

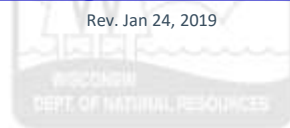
WISCONSIN WASTEWATER  
OPERATORS' ASSOCIATION



# Alternative Energy – zation as

## WISCONSIN DNR SEPTAGE MASTER OPERATOR CLASS

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S, SYMBIONT

# What to **Expect**



Why RNG?



Case Studies



Recap/Advantages



# Why RNG?

# Traditional Uses for Digester Gas



**Flare**

Lost Opportunity



**Boiler**

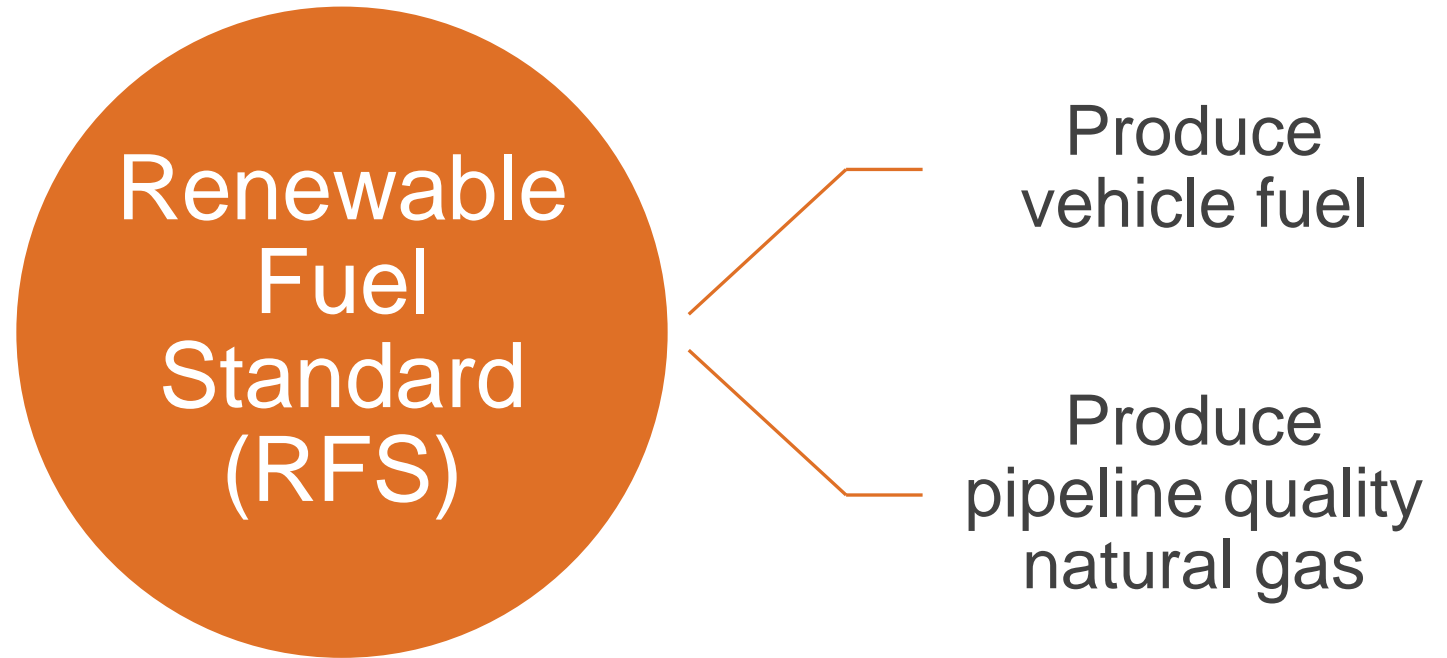
Process/Building Heat



**Engine  
Generator  
Microturbine**

Combined Heat/  
Power (Cogeneration)

## More Recent Biogas Uses



# Renewable Fuel Standard (RFS)

- The RFS program was created to:
  - ◆ Reduce greenhouse gas emissions
  - ◆ Expand nation's renewable fuels sector
- In 2007, program was significantly expanded:
  - ◆ Defining what qualified as a renewable fuel
  - ◆ Extending volume requirements to 2022
  - ◆ Increasing 2022 renewable fuel goal to 36 Bgal



