Corporate Presentation

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- Background
- Business-lines
- Core Strength

BACKGROUND

Background

- Established in 1984
- Technocrat Promoted Group
- 1st Company to avail Venture Capital Funding through ICICI
- Listed Company

Mission

PRAJ is committed to delivering reliable, cost effective, environment friendly solutions for maximizing prosperity of our customers. Further, PRAJ endeavors to deliver Innovative, future perfect technologies that can withstand the test of time.

Business Lines

Business Lines

Technology & Plants for:

- Ethanol production
- Biodiesel
- Beer production
- Wastewater treatment

and

- Bionutrients for Ethanol industry
- Evaporation Systems

ETHANOL TECHNOLOGY, PLANT & EQUIPMENT

Leadership

- Over 350 references from Australia to Peru
- Largest resource base for ethanol industry

Ethanol Technology

- Liquifaction & Saccharification
- Fermentation
- Distillation
- Dehydration

HiFERM FERMENTATION SYSTEMS

ECOFINE DISTILLATION SYSTEMS

ECOMOL Fuel Ethanol Plants

HIFERM Fermentation Technology

For starch bearing Feedstock

- Corn
- Wheat
- Sorghum
- Rice
- Cassava, etc.

For sugar bearing Feedstock

- Cane Molasses Cane Juice – **Secondary / Primary / Filterate / Mixed Syrup**
- Sweet Sorghum **(juice/syrup)**
- Sugar Beet - **(Juice/syrup/molasses)**

HIFERM Fermentation

- High fermentation efficiency
- Water and energy conservation.

ECOFINE Distillation

- Plants optimized for quality,energy consumption and operational ease.
- Multi-pressure, Atmospheric and Energy Integrated distillation.
- Plant automation based on SCADA / PLC system

Partial References - India

- Bajaj Hindusthan (8 Projects)
- Balrampur Chini Mills (9 Projects)
- Radico Khaitan (7 Projects)
- United Spirits (15 Projects)
- Bannari Aman (4 Projects)
- Thiru Arooran Sugars (4 Projects)
- Sakthi Sugars (2 Projects)
- Seagram India
- Triveni Engineering
- Mawana Sugars
- Sagar Sugars
- Dalmiya Cements
- AB Sugars

Partial References - International

- British Sugar, Wissington, UK
- Anklam Bioethanol (Danisco Group), Germany
- Biowanze SA,(Sudzucker Group), Belgium
- Prophex Bioproducts Ltd., Bulgaria
- S.C.Amochim S.A., Romania
- Konya Seker Sanayi Veticaret A.S., Turkey
- Cilion - 3 projects in California, USA
- GoEthanol, USA
- Australian Bio-Fuels Pty, Ltd., Australia
- Bilfinger and Bwerger Services for CSR Sugar, Australia
- Marubeni Techno Systems Corporation, Japan

Partial References

- Gasohol de El Salvador
- Incauca SA, Cauca, Colombia
- Providencia SA, Valle, Colombia
- Mayaguez SA, Colombia
- Risaralda SA, Colombia
- Manuelita SA, Colombia
- Khon Kaen, Thailand

