Biogas Opportunities Workshop

Federal Policy

Opportunities and Challenges in Anaerobic Digestion: Maryland and the Northeast US Experience

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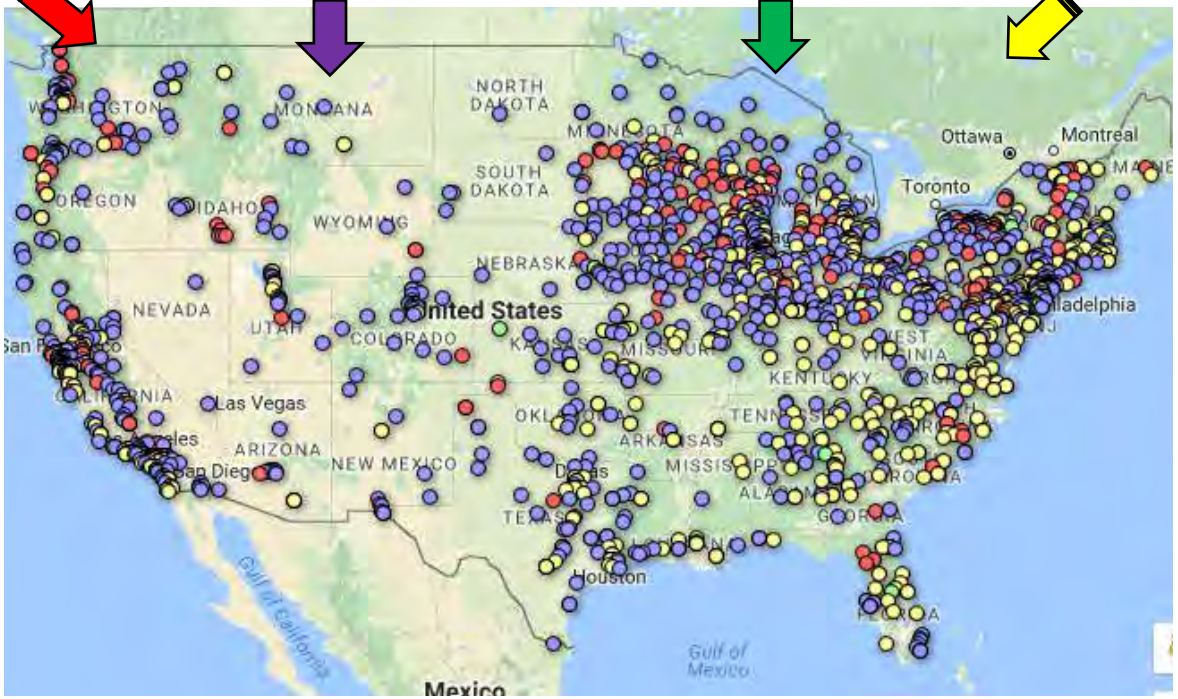
U.S. Biogas Market

253
on Farm
(dairy, swine only)

1,269
Water
(860 using their biogas)

66
Food Scrap

645
at Landfills



2,200+
Operational
Biogas Systems

13,500+
Potential
New Biogas Systems

8,241
on Farm
(dairy, swine only)

3,888
Water
(incl. 380 not using their biogas)

