Combining West Virginia’s Coal & Biomass Resources to Reduce Environmental Impacts & Penetrate New & More Profitable Markets

TransTech Energy Conference - November 16, 2012

Joseph J. James, President Agri-Tech West Virginia, LLC
Phone: (803) 462-0153
josephj james@bellsouth.net
Customer Pain!!!

Large Coal Users:
• On a global basis, large coal users (electric utilities) are being mandated to find cleaner and renewable fuels to co-fire with or replace coal, build new biomass power plants, costing $100’s of millions, or face stiff penalties and/or the loss of incentives.

Biomass Processers:
• Biomass processers are looking for biomass feedstock that is easier to convert, better and/or cheaper than alternatives.

West Virginia Coal Producers:
• Facing stiff competition from cheap natural gas and growing environmental pressures, coal producers need to reduce air and land impacts and penetrate new and profitable markets.
Agri-Tech West Virginia, LLC’s Solutions

Agri-Tech West Virginia, LLC (ATP-WV), an affiliate of Agri-Tech Producers, LLC (ATP), will use ATP’s innovative and cost-effective torrefaction process to sustainably convert West Virginia’s plant and wood biomass into a substance, which can be co-fired or blended with West Virginia coal, used as a feedstock from which to make a variety of bio-products, or used as a biochar to help remediate poor soils and promote plant and tree growth on West Virginia’s former mining sites.
The Market

• According to the IEA, annual world coal use is **6.2 billion tons**, of which 63% is used to produce electricity. Annually, the US and EU use about 2 billion and 1.2 billion tons each, with increasing rules to use cleaner and renewable fuels.

• The world's pellet industry supplies a **mediocre** alternative, but has been growing at a 20% rate. In 2020 pellet demand will increase from 6 million to over 40 million tons.

• Torrefied biomass can easily displace 25% of the coal being used and be used in 50% of pellets produced.

• Because of EU regulations and incentives, EU utilities are now willing to pay approximately **$210/ton** for torrefied pellets, versus the **$160/ton** they pay for standard pellets.

• The market for torrefied feedstock used in making bio-based products is being determined, but expected to offer much **higher profits** than utility fuels.
ATP’s Technology

ATP’s now patented torrefaction technology, which it has exclusively licensed from NC State University, involves heating biomass in a low-oxygen environment to:

1. Remove water, which reduces logistics costs and improves combustion performance,
2. Greatly increase energy (10k-13k BTU’s) density;
3. Make a very brittle and easily ground solid fuel, suitable for pulverized coal power plants;
4. Make water resistant pellets and briquettes;
5. And, to make a better feedstock for more cost effectively producing a host of bio-products.
6. ATP’s auto-thermal units require no external energy for process heat, which reduces processing costs and life-cycle impacts.
Competition & Competitive Advantages

ATP's biggest competitors are EU companies, like France’s Thermya (www.thermya.com) and the Dutch Topell BV (www.topell.nl), have developed units, but

1. Their processes are much more complex and more expensive than ATP's,

2. The competitors’ units require a costly, extra step to pre-dry biomass inputs to 20% or less moisture,

3. Whereas, ATP's units can process 40% moist biomass in a single step, without pre-drying.

4. ATP-SC’s auto-thermal units make their own process heat, by capturing and using the gases emitted by the biomass being processed.
Schematic of ATP’s Torrefaction Machine

- Green Biomass
- Hopper with Airlock
- Hot Exhaust
- Steam
- Gas Collection
- VOC H₂ CO
- Mechanical Movement of Biomass
- Combustion Gasses Heating Biomass
- Torrified Biomass
NC State’s 3-Year Old Prototype Torrefaction Unit

Agri-Tech Producers, LLC
TORRE-TECH® 5.0

Specifications

System Dimensions:  IP (FT)  SI (M)

<table>
<thead>
<tr>
<th></th>
<th>IP (FT)</th>
<th>SI (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (L)</td>
<td>80</td>
<td>24.0</td>
</tr>
<tr>
<td>Width (W)</td>
<td>32</td>
<td>9.8</td>
</tr>
<tr>
<td>Height (H)</td>
<td>30</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Agri-Tech Producers, LLC
Clarifications & Updates

• **Customer Engagement (**Money**): Contacted ATP: EPRI*, US & EU utilities, Consol Coal Mining Company, US Steel* and a Federal Utility, as well.

• **Incumbent’s Power:** EPRI, US Steel, Etc.

• **Product Dev. Risk Mitigations:** 3-Yr Old Prototype, SC Pilot Plant in 2013

• **IP:** US Patent **Issued** – 11/6/12
Clarifications & Updates

- **Non-IP Barriers**: Coal Bias/Cheap NG!!!
- **Scaling Plans**: Imbed in Existing Coal & Wood Processing Operations
- **Management Team**: WV Partners are helping to recruit
- **Advisors**: WVA, WVU, WVCC, EPRI, KZC
- **Data Quality**: DOE, USDA, IEA, PFI, EPRI, Etc.
Combining West Virginia’s Coal & Biomass Resources to Reduce Environmental Impacts & Penetrate New Markets

TransTech Energy Conference - November 16, 2012

Joseph J. James, President Agri-Tech West Virginia, LLC
Phone: (803) 462-0153
josephjjames@bellsouth.net