# RFS Program Basics



## Obligated parties:

Refiners/importers of gasoline and diesel fuel



## Compliance achieved by:

Blending renewable fuel into transportation fuel

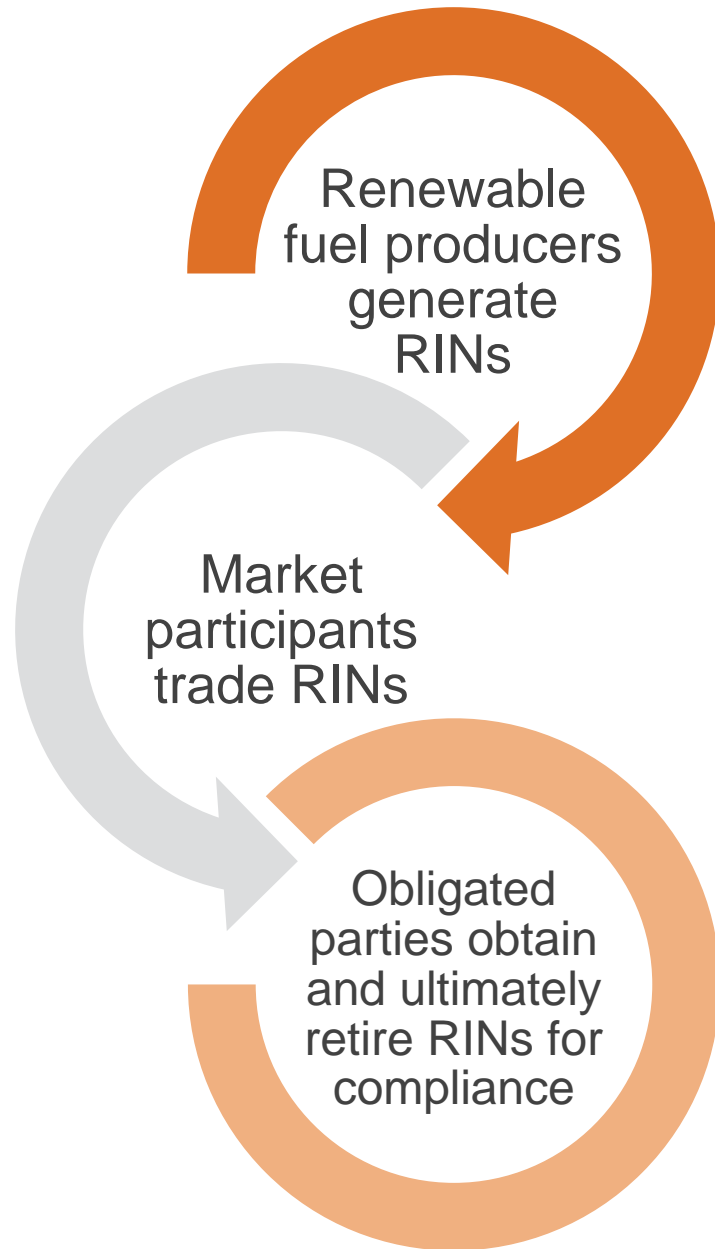
Obtaining credits (RINs – Renewable Identification Numbers)



