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Clean Tennessee Energy Grant and an Innovative Biomass Technology

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About ARiES Energy

Alternative, **R**enewable, **I**nnovative **E**nergy **S**olutions

We focus on clean & renewable energy solutions

Specialties:

- Renewable Energy design and installation
- Securing Grant Funding for our Clients - millions $ in grant awards
- Feasibility Studies

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Quote of the Century

"The choice we face is not between saving our environment and saving our economy – it's a choice between prosperity and decline. The nation that leads the world in creating new sources of clean energy will be the nation that leads the 21st century's global economy."

-- **President Barack Obama [Newton, IA, April 22, 2009]**

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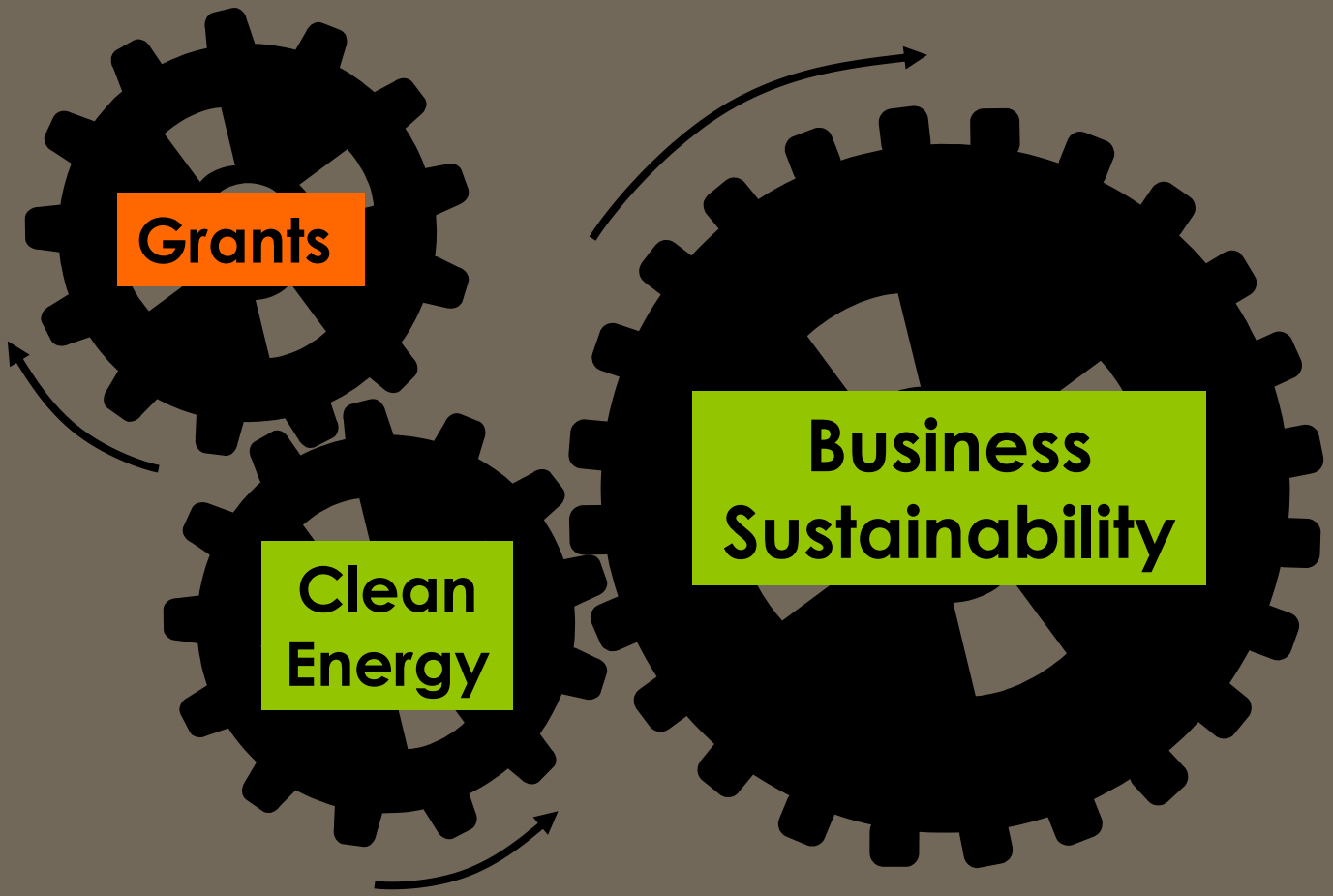
Grants



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Grant Overview

Clean Tennessee Energy Grant

Financial assistance to install and construct energy projects. Eligible project categories:

- Cleaner Alternative Energy: biomass, geothermal, solar and wind
- Energy Conservation: lighting, HVAC improvements, improved fuel efficiency, insulation and idling minimization
- Air Quality Improvement: reducing GHG, SO2, VOC's, NOx, HAP's or PM

All grant proposals are due by

March 31st, 2012

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Clean TN Energy Grant

Financials:

- $2.25 million allocated to this grant.
- Grant request from $5,000 to $250,000
- Tennessee Department of Environment & Conservation (TDEC) manages grant.

