Terra Pellets

Biomass Energy for Home & Industry

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Terra Pellets

Biomass Energy for Home & Industry

- Biomass pelleting company located in Geneseo, New York
- Mission: To deliver **a sustainable and reliable switchgrass pellet fuel** to consumers for home heating and large scale power production
- Vision: To further the practice and growth of **pelleting biomass** for energy without negatively impacting the environment
- We have over 50 years experience in pelleting animal feed, now exploring biomass

High Demand

Ref: Alliance for Green Heat, Report 2010

- Energy crisis ebbs and flows relative to fossil fuels, but concerns over CO2 emissions and global warming remain
- As a result, significant research continues in carbon-free or carbon-neutral alternative fuels (solar, wind, **biomass**)
- ***Wood and wood pellets most widely utilized biomass throughout the world***
- Historically and continuing to be in high demand
  - *North America uses 5 M metric tons of pellets annually*
  - *Europe uses 16 M metric tons of pellets annually*

Manufacturing Problems

Ref: Alliance for Green Heat, Report 2010

- Wood pellets are either made directly from trees or from sawdust and harvest residue
  - *Made from residue,* ***availability is unpredictable***
  - *Made from trees, lumbering raises* ***deforestation concerns***
- There's an even bigger problem once the pellets are made

Exporting Problems

Ref: Wall Street Journal, Article 2013

- Pellet makers are incentivized to export to Europe
- **Europe's** carbon taxes create high demand for wood pellets
- EU can't supply their own pellets due to strict forestry regulations
- Therefore US supplying their demand
  - *Exports doubled between 2012 and 2013*
  - *From 2013 to 2016, export volumes to increase by 250%*

Scarce Supply

Ref: Wall Street Journal, Article 2013

- Due to problems in manufacturing and in high volume of exports, wood pellets are in scarce supply in US
- Ironically, sales of pellet stoves continue to increase!
- At the same time, US industry continues to move away from fossil fuels to consider biomass alternatives
- Leaving pellet users *<u>disappointed</u>* and *<u>cold</u>*

Both consumers and industry need a <u>reliable & sustainable</u> pellet fuel

Validated the Need

For Consumers:

"We booked 5.3 K tons of pellets this year, but we will probably not receive all of that due to an undersupply."

"A severe undersupply started 3 years ago. No retailer has enough supply to fulfill the demand from the stove owners."

"Pellet Manufactures have ample production capacity, but they do not have enough raw materials to produce wood pellets."

-Northeast Distribution Manager, New York Big-Box Pellet Retailer

For Industry:

"The most important variable considered for a fuel source is availability and a consistent, reliable supply."

-Bill Cox , Power Plant Chief Engineer

The time is right to introduce new biomass alternatives

Solution: Switchgrass Pellets

Ref: Cornell, Report 2014

- Our company is developing a switchgrass pellet that provides a **comparable energy output to wood pellets**
- We can replace wood pellets and/or help meet the demand
- We **grow** (or subcontract) switchgrass on unused land (2.5M acres in NYS) with major benefits for the environment
- We **harvest** using simple equipment
- We **pellet** switchgrass using our proprietary formulation and manufacturing process
- **Initially, we will be selling 40lb bags of switchgrass pellets to retailers and distributors with a long term vision to enter European markets**

Ecological Benefits

Ref: Cornell, Report 2014

- Switchgrass is a perennial crop
- Grows rapidly
- Can be grown on unused lands or fallow fields
- Actually increases soil health
- Carbon neutral biomass
- Reduces the rate of deforestation
- Can be grown specifically for pellets; by not relying on forests or waste product, we control reliability and availability

Intellectual Property

- Our Company will be partnering with Christiano Milling Co. in Geneseo, NY where their **equipment is unused for half a year**
- **50+ years of experience** in pelletizing alfalfa for animal feed
- We will be capitalizing on their manufacturing know-how and trade secrets
- Experimenting with *patentable* formulations based on research from various universities