## Renewable fuel producers generate RINs

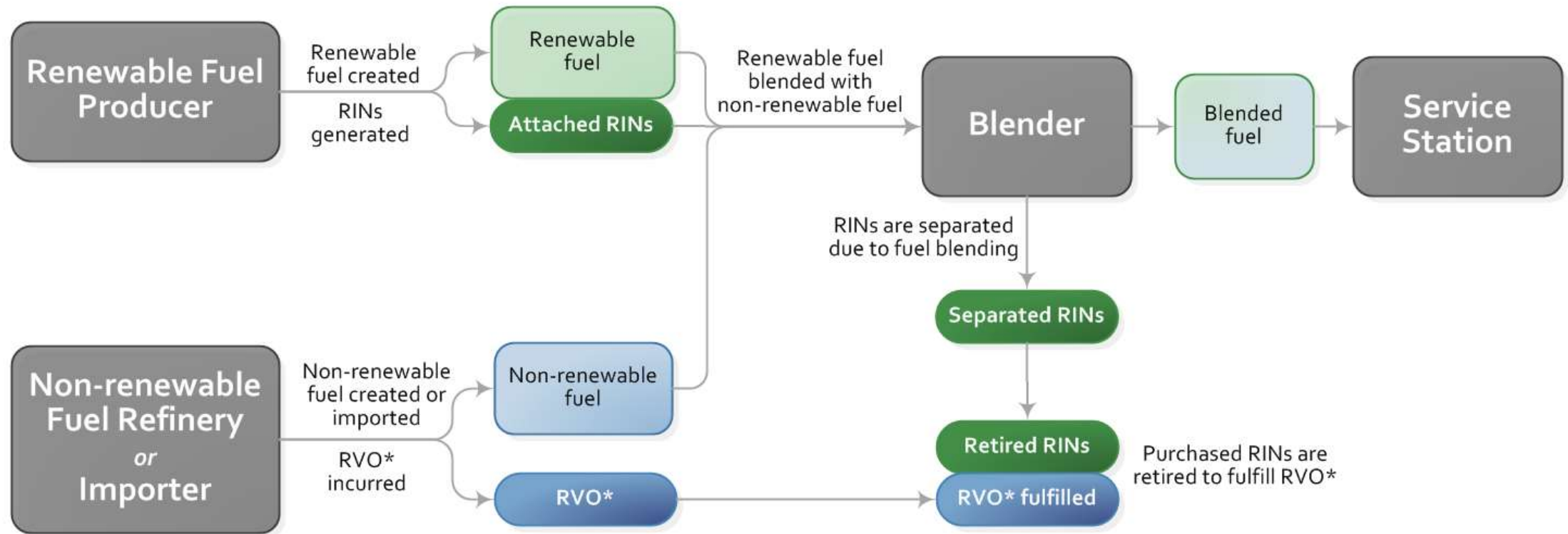


## RIN credits are the currency of the program



# Renewable identification numbers (RINs)

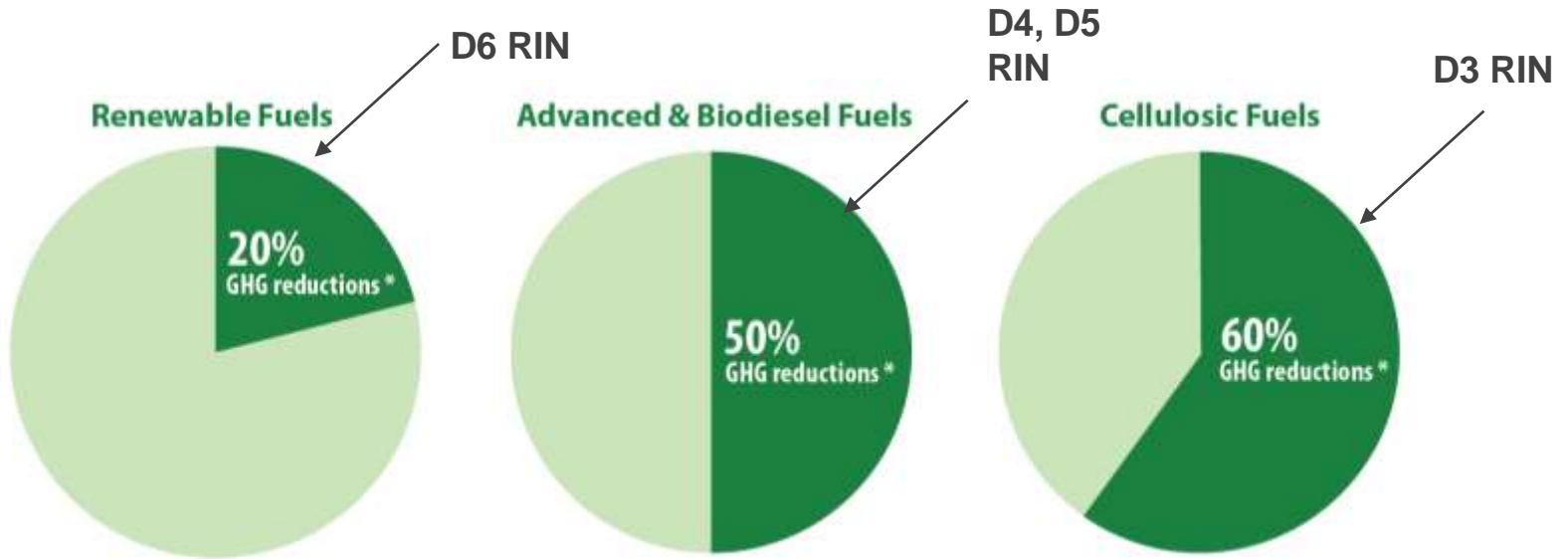
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\* RVO = Renewable Volume Obligation  
 Source: U.S. EPA

