

# PROMUS OUTLOOK-GRANGER PROJECT

NEW DIGESTER MODEL: RNG, RECOVERED NUTRIENTS & FIBER

Western WA Clean Cities  
Cash Cow Workshop  
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# Promus Energy Digester System

Anaerobic digester-based system that profitably converts organic wastes (e.g., manure, substrates) to revenue-generating products, including:

- RNG delivered to fleets for half the price of diesel
- Bio-fertilizers (ammonium sulfate, P-solids)
- Fiber products (peat moss substitute, compost)
- Carbon credits, RINs
- Potentially other products, such as CO<sub>2</sub>

## Presentation overview

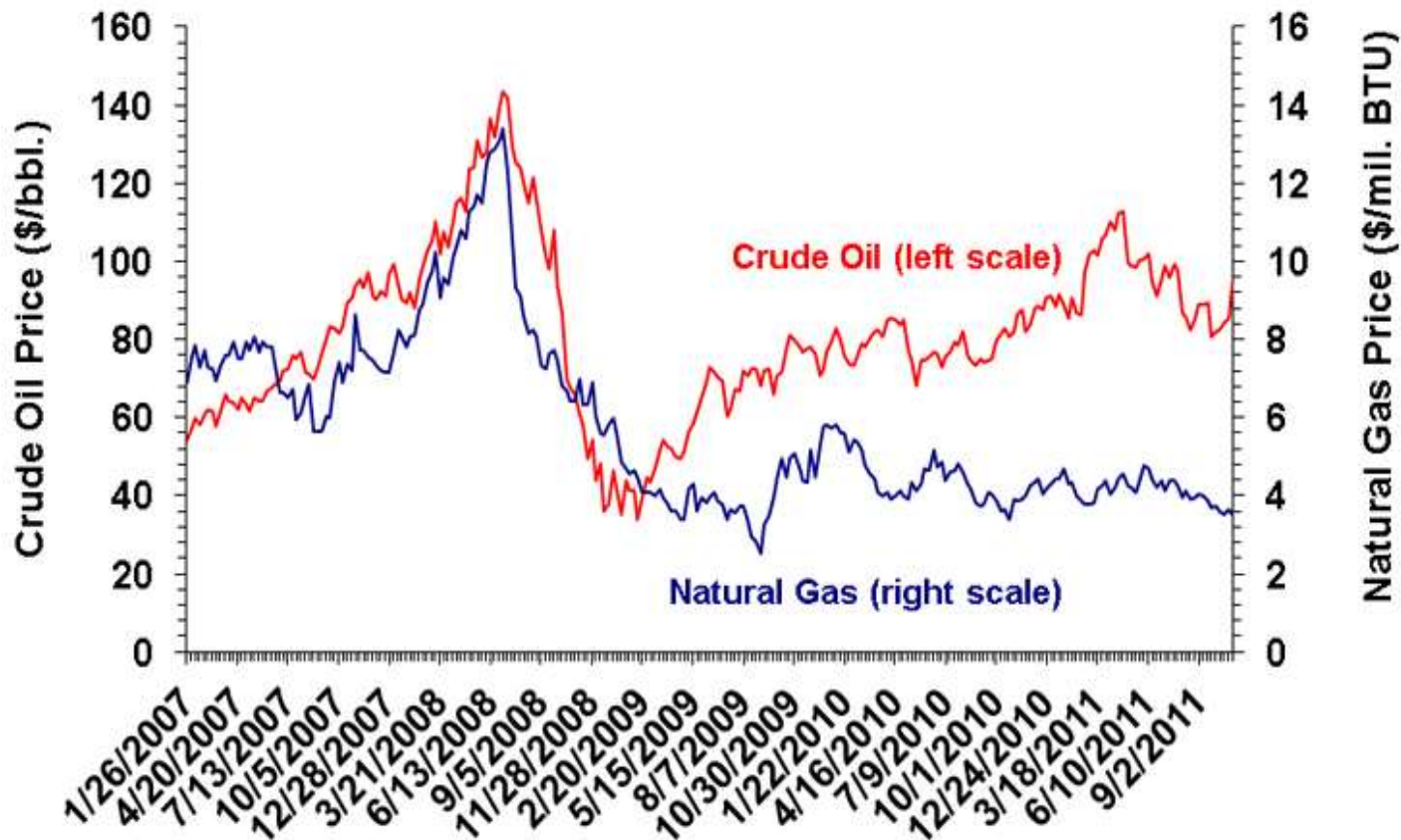
1. Anaerobic digester waste-to-revenue system
2. WA Dept. of Commerce RNG/Nutrient Recovery Feasibility Study (2012)
3. Promus Outlook-Granger Project Overview

