Advanced Fixed-Bed Gasifier

Commercial Application

The advanced fixed-bed gasifier is a packaged power generation system in the range of 250 kWe–1 MWe. Microgasification power generators provide energy solutions for commercial and industrial clients that have simultaneous waste disposal and power needs. Wood-based fuels (biomass) are the most common application; however, other agricultural residues and coal can be considered.

Commercial Opportunity

Many residues have a high energy value; however, this value is lost as they are transported off-site at a disposal cost. As corporations seek to lower operational costs and increase revenues, utilization of residues or by-products provides an economically attractive solution.

Current Approaches

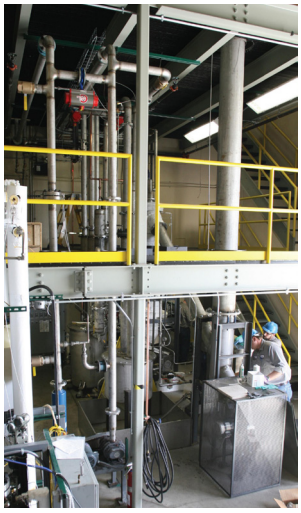
Steam boiler combustion technology is used to produce electricity from biomass; however, steam boiler combustion is expensive and requires certified boiler attendants.

Technological Advantage

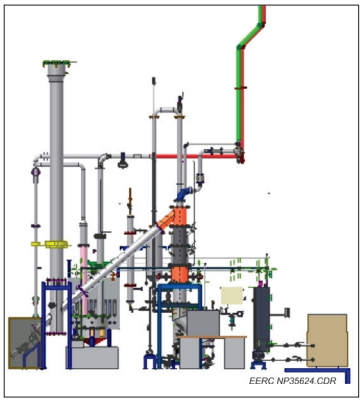
The Energy & Environmental Research Center (EERC) utilizes a downdraft gasifier because of superior gas quality performance relative to updraft fluidized-bed gasifiers. The gasifier design philosophy is based on the production of clean syngas with high conversion efficiency and near-zero effluent discharge from the overall system. The production of clean syngas is achieved by converting the complex organics in the hot zone of the gasifier.

Benefits

- New zero, efficient discharge.
- Completely automated to minimize operational cost.
- Utilizes on-site, low-value by-products and wastes to produce value-added products



Advanced Pilot-Scale Gasifier



Three-dimensional view of the pilot plant gasifier depicting the major components of the system.

- Distributed generation of electricity
- Small footprint enables use in portable applications
- Potential chemical or liquid fuels production
- Packaged to meet the strictest environmental requirements and permits.
- Inherently safe design at low pressure to meet Occupational Safety and Health Administration (OSHA) and National Electrical Code (NEC) standards, with computerized monitored and logic-based feedback interface.
- Simplified maintenance and recycled process consumables.

Market Information

Numerous industries such as forest products, agricultural processing, and secondary milling can benefit from the waste utilization features of gasification technology. There is an estimated potential application for at least 100,000 units in the United States.

Development Stage

The EERC has operated a variety of small-scale gasification systems for testing and performance measurement since 2004. Based on these developments for specific applications, a 100-lb/hr true multifuel pilot system has been installed at the EERC and is being operated to prove long-term viability (illustrated in the figures). The EERC looks forward to providing comprehensive solutions for residue disposal and power production in partnership with industry.

Additional ongoing development includes the utilization of syngas for chemical conversion.

Type of Collaboration

The EERC is actively seeking demonstration and commercialization partners in medium and small commercial applications.

Intellectual Property (IP) Rights

Development of a comprehensive package of IP rights is under way, including but not limited to:

- Method and Apparatus for Supply of Low-Btu Gas to an Engine Generator, Serial No. 11/683,636
- Charcoal/Ash Removal System for a Downdraft Gasifier, Serial No. 12/166,300
- Thermally Stable Cocurrent Gasification System, Serial No. 12/035,331
- Sandwich Gasification Process for High-Efficiency Conversion of Carbonaceous Fuels to Clean Syngas with Zero Residual Carbon Discharge, Serial No. 61/374,139

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