



*The Clean Coal Gasification Company™*

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## Coal Gasification Technology

For

**Western Business Roundtable Briefing Series**  
***Technology at the Cutting Edge***



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**Econo-Power International Corporation**  
*The Clean Coal Gasification Company™*

# Introduction

- EPIC, The Clean Coal Gasification Company™, has proprietary technology to use coal in a clean manner and meet required environmental regulation
- EPIC has a significant ability to provide syngas or fuel gas in multiple markets:
  - Fuel gas for IGCC and cogeneration
  - Fuel gas to replace natural gas with on-site, coal-based fuel gas
  - Syngas for methanol
  - Syngas gas for ammonia/ammonium nitrate/urea
  - Syngas for coal-to-ethanol
  - Syngas for other chemical processes
- Basic EPIC technology has been in operation for over 50 years
- Important distinction – EPIC air-blown gasification is suitable for industrial-scale projects and does not require an air separation plant – focus on smaller, more immediately implementable projects



# Uses of EPIC Syngas

- **Power production (IGCC)**
  - Modularity/scalability of system can customize plants from 50 MW to 500 MW
  - Highest IGCC efficiency, with or without carbon capture
- **IGCP – cogeneration plants on similar concept to IGCC**
- **Feedstock for:**
  - Ammonia, ammonium nitrate plants
  - Coal-to-alcohol (methanol, butanol, ethanol)
- **Fuel gas for:**
  - Boilers
  - Kilns, calciners
  - Process furnaces



# Strategic Relationships

EPIC has strategic relationships with key industry participants:

- Peabody Venture Fund, LLC (the “Fund”), a wholly owned subsidiary of Peabody Energy Corporation (“Peabody” - NYSE:BTU) owns approximately 25% of EPIC Common Stock in a private investment and holds two seats on the EPIC’s Board of Directors

**Peabody**

- Major EPC firms (such as Burns & McDonnell)



- Major equipment and systems suppliers



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# Summary Projects Listing



**EPIC various projects in preliminary design or in advanced stages of negotiations:**

- **US – Repower existing boilers with IGCC using PRB and wood waste and CO2 capture for EOR**
- **US – Syngas for ammonia plant in western US and capture CO2 for EOR (PRB coal)**
- **US – Major US utility to refuel 2 x 156 MW coal units for environmental compliance (PRB coal)**
- **US – Fully permitted gasification for Midwestern ethanol plant (PRB coal)**
- **China – US developer has financing and project approvals for 3 x 100 MW IGCC**
- **Mexico – Refueling of existing heavy fuel oil boilers and gas turbines**
- **US – Series of projects for feedstock to coal-to-ammonia, coal-to-ethanol, coal-to-methanol and to fuel power generation (PRB and Midwestern coal)**
- **US – Major southwestern independent power producer for large IGCC with carbon capture**
- **US – Midwestern utility – series of Projects (PRB coal)**
- **US – Various ethanol producers to replace natural gas as primary energy source (PRB coal)**
- **US – Teaming arrangement with major engineering company**
- **Taiwan – First coal gasification system in Taiwan to replace natural gas at ceramics plant**
- **Chile and Colombia – Series of projects to replace natural gas fuel for boilers and kilns**



