

# **Renewable Dairy Fuels Project Review**



**Annual Manure Energy Output**

2,117 kWh or 14.6 MMBTU

\$148 @ 7¢ or \$73 @ \$5



**Annual Manure Nutrient Output**

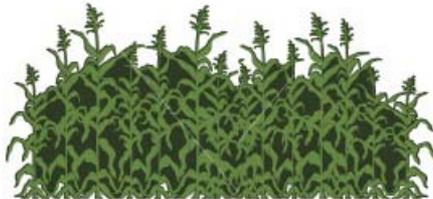
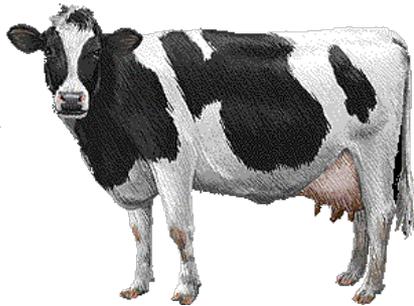
220 lbs. Nitrogen

40 lbs. Phosphorus

137 lbs. Potassium

Value = \$219.19

**Manure Processing**



**Corn Nutrient Requirements**

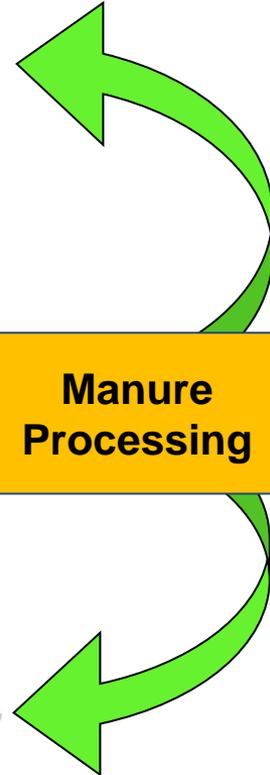
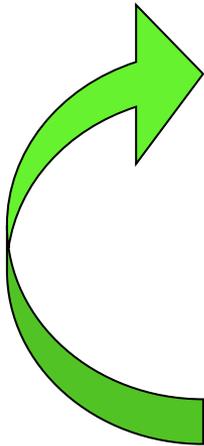
210 lbs. N - 35 lbs P - 166 lbs K

