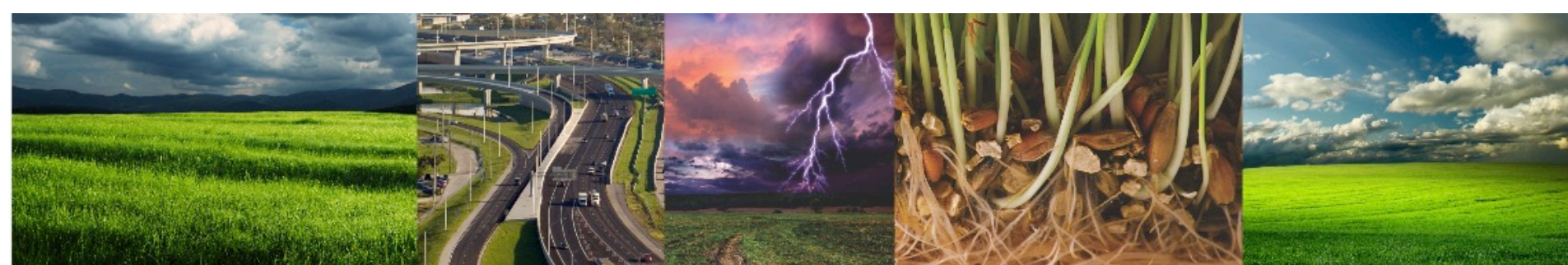


Biogas Policy Opportunities

Amanda Bilek
Great Plains Institute



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INSTITUTE**

Better Energy.
Better World.

Great Plains Institute Today

Mission: To transform the way we produce, distribute and consume energy to be both economically and environmentally sustainable.

18-yr. old non-partisan, non-profit that:

1. Develops better energy policy via consensus.
2. Catalyzes deployment of best energy technologies, practices & programs.
3. Provides reliable analysis & decision tools.



BIOGAS APPLICATIONS

Agricultural



Photo credit: Five Star Dairy (WI)

Industrial



Photo credit: Kreig and Fischer

Wastewater Treatment



Photo credit: iStock



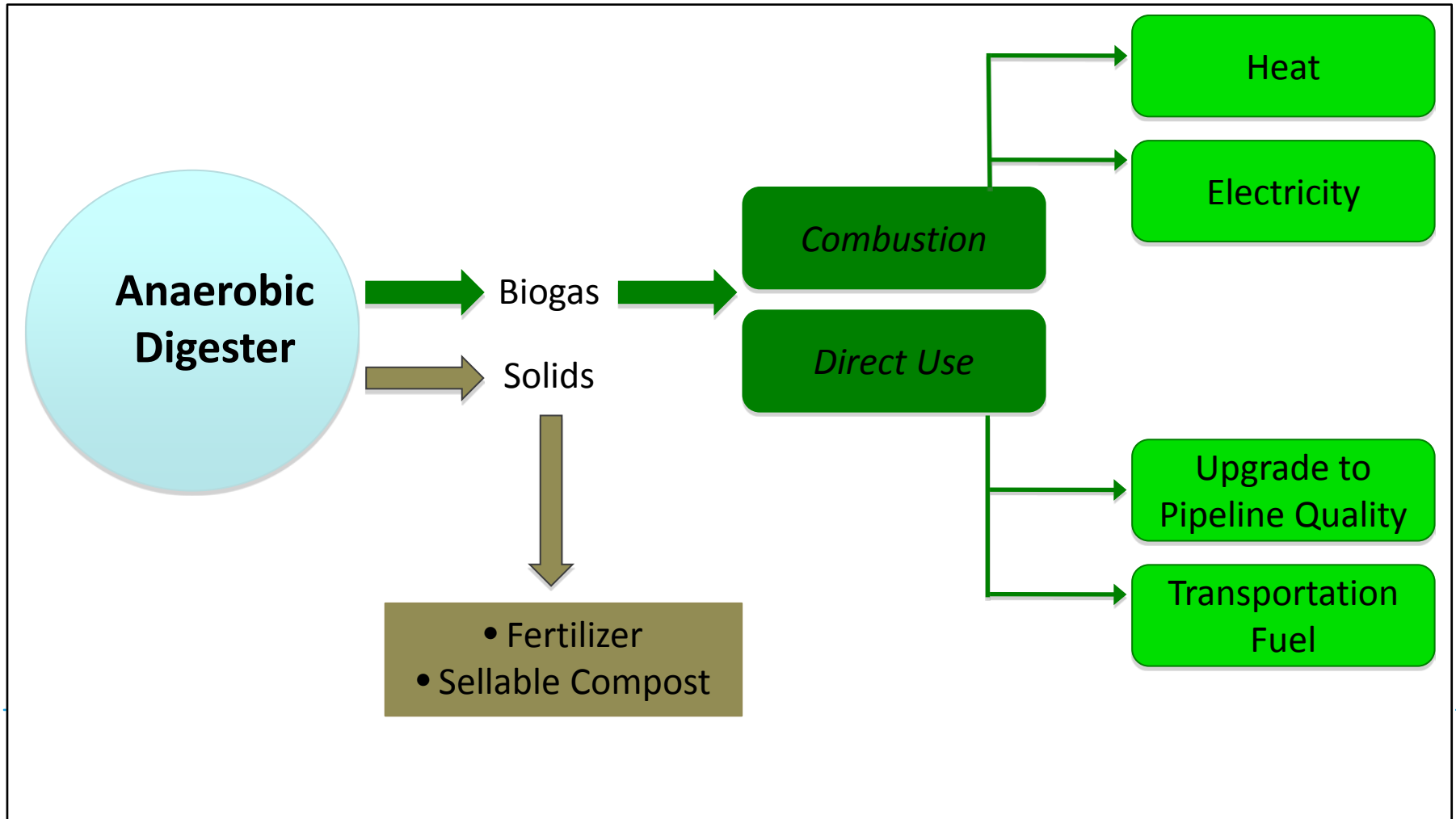
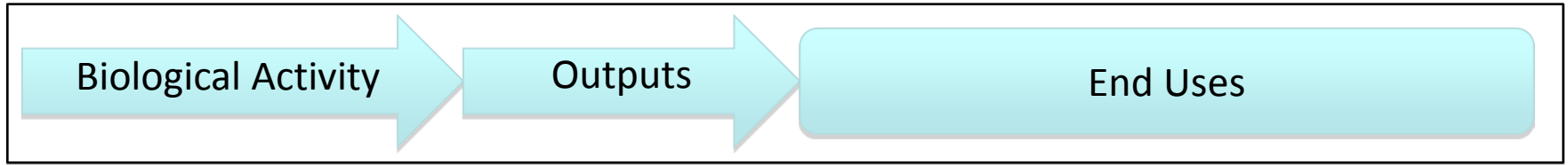
Photo credit: City of Flint Michigan

