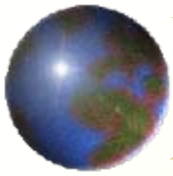


포럼에 대한 논의의 기초와 논제



Primenergy & Alternative, Renewable Energy Market

● The Broad Market of Renewable Energy

- Wind, Solar or Biomass

- Regulatory Driven

 - Deregulation

 - Environmental

 - Restrictions on Land Application

 - Reduction in Carbon Dioxide from Fossil Fuel

- Economically Driven by Energy Pricing

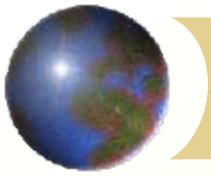
● Biomass

- Definition

 - Any plant derived organic matter available on a renewable basis, including dedicated energy crops and trees, agricultural food and feed crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, animal wastes, municipal wastes, and other waste materials

- Abundance and Price

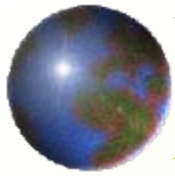




Advantages of Biomass Gasification



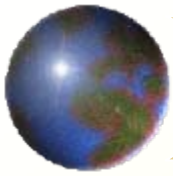
- Biomass Energy Conversion via Gasification
 - Intermediate Synthesis Gas Production
 - Cleansing & Subsequent Processing
- Controlled Air Gasification Eliminates
 - Fuel Slagging
 - Conversion of Silica in the Fuel to Crystalline Form
 - Heavy Particulate Loading in the Synthesis Gas
 - Lower Temperature Operation Vaporizes Less Pollutants
- Gasification Produces a Synthesis Gas
 - Gases Can Be Intermediately Cleaned
 - Gases Can Be Burned in Stages for Proactive Pollution Control
- Recognized by the US Department of Energy and Environmental Organizations as *Superior Combustion Technology*



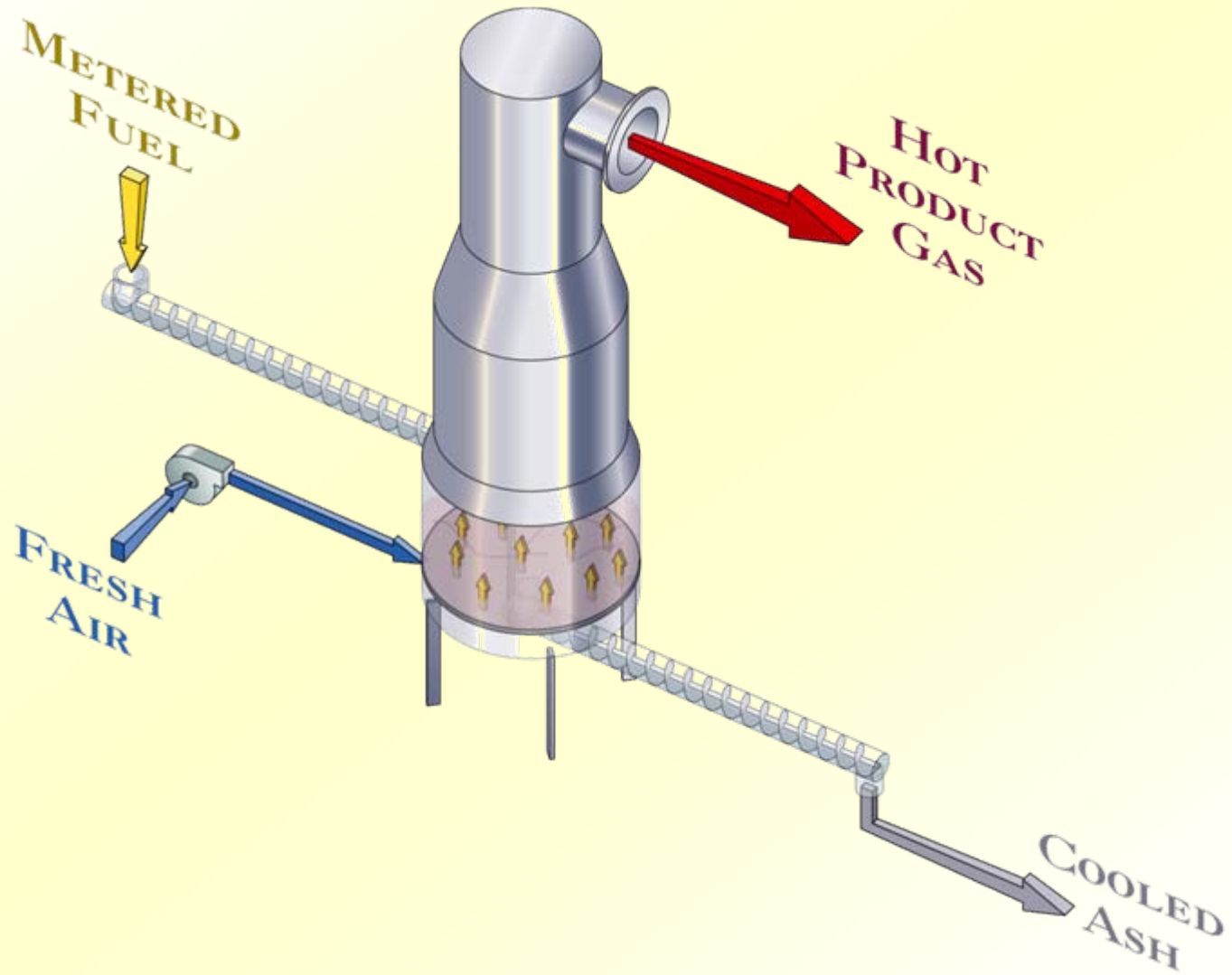
Advantages of Proven Gasification Technology