931
Food Scrap

440
at Landfills

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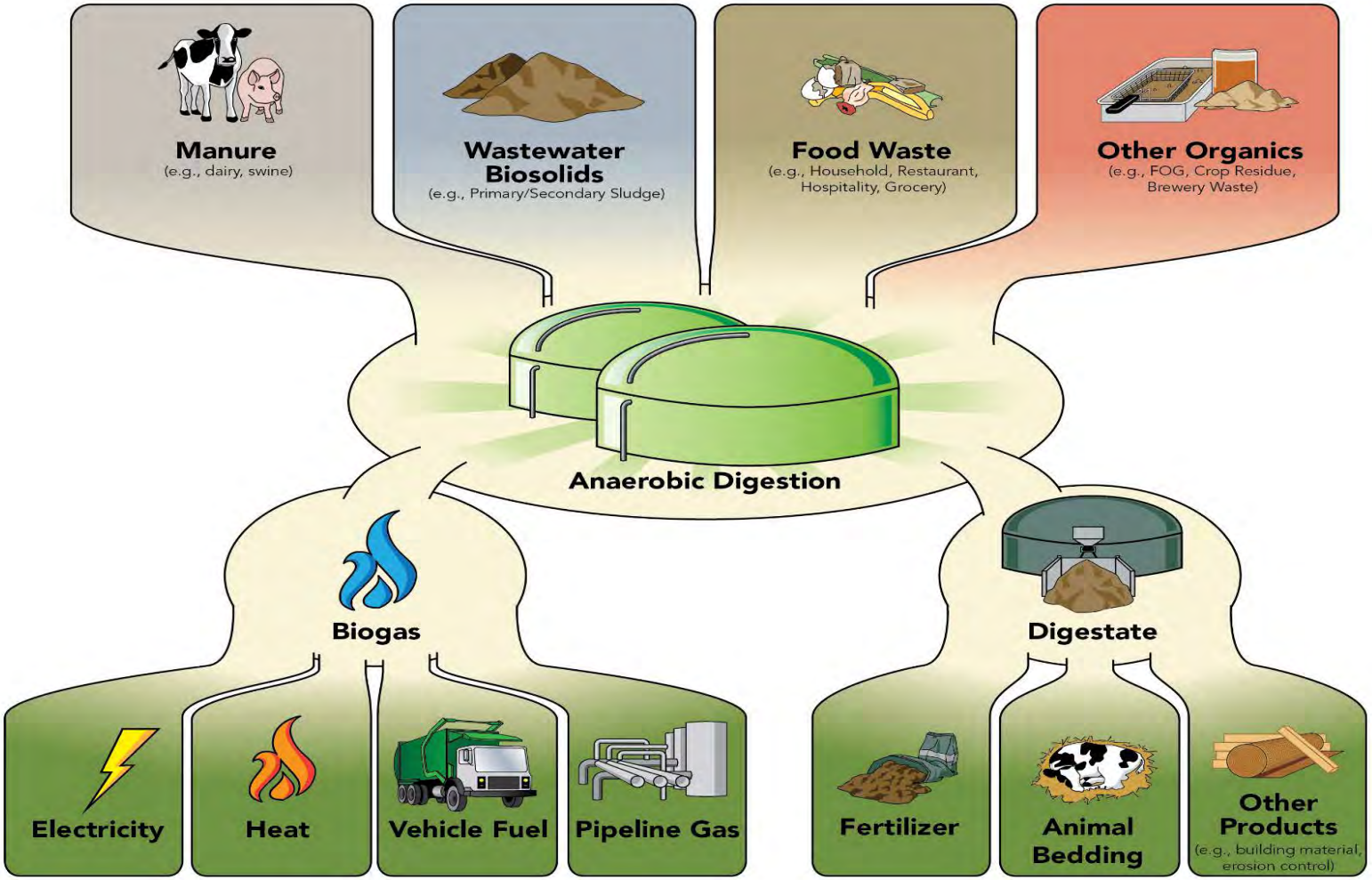
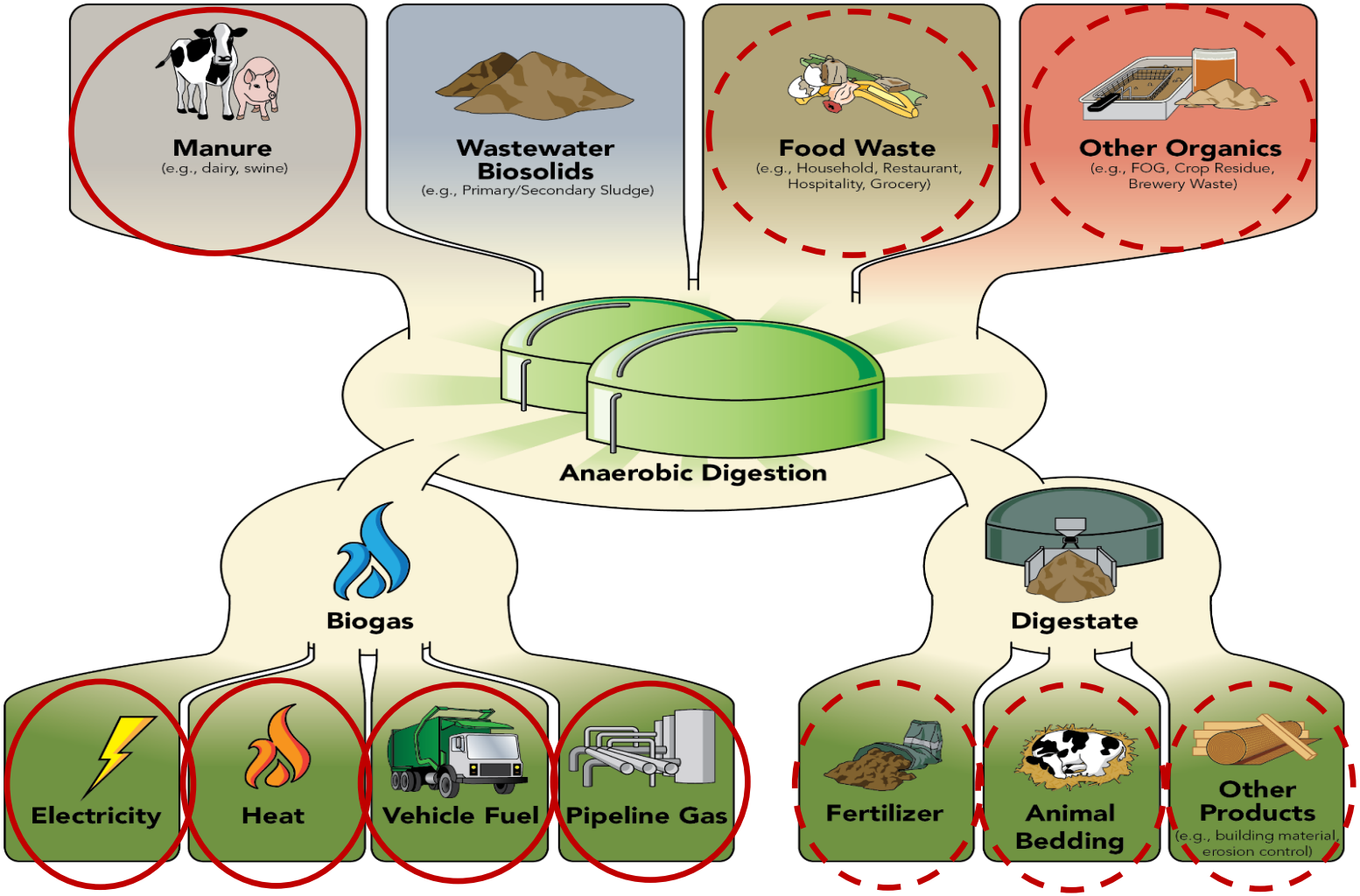
How Biogas Systems Work



