

PYRAMID E&C

Bioethanol Solutions

Conventional (1G) Ethanol Plants •

Cellulosic (2G) Ethanol Plants •

Green Plastics •



OUR OFFERING

Pyramid E&C offers modern, efficient, and fully automated Conventional (1G) Ethanol, Cellulosic (2G) Ethanol and Green Petrochemical plants complying with the environmental requirement of Zero Liquid Discharge (ZLD) and Zero Green House Gas (GHG) emissions.

CONVENTIONAL (1G) ETHANOL

These plants utilize Corn, Rice, Maize, Wheat crops, Sorghum, Beet, Sugarcane or Molasses as the feedstock to produce bio Ethanol by fermentation of starches or sugars present in the feedstock. The conventional 1G ethanol production system consists of extraction, concentration, fermentation, distillation & dehydration units.

CELLULOOSIC (2G) ETHANOL

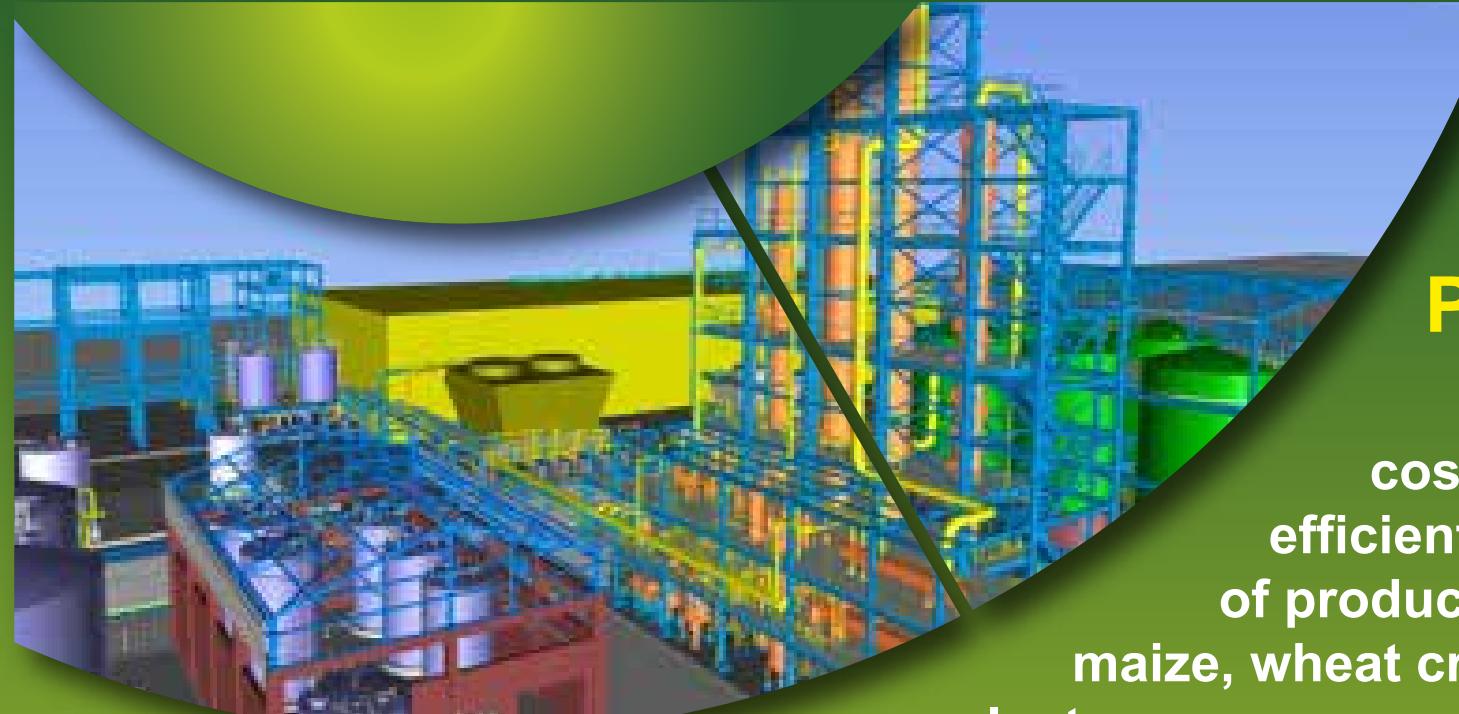
Second-generation Cellulosic Ethanol plants utilize Lignocellulosic feedstock biomass comprising of cellulose, hemicellulose or lignin found in agri-residues e.g. Rice and Wheat straw, Cane trash, Corn Cobs, Cotton stalk and Bagasse. This feedstock is tough to ferment due to presence of Lignin as a binder. Pyramid E&C offers a patented process to separate fermentable materials from lignin and a proprietary enzyme for fermentation of cellulose, thus able to produce bio-ethanol. Rest of the process involves separation and storage similar to Conventional Ethanol.

GREEN PETROCHEMICALS

Ethanol produced from biomass (1G or 2G) route can be further processed to produce Green versions of Ethylene, Ethylene Oxide and Ethylene Glycol for meeting regional demands or renewable input requirements of polymers for food and beverage containers.

