

# Policy and Regulatory Considerations to Develop Food Waste Digestion in Minnesota

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## GLOSSARY

**AD:** anaerobic digestion

**AB:** assembly bill

**Biogas:** one of the products of the anaerobic digestion process. It is a combustible gas composed primarily of methane, carbon dioxide, and water.

**CARB:** California Air Resources Board

**CNG:** compressed natural gas

**CFP:** Clean Fuels Program

**CO<sub>2</sub>e / MJ:** carbon dioxide equivalent per megajoule

**CPUC:** California Public Utilities Commission

**DEED:** Department of Employment and Economic Development

**EAW:** environmental assessment worksheet

**EER:** energy economy ratio

**EIS:** environmental impact statement

**EPA:** Environmental Protection Agency

**EV:** electric vehicle

**GHG:** greenhouse gas

**LCFS:** Low Carbon Fuel Standard

**MSW:** municipal solid waste

**MPCA:** Minnesota Pollution Control Agency

**NPDES:** National Pollutant Discharge Elimination System

**PFAS:** Per- and polyfluoroalkyl substances. PFAS are a group of synthetic chemicals found in a wide variety of products including food packaging, cosmetics, carpeting, and more.

**PHEV:** plug-in hybrid electric vehicle

**PUC:** public utilities commission

**RECs:** renewable energy certificates

**RECIP:** Renewable Energy Competitive Incentive Program

**RFS:** Renewable Fuel Standard

**RIN:** renewable identification number. An environmental credit used for trading under the RFS program.

**RNG:** renewable natural gas. A natural gas substitute that can directly be incorporated into the natural gas network.

**RRED:** Rural Renewable Energy Development

**RVO:** renewable volume obligation

**SB:** senate bill

**WRRF:** water resource recovery facility



# EXECUTIVE SUMMARY

## PURPOSE

This report was commissioned by the Partnership on Waste and Energy (the Partnership), which is a collaboration between Minnesota's Hennepin, Ramsey, and Washington counties that addresses certain areas of waste and energy management. In Minnesota, counties are tasked with developing solid waste plans in accordance with guidance provided by the Minnesota Pollution Control Agency (MPCA) and the state's waste management hierarchy.

In 2014, the Minnesota Legislature passed a goal of recycling 75 percent by weight of total solid waste generation that counties in the Twin Cities metropolitan area must meet by December 31, 2030. A statewide waste characterization report prepared for the MPCA by Burns & McDonnell revealed that 31 percent of the state's solid waste stream consisted of uncaptured organics, such as food waste and compostable products. Current options in the greater Twin Cities metropolitan area for managing these organics include food waste prevention, food-to-people, food-to-animals, and composting. However, these options do not provide enough capacity to recycle the quantities of organic material necessary to meet mandatory recycling goals. As organic collection programs continue to grow, the capacity shortage is expected to increase over time. Based on the definition of recycling under Minnesota Statute 115A.03, subdivision 25b, anaerobic digestion (AD) could help meet this capacity shortage.

AD is a widely used technology in North America and Europe for processing organic waste into biogas and digestate. Depending on the level of conditioning and upgrading, biogas can be used to produce heat, electricity, vehicle fuel, or renewable natural gas (a natural gas substitute also known as RNG) that can be directly integrated into the natural gas network.

According to analysis by the Great Plains Institute (GPI) in the 2018 report, *Anaerobic Digestion Evaluation Study*, displacing diesel in transportation vehicles with compressed RNG and displacing conventional North American natural gas with RNG offer the greatest greenhouse gas emission reductions from biogas produced by AD.<sup>1</sup> Additionally, RNG is likely to be an economically attractive market for AD projects in Minnesota.

GPI's conversations with stakeholders revealed that significant market barriers are preventing AD from becoming a widely used food waste and organics processing technology. These barriers include a perceived lack of clear and predictable pathways for permitting, cost-competitiveness of end products, and lack of clarity from state agencies in treating AD as a viable waste and energy solution.

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<sup>1</sup> Great Plains Institute, *Anaerobic Digestion Evaluation Study* (September 2018), <http://morevaluelesstrash.com/s/Anaerobic-Digestion-Evaluation-Study-2219.pdf>.

Focused on food waste digestion, this report investigates Minnesota's existing permitting and regulatory environment along with existing policies and incentives. It then discusses the permitting and regulatory environment in California, Oregon, Wisconsin, and Iowa. Lastly, it provides policy and regulatory considerations that could support developing food waste digesters in Minnesota.

It should be noted that there are three primary types of food waste digesters:

- Stand-alone: facilities that primarily process food waste but may source other organic materials as well, such as manure and wastewater solids.
- On-farm digesters that co-digest food waste: facilities that are located on farms and primarily process manure but also accept food waste.
- Digesters at wastewater resource recovery facilities (WRRFs) that co-digest food waste: facilities that primarily process wastewater solids but also accept food waste.

The information presented in this report primarily focuses on information that would be helpful to develop stand-alone food waste digesters, though on-farm digesters and digesters at WRRFs processing food waste may also benefit from the policy considerations included.

## REGULATORY ENVIRONMENT IN MINNESOTA

Minnesota's Permitting Efficiency Law directs state agencies to reach permitting decisions within 150 days and develop online permitting processes. Agencies, including the MPCA, have worked toward compliance and issued permits on time over 90 percent of the time. Yet, while permitting in general has streamlined, permitting uncommon projects, like food waste digesters, is challenging.

Minnesota currently has eight permitted anaerobic digesters, which all use agricultural waste as a feedstock. To date, Minnesota has not permitted a food waste digester and does not provide guidance in a centralized location to project developers looking to develop one. Because all anaerobic digesters could potentially impact several aspects of the environment, project developers need to apply for permits from the MPCA and other agencies. Common permitting areas include air, water, environmental review, and solid waste.

### Air

The MPCA has the primary responsibility for implementing and enforcing state and federal air quality requirements. Once facilities have demonstrated compliance, they are issued construction permits that include operating requirements to assure continued compliance. The MPCA encourages project developers to work with the agency from project inception to get preliminary review and feedback prior to permitting.

### Water

Water quality permits address wastewater and stormwater concerns. There are two types of wastewater permits generally required from the MPCA:

- The National Pollutant Discharge Elimination System permit is required when process water will be discharged to surface water or sanitary sewers.
- The State Disposal System permit addresses surface water and groundwater concerns and may be required if process water will be land applied or infiltrated to a pond.

Stormwater permits include the Construction Stormwater permit, which is required for facilities disturbing one or more acre of soil, and the Industrial Stormwater permit, which is required after the facility is constructed to address ongoing stormwater management.

## Environmental Review

Environmental review includes completing an environmental assessment worksheet (EAW) prior to receiving other permits. Permits can be started while environmental review is happening, but they cannot be issued until after review is completed. An environmental impact statement (EIS) may also be required during the environmental review process. An EIS is more stringent than an EAW and is required when higher thresholds of size or production level are met. For example, under the solid waste category of the mandatory EAW and EIS categories, the construction or expansion of an MSW energy recovery facility that accepts 250 tons or more of input per day requires an EAW and EIS while one that accepts 30 tons or more per day only requires an EAW. An AD developer would need to complete the EAW process and may be required to complete an EIS if any component of the project meets EIS thresholds.

## Solid Waste

Solid waste permits are required when food waste is being stored, transferred, or processed in Minnesota. They may be required by the state, county, and municipality depending on where the AD facility is to be located.

## Other

AD facilities looking to upgrade their biogas to RNG have additional approvals to consider. The key approvals to consider include being able to interconnect and sell RNG to a natural gas local distribution company or interstate pipeline and review under the Information Book Process from the Minnesota Public Utilities Commission (PUC).

At present, only one natural gas distribution company, CenterPoint Energy, has explored accepting RNG into its system. Its interconnect petition was recently approved by the PUC. Beyond CenterPoint's system, AD developers need to locate their facility near an interstate pipeline, which is regulated by the Federal Energy Regulatory Commission in compliance with the US Department of Transportation safety standards. This limits the available sites at which to erect a food waste digester and may add additional regulatory considerations.

## Survey Analysis

GPI conducted a survey of several Minnesota AD facilities in January 2020 to further understand permitting experiences. Three out of six facilities responded—two were

operating and one was undergoing permitting at the time of the survey. Respondents confirmed that permitting was an extensive process and desired more clarity and streamlining in the permitting process. Only one company was familiar with the Minnesota Business First Stop program (a group of state agencies designed to assist companies with complex projects), and the company indicated working with the program improved its permitting experience.