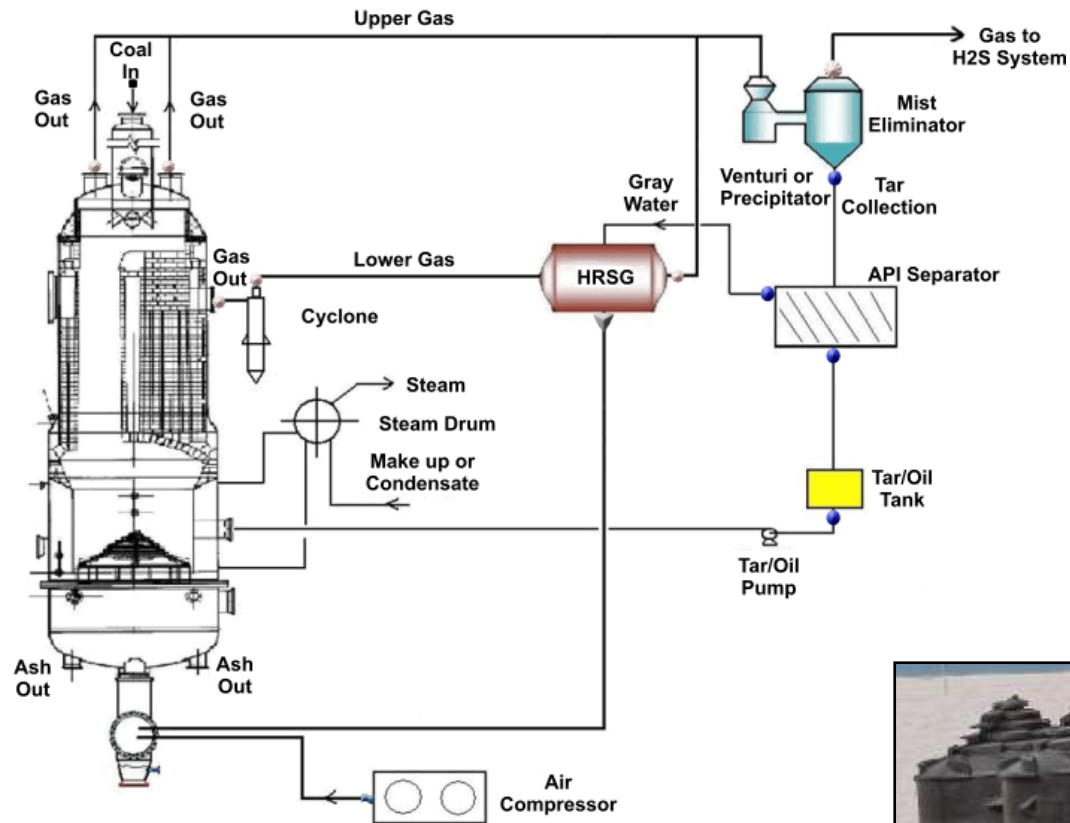
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# The EPIC Clean Coal Gasification System™

- **Commercially operating internationally for over 50 years.**
- **EPIC has proprietary technology with US patents and patents-pending on the system and various enhancements and uses.**
- **EPIC's technology uses coal as a feedstock to produce fuel gas in a low-pressure, air-blown process with the fuel gas produced as an environmentally friendly gas to replace natural gas in most industrial applications.**
- **The EPIC system can also use a blend of coal and biomass or other renewable fuels.**
- **The net cost of the fuel gas ranges from \$5.50 to \$6.50 per mmBtu.**
- **Scalable, modular designs offer high reliability and are installed in multiple trains to match any size customer application**
- **Low maintenance and operating costs compared to other systems.**



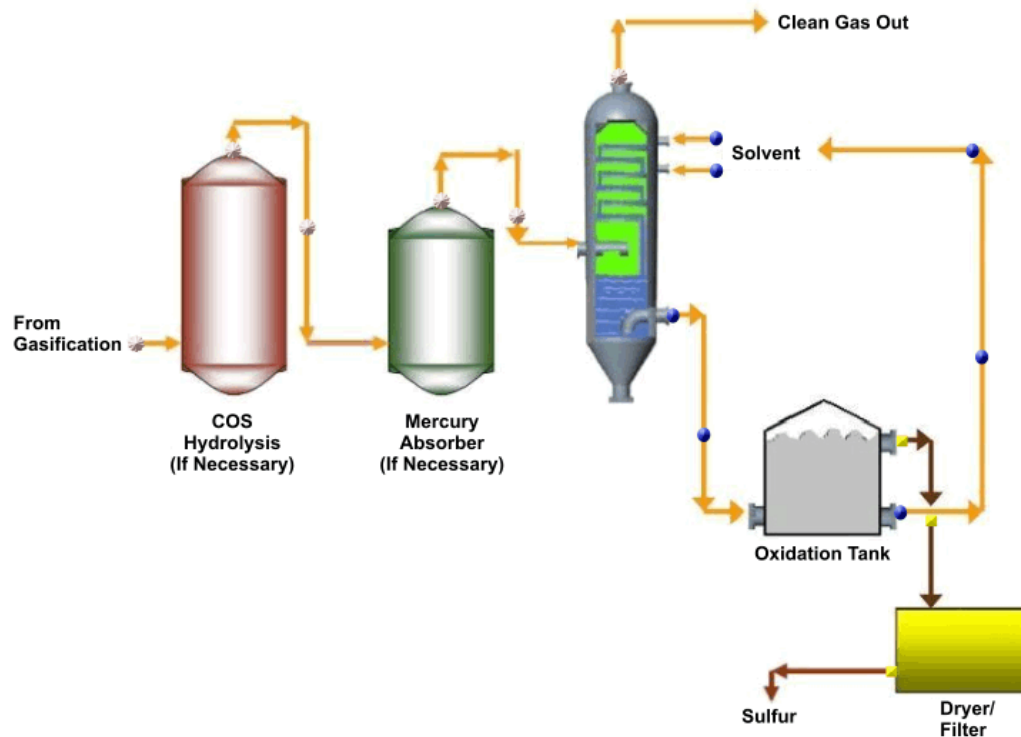
# The EPIC Technology – The Gasification System



