

Energy Grasses

For the Masses



**iron goat**

[www.IronGoatTech.com](http://www.IronGoatTech.com)

Clifton, VA

# Problem: Conventional Grass Processing Costs



Labor Cost

Equipment Cost

Fuel Cost

Fossil Fuel

Environmental

Impact

# Solution: Automated Robotic Direct-to-Pellet Harvesting



**No Labor**



**No Fuel**



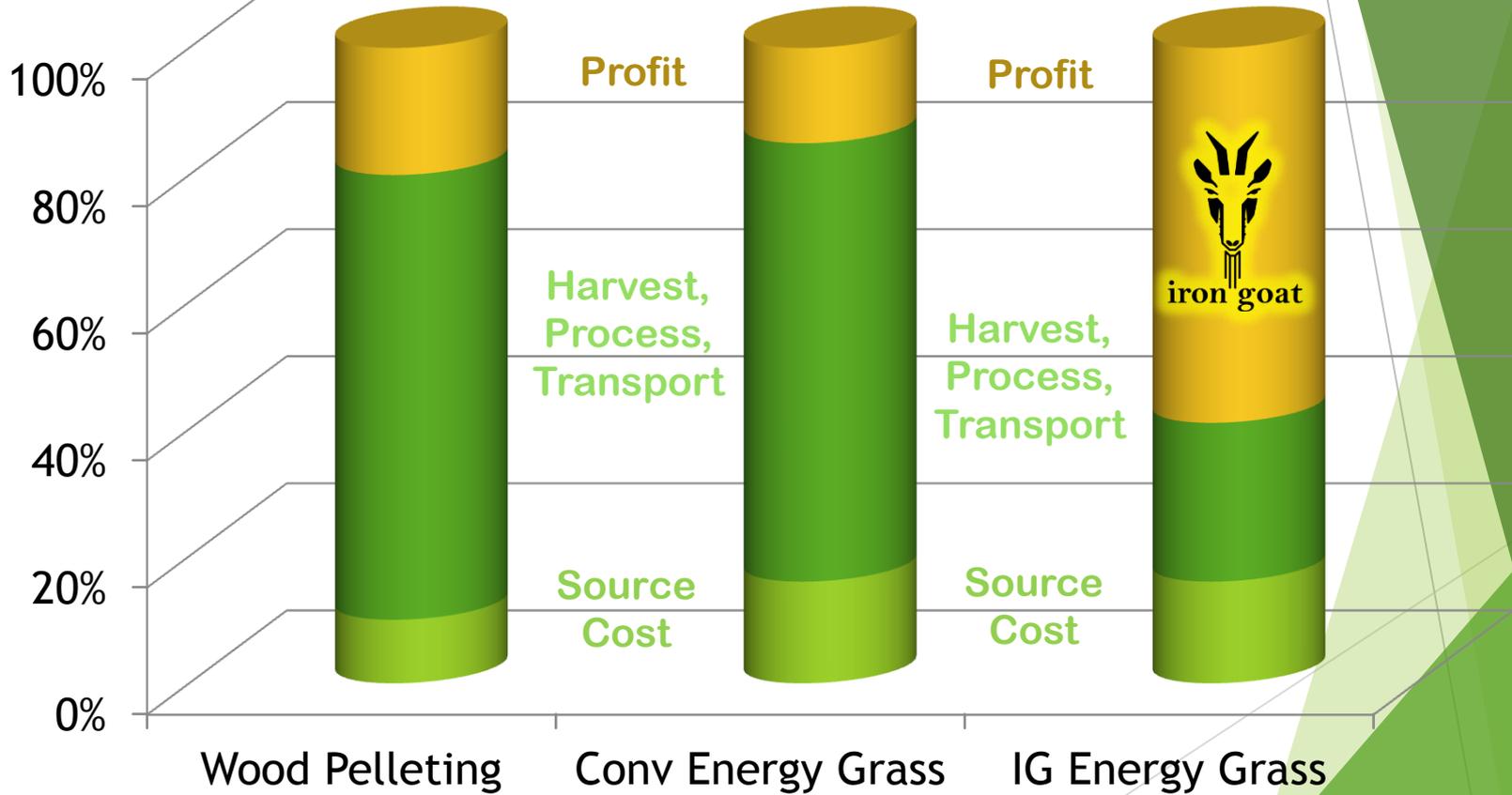
**One  
Machine**





# Competitive Advantage: Cost

(For Same \$/BTU market price)



