



Licensing Cellulosic Biofuel Technology Today

*Gasification Technologies Conference*

*Coskata's Syngas to biofuels & Chemicals Platform*

Ralph Corley

# Coskata vision for a synthesis gas platform technology



## Coskata Vision:

To be the global leader in the **synthesis gas-to-biofuels and chemicals platform**, beginning with cellulosic ethanol

We will achieve this through technology development, licensing as well as owning and operating facilities, and providing onsite products and services

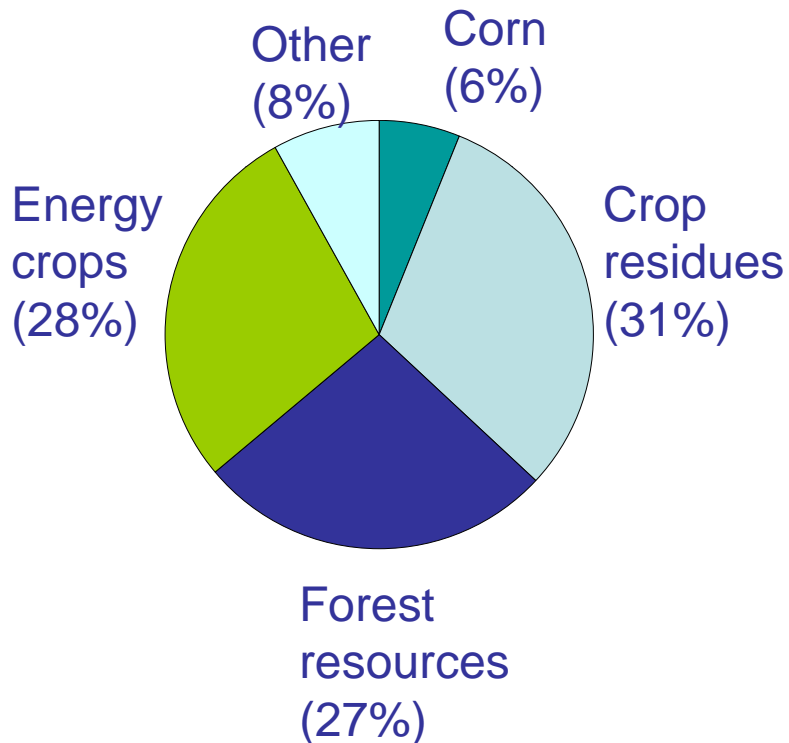


# A “Feedstock Flexible” process will help the industry to rapidly grow



## Projected biomass sources

100%= 1.3 billion dry tons



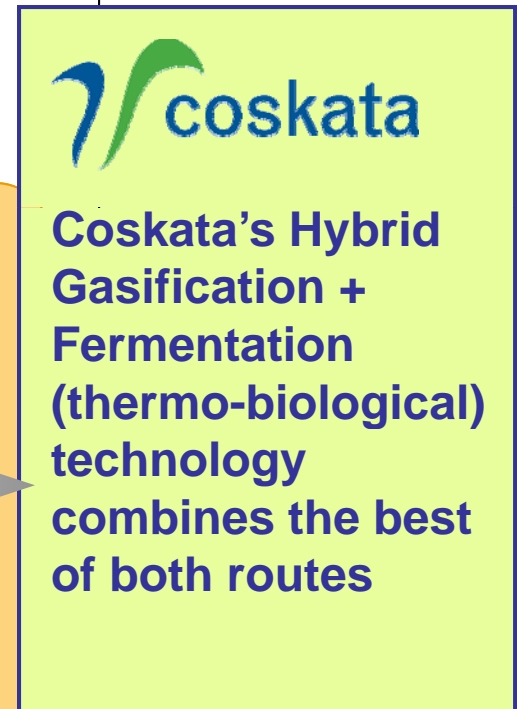
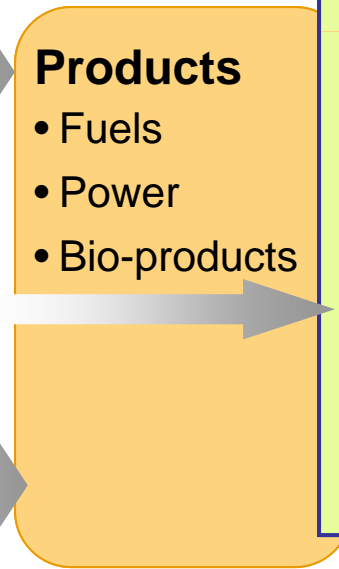
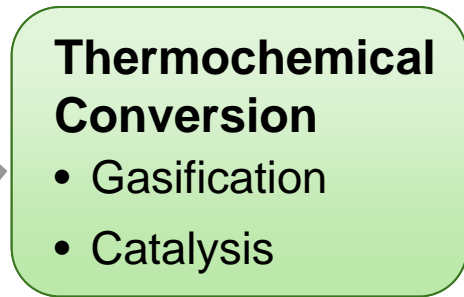
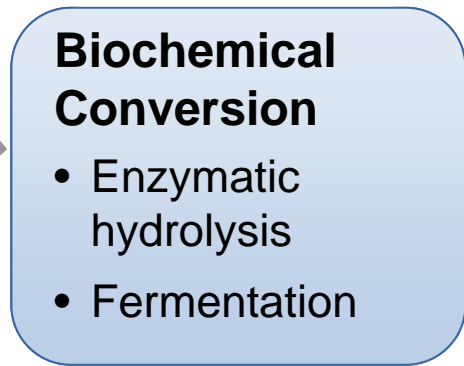
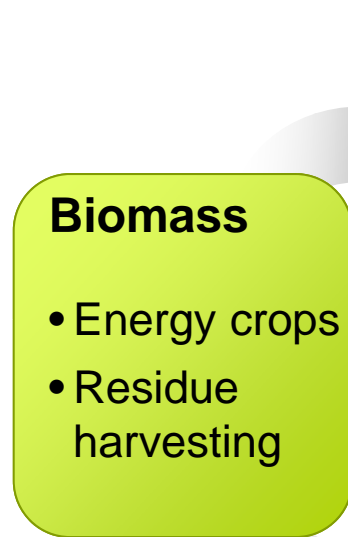
## Cellulosic ethanol:

- READY TODAY
- Able to be made from any carbon source
- Billion ton report estimates over 1/3<sup>rd</sup> of gasoline can be replaced
- Use of locally grown resources enhances energy security

# Flex Ethanol will involve several technologies



DOE is targeting 2 major pathways for cellulosic biofuels



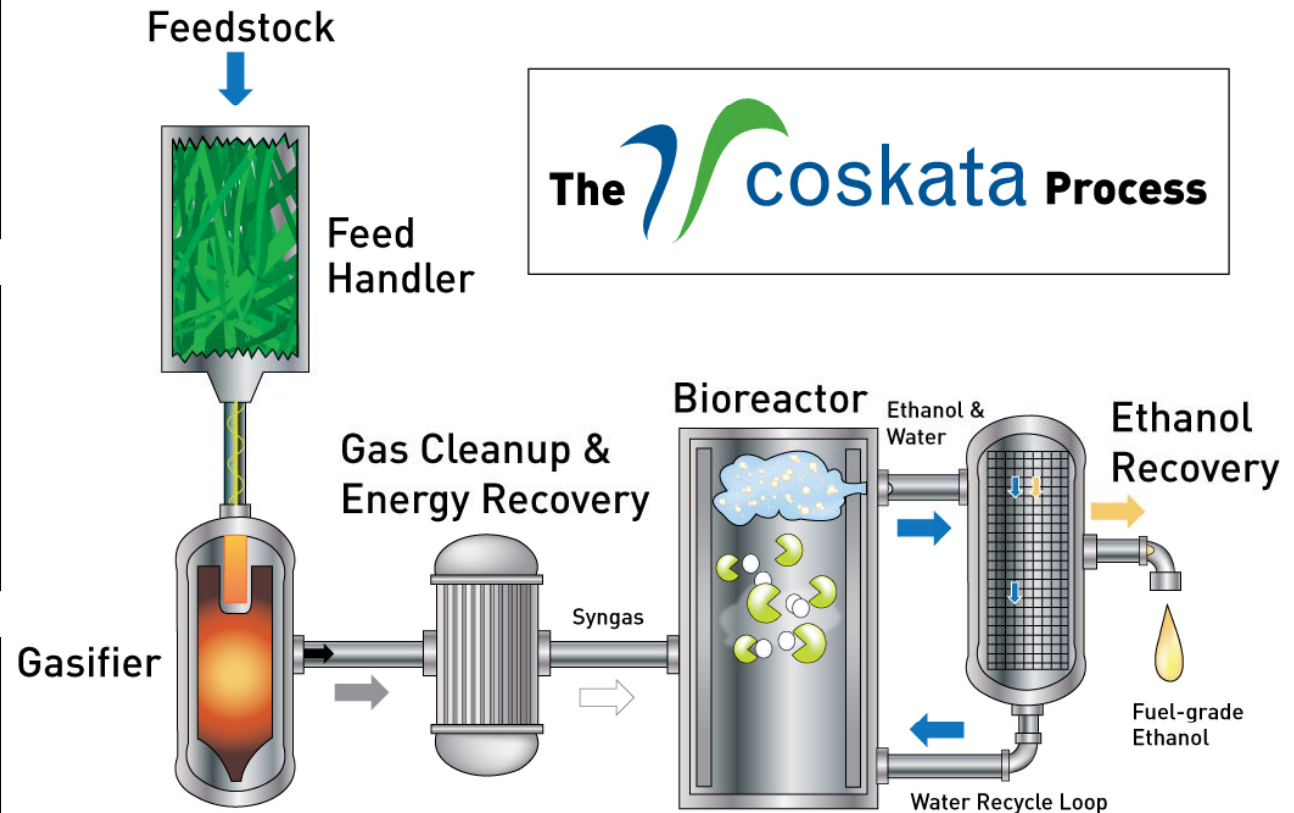
# Coskata is building facilities and licensing technology