- US Patent pending on system
- Uses common components
- Recycle tars and light oils
- Gas to desulfurization system
- Can use supplemental fuels such as biomass and MSW



# The EPIC Technology – Sulfur Removal



- Uses either EPIC Proprietary “888” catalyst or other commercially available H<sub>2</sub>S removal systems
- Standard system removes total sulfur to less than 10 ppm
- Can remove total sulfur to less than 1 ppm if process requires



# EPIC Technology & the Environment

The major pollutants to be considered in any fuel burning system are: **Particulate Matter; Sulfur Oxides; Nitrous Oxides and Mercury.** The EPIC™ *Clean Coal Gasification System* significantly reduces or eliminates these pollutants as follows:

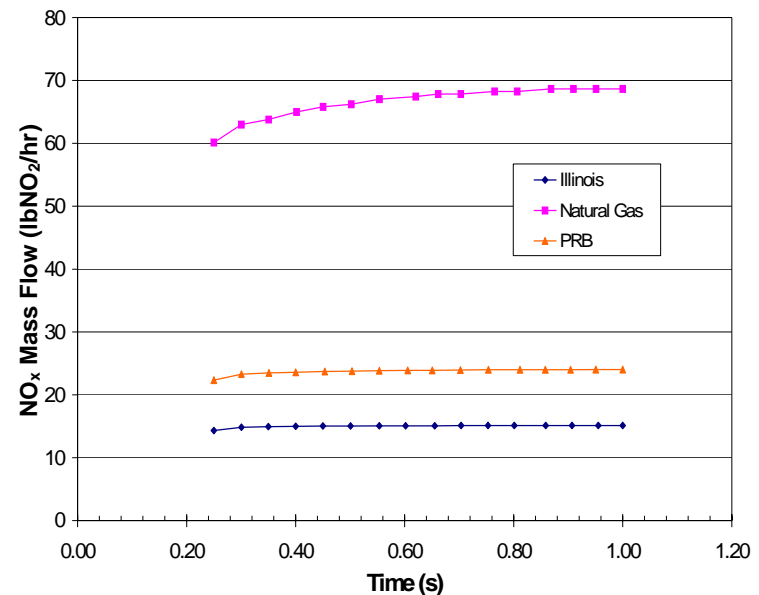
**Particulate matter** – all particulate is removed from the coal as ash before the fuel gas is burned in gas turbines, boilers, kilns, dryers, etc.

**Sulfur oxides** – SO<sub>x</sub> (most notably SO<sub>2</sub>) is removed as non-toxic elemental sulfur.

**Nitrous oxides** – Lower flame temperature than natural gas (or direct combustion of coal) leads to an inherent reduction in NO<sub>x</sub>.