# Self-Fueling Mobile Harvesting Technology



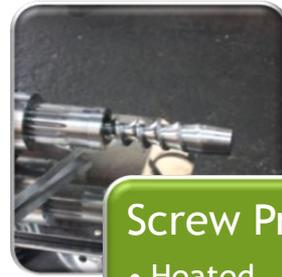
## Grass

- 80% Moisture



## Cut & Shred

- Forage Cutter



## Screw Press

- Heated
- Water Removal
- Shredding



## Cyclone Dryer

- Uses Waste Engine Heat



## Pelletizer

- Compacting
- Extruder
- Friction Heated



## Gasifier

- Pellets In
- Syngas Out



## Engine

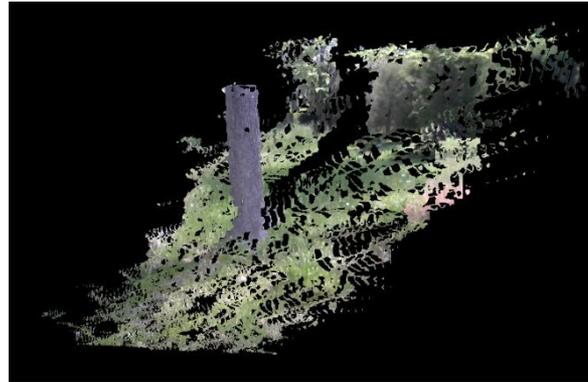
- Shaft Power
- Heat for Drying



## Generator

- Shaft to Electrical

# Our Vision: Machine Vision



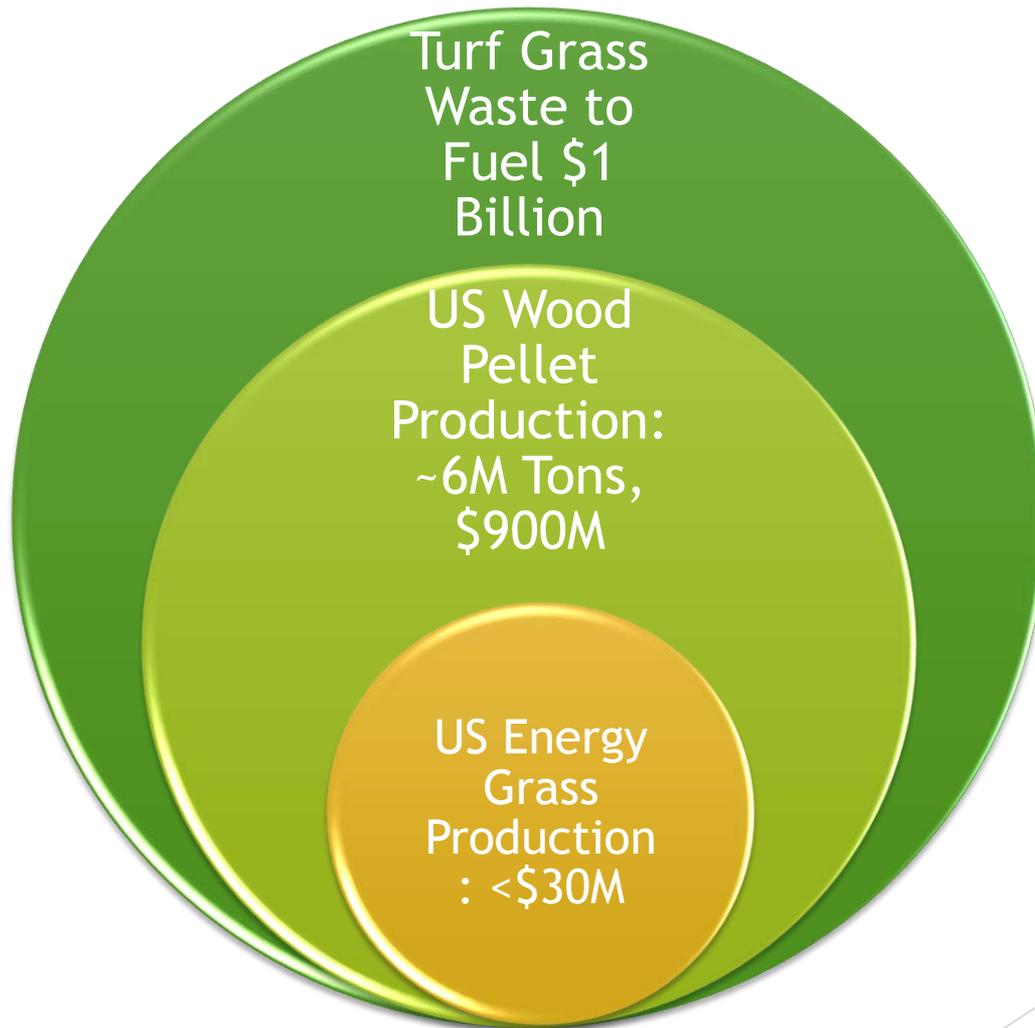
- ▶ Machine Vision Enables
  - ▶ Physical Safety
  - ▶ Environmental Safety
  - ▶ Environmental Rulesets
  - ▶ Species-Selective Harvesting
  - ▶ Ecological Engineering
  - ▶ Wild Harvesting