Cost = \$226.08

**Alfalfa Nutrient Requirements**

0 lbs. N - 35 lbs P - 249 lbs K

Cost = \$166.19



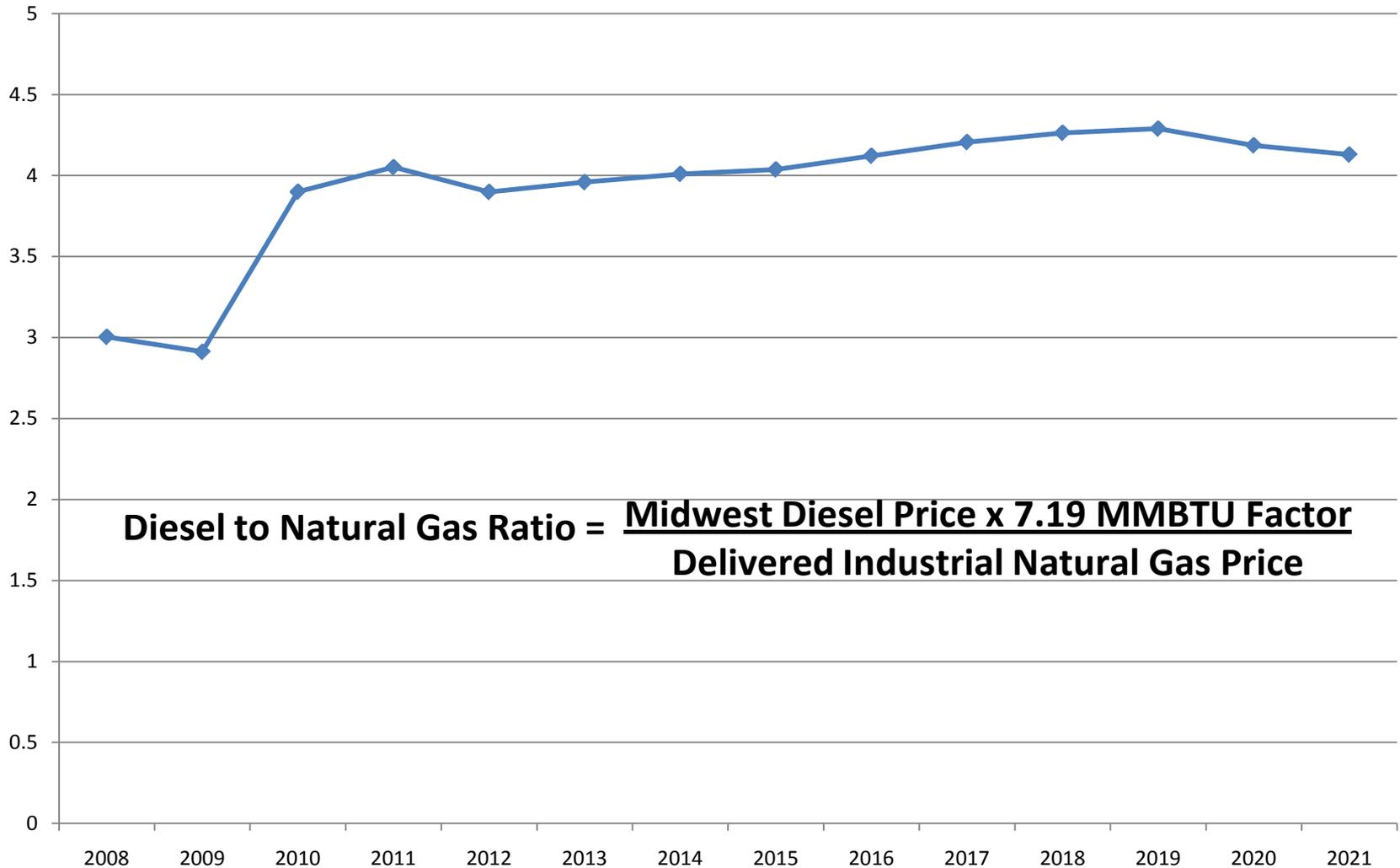
# What Makes This Work?

The disconnect between Natural Gas and Transportation Fuel Based on Petroleum



**7.19 Gallons of Diesel = 1000 Cubic Feet of Natural Gas**  
**Both = 1,000,000 BTU's**

## Projected Midwest Diesel to Delivered Natural Gas Ratio



$$\text{Diesel to Natural Gas Ratio} = \frac{\text{Midwest Diesel Price} \times 7.19 \text{ MMBTU Factor}}{\text{Delivered Industrial Natural Gas Price}}$$

Data From The U.S. Energy Information Administration (EIA) Annual Energy Outlook 2011

[Release Date: April 26, 2011](#) | [Next Release Date: April 2012](#) | [Report Number: DOE/EIA-0383\(2011\)](#)





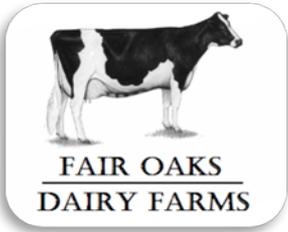
## Project Overview

Plants	One Way Miles	Round Trip Miles	Loads	Total Miles
Indianapolis	116	232	17	3,944
Winchester	316	632	19	12,008
Murphysboro	428	856	17	<u>14,552</u>
			Daily	30,504

	Weekly Miles	Annual Miles	Annual DGe Based on 5.5 mpg	Annual MMBTU	Daily MMBTU
Fair Oaks	142,352	7,402,304	1,345,873	181,693	498
Clark County	71,176	3,701,152	672,936	90,846	249
<b>Total</b>	<b>213,528</b>	<b>11,103,456</b>	<b>2,018,810</b>	<b>272,539</b>	<b>747</b>