Comparison Matrix

** Red indicates a major flaw of the feedstock

Ref: Cornell, Report 2014 & SUNY ESF, Report 2011

Advantage	Switchgrass Pellets (Ernst)	Wood Pellets (Enviva)	Miscanthus Pellets (Agripellets)	Willow Pellets
Growing Time (years)	1	10	1	4
Crop Maintenance	Low	Low	High	Low
Harvesting Procedure	Haying	Logging	Haying	Logging
Yield (tons/acre/yr)	6	5-10	13	11.5
Cost similar to Wood	Same	Same	More	Same
Net Heating Value (btu/ton)	12.4 M	13.6 M	14.8 M	13 M
Ash %	<5%	<1%	<6%	<4%
Competition for Feedstock	Low	High	Low	Low

Switchgrass is the best feedstock for biomass pellets

Supply Chain

Contract for Growth & Harvesting of Switchgrass

Terra Pellets

Formulate, Pellet and Bag (40 lb) Switchgrass

European Distributor

Industry

Retailer

Homeowner

US Northeast Distributor

Retailer

Homeowner

US Wood Pellet Market Size

Market Segment	Annual Market Size[1,2] (in Tons)	Price Per Ton	Annual Market Size
US Exports	3.2M	$250	$800M
US Domestic Consumption	1.6M		$400M
Total			$1.2B

1: Energy, Technology, & Policy, 2013
2: US Energy Information Admin, 2014

"It is a definitely a growing and compelling market. As far as renewable research goes this is definitely more viable than wind and solar. I think it's the future."
-Bill Cox , Power Plant Chief Engineer

We will capture a share of the wood pellet market

Financials

Year	2015	2016	2017	2018	2019
Units Sold (Bags)	**200**	**260 K**	**260 K**	**520 K**	**520 K**
Revenues	$0.00	$1,040 K	$1,040 K	$2,080 K	$2,080 K
Cost of Goods Sold (COGS)	$543	$706 K	$706 K	$1,412 K	$1,412 K
Gross Profit	**($543)**	**$334 K**	**$334 K**	**$668 K**	**$668 K**
Gross Profit Margin	NM	32%	32%	32%	32%
Operating (Fixed) Expenses	$49 K	$170 K	$170 K	$512 K	$262 K
EBITA	**($50 K)**	**$165 K**	**$165 K**	**$157 K**	**$407 K**
Operating Margin	NM	15%	15%	8%	20%

Start-Up Expenses

Start-Up Expenses	Amount
Working Capital	$30,000
Advertising/Marketing	$2,000
Legal & Accounting	$3,000
Equipment Maintenance	$10,000
Office Equipment	$5,000
Total Start-up Expenses	$50,000

Sources of Capital	Amount
Personal/Founder Investments	$15,000
Awards and Prize Monies	$5,000
Campus Seed Fund	$15,000
Angel Investors	$15,000
Total Source of Funds	$50,000