Landfill



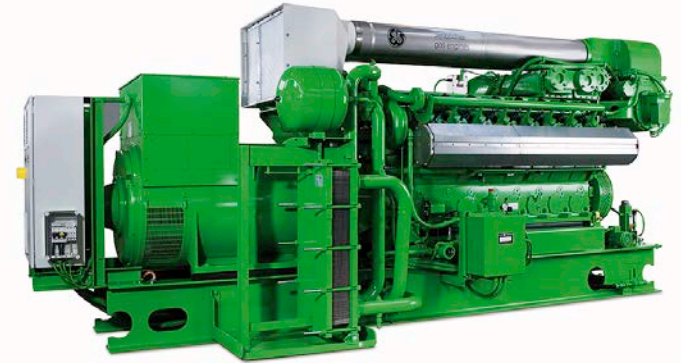
Photo credit: King County (WA) Solid Waste Division

What is Biogas? – Outputs and End Uses

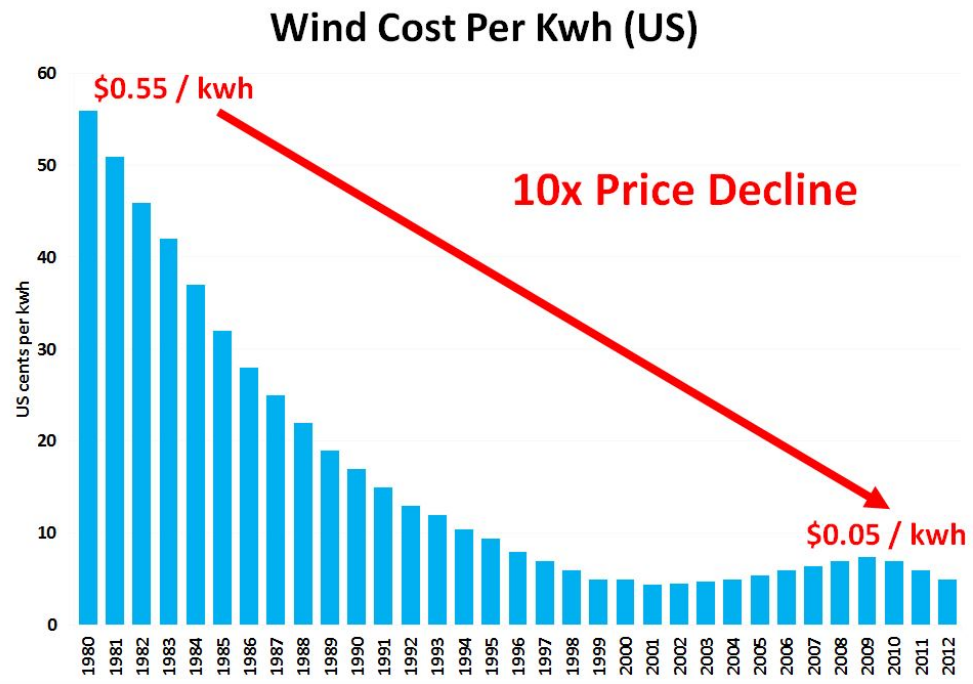
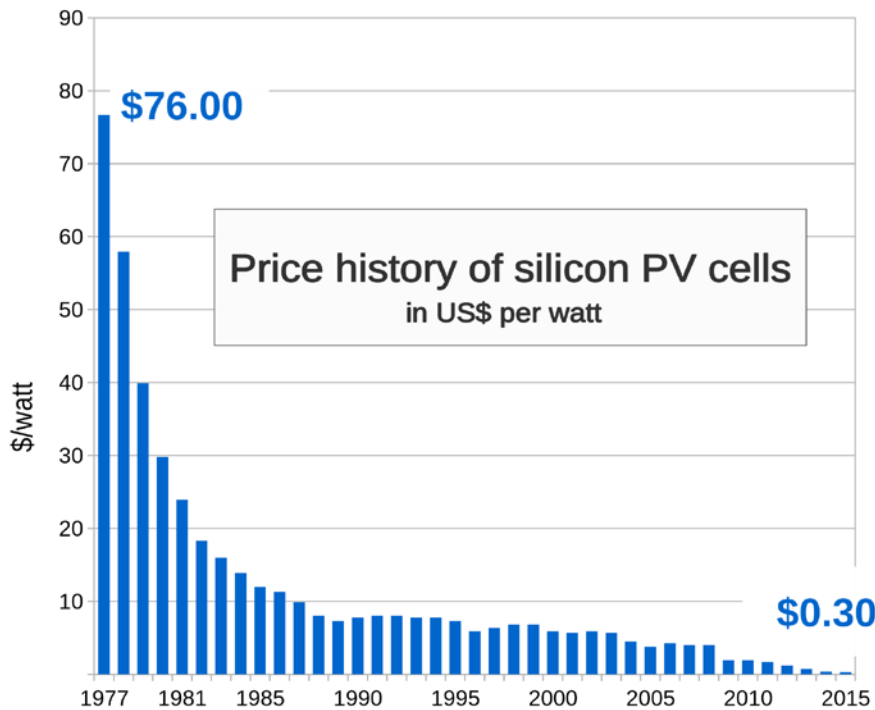