Eligibility:

- Tennessee sites only
- Non profit organizations
- Public or private organizations
- Local and state government agencies
- Utilities
- Educational institutions (Colleges, Universities, public or private)

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Scoring for Eligible Projects

Scoring Criteria	Solar	Geothermal	Wind	Biomass/ CHyP	Lighting
Energy Efficiency (25 Points)	–	+	–	/	+
Air Quality (30 Points)	+	+	+	+	+
General Public Benefit (15 Points)	+	+	+	+	+
Protection of Environmental Resources (15 Points)	/	/	/	+	/
Creative/New Technology (15 Points)	/	/	/	+	/

–	No Credit
+	Credit
/	Some Credit

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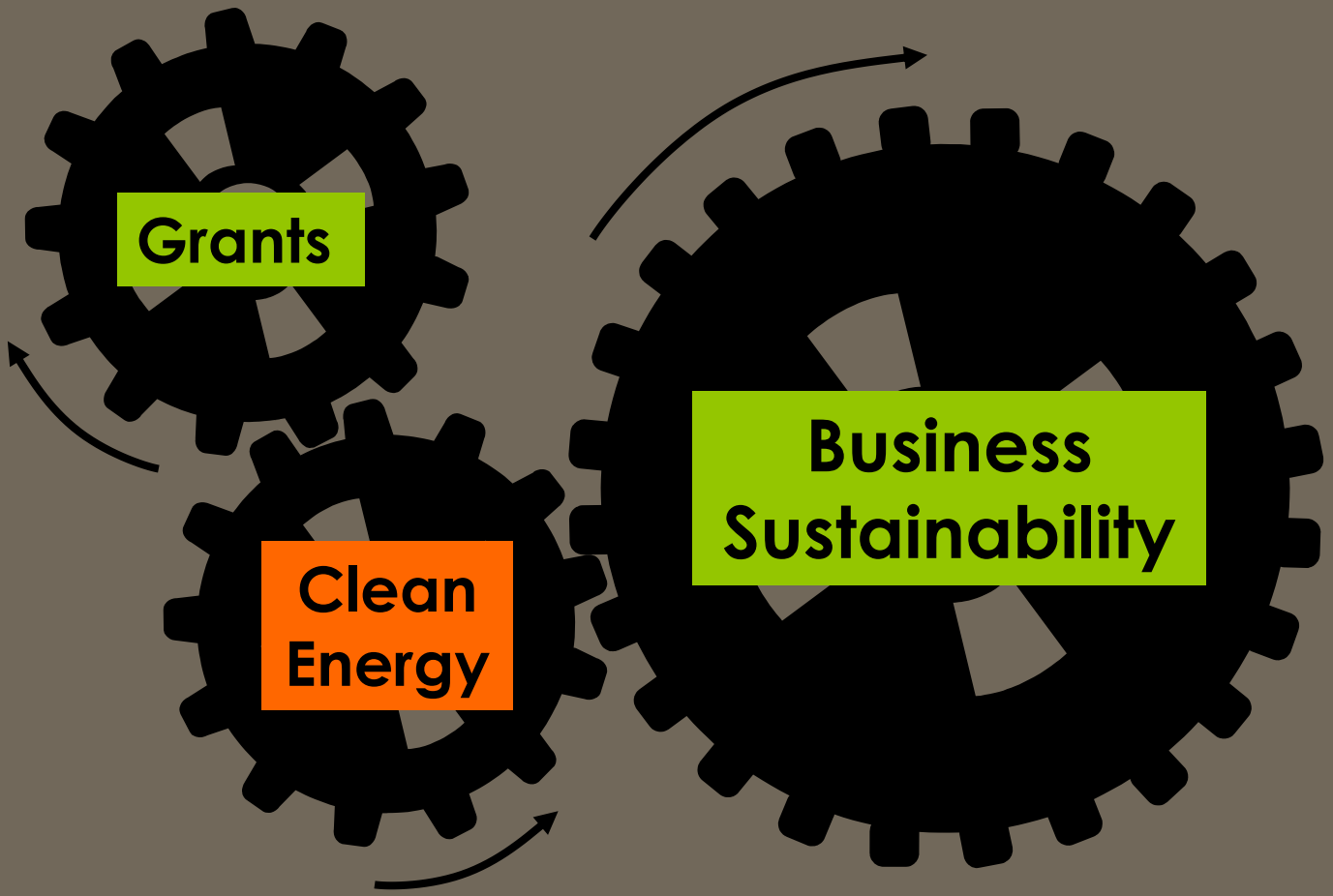
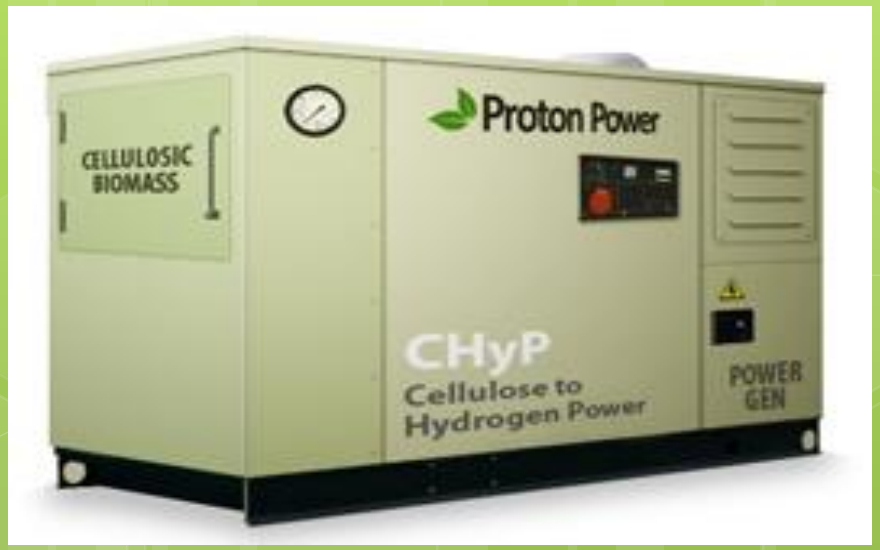
Clean Energy: CHyP System





Proton Power

CHyP System: Cellulose to Hydrogen Power

An Innovative Bioenergy Technology

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CHyP Technology Background

- The CHyP System uses a thermal gasification process that converts cellulose material into a syngas by reacting it at very high temperatures.

- This process has been around for many years; first patented in 1873. British citizens used this process for creating fuel during WWII.