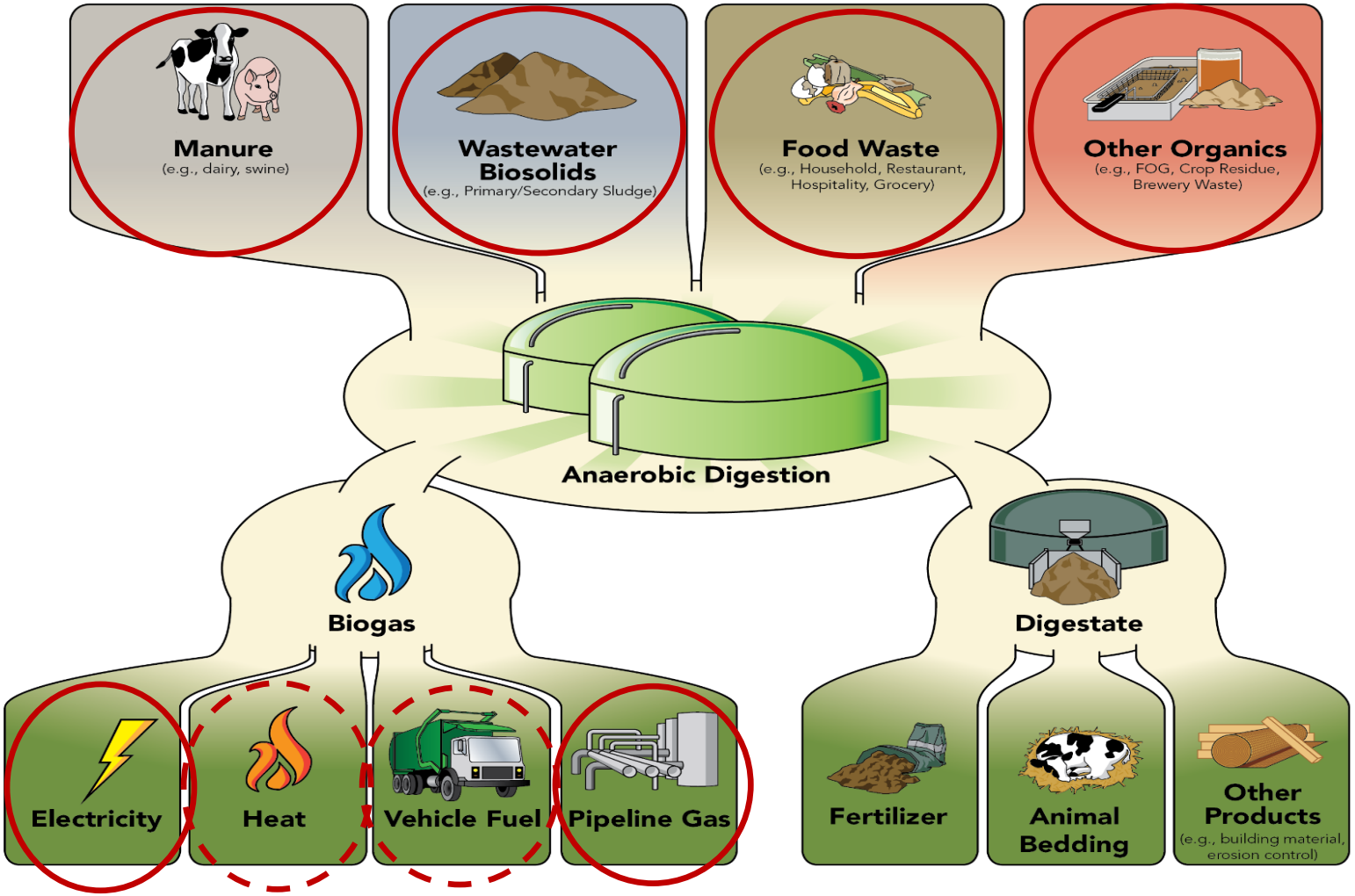
Federal Policy Highlights

1. Legislation
   - Farm Bill
   - Tax Credits
2. Administration
   - EPA, Renewable Fuel Standard
   - Treasury, 30% reduction in gas interconnection costs

Farm Bill


Manure
(e.g., dairy, swine)
Wastewater Biosolids
(e.g., Primary/Secondary Sludge)
Food Waste
(e.g., Household, Restaurant, Hospitality, Grocery)
Other Organics
(e.g., FOG, Crop Residue, Brewery Waste)
Anaerobic Digestion
Biogas
Digestate
Electricity
Heat
Vehicle Fuel
Pipeline Gas
Fertilizer
Animal Bedding
Other Products
(e.g., building material, erosion control)