BIOGAS UTILIZATION

- Electricity and/or heat
- Renewable natural gas
- Transportation fuel
- Emerging opportunities
 - High value chemicals or products



Biogas-based Electricity Increasingly Competes with Cheaper Sources of Renewable Electricity



Source: Bloomberg New Energy Finance & pv.energytrend.com



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MN Policy for Biogas Projects – Historical

- Renewable Electricity Standard
- Net Metering
- Renewable Electricity Production Incentive
- Grants and loans
 - Electricity generation a requirement for qualification



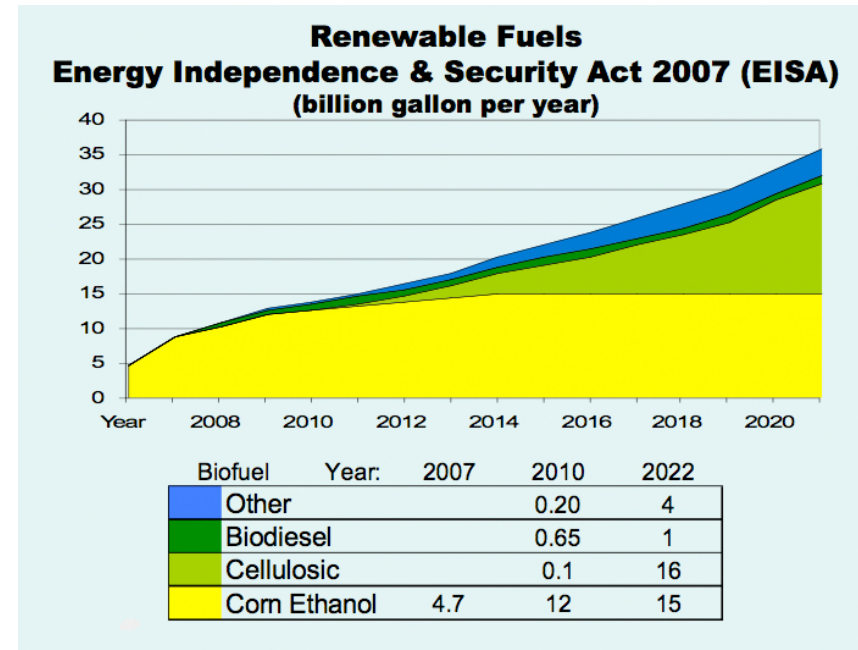
BIOGAS AS A TRANSPORTATION FUEL

- Upgraded and compressed biogas as a transportation fuel (bioCNG)
 - Can serve large vehicles and fleets
- Multiple projects outside of Minnesota already in operation or development
- High value market for biogas
 - improved project economics



Federal Renewable Fuel Standard

- 36 billion gallons by 2022
- Mandates increasing renewable fuel supplies for transportation fuels
 - Biogas is as a qualifying fuel to generate credits
 - 77,000 Btu = 1 gal. renewable fuel
 - Advanced or cellulosic biofuel