Land Lease & Easements



Digester Lease & Environmental Credits



Electrical Generation for RDF & Fair Oaks Dairy

Biogas Cleaning



VECTREN

Natural Gas Provider

Fair Oaks Fuel Station



CNG Sales



Clark County Fuel Station

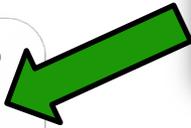
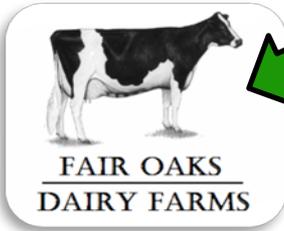


CNG Sales

Land Lease & Easements – Property lease for the Fair Oaks Fueling Station and easements for Biomethane Pipeline.



Land Lease & Easements



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CNG Sales



Clark County Fuel Station



CNG Sales

Digester Lease & Environmental Credits – Leased digester provides Biogas for gas cleaning and electrical generation. Credits include Carbon Credits, RIN's, REC's and Tipping Fees.



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CNG Sales



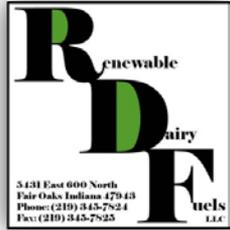
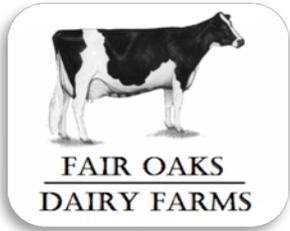
Clark County Fuel Station



CNG Sales

Electrical Generation for RDF and Fair Oaks Dairy – Generated electricity will be produced and used by RDF and the dairies to reduce their costs and lower the carbon footprint

Land Lease & Easements



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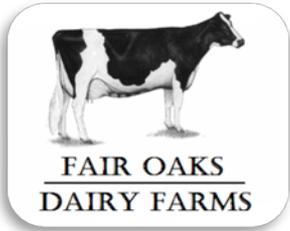
Clark County Fuel Station



CNG Sales

Biogas Cleaning – This is a contract for cleaning Biogas (60% Methane, 40% CO<sub>2</sub> and 3,500 ppm H<sub>2</sub>S) to pipeline quality (98% Methane, 2% CO<sub>2</sub>, .2 ppm H<sub>2</sub>S) and compression for putting into the Utility Pipeline.

Land Lease & Easements



Biogas Cleaning



Fair Oaks Fuel Station



Digester Lease & Environmental Credits



Electrical Generation for RDF & Fair Oaks Dairy



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Natural Gas Provider



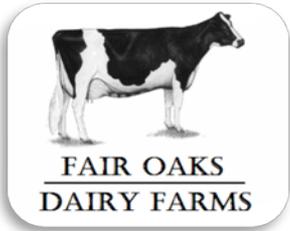
Clark County Fuel Station

CNG Sales



CNG Sales

Land Lease & Easements



NIPSCO & Vectren Contracts – Contract with NIPSCO for gas purchases to back up Biomethane production and sales into the pipeline to offset purchases from Vectren which is the Natural Gas Utility in Sellersburg IN.



Digester Lease & Environmental Credits



Electrical Generation for RDF & Fair Oaks Dairy

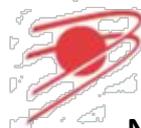
Biogas Clean



Fair Oaks Fuel Station



CNG Sales



VECTREN

Natural Gas Provider

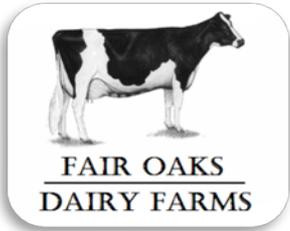


Clark County Fuel Station



CNG Sales

Land Lease & Easements



Clean Energy Contracts – Contracts for CNG station construction and operations. The Fair Oaks Station will utilize Biomethane while the one in Sellersburg IN. will run only on Utility Provided Natural Gas. Both stations will be open to the public

