Bio-Ethanol Plants

The ChemPro Group is a process oriented, multi-disciplined design-build company that is adept in prefabrication designs and process modularization. Our strength in project management allows us to handle any project from process inception through commercial production. We provide modular systems on most projects. Our on-site support capabilities can play a critical role in the timely online operation of a ChemPro system.

Undoubtedly, ethanol derived from renewable biomass feedstocks will play a key role in reducing the world dependence on fossil fuels. Yet, ethanol production capacity falls far short of meeting even the current demand. The source for biomass is widely distributed and the conversion rates of biomass-to-ethanol do not warrant transportation of biomass feedstocks for great distances. Clearly, there is a large market for regional-scale ethanol plants that are small enough to be easily modularized.

ChemPro has strategic alliances with key biomass-to-ethanol technology providers and has the modular design-build experience to deliver this technology as a completed plant in the shortest timeframe.

Traditionally, production of Bio-Ethanol from biomass has generally involved these steps:

- Store/grind/feed biomass
  - this is the front-end, solids-handling section of the plant
  - involves storage silos, conveyors, hoppers, grinders, etc.
  - configuration largely depends on source of biomass
- Slurry with water and cook broth
- Cool and add yeast to ferment – converting sugars to alcohol in the fermentation broth (or beer)
- Remove water and carbon dioxide – generally by multiple effect evaporation and fractionation
- Dry ethanol, first by azeotropic distillation and then with molecular sieve beds
- If a non-FDA fuel grade product is desired, approximately 5% gasoline (or other hydrocarbon) is added to "denature" the alcohol

Advanced, Bio-Ethanol technology is being developed globally, to make this process less energy intensive. The success of this alternate technology may well depend on what developers refer to as "biorefineries" because their co-products (chemicals, steam, power, etc.) lower their overall ethanol production cost.

It is important to recognize that:

1) conventional Bio-Ethanol technology remains the choice for existing plant expansions, new plants under construction, and proposed facilities in the near-term, except for certain announced demonstration plants utilizing advanced technologies
2) futuristic bio-refineries will almost certainly use traditional processing steps as their basis, with added features to improve conversion, reduce energy costs, and/or produce saleable byproducts

3) ethanol plants will continue to be of a scale where modular construction can be used to improve overall schedules, reduce field construction costs and improve safety
4) choice of the technology licensor will be important, since certain licensed technologies:
   a. provide higher conversions to ethanol
   b. are adaptable to varying sources of biomass feedstocks

ChemPro Modular Fuel-Ethanol and Bio-Ethanol Systems are the Solution

Today, those interested in Bio-Ethanol are considering their options - whether to acquire all the expertise and staff upfront, to outsource responsibility to one entity for the entire refinery, or to find a balance by splitting responsibility. Looking back at the processing steps listed above, there is a clear division of design and construction needs. The front end of the process is a materials handling issue, the middle of the process is fermentation, and the back end plant involves separations and mass transfer. Outsourcing the full scope of these ethanol plants to one large E&C firm can be costly and limits the use of technology to that available within the E&C contractor. Packaging and outsourcing selected portions or sub-systems of the ethanol process provides flexibility, reduces overall costs, and allows the individual contractors to operate in their respective areas of strength and expertise – thus bringing the best technology available to each step of the process. By selecting the right sub-systems providers, the owner can get a complete overall package - the designs, the prefabrication know-how, the project management, specialized experience, and proven on-site support capabilities.

As separations and mass transfer experts, ChemPro excels at the back end of the Bio-Ethanol process. We can also take on overall, sole source responsibility and provide the optimum, most advanced, custom designed Bio-Ethanol production system for your specific needs, using proven technology from one or more of our alliance partners for the front end of the process. As new Bio-Ethanol process technology continues to evolve, ChemPro has the proven capabilities, skills, experience, and resources to support the modular design and fabrication of these advanced systems.

The ChemPro Bio-Ethanol Technology Solution

- ChemPro began its Bio-Ethanol experience on Potatoes-to-Ethanol plants for J.R Simplot Company over 25 years ago.

- ChemPro is known for its process design and modular/prefabrication techniques. Our systems are engineered to meet our client's exact project requirements and specifications.

- ChemPro has direct experience with fermentation broth purification and concentration to ethanol. We remove water and other impurities by multiple effect evaporation and fractionation to produce the alcohol-water azeotrope, then use azeotropic distillation and/or molecular sieves to reach final ethanol purity.

- ChemPro is, first and foremost, a technology-driven design-build contractor that partners well with its clients to transform their concepts to practical processing systems. We know and understand conventional Bio-Ethanol processing and have the innovative skills to quickly integrate our client’s new ideas into advanced, modular Bio-Ethanol systems.

- ChemPro can offer both complete, sole-source Bio-Ethanol plants in selected regions or stand-alone, individual processing systems within the overall plant scope. Through our association with McAbee Construction, we have in-house equipment and modular fabrication capability along with an experienced on-site construction team to assist with final assembly at the jobsite. Our in-house staff can provide start-up assistance and technical service for the client's new plant.

ChemPro Is Your Logical Bio-Ethanol Partner

The ChemPro Modular Construction Solution

- ChemPro designs prefabricated modules for on-site installation, as a complete process system. They meet all national and local fabrication codes and regulations, as well as provide safe and reliable operation.

- Chem-Pro system layouts are based upon years of prefabrication design and modular construction experience, and offer maximum accessibility of all equipment, valves, and instruments for safety and for ease of operation and maintenance. Our modules are fully piped, wired, assembled; documented, and tested. The assembled modular plant is available for inspection, client approval, and operator training, prior to shipment. After client inspection and approval, the modules are then taken apart and shipped to the site for reassembly and a problem-free startup.

- ChemPro plants are built in the USA and delivered as prefabricated modules anywhere in the world for on-site installation. There are no surprises in the field since the plant was trial assembled and tested in our shop.

Key Benefits of Choosing a ChemPro Bio-Ethanol Plant

Benefits for selecting a ChemPro plant for your next Bio-Ethanol project are:
- Single source project responsibility
- Cost effective source of critical capabilities and skills
- Effective use of time-saving prefabricated modules
- Flexibility in scope to fit your needs - a sub-system or a complete plant
- Dependable long-term process-oriented partner
- Ongoing customer service and troubleshooting

ChemPro offers a complete one-stop package; design, prefabrication know-how, project management experience, proven on-site capabilities, and long-term follow-up.

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