

INNOVATION



Piedmont BioProducts, LLC

Piedmont BioProducts Summary



FIRM

- Renewal, clean energy start-up located in Gretna, VA
- Founder & advisors - nursery / industrial / energy distribution

PARTNERS

- Financed by the CIT and Tobacco Commission in 2007
- Revolutionary innovation strengthened via IALR and various professional collaborators

GREEN

- Flagships products are **Green** Crude and **Green** Coal...not ethanol
- 100% carbon-neutral pilot refinery coming online in early 2010

Leadership



- **Ken Moss** – Founder and CEO, BS Engineering from Old Dominion University
 - Strategic experience with Volvo Heavy Trucks
 - Process Engineer with The Goodyear Tire & Rubber
 - Founder/COO Windy Acres Nursery Inc.
- **Board of Advisors**
 - Equipment inventor
 - Feedstock producers
 - Community leaders
- **Technical Support Team** – IALR, Various Universities and Technical Organizations

Business Model



- Parent company arrangement with attached closed loop feedstock producer coop providing low cost perennial feedstocks to the refineries built in a transportable modular configuration.
- Net conversion of Bio Crude Oil is ranges from 120-140 gallons/dry ton of feedstock input and 15% excess char.
- Sold in place of Diesel fuel and propane at a lower cost per BTU than petroleum fuels while addressing cleaner burning carbon dioxide neutral fuels.
- Sold through normal distribution channels by qualified distributors

Strategic Advantages



- **Geographically desirable location** - strategic proximity to massive industrial boiler market in the Northeast US.
- **Grass roots business model** - partnership anchored with community coops where the farmers both grow feedstock crops and own a stake.
- **Smart feed stocks** - only use cellulosic sources that are perennial and free of spot market influences.
- **Better economics** - significantly lower energy cost than comparable petroleum products without the added advantage of tax credits, but nonetheless benefits from these credits.
- **Scalable refinery** – modular technology coupled with the locally-owned business model allows for region-wide proliferation.

Our success as the nation's future supplier of clean energy leverages the Commonwealth's agricultural heritage AND a strong tech tradition

Large, Underserved Market



- The diesel fuel market in the US is 56 billion gallons per year
- Of the total, 13.4 billion or 24% is used for heating purposes.*
- Piedmont will initially target the industrial boiler market with the 2010 rollout of **Green** Crude.

* Source - Northeast Regional Biomass Program - Assessment of Bio-oil as a Replacement for Heating Oil by James L. Easterly

Apples-to-Apples Comparison



PRODUCT	ENERGY CONTENT/GAL	COST/GAL	COST/100,000 BTUs
Green Crude	80,000-85,000	\$1.20	\$1.41 -1.50
Soy Bio-Diesel	113,000	\$3.25	\$2.88
Diesel Fuel	140,000	\$2.00	\$1.43
Propane	90,000	\$1.50	\$1.67
Ethanol	70,000	\$2.00	\$2.86

Economic Expansion Trajectory



<u>Round</u>	<u>Date</u>	<u>Amount</u>	<u>Use of Funds</u>
Pilot plant	4Q 2010	\$1.5 M	Equipment / Startup
Commercial Refinery	2011	\$10 M	<ul style="list-style-type: none">• Equipment• Land• Start-up Cost
Regional growth	open	open	Replicate model throughout the Commonwealth

