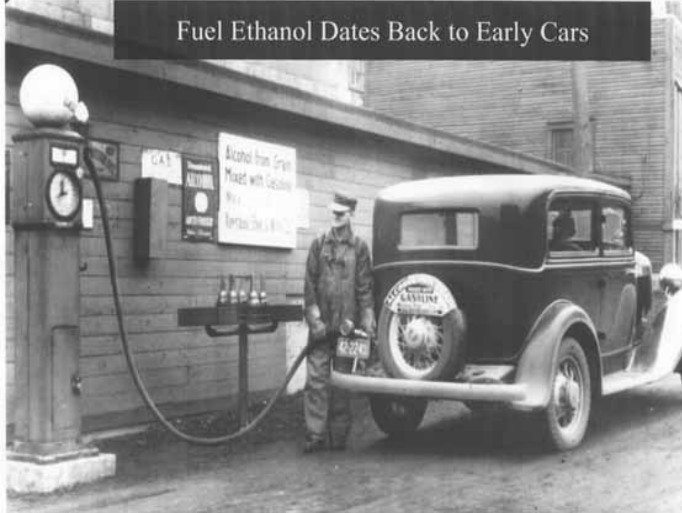




Then and now: Sunset Glacier in Alaska's Denali National Park, shown covering a mountainside in August 1939, had all but vanished 65 years later when photographed during the same month.

# BIOMASS AND ENERGY AGRIBUSINESS

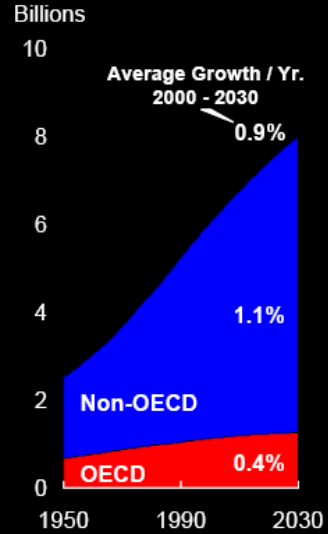


**LUIZ CARLOS CORRÊA CARVALHO**  
**BLUMENAU, 19/11/07**

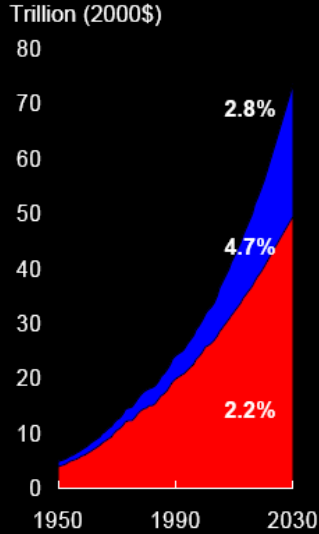


# Global Economics and Energy

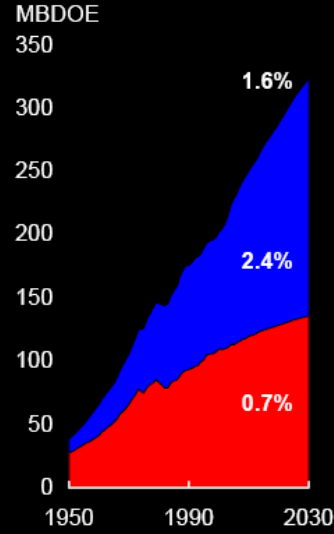
## Population



## GDP



## Energy Demand



ExxonMobil



Getting ethanol from the plant to the gas pump presents a logistical challenge.