Plant Views

Plant Views

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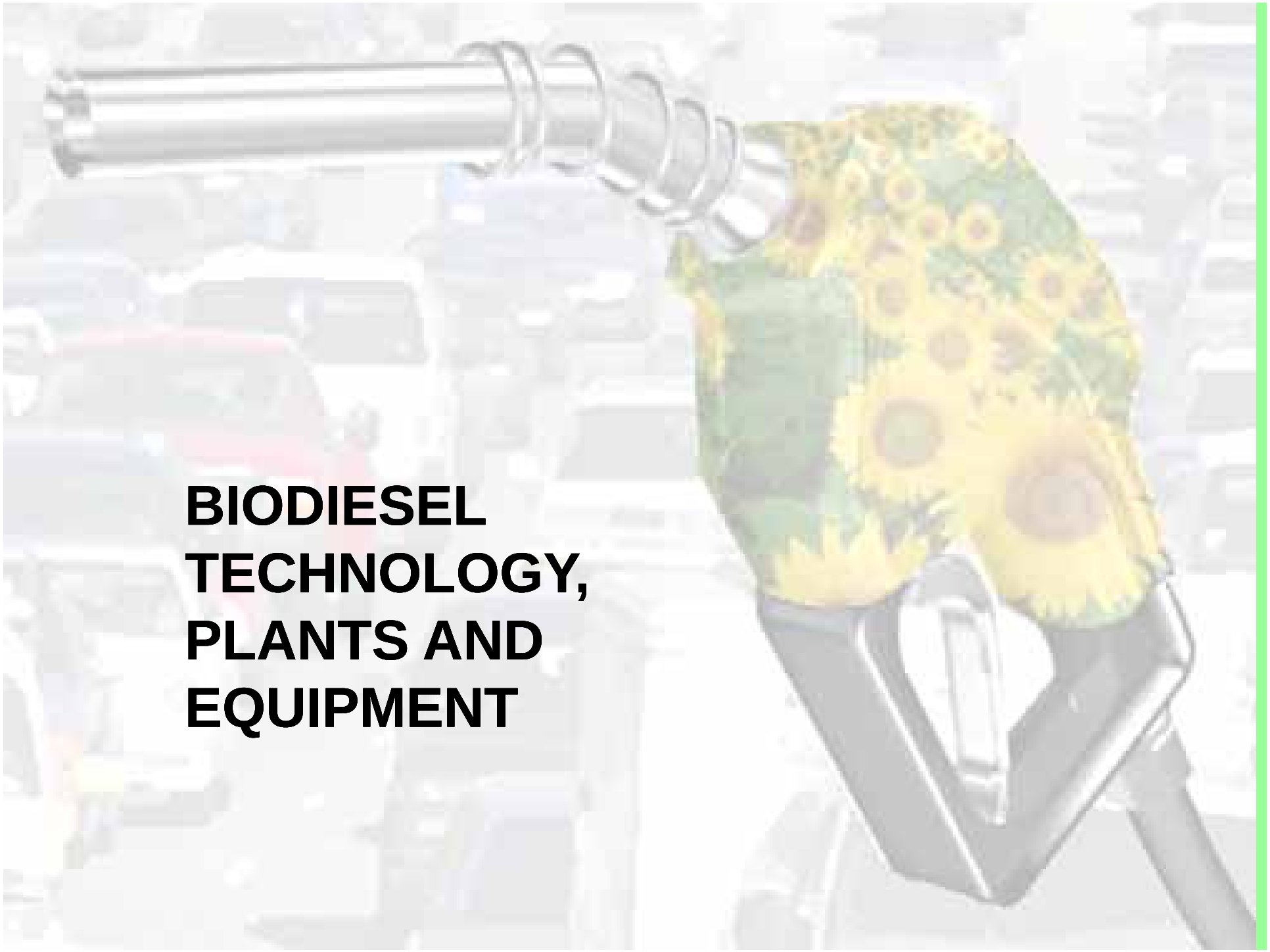


BIODIESEL TECHNOLOGY, PLANTS AND EQUIPMENT

Biodiesel Plants

Leveraging over two decades of experience in agri-based processes for renewable Biofuels, PRAJ now offers technology, plants, and services for **Biodiesel** production.

Biodiesel Plants

Special features of PRAJ's Biodiesel Technology

- Wide range of standard capacities: 100 to 500 MT/Day.
- Flexibility to operate with Multiple vegetable oil feedstocks.
- Proprietary High efficiency cascade transesterification process
- Advanced distillation / evaporation designs
- Reduced operations for centrifugal separations.