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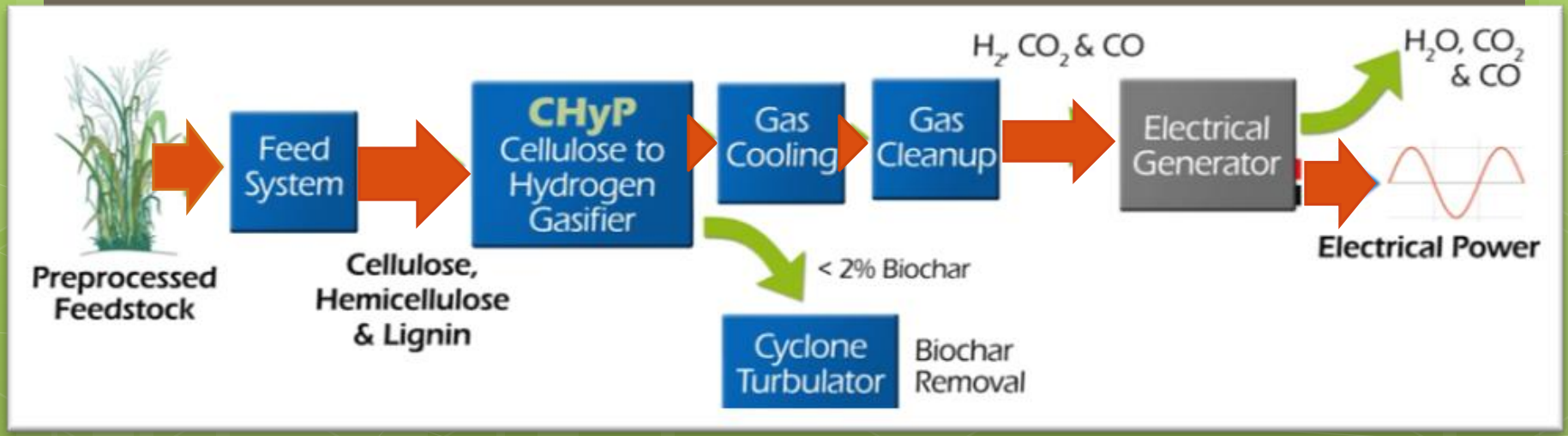
What is the CHyP System?

The CHyP System is a Cellulose to Hydrogen Gasification system that generates a hydrogen-rich gas stream for power & heat.

Preprocessed cellulosic biomass is fed directly into the apparatus.

Through a thermal gasification process, hydrogen syngas is produced…

…which feeds an off-the-shelf natural gas generator to produce electricity or heat.



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CHyP Technology Explained

- The CHyP System is unique because the efficiency of it's patented gasification process is much higher than most other processes, producing a 65% hydrogen gas stream. (average is 30%)
- The engineers at Proton Power have been involved in thermal chemical processes for over 30 years.
- The CHyP System has been vetted by US and foreign 3rd party companies.

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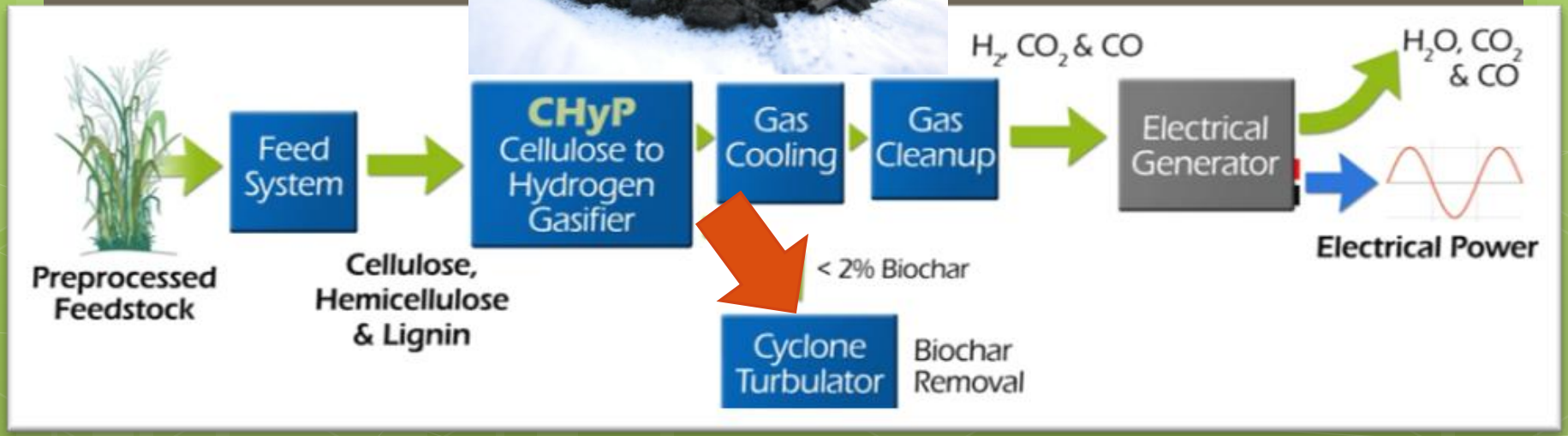
What is the CHyP System?

A co-product and added benefit of the CHyP System is the Biochar which can be sold for its multiple agricultural benefits.