## EXISTING REGULATIONS AND POLICY INCENTIVES IMPACTING PROJECTS IN MINNESOTA

There are several existing policies and regulations at both the federal and state levels that could support food waste digestion in Minnesota.

### Federal

The primary federal regulation that could encourage food waste digestion in Minnesota is the Renewable Fuel Standard (RFS). It is a national policy that requires refiners or importers of fossil fuels (gasoline and diesel) to incorporate a certain volume of renewable fuel into existing transportation fuel, heating oil, or jet fuel, known as the renewable volume obligation (RVO). The US Environmental Protection Agency (EPA) established annual RVOs, working toward a goal of 36 billion gallons of total renewable fuel annually by 2022.

Fuel producers collect financial incentives by selling environmental credits, called renewable identification numbers (RINs) associated with the production of renewable fuels. RNG is an eligible fuel under the program. To generate and sell RINs, renewable fuel producers must have their fuel verified by the EPA and receive a pathway approval. The EPA defines a fuel pathway as “a specific combination of three components: (1) feedstock, (2), production process, and (3) fuel type.”<sup>2</sup> RNG produced from biogas will generate D5 or D3 RINs based on feedstock. D5 RINs are produced from qualifying renewable biomass except cornstarch and need to meet a 50 percent lifecycle greenhouse gas (GHG) reduction. D3 RINs are produced from cellulose, hemicellulose, or lignin and need to meet a 60 percent lifecycle GHG reduction. Most food waste is non-cellulosic, so biogas produced from food waste will generate D5 RINs.

The RFS makes RNG investments more attractive and affordable from the generation and selling of RINs to obligated parties, but the program is very complex. While there are two generally applicable pathways that biogas producers can use to generate RINs from RNG, it can be challenging to secure offtake agreements due to limitations with pipeline infrastructure and a lack of end users. Producers need to secure offtake agreements or indicate that they will fully utilize the RNG prior to receiving EPA approval.

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<sup>2</sup> “Fuel Pathways under Renewable Fuel Standard,” Renewable Fuel Standard Program, United States Environmental Protection Agency, accessed December 18, 2020, <https://www.epa.gov/renewable-fuel-standard-program/fuel-pathways-under-renewable-fuel-standard#:~:text=A%20fuel%20pathway%20is%20a,which%20fuel%20pathways%20can%20qualify>.

## States

The California Low Carbon Fuel Standard (LCFS) and Oregon Clean Fuels Program are two clean fuel markets available to Minnesota project developers. The policies work to reduce carbon and incentivize the deployment of low-carbon fuels, including RNG. Clean fuel producers, including RNG producers, benefit from the programs by generating and selling credits to fuel producers that are not meeting the carbon intensity standard set by the policy. Both the California LCFS and Oregon Clean Fuels Program are important drivers of RNG projects around the country. RNG producers must sell their product to the operator of a compressed natural gas vehicle in California or Oregon to be eligible.

## Minnesota

Minnesota has several regulations, policies, other incentives, and administrative services that can help drive food waste digestion. These include the Bioincentive Program, the Renewable Energy Standard, state general obligation bonding, and Minnesota Business First Stop.

**Bioincentive Program:** The Agricultural Growth, Research, and Innovation Bioincentive Program encourages the production of commercial-scale advanced biofuels, renewable chemicals (for example, biobased plastics, dissolving wood pulp, biobutanol), and biomass thermal energy. The incentive rewards producers once they have met the requirements of the program, including quarterly production thresholds. A food waste digester could be eligible for both the advanced biofuel program and biomass thermal program, depending on how the biogas is used. If upgraded to RNG, the biogas would qualify for the Advanced Biofuel Bioincentive Program with an EPA pathway. If used as a heat source, the biogas would be eligible under the Biomass Thermal Energy Bioincentive Program. While the Bioincentive Program has numerous benefits as cited in this report, its main drawback is lack of funding appropriated by the Minnesota Legislature. The current allocation for FY 2020-21 is \$2.5 million per year, and projections from companies intending to use the program indicate that at least \$9-10 million per year is needed.

**Renewable Energy Standard:** The Minnesota Renewable Energy Standard requires electric utilities to source 25 percent of their electricity sold to customers from renewable sources by 2025, which includes AD. However, many utilities are meeting and surpassing the standard by sourcing solar and wind energy, which are less expensive to produce than biogas. For this reason, generating biogas for electricity is not likely to be very profitable or competitive in Minnesota without changes to the policy or additional incentives.

**State general obligation bonding:** State general obligation bonds are sold on the bond market to investors, and the proceeds are granted to capital improvement projects named in the enacted bonding bill. Bonds can only be issued for publicly-owned capital projects with a public purpose, which prevents private AD developers from benefiting. While these bonds could fund the capital for food waste digesters and other AD facilities run by local governments, there are numerous complexities. The process to receive

bonds is very competitive, and bonding bills are not guaranteed to pass. Additionally, if a project receives bonding funds, the state holds restrictions on the property, preventing the public entity from selling, mortgaging, or otherwise encumbering it without approval from the Minnesota Management and Budget Commissioner.

**Minnesota Business First Stop:** The Minnesota Business First Stop is a collaboration of nine state agencies that work together to streamline the development process for companies undergoing licensing, permitting, financing, or other processes that require multi-agency assistance. It has been an effective program for connecting project developers with relevant staff and agencies, but not all companies are aware of the program. Marketing of the program is limited at present to word-of-mouth. Additionally, the success of the program is limited by the policies and incentives that currently exist in Minnesota.

## POLICY AND REGULATORY ENVIRONMENTS IN OTHER STATES

GPI conducted a literature review to further understand the impact policies and regulations in other states have on AD markets in those states. The review included California, Oregon, Wisconsin, and Iowa.

### California

California has numerous policies and regulations that impact the development of AD, in addition to the California LCFS:

- **The Pollution Control Tax-Exempt Bond Financing Program (1972):** this program provides private activity tax-exempt bond financing in the form of loans to California businesses for the acquisition, construction, or installation of qualified pollution control, waste disposal, or waste recovery facilities, and the acquisition and installation of new equipment.
- **Natural Gas Research and Development Program (2004):** this program aims to increase the energy efficiency of existing uses of conventional natural gas and increase the use of alternatives to conventional natural gas, including biogas and RNG. It is part of a suite of energy research and development programs administered by the California Energy Commission.
- **Global Warming Solutions Act of 2006 (AB 32):** this act requires California to lower its GHG emissions to 1990 levels by 2020.
- **Assembly Bill No. 341 (2011):** the bill requires 75 percent of the state's waste to be reduced, recycled, or composted by 2020.
- **Electric Program Investment Charge (2012):** the program was established by the California Public Utilities Commission and invests over \$130 million annually in technologies that benefit ratepayers and decarbonize electricity, including biogas development.
- **Cap-and-trade Program (2013):** a market-based mechanism aimed at reducing GHG and other emissions that also provides incentives for AD projects.



- **Greenhouse Gas Reduction Grant and Loan Programs (2013):** Using revenue from California's cap-and-trade program, CalRecycle established a suite of grant and loan programs to fund capital investments that reduce GHG emissions, including AD projects.
- **Assembly Bill 1826 (2014):** this bill required businesses generating eight or more cubic yards of organic waste per week and businesses generating four or more cubic yards of commercial solid waste per week to recycle organics. It also required local jurisdictions to implement organics diversion programs to assist businesses in recycling organics.
- **Short-Lived Climate Pollutants Strategy SB 1383 (2016):** this bill established emissions reductions targets for short-lived climate pollutants and specified targets to reduce organics in landfills by 50 percent by 2020 and 75 percent by 2025 from 2014 levels.

California has the highest number of operating food waste digesters at 30, which includes stand-alone and wastewater resource recovery facilities (WRRFs).

## Oregon

Oregon has the easiest to understand permitting process for AD, which follows a six-step process and is detailed on the Department of Environmental Quality's website.