Feedstock and geographic flexibility with gasification

Highest proven conversion efficiency of:  
1 ton = ~100 gal.

Cost competitive with gasoline at oil prices today





# Gasification is a critical element of plant design

	Plasma	Direct	Indirect
<b>Design elements</b>	<ul style="list-style-type: none"><li>• Oxygen blown</li><li>• Bed material</li></ul>	<ul style="list-style-type: none"><li>• Oxygen blown</li><li>• Catalytic reformer for tars</li></ul>	<ul style="list-style-type: none"><li>• Circulating fluidized bed</li><li>• Tar Reforming</li></ul>
<b>Key Features</b>	<ul style="list-style-type: none"><li>• Works well with high ash and low melting ash feedstocks</li><li>• No tars</li><li>• Can make higher CO:H<sub>2</sub> ratio gas</li><li>• Has operating commercial units</li></ul>	<ul style="list-style-type: none"><li>• Works well with low ash feedstock</li><li>• Lower operating costs</li><li>• Full size plant operational for ~ 2yrs (oxygen blown tests at GTI)</li></ul>	<ul style="list-style-type: none"><li>• Works well with all feedstocks, including low melting ash</li><li>• Lower operating costs</li><li>• Simple operation</li></ul>



# Successful technology roll-out plan



Currently Operating

## Horizon (2008)

*Integrated Processing*  
Warrenville, IL

- Integrated processing system with methane thermal reformer, multiple bioreactor designs, and distillation



Currently Operating

## Lighthouse (2009)

*Semi-Commercial*  
Madison, Pennsylvania

- Minimum engineering scale (linear scale-up to commercial production)
- Front-end biomass gasifier
- Will test multiple commercial-scale bioreactor and separations designs



Under Development

## Flagship (2012)

*Commercial Production*  
Location TBA

- 50-60 MM Gallons / yr
- Multiple gasifiers that process ~1700 dry tons/day of biomass
- Cost competitive with gasoline

# Coskata is ready for full-scale facilities today



Coskata:

- **Successfully scaled** its cellulosic ethanol technology
- Uses **half the water\*** compared to a gallon of gasoline
- Completed its **commercial design** for a wood biomass facility
- Has feedstock flexibility and a licensing model that enables **rapid deployment**



