



BIOGENIC REAGENTS

MICHIGAN RENEWABLE CARBON

APRIL 2015

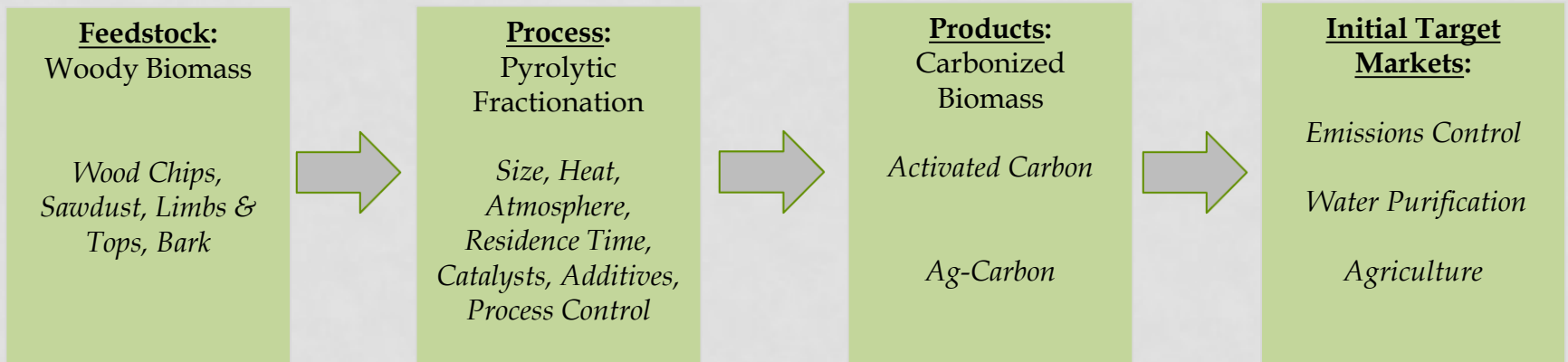
BIOGENIC REAGENTS

- Biogenic Reagents is a **developer and producer of high value carbon products from renewable woody biomass**
- Headquarters and laboratories located in Minneapolis, Minnesota with flagship commercial production facility--**Michigan Renewable Carbon**--located in Gwinn, Michigan
- Company has developed and commercialized a **low-cost platform technology** to make carbon products such as **activated carbon** for use in purification of air, water, food and pharmaceuticals, and **agricultural carbon** to improve crop production
- Products **improve the environment and people's lives**



Mission: Create carbon products that cost less, perform better, and reduce environmental impacts

BUSINESS OVERVIEW



Conversion of Wood to High Value Carbon Products



PROCESS AND PRODUCT DEVELOPMENT

- **Assembled expert team** to develop, scale, and deploy state-of-the-art technology **to reinvent carbon production and products**
- Process and product **development teams included** leading global clean-tech experts from **Cargill, POET and Interpol** and leading research universities such as **Stanford University**
- **Developed safe and least-cost carbon production platform** with significantly **lower capital and operating costs** than competitors and **highest performing products in the world**



Many patents issued and pending for innovative processes, equipment, and products



- **\$50 million commercial production facility located in Gwinn is largest advanced bio-carbon production facility in North America**
- **Deploys patented thermal and gas treatment of wood with proprietary monitoring technologies to create high value carbon products**
- **Producing and shipping commercial products on global basis**
- **Perfect safety and environmental record**
- **Added 31 new jobs in 2014**





- Uses **100% renewable wood and wood co-product feedstock** for products and primary process energy
- **100% locally sourced**
- Feedstock includes **sawdust, shavings, bark, chips, tops/limbs**
- Use **both hardwoods and softwoods**
- Create **feedstock blends** at different recipes and **then carbonize and activate with patented mixture of inert and oxidizing gases** to achieve product specifications





- **Proprietary least-cost carbon production platform** with significantly **lower capital and operating costs** than competitors
- Consolidated process design requires **less capital, and reduces energy, labor, and maintenance costs**
- **Waste-water free process** reduces costs competitors incur to manage and dispose of wastewater
- **Bio-gas-fired reactor design, and heat and energy recovery systems** reduce energy costs compared to competitors
- Biomass system avoids **capital and operating costs competitors incur for controlling NO_x and SO₂ emissions from coal**



Demonstrating least-cost and lowest environmental impact carbon production



SUPERIOR ENVIRONMENTAL AND SUSTAINABILITY PROFILE

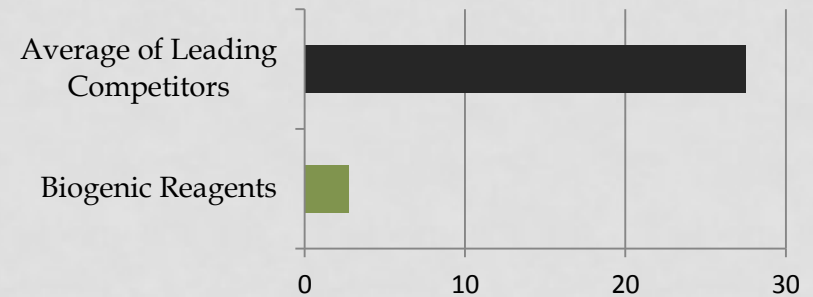


- **Lowest life-cycle environmental footprint** for production of activated carbon **in the world**
- Uses **renewable feedstock** and **renewable energy**
- Air emissions are **>90% lower** than competitors
- **Wastewater 100% lower**--BR's process does not produce any wastewater
- **Better for environment and competitive advantage**