Biodiesel Plants

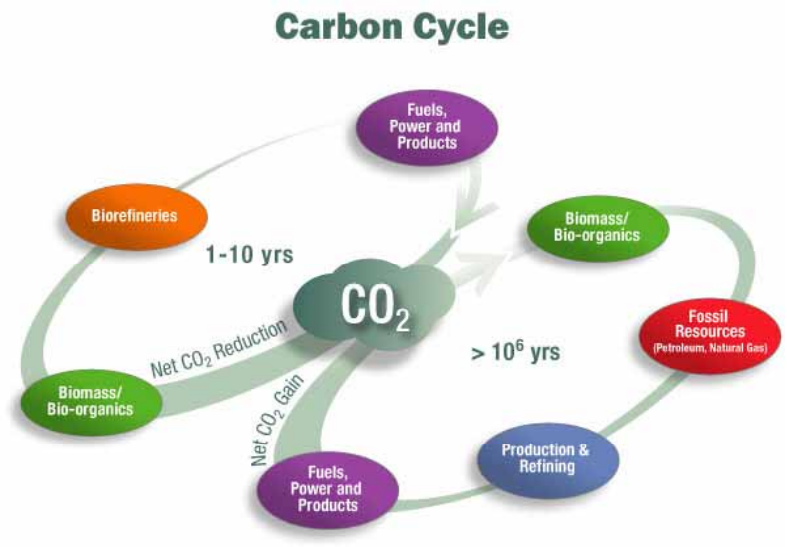
Special features of PRAJ's Biodiesel Technology

- High yields with minimum losses.
- Low consumption of chemicals.
- In-plant integration to minimize energy & fresh water needs.
- Negligible waste-water due to in-process water recycle.
- High purity glycerol as by-product

Biodiesel Plants

Praj Expertise for Biodiesel Plants:

- Agriculture of oil sources – Backward integration for feedstocks
- Process Oleo chemistry
- Reaction kinetics and process development
- Pilot studies Engineering and technology commercialization



Biodiesel Plants

Feedstocks

- Refined Oil
- Raw tree borne oils – Jatropha or
- Pongamia
- Raw veg. oils like canola,
- sunflower, soybean.
- Degummed oil (<2% FFA)
- Soybean or rapeseed oils.
- Degummed oil (>2% FFA)

Palm oil or acid oil.

Agronomy: Energy Crops

Agronomy Group

- Focus -Develop Energy crop varieties

  – Not competing for food applications
  – High farm productivities
  – Low water requirements
  – Versatility for global plantation
  – High energy gain
  – High CO_2 absorption ratios
  – Low cultivation costs

Energy Crops

Bio-ethanol

Sweet Sorghum

Grass Varieties (Cellulosic)

Bio-diesel

Non-edible Oil Crops

High Oil containing Algae

Objective

	Agro-traits	Compositional traits
Sweet Sorghum	Small growth cycle • High biomass yields • Low thermal / photo sensitivity • Large harvesting window • Low foliage • Flexibility of soil conditions • Flexibility to temperate climates • Resistance to fly and borer • Low water / fertilizer needs	• High juice and grain yields • High sugar content • High fiber content • Post harvest stability • High juice purity • Low juice salts and NFS • Low lignin varieties
Grasses	Short duration • High biomass yields • Low thermal / photo sensitivity • Multi-cut high yields and windows • Flexibility of soil conditions • Flexibility to temperate climates • Resistance to pests • Low water / fertilizer needs	• High Cellulose yields • Low hemi-cellulose • Low Lignin content • Low fiber content • High enzymatic digestibility • Low ash content
Non-edible oil crops & Algae	Fast growth cycles • High biomass yields • Low thermal / photo sensitivity • Flexibility to temperate climates • Resistance to bacterial, viruses and fungi attacks • Low mineral needs • High salinity tolerance	• High oil yields • High Triglycerides • Low free fatty acids • Low phospholipids • Elimination of FS enzyme • High CFPP quality

Proposed Activities

- Selection / Development of Varieties
- Multi-locational Field trials
- Seed systems – Bulking
- Farming systems / processing techniques
- Offer Client Services
  - Techno-commercial Feasibility Testing
  - Commercial farming developments