# System Level Implementation

- ▶ Multiple Platforms Remotely Supervised in Groups
- ▶ Automated Off-Load to Lined Shipping Container
- ▶ Automated Modular Container Loader with Desicator/Dehumidifier
- ▶ Manual Container Pickup & Loader Swap
- ▶ Container Ready for Local or Long Distance Transport

# Market





# Unit Economics

|                                  |                 |
|----------------------------------|-----------------|
| <b>Expenses</b>                  |                 |
| Shepherd Labor -                 | \$15.00         |
| Maintenance Labor-               | \$4.00          |
| Amortized Harvester<br>Equipment | \$5.60          |
| Other Equipment                  | \$3.00          |
| <b>Total Expenses</b>            | <b>\$27.600</b> |
| <b>Revenue per Ton</b>           | <b>\$90.00</b>  |
| <b>Margin</b>                    | <b>70%</b>      |

# Team



## Core Team



**Jason Force, Founder & CEO**  
Biomass Processing & Technical Strategy  
Computer Vision



**Todd Schimmel, COO**  
Operations and Manufacturing  
Fabrication, Material Handling,  
Information Systems



**Charlie Sibbald, CFO**  
Finance and Strategy  
Professor of Business. Marymount University



**Bart Gallet**  
Robot Guidance Specialist  
Computer Vision, Deep Learning

## Advisers



**Dr. Jana Kosecka** Machine Vision  
Specialist, GMU



**Brecc Avellar** Biomass Industry and  
Process Specialist, Chemical Engineering

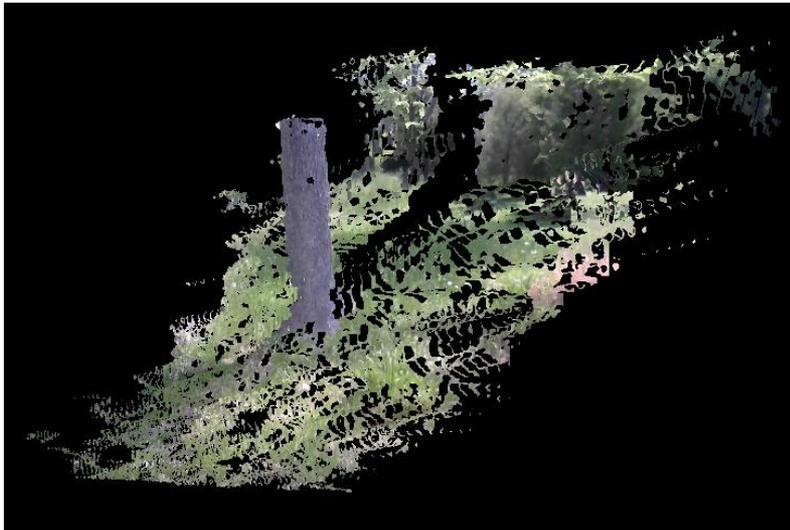


**Fred Circle**, Biomass Industry Expert,  
Sustainable Grassy Sources



**Kevin Hicks**, USDA Emeritus Research  
Leader, Sustainable Biofuels and  
CoProducts Research Center ERRS  
Biomass Industry Expert, Grassy Sources

# Status I



Point Cloud from Stereo Vision

- ▶ GMU, Venture Well Grants, Friends & Family: \$62k
- ▶ IP Portfolio
- ▶ Grant Proposals
  - ▶ NSF
  - ▶ EPA
- ▶ Guidance Development

# Status II



- ▶ Remote Control Platform (Propane)
- ▶ Pellet Processing
- ▶ Customer Development



# Timeline

| <b>Year</b>                  | <b>1(2015)</b>                                    | <b>2</b>                                | <b>3</b>                                  | <b>4</b>                  |
|------------------------------|---|---|---|---------------------------|
| <b>Production (KiloTons)</b> | 0.4   | 8                                       | 30  | 100                       |
| <b>Revenue</b>               | \$60k   | \$1.2M                                  | \$4.5M                                    | \$15M                     |
| <b>Corporate Focus</b>       | Direct Sales<br>Customer Discovery<br>Engineering | Distributor Sales<br>Process<br>Culture | Fleet Production<br>Operations<br>Markets | Production<br>Franchising |



# Challenges

- ▶ Integration with Biorefinery Concept
- ▶ Stage II prototype
- ▶ Strategic Partners
- ▶ Strategic Relationships
- ▶ Application Focus



# Investment

- ▶ **\$1M Funding**
  - ▶ Design, Build & Test Gen II Prototypes
  - ▶ Market & Partner Research
  - ▶ Pilot Production



# Why Invest

- ▶ High Margin Opportunity
  - ▶ Large, Proven Markets
  - ▶ New Tech with Defensible IP
  - ▶ Rapid Scaling
- ▶ Other Applications
    - ▶ Livestock Feed
    - ▶ Macro Algae Farming
    - ▶ Turf/Landscaping
    - ▶ Ecological Engineering

Energy Grasses

For the Masses



**iron goat**

[www.IronGoatTech.com](http://www.IronGoatTech.com)

Clifton, VA