Tax Credits



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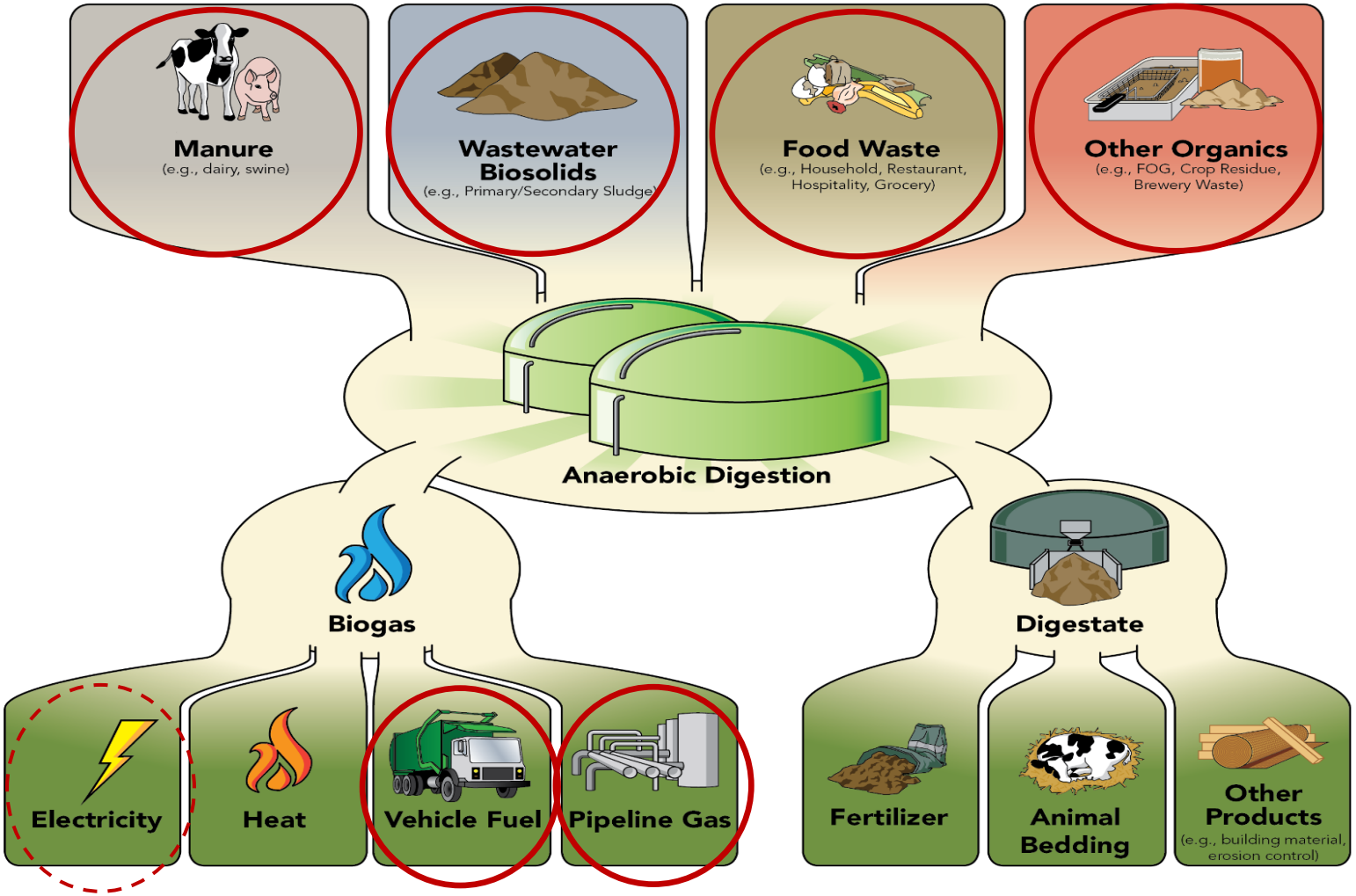
Renewable Fuel Standard