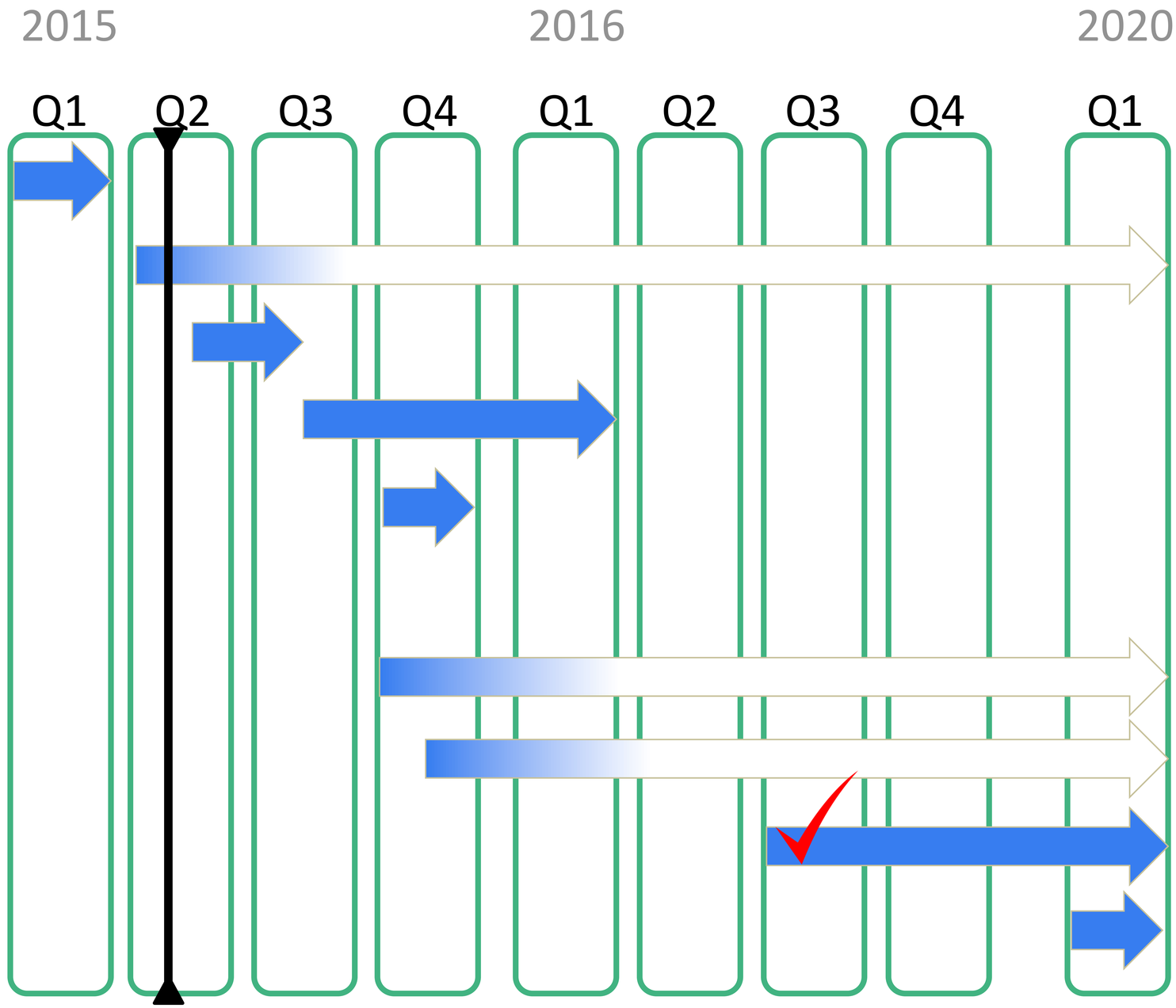
Project Plan

Product Development

- Acquire Switchgrass (pilot).....
- Test Pellet Formulations.....
- Burn Test.....
- Beta Test.....
- Patent Application.....

Business Development

- Contract Grower.....
- Sales and Marketing.....
- Full Scale Production.....
- Expand Production Capacity.....



✓ First revenues expected Q3 2016

Management Team

Company Managers*

Mizuki Arai – CEO; B.S. in Business Admin

Dominic Morell – CFO; B.S. in Chemistry, Minor in Finance

Brandon Mark – COO; B.S. in Physics

Ishtyaq Habib – VP of Bus Dev; B.A. in Physics

Advisory Board:

Dan Christiano – Technical Advisor; Operates Pelletizing Plant in Geneseo

Tom Bourne – Business Consultant; CEO of Terrenew

Frank Reynolds – Engineering Consultant; SCORE Counselor

Josh Biesker – Legal Advisor; Senior Associate Attorney at Boylan Code

** Christiano Milling is looking to work with SUNY Geneseo to create a student-led company*

Conclusion

- ✓ Problems with wood pellets
    1. In making them
    2. In high exports
- ✓ Severe supply shortages in US both home and industrial use
- ✓ Consumers are left disappointed and cold
- ✓ Industry is looking for biomass alternatives to fossil fuels
- ✓ **Switchgrass is the reliable & sustainable pellet fuel**
- ✓ 50+ years of experience in pelleting
- ✓ Dedicated & hard working team

"There is a commercial market for grass pellets."
-Pete Blaser , Pellet Stove Engineer