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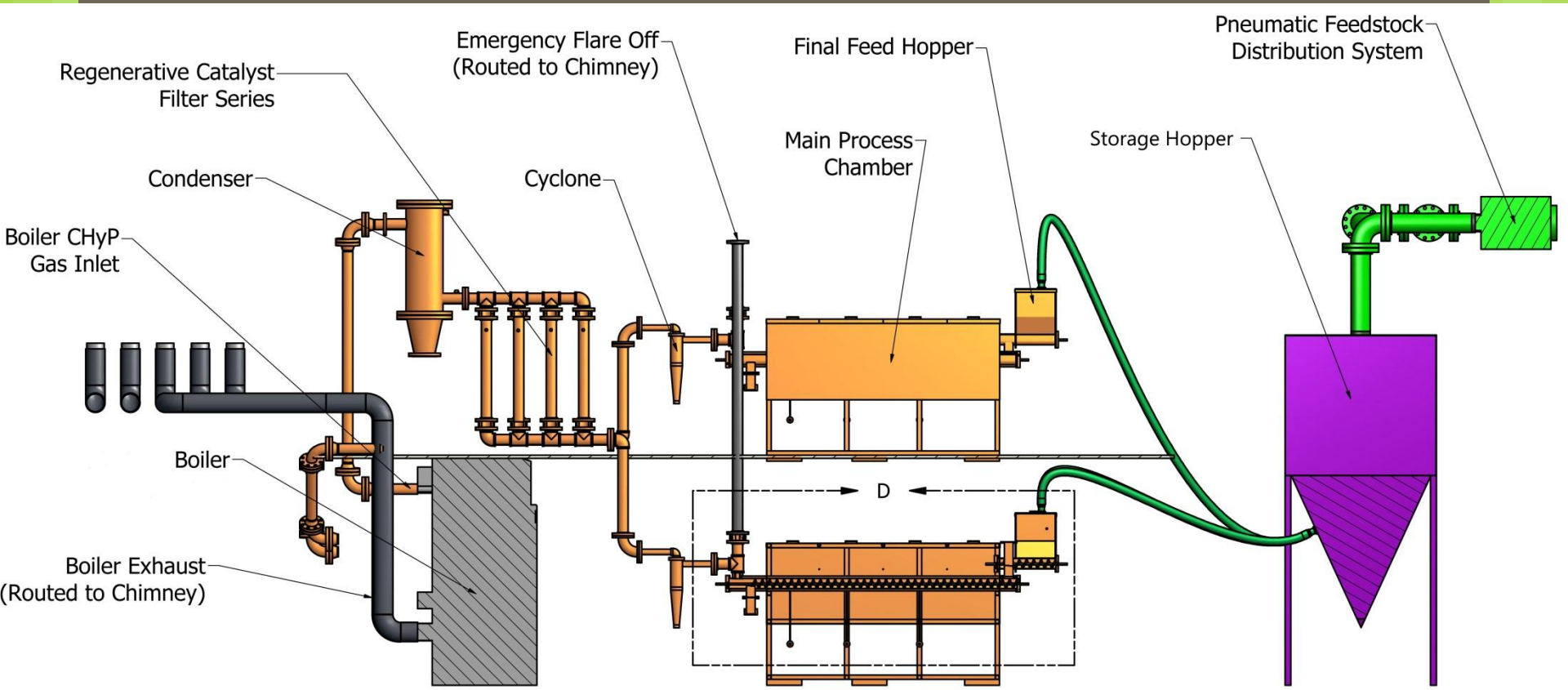
CHyP Engine Cross-Section

Boiler Application



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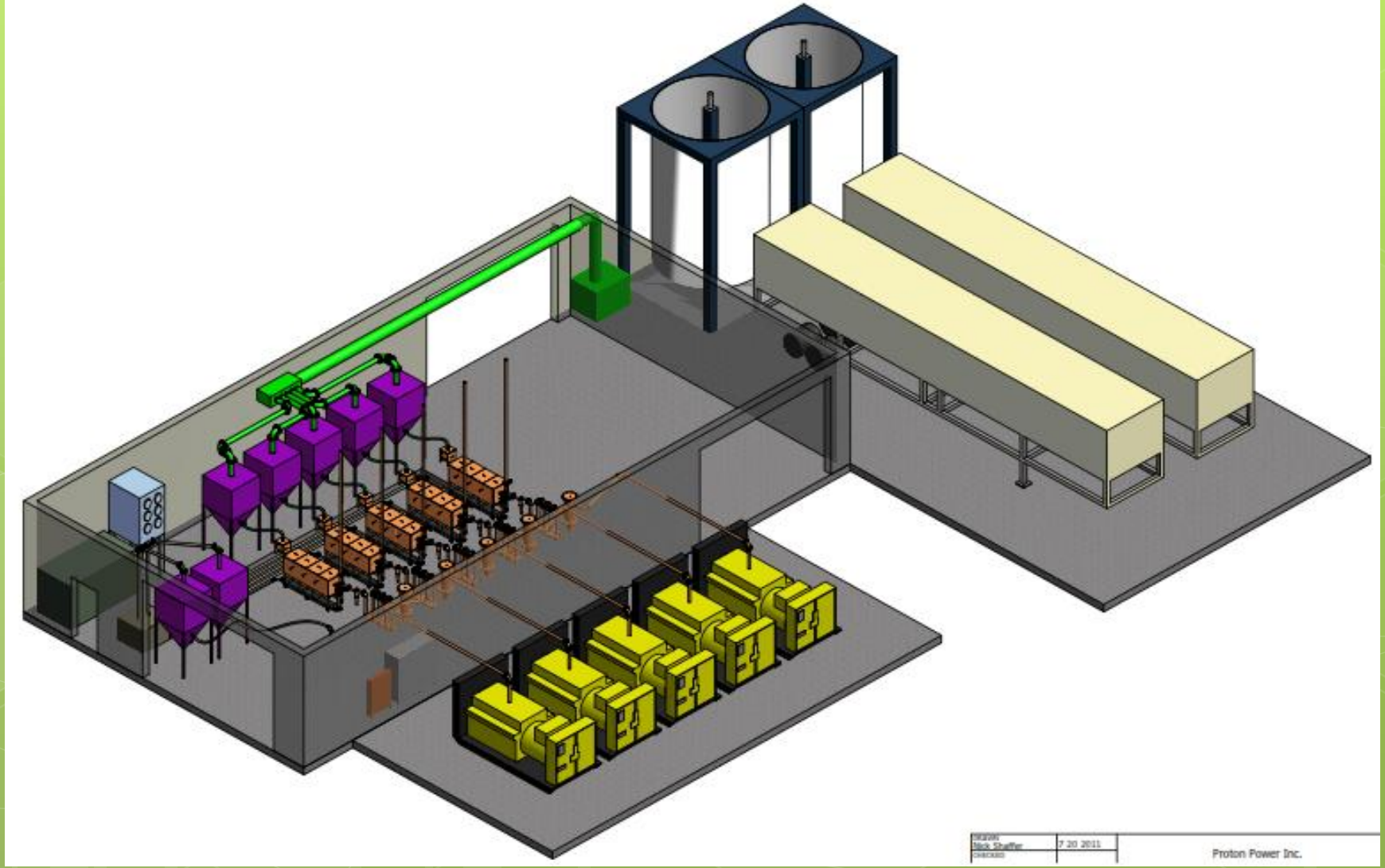
1 MW Switchgrass Application



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Advantages of CHyP

Easy installation and operations

- The systems are scalable to suit your application.
- Eliminates the need for a hydrogen storage and distribution system.
- Minimal construction and environmental requirements that would impede the build of a system.

