



**FDC Enterprises, Inc.**  
**Conservation & Bioenergy**



**FDCE– Conservation & BioEnergy**  
2003-Conservation- establishment\management



2006- BioEnergy- RTU products  
(utilizing primarily Switchgrass)



**2003- 1 unit  
1100 acs**



**2018- 2 units**



**2018- 12 units  
23000 ac**





# FDCE 2003-2017

- 15 years conservation establishment experience
- 390,000+ acres conservation established-26 states
- 3300 acres purpose grown (switchgrass) bioenergy crops- 2 countries (USA & Macadonia)





**Plant\Spray in one operation**



**FDCE- 2018**



**018 Iowa Plant Crew**

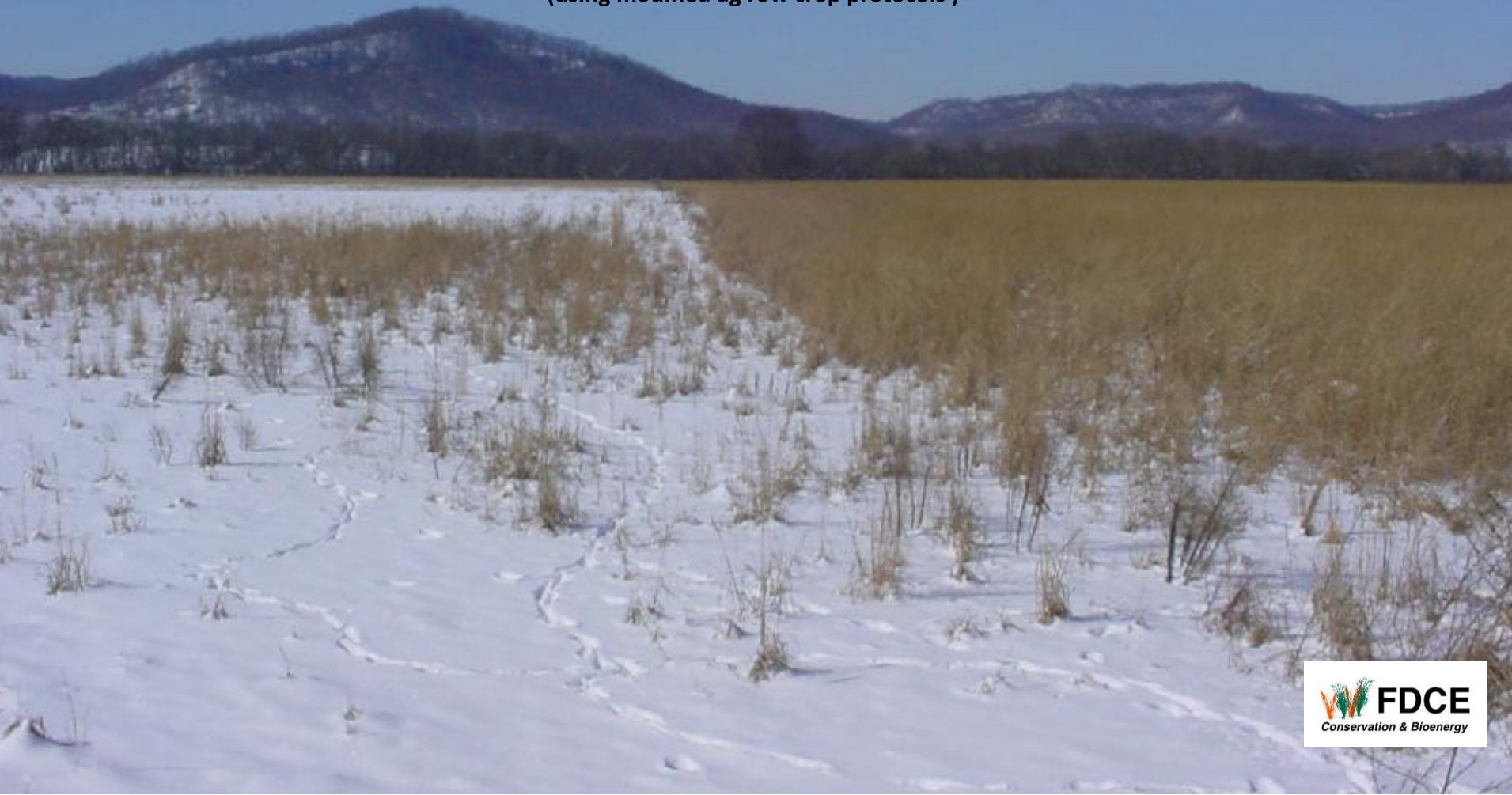








**What sets us apart- First Year Results**  
**Left- Traditional Conservation Establishment**  
**Right- FDCE Conservation Establishment**  
(using modified ag row crop protocols )