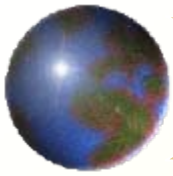


- Scalability & Energy Output Flexibility
 - Commercial Operations from Three to over Twenty Tons per Hour
 - Energy Outputs of Steam, Heat Electricity & Combinations
- Experience in the Design of Power Generation
 - Stuttgart 12.8 MWe Rice Hull Fueled Steam Cycle
 - Rossano 4.5 MWe Olive Waste Fueled I/C Engine Generation
- Commercial Scale Demonstration Facility in Tulsa
 - Demonstration of Client's Biomass Feed
 - Existing Fuels or New Fuels
 - Third Party Verification of Testing
- Proven Fuel Flexibility
 - Twenty + Biomass Fuels Successfully Demonstrated
 - Five Different Commercial Fuels



Gasification Technology

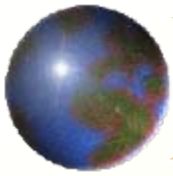




Primenergy's Major Milestones

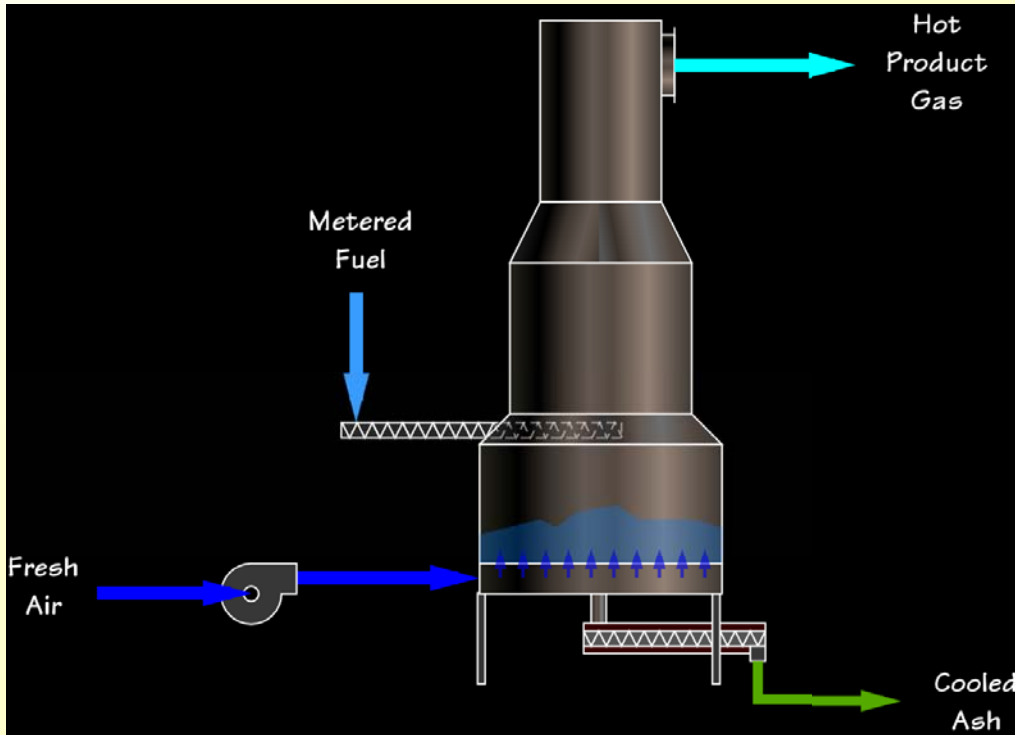


- ⊕ Test Facility Commissioned 1996
- Over 20 Different Types of Biomass Tested
- ⊕ Privately Owned and Funded
 - Part of the Energy Process Technologies, Inc. Group of Companies
- Primenergy's Gas Processing Improvements
 - ⊕ **S³** - Dry Scrubbing with High Temperature Filters for "Dirty" Feed Materials
 - ⊕ **PARS™** - Wet Scrubbing and Gas Conditioning for Engine or Turbine Fuels (patented)

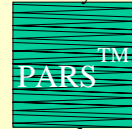


Flexibility in Fuel Input and Energy Output

Sized Waste Product is fed into a thermally insulated gasifier. The organic waste reacts at high temperature in an oxygen starved atmosphere to form a synthetic hydrocarbon gas. The reaction takes place without combustion, and produces no harmful emissions.



The Gas can be Cooled and Filtered Using the PARS System

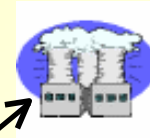


The Cooled gas can be burned cleanly in a generator or gas turbine



The Resulting Electricity can Power a Factory or be Sold back onto the Grid

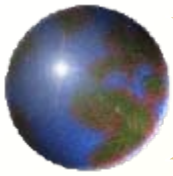
The S³™ System allows the gas to be filtered hot and cleanly combusted immediately



The Resulting Heat Can Be Used to Produce Steam and Process Heat



Or it can be used to turn a turbine to produce electricity



Commercial Projects

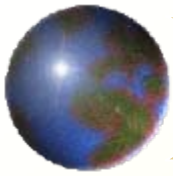
❑ Rice Husks To Energy Plants

- Stuttgart, AR - Combined Power (12.8 MW) & Steam
- Jonesboro, AR - Combined Steam & Heat

❑ Olive Waste (Sanza)