**Mercury** – Commercially available carbon beds reduce Mercury below detectable levels.

**NO<sub>x</sub> Emissions – EPIC Syngas v. Natural Gas**



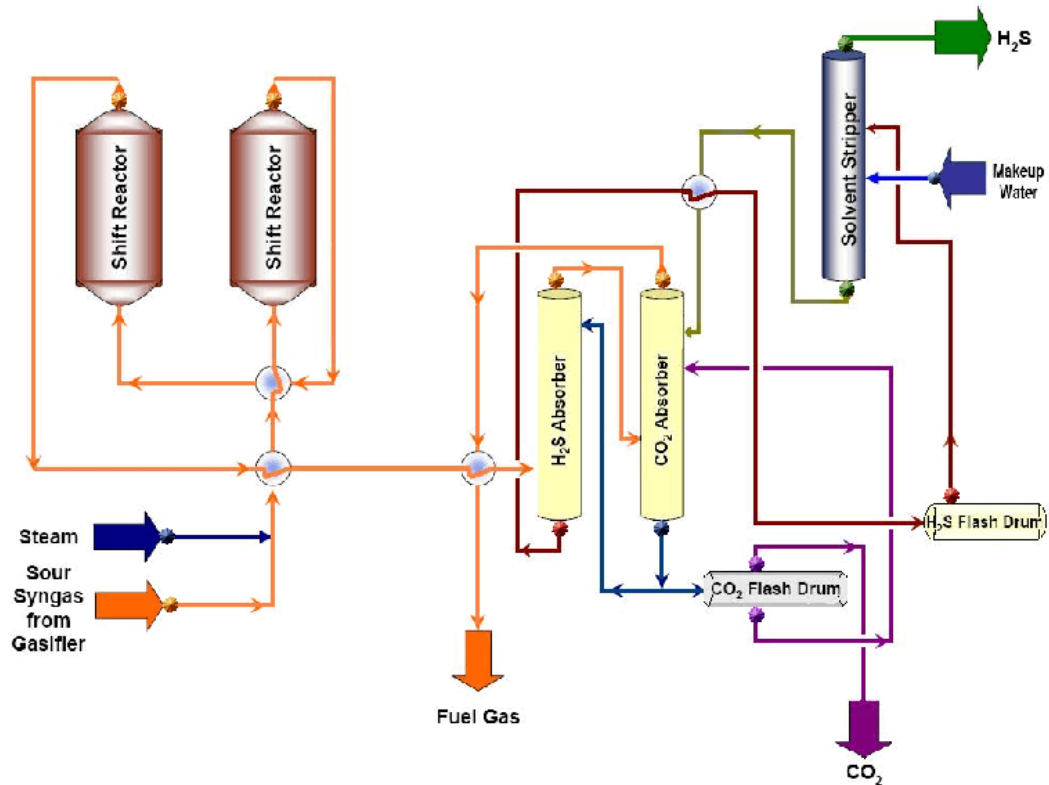
# EPIC Technology & the Environment - Carbon

EPIC believes that a staged approach to CO<sub>2</sub> reduction is more practical than a mad rush to complete CO<sub>2</sub> removal and sequestration. There are well proven methods to convert CO to H<sub>2</sub>, with the subsequent removal of the resulting CO<sub>2</sub> for use or sequestration (typical commercial process shown at right).

EPIC's solution is a simple and economical shift reaction to reduce the CO<sub>2</sub> emitted to equal natural gas.

The EPIC system may be one of the only viable options for many small and medium-sized natural gas fueled facilities to continue to operate in a carbon-constrained environment.

The EPIC carbon capture system is available now!



# Summary

- **EPIC's Clean Coal Gasification is a flexible and versatile technology with potential to produce a wide variety of single or multiple products, including electric power, steam, chemicals, fertilizers, ultra clean fuels, and/or hydrogen.**
- **Gasification provides a feasible bridge to a hydrogen economy based on abundant coal reserves. Refineries, as some of the largest users of hydrogen, could benefit from hydrogen produced by gasification of coal and lignite.**
- **Products used in everyday life are currently made using coal gasification, including such items as electric power, photographic film, toothbrush and screwdriver handles, mending tape, pain relievers, artificial sweeteners, automotive coatings, and pharmaceuticals.**
- **The EPIC system has lower capital costs, greater reliability, and less complex operation than large-scale gasification technologies under consideration for electricity generation, and can produce syngas at a lower cost per Btu for small and medium sized users. EPIC's target market includes more than 2,000 cogeneration and industrial process plants.**



# For Further Information

## CONTACT INFORMATION

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