## Europe



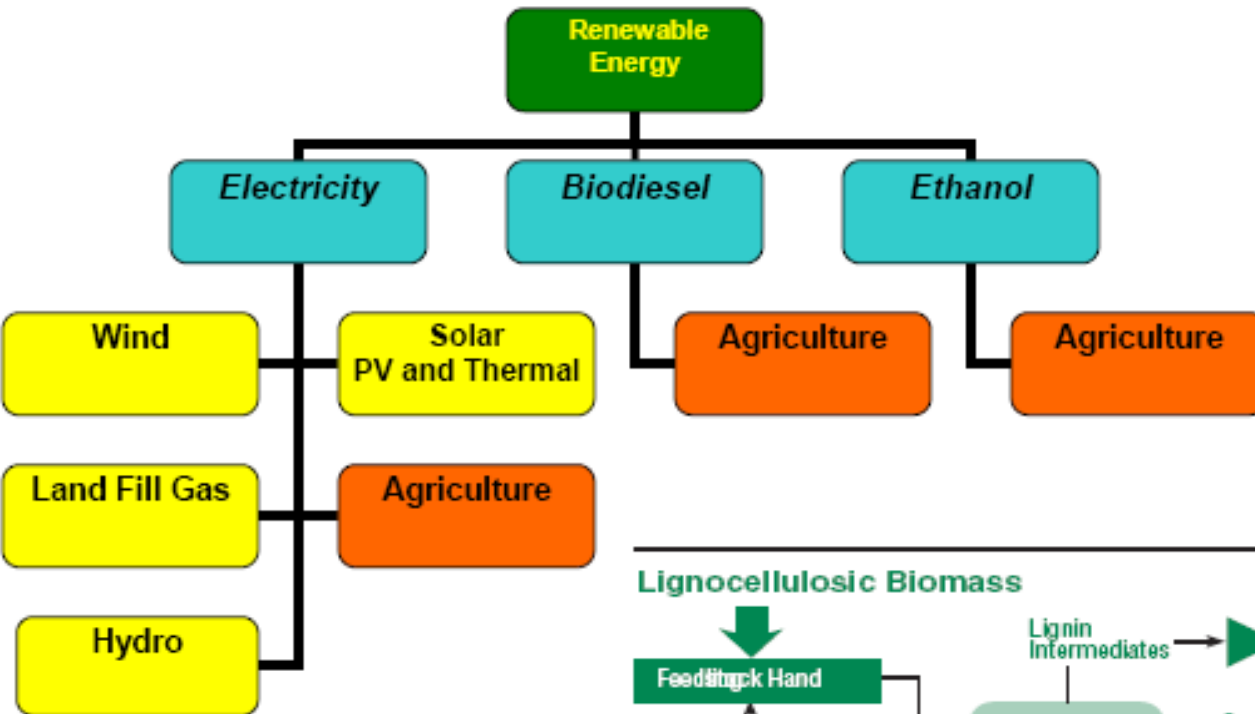
# Biology's Big Bang



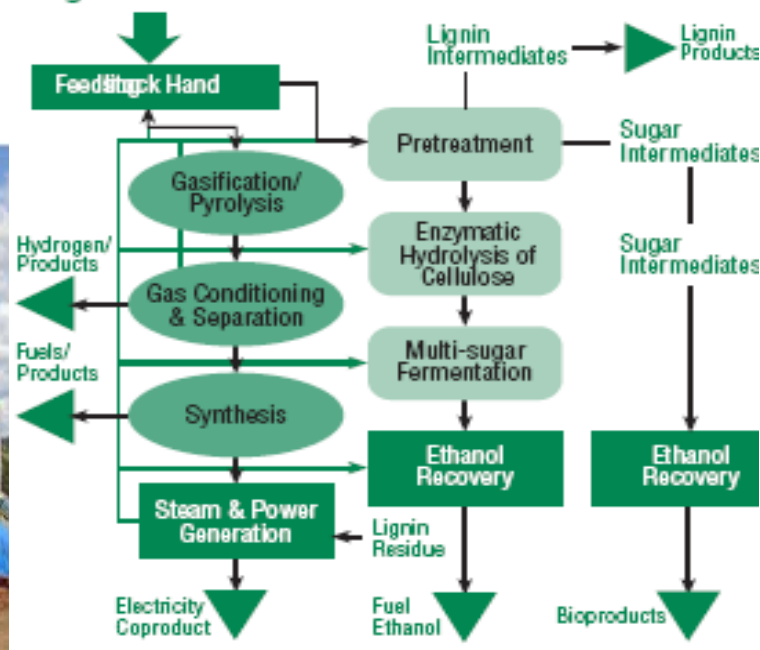
## THREE CHALLENGES



# RENEWABLE ENERGY AND AGRICULTURE



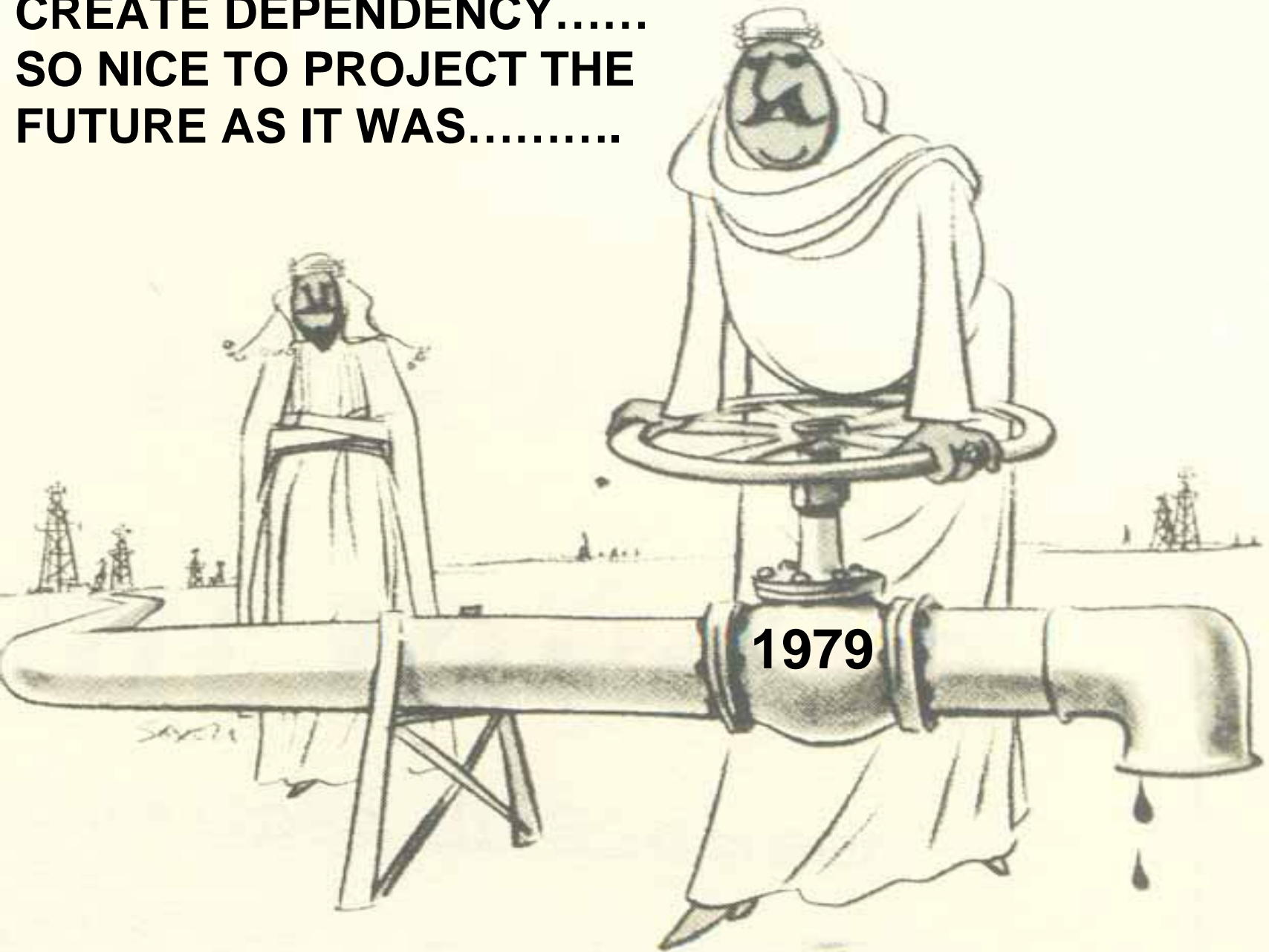
## Lignocellulosic Biomass



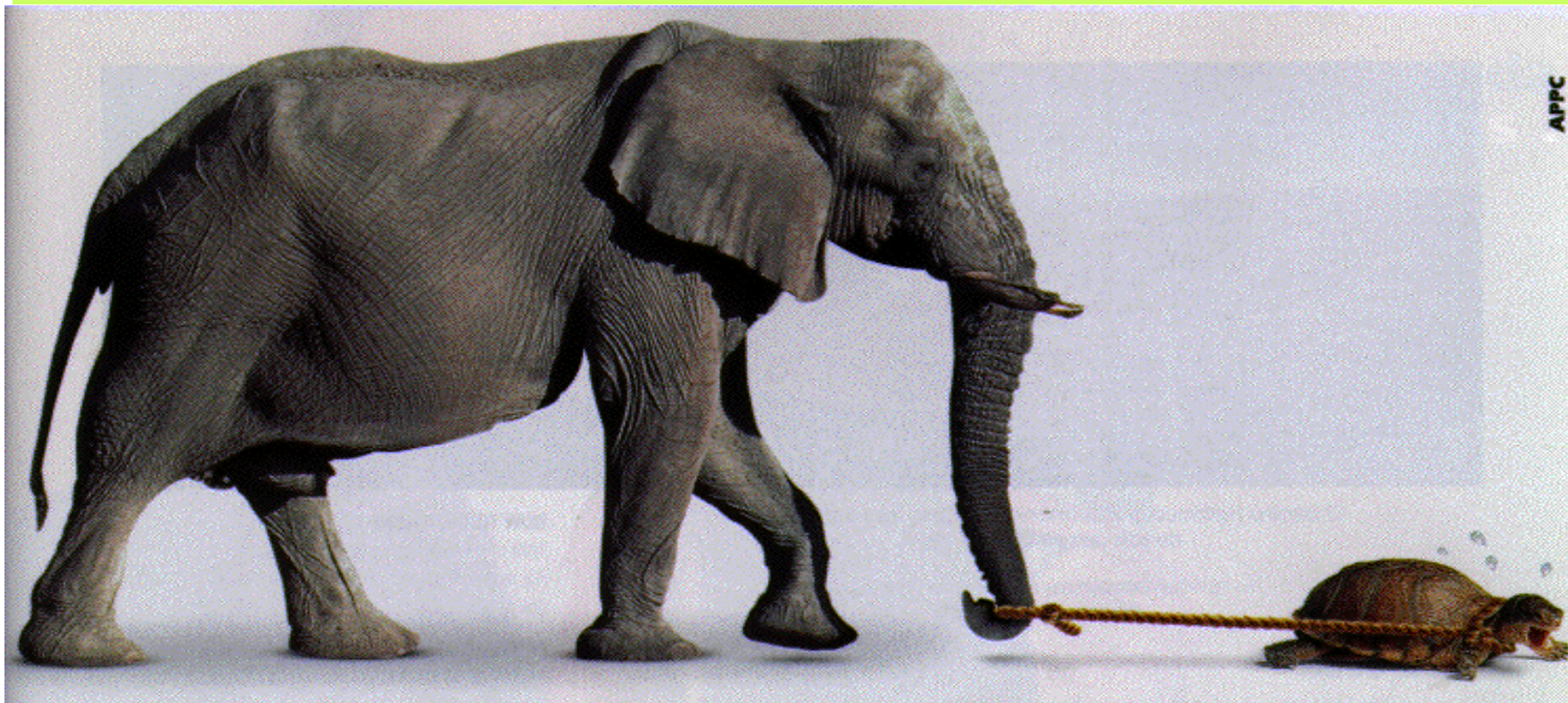
# OIL PRICES IMPACT IN POTENTIAL ECONOMIC SUBSTITUTION OF OIL BY BIOFUELS

<b>2020</b>		
<b>OIL* (US\$/barrel)</b>	<b>ECONOMIC PRODUCTION</b>	<b>% TOTAL DEMAND (TRANSPORTATION SECTOR)</b>
<b>40</b>	<b>70 bi g (265 bi l)</b>	<b>10</b>
<b>50</b>	<b>210 bi g (794 bi l)</b>	<b>30</b>