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Advantages of CHyP

Locally available feedstock that is plentiful, and renewable

- The system can run on cellulose material or energy crops specifically harvested for fuel, such as switchgrass.

Genera energy

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Advantages of CHyP

Interchangeable feedstock

- The fuel supply can also come from common waste that's generated everyday

- A waste stream that would otherwise be a liability to an organization can become an asset

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Advantages of CHyP

Local Job Creation

- Manufacturing, deployment, operations, and feedstock sourcing of the system will generate both direct and indirect job creation, and foster economic development.

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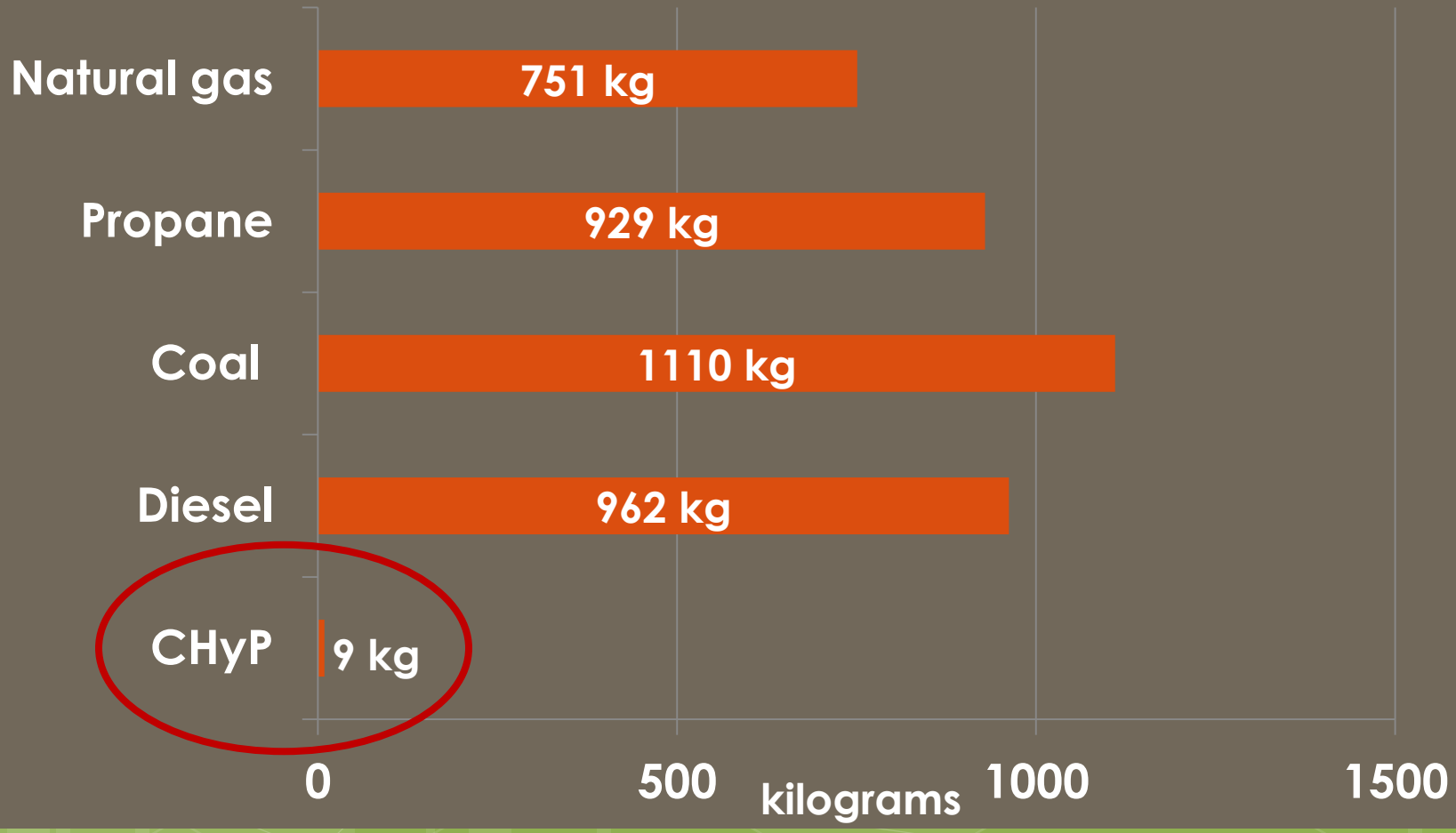
Advantages of CHyP

Carbon Neutral or Negative



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Advantages of CHyP

Reduces Waste

The CHyP System can use up to 70% of what goes into landfills as feedstock.