Combined with the Clean Fuels Program described above, Oregon also has several policies, regulations, and other incentives in place that support food waste digestion:

- **Energy Trust of Oregon (2002):** this nonprofit organization provides project development assistance to facilities looking to generate renewable electricity from biogas.
- **Rural Renewable Energy Development (RRED) Zones (2011):** Business Oregon provides a three- to five-year exemption from property taxes on new investments in solar energy farms, geothermal power generation, biofuel production facilities, and other eligible projects in designated rural areas.
- **Senate Bill 98 (2019):** this bill established voluntary goals for adding up to 30 percent RNG into Oregon's pipeline system by 2050.

Oregon has four operating food waste digesters, including stand-alone and WRRFs.

## Wisconsin

All permits required to develop an anaerobic digester in Wisconsin can be obtained from the Wisconsin Department of Natural Resources. However, guidance specific to food waste digesters is limited.

Compared to California and Oregon, Wisconsin has fewer policies, regulations, and other incentives in place that support food waste digestion:

- **Focus on Energy (formed in 1999, operating since 2001):** this is a statewide program within Wisconsin's Office of Energy Innovation offering information,

services, and financial incentives for a variety of energy efficiency and renewable energy initiatives.

- **Renewable Energy Competitive Incentive Program (RECIP) (created in 2012, started awarding projects in 2013):** administered by Focus on Energy, this program is a grant process that provides financial support based on cost-effectiveness to eligible renewable energy projects, including biogas, biomass, solar thermal, and wind.
- **Biogas, Solar, and Wind Property Tax Exemption (2013 AB 40/2013 Wisconsin ACT 20) (2013):** this is a property tax exemption for biogas or synthetic gas, solar, and wind energy systems in Wisconsin.

Wisconsin has 14 operating food waste digesters, including stand-alone, farm-based co-digesters, and WRRFs. Based on GPI's survey results reported in appendix C of this report, it does not appear that policies and regulations alone are driving AD development in the state because of the low number of incentives available. One possible driver regarding the high number of digesters could be related to the state's larger agricultural footprint and need to manage manure. Additionally, because many of the existing digesters in the state are selling electricity, they could be benefiting from prior power purchase agreements from electric utilities and electric cooperatives that offered higher rates in addition to other utility policies impacting the success of these projects.

## Iowa

Like Wisconsin, the Iowa Department of Natural Resources administers all permits for anaerobic digesters in the state. However, further streamlining and consolidating was recommended in the Iowa Energy Office's 2018 Biomass Conversion Action Plan.

Iowa has the smallest number of policies, regulations, and incentives supporting food waste digestion:

- **Iowa Energy Center Grant Program (2019):** this is a grant program funded by gas and electric utilities across Iowa for projects that would aid in the implementation of a key focus area of the Iowa Energy Plan, including biomass conversion.
- **Alternate Energy Revolving Loan Program (2019):** this program provides zero-interest loans for the development of alternative energy production facilities in Iowa.

Iowa has five operating food waste digesters, which are all WRRFs.

## Additional Policies, Regulations, and Guidance

All states reviewed shared similar policies and regulations including net metering and renewable portfolio standards. Additionally, several states provided comprehensive permitting guidance.

**Net metering:** Net metering policies provide customers that supply renewable energy to the electric grid with compensation or credits on their electric bill based on the amount of electricity supplied. Minnesota, California, and Oregon all specify that biogas is an



eligible technology under these programs; biogas is not specified in Wisconsin or Iowa, but it could still be an eligible technology. Net metering policies tend to vary between utilities. Additionally, they generally have maximum project size thresholds that would limit applicability for all but the smallest AD projects. Net metering could benefit very small biogas projects that are primarily focused on serving internal demands for heat or electricity and sell excess electricity on the margin when internal demand is low.

**Renewable portfolio standards:** Renewable portfolio standards (RPS), sometimes referred to as renewable energy standards or renewable electricity standards (or the Alternative Energy Production law in Iowa), require electric utilities to source a percentage of their overall energy from qualifying renewable sources. Minnesota, California, Oregon, and Wisconsin all specified that biogas was a qualifying renewable source; it was not specified in Iowa, but it could still be a qualifying renewable source. Because of the low cost of other renewable sources (e.g., wind and solar) and the subsequent low cost of renewable electricity credits, renewable portfolio standard policies are unlikely to be a driver for AD projects unless there are special incentives or carve-outs for biogas.

**Permitting guidance:** Several states developed permitting guides to demystify the permitting process in that state. Notable examples include California, Maryland, and Oregon. California and Maryland both produced comprehensive permitting guides, but they were static in nature. Oregon provides readily accessible information online, which allows it to update information when needed.

## POLICY AND REGULATORY CONSIDERATIONS FOR MINNESOTA

While food waste digestion is a fully mature technology, it is underutilized in Minnesota and across the United States. However, the policies, regulations, guidance, and recognition of AD as a waste and energy solution provided in other states indicates that food waste digestion, and AD generally, is likely to grow in most states. After analyzing progress being made in other states compared to Minnesota, GPI identified several considerations that could accelerate and expand the development of food waste digestion in Minnesota. By implementing these considerations, Minnesota could become a leader in food waste digestion:

- **Implement a clean fuels policy in Minnesota:** The Minnesota Governor's Council on Biofuels, a 15-member group formed by Governor Tim Walz in September 2019, included developing a clean fuels policy proposal in its policy recommendations to the governor on November 2, 2020.<sup>3</sup> The recommendation referenced the white paper *A Clean Fuels Policy for the Midwest*,<sup>4</sup> produced by

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<sup>3</sup> Brendan Jordan and Katelyn Bocklund, "Governor's Council on Biofuels Supports Vision for Minnesota Clean Fuels Policy," Great Plains Institute, December 7, 2020, <https://www.betterenergy.org/blog/governors-council-on-biofuels-supports-vision-for-minnesota-clean-fuels-policy/>.

<sup>4</sup> Great Plains Institute, *A Clean Fuels Policy for the Midwest* (January 7, 2020), <http://www.betterenergy.org/cleanfuelspaper>.

the Midwestern Clean Fuels Policy Initiative (a stakeholder group facilitated by GPI). A Minnesota policy could help grow the RNG market, improving the economics for food waste digesters.

- **Pass the Natural Gas Innovation Act to make AD more feasible:** During the 2020 legislative session, CenterPoint Energy supported the Natural Gas Innovation Act, which was authored by Representative Stephenson and Senator Weber. Under the legislation, natural gas utilities could submit an alternative resource plan, which could include using RNG, for approval to the PUC. Additionally, the legislation would require the PUC to establish a program for tradable RNG credits, which would further incentivize sourcing RNG, and require the Minnesota Department of Commerce to develop an inventory of the state's potential RNG sources. Passing this act could increase demand for RNG, which would contribute to stronger, stable, and reliable markets for RNG. The result would be improved access to financing, as well as more reliable revenue streams for facilities that use AD to manage organic waste.
- **Explore ways to encourage biogas as a source of renewable electricity:** Biogas is an eligible source of renewable electricity for existing policies like the RFS, renewable portfolio standards, and net metering. However, it tends to be higher cost than solar and wind. Yet, when combined with the right set of policies, renewable electricity production can be a strong source of revenue, particularly for smaller AD facilities. Minnesota should explore additional policies that can improve the economics of renewable electricity production for smaller AD facilities and help meet state renewable electricity goals. This could include supporting efforts of other coalitions working to establish an eRIN process (biogas used to power battery or fuel cell electric vehicles) with the EPA as part of the federal RFS program.
- **Explore the feasibility of implementing a cap-and-trade program in Minnesota:** California's cap-and-trade program has been largely successful in reducing GHG emissions and funding local projects that improve air quality. While a cap-and-trade program is far broader than the other policies under consideration and impacts a wide variety of projects, it could be helpful for AD projects as it has been in California. More discussion would be required with Minnesota stakeholders to test the feasibility of implementing a similar program in the state and identifying program design principles. How a carbon emissions regulation impacts AD projects will depend on program design and implementation.
- **Fully fund the Bioincentive Program:** The legislature has not appropriated enough funding for this program, and there is increasing demand by companies wanting to receive incentive payments. Fully funding the program would mean appropriating about \$9-10 million annually. A fully funded Bioincentive Program could assist development of food waste digesters in Minnesota.
- **Increase state funding for Minnesota Business First Stop:** State agency staff time to serve the program is constrained, which has prevented the program from further marketing its services. Supplying the program with additional funding could mean adding additional staff capacity. Additionally, more funding

dedicated to marketing would increase awareness of the program for AD developers (and other developers) looking to site facilities in Minnesota. Increased marketing efforts could be a combination of billboard ads, earned media, paid social media, magazine advertisements, online media stories, and others.

