante

EMB-110 "Bandeirante"

Motores: 2 x Pratt & Whitney, Canadá PT6A-27

Tipo e potência: Turboélice de 750 SHP cada

Comprimento: 14,22 m **Superfície alar:** 29 m²

Envergadura: 15,33 m **Altura:** 4,73 m

Peso vazio: 3.402 kg

Peso máximo de decolagem: 5.600 kg

Velocidade de cruzeiro: 184 kts (341 km/h)

Velocidade máxima operacional: 244 kts (452 km/h)

Altitude de cruzeiro: 6.000 a 15.000 ft

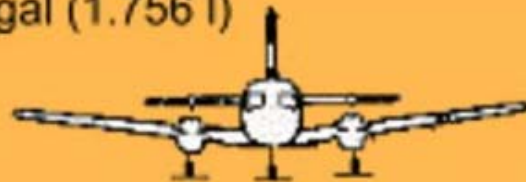
Altitude máxima operacional: 25.000 ft

Alcance (FL100): 1.026 NM (1.900 km)

Capacidade de combustível: 464 gal (1.756 l)

Distância de pouso*: 763 m

Distância de decolagem*: 889 m





Where do we go from here?

Thank you for your attention.

Dr. Expedito Parente



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