# RIN Example Life Cycle

# RIN TYPES

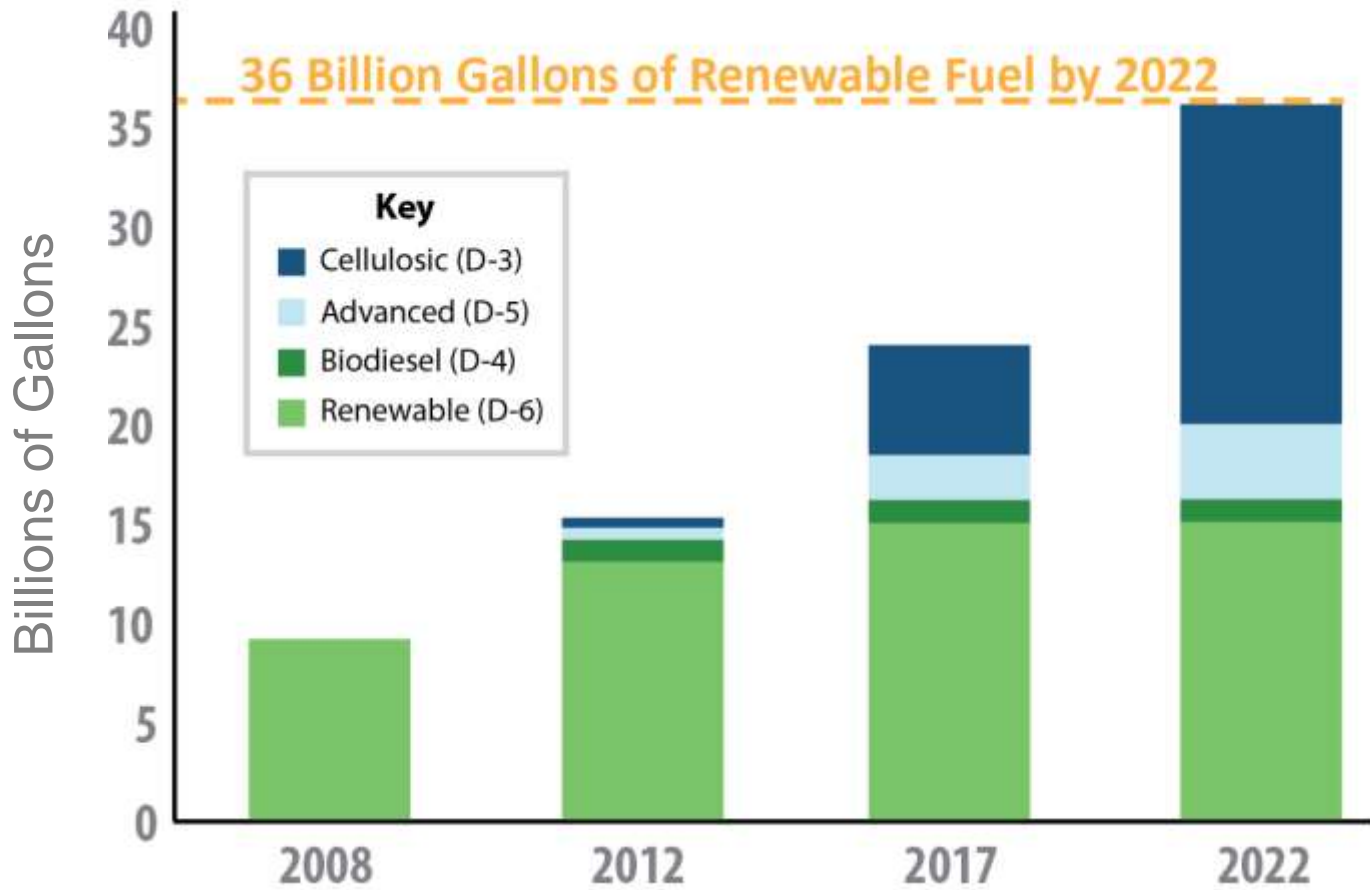


\* compared to a 2005 petroleum baseline

Source: U.S. EPA

Biogas from POTWs qualify for **D3 RINs**

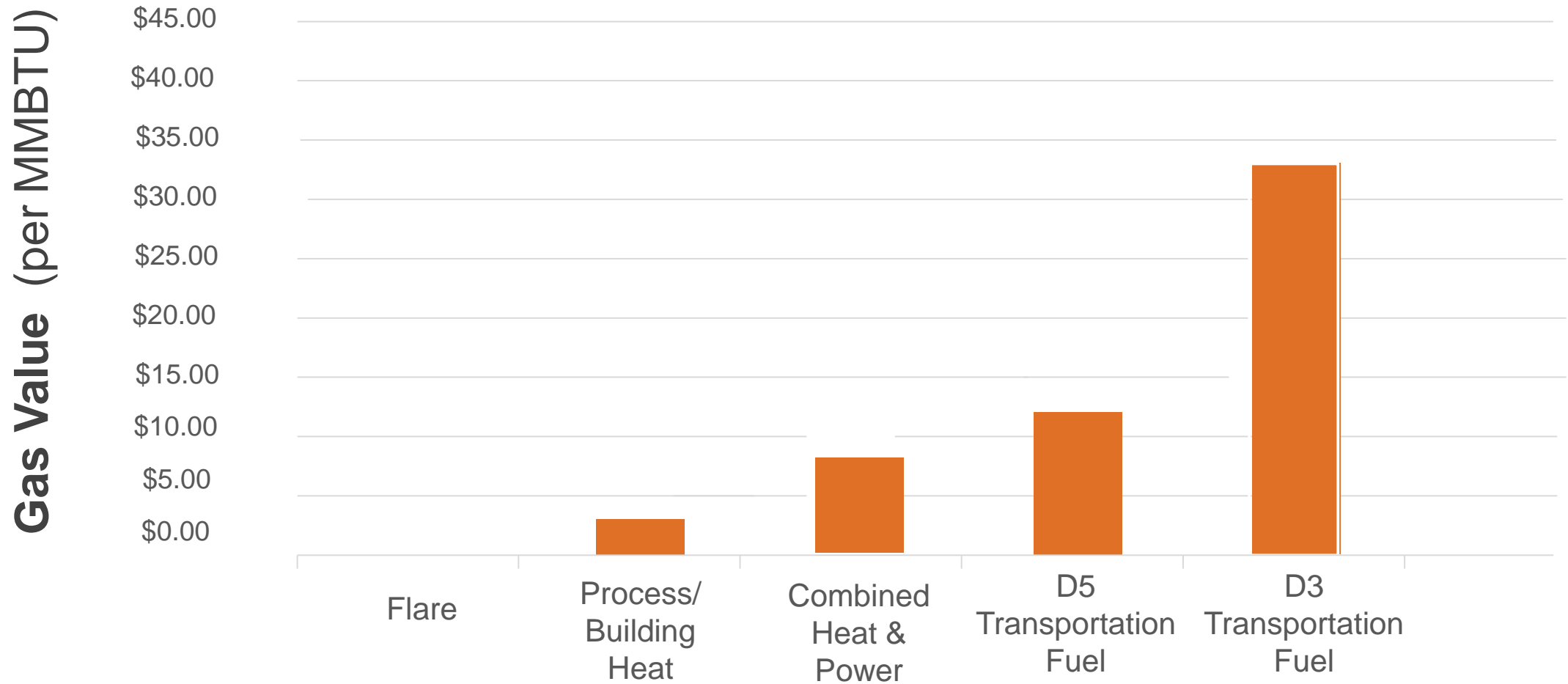




# Renewable Fuel Volume Targets (RVO)

Source: U.S. EPA

# Biogas Value Based on Utilization

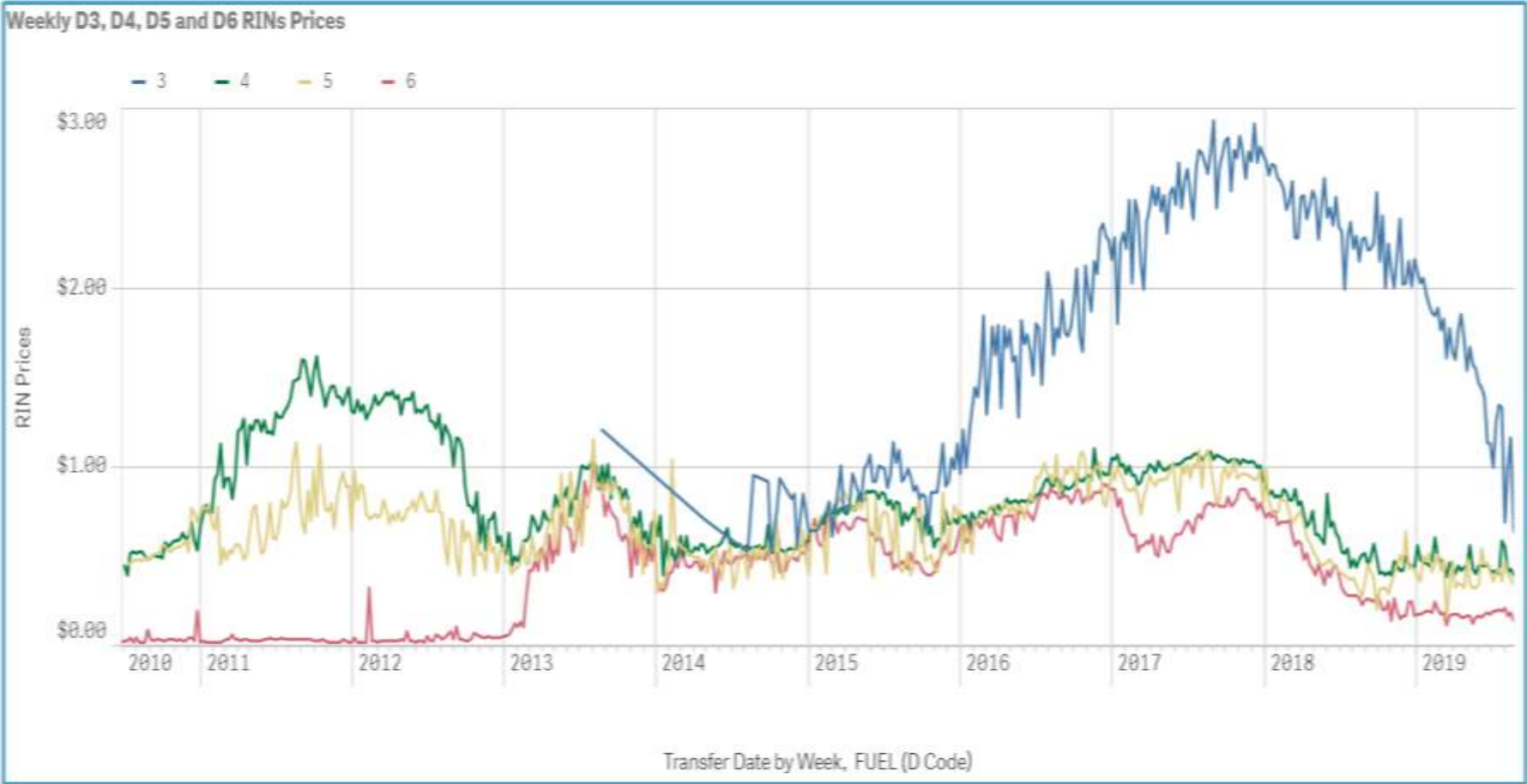


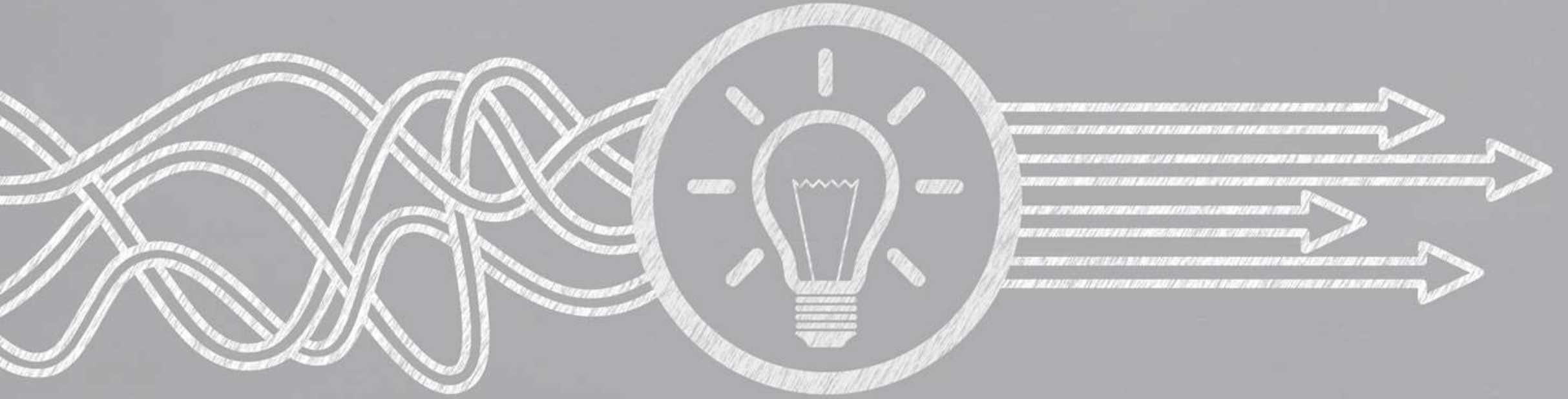
# RIN Market Value

Transfer Years

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
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Last updated date: Sep, 10, 2019 (Updated monthly)





# Case Studies

# Persigo Gas System Upgrade

## Challenge

A municipality in Colorado wanted to reduce plant operating costs by converting digester gas to RNG (using BioCNG™ conditioning skids).





# Persigo Gas System Upgrade

## Overview

- Municipal WWTP
- 500 GGE/day produced (200 cfm)
- Piped 6 miles to existing CNG fueling station
- Fuel powers a fleet of busses + municipal vehicles

Equipment				
H <sub>2</sub> S Vessels	Gas Conditioning Skid	Gas Control Skid with Chiller	New Flare	Six Miles of Pipeline



# Persigo Gas System Upgrade

## Solution

In conjunction with the municipality, Symbiont built a system to transport CNG from the local WWTP to a preexisting fueling station.

- CNG fuel sold to a public transportation agency as a source of revenue
- CNG fuel also powers city refuse trucks, street sweepers, and general utility pickups

# Upgrade Cost

**Equipment  
\$1,550,000**



**Construction  
\$1,300,000**

**Total  
\$2,850,000**



# St. Landry Parish Vehicle Fuel System

## Challenge

A regional waste disposal district wanted to increase gas production and construct a renewable natural gas system to produce vehicle fuel.