- **Support grantmaking through state general obligation bonds or other funding sources:** The MPCA and the Walz Administration have shown interest in funding grants to construct public AD facilities utilizing food waste through state general obligation bonds. Although bond funding is highly competitive, a grant program funded with bonds or other means could help develop publicly-owned food waste digesters in Minnesota and should continue to be explored.
- **Create a GHG reduction grant program:** Using California's Greenhouse Gas Reduction Grant and Loan Programs as an example, Minnesota could adopt a similar program if it implemented a cap-and-trade program. Revenue generated from the sale and purchase of credits in a cap-and-trade program could be deposited into a greenhouse gas reduction grant program, which could be administered by a state agency.
- **Outline the permitting process for AD, including food waste digesters, on the MPCA's website:** Minnesota could demystify the permitting process for food waste digesters and produce a guide, like Oregon, to be housed online with information regarding permits needed and other considerations.
- **Recognize AD as a viable and preferred food waste management solution:** On the existing MPCA website, AD is not recognized as a food waste diversion solution. In other states, AD is widely acknowledged by state agencies as playing an important role in managing food waste and reducing GHG emissions. Minnesota trails behind these other states by not clearly acknowledging the role AD could play in meeting climate goals. To improve this, the MPCA could create a webpage specific to AD or update existing webpages to acknowledge AD as a viable and preferred food waste management solution.
- **Identify a permitting navigator for project developers on the MPCA's website:** Several states, including California and Oregon, identify a primary contact person that developers can work with when navigating permitting processes in those states. The MPCA has expressed interest and willingness to work with project developers from project inception, but the role has not been formally established. Identifying a contact person on a page specific to AD could streamline permitting for developers.
- **Limit or ban PFAS in consumer products and industrial uses:** If land application of digestate from the AD of food waste becomes a barrier in Minnesota due to PFAS concerns, state agencies should consider limiting or banning PFAS in consumer products and industrial uses. This would assure that the amount of PFAS entering waste streams is reduced and reduce barriers for AD.

## CONCLUSIONS

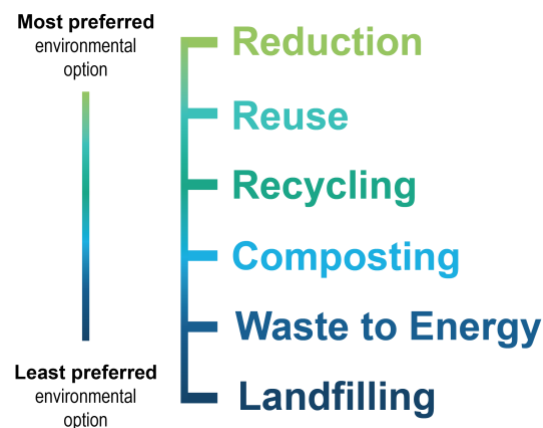
The report concludes that food waste digestion is a technologically mature but underutilized technology in the United States. Other states have implemented measures that should help grow the national market for food waste digestion, but Minnesota has trailed behind. Minnesota has also failed to recognize AD as a viable and preferred waste and energy solution. Although some projects are being proposed in Minnesota, additional policy and regulatory action could accelerate and expand development of projects in the state. Actions needed to address the slow pace of food waste digestion project development in Minnesota are multi-faceted; there is no single change that will spur AD development. By working toward considerations provided in this report, local and state agencies can improve the policy and regulatory environment in a way that encourages food waste digestion development and helps meet climate goals in Minnesota.

# I. INTRODUCTION

## PROBLEM STATEMENT

The Partnership on Waste and Energy (the Partnership) is a collaboration between Minnesota's Hennepin, Ramsey, and Washington counties, created to address certain areas of waste and energy management. The Partnership focuses on policy development, planning, communication and outreach, emerging waste processing technologies, and other select programs. In Minnesota, counties are responsible for managing waste, following county solid waste plans that are consistent with a regional plan developed by the Minnesota Pollution Control Agency (MPCA) and the state's waste management hierarchy, pictured in figure 1. The counties manage waste to reduce environmental, public health, and financial risk.

**Figure 1. Minnesota's waste management hierarchy**



Source: Adapted from Anna Kerr, Mark Rust, and Peder Sandhei, *2015 Solid Waste Policy Report* (Saint Paul: Minnesota Pollution Control Agency, 2016), 2, <https://www.pca.state.mn.us/sites/default/files/lrw-sw-1sy15.pdf>.

In 2014, the Minnesota Legislature passed a goal of recycling 75 percent by weight of total solid waste generation that counties in the Twin Cities metropolitan area must meet by December 31, 2030. According to Minnesota Statute 115A.03, subdivision 25b, recycling means “the process of collecting and preparing recyclable materials and reusing the materials in their original form or using them in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.” Based on this definition, anaerobic digestion (AD) could help meet county recycling goals as it provides useful products: biogas and digestate.

In 2013, a statewide waste characterization report prepared for the MPCA by Burns & McDonnell revealed that 31 percent of the state's solid waste stream consisted of uncaptured organics, such as food waste and compostable products. Current options in the greater Twin Cities metropolitan area for managing these organics include food waste prevention, food-to-people, food-to-animals, and composting. However, according to the Partnership and other stakeholders, these options will not provide sufficient capacity to recycle all separated organic materials in the near future. As more programs

to capture food waste are implemented throughout the metropolitan area, it is expected that the existing ways of managing organics will fall short in meeting processing demand.

## ANAEROBIC DIGESTION AS A WASTE AND ENERGY SOLUTION

As described in a 2018 Great Plains Institute (GPI) report, *Anaerobic Digestion Evaluation Study*, AD is a widely used technology in North America and Europe for processing organic waste into biogas and digestate. Biogas is composed primarily of methane, carbon dioxide, and water. Depending on the level of conditioning and upgrading, biogas can be used to produce heat, electricity, vehicle fuel, or renewable natural gas (a natural gas substitute also known as RNG) that can be directly integrated into the natural gas network. Biogas can also be used to synthesize renewable chemicals. Digestate is a solid or liquid material that can be land applied or further processed to produce concentrated soil nutrient products.

Deploying AD technology for organics processing will not only help to divert organics in the waste stream away from disposal; it will also help to decarbonize the energy and transportation sectors. According to GPI's analysis in the 2018 report, displacing diesel in transportation vehicles with compressed RNG and displacing conventional North American natural gas with RNG offer the greatest greenhouse gas (GHG) emission reductions from biogas produced by AD. Additionally, for most AD projects in Minnesota, RNG is likely to be the most lucrative use of the biogas.

## PROJECT BACKGROUND

From 2018 to 2019, GPI completed work for the Partnership to evaluate AD projects processing organics from municipal solid waste (MSW) and explore the potential for projects in the Twin Cities metropolitan area:

- A literature review and analysis evaluating the economics of operating an AD system, potential policy incentives, regulatory considerations, and case studies from the United States and European Union, concluding in the publishing of a white paper entitled *Anaerobic Digestion Evaluation Study* in September 2018.
- Engagement of stakeholders and technical experts through a series of meetings.
- Engagement of state officials to scope out the permitting process and generate interest from state agencies in supporting potential AD projects.

GPI's stakeholder engagement revealed several insights:

- Stakeholders were excited about AD projects and wanted to keep the conversation going.
- Policy can be a useful tool to spur AD and RNG projects when developed correctly.
- Many barriers exist that prevent market development for AD projects.
- More research needs to be done to address the financial feasibility of projects, regulatory barriers, permitting requirements, and other issues.

When exploring what barriers exist, one recurring theme from stakeholders was a perceived lack of clear and predictable pathways for permitting.

Focused on food waste digestion, this report investigates Minnesota's existing permitting and regulatory environment along with existing policies and incentives. It then identifies what the permitting and regulatory environments look like in California, Oregon, Wisconsin, and Iowa where numerous food waste digesters exist. Lastly, it provides policy and regulatory considerations that could support developing food waste digesters in Minnesota.

There are three primary types of food waste digesters:

- Stand-alone: facilities that primarily process food waste but may source other organic materials as well, such as manure and wastewater solids.
- On-farm digesters that co-digest food waste: facilities that are located on farms and primarily process manure but also accept food waste.
- Digesters at wastewater resource recovery facilities (WRRFs) that co-digest food waste: facilities that primarily process wastewater solids but also accept food waste.

