FETC SUCCESS
U.S. Department of Energy
Federal Energy Technology Center

CLEAN AFFORDABLE FUELS

- [x] fossil energy
- [ ] environmental
- [ ] energy efficiency
- [ ] other

M99000471 P6.5

# ACTOSOL®

## Description

Supported by the U.S. Energy Department's Federal Energy Technology Center, ARCTECH, Inc., of Chantilly, Virginia, developed and patented a technology called MicGAS™ that uses a biological conversion process to produce a hydrogen-rich clean fuel gas. While developing MicGAS™, the company produced a highly successfully spinoff, a carbon-rich humic acid fertilizer product now being commercially marketed throughout the U.S. and international markets. ARCTECH based the MicGAS™ technology on the biological conversion of coal as a way to produce a clean fuel gas, as well as the humic acid by-product, while reducing carbon dioxide. The technology uses naturally occurring microorganisms that are adapted to the conversion process. The bioconversion occurs in three steps. The first step uses chemical processes called hydrolysis and fermentation in which microbes convert coal into volatile organic liquids. These first-step liquids and gases are contacted with methane-producing microbes that hydrogenate the acetate and carbon dioxide to methane. When the methane is separated, it undergoes a biochemical conversion in step three, where the coal residue is converted into the humic acid by-product called actosol®.

## Goals

To facilitate the efficient use of the nation's abundant coal resources for the production of energy, while sequestering carbon as the actosol® by-product and mitigating greenhouse carbon dioxide gas emissions.

## Tangible Benefits

**National:** Because it sequesters carbon, the technology has shown the potential to mitigate greenhouse $CO_2$ gas emissions by 50 to 75 percent in comparison with the conventional power generation Rankine Cycle approach. In addition, the technology can be easily integrated into newer, high efficiency power plants. Also, ARCTECH recently scaled up a pilot product facility to produce humic acid and formulate it into the actosol® fertilizer product. The fertilizer is being marketed throughout the U.S. for use on golf courses, landscaping projects, erosion control, agriculture production, and many others. Oversees, the product is used in the Middle East to help propagate alfalfa, palm trees, and greenhouse crops, as well as in South Korean for golf courses and greenhouses.

**Regional/Local:** A primary benefit of the actosol® fertilizer is an increase of crop and plant yields by 20 to 100 percent, resulting in a net value gain of about $100 per acre. The fertilizer would be particularly attractive to those regional or local areas needing a boost in productivity.

**States Impacted:**
All states

**Benefit Areas:**
Environmental Quality Improved

**Participants:**
ARCTECH, Inc.

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September 1999