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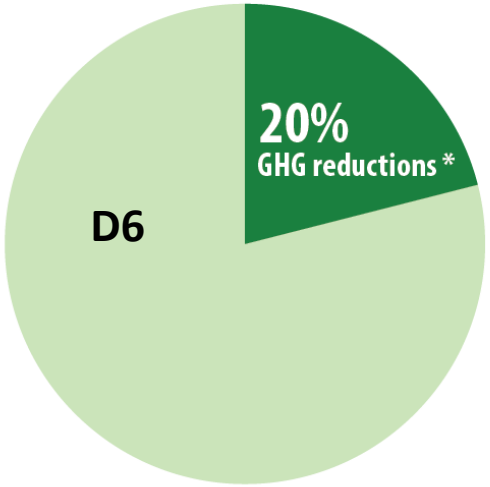
RFS Fuel Categories and D-Codes

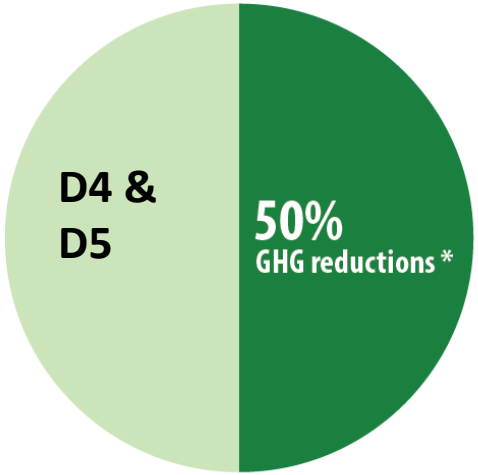
Lifecycle Greenhouse Gas (GHG) Emissions

GHG emissions must take into account direct and significant indirect emissions, including land use change.

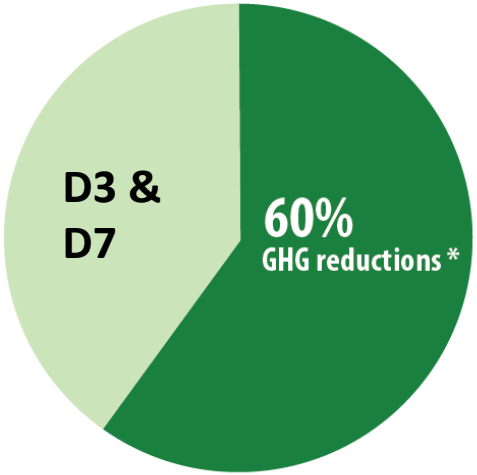
Renewable Fuels



Advanced & Biodiesel Fuels



Cellulosic Fuels



* compared to a 2005 petroleum baseline

Credit: ecoengineers

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RNG Fuel Pathways

PATHWAY	FUEL TYPE	FEEDSTOCK	PRODUCTION PROCESS	D CODE
Q	Renewable Compressed Natural Gas, Renewable Liquefied Natural Gas, Renewable Electricity	Biogas From Landfills, **Municipal Wastewater Treatment Facility Digesters**, Agricultural Digesters, and Separated MSW Digesters; and Biogas From The Cellulosic Components Of Biomass Processed In Other Waste Digesters	ANY	D3
T	Renewable Compressed Natural Gas, Renewable Liquefied Natural Gas, Renewable Electricity	Biogas From Waste Digesters	ANY	D5

- D3 RIN ≈ $2.50
- D5 RIN ≈ $0.75

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Renewable Fuel Standard-RINs

- For upgraded biogas/RNG as vehicle fuel
- Fossil NG = $3.00/MMBTU +

OR
+ D3 RIN @ $2.50 = $30.00/MMBTU — *Biosolids, LFG Manure, MSW*
+ D5 RIN @ $0.75 = $9.00/MMBTU — *Food waste*

Electricity:
1MMBTU will run a 1MW engine for ~ 6 mins ($5/MMBTU @ $.05/kWh) + 1/10 of a REC