<b>70 – 80</b>	<b>350 bi g (1.325 bi l)</b>	<b>50</b>
<b>* Without subsidies</b>		

**IT IS SO EASY TO  
CREATE DEPENDENCY.....  
SO NICE TO PROJECT THE  
FUTURE AS IT WAS.....**



# SO...IT IS NOT EASY TO BE GREEN !



APPC

**PUBLIC OPINION  
(LACK OF INFORMATION)**

**CAR MAKERS  
(DIFFERENT VIEWS)**

**PUBLIC POLICIES:  
GLOBAL/LOCAL  
SUSTAINABILITY;  
COORDINATION**

**AGRICULTURE**

**THERMO-PLANTS**

**ONG's  
(MANY RADICALS)**

**OIL  
COMPANIES**

# EXAMPLE: SUGAR CANE ENERGY IN BRAZIL



**1 TON OF CANE PRODUCES: 0,165 toe, or  
1,2 barrel of oil**

**1 Ha OF CANE PRODUCES ENERGY EQUIVALENT TO  
> 100 BARRELS OF OIL**

**475 MILLION TONNES OF CANE (ACTUAL PRODUCTION)  
REPRESENTS 30% OF THE PRIMARY ENERGY  
CONSUMED TODAY IN BRAZIL**

# Brazilian Agro-energy : Innovation

## Electrical Energy

- Technological advances
- Investments (Energy efficiency)
- Large numbers
- Economy
- An important way to faster clean elect. energy supply

## Green Chemicals

- Know-how and Technological advances
- Investments (Biorefineries)
- Competitive
- Adding value
- An important way to faster oil derivatives substitution

