

Demonstrating new cellulosic ethanol process technology

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In October 2009, Coskata, Inc. announced that its demonstration plant was producing ethanol from wood chips—illustrating the importance of this key demonstration step in the commercialization of new process technology.

The plant (designed and built by Zeton Inc. of Burlington, Ontario, Canada and located next to Alter NRG's Westinghouse Plasma gasification demonstration facility in Madison, Pennsylvania, USA) combines two innovative process technologies:

- Alter NRG's plasma gasification process uses plasma torches in the gasifier to convert carbonaceous materials such as coal, municipal waste, wood chips, or other waste biomass sources into carbon monoxide (CO) and hydrogen (H₂), or syngas, and an inert slag by-product. The technology also operates at commercial scale in Japan and India. Since 2007, Hatch has been providing Alter NRG with engineering services for its commercial gasifier designs.
- Coskata's fermentation process technology utilizes proprietary microorganisms to convert synthesis gas (CO and H₂) to ethanol in a novel bioreactor. The product of the bioreactor is then separated and distilled to recover fuel-grade ethanol.

The purpose of a demonstration plant is to prove the technical and commercial feasibility of the process, as well as to verify process data for the next scale-up step to a commercial plant.

For Coskata's demonstration plant, this includes proving the syngas-to-ethanol conversion rates and the overall product selectivity. The plant scale was set at a capacity where all the process steps would replicate, as closely as possible, the envisaged commercial plant operation. In this case, the demonstration plant produces approximately 40,000 gallons per year of ethanol, while commercial-scale plants for this process are planned to produce 50 to 100 million gallons of ethanol per year.

Design and fabrication of demonstration plants present unique challenges for both the technology developer and the designer/fabricator. The company developing the process technology has invested significant time and money in the research and development effort and needs to quickly show progress towards commercialization in order to maintain interest in the technology. The plant must therefore be completed in as short a time as possible.

While the plant is being built, research and development efforts continue, often leading to changes in the process technology that must be incorporated into the plant. This requires a flexible, disciplined and integrated approach between the design-build company and the technology developer—such that the project continues moving efficiently towards completion.

Zeton designs and fabricates demonstration plants as skid-mounted modules, which enables construction to benefit from the same state-of-the-art technologies that went into the design. Of key advantage is the greatly simplified communications, with one contact point from project inception to completion. With the design engineers working in the same facility and continually involved in fabrication, design changes can be implemented with minimal delay and maximal accuracy.

To read more on Alter NRG and Coskata, and on how Zeton designs and fabricates modular demonstration plants for technology developers worldwide, please see the following websites: www.alternrg.com, www.coskata.com, www.zeton.com.

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Coskata's cellululosic ethanol demonstration plant in Madison, Pennsylvania, has a production capacity of 40,000 gallons per year of ethanol

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