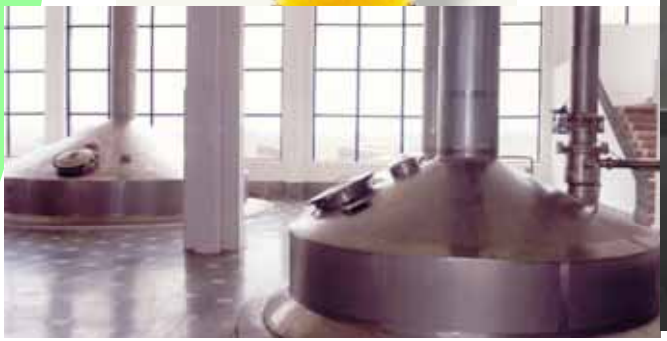
Resources

- Experts from
  - Botany & Plant tissue culture
  - Agronomy and Agriculture (Farming)
  - Breeding technology
  - Algology
  - Agriculture Engineering
  - Agriculture management

Brewery Engineering

Brewery Engineering

- Process Equipment for Brewing
- Brewhouse engineering in line with DIN 8777 standards
- Energy Saving innovations Process
- Collaboration with Holverieka and Meura



e-comBOILER
Boiler which saves on energy, water and cleaning solutions

e-com freeze
For refrigeration plant energy economy

e-com Force
For energy economy in water supply

Some of our international customers…

- SAB Miller
- United Breweries
- Carlsberg (Crown Brewery Unit)
- Bhutan Breweries Limited
- Rhino Agencies
- Hieneken (Al Ahram Unit)

Wastewater Treatment

Wastewater Treatment & Utilization

Sugar based distilleries

- Evaporation
- Biomethanation
- Biocomposting

Starch based distilleries

- Thin slop Evaporation
- DWG
- DDGS
- Biomethanation

Breweries

- Two Stage Aeration
- Anaerobic followed by aerobic composting
- Biomethanation

Wastewater Treatment

A basket of technology including:

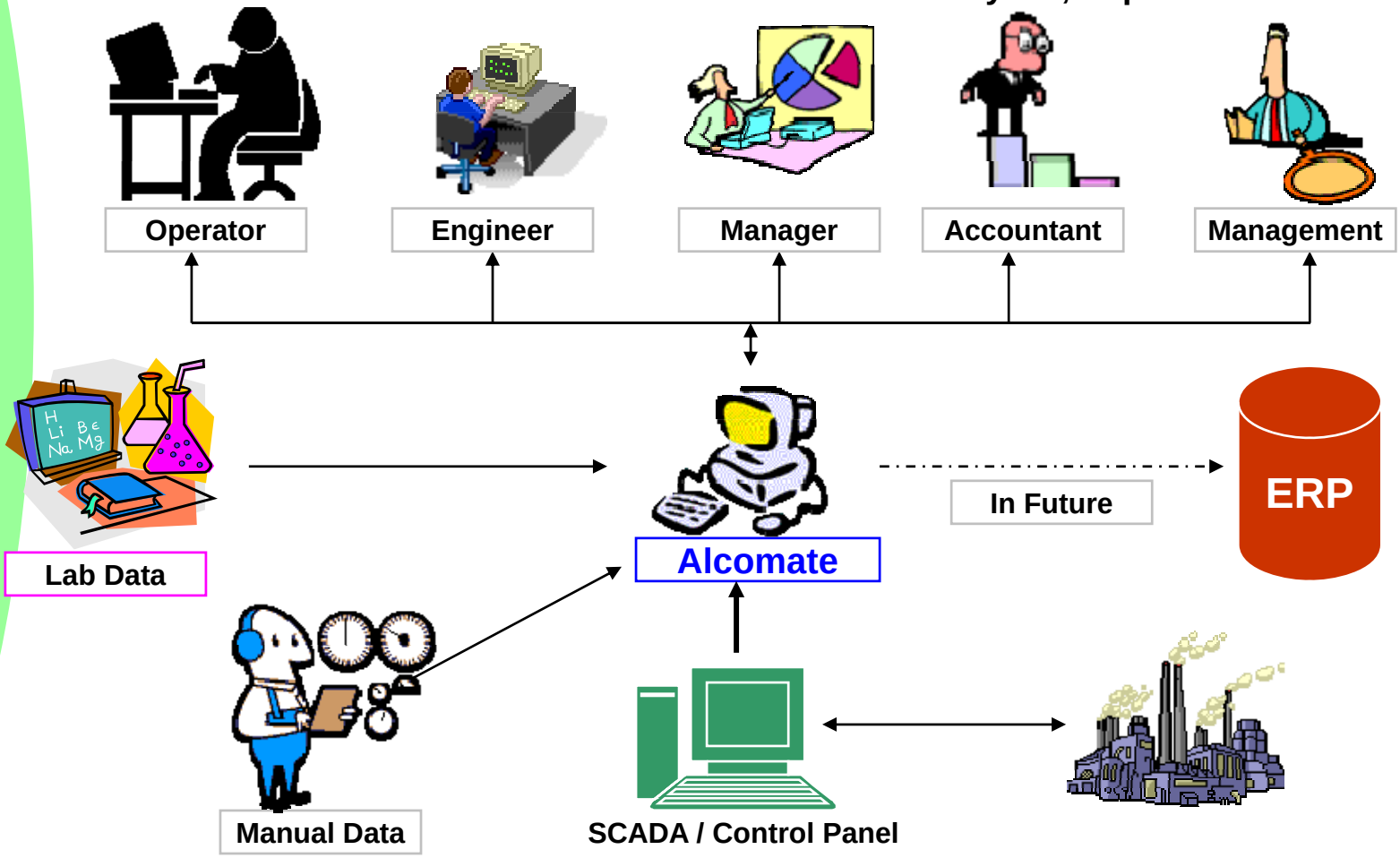
- **Biomethanation**
  - ECOMET- XT* Mixed Tank Reactor
  - Swivel Agitators
- **Biocomposting**
  - Complete `Zero' discharge system
  - Produces valuable bio fertilizer
- **Evaporation**
  - Self cleaning mechanism
  - Substantial volume Reduction
- **Vinasse Boiler**
  - Ultimate 'Zero' pollution system

Wastewater Treatment

- Knowledge of upstream process leveraged for better results.
- Incorporation of innovative technologies like **Flubex*** – a self cleaning evaporator for wastewater volume reduction.

AlcoMate
for Informed Decisions……..

• Plant Monitoring • Analysis, Investigate & Improve • KPI's & Analytics, Reports • Performance



AlcoMate

Key Features….

- Right information to right people
- Tracking of Key Performance Indicators and bench marking.
- Auto generation of reports : Daily / Weekly / Monthly.
- Pile of data as an Asset – To learn / Analyze / Synthesize.
- Built in Trouble shooting guide.
- Ready access available from anywhere (over intranet)
- Alerts / Notifications – e.g. process disturbance.
- Collaboration with consultants, suppliers, contractors etc to get support
- Data collection easier, authentic and time saving.

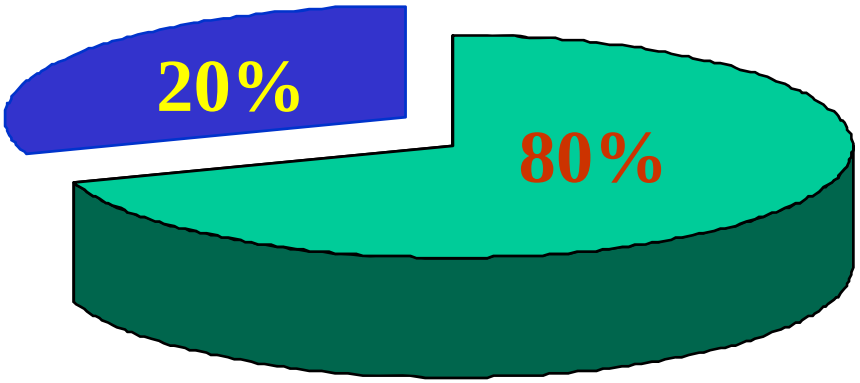

Core Strengths

Core Strength

- Out of the staff strength of > 800, 80% are Engineers and Technicians.