**More Ethanol in the same area  
Hydrolysis**

**And the BTL alternative, via  
Gasification**

# Window of other opportunities : Bioelectricity

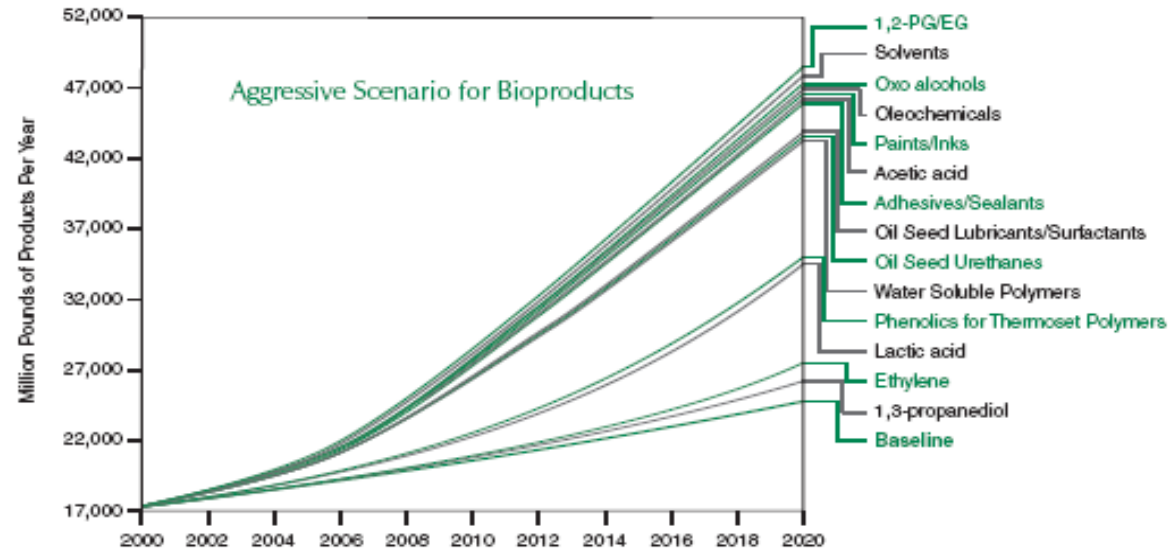
- Competitive in price
- Environmental correct option
- Ethanol as a fuel for thermo - plants



**TRANSFORMING**  
**SMOKE**  
**IN**  
**POWER**

# GREAT GREEN CHEMICALS OPPORTUNITY

## Potential Growth of Bioproducts



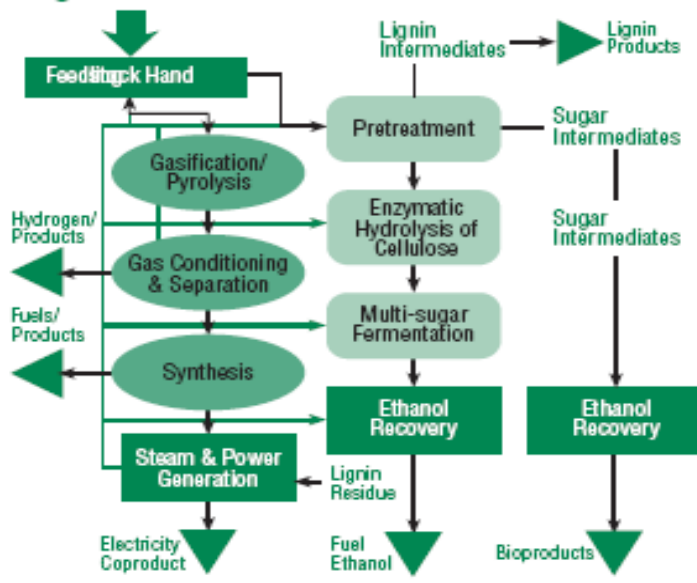
Source: "Aggressive Growth in the Use of Bio-derived Energy and Products in the United States by 2010," Final Report, Arthur, D. Little, DOE contract number GS-23F-8003H, October 31, 2001

## Cellulosic Biorefinery Vision

An integrated biorefinery makes use of:

- Thermochemical conversion technology
- Biochemical conversion technology
- Existing technology