1. Anaerobic digester waste-to-revenue system
  - a) Renewable natural gas (RNG) for vehicle fuel  
(vs. elect)
  - b) Recovered nutrients & fiber products
  - c) Credits: RINs, carbon / LCFS credits

## a) RNG (biomethane) as Vehicle Fuel

- Good news: abundant, low-cost natural gas opens door to methane vehicle fuels, incl. RNG
- Bad news: cheap gas hard to compete with
- Questions:
  - Can RNG compete with fossil CNG?
  - Can RNG play significant role in vehicle fuel mkt?

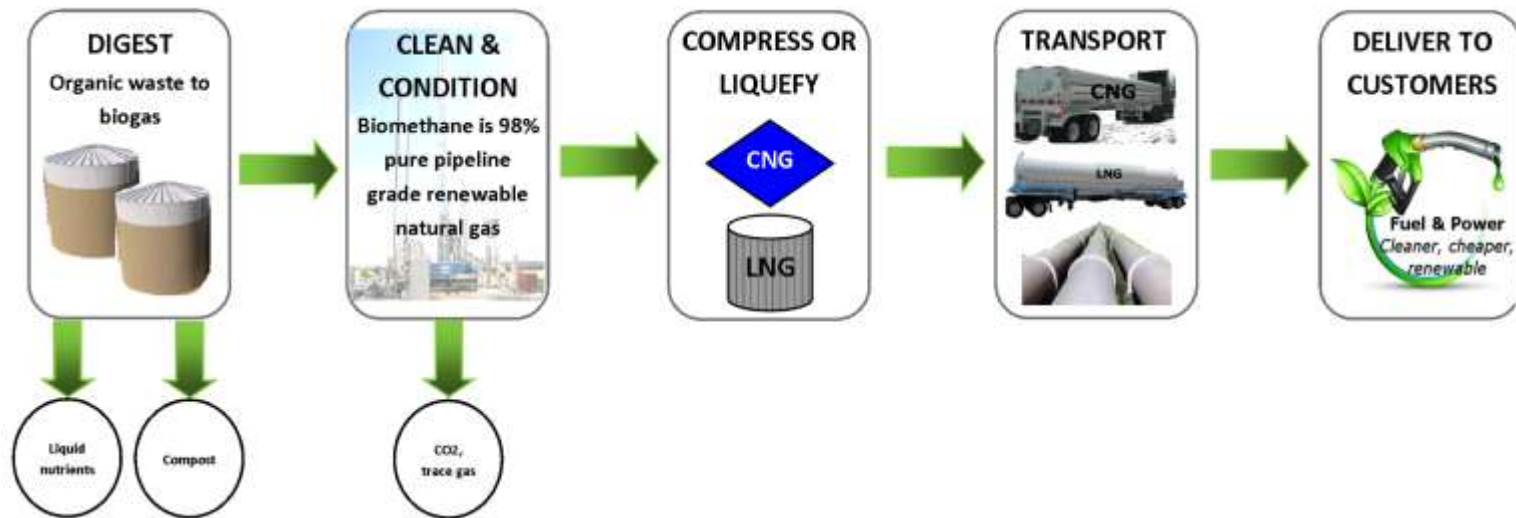
## Decoupling of gas & petroleum pricing since 2009