+ $3 - $30/MMBTU if you can sell into the LCFS Market

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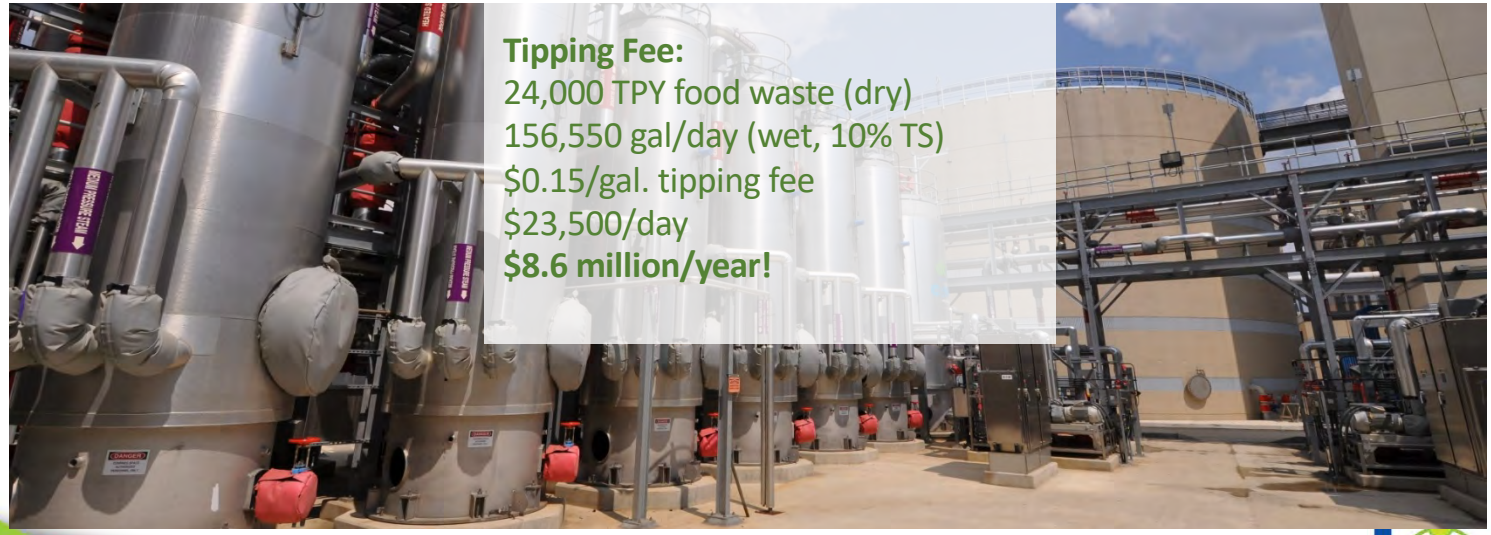
Project example:

A 42 MGD WRRF is considering whether to not take in 60,000 TPY/0.16 MGD (0/4%) food waste, and if they do, how to account for the RINs—accept 100% D5 RINs or calculate a D3/D5 split for the biogas produced.

100% D3 RINs	100 % D5 RINs	Split 23% D3 RINs | 77% D5 RINs
WITHOUT food waste	*WITH food waste*	
300 MMBtu/day	1,000 MMBtu/day	1,000 MMBtu/day
$3,200,000 gross revenue/yr.	$3,200,000 gross revenue/yr. + food waste tip fee	$4,900,000 gross revenue/yr. + food waste tip fee
@ $2.50 per D3 RIN	@ $0.75 per D5 RIN	@ $2.50 / D3 RIN, $0.75 / D5 RIN
	Same revenue (+ tip fees)	$1.7 million in additional RIN revenue!