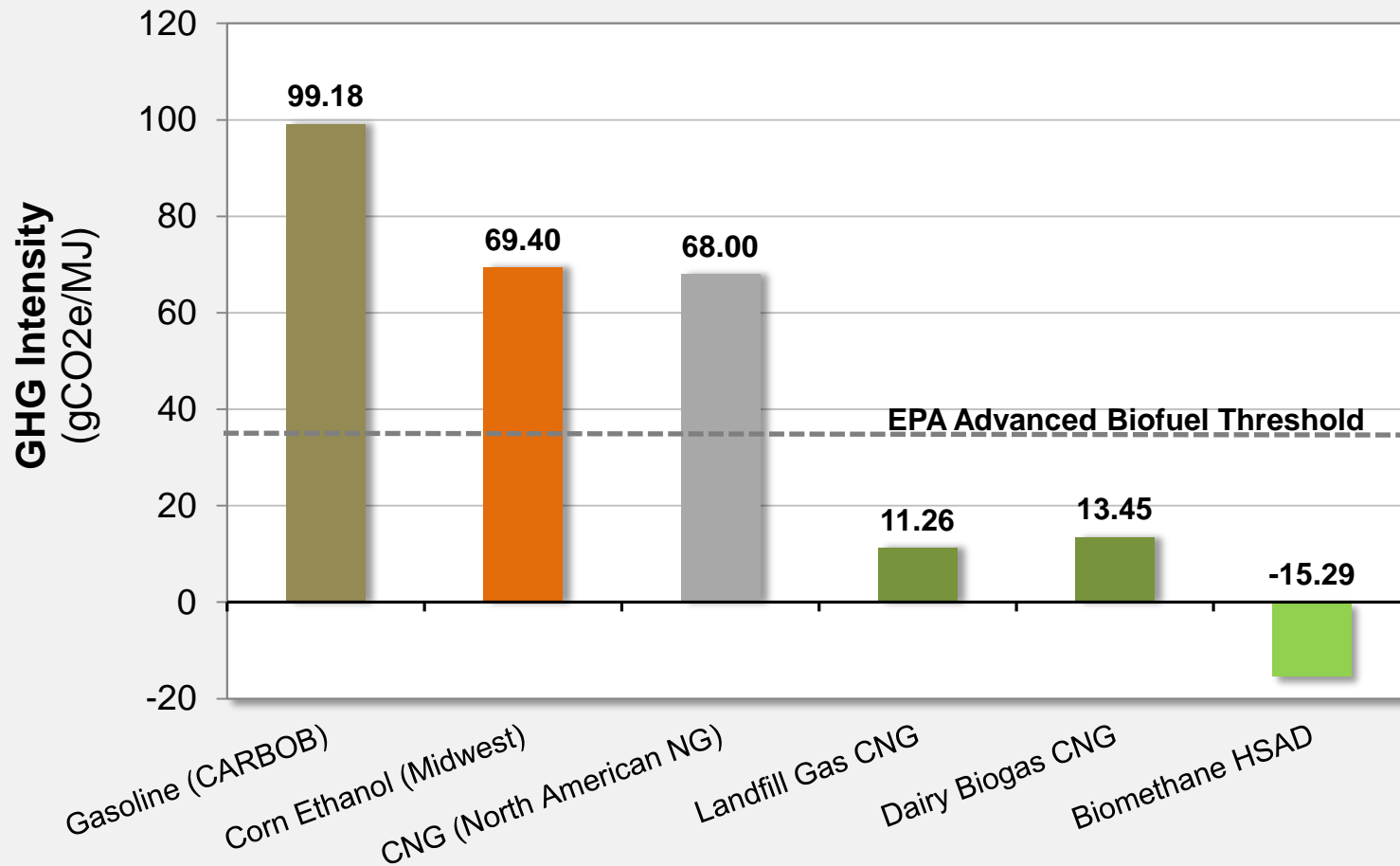


Federal Renewable Fuel Standard

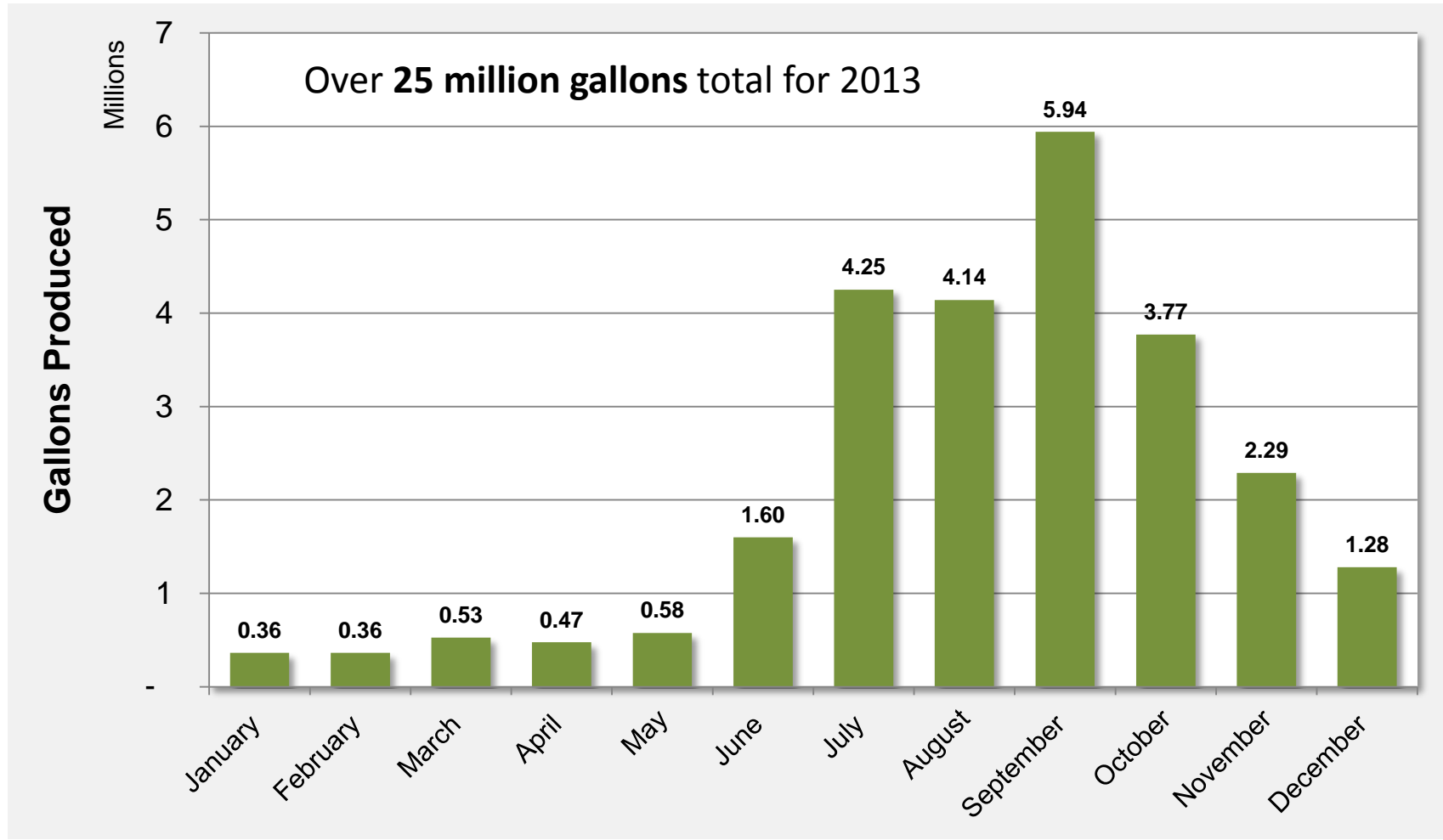
