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

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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:

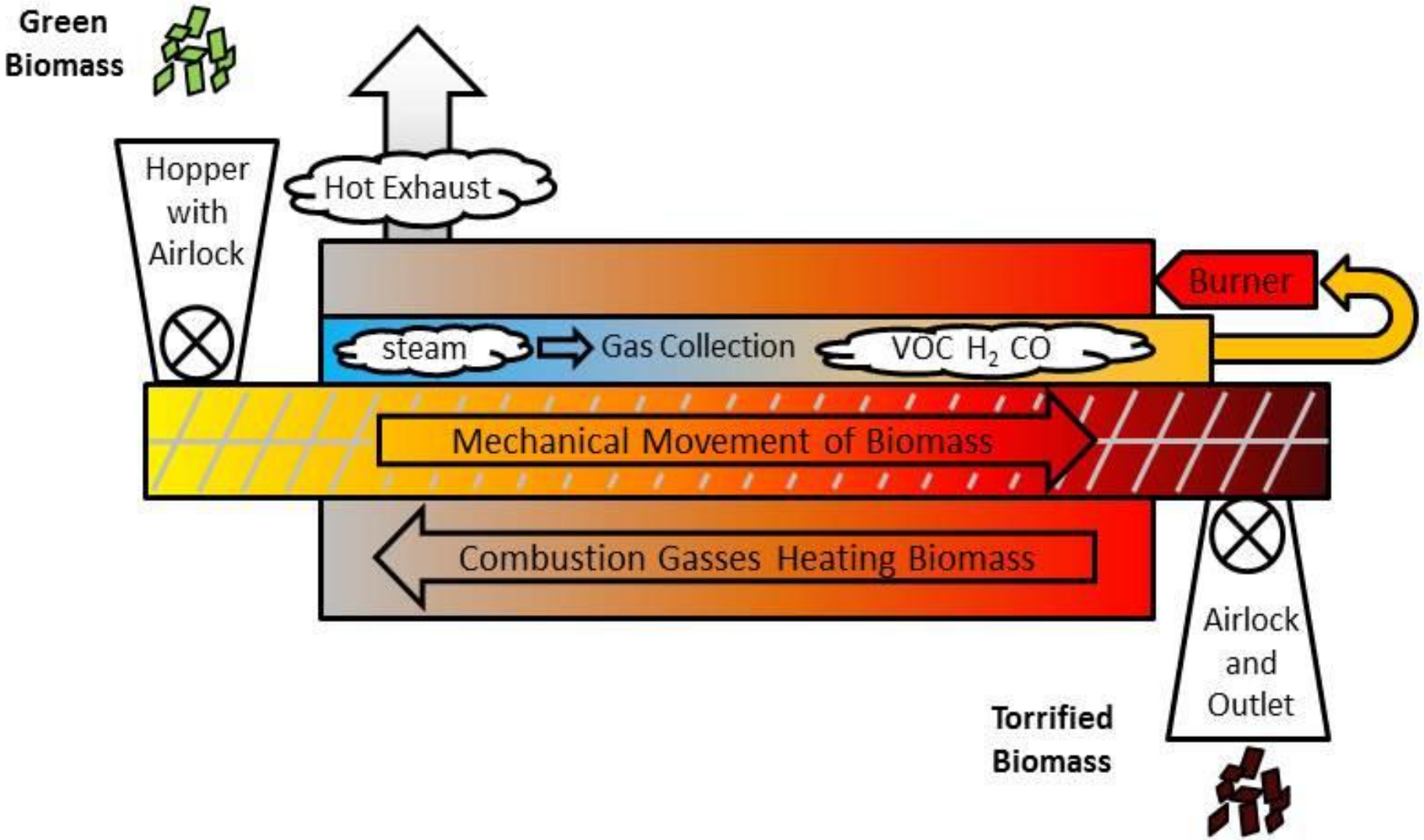
1. Remove water, which **reduces logistics costs** and improves **combustion performance**,
2. **Greatly** increase **energy** (**10k-13k BTU's**) **density**;
3. Make a **very brittle and easily ground solid fuel**, suitable for pulverized coal power plants;
4. Make **water resistant** pellets and briquettes;
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.

