#### A SUGAR CANE TO ETHANOL BIOENERGY PLANT TAPACIGUARA, MINAS GERAIS, BRAZIL



#### 600,000 L/D , 99.6°GL FUEL GRADE ETHANOL 6 MW NET POWER EXPORT

















#### AN AUTOMATIC CORE SAMPLES COLLECTS A SAMPLE OF THE LOAD.













THE EXTRACTED SAMPLE IS SHREDDED, THEN TRANSFERRED TO THE LAB FOR TESTING









## THE CANE IS WASHED, THE DIRT IS PARTIALLY REMOVED, THE CANE IS FED INTO THE MAIN CARRIER UNI-SYSTEMS









THEN THROUGH A COP-10 HEAVY DUTY CANE SHREDDER ALSO ELECTRICALLY DRIVEN





## UNTIL IT IS PROPERLY PREPARED TO A MINIMUM OPEN CELL INDEX OF 90-91%











# THE SHREDDED CANE IS THEN TRANSFERRED INTO THE DIFFUSER TRANSVERSAL FEED CARRIER





#### THE EXCESS CANE IS RETURNED TO THE MAIN CANE CARRIER





## A FLAT MOVING BED DIFFUSER WITH 98% EFFICIENCY IS USED FOR EXTRACTING THE JUICE





#### THE EXTRACTION IS ACCOMPLISHED IN A COUNTERCURRENT PATTERN BETWEEN CANE AND WATER







#### THE EXTRACTED JUICE IS PUMPED TO A PRIMARY ROTARY FILTER WHERE BAGACILLO IS SEPARATED







#### A HIGH SPEED HORIZONTAL SEPARATOR SET COMPLETES THE SCREENING. THE JUICE IS SENT TO EVAPORATION







#### THE BAGASSE IS DISCHARGED AND DRIED TO 50% MOISTURE IN A DRYING MILL ELECTRICALLY DRIVEN







#### THE DRIED BAGASSE IS TRANSFERRED TO THE STEAM BOILER FEED CARRIER







THE SCREENED JUICE IS HEATED, THEN CONCENTRATED IN A MULTIPLE EFFECT EVAPORATOR TO 18-19° BRIX





THE EVAPORATED JUICE PROCEEDS TO A MELLE-BOINOT RERMENTATION PROCESS WITH YEAST CELLS RECYCLING







#### THE CO2 PRODUCED IN THE FERMENTERS IS SCRUBBED IN A TRAY COLUMN TO RECOVER THE ENTRAINED ETHANOL.







YEAST CELLS, PROPERLY TREATED, ARE RESPONSIBLE FOR THE CONVERSION OF SUGARS INTO ALCOHOL AND CO<sub>2</sub>













600,000 L/D OF FUEL GRADE ALCOHOL 96° GL





#### THE HIDRATED ALCOHOL AT 96° GL IS CONVERTED TO ANHYDROUS 99.6°GL IN A MOLECULAR SIEVE







#### PRODUCTS AND BY-PRODUCTS ARE STORED PRIOR TO SHIPMENT













#### THE BIOMASS DISCHARGED FROM THE DRYING MILL IS TRANFERRED TO THE BOILER ISLAND







#### THE COMBUSTION OF THE BIOMASS IN THE BOILER FURNACE GENERATES HIGH PRESSURE STEAM







#### ASHES ARE COLLECTED FROM THE BOILER GRATE, BOILER BANK AND SCRUBBER AND SEPARATED







THE WASH WATER IS RECYCLED INTO THE PROCESS AND THE ASHES ARE TRUCKED TO THE CANE FIELDS AS FERTILIZER











## THE EXCESS OF BIOMASS IS PILED IN THE BIOMASS PATIO AND IS REUSED DURING THE OFF SEASON TO GENERATE POWER UNI-SYSTEMS



THE EXCESS OF BIOMASS IS A CLEAR EVIDENCE OF AN EFFICIENT PROCESS AND A WELL PLANNED OPERATION







## H.P. STEAM IS FED TO TG SETS TO GENERATE POWER. THE TURBINE EXHAUST IS USED AS PROCESS STEAM





THE POWER IS CHANNELED INTO THE FACILITY DISTRIBUTION SYSTEM. THE EXCESS OF POWER IS SOLD TO THE GRID.





## THE INDUSTRIAL WATER IS FILTERED AND USED IN CLOSED CIRCUIT. HOT WATER IS COOLED IN COOLING TOWERS





#### PROCESS WATER MAKE-UP IS FILTERED AND CLARIFIED. BOILER FEED WATER IS DEMINERALIZED













#### THE OPERATION IS SUPERVISED BY TV CAMERAS INSTALLED IN CRITICAL PROCESS AREAS













#### THE EMPLOYEES BENEFIT FROM A COMPLETE SOCIAL AND MEDICAL INFRASTRUCTURE







## TECHNICAL AND SOCIO-ECONOMIC ASPECTS OF THE PROJECT

















AND EXPORTING APPROX 30,000 MWH OF ELECTRICITY TO THE LOCAL GRID







## 670 PERMANENT JOBS WERE CREATED ON PERMANENT **BASIS TO RUN THE FACTORY**







#### ALMOST 2,700, INCLUDING DIRECT AND INDIRECT EMPLOYEES AND THEIR FAMILIES BENEFIT FROM THE OPERATION



LOCAL COMMUNITY









SPONSORING EDUCATION AND FINANCING REMODELING OF SCHOOLING FACILITIES





## OFFERING PATRONAGE OF SPORTING ACTIVITIES AND SOCIAL EVENTS









# PROBLEMS AND EPIDEMICS







ENDORSING ENVIRONMENT MONITORING AND PROMOTING ECOLOGICAL EDUCATION







AND PARTICIPATING IN CHILDREN CARING PROGRAMS (FEEDING AND DRESSING)





## BIOENERGETICA AROEIRA TUPACIGUARA, MG, BRAZIL

LEADING THE WAY TO A SUSTAINABLE FUTURE