



CORPORATION FOR THE INDUSTRIAL DEVELOPMENT OF BIOTECHNOLOGY AND CLEAN PRODUCTION

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CORPORATION FOR THE INDUSTRIAL DEVELOPMENT OF BIOTECHNOLOGY AND CLEAN PRODUCTION

# **LAMNET WORKSHOP ON BIOMASS OPPORTUNITIES IN VENEZUELA**

## ***THE PROGRESS OF FUEL ETHANOL IN COLOMBIA***

**OCTOBER 22, 2004**



## **BIOETHANOL FOR COLOMBIAN FUELS**

**The Corporation for the Industrial Development of Biotechnology and Clean Technology, has been actively working in this project during the last eight years and first worked out the preliminary study and now is finishing out the feasibility study and the implementation plan, studies that show a sustainable project with good profitability for investors.**



## **BIOETHANOL FOR COLOMBIAN FUELS**

Congress of the Republic of Colombia approved on June 19<sup>th</sup>/2001 a new law, Law 693, signed by President of Colombia on September 19<sup>th</sup>/2001 which mandates the use of bioethanol from sugar cane in Colombian gasolines and diesel fuel oil, to improve quality of these fuels and decrease emissions to environment from tail pipes. This project will start in september/05 in the four biggest cities and in September/06 in the rest of the country.



## **BIOETHANOL FOR COLOMBIAN FUELS**

Once Colombian gasolines use 10% of ethanol it will be gradually increased up to 25% of ethanol, for a total production /consumption of 5 million liters /day (1825 millions liters per year). This goal should be met in approximately 15 years.

In addition Colombia can export fuel ethanol to the international markets another 5 million liters/day for a total of 10 millions liters/day.

This means a total 750.000 hectares of sugar cane harvested and 750.000 new employers (direct and indirect).



## PROJECT OPPORTUNITIES

- ✦ Colombia considers the production of renewable fuels as a very good opportunity to link the agriculture sector to the production of fuels for transportation with high employment generation, better quality of life and better income for farmers future generation.
- ✦ These kind of projects will definitely help in the eradication of illicit harvest and governmental peace programs which Colombia has the compromise to fulfill before the international community.



## **FUEL ETHANOL WILL REDUCE ATMOSPHERIC POLLUTION**

- ✦ Dynamometer test and fleet test in Bogotá (2600 meters above sea level) with 10% ethanol will reduce in new cars 27% of carbon monoxide (CO) and a reduction of 45% in typical cars (7-8 years old) and 20% of unburned hydrocarbon (HC).**
- ✦ Dilution of benzene, aromatics, olefins and others compounds.**



## **FUEL ETHANOL AND GREENHOUSE EFFECT**

**In addition to environmental benefits, the project for 10% of EtOH in gasolines will save 6 million of tons of CO<sub>2</sub> per year which through the Clean Development Mechanisms (CDM), of Kyoto Protocol will permit commercialize CO<sub>2</sub> bonds.**