# St. Landry Parish Vehicle Fuel System

## Overview

- Municipal solid waste
- 50 scfm biogas treated
- 210 GGE/day produced
- Fuel sold to power 10 CNG refuse trucks

Equipment				
H <sub>2</sub> S Vessels	Gas Conditioning Skid	Gas Control Skid with Chiller	CNG Fueling Station	Medium and High-Pressure Storage Tanks



# St. Landry Parish Vehicle Fuel System

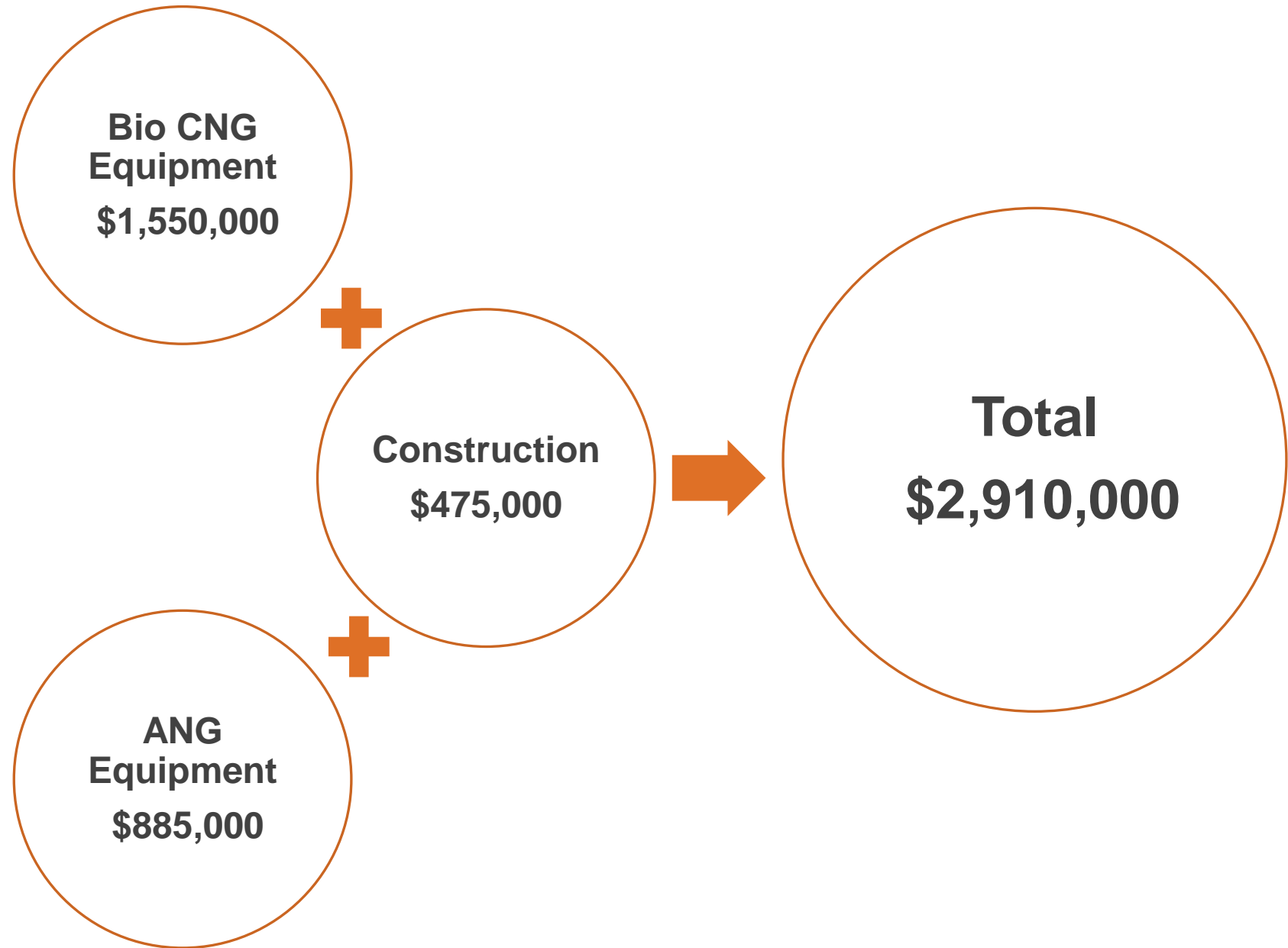
## Solution

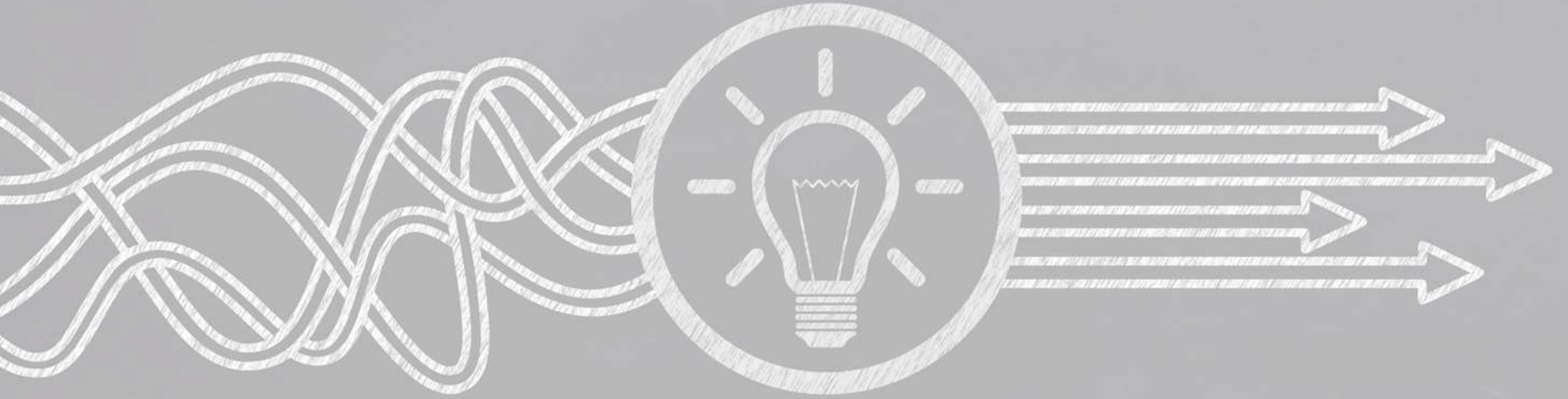
In conjunction with the municipality, Symbiont managed:

- Construction
- Scheduling
- Regulatory Approvals
- Commissioning for the installation of the BioCNG™ system

CNG fuel sold to power fleet of 10 CNG refuse trucks

# Upgrade Cost





# Recap/Advantages

	Compared to Gasoline	Compared to Diesel
NOx	66% (g/mile basis)	N/A
NMHC	85% (g/mile basis)	N/A
CO	50% (normal driving)	N/A
Air Toxics	85%	N/A
SO <sub>2</sub>	90%	90%
Global Warming Gases	20%	50%