## 100 days PP- The How

- Extra processes in Seed cleaning
- Site specific Micronutrients, seed coat applied creating a macro environment enhancing seedling vigor
- Precision planting\placement through advanced technologies
- Light herbicide rates to control 1<sup>st</sup> flush of invasive weeds
- Mowing regiments to control sunlight inhibitions





**Bioenergy crops- critical is 1<sup>st</sup> year success  
to get to a harvestable stand in 3<sup>rd</sup> year**

**Year 3 post establishment SG\BB mix  
Harvested Ave. 4.2 tons\ac (SS Va 2015)  
Harvested Ave. 7.8 tons\ac (N Va 2015)**



**2006- FDCE recruited by VT for R&D at Commonwealth of Virginia Hospital Power Plant- concept target was thermal energy from direct fired purpose grown bioenergy crop using existing conveyance\boiler**





**Early multiple problems encountered-  
QC inconsistencies of biomass at the boiler house (ash)  
Inconsistency of field yields and subsequently, cost/ton**

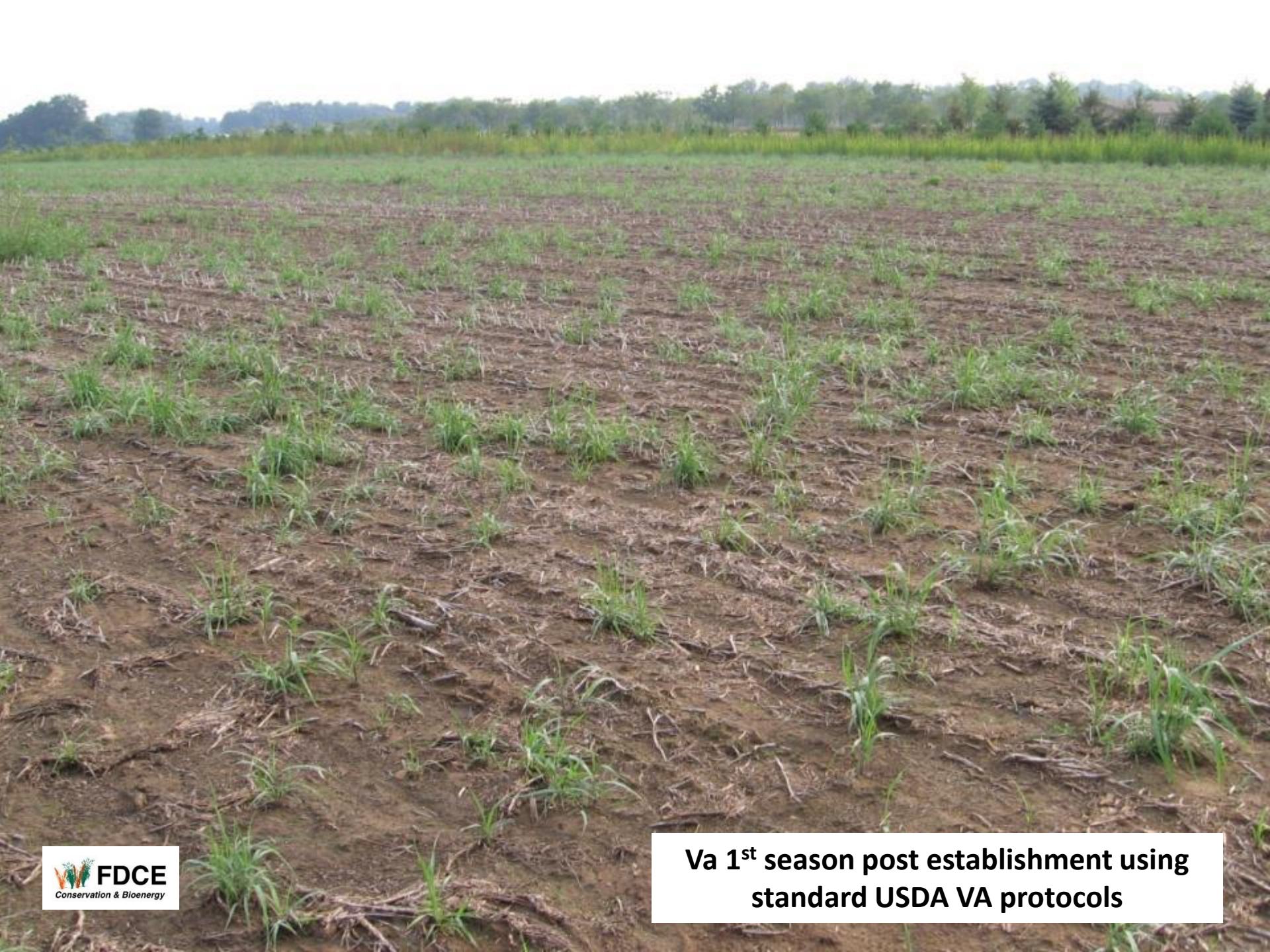




RTU SG moving from storage silo to Boiler









**Evaluate\quantify feedstock supply shortcomings**  
**Design improvements**  
**Develop a comprehensive INDUSTRIAL approach**  
**Change the existing paradigms**





## Benefits to Nottoway Area Land Owners

- Convenience- FDCE handles all establishment\mgmt.\harvest activities
- Efficiencies- FDCE cuts costs\manages quality standards through SOP's
- Economic- new annual revenues to landowners of \$50-234\ac(2017)
- Environmental- tall grasses attract avian wildlife....and the occasional bear
- Environmental- No fertility amendments (51% reduction in P leaching- actuals from VT)
- Environmental- tall grasses improve poor soil health
- Environmental- water quality benefits (82% in reduction sedimentation- actuals from VT)



**One of 2 Va harvest crews. Redundancy is critical for QC of harvested biofuel . Redundancy is critical to meet contract obligations**

