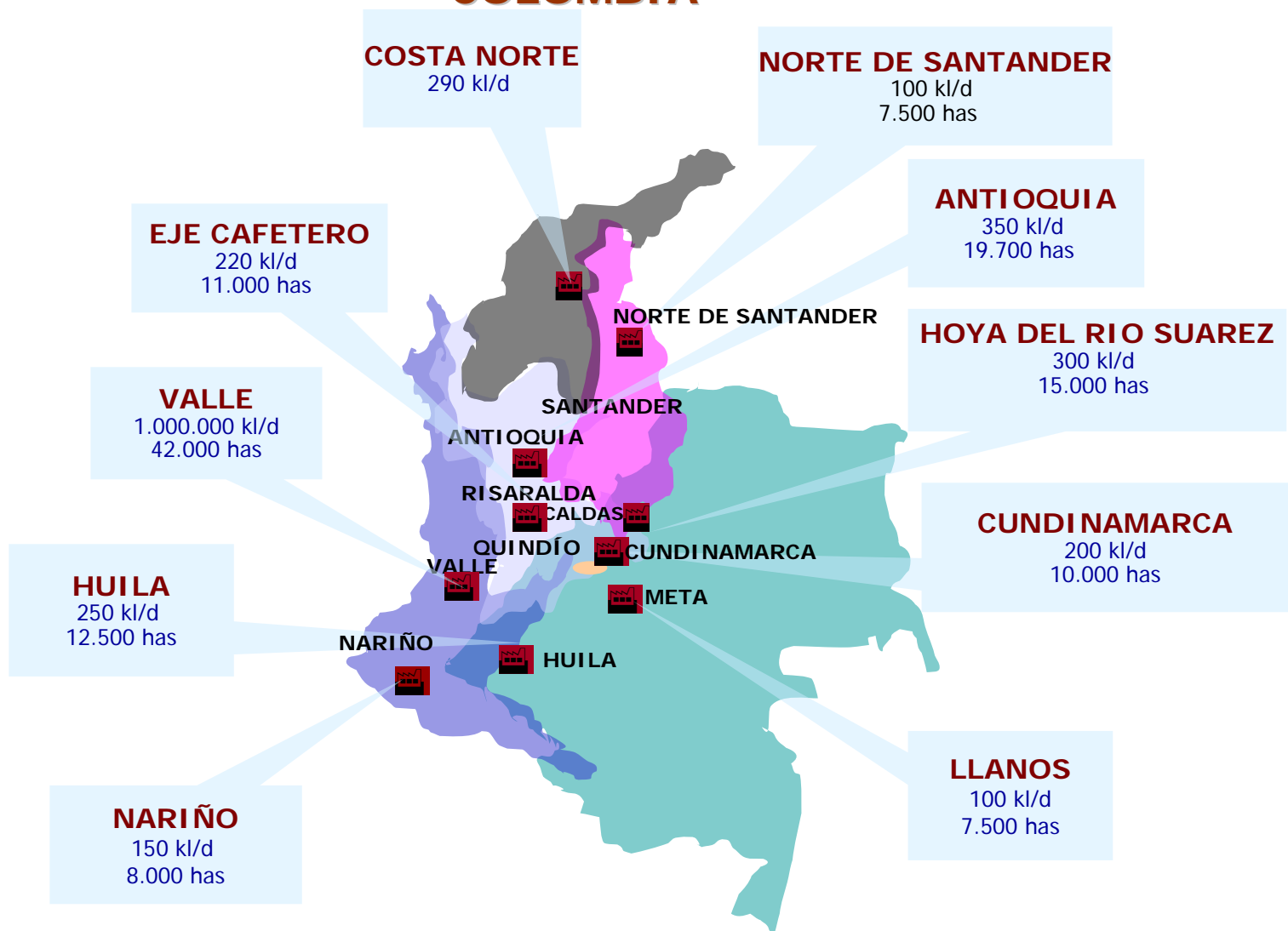
## **BIOETHANOL FOR COLOMBIAN FUELS**

**Main characteristics of the project for 10% (vol.) of bioethanol in gasolines follows:**

- + 10 biorefineries (900 million liters per year), located in different Colombian regions**
- + 150.000 Hectares harvested in sugar cane.**
- + US\$ 680 million of investment with 20% + of DCF rate of return.**
- + 170.000 new employments (direct and indirect).**



# FUEL ETHANOL AGROINDUSTRIAL COMPLEXES IN COLOMBIA





## **ECONOMY OF ETHANOL IN COLOMBIA**

- + Production cost of ethanol between 0.90 – 1.15 US\$/gallon.**
- + No gasoline taxes for ethanol.**
- + Ethanol producer revenue will be 1.43 USD/Gal**
- + Gasoline price at 10% (vol.) level of ethanol will be lower than actual price (1.80 US\$/gal).**
- + Investment will be about MUS\$ 680.**
- + Hard currency saving for less gasoline importation of 150 MUS\$/year or higher exportation of crude oil. One barrel of ethanol is equivalent to 1 barrel of gasoline or 2.5 barrels of crude oil.**



## **PRESENT COLOMBIA SITUATION**

### **VALLE DEL CAUCA (COLOMBIA SUGAR REGION)**

<b>SUGAR FACTORIES</b>	<b>MILLION LITERS/DAY</b>	<b>COMMENTS</b>
<b>1. INCAUCA</b>	<b>300</b>	<b>PRAJ FROM INDIA IS STARTING TO BUILD ALL THESE FIVE ANNEXED DISTILLERIES TO THE CORRESPONDING SUGAR FACTORIES.</b>
<b>2. PROVIDENCIA</b>	<b>200</b>	
<b>3. MANUELITA</b>	<b>200</b>	
<b>4. MAYAGUEZ</b>	<b>150</b>	
<b>5. RISARALDA</b>	<b>100</b>	
<b>TOTAL</b>	<b>950</b>	



## PRESENT COLOMBIA SITUATION

SUGAR FACTORIES	MILLION LITERS/DAY	COMMENTS
6. HOYA DEL RIO SUAREZ	300	Feasibility studies done Pending environmental permit
7. SUGAR BEET PLANT (BOYACA)	300	
8. CUNDINAMARCA	150	Working in preliminary studies
9. QUINDIO	150	
10. HUILA	250	
11. COSTA ATLANTICA	300	
12. ANTIOQUIA	300	
13. NORTE DE SANTANDER	100	
14. CASANARE (LLANOS ORIENTALES) CASAVA	25	



## ETHANOL PRODUCTION COST

COUNTRY	RAW MATERIAL	US\$/LITER	US\$/GAL
BRAZIL	SUGAR CANE	0.15 – 0.17	0.57 – 0.64
USA	CORN	0.30 – 0.35	1.14 – 1.33
EUROPEAN COMMUNITY	SUGAR BEET / WHEAT	0.50 – 0.55	1.89 – 2.08
COLOMBIA	SUGAR CANE	0.26 – 0.32	0.90 – 1.15