# RNG Production & Use

- RNG = Pipeline quality renewable natural gas
- Natural gas “drop in” fuel, including vehicle fuel:
  - CNG
  - LNG
- Differences:
  - From renewable biological process (AD)
  - Qualifies for RIN under Renewable Fuel Standard
  - Ultra low GHG, even GHG negative

# RNG Production and Delivery





## Sources of Biogas (RNG precursor)

- Landfills: 348,000 GGE/day
- Wastewater Treatment Plants: 37,000
- Dairy-based digesters: 61,000
- MSW digesters: 59,000

TOTAL WA 505,000 GGE/day

= 31% of diesel consumed in WA

= 7% of gasoline

Gas Cleaning Unit  
FloTech Totara  
Fair Oaks, Indiana



## b) Recovered Nutrients & Fiber

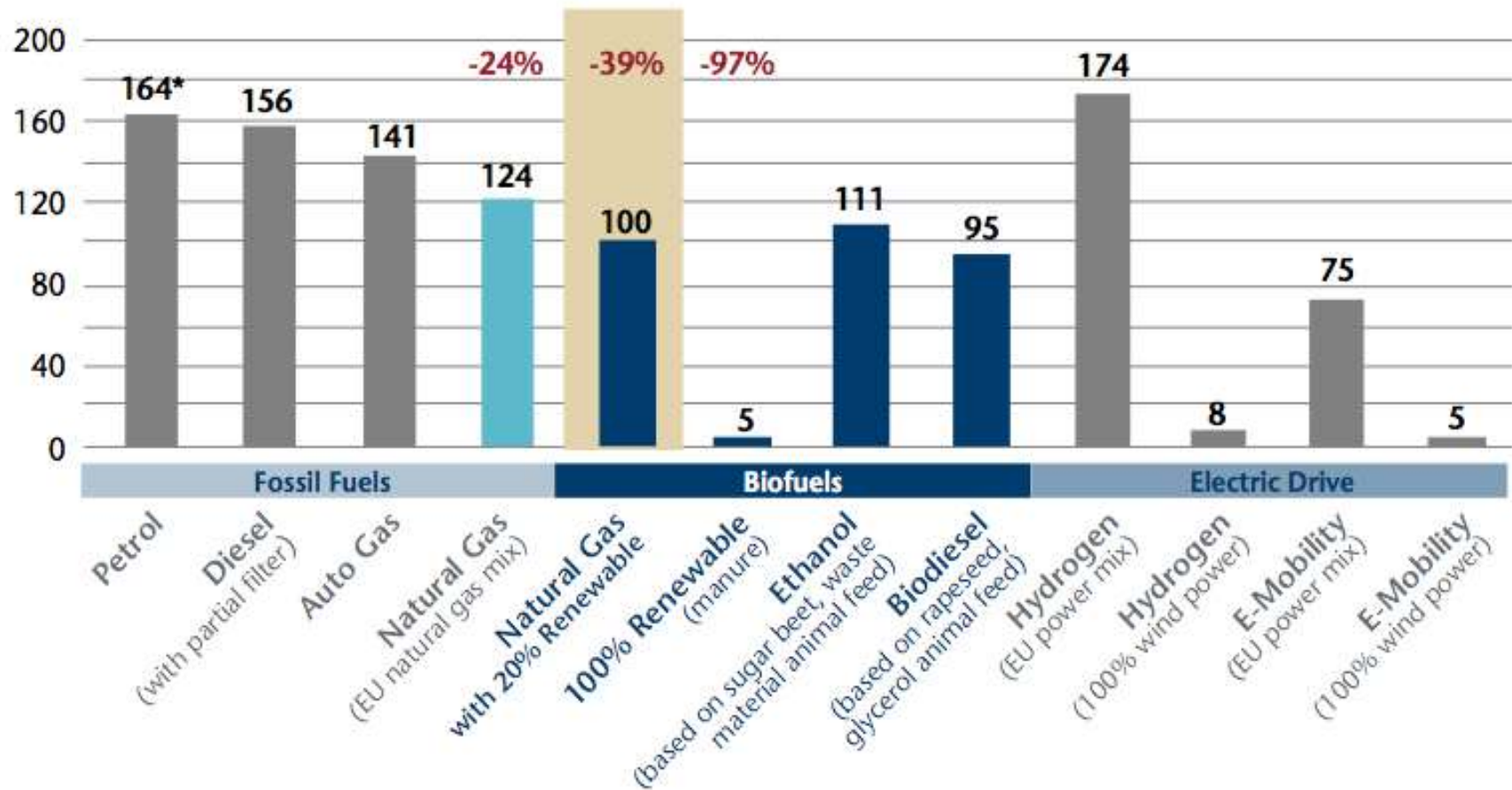
- Ammonium Sulfate
  - 8% pure N 8:0:0:9(S)
  - 15 tons/day; clear, odorless liquid
  - Can be blended with urea or other fertilizers
- Phosphorus Solids
  - 3% pure P 1.5:3:3:0.5(S):5(Ca):2(Mg):1(Fe)
  - 12 dry tons/day; can be certified organic
- Fiber
  - Hi-value peat moss substitute (\$11/cu yd)
  - 190 cubic yards/day