3300 acs currently under harvest mgmt. in Va





Indoor under roof storage 2000 tons  
Outdoor under tarp storage 10000 tons



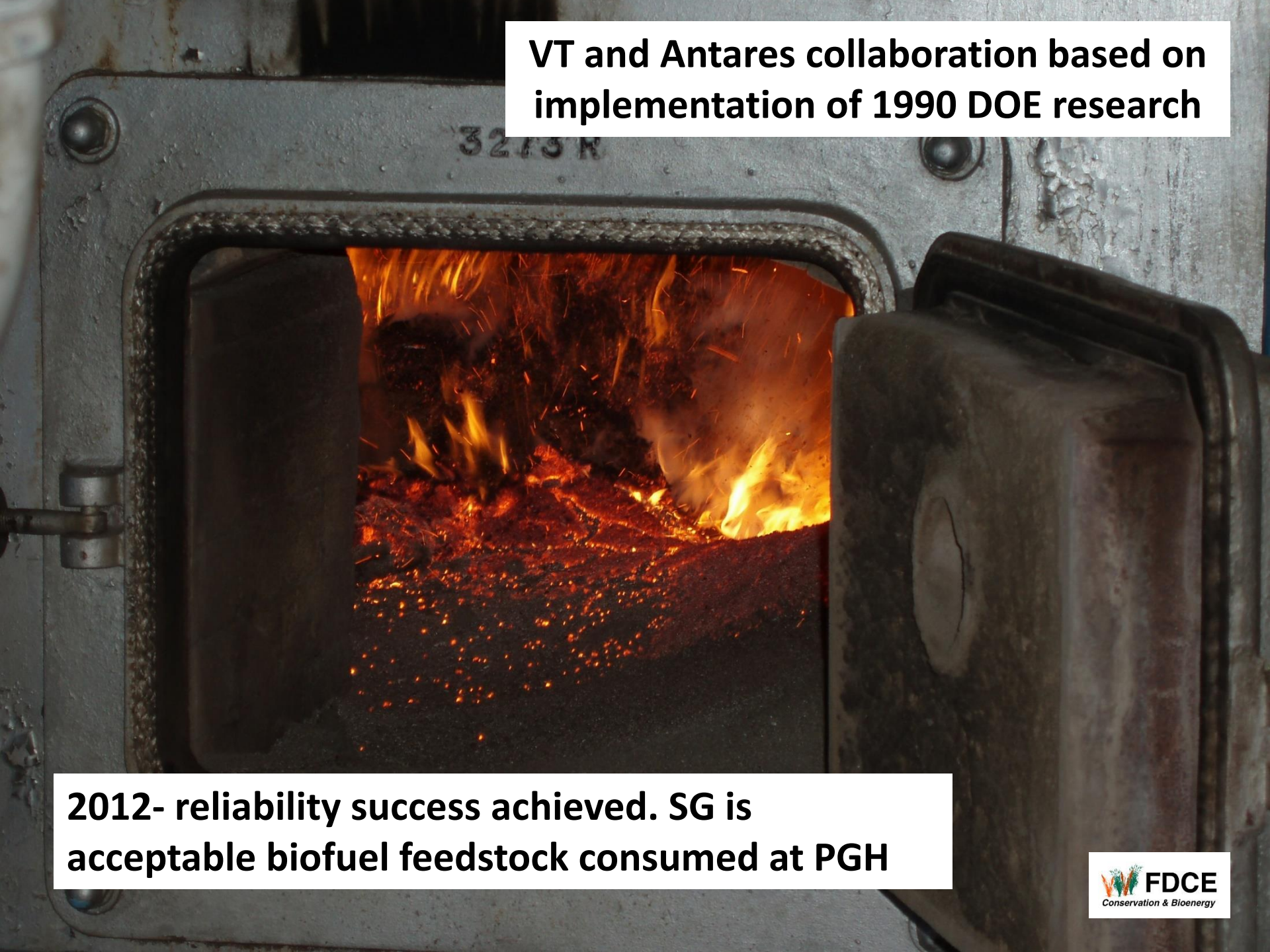


## 2 walking bottom bale hauling trailers (sq bale hauling specific)

42 bale capacity  
15 min load\unload  
Only 2 straps needed for transport

**K**  
helderman  
MANUFACTURING, LLC  
WWW.KELDERMAN.COM  
PATENT PENDING





**VT and Antares collaboration based on  
implementation of 1990 DOE research**

**2012- reliability success achieved. SG is  
acceptable biofuel feedstock consumed at PGH**



## The “Nottoway Farm to Fuel Project”

### Nottoway County EDC Sponsors FDCE Processing Center

Benefits now enjoyed by Nottoway County  
New business income taxpayer  
Local business impact- over \$200,000\yr  
Jobs for 3 individuals  
Soil erosion reduction- not an annual crop  
Water quality improvements – not an annual crop  
Wildlife habitat improvement over tradn'l crops  
New income stream for local landowners  
Improved air quality for local residents\animals  
Budget stabilizer for Commonwealth- fixed pricing  
Budget reallocation for Commonwealth- savings  
Stable moistures\steam production efficiencies  
No toxic residuals (ash)







**NOTTOWAY  
BIOFUELS**  
225 BUTTERWOOD TRAIL



**Storage\Processing Facility- \$3.4M investment  
collectively by Nottoway Co EDC, TIC, FDCE**





2000 tons storage capacity plus processing area under roof







Expand traffic  
compacted  
gravel area

**FDCE expansion Spring 2019**  
\$1.5 building improvements  
\$1.1 equipment improvements

Existing  
2000 ton  
capacity

Proposed 2000 ton  
150'x 300' bldg

100' additional to  
existing building  
for processing

ST seasonal harvest overflow storage area  
(compacted gravel pad)  
2000 ton

Sediment pond