## **ECONOMY OF ETHANOL IN COLOMBIA**

- ✦ Substitution of 20 MUS\$ beverage ethanol importation.**
- ✦ One dozen of mothball liquor plants, because of vinasse contamination, will be started again using ethanol from big fuel ethanol plants with the associate employment generation.**



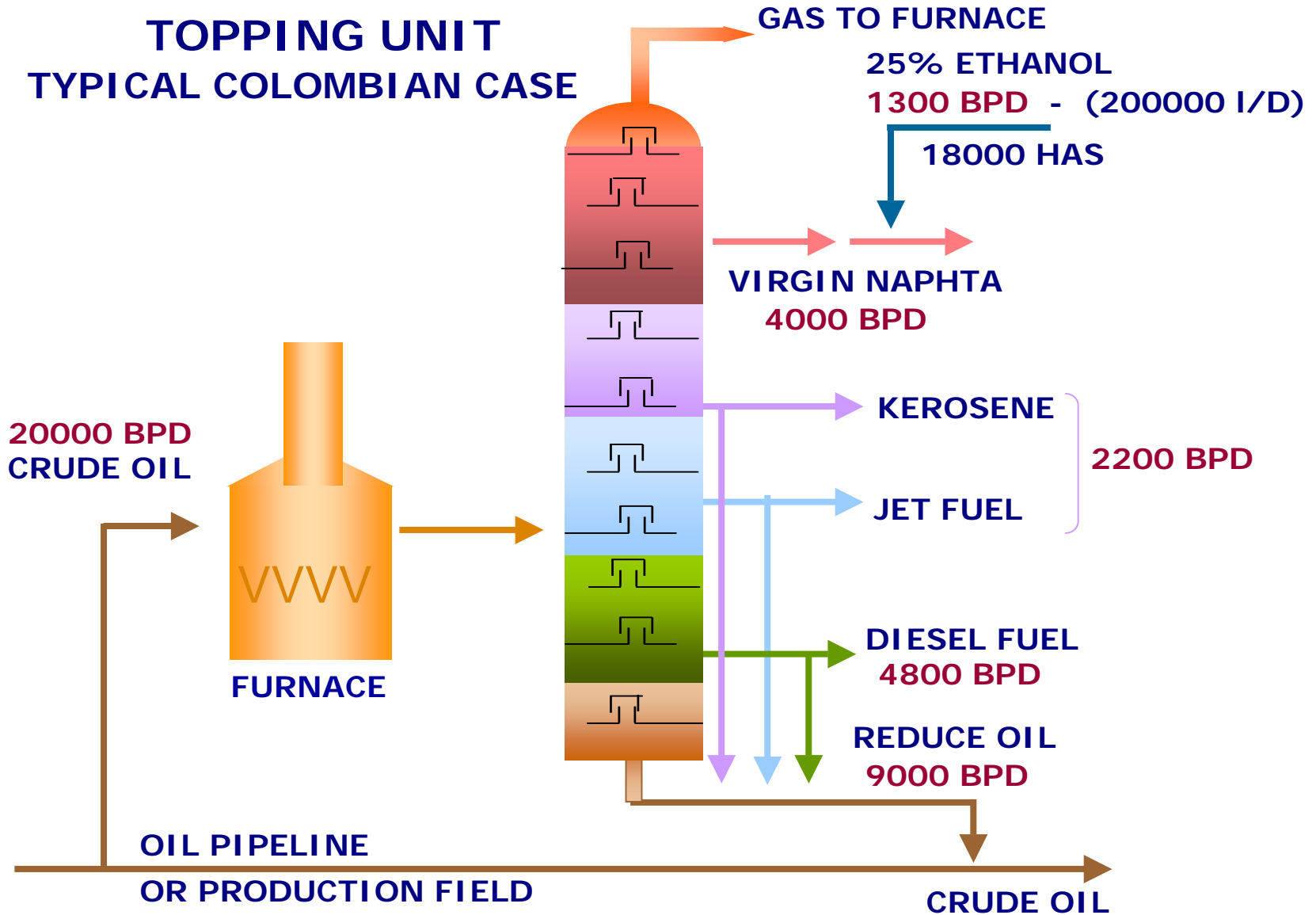
## **ECONOMY OF ETHANOL IN COLOMBIA**

**In addition, in Colombian regions where there is crude oil, or there are pipelines transporting crude oil and are far apart from main petroleum refineries, we can combine biomass industry for the production of fuel alcohol with a Topping Unit to produce virgin naphtha, which with 25% (vol) of alcohol we will obtain gasoline. This topping unit will also produce other fuels for the regions such as diesel fuel oil and Kero/jet.**





# TOPPING UNIT TYPICAL COLOMBIAN CASE





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***THANKS !***