The information presented in this report primarily focuses on information that would be helpful to develop stand-alone food waste digesters, though on-farm digesters and digesters at WRRFs processing food waste may also benefit from the policy considerations included.



## II. CHARACTERISTICS OF THE EXISTING REGULATORY ENVIRONMENT IN MINNESOTA

### BACKGROUND

In 2011, Governor Dayton signed an executive order that would later become the Permitting Efficiency Law, directing state agencies to reach permitting decisions within 150 days and develop online permitting processes. Since then, agencies have worked toward compliance. According to the MPCA, which receives thousands of permitting applications annually, it has issued 93 percent of permits on time.<sup>5</sup> Yet, while permitting in general seems to be becoming more efficient, permitting uncommon projects, like food waste digesters, is still challenging.

### STATE PERMITTING REQUIREMENTS

There are currently eight permitted anaerobic digesters in Minnesota, and all of them use agricultural waste as a feedstock.<sup>6</sup> Because no stand-alone food waste digesters have been permitted in Minnesota, the state does not currently have an example of a food waste digester permitting process. Also, there is not a sole agency responsible for issuing all the potentially required permits. Because all anaerobic digesters could potentially impact several aspects of the environment, project developers need to apply for permits from the MPCA and other agencies. Before construction can start, facilities must obtain all the applicable environmental permits. Once a facility has shown compliance with state and federal requirements, it is issued construction permits, including operating requirements to ensure continued compliance. Common permitting areas, as well as some challenges that may be encountered, are characterized below. A comprehensive list is presented in table 1.

#### Air

Air quality standards limit air pollution from point sources. New AD facilities must be designed to meet local, state, and federal air emissions standards. In Minnesota, the MPCA has the primary responsibility of implementing and enforcing state and federal air quality requirements. Specific characteristics of each individual AD facility determine if an air permit is required.<sup>7</sup>

According to Jeff Smith, director of the MPCA Industrial Division, air permit applications can be very hard to understand and often require project developers to hire an

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<sup>5</sup> Jeff Smith, "Minnesota Pollution Control Agency's Annual Permitting Efficiency Report," Minnesota Pollution Control Agency, August 2018, <https://www.pca.state.mn.us/sites/default/files/lrp-gen-1sy18.pdf>.

<sup>6</sup> "Biogas Projects," American Biogas Council, accessed July 20, 2020, <https://americanbiogascouncil.org/resources/biogas-projects/>.

<sup>7</sup> FOTH Infrastructure & Environment, LLC, "Preliminary Considerations for Siting an Anaerobic Digester in Iowa or Wisconsin," accessed July 20, 2020, 5.



experienced consultant to complete the forms, which can be expensive.<sup>8</sup> To reduce potentially wasted effort and the overall permitting timeline, the MPCA encourages project developers to partner with the agency from project inception to get a preliminary review and feedback from MPCA staff in the early design phases of a project.

Community input is also part of permitting process, and community opposition can hinder permitting. Therefore, the MPCA further recommends that developers engage the community early in the process to identify any potential issues.

## Water

Like air quality standards, anaerobic digesters must meet local, state, and federal regulatory and permitting requirements for water quality, which includes wastewater and stormwater concerns.

Water quality permits address wastewater concerns that are triggered when facilities propose to release pollutants into surface or ground waters. There are two types of water permits that are generally required from the MPCA:

- The National Pollutant Discharge Elimination System (NPDES) permit is required when process water will be discharged to surface water or sanitary sewers.
- The State Disposal System (SDS) permit addresses surface and groundwater concerns and may be required if process water will be land applied or infiltrated to a pond.

Beyond NPDES and SDS, there are 12 general permits that may be required to address wastewater concerns. The [MPCA provides a list of them](#) and explains what each one means on its website.<sup>9</sup>

Additional permits may be required to address stormwater concerns. The Construction Stormwater permit is required for facilities disturbing one or more acre of soil, and the Industrial Stormwater permit is required after the facility is constructed to address ongoing stormwater management.<sup>10</sup>

When applying for water quality permits, the plan for managing digestate is an important consideration. In Minnesota, digestate falls under the definition of industrial by-products (IBPs). IBPs from food waste can contain valuable nutrients such as nitrogen, potassium, and phosphorus. At the right quantities, these nutrients can be helpful for soil health and reducing commercial fertilizer use. However, if the nutrient levels are too high, they can impact groundwater and nearby bodies of water. Land application in excess of 50,000 gallons of liquid digestate or 10 tons of dry digestate generally requires an SDS permit. Any amount below this threshold only requires a notification to the MPCA to land apply without a permit. If digestate will be landfilled, it does not require a wastewater permit. In addition to requesting a permit, developers may need to conduct

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<sup>8</sup> Jeff Smith, "Project Permitting 101," presentation (The Future of Anaerobic Digestion in Minnesota meeting, St. Paul, Minnesota, July 29, 2019).

<sup>9</sup> "General permits for wastewater," Minnesota Pollution Control Agency, accessed December 18, 2020, <https://www.pca.state.mn.us/water/general-permits-wastewater>.

<sup>10</sup> Doug Wetzstein, email message to Katelyn Bocklund, June 4, 2020.

an analysis of the digestate to test for pollutant concentrations. The MPCA offers a [decision flow chart](#) to help developers determine if a permit or analysis is required and if so, which ones.<sup>11</sup>

Managing digestate off-site, such as through composting, also has several implications as it relates to stormwater. Recently, a study commissioned by the MPCA identified per- and polyfluoroalkyl substances (PFAS) in contact water from several Minnesota compost sites. PFAS are a group of synthetic chemicals found in a wide variety of products including food packaging, cosmetics, carpeting, and more. PFAS concerns exist for essentially every facility managing solid waste, including landfills, compost sites, wastewater treatment plants, and others.<sup>12</sup> Some concerns can be reduced by limiting the types of feedstocks accepted (e.g., food waste only) and testing feedstock and end products for PFAS levels. This is an emerging area of concern in Minnesota.

## Environmental Review

Anyone developing an AD facility in Minnesota must complete an environmental review, overseen by either the Minnesota Environmental Quality Board or MPCA depending on project type, prior to receiving permits. This review can be done while applying for permits. According to the Minnesota Environmental Quality Board, environmental review usually refers to either an environmental assessment worksheet (EAW) or an environmental impact statement (EIS).

An EAW is required for projects that meet or surpass thresholds listed in the mandatory EAW categories in [Minnesota Rules part 4410.4300](#), unless they meet EIS thresholds. Each category has its own threshold. AD applicable categories may include electric-generating facilities, fuel conversion facilities, pipelines, industrial, commercial, and institutional facilities, air pollution, solid waste, and wastewater systems. Under the solid waste category, it is assumed AD facilities count as an MSW energy recovery facility, which requires an EAW for the construction or expansion of a facility with 30 tons or more per day of input.<sup>13</sup>

An EIS is required for projects that meet or surpass size or production thresholds listed in the mandatory EIS categories in [Minnesota Rules part 4410.4400](#). Each category has its own threshold. AD applicable categories may include fuel conversion facilities, industrial, commercial, and institutional facilities, and solid waste, among others. Under the solid waste category, it is assumed AD facilities count as an MSW energy recovery facility, which requires an EIS for the construction or expansion of a facility with 250 tons or more per day of input.<sup>14</sup> Whether or not an AD project will need an EAW or an EIS is very dependent on specific aspects of the projects, such as location, capacity, and

<sup>11</sup> "Industrial by-products," Minnesota Pollution Control Agency, accessed September 23, 2020, <https://www.pca.state.mn.us/water/industrial-products>.

<sup>12</sup> Wood Environment and Infrastructure Solutions, Inc., "Site Investigation Report: Investigation of per- and polyfluoroalkyl Substances at Select Source Separated Organic Material and Yard Waste Sites," 2019, <https://www.pca.state.mn.us/sites/default/files/w-sw4-37.pdf>.

<sup>13</sup> "Mandatory EAW categories," Office of the Revisor of Statutes, Minnesota Legislature, accessed July 20, 2020, <https://www.revisor.mn.gov/rules/4410.4300/>.

<sup>14</sup> "Mandatory EIS categories," Office of the Revisor of Statutes, Minnesota Legislature, accessed July 20, 2020, <https://www.revisor.mn.gov/rules/4410.4400/>.

feedstock. If any part of an AD project meets thresholds under an EIS, the entire project will require an EIS.