## **2011-18 Intermittent Use Cumulative**

**SG- 1,062,982 gal fuel oil offset**

**SG- \$1,031,249 savings vs fuel oil**

**SG- 17,256 metric tons CO<sub>2</sub> avoidance**

## **2017-18 Heating Season** (New Boiler)

**Start 7\1\17 through 6\30\18**

**SG- 332 days**

**SG- 3,914.87 tons consumed**

**SG- 49,497,901 lbs. steam produced**

**SG- 14,565,382 btu\ton**

**SG- 415,180 gal fuel oil offset**

**SG- \$344,347.81 savings vs fuel oil**

**SG- 4,188 metric tons CO<sub>2</sub> avoidance**





**Production maturity anticipated in 2 years- 12-15k tons annually**  
**Consumption will max out current established acreage capacity in 2019**  
**New regional demand- 50% tonnage increase at PGH & a large new industrial market opp**  
**FDCE will establish addt'l 3000 acs in 2019 to meet anticipated demand**



## Success Lessons

- Feedstock provider must be at engineering table when planning starts
- Purpose grown perennial SG must have at least 10 year contracts to cash flow
- Energy crops must have a 2 year head start to mature and provider to have time for building adequate inventories
- QC generally is much tighter than other ag use requirements- efficiencies
- There must be adequate non volatile pricing\profit opportunity for all stakeholders- (\$108\ac ave in 017)
- There must be adequate dry storage to minimize losses\maintain quality
- Ancillary benefits are important- need to promote all value props to interested parties





**To date- The Commonwealth's Piedmont Geriatric Hospital is the only facility in America utilizing SG as their primary fuel source.**

“This project is an example of how properly planned and executed community based and community sized power generation can enhance local community economies, utilizing locally produced biofuel and, at the same time, enhance water quality, wildlife habitat and land conservation.” Steven Thomas USDOE