Source: GLBRC



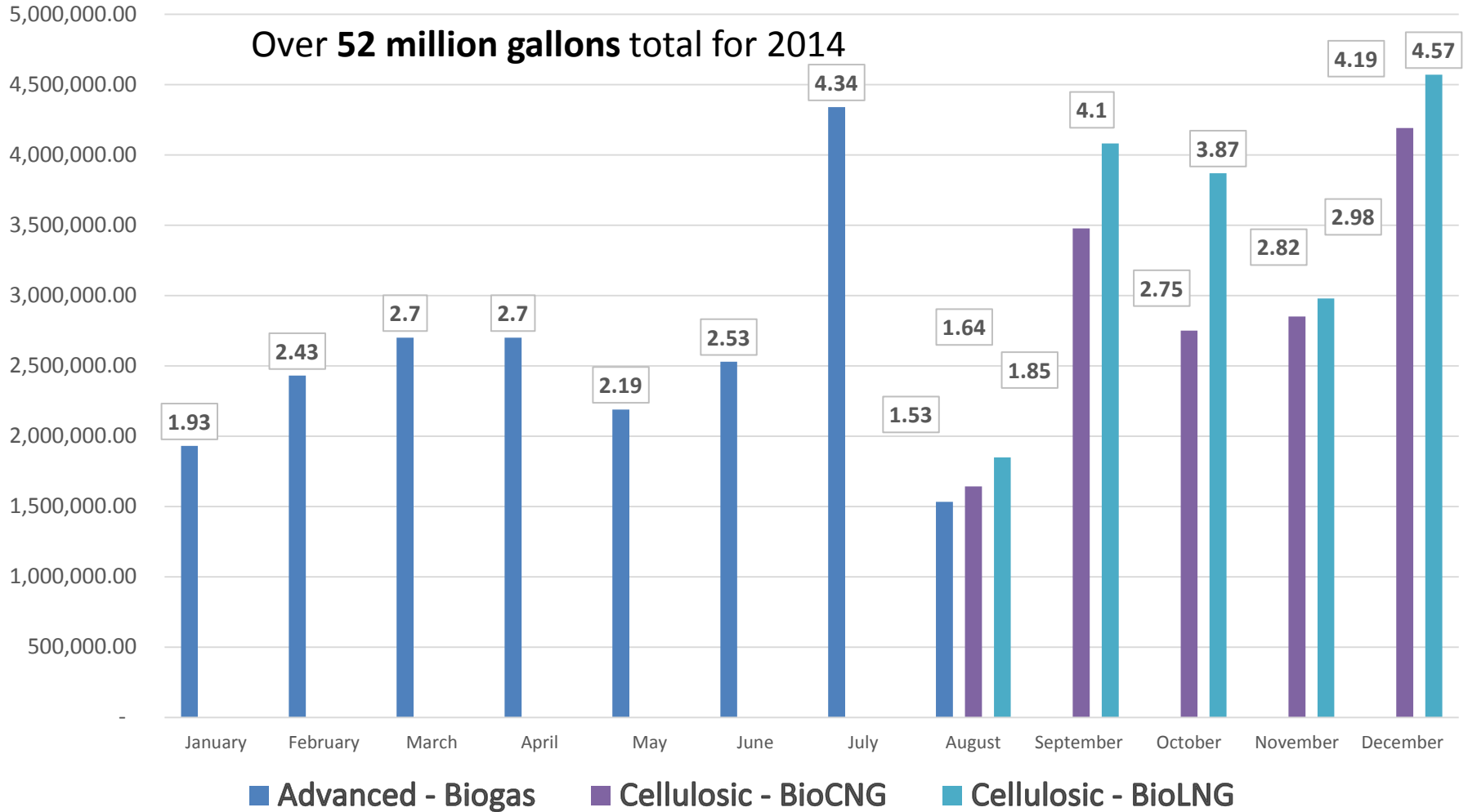
Biogas-based Fuel Offers Substantial GHG Reductions