Biogas Cleaning



Digester Lease & Environmental Credits



Electrical Generation for RDF & Fair Oaks Dairy



VECTREN

Natural Gas Provider



Fair Oaks Fuel Station



CNG Sales

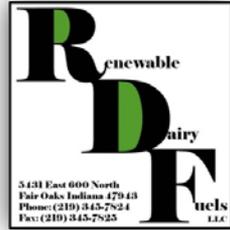
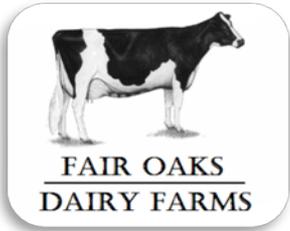


CNG Sales

Clark County Fuel Station



Land Lease & Easements



Ruan Contract – Contract for operation of the 42 trucks that are powered CNG with maintenance provided by Palmer Leasing of Indianapolis.

Biogas Cleaning



Fair Oaks Fuel Station



Digester Lease & Environmental Credits



Electrical Generation for RDF & Fair Oaks Dairy



VECTREN

Natural Gas Provider



Clark County Fuel Station

CNG Sales



CNG Sales



## Anaerobic Digestion



## in the United States

**74 GHD Digesters Operating**

**57 farms/sites with GHD digesters**

**13 states with GHD digesters operating, 2 under construction.**

**145,000 cows “going through” GHD digesters.**

**34 MW Total power production from dairy farms**

**First GHD Digester: Gordondale Farms, near Stevens Point, WI in 2001**



## Biogas Upgrading



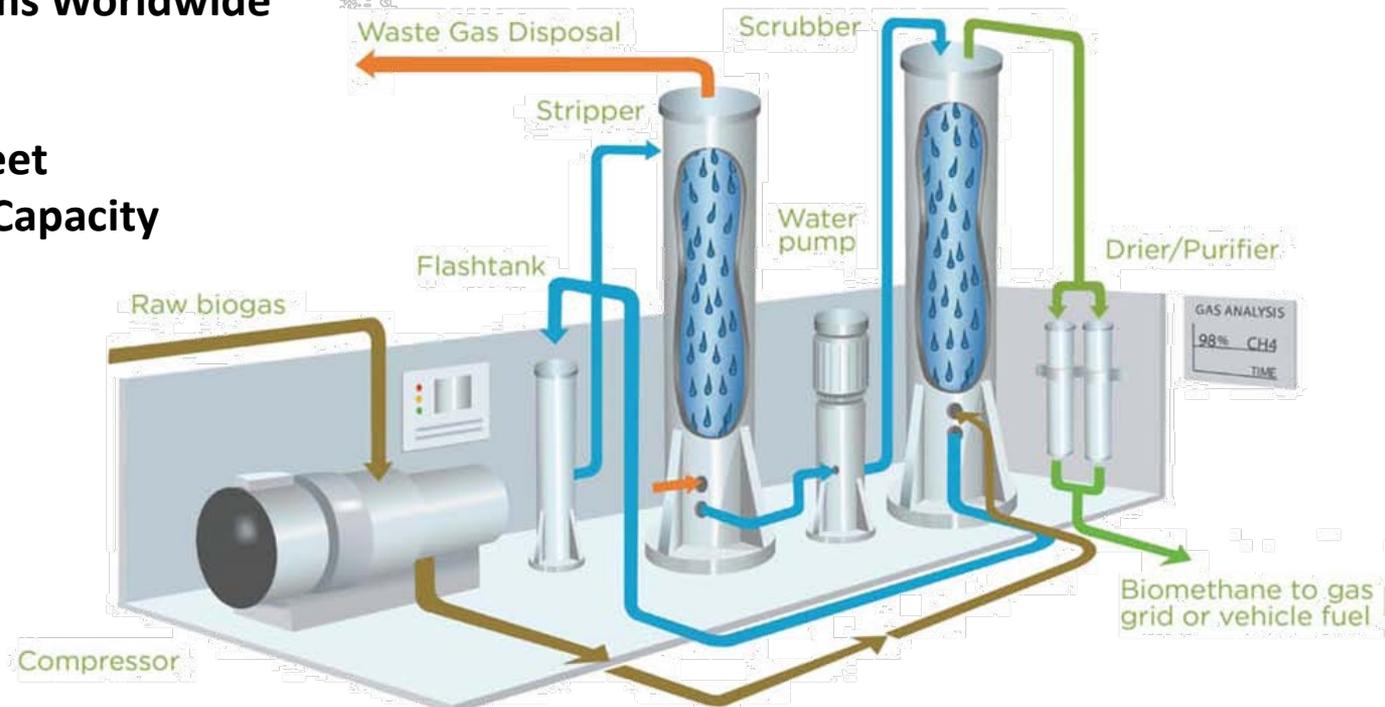
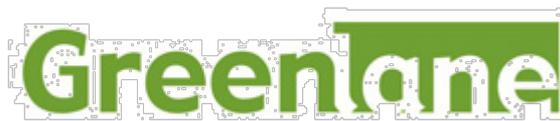
- UTS Residual Processing (UTS-RP) has the objective to be positioned as a leader in biogas technology including feasibility, design, operation and biogas upgrading and conversion to energy;
- UTS–RP sees themselves as a fusion of the best European Technology with extensive American knowledge, experience and service capability;
- Personnel based in the US with vast experience working with Anaerobic Digestion.
- UTS–RP understands the needs and differences of US market when compared to other countries.