Because environmental review, whether EAW or EIS, needs to be completed prior to receiving permits, it can increase the time period needed to complete permitting and delay project construction. To expedite the permitting process, agencies and project developers can work on drafting permits while environmental review is happening so permits can be issued immediately after the environmental review process is completed.

## Solid Waste

A solid waste permit is required anytime there is storage, transfer, or processing of food waste in Minnesota. Depending on the site's location(s)—including end product management—solid waste permits, licenses, or approvals may be required by the state, county, and municipality.

**Table 1. Required permits for anaerobic digesters in Minnesota**

Agency	Permits Required*
US Environmental Protection Agency	<ul style="list-style-type: none"> <li>• Spill Prevention, Control and Counter Measure Plan</li> <li>• Resource Conservation and Recovery Act Subtitle D requirements</li> </ul>
Minnesota Environmental Quality Board or Minnesota Pollution Control Agency	<ul style="list-style-type: none"> <li>• Environmental assessment worksheet</li> </ul>
Minnesota Pollution Control Agency	<ul style="list-style-type: none"> <li>• Above ground storage tanks               <ul style="list-style-type: none"> <li>◦ Tankage requirements and/or permitting</li> </ul> </li> <li>• Wastewater Discharge Permit (NPDES/State Disposal System Permit)               <ul style="list-style-type: none"> <li>◦ Process and Sanitary Water Permit</li> </ul> </li> <li>• Stormwater permits               <ul style="list-style-type: none"> <li>◦ Construction Stormwater Pollution Prevention Plan</li> <li>◦ Industrial Stormwater Pollution Prevention Plan</li> </ul> </li> <li>• Hazardous Waste Generator License**</li> <li>• Solid waste permit</li> <li>• Air quality permit</li> </ul>
Minnesota Department of Natural Resources	<ul style="list-style-type: none"> <li>• Utility Crossing License</li> <li>• Water use (appropriation) permit</li> </ul>
Minnesota Department of Transportation, Office of Land Management	<ul style="list-style-type: none"> <li>• Utility Accommodation on Trunk Highway Right of Way (for projects seeking to transport biogas via a low-pressure pipeline within highway right of way)</li> </ul>

\*Actual permits required depends on the specifics of the proposed project.

\*\*If located in the Twin Cities metropolitan area, this is issued by local counties.

Source: Based on interviews with the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, and Minnesota Department of Transportation officials.

## LOCAL PERMITTING REQUIREMENTS

In addition to state requirements, anaerobic digesters may need local permits for construction, zoning, wastewater discharge, and stormwater management, which will depend on the geographic location of the proposed digester. Local ordinances will vary for each municipality. A comprehensive guide on local permitting requirements or model ordinances for anaerobic digesters does not exist in Minnesota.

## OTHER REQUIREMENTS

Beyond permitting, additional approvals may be required by utilities for project developers planning to connect to the electric grid or natural gas pipeline network. Because RNG is likely to be more profitable for AD developers in Minnesota, compared to selling electricity, this section focuses on connecting to natural gas pipelines.

To connect to natural gas pipeline networks, biogas needs to be conditioned and upgraded to pipeline-quality gas, which means removing water, carbon dioxide, hydrogen sulfide, and other elements. The resulting gas can be used in place of conventional natural gas.<sup>15</sup>

Natural gas local distribution companies are regulated by the Minnesota Public Utilities Commission (PUC) and therefore need to have approval from the PUC to allow RNG into their systems. According to Minnesota Statute 216B.2421, project developers would need to secure a Certificate of Need and environmental report from the PUC if they intend to transport RNG at pressures in excess of 200 pounds per square inch with more than 50 miles of length in Minnesota. Additionally, a route permit is required from the PUC if a pipe has a diameter of six inches or more and transports hazardous liquids or if the pipe carries gas and operates at a pressure of more than 275 pounds per square inch. If the pipeline does not meet either qualification but is in Minnesota and transports natural or synthetic gas at pressures beyond 90 pounds per square inch, it requires review under the Information Book Process, which is a local review process.<sup>16</sup> According to CenterPoint Energy, most RNG pipelines would generally run at lower pressures (below 200 pounds per square inch).<sup>17</sup>

There are three large distribution companies in the state (CenterPoint Energy, Xcel Energy, and Minnesota Energy Resources) and two small distribution companies (Great Plains Natural Gas Company and Greater Minnesota Gas).

In August 2018, CenterPoint Energy, Minnesota's largest natural gas utility, filed a proposal to the PUC to offer RNG to its customers. While the PUC declined this pilot program as proposed, it acknowledged the potential benefits of RNG and expressed interest in facilitating Minnesota-produced RNG efforts.<sup>18</sup>

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<sup>15</sup> "Renewable Natural Gas Production," Alternative Fuels Data Center, US Department of Energy, accessed August 18, 2020, [https://afdc.energy.gov/fuels/natural\\_gas\\_renewable.html](https://afdc.energy.gov/fuels/natural_gas_renewable.html).

<sup>16</sup> Bob Harding, CenterPoint Energy, email message to Katelyn Bocklund, August 20, 2020.

<sup>17</sup> Erica Larson, CenterPoint Energy, email message to Katelyn Bocklund, September 1, 2020.

<sup>18</sup> "CenterPoint Energy proposes tapping Minnesota-made renewable natural gas," CenterPoint Energy, accessed July 21, 2020, <https://www.centerpointenergy.com/en-us/corporate/about-us/news/1337>.

The [PUC recently approved CenterPoint Energy's 2020 interconnection petition](#), opening the door for AD developers to inject RNG into CenterPoint's system. Beyond CenterPoint's system, project developers can only interconnect to one of several interstate pipelines in Minnesota that are regulated by the Federal Energy Regulatory Commission in compliance with US Department of Transportation safety standards. However, these pipelines operate under higher pressures than local pipelines, which requires expensive equipment to pressurize the gas. Developers that intend to produce RNG and inject it into a pipeline are best served at this time by locating near an interstate pipeline to interconnect, although that limits the prevalence of suitable sites.<sup>19</sup> To date, the other distribution companies in Minnesota have not pursued accepting RNG into their systems.

In 2020, CenterPoint Energy supported the Natural Gas Innovation Act,<sup>20</sup> Minnesota legislation which would allow a natural gas utility to submit an alternative resource plan to the PUC to offer its customers alternative fuels such as RNG. An alternative resource plan could propose the use of renewable energy resources and innovative technologies such as RNG, renewable hydrogen gas, energy efficiency measures, and other innovative technologies that reduce or avoid GHG emissions. During the 2020 legislative session, the legislation passed in the Senate but did not receive a hearing in the House. According to Erica Larson, CenterPoint Energy Senior Regulatory Analyst, they plan to support similar legislation in the 2021 legislative session.<sup>21</sup>

## PERMITTING SURVEY ANALYSIS

### Background

As mentioned earlier, one recurring theme that surfaced during GPI's stakeholder engagement was a lack of clear and predictable pathways for permitting. To understand the barriers companies experienced during permitting, GPI conducted a survey in January 2020 focused on AD projects in Minnesota.

### Methodology

GPI compiled an electronic survey with questions about project characteristics, agencies involved in the permitting process, challenges, and timeline, as well as the use of the Minnesota Business First Stop program (described in section 3 of this report). GPI sent the survey to six AD projects that had sited or were in the process of siting in Minnesota and followed up with outreach via email and telephone. GPI then analyzed results from the respondents.

A blank version of the survey is provided in appendix A.

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<sup>19</sup> Erica Larson, email message to Katelyn Bocklund, July 21, 2020.

<sup>20</sup> "Natural Gas Innovation Act," CenterPoint Energy, accessed July 21, 2020, <https://www.centerpointenergy.com/en-us/residential/in-your-community/natural-gas-innovation-act?sa=mn>.

<sup>21</sup> Erica Larson, email message to Brendan Jordan, July 20, 2020.