## Lignocellulosic Biomass



**ADDING VALUE;  
SUBSTITUTING FOSSIL  
FUEL; DEVELOPING  
TECHNOLOGIES**

# Window of other opportunities :

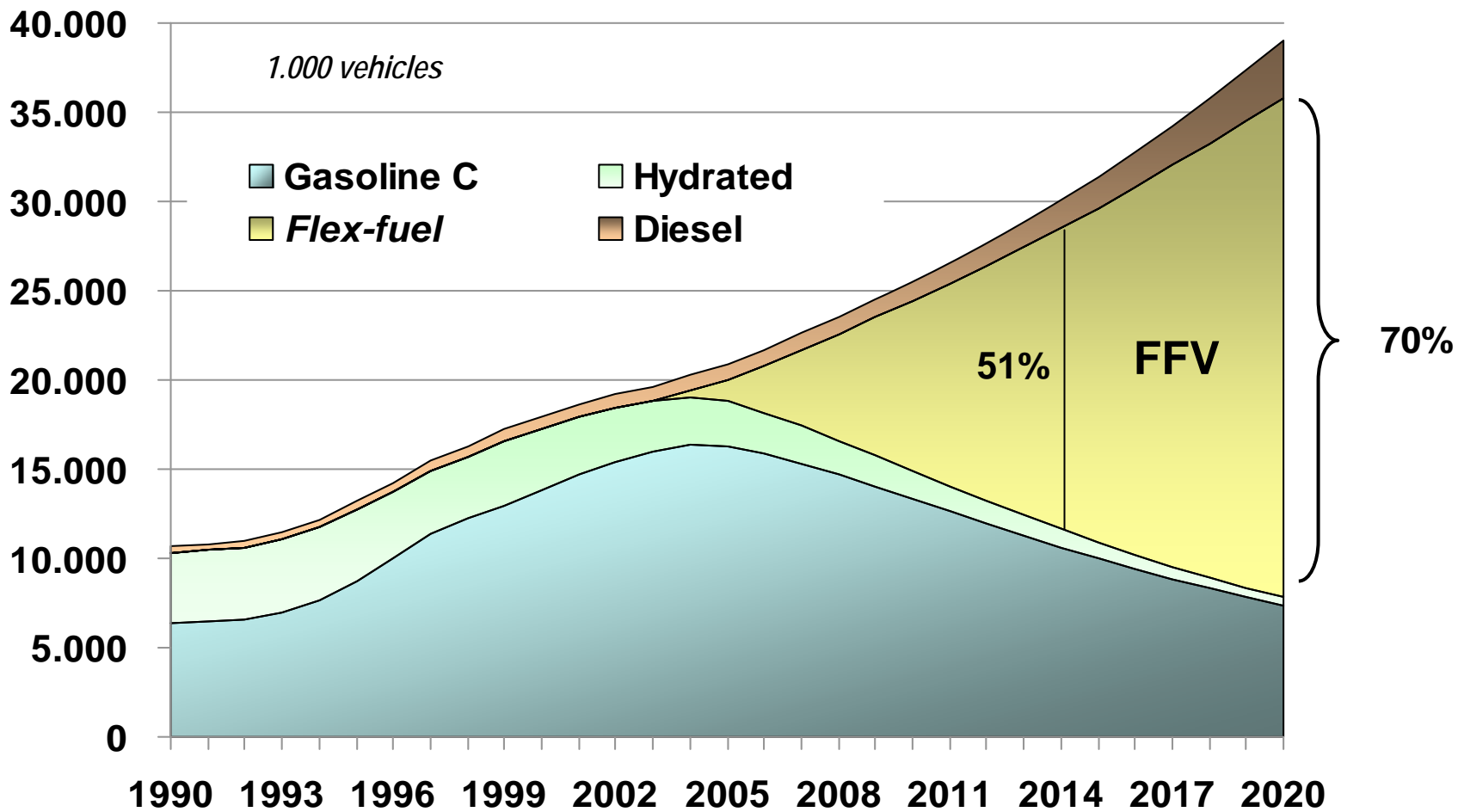
**A growing source of revenue for  
the world's farmers and agricultural  
processors**

*“Challenging the manner in which current farm policy is formulated and implemented.....Biofuels may open up the way for far-reaching reforms and put farming strategy on a completely new footing at least for those commodities which are used in their production”*