Particulate Matter	NA	50-75%

# Relative Pollutant Reduction Using RNG Fuel

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# Critical Considerations Affecting Feasibility

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Purchaser of Gas



Value of RIN



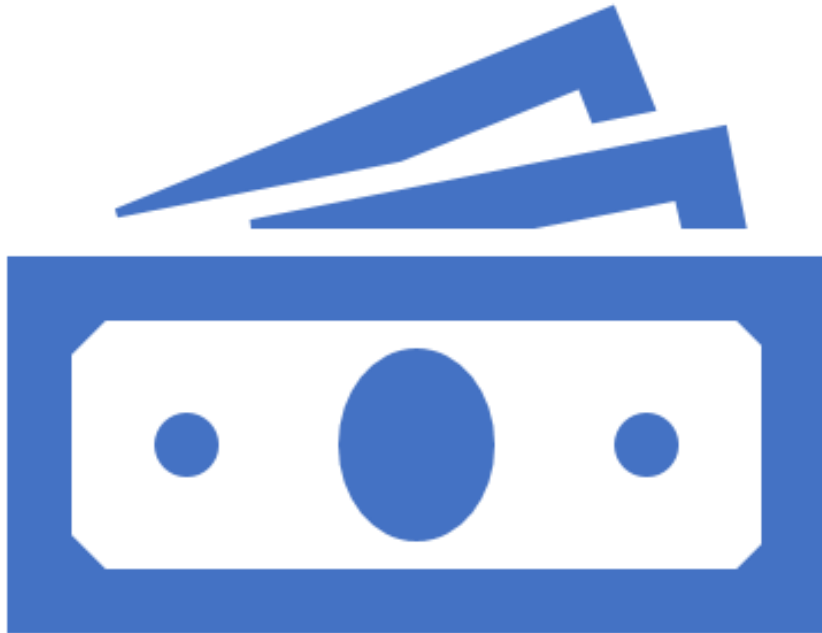
Value of Sale of Gas



Potential for Additional Feedstock



Capital and O&M Cost Estimates



# Simple Payback Analysis

- Capital Cost
- Operating Cost
- Annual Gross Revenue
- Annual Net Revenue
- Simple Payback





# Want to Know more?

Visit Symbiont at **Booth 218**

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## Contact Us

414.291.8840

Jeff.Vanvoorhis@SymbiontEngineer.com



# Low Carbon Fuel Standard (LCFS) Credits

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- Program designed to reduce greenhouse gas (GHG) emissions
- Applies to fuels used for transportation
- \$6.85/MMBTU CNG
- \$610,000/year