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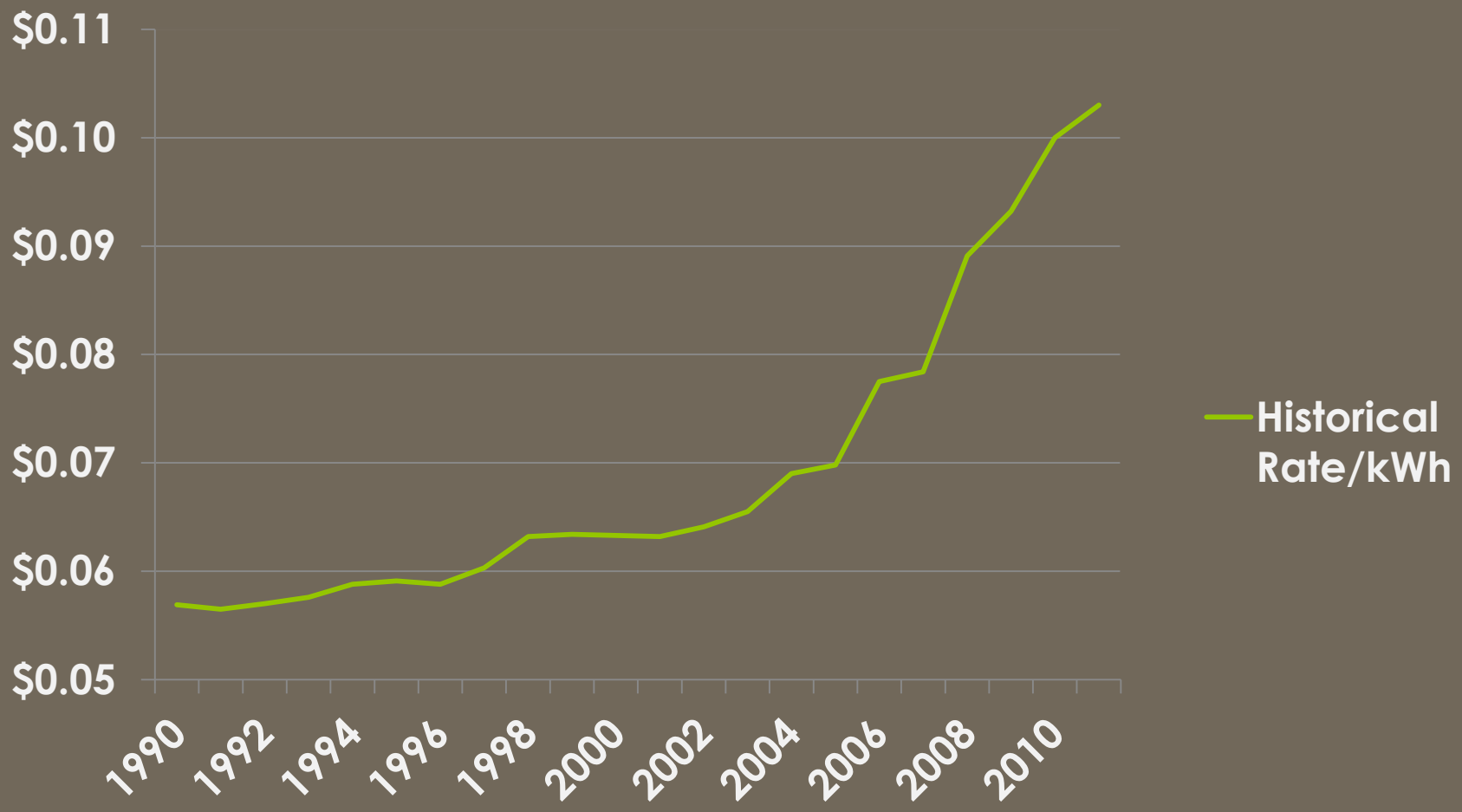
TN Historical Utility Rates



Data from U.S. Energy Information Administration www.eia.gov

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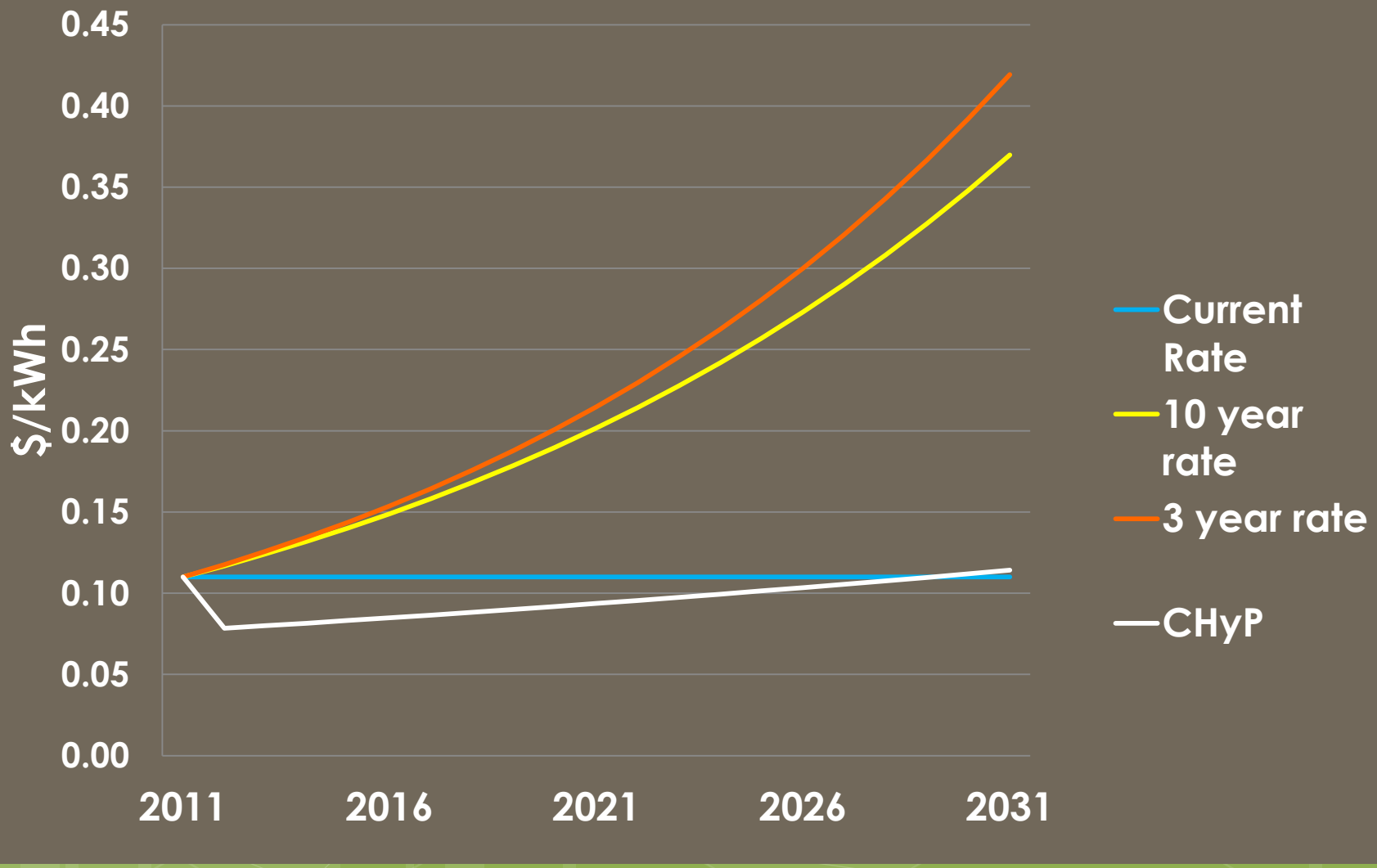
Projected Utility Rates, TN