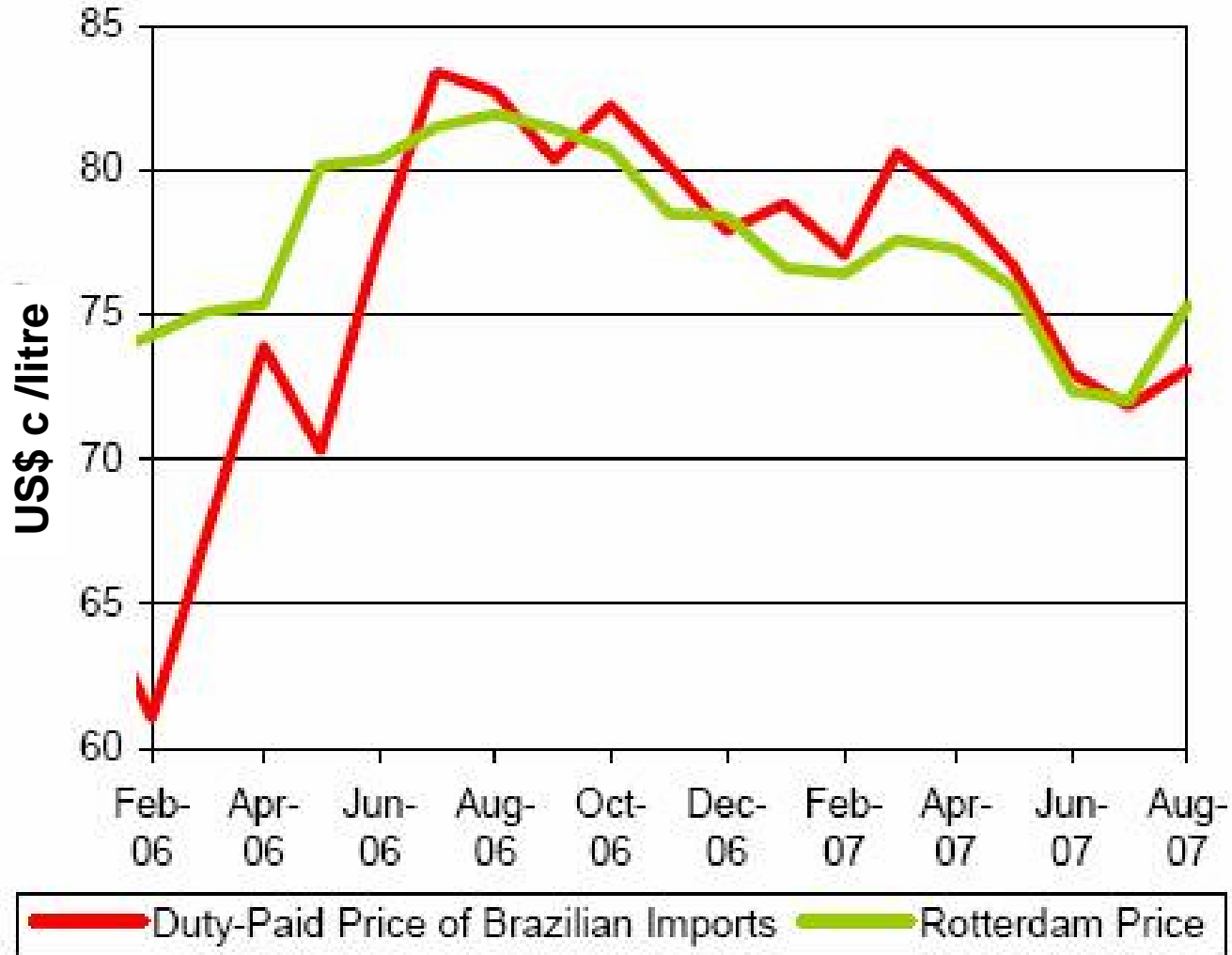
*F.O.LICHTS World Ethanol &  
Biofuels Report, august 8, 2007*

# BRAZIL - LIGHT VEHICLES PROJECTION

## FFV WILL REPRESENT 70% OF TOTAL FLEET IN 2020



# E.U. - ETHANOL: PRICES BASED ON BRAZILIAN MARKET PRICES PLUS FREIGHT PLUS IMPORT TAX



# GERMANY CARS.....




.....Since hydrogen can be produced from various regenerative energy sources with practically no CO2 emission.

# AGRICULTURE AND PASTURES

## A CLEAR TREND IN BRAZIL

Valores para o ano de 2005 ( 2005 VALUES)