## Respondents

Out of the six projects that received the survey, three completed it with information pertaining to their projects and permitting process experiences. The three respondents and project characteristics are listed below:

### HOMETOWN BIOENERGY | LE SUEUR, MN

**Status:** Operating

**Technology:** Center mounted, continuously stirred reactor (Xergi-Denmark)

**Feedstock:** Agricultural and food processing waste

**Capacity:** Permitted for 45,000 dry tons of feedstock

**Products:** Biogas used to produce electricity

### ST. CLOUD BIOFUEL RECOVERY PROJECT | ST. CLOUD, MN

**Status:** Operating

**Technology:** Two primary digesters heated using waste heat from the engine-generator, supplemented with natural gas. The solids have a retention time ranging from 20-25 days in the primary digestion phase, then they are transferred to a centrifuge to remove water, then the solids go to the Lystek process, which includes the addition of high shear mixing, steam, and potassium hydroxide.

**Feedstock:** Domestic solids, food and beverage industry by-products

**Capacity:** 20,000,000 gallons

**Products:** Biogas used to produce electricity (5.4 million kWhs annually at 100 percent capacity); bio-fertilizer recycled on area farmland.

### RDF STEVENS | MORRIS, MN

**Status:** Permitting

**Technology:** DVO, Inc. complete mix

**Feedstock:** Dairy manure

**Capacity:** Roughly 1,100 dry tons/year produced from 20,000 cows

**Products:** Biogas to compressed RNG

## Results

Through survey results, GPI learned that permitting is an extensive process in Minnesota that requires coordinating with several agencies. Respondents indicated a desire for more clarity and streamlining of permitting requirements. On average, it took Minnesota AD projects four years to go through the permitting process. Permitting challenges cited included, “the MPCA team had some staffing shortages,” “the MPCA didn’t have a box to put us in,” and “the local utility provider has a very lengthy interconnection application process.” While the Minnesota Business First Stop program can help to streamline the permitting process, especially for complex projects, only one respondent was aware of it and used it. What that respondent appreciated most about the program was “the ability to cross multiple organizations in one place.”

While GPI received some valuable information from respondents, the fact that there were so few AD projects to survey in Minnesota indicates a lack of precedent to aid in

AD permitting in the state. The next section explores regulatory strategies and policy incentives for food waste digesters that exist today.



### III. EXISTING REGULATIONS AND POLICY INCENTIVES IMPACTING PROJECTS IN MINNESOTA

As GPI's 2020 survey indicated, there are few commercial-scale anaerobic digesters in Minnesota and currently no commercial-scale food waste digesters. However, there are several existing regulations and policy incentives at both the federal and state levels that can support food waste digester development in Minnesota.

#### FEDERAL

The Renewable Fuel Standard (RFS) is the primary federal program available to support food waste digestion project developers considering siting facilities in Minnesota.

#### Renewable Fuel Standard<sup>22</sup>

**Background:** The RFS program was created under the Energy Policy Act of 2005 and amended by the Energy Independence and Security Act of 2007 to increase energy security, reduce GHG emissions, and expand the production and use of renewable fuels. The 2007 amendment significantly increased the size of the RFS program and included key changes, such as boosting the long-term annual goal to 36 billion gallons of total renewable fuel by 2022. The US Environmental Protection Agency (EPA) administers the program in consultation with the Department of Agriculture and Department of Energy.

**What it is:** The RFS is a national policy that requires refiners or importers of fossil fuels, such as gasoline or diesel, to incorporate a certain volume of renewable fuel into existing transportation fuel, heating oil, or jet fuel, which is called the renewable volume obligation (RVO). The program aims to achieve 36 billion gallons of total renewable fuel annually by 2022 and established annual volume levels working toward this 2022 goal. However, the EPA has had to set lower RVOs each year because there has not been enough renewable fuel to blend.

Compliance with the program is determined through trading and retirement of an environmental credit called a renewable identification number (RIN). RINs are generated when renewable fuel is produced, and one gallon of renewable fuel typically equates to one RIN. RINs are classified based on renewable fuel type, such as RNG, and are further broken down into D-codes based on feedstock, process used to create the fuel, and GHG emission reductions. Table 2 shows the four renewable fuel categories and examples of each along with their associated pathway requirements and RINs. The EPA

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<sup>22</sup> "Renewable Fuel Standard Program," United States Environmental Protection Agency, accessed May 21, 2020, <https://www.epa.gov/renewable-fuel-standard-program>.



defines a fuel pathway as “a specific combination of three components: (1) feedstock, (2), production process, and (3) fuel type.”<sup>23</sup>

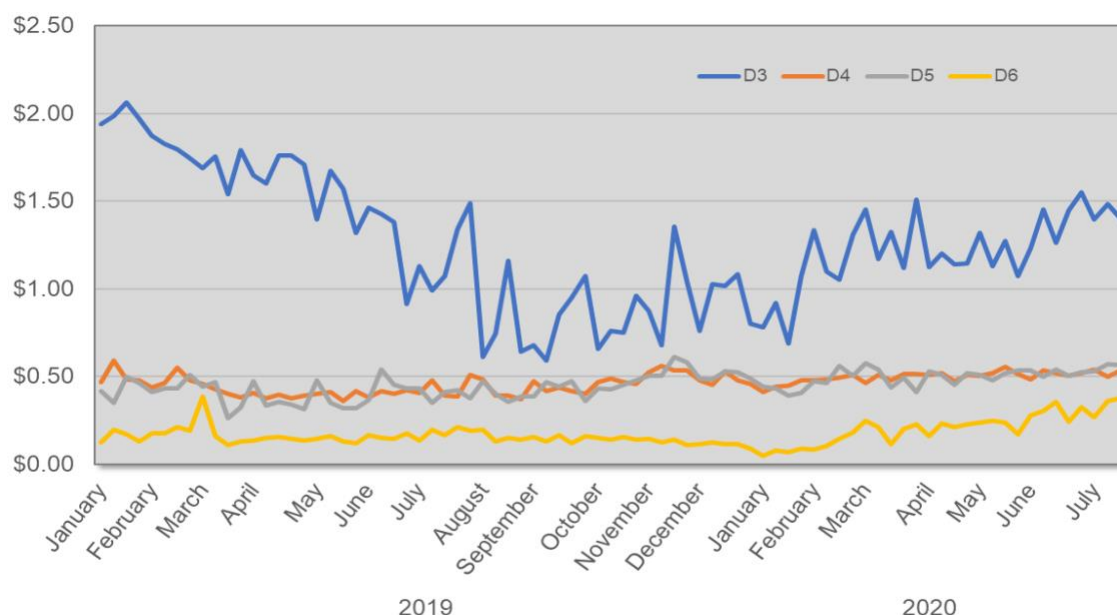
**Table 2. Renewable fuel categories and associated requirements, RINs, and 2020 volume standard**

Category	Examples	Pathway Requirements	RINs
Biomass-based diesel	Biodiesel, renewable diesel	50% lifecycle GHG reduction	D4 RIN
Cellulosic biofuel	Cellulosic ethanol, RNG	Produced from cellulose, hemicellulose or lignin and meet 60% lifecycle GHG reduction	D3 or D7 RIN
Advanced biofuel	Sugarcane ethanol, RNG	Produced from qualifying renewable biomass except cornstarch and meet 50% lifecycle GHG reduction	D5 RIN
Total renewable fuel	Corn ethanol	Typically ethanol; 20% lifecycle GHG reduction	D6 RIN

Source: Based on information from the US Environmental Protection Agency website, <https://www.epa.gov/renewable-fuel-standard-program>.

As seen in table 2, RNG produced from biogas falls into D5 or D3 RINs based on the feedstock. Current RIN pricing indicates D3 RINs are more valuable, as depicted in figure 2.

<sup>23</sup> “Fuel Pathways under Renewable Fuel Standard,” Renewable Fuel Standard Program, United States Environmental Protection Agency, accessed December 18, 2020, <https://www.epa.gov/renewable-fuel-standard-program/fuel-pathways-under-renewable-fuel-standard#:~:text=A%20fuel%20pathway%20is%20a,which%20fuel%20pathways%20can%20qualify>.

**Figure 2. Monthly D-code RIN prices, 2019-20**

Source: Data based on “RIN Trades and Price Information,” Fuels Registration, Reporting, and Compliance Help, US Environmental Protection Agency, last modified July 10, 2020, <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information>. Figure authored by Dane McFarlane, GPI, 2020.