## c) Environmental Credits

- Carbon credits: methane capture (\$200k+/yr)
- RIN – RNG as vehicle fuel (\$1.22/DGE avg.)
- Low Carbon Fuels Standard (CA \$.35/DGE)
- Alternative Fuel Excise Tax Credit (\$.50)

# Well-to-Wheel GHG Emissions

Source: DENA -- German Energy Agency



\* Reference vehicle: gasoline engine (induction engine), consumption 71 per 100 km.

## 2. WA DEPARTMENT OF COMMERCE RNG FEASIBILITY STUDY

- Team selected to conduct 2012 feasibility study (WSU, Promus, et al)
- Purpose
  - Evaluate DeRuyter digester
    - RNG vs. CHP (Promus)
    - Full nutrient recovery (WSU's Craig Frear)

<http://csanr.wsu.edu/publications/deRuyterFeasibilityStudy.pdf>

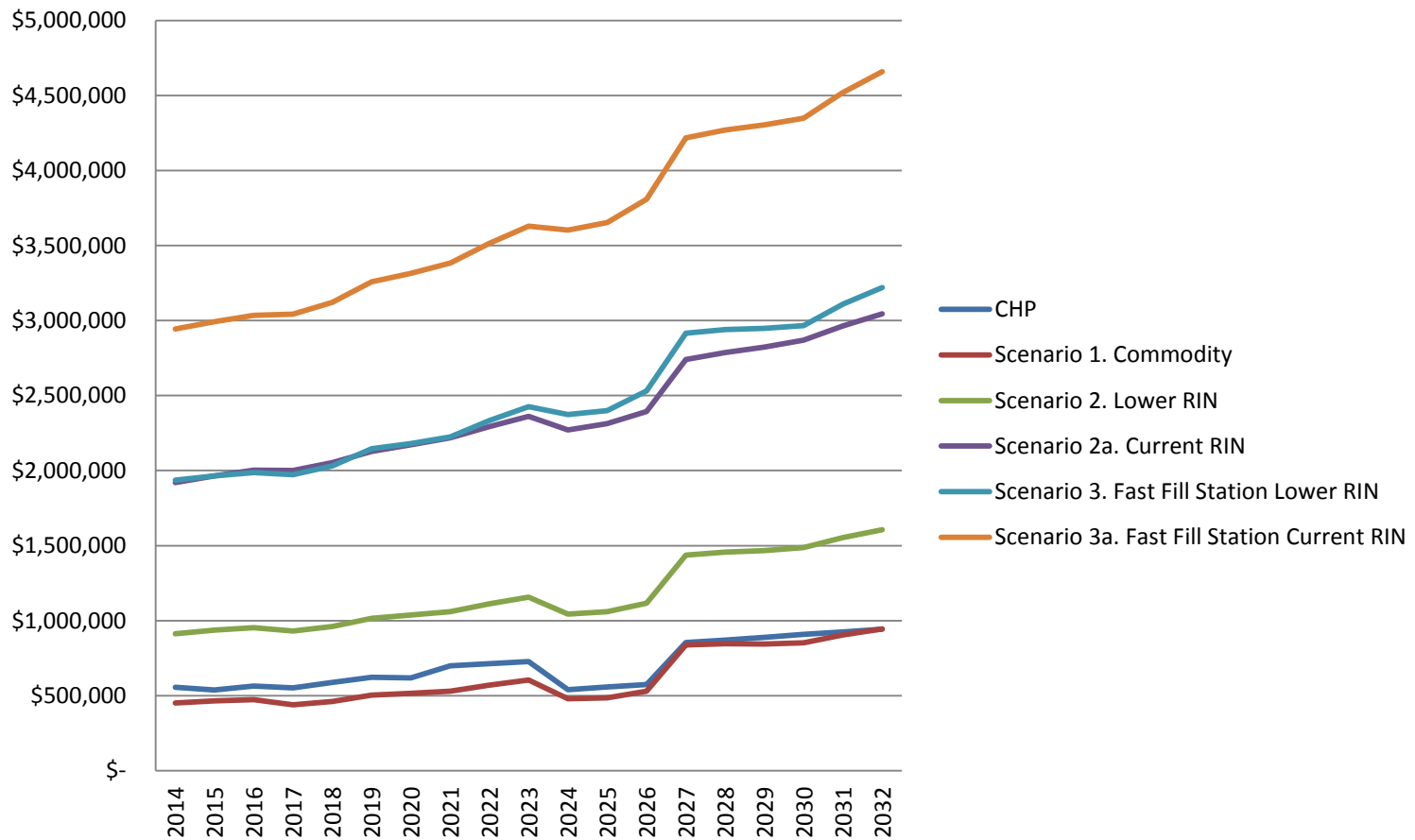
### Findings

1. Greater revenue potential from RNG
2. Diversified revenue stream important
3. Greater returns with greater biogas production
4. Full nutrient recovery feasible = regulatory certainty

# RNG pricing scenarios

- Commodity natural gas (\$.55/DGE)
- Commodity natural gas + RIN, etc.
  - $\$.55 + \$.61$  (split RIN @  $\$1.22/\text{DGE}$ ) =  $\$1.16$
  - $\$.55 + \$.61 + \$.18$  (split LCFS) =  $\$1.34$