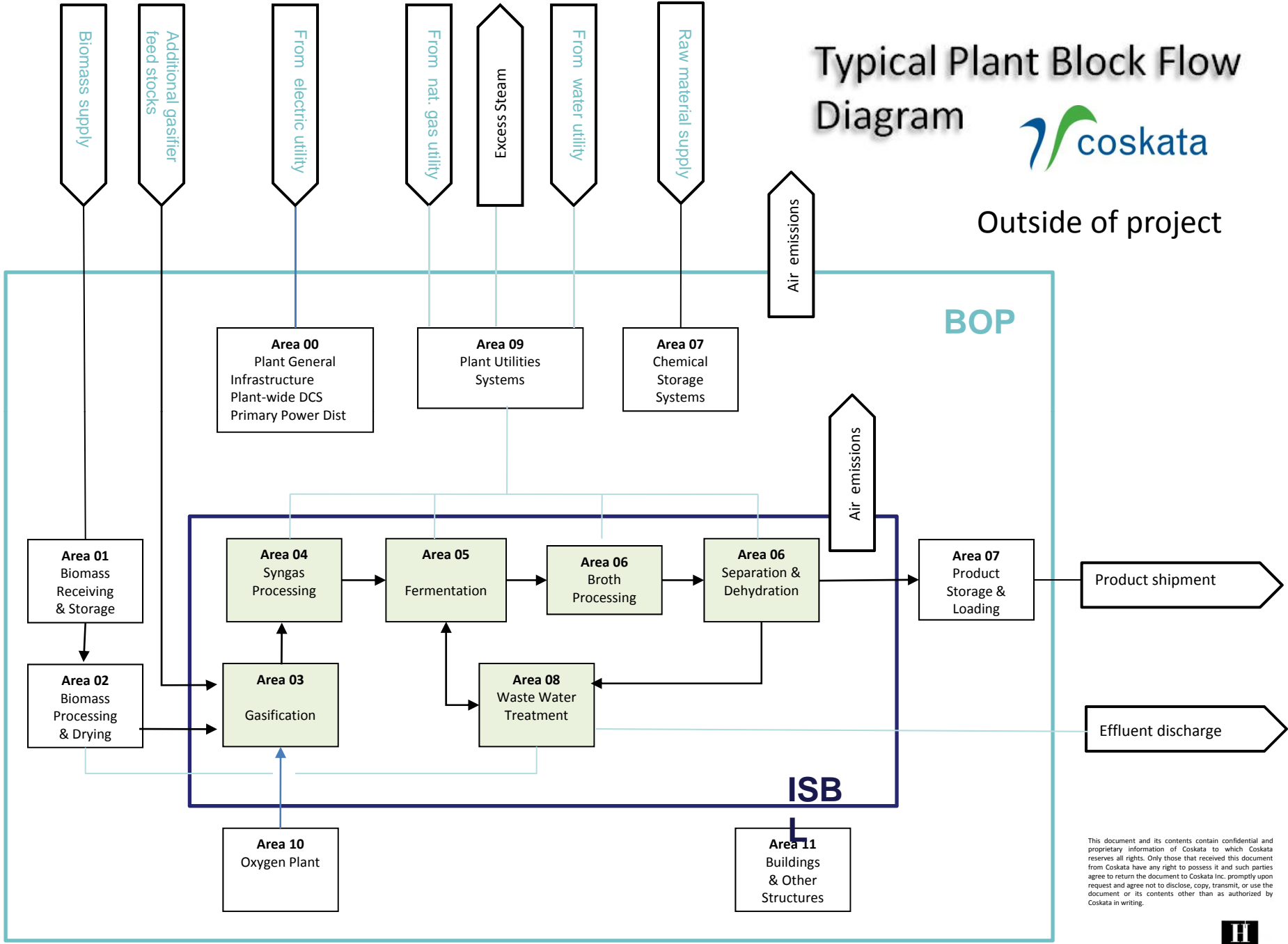
**IT'S TIME TO START BUILDING!**

\*Using 50% moisture incoming green wood

# Typical Plant Block Flow Diagram



Outside of project



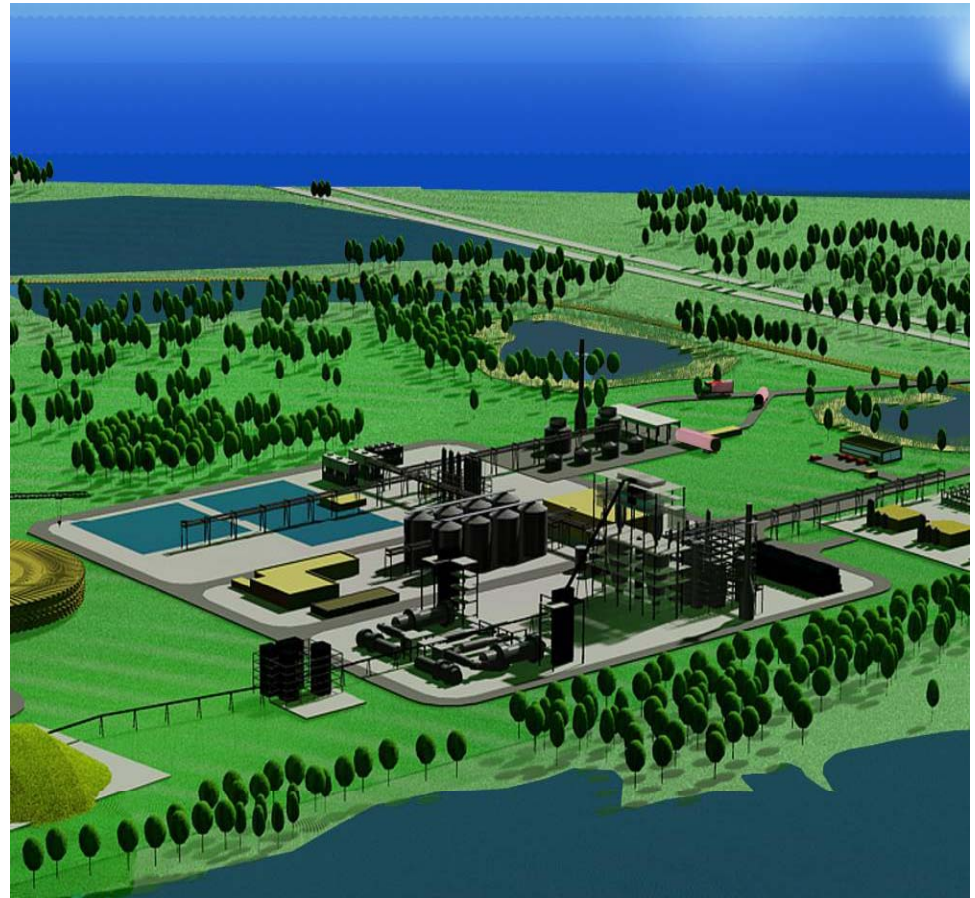
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# Flagship is Coskata's first commercial facility