## Biogas Upgrading

- Established in the early 1990's
- 30 operating systems Worldwide
- 13 Countries
- >1,500,000 Cubic feet per hour Installed Capacity





## CNG Fuel Station



**CE is North America's leading provider of natural gas for transportation**  
**200 natural gas fueling stations throughout North America**  
**More than 400 fleet customers operating over 17,500 Natural Gas Vehicles (NGV) daily**





## **RUAN Transportation Management Systems**

- 160+ locations nationwide**
- Professional drivers with 1/5 the turnover rate of the industry average**
- On-site manager to direct fleets and drivers**
- 99.8 percent on-time delivery**
- 99.7 percent customer retention**
- Ongoing commitment to quality and improvement**

- 24/7 customer care, full-service transportation company**
- Asset- and non-asset-based solutions**
- First in the industry to implement a formal safety program**
- Board members of the American Trucking Associations (ATA) and National Tank Truck Carriers (NTTC)**
- Leadership council for the SmartWay Transport Partnership**
- Co-chair E-SMART for Innovation Center for U.S. Dairy**

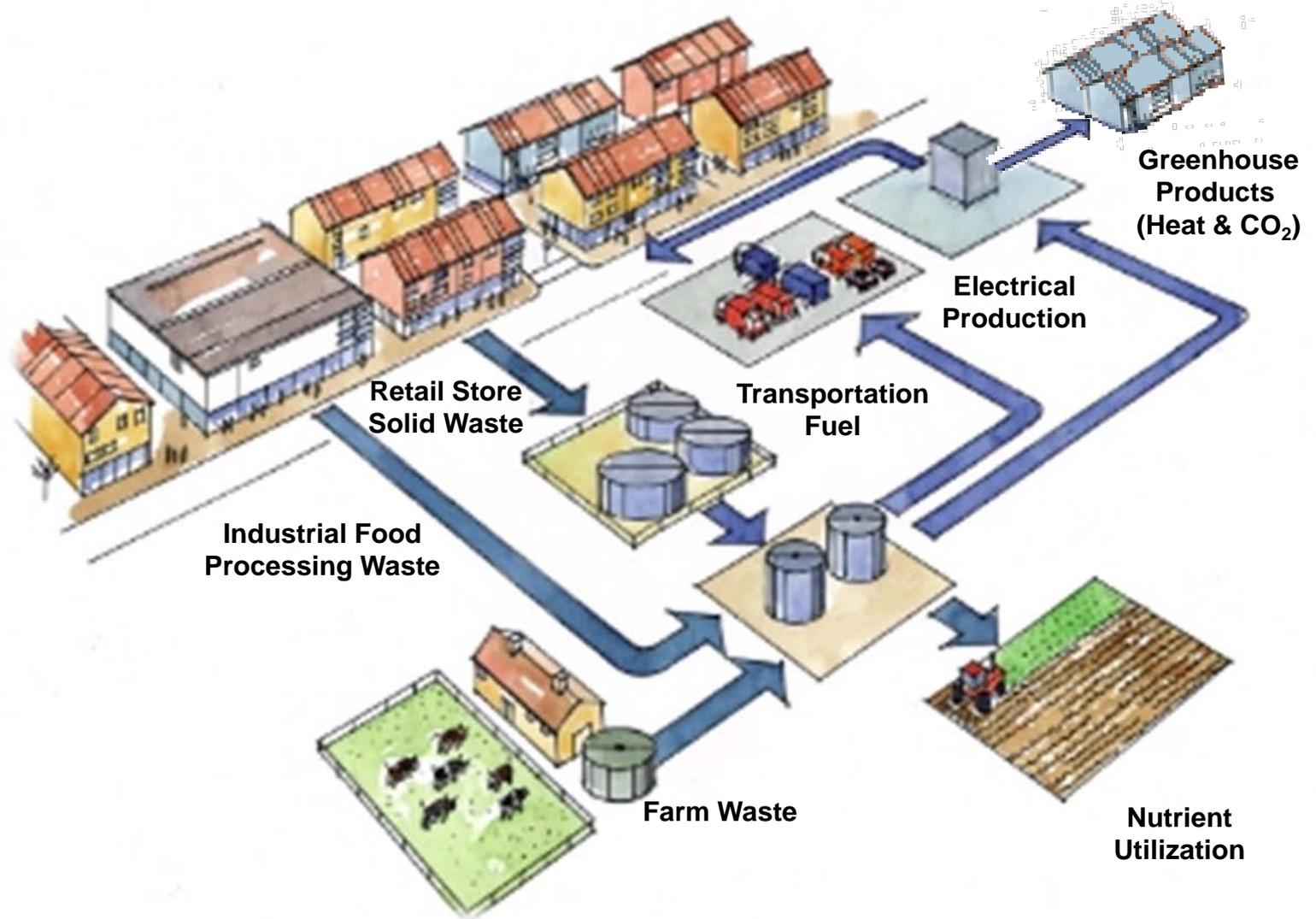


## Project Capital Costs

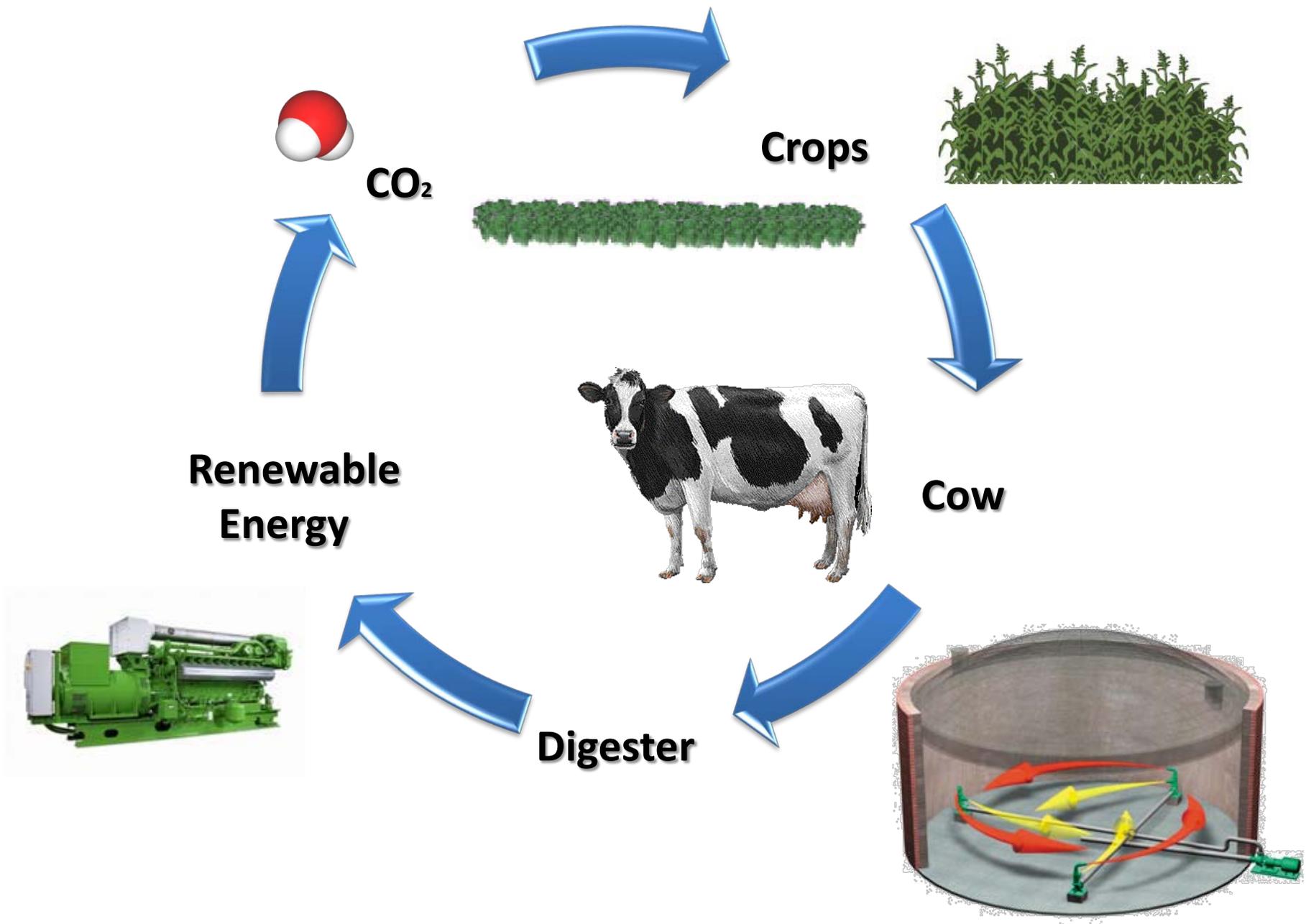
Compression and Cleaning	\$	6,200,000
Fair Oaks Fuel Station	\$	1,988,160
Clark County Fuel Station	\$	1,900,433
NIPSCO security Deposit	\$	132,000
Construction- Interest & Financing Fees Capitalized	\$	174,504
Digester Heat Exchangers	\$	150,000
Contingency	\$	<u>704,903</u>
Total	\$	11,250,000

## Project Financing Sources

USDA B&I Guaranteed Loan	\$	5,500,000
RDF Short Term Obligation	\$	3,200,000
Greater Indiana Clean Cities Grant	\$	750,000
Member Equity	\$	<u>1,800,000</u>
Total assets	\$	11,250,000