Inexact Energy Substitutes



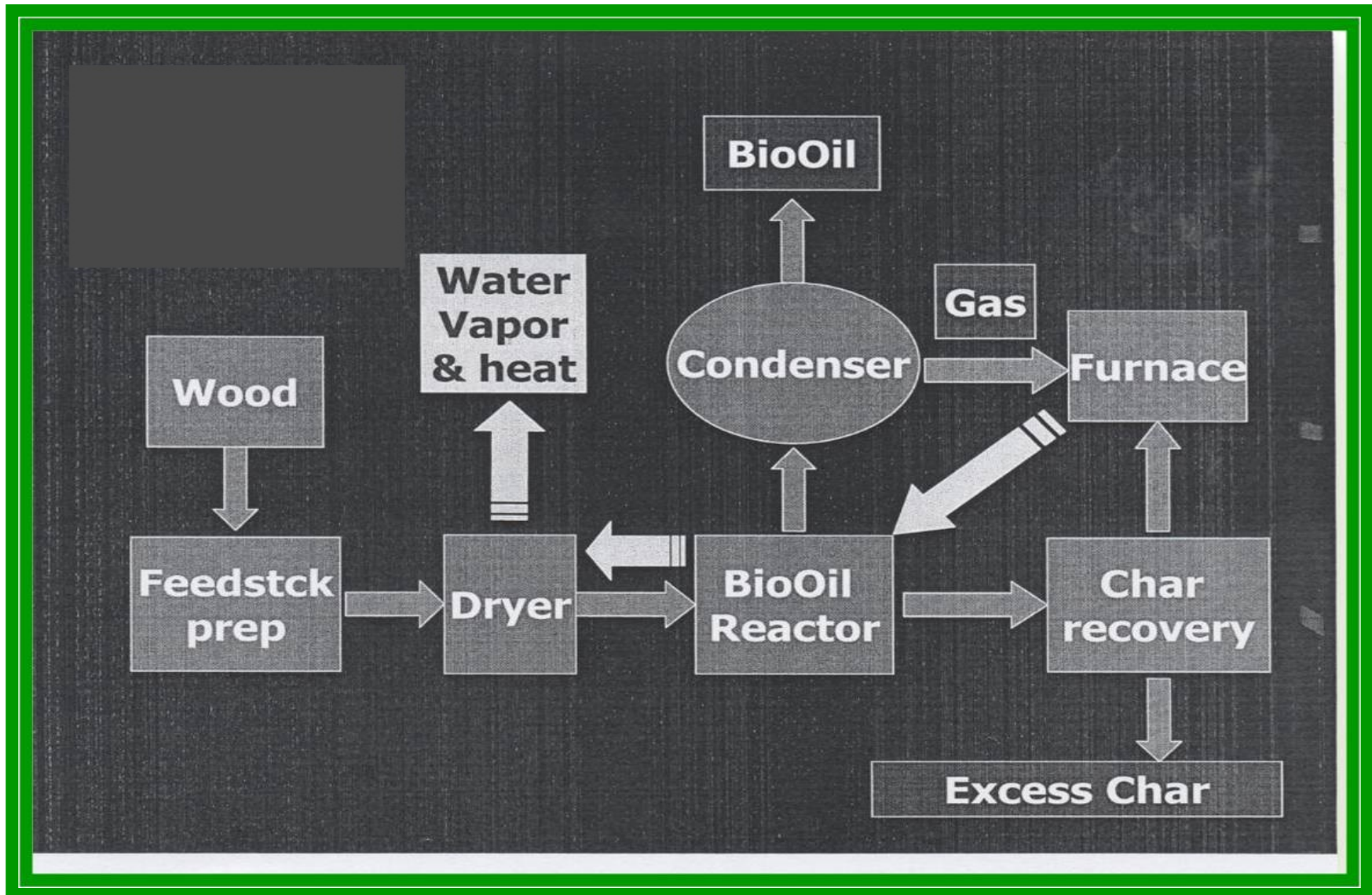
<u>Category</u>	<u>Examples</u>	<u>Piedmont BioProducts Response</u>
Crude Oil	Diesel Oil	Dependent on foreign supplies with high fluctuation in prices; carbon content.
Feed Grain Base	Ethanol	Annual feedstocks & competition for food supply limit capacity & create high costs.
Cellulose Fuels	Conoco Phillips venture	Midwest location ensures Piedmont's access advantage to the Northeast.
	Ensyn (Canada)	Using fast pyrolysis for food grade chemicals – conversion costs high.
	Dynamotive (Canada)	Similar customer bases but in large centralized plant in Canada – expensive. Not operating due to technical issue with fluidized bed design.

Pyrolysis Technology



- Converts biomass from solid to liquid
 - Flash Pyrolysis self-sustaining
 - Byproducts of the process used as fuel to make the conversion
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- Feedstock producer brings biomass (feedstock) to refinery:
 1. Biomass reduced in size
 2. Dried
 3. Burned in the absence of oxygen
 4. Condensed into a liquid
 5. Excess char recovered and sold as additional high value product

Green Refinery Technology



Closing Points To Remember



- Piedmont's proven team and partners, clean technology, and novel business model offer compelling strategic advantages to the region
- Systemic high demand for clean renewable low cost fuels can only persist
- Economic contribution of products such as **Green** Coal are not yet factored into the growth plan.

Visit Piedmont for an early preview of Virginia's green energy future.