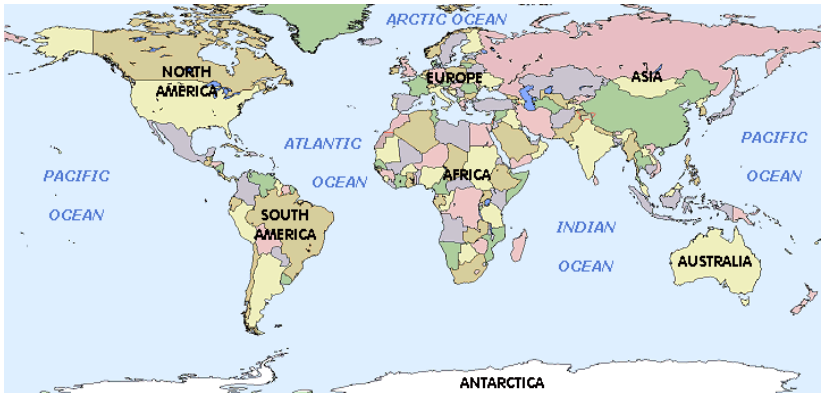






Core Strength

Over 4000 man-years of experience in alcohol technology.



Core Strength

Design and simulation software including P4D, Chemcad and other proprietary softwares.

Core Strength

- Process & Application Engineering with 7 Patented Products/Processes
- Manufacturing & R & D backed delivery
- Experience & Expertise

Manufacturing unit – 1: Sanaswadi

Total Area 18,500 sq. mtr (4,500 Sq.mtrs covered space).

Manufacturing unit - 2 : Sanaswadi

2400 Sq.mtr. Covered space

Manufacturing unit- 3: EOU (Markal)

4400 sq.mtr. (1700 sq.mtr. Covered area)

Manufacturing unit- 4 : SEZ Kandla

The covered area 15220 sq mtrs. The annual fabrication capacity would be approx 3000 tons.

Project Management

A strong project management team with global experience

Quality Assurance

- Dedicated Quality Assurance Team
- Quality Assurance Plan for each equipment, raw material and bought outs.
- Personnel trained as Lead Assessor and in NDT Level III, Certified Welding Inspector, British Welding Society.