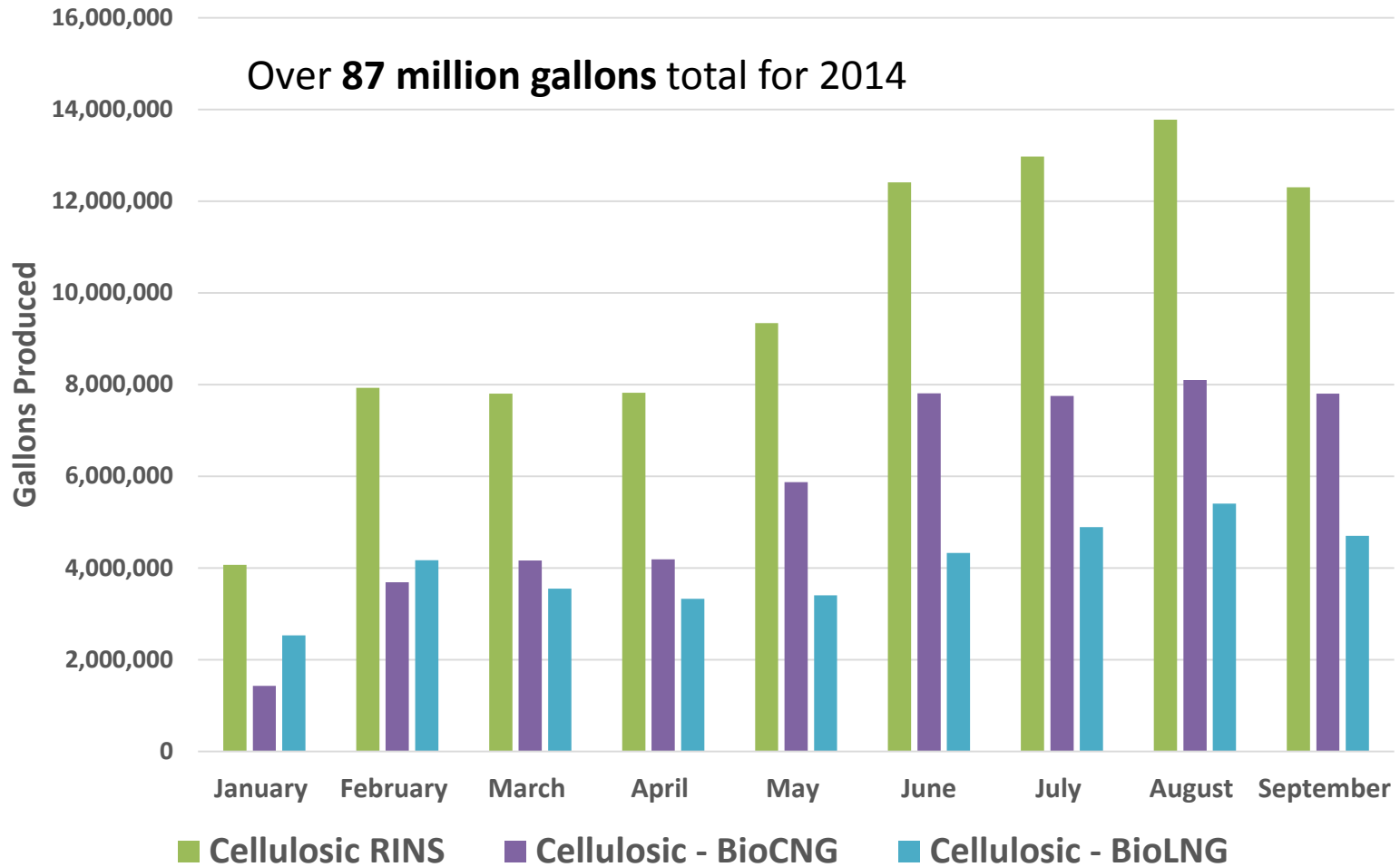
RFS Biogas Gallons in 2013



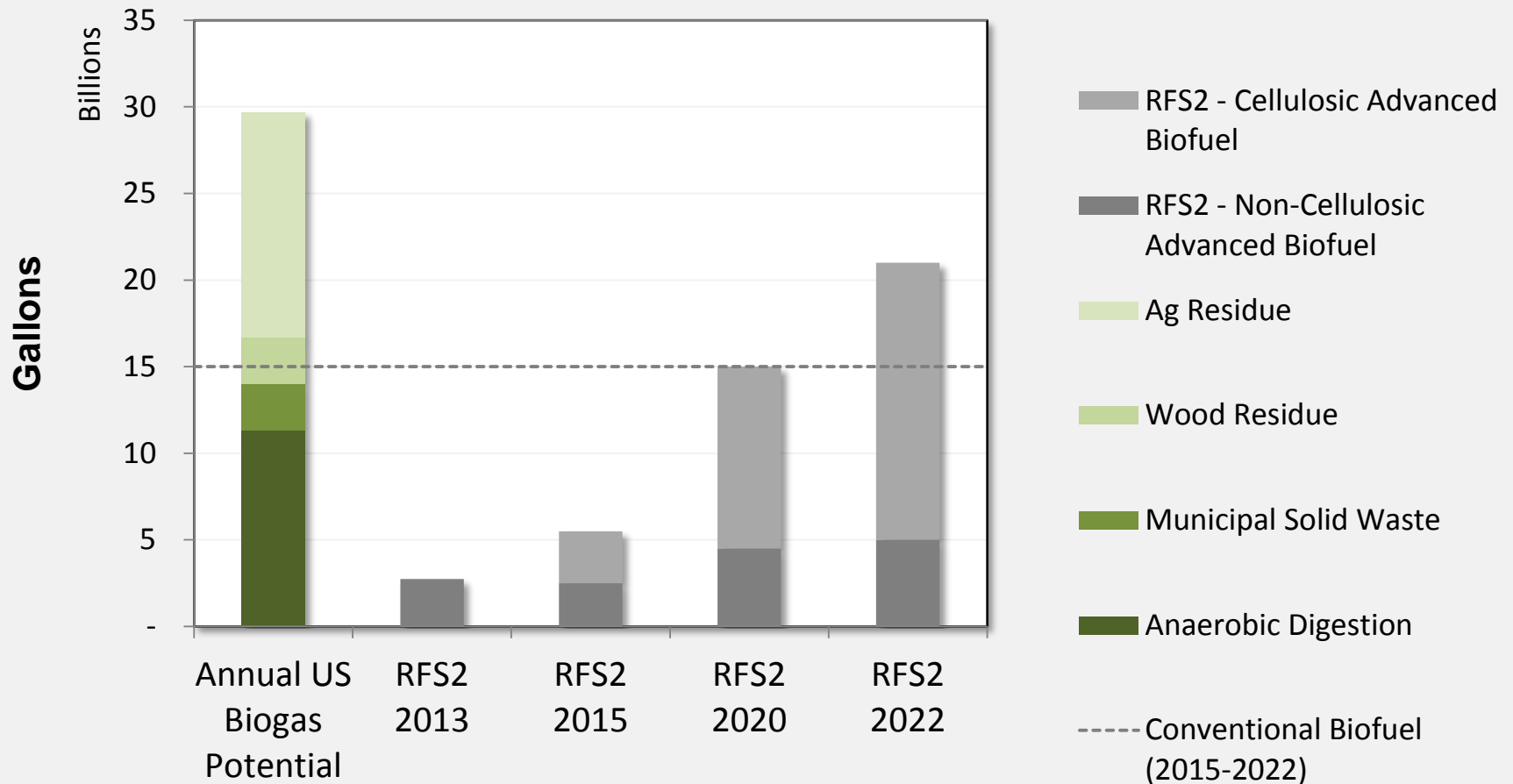
RFS Biogas Gallons in 2014



RFS Biogas Gallons in 2015 – So Far



Large Potential for Biogas to Help Meet Renewable Fuel Standard Targets

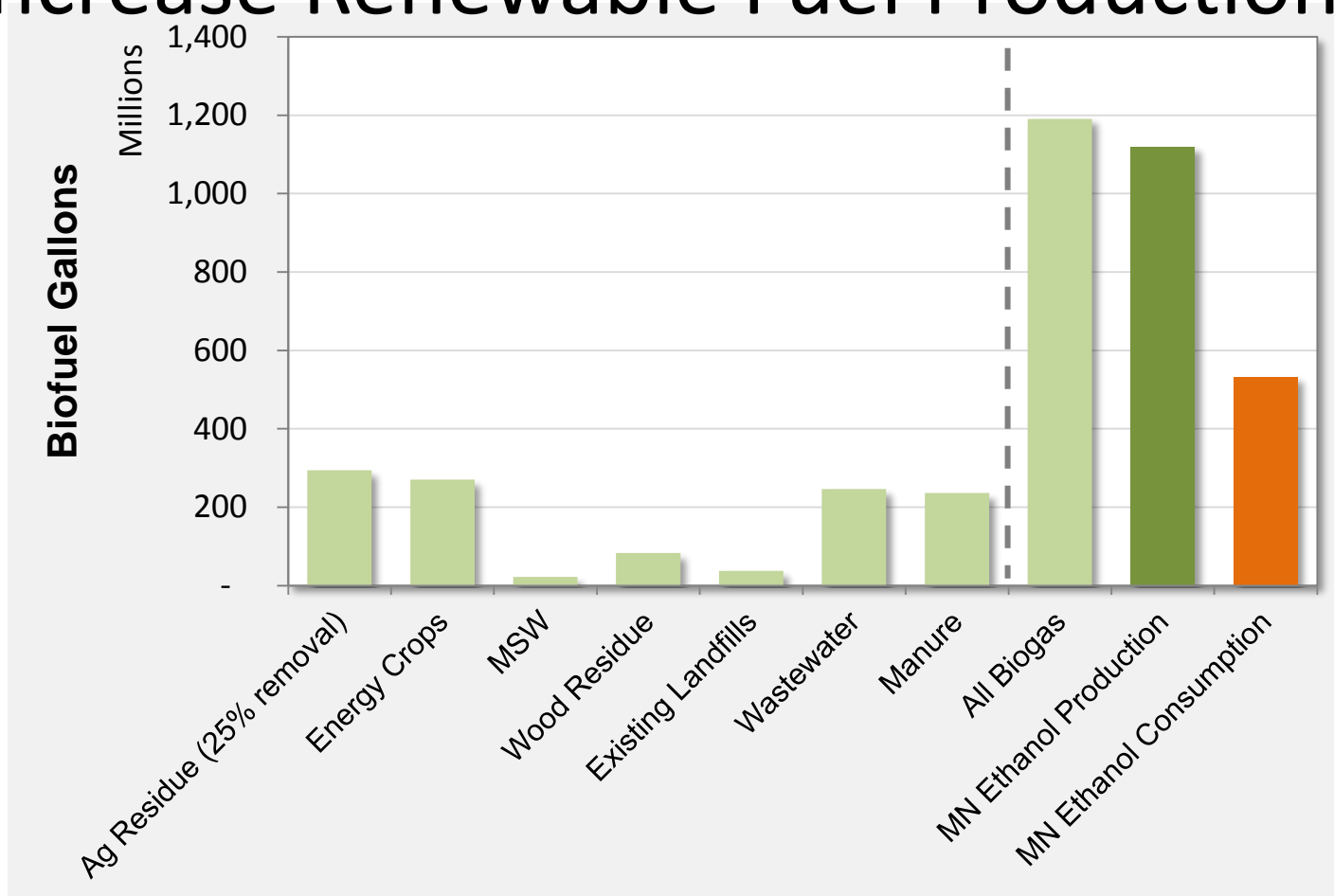


Minnesota Biogas Resources

Agriculture Residue	12.5 million wet tons / year
Energy Crops	2.32 million wet tons / year
Existing Landfills	21.7 million wet tons / year
Manure	27 million wet tons / year
Municipal Solid Waste (MSW)	0.31 million wet tons / year
Wood Residue	0.88 million wet tons / year
Wastewater Treatment Facilities	138 billion gallons / year



Minnesota has Significant Opportunity to Increase Renewable Fuel Production



Mission of the Bioeconomy Coalition of Minnesota

Articulate and implement a Minnesota state policy and regulatory agenda to expand renewable chemical, advanced biofuel, and biomass thermal energy industries, along the entire value chain from R&D through commercial production and use.



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2015 Bioeconomy Coalition



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What is an Advanced Biofuel?



Sugar
Beets, Corn



Cellulosic Biomass
Switchgrass, Wood,
Corn Stover & Ag
Residue



Processing



e.g. enzymatic hydrolysis,
dilute acid hydrolysis,
metal catalysis,
etc...



