



Gasifier

Proven technology to process multiple feedstocks

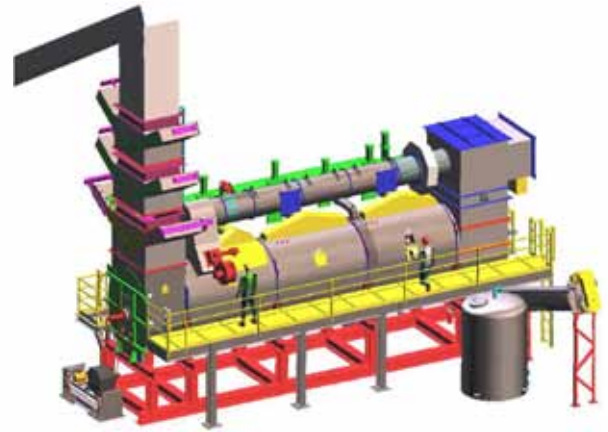
ICM's proven gasification technology was developed in the early 1980s and was successfully tested and supported at rates up to 250 TPD by the Department of Energy.

Our three commercial-scale unit designs will operate at 150-200 TPD, 300-350 TPD, or 450-500 TPD rates. All models are capable of handling multiple feedstocks. Typical fuels or fuel blends could include:

- Agricultural residue
 - Corn stover and cobs
 - Rice straw or wheat straw
 - Oat hulls
 - Bran
- Wood chips and bark
- Urban trimmings
- Construction & Demolition waste (C&D)
- Refuse Derived Fuel (RDF) from Municipal Solid Waste (MSW)
- Bio-refining residue
- Energy crops
- Sugar cane bagasse
- Tire Derived Fuel
- Landfill gas
- Poultry litter
- Bio-solids
- Paper sludge

How it works

Gasification is a process that heats and converts carbon-based feedstocks into a combustible fuel comprised largely of carbon monoxide and hydrogen. In the ICM gasifier, a limited amount of air is used to partially combust the fuel. The heat generated breaks down the remaining feedstock to form a gas, commonly called syngas or producer gas. This highly combustible gas can be readily burned to provide process heat and steam or produce renewable electricity.



Copyright © 2010 ICM, Inc.
All rights in this drawing and the proprietary design of the system depicted are reserved.

Advantages of ICM Gasification Technology

- **Multiple, non-specific feedstocks with minimal size reduction** – Some gasifiers can only process a specific feedstock with strict size and moisture content limitations. ICM's gasifier comes with fuel flexibility built in. It uses a large, slow-turning auger to move feedstock through the gasification chamber. This offers the advantage of controlled retention time, allowing the feedstock flow to be slowed down or sped up, depending on needs. Separate air zone stages and a gas bypass duct provide added control and flexibility, giving ICM gasification technology the ability to process a wide range of different feedstocks, including those with high-moisture content (<50%) and minimal size reduction.
- **Robust, maintenance-friendly design** – With very few moving parts, the ICM gasifier has a low requirement for maintenance, and we can test your feedstock at our full-sized 150 TPD demonstration unit to ensure our technology will deliver the results you are expecting.
- **Small footprint** – The footprint for our largest unit is 38' x 14'.
- **Variable energy output** – A single gasifier can produce 3 MW - 18 MW, and a dual unit can produce up to 36 MW. Currently, we are providing 150, 300, & 450 ton per day units.
- **In-house fabrication** – By fabricating equipment in-house, we are able to maintain a strict quality control chain throughout the entire manufacturing process, ensuring each piece of equipment meets our high quality standards. It also means that when your equipment needs system maintenance in the years to come, the same people who built your equipment will be on hand to travel to your facility to service it. Shop fabrication of the gasifier's modular components also minimizes risk of construction cost overruns and delays. This modular construction allows for easy truck/rail/barge transport to your site, and it provides significant cost advantage over site-built systems.
- **Carbon sequestration** – The ICM gasifier is capable of generating a high-carbon ash co-product that can also be used as fertilizer for beneficial soil amendment as well as on-farm carbon sequestration.
- **Best Available Control Technology (BACT)** – Our gasification technology package, when used with a Wet ElectroStatic Precipitator (WESP) for emission abatement, will be capable of removing a wide variety of pollutants, including those that are otherwise difficult to remove, such as NO_x and elemental mercury.



the energy of innovation™



Cleaner, more energy efficient, and more flexible than combustion

ICM recommends that our customers seriously consider gasification as an alternative to combustion, as we believe it is the better option for most applications.

Industrial applications for gasification technology in new plants and brown-field retrofits:

- Coal boiler re-powering
- Pulp and paper mills
- Food processors
- Pellet plants
- Poultry/swine processing facilities
- Timber mills
- Panel board plants
- Independent power producers
- Water treatment plants
- Biorefineries, including traditional corn-to-ethanol and cellulosic ethanol plants

Contact us for more information, or to schedule a tour of demonstration facility

Learn more about this and other ICM technology by calling our Business Development department today.

316.977.6796

Gasification (as compared to traditional combustion)	Benefits
Greater flexibility and control in maximizing the utilization of the chemical energy of biomass fuel	<ul style="list-style-type: none"> • Combustion produces heat only • Gasification allows owners to repower existing infrastructure while creating valuable co-products. Possibilities include: <ul style="list-style-type: none"> ☐ Cooling ☐ Heat recovery ☐ Steam ☐ Power ☐ Biochar production
Flexible co-products	<ul style="list-style-type: none"> • Gasification can be controlled to produce ash with varying carbon contents, depending on desired result, allowing use as a soil amendment or for carbon sequestration • Inert ash derived from tires or RDF can be deposited at landfill
Provides a cleaner alternative	<ul style="list-style-type: none"> • Gasification takes place at lower temperatures (<1300° F vs. +2000° F), reducing the formation of corrosive alkali compounds that create hard-to-remove small particulate emissions and cause boiler fouling and slag formation • Better residue management capabilities • Lower air throughput requirements eliminates the need for large and extensive flue gas cleanup equipment that is necessary in combustion applications
Lower operating temperature	<ul style="list-style-type: none"> • Greater feedstock flexibility (i.e., agricultural residues)



the energy of innovation™

© 2010 ICM, Inc. All Rights Reserved.