- Retail CNG ( $\$2.40/\text{DGE}$ )
  - $\$2.40$  minus: transport, compression, dispensing
  - Plus split RIN, other attributes

# NET CASH FLOW CHP AND RNG SCENARIOS





# 3. Promus Outlook- Granger Proj. Overview

## PROMUS ENERGY

Gary Coppedge

Dan Evans

Kate Snider (Floyd & Snider)

Brandon Coppedge

Blair Scanlan

John Buchovecky (Van Ness)

Graham Noyes (Stoel Rives)

Bob Erwin (MaxEn Capital)

WSU Craig Stuart Frear

ADNGAR/DVO

Steve Dvorak & DVO team

Andgar team

GREENLANE/FLOTECH (gas cleaning)

## Project Overview

### Components

DeRutyer Digester

Cow Palace Digester

Joint Gas Scrubbing

Pipeline Injection

Full Nutrient Recovery

### Products

Renewable Natural Gas

Fiber

Bio-Fertilizer

Carbon Credits

# Project Specifics

- Digesters
  - DeRutyer digester + new AD at Cow Palace
    - 8,600 cows worth of manure
    - 20% organic substrate (e.g., glycerin, sugar, carbs)
- Digester Products
  - Pipeline quality RNG (8500 DGE/day)
  - Carbon credits
  - Fiber (peat moss substitute -- \$11/cubic yd whsle)
  - Bio-fertilizers (ammonium sulfate, P-solids)