Waste
Municipal Waste,
Livestock Waste

Cellulosic Ethanol

Biodiesel

Butanol

Biogasoline

Biogas

Required GHG
reduction: 50% lower
GHG emissions than
gasoline

Bioeconomy Production Incentive

- Program aims to attract commercial-scale production of renewable chemicals, advanced biofuels and biomass thermal energy
- Eligible facilities:
 - Must source raw materials (sugar, biomass) from Minnesota
 - Raw material must be from agricultural or forestry sources, or from solid waste.
 - Facility must be located in Minnesota
 - Facility must begin operation after July 1, 2015 (including existing facilities with significant retrofits to allow new production after July 1, 2015)
 - Project must start before July 1, 2025



Production Incentive Levels

- Advanced biofuels
 - \$0.20/gal – cellulosic derived
 - \$0.10/gal – sugar/starch derived
 - Total payments capped per year, available for 10 years
 - Up to 6 projects (or more if projects are smaller)
- Renewable Chemicals
 - \$0.03/lb – sugar derived renewable chemical or cellulosic sugar
 - \$0.06/lb – cellulosic derived renewable chemical
 - Total payments capped per year, available for 10 years
 - Up to 6 projects (or more if projects are smaller)
- Biomass Thermal
 - \$5.00/MMbtu – agricultural or forestry feedstocks
 - Total payments capped per year, available for 10 years
 - Up to 5 projects (or more if projects are smaller)

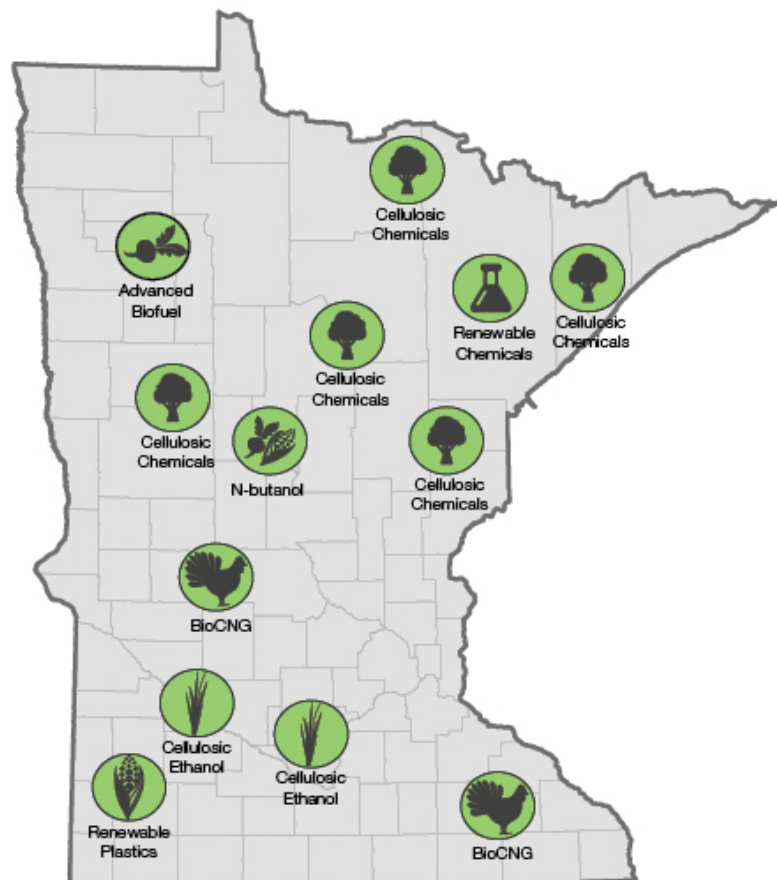


Program Funding

- \$500,000 FY 2016 and \$1.5 million FY 2017
 - FY 2015 must be spent by June 30, 2017
 - FY 2016 must be spent by June 30, 2018
- Base funding of \$1.5 million in FY 2018 and FY 2019



Bioeconomy State Economic Contribution



Example project types and locations are hypothetical and for purposes of modeling economic impact of possible projects

A Growing Industry

14 hypothetical facilities:

- 1 x Renewable Chemicals from Sugar
- 1 x Renewable Plastics from Corn Sugar
- 2 x Cellulosic Ethanol from Ag. Residue
- 5 x Cellulosic Chemicals from Wood
- 1 x N-butanol from Corn and/or Beet Sugar
- 2 x BioCNG from Ag. and Livestock Waste
- 1 x Advanced Biofuel from Beet Sugar

\$ 23.8 million temporary annual government investment*

\$ 837.6 million permanent annual economic impact

\$ 1.5 billion temporary construction economic impact

Economic Impact

	Type	Employment	Labor Income (millions)	Output (millions)
Annual	Direct	590	\$ 36.8	\$ 470.3
	Indirect	2,150	\$ 115.8	\$ 304.0
	Induced	450	\$ 21.5	\$ 63.3
	Total	3,190	\$ 174.1	\$ 837.6
Construction	Direct	4,380	\$ 303.4	\$ 867.8
	Indirect	1,690	\$ 112.7	\$ 306.2
	Induced	2,620	\$ 122.1	\$ 357.4
	Total	8,690	\$ 538.2	\$ 1,531.4

Impact estimates based on University of Minnesota Extension Economic Impact Analysis

*Over 15-20 years

ADDITIONAL POLICIES FOR CONSIDERATION



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Loan guarantee program

- Eligible technologies: anaerobic digestion
- Structure as a “gap loan” program – help finance projects that have other financing, but are \$1-2 million away
- \$30-40 million dollar fund, may result in 15-20 projects



Financing assistance

- Biogas Production Incentive or Tax Credit
 - Federal proposal, could be adapted for state level
 - Only require biogas use for beneficial purpose
 - Don't specify utilization option



Summary

- **Biogas is able to supply a reliable and constant source of renewable energy**
- **Biogas has flexible inputs (feedstocks) and outputs (utilization options)**
- **Enormous opportunity to use biogas to help meet energy needs and serve markets not met by other renewable technologies**



Thank You!

More information:

www.betterenergy.org

www.mnbioeconomy.org

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