- Cosenza, Italy – Scrubbed Gas for Internal Combustion Engines, 4.5 Megawatts

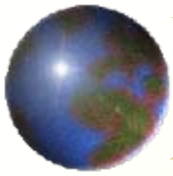




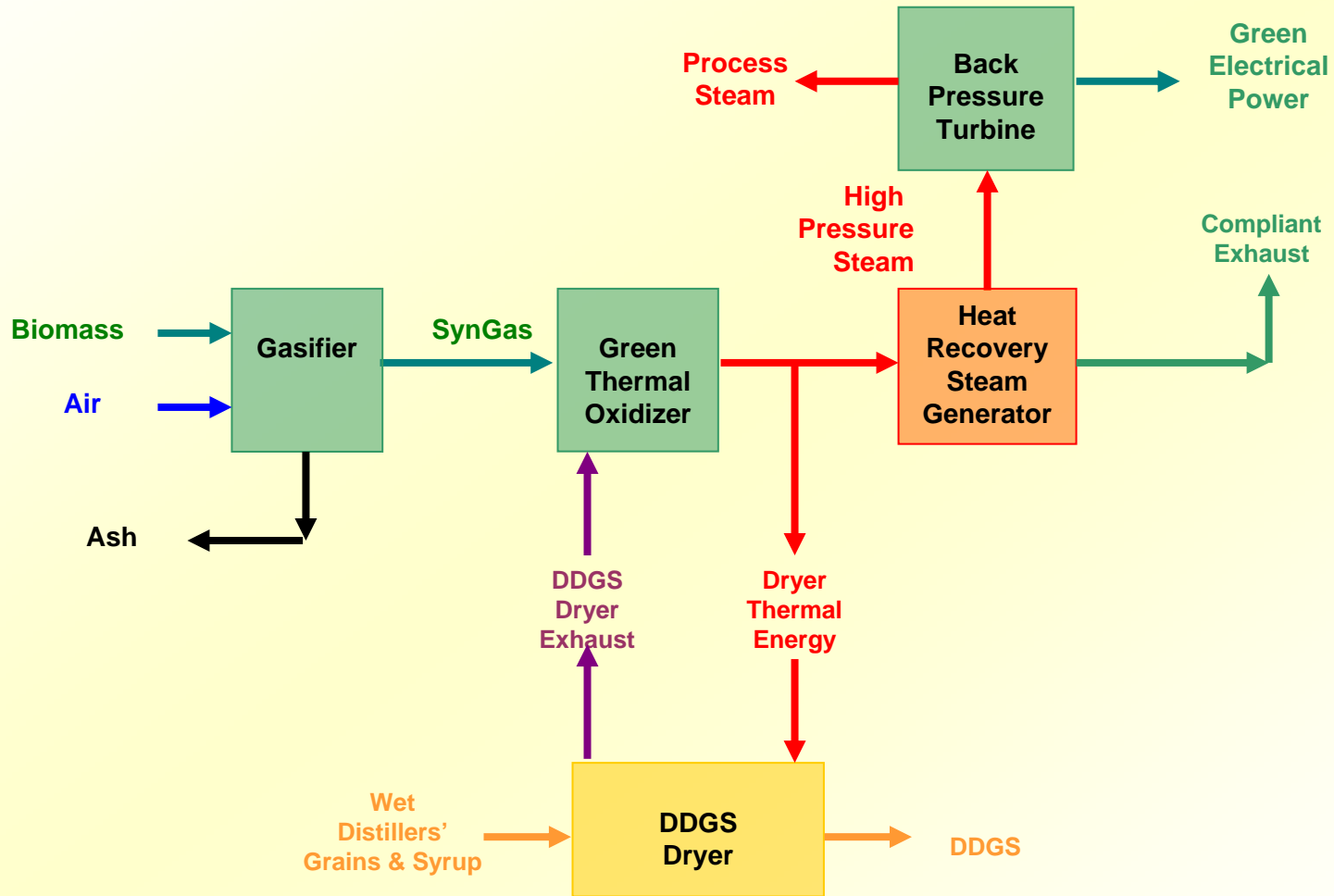
Commercial Projects

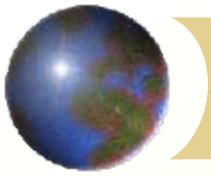
- ❑ Carpet Waste to Energy
 - Dalton, GA - Steam Output
- ❑ Sewage Sludge Destruction
 - Philadelphia, PA - 10 Wet Tons per Hour
- ❑ Wood Fueled Ethanol Plant
 - Little Falls, Minnesota - Combined Heat, Steam and Power





CMEC Block Flow Diagram

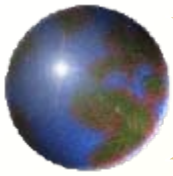




Competitive Advantages



- Scalability
 - Operating Systems from 24 to over 500 tons per day
- Proven Fuel & Energy Output Flexibility
 - Over 25 Different Solid Fuels Tested
 - Heat, Steam, Power & Combinations
- Biomass Energy is Dispatchable
- Commercial Scale Demonstration Facility
- Recognition by U.S. Department of Energy, National Energy Technology Laboratory, Sandia National Labs
- Single Source, Turn-key Capability Through Energy Process Technologies, Inc. (EPTI) Sister Companies
- All Installed Systems are Operating



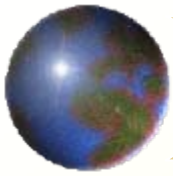
Primenergy's Products & Services



HSI



- Process Engineering Design
- Project Management
 - Detailed Equipment Design
- Environmental Permitting
- Process Equipment Manufacturing
Though HSI, L.L.C.
- Equipment Installation Through MFSI
and Other Specialized Contractors
- Operator Training and Equipment
Commissioning
- Project Finance
 - Own Operate, or Project Financing



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