Standards & Codes

- AD Merkblatter
- API 650
- TEMA
- BS
- AS 1210
- IS 2825

Certification

ASME

H & U

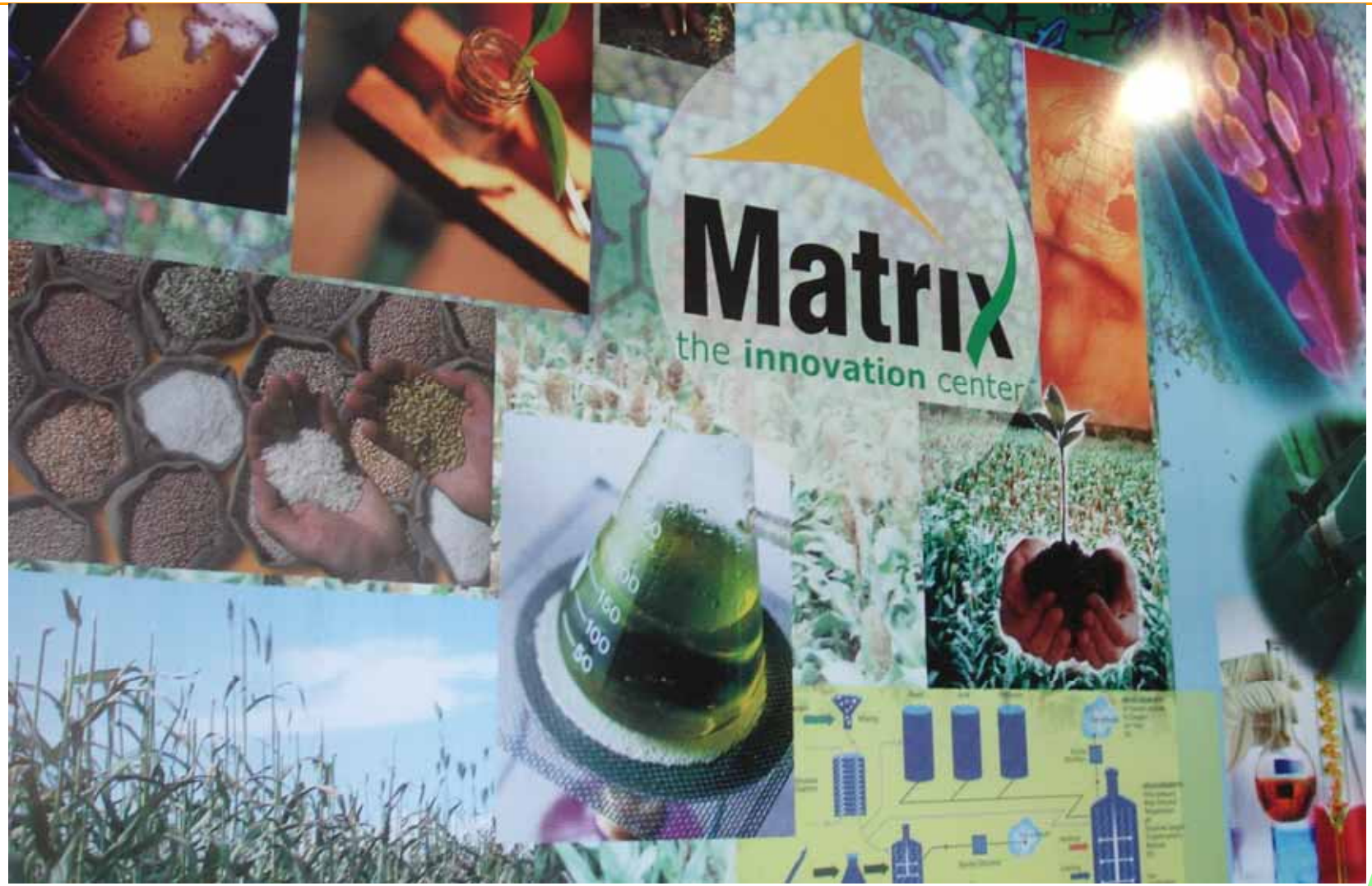
Stamp Holders

TÜV CERT

ISO 9001:2000

Certificate : 041000279

Matrix-The Innovation Center



Matrix-The Innovation Center

- Instrumentation Laboratory
- Analytical Laboratory
- Wet Chemistry Section
- Bioengineering Section
- Pilot Facilities

Matrix-The Innovation Center

Explore and Develop viable Bio-Engineering Technologies for converting Renewable Agro-molecules into Beneficial Bio-products and Energy

Matrix-The Innovation Center

- Initiated alternate energy crops programmes including tapioca, tropical sugar beet and sweet sorghum.