Reference: 1 MMBtu = 11.727 RINs

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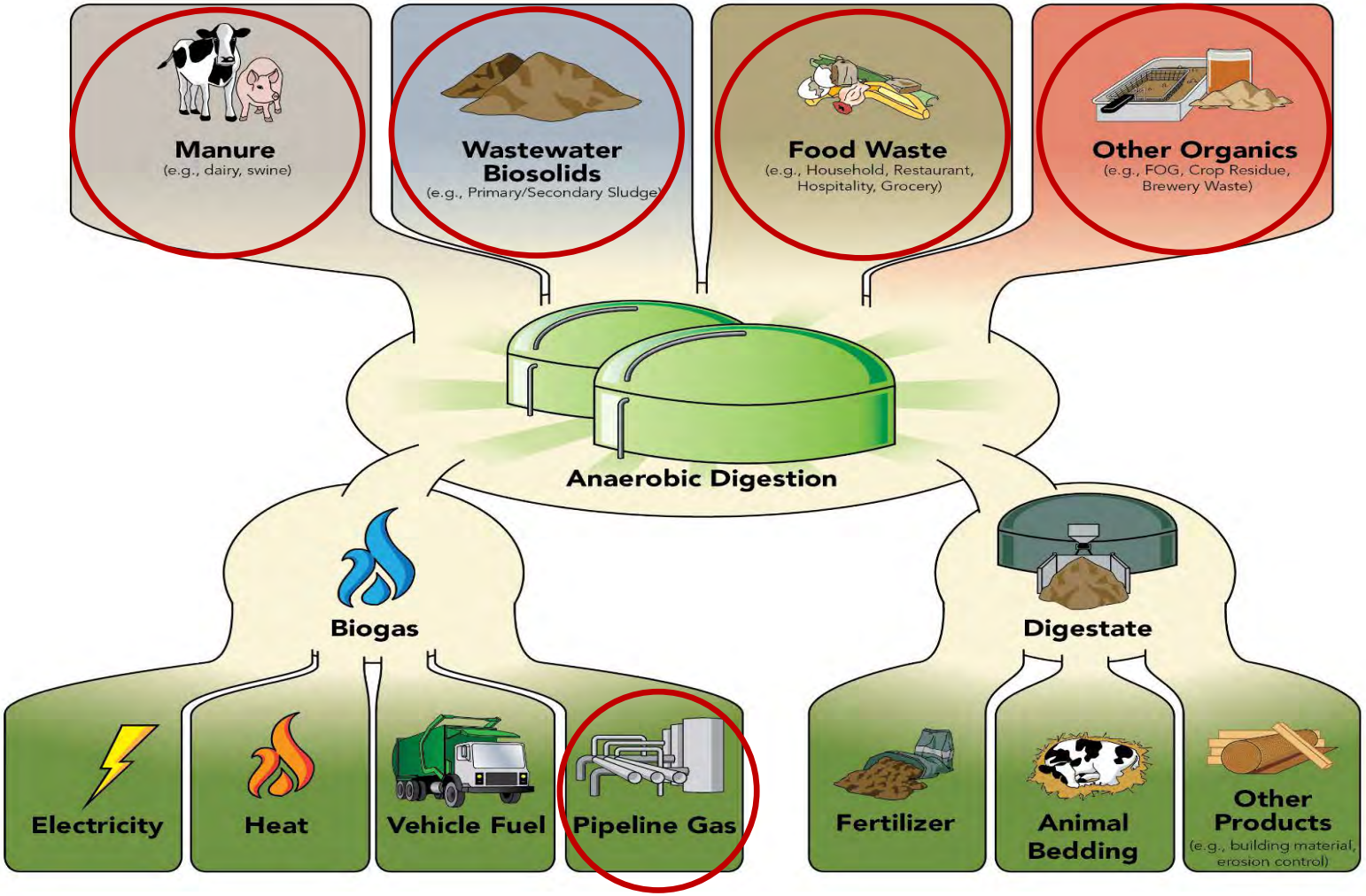
Treasury, ~30% CIAC Tax



New US Digestate Standard

www.Digestate.org

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CERTIFIED DIGESTATE

GENERALLY UNRESTRICTED

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CERTIFIED DIGESTATE

RESTRICTED

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Questions?

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