Pyramid E&C has entered into technical collaboration with leading US Technology providers to utilize the patented technology, enzymes, and catalysts to build world class bio ethanol and green petrochemical facilities. The basic engineering and procurement for these plants is carried by Pyramid E&C Houston office in close coordination with the technology provider. The detailed engineering and construction management is carried out by Pyramid E&C High Value Engineering Centre at Thane, Mumbai, the plants are manufactured at Pyramid E&C Modular Fabrication Yard at Mundra Port, Gujarat, India, thus providing a seamless value chain ensuring high quality, competitive plant delivery to customers.





CONVENTIONAL (1G) ETHANOL PLANTS

Pyramid E&C offers cost-effective and most energy efficient 1G Ethanol plants capable of producing bio-Ethanol using corn, maize, wheat crops, waste straw, Sorghum plants, sugarcane, sugar beet as the feedstock.

Process

The feedstock is sent to milling unit to achieve desired particle size & capacity followed by a liquefaction unit where enzymes are added. This liquid is then forwarded to a fermentation stage, where the dilute ethanol is produced (ethyl alcohol). From here it is distilled and the light fraction (ethanol) is sent to a fractionation unit and eventually through dehydration before being pumped to storage as bioethanol.

The heavier fractions from the distillation process is sent through a separator where the stillage is centrifuged, and solids dried then sent to storage for further uses. The syrup component is concentrated, then dried and stored for further use as DDGS. Very little goes to waste as most of the by-products are used, if needed further separation equipment are provided to achieve Zero Liquid Discharge (ZLD) to meet local environment norms.

By-product CO₂ released during fermentation is captured and liquified for

sale as a by-product for refrigeration or carbonated drinks industry thus achieving Zero Green House gas (GHG) emission.

Standard Sizes (Ethanol Production)

- 100 KLPD
- 200 KLPD
- 400 KLPD

Typical Configuration

- Extraction
- Concentration
- Fermentation (Yeast or Microorganism)
- Distillation
- Dehydration
- CO₂ Recovery and Bottling System
- Zero Liquid Discharge Section

CELLULOSIC (2G) ETHANOL PLANTS

Pyramid E&C offers 2G Ethanol plants of proven technology capable of fermenting cellulosic feedstock e.g. Rice and Wheat straw, Cane trash, Corn Cobs, Cotton stalk and Bagasse to produce bio-Ethanol.

Process

2G bioethanol technology uses plant Lignocellulosic biomass as a feedstock which comprises of three major components viz. Lignin, Cellulose and Hemicelluloses. Cellulose and Hemicelluloses are the structural carbohydrates while lignin is heterogeneous phenolic polymer

Pre-treatment

Due to the presence of lignin in "Lignocellulosic" materials, and compared to the accessibility of sucrose in sugar cane and starch in grains, cellulose and hemicelluloses are not easily and readily available for saccharification and fermentation. A "pre-treatment" step is hence required to facilitate conversion of cellulose and hemicelluloses to fermentable sugars.

Hydrolysis

Hydrolysis process is used to convert hemicellulose and cellulose content of lignocellulosic biomass into fermentable monomeric sugars. Pyramid E&C uses a Patented and proven process and enzyme to achieve hydrolysis. The reference plant for the process currently operates in Ohio, USA.

Fermentation

In the Fermentation process, the hexoses and pentoses are converted into ethanol by employing highly efficient proprietary microorganisms patented and purchased from a third party depending on feedstock to achieve Simultaneous Saccharification and Co-fermentation

Distillation & Purification

From fermented mash, fuel grade Ethanol is produced through conventional distillation as Ethanol and water extractive form an azeotropic mixture.

Main Plant Section

- Feedstock treatment
- Enzymatic Saccharification
- Fermentation
- Distillation
- Dehydration
- Separation
- CO₂ Recovery and Bottling System
- Zero Liquid Discharge Section



PYRAMID E&C

About Pyramid E&C

Pyramid E&C is an international provider of Technology, Services, Products and Solutions for Conventional and Renewable Hydrocarbon processing facilities and has delivered more than 700 projects since inception in 1995, thus achieving significant business maturity globally. The company has strong knowledge base in Oil & Gas, Refining & Petrochemicals, Steam Methane Reforming and Bio Ethanol businesses. The proven capability and necessary infrastructure to engineer, manufacturer and commission international quality plants is the hallmark of Pyramid E&C's hydrocarbon solution delivery capability.



Web Contact

URL : www.pyramidenc.com

Enquiry : sales@pyramidenc.com

Americas & Caribbean
Houston, USA

Pyramid E&C LLC.
1255 Enclave Parkway
Suite 102
Houston TX 77077
USA

Anant Bajpai
+1 713 429 5499

Middle East & Africa
Dubai, UAE

Pyramid E&C FZE
48 BurjGate Tower
Level 20
Dubai
United Arab Emirates

Prakash Pardasani
+971 4 518 2635

Europe & Russia
Newbury, United Kingdom

Pyramid E&C LTD.
Dominion Hous
Kennet Side, Newbury
RG14 5PX
United Kingdom

Manj Duhra
+44 16357 22014

Asia Pacific
Mumbai, India

Pyramid E&C LTD.
4th Floor, Hamilton 'A' Wing
Hiranandani Business Park
Thane, Mumbai - 400 607
India

Harshad Shah
+91 22 4038 1000