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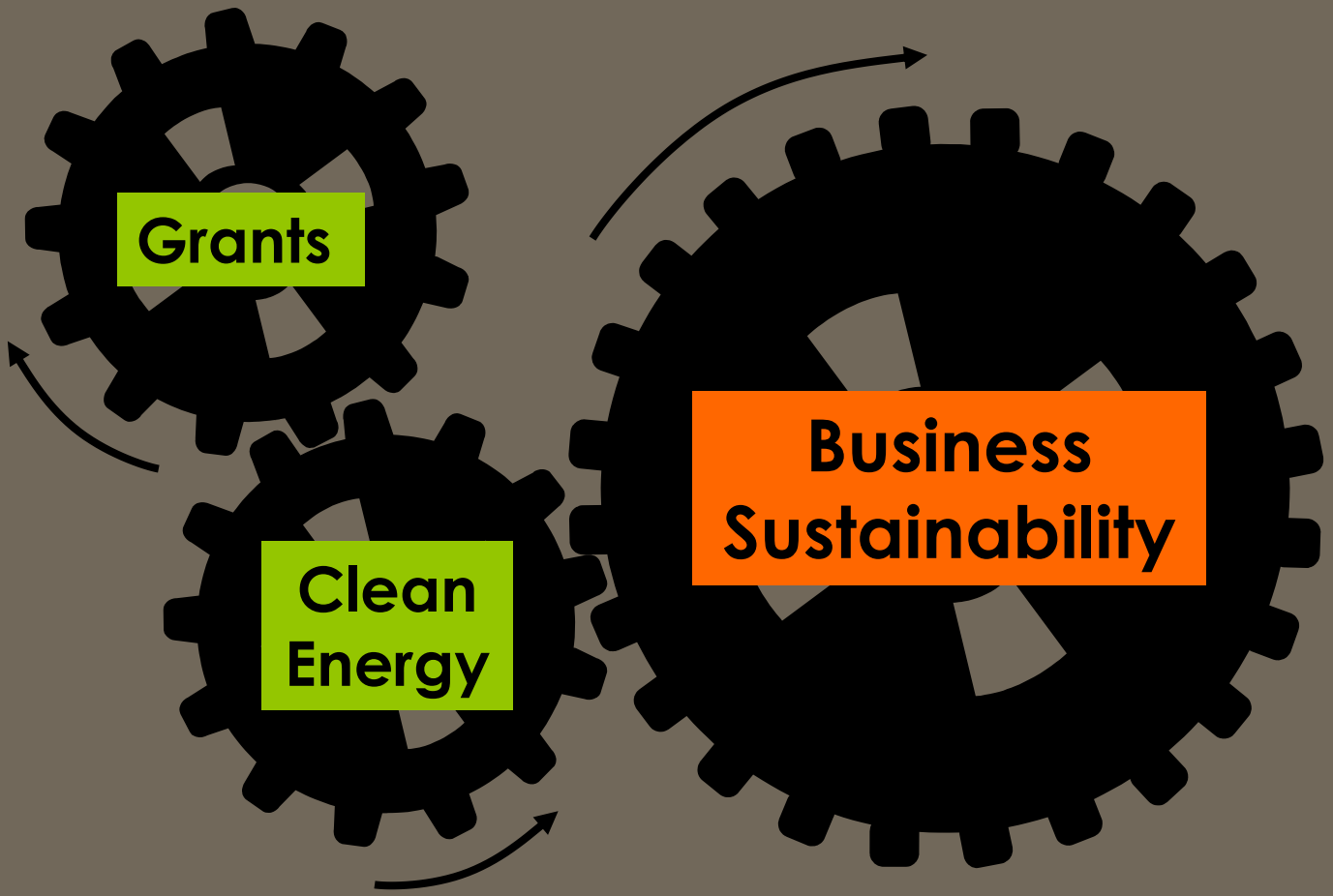
Business Sustainability



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Example: 100kW system

System Watts/Cost per watt	
System size (in watts)	100,000
Cost per installed watt	$5.75
Feedstock Cost per ton (Processed Switchgrass)	$65.00
Average Cost per kWh generated (year 1-10)	$0.082
Average Cost per kWh generated (year 1-20)	$0.107
BioChar Value per ton	$0.00
BioChar efficiency (2%-18%)	4%

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100 kW Example

*According to TVA

- The average home in Tennessee consumes 1200 kWh's month*, therefore this system could power 55 homes and would consume approximately 1.6 tons of biomass per day.
- Assuming a garbage truck contains 16 tons of waste, this is the equivalent to only one delivery every 10 days.