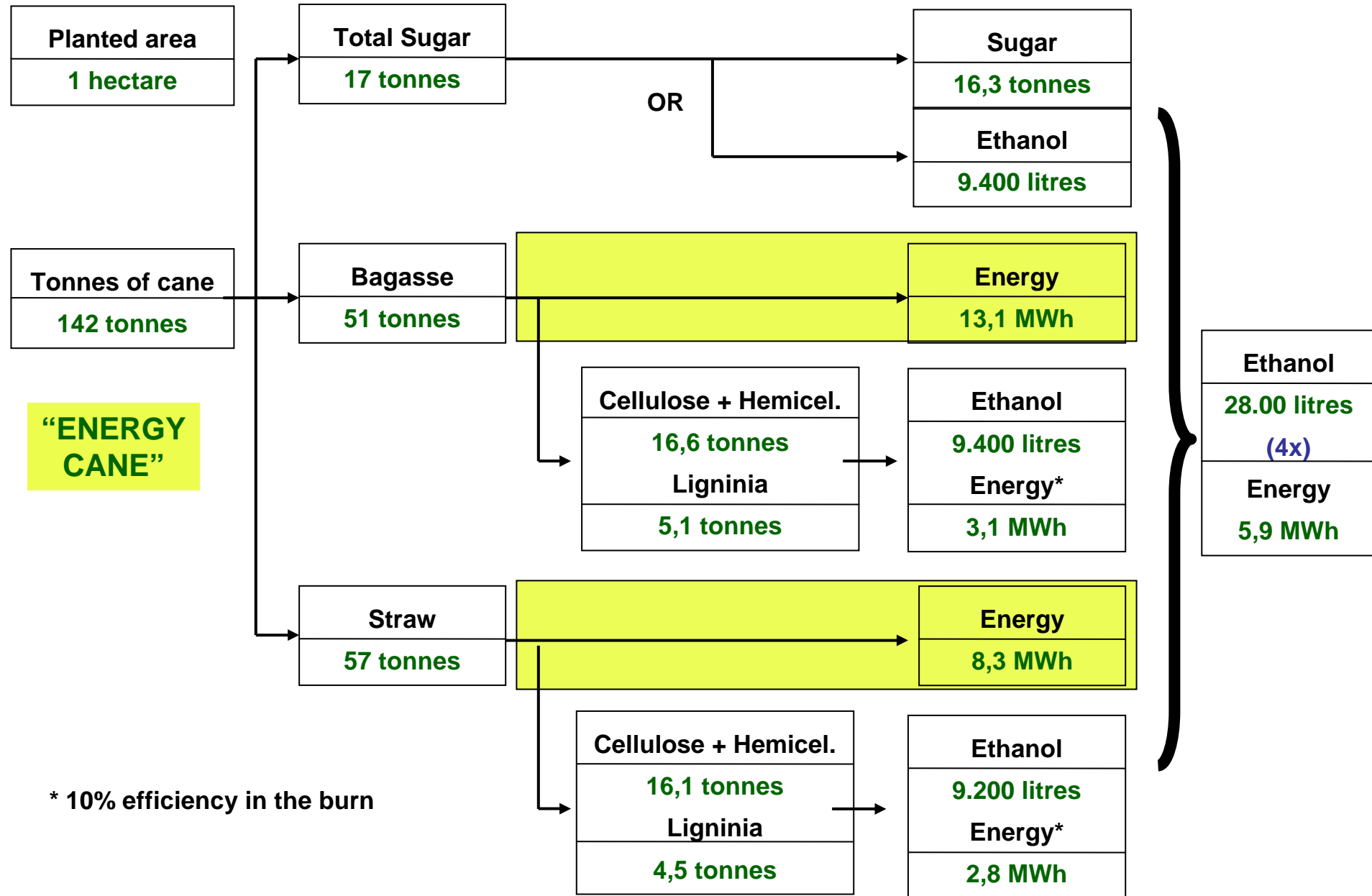
	Million of Animals – cattle	Pasture Area in Million ha	Number of Animals per Ha (avg)
<b>BRAZIL</b>	<b>207,1</b>	<b>200-220</b>	<b>≈ 1,0</b>
<b>São Paulo</b>	<b>14,1</b>	<b>10</b>	<b>≈ 1,4</b>



**If Brazil is going to have 1,4 animals (cattle) per hectare,  
it will represent 50 to 70 million hectares of pastures  
available for agriculture – food or energy or both !!**



# THE STRAW USE; THE NEW BR. ENERGY CANE



# ETHANOL – INTERNAL MARKET

Centre – South - 1.000 M3

YEAR	ANHIDR.	HYDRATED	TOTAL
2007	6.590	10.670	17.260
2015	5.500	35.425	40.925

# ETHANOL – EXTERNAL MARKET

From 300.000 M3 To 2.000.000m3 To  
3.500.000 m3.....To ?

***“IT LOOKS TO ME THAT BRAZIL HAS A  
DREAM TO BE BIG AND GLOBALLY  
IMPORTANT, BUT THE COUNTRY WILL BE  
MUCH MORE IMPORTANT FOR THE WORLD  
IF IT CONTINUES TO DEVELOP BIOMASS  
AND BIOFUELS”***

***Prof. Hans Joachim Schellinhuber,  
physicist and mathematics,  
Potsdam Institute for Research in Climate Change,  
Caros Amigos Magazine, September 2007.***

An aerial photograph showing a paved road with white lane markings curving through a landscape. The road has a few cars on it. To the left of the road is a large, dense green field. In the foreground, a large, dark green tree stands on a grassy slope. The background shows more fields and a distant horizon under a clear sky.

**THANKS!**

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