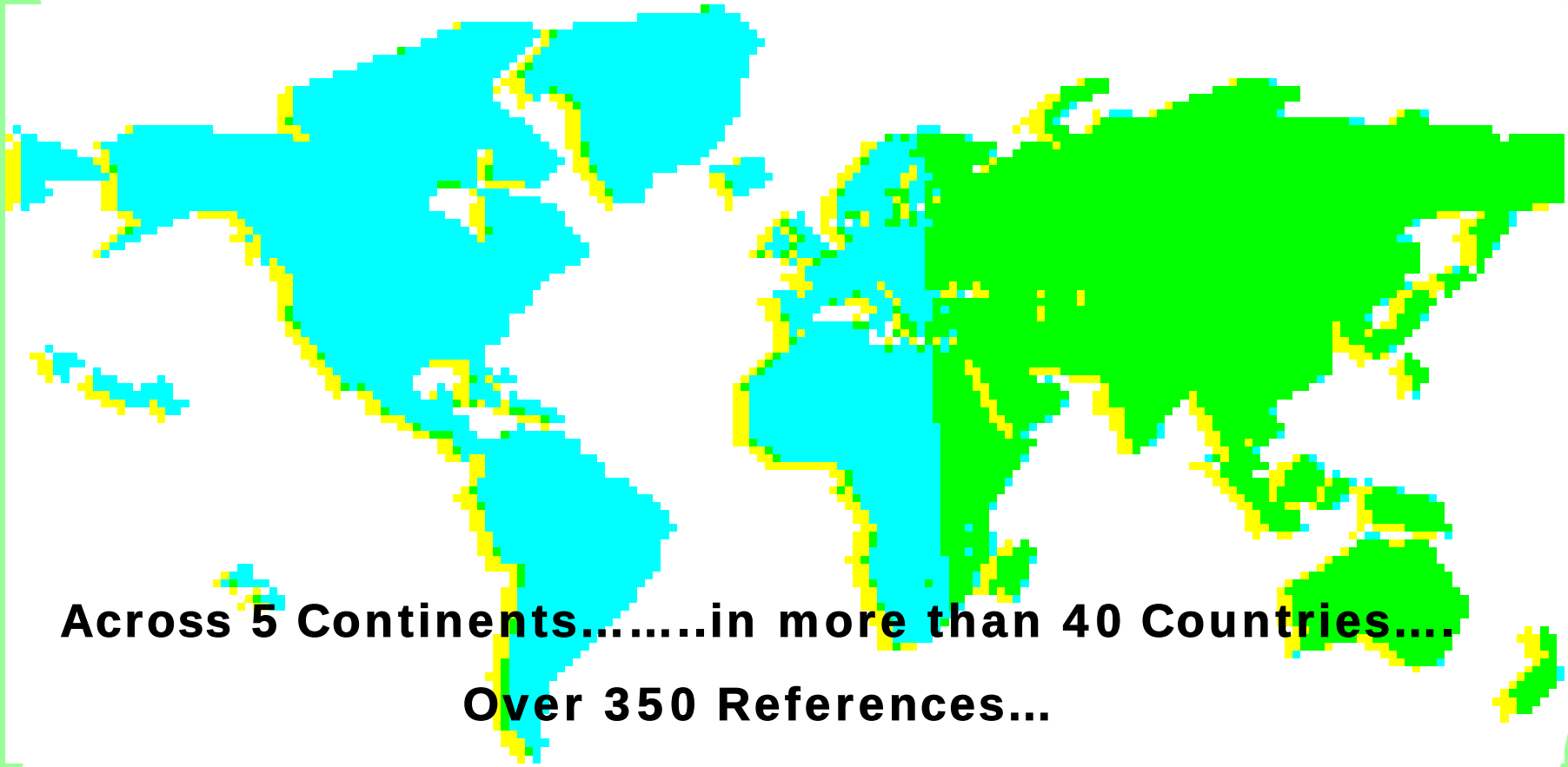


PRAJ : Locations

PRAJ : Joint Ventures & Subsidiaries

BioCnergy is a Joint Venture with Aker Kvaerner, Netherlands for European Biofuels market. Praj holds 60% in the JV while AK holds 40%. The operations are based out of Zoetermeer, The Netherlands.

Praj Schneider (formerly C.J. Schnieder) is a 100% subsidiary of Praj Industries. It is an engineering Company focused upon balance of plant design and engineering. The Company is based in Omaha, Nebraska.



Across 5 Continents……..in more than 40 Countries….

Over 350 References…

From Australia to Peru…

Please do visit us at

www.praj.net

Contact us at

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Thank You

USE FUEL ETHANOL

Renewable…Clean…Green