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100 kW Financials

System Estimated Generation	
Approximate kwh per year generated at 91% efficiency	797,160
Estimated Annual FeedStock Tonnage consumed	598
Price per kWh + any fuel surcharge (from your electric bill)	$0.11
Estimated Annual Utility Offset (year 1)	$87,688
Estimated Operating Cost (year 1)	$62,502
Estimated Annual BioChar Revenue	$0
Estimated Savings (year 1)	$25,185

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Financials

Incentive Application*	
Capital Investment	**$575,000**
Clean TN Grant	$250,000
Federal Tax Credit (30% No Cap)	$187,500
Net Investment after 1st year Incentives	**$152,500**
Estimated Utility Rate Savings (year 1-10) (6.249% Utility Escalator)	$550,731
Estimated Utility Rate Savings (year 1-20) (6.249% Utility Escalator)	$1,642,184
Estimated BioChar Revenue (year 1-20)	$0.00

***Please consult your tax professional for applicability to your tax situation. ARiES Energy, LLC makes no guarantees in regards to tax applicability.**

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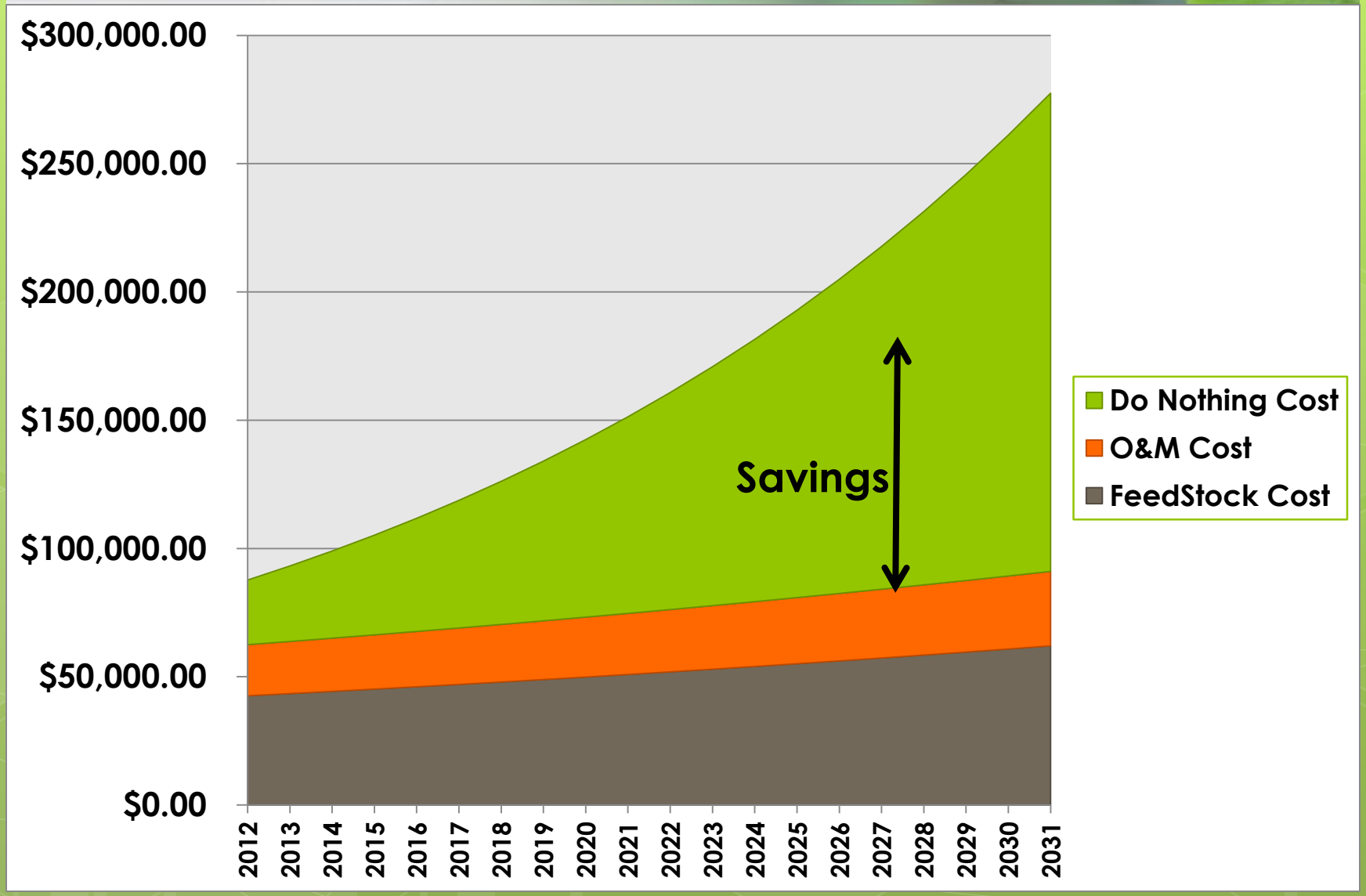
Annual Cost Comparison



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Projects Under Construction

- Wampler's Farm Sausage, US
  - Lenoir City, Tennessee
  - Off set base load – Power
  - Commercial Manufacturer

- Heckfield Place, UK
  - Hampshire, England
  - 2.6 MW – Combined Heat/Power
  - Luxury Country House Hotel-Resort

- Transfer Station, US
  - Raleigh, North Carolina
  - 600kW – Power & Volume Reduction
  - Construction & Demolition Debris

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Summary

- Clean Tennessee Energy Grant awards from $5,000 to $250,000 to clean energy or energy efficiency projects.
- Winners announced in May 2012; have 2 years to complete project.
- The CHyP System is a qualifying project for these grants.
- ARiES Energy can prepare your application and guide you through all the processes and authorities until final commissioning.
- Due date for grant applications: March 31st

We need to get started ASAP

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To Learn More…

- Workshop: February 27th: Morristown
  - 10-11 am Walters State College
  - Buggins Foundation Room
- CHyP Demo Day: February 29th
- Gosolar.ning.com
- Power Trip, by Amanda Little
- Sign up for Green Power Switch!

Please spread the word!

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Thank you!

- Harvey Abouelata, harvey@ariesenergy.com
- Lisa Leonard, lisa@ariesenergy.com
- Patrick West, patrick@ariesenergy.com
- Lauren Steier, lauren@ariesenergy.com

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www.ariesenergy.com