**The Goal: an Integrated Solution that converts Waste into Value Added Products**

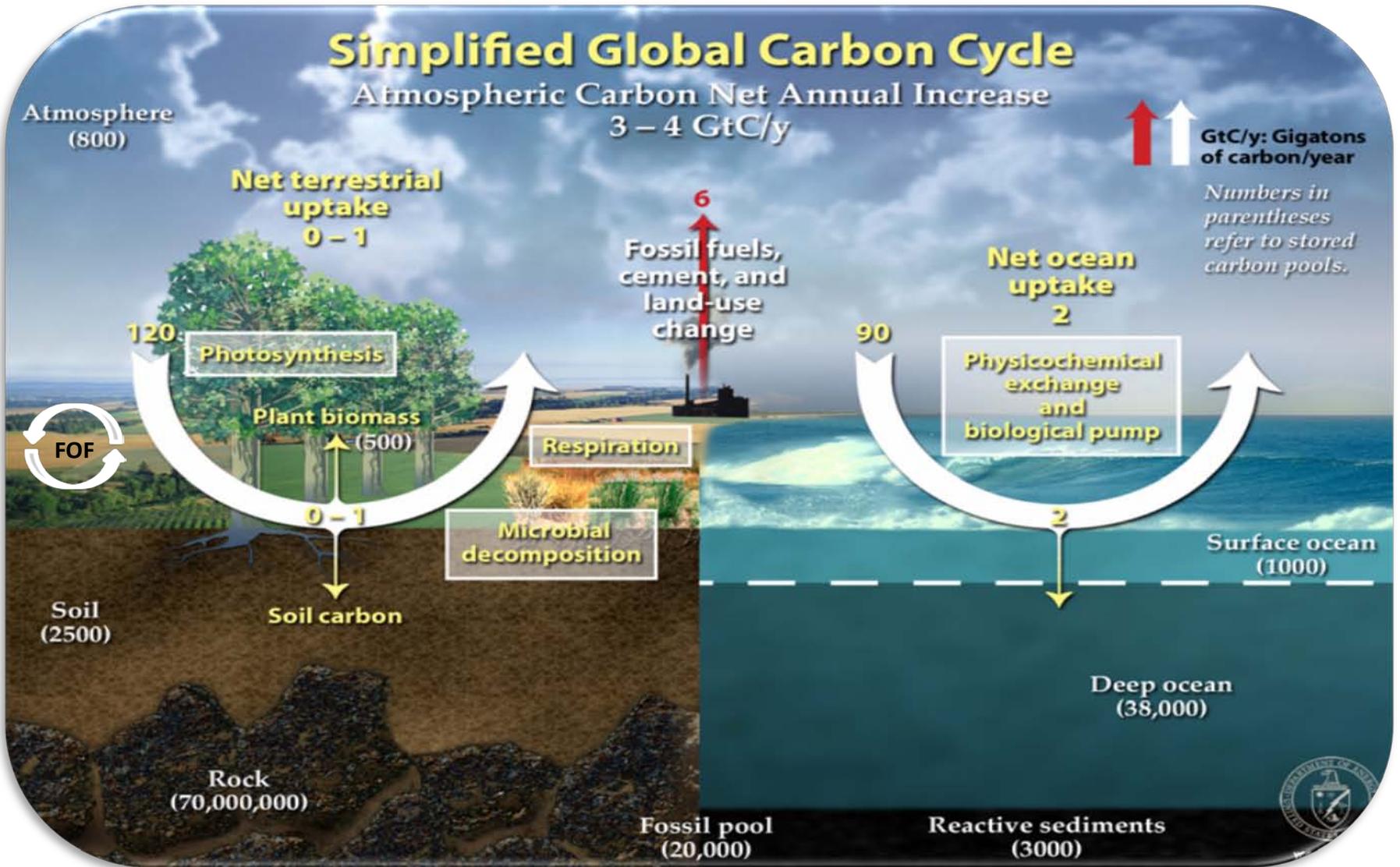


# Simplified Global Carbon Cycle

Atmospheric Carbon Net Annual Increase  
3 – 4 GtC/y

  **GtC/y: Gigatons of carbon/year**

*Numbers in parentheses refer to stored carbon pools.*



## True Carbon Footprint Reduction

# Questions