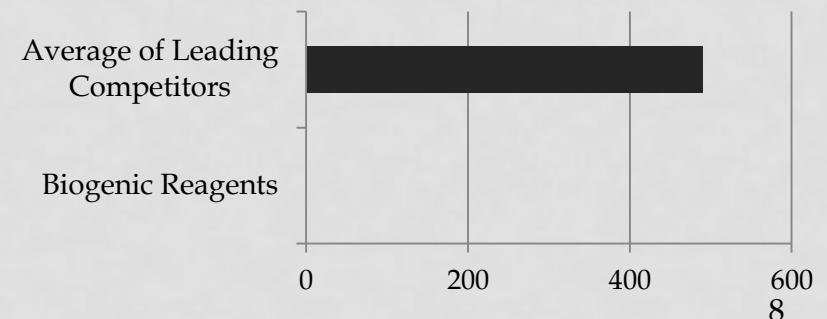
>90% Lower Air Emissions

Air Emissions Per ton of Activated Carbon Produced (SO_2 , NO_x , CO , PM_{10}) (lbs)



100% Less Wastewater

Wastewater Produced Per Year (millions of gallons)

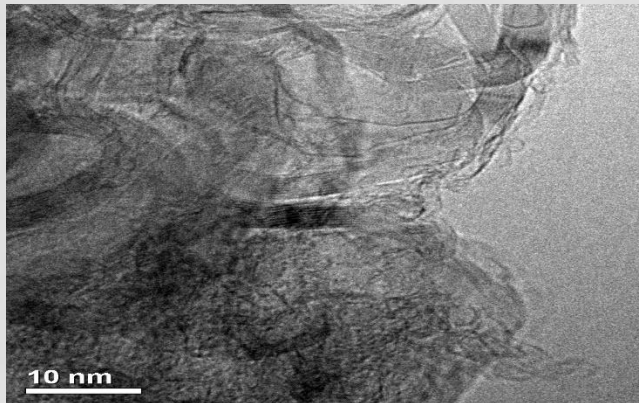


CARBON PERFORMANCE OPTIMIZATION

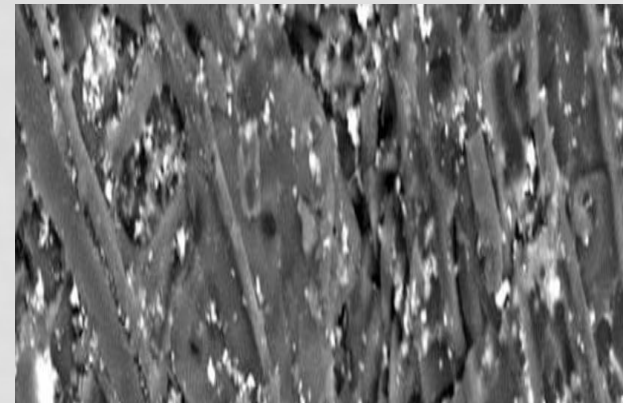
- Feedstock selection and process technologies result in higher carbon content and greater purity than coal-based carbons
- Patented optimization of key product characteristics leads to industry-leading performance:
 - Adsorptive properties and surface area
 - Pore sizing/ volumes/ ratios
 - Electrosorptive properties
 - Inclusion of additives that modify performance
 - Product sizing

Comparative Analyses		
	BR Activated Carbon	Coal-Based Activated Carbon
Iodine Number	685	540
Moisture %	3.11	2.69
Ash %	1.82	34.7
VM %	3.53	7.17
Fixed Carbon %	91.5	55.4
Sulfur %	<0.05	1.04
Hydrogen %	0.59	0.46
Nitrogen %	0.39	0.63
Oxygen %	4.84	2.66

Higher Purity and Carbon Content



Enhanced graphene-carbon compound



Additive distribution under SEM

Biogenic Reagents produces high-performing activated carbon products for water purification, emissions control, and agricultural applications

Water Purification



USE: Used in beds and filters to remove contaminants from drinking and wastewater

PERFORMANCE: Outperforming competitors at removal of dozens of contaminants including odor, total organic compounds, geosmin, MIB, and atrazine

Emissions Control



USE: Injected into emissions or used in vessels to remove air pollutants and odors

PERFORMANCE: Outperforming competitors at removal of multiple air pollutants and demonstrated mercury reductions 15 times lower than EPA's new Mercury regulation

Agriculture



USE: Added as soil amendment to increase water and nutrient retention and improve crop yields

PERFORMANCE: Demonstrated to increase plant productivity and yield, improve soil water-holding capacity, and reduce nutrient leaching loss thereby reducing costs and runoff

ADOPTION, PERFORMANCE AND GROWTH

Price

Performance

Sustainability



Finished Activated Carbon Supersacks Staged for Shipment at Michigan Renewable Carbon



Biogenic Reagents Highlights Success of Recently Patented Product - Yahoo Finance
From Yahoo Finance: **New Bio-Carbon Adopted by More than 50 Municipalities Across North America in 2014**

- **BR holds key product patent for ultra-high performance activated carbon**
- Independent evaluations by universities, laboratories, and municipal and industrial customers demonstrate **BR's products outperform all competitors**
- **Growing sales based on price, performance and sustainability in water purification, emissions control, and agricultural carbon market segments**
- **Won dozens of supply contracts for 2015 (and beyond) and supplying major U.S. cities, utilities, industrials, and farms**
- **Fastest market share growth in the activated carbon industry**