## “Project Flagship” will:

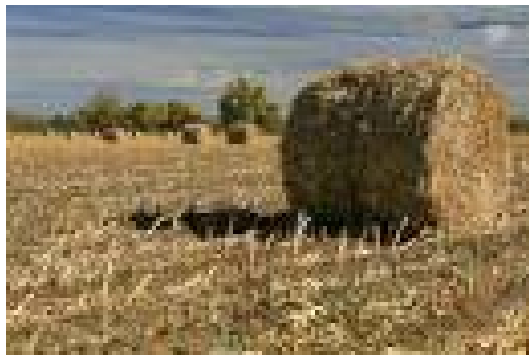
- Produce 55 million gallons of fuel-grade ethanol in the Southeast US
- Utilize 1.0-1.2 million green tons of wood biomass\*
- Create over 700 direct and indirect green jobs
- Represent the world's first commercially viable, feedstock flexible ethanol plant
- Enable acceleration of licensed facilities



Cutout of Coskata's “Flagship” commercial plant design

\* Green tons refer to total tonnage of biomass including moisture. For wood biomass moisture typically makes up ~50% of the total mass.

# Co-located facilities may have substantial capital and operating advantages

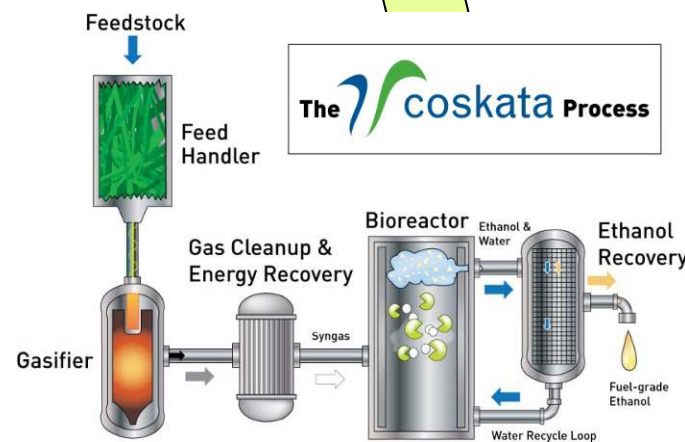


## Raw Materials Procurement

- Corn stover
- Corn fiber
- Wood biomass
- Municipal waste



Excess steam can be shared in existing facility



## Shared Infrastructure

- Wastewater Handling & Treatment
- Chemicals Storage
- Utilities
- Road, Rail, etc.



# Coskata technology vetted by strong partners

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**TOTAL**



khosla ventures

The Blackstone Group®



ADVANCED TECHNOLOGY  
VENTURES



COGHILL  
CAPITAL MANAGEMENT



# Coskata's technology – delivering solutions today



## Environmental Sustainability

- Up to 96% reduction in greenhouse gasses vs gasoline
- Efficient process has low water use per gallon of ethanol

## Energy Security

- A geographic and feedstock flexible process provides security
- Scalability allows significant early contribution to both cellulosic and advanced biofuel RFS

## Economic Growth

- Affordable process can be cost competitive with gasoline, unsubsidized
- Helps create 1,500,000 “green jobs” at 90 billion gallons

## Ready Today

- No front-end enzymes or other pre-treatment
- Only fuel grade ethanol (no mixed alcohol streams)
- One of the highest ethanol yields in the industry
- Strong team and financial backers for execution
- Semi-commercial facility outside Pittsburgh
- Licensing of Coskata technology started in 2010



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