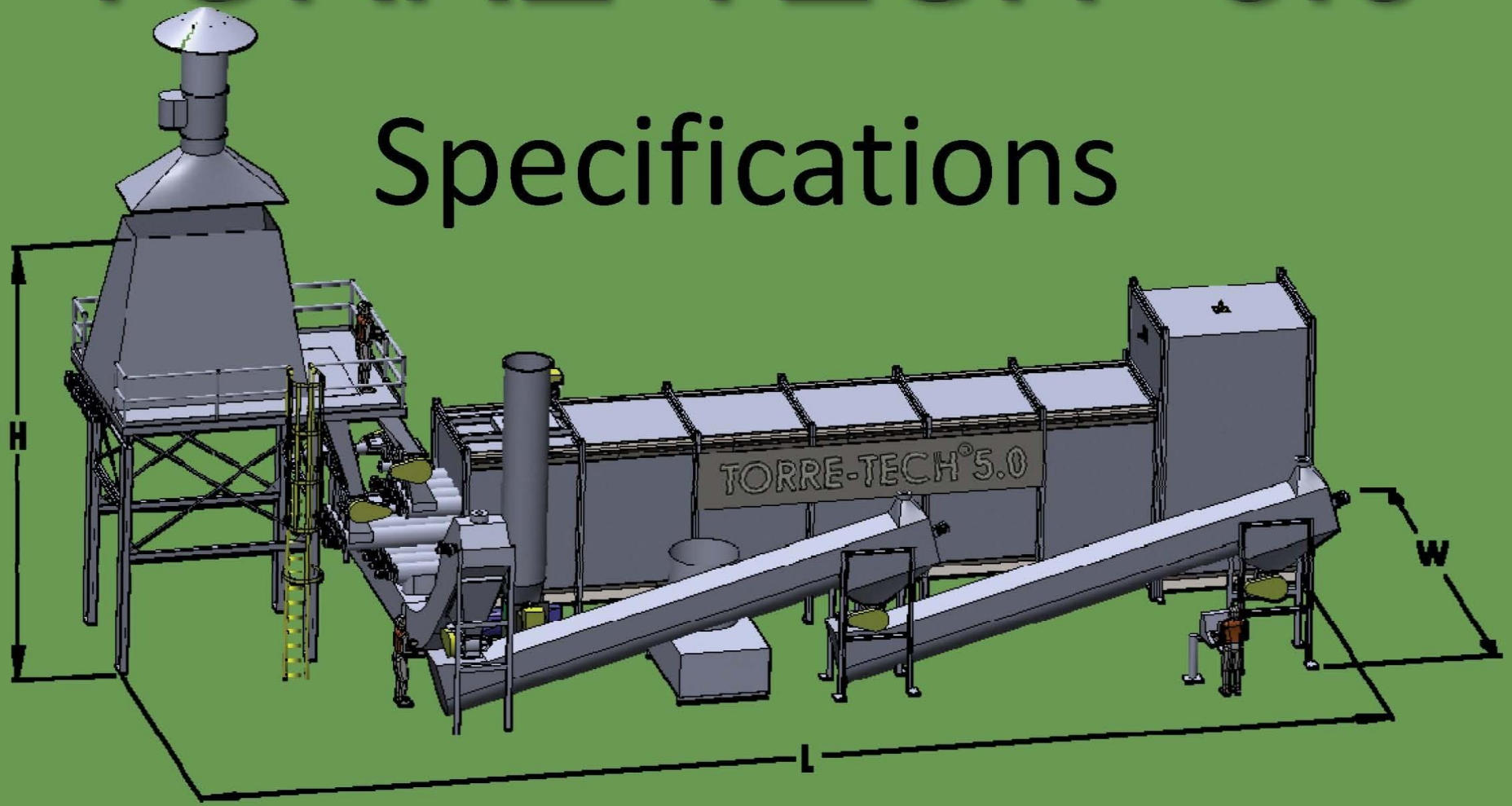
Schematic of ATP's Torrefaction Machine



NC State's 3-Year Old Prototype Torrefaction Unit

TORRE-TECH® 5.0

Specifications



System Dimensions:	IP (FT)	SI (M)
Length (L)	80	24.0
Width (W)	32	9.8
Height (H)	30	9.0

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.

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