Most food waste is non-cellulosic, so AD using food waste as a feedstock will generate D5 RINs. If co-digesting cellulosic and non-cellulosic feedstocks, facilities could separate these feedstocks into separate digesters and then measure and monitor biogas produced from each in order to qualify for the more valuable D3 RINs.<sup>24</sup>

**Approved pathways:** Producers seeking to generate RINs from the production of RNG from biogas can use one of two generally applicable pathways:

- RNG or renewable electricity produced from biogas from AD using any production process can generate D5 RINs (less value).
- RNG or renewable electricity produced from biogas from “landfills, municipal wastewater treatment facility digesters, agricultural digesters, and separated MSW digesters; and biogas from the cellulosic components of biomass produced in other waste digesters” using any production process can generate D3 RINs<sup>25</sup> (more value).

Several groups, including the American Biogas Council, Biomass Power Association, and Energy Recovery Council have been working for over five years to push the EPA to

<sup>24</sup> Brad Pleima, “Biogas to RNG Projects: What, Why and How,” BioCycle, March 11, 2019, <https://www.biocycle.net/biogas-rng-projects/>.

<sup>25</sup> “Approved Pathways for Renewable Fuel,” United States Environmental Protection Agency, accessed October 15, 2020, <https://www.epa.gov/renewable-fuel-standard-program/approved-pathways-renewable-fuel>.

approve an eRIN pathway that would allow biogas projects powering battery or fuel cell electric vehicles to participate in the RFS. In 2019, they formed the RFS Power Coalition and filed a lawsuit against the EPA challenging its 2019 fuel targets.<sup>26</sup> In the spring of 2020, the coalition filed a petition for review against EPA in the DC Circuit Court of Appeals for its 2020 volume requirements for the RFS. The last action taken in the existing lawsuit occurred June 10, 2020 when the EPA filed to sever and hold the case in abeyance.<sup>27</sup> If this pathway were to be approved, it could increase market opportunities for renewable electricity derived from biogas.

**Benefits:** The RFS has wide-reaching benefits: it makes fuel more affordable for consumers, reduces pollution and GHG emissions, reduces reliance on foreign oil, and creates jobs. A study by policy expert Dr. Philip Verleger showed that blending ethanol into motor fuel lowered the price of crude oil by \$6 per barrel. It further highlighted that consumers save 22 cents on every gallon of gas from 2015 to 2018 because of the RFS, equating to a savings of \$250 per American family every year.<sup>28</sup>

For AD project developers, the RFS can make RNG investments more attractive and affordable by generating and selling RINs to obligated parties.

**Shortcomings:** While the RFS provides numerous benefits, it has three main flaws: securing a pathway approval requires offtake agreements if unable to fully use RNG on-site (explained below), reporting is complex, and small refineries that produce less than 75,000 barrels of fuel per day can petition to be exempted from the law.

- **Pathway approval:** To qualify for the RFS program, the EPA must verify that the fuel satisfies the statute and regulations, which require an EPA-approved pathway. There are two general approved pathways that facilities can use, described above, that exist for facilities producing biogas into RNG; as long as the facility meets the requirements set forth in the approved pathways, it is a fairly straightforward process to receive EPA approval. However, facilities wanting to generate RINs for biogas turned into other types of renewable fuel (i.e., beyond RNG, electricity, or dimethyl ether) may need to request approval for a new pathway, which can take years.<sup>29</sup>

The primary challenge in receiving pathway approval for biogas producers lies in the limitations of the RNG market. Before a developer can receive pathway approval from the EPA to start generating RINs, it needs to demonstrate that it will fully use the biogas for RNG. RNG from biogas is challenging for producers to fully use on-site, especially if they do not have a large fleet that uses RNG.

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<sup>26</sup> Maureen Walsh, "2019 Renewable Fuel Standard Update," BioCycle, March 11, 2019, <https://www.biocycle.net/2019-renewable-fuel-standard-update/>.

<sup>27</sup> "RFS Power Coalition v. EPA," Sabin Center for Climate Change Law, accessed July 22, 2020, <http://climatecasechart.com/case/rfs-power-coalition-v-epa/?cn-reloaded=1>.

<sup>28</sup> Dr. Philip K. Verleger, Jr., "The Renewable Fuel Standard Program: Measuring the Impact on Crude Oil and Gasoline Prices," Renewable Fuels Association, accessed May 21, 2020, <https://ethanolrfa.org/gaspricestudy/>.

<sup>29</sup> "Renewable Fuel Standard Program," United States Environmental Protection Agency, accessed May 21, 2020, <https://www.epa.gov/renewable-fuel-standard-program>.

This requires them to upgrade the biogas into pipeline quality and secure offtake agreements with end users to utilize the produced RNG. In a nascent RNG market, the challenges result from a lack of end users and pipeline limitations (i.e., located too far from a pipeline that will accept RNG). If biogas producers can secure offtake agreements, EPA approval is generally guaranteed.<sup>30</sup> Due to the complexities surrounding pathway approval and offtake agreements, it is advisable for AD developers to work with a consultant familiar with the RFS.

- **Reporting:** RIN generators are required to submit numerous reports (currently 13) with varying deadlines according to federal regulations. Except for two reports submitted on an annual basis, all reports must be submitted quarterly. Prior to submitting reports, users must be registered, which can take considerable time.<sup>31</sup>
- **Exemptions for small refineries:** Exemptions lower the required volumes of renewable fuel that refineries must purchase each year, which reduces the overall demand for RINs. This, in turn, lowers the value of RINs. According to the Renewable Fuels Association, while the EPA is required to consult with the Department of Energy before granting an exemption, it has not publicly released information on the process it uses to grant exemptions nor the names of exempted refineries.<sup>32</sup> In recent years, the number of exemptions granted has increased significantly, which has notably lowered the demand for RINs, thereby reducing their value.

## STATES

At the state level, clean fuel policies are known to be a primary driver for RNG, creating economic incentives for AD in the process. Unlike the federal RFS that works to increase the volume of renewable fuel, clean fuel policies work to reduce carbon and therefore incentivize deployment of the lowest-carbon fuels. Several states have implemented or are considering clean fuels policies.

### Clean Fuels Policies

**Background:** Clean fuels policies, such as California's Low Carbon Fuel Standard (LCFS) and Oregon's Clean Fuels Program, have been gaining momentum in the United States since California enacted its standard in 2011. Oregon implemented its program in 2016, and Colorado, New York, Washington, and several Midwestern states are considering or developing similar policies. British Columbia, Brazil, the European Union, and the United Kingdom also have similar policies in place.

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<sup>30</sup> Brad Pleima, phone conversation with Katelyn Bocklund, October 22, 2020.

<sup>31</sup> "Fuels Registration, Reporting, and Compliance Help: List of All Quarterly and Annual Reports for Renewable Fuel Standard (RFS)," United States Environmental Protection Agency, accessed May 21, 2020, <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/list-all-quarterly-and-annual-reports-renewable>.

<sup>32</sup> "Renewable Fuel Standard (RFS): The foundation of America's renewable energy policy," Renewable Fuels Association, accessed May, 2020, [https://ethanolrfa.org/renewable-fuel-standard/#:~:text=The%20Renewable%20Fuel%20Standard%20\(RFS,air%20pollution%20and%20greenhouse%20gas](https://ethanolrfa.org/renewable-fuel-standard/#:~:text=The%20Renewable%20Fuel%20Standard%20(RFS,air%20pollution%20and%20greenhouse%20gas).

While the policy concept is the same between existing clean fuel policies, such as California's LCFS and Oregon's Clean Fuels Program, there are differences between them that may impact how RNG is treated in each market. The [State of Washington](#) has conducted thorough analyses of existing policies that identifies the key differences between them.<sup>33</sup>

**What it is:** A clean fuels policy is a market-based policy that sets a carbon intensity standard for all transportation fuels and lowers it over time. Carbon intensity is the calculated score of a fuel's well-to-wheels lifecycle assessment, including extraction, production, refining, and use. It is measured in grams of carbon dioxide equivalent per megajoule (g CO<sub>2</sub>e / MJ). Fuel producers with carbon intensities higher than the standard generate deficits, while fuel producers with carbon intensities lower than the standard generate credits. To comply with the standard, fuel producers with deficits must purchase credits from other fuel producers. Once a credit is used to cover a deficit, it is retired. Over time, the policy decreases the use of higher-carbon fuels and increases commercial deployment of lower-carbon fuels, including ethanol, biodiesel, RNG, renewable diesel, sustainable aviation fuel, electricity for electric vehicles, hydrogen, and other fuels. Figure 3 illustrates the market logic of clean fuel policies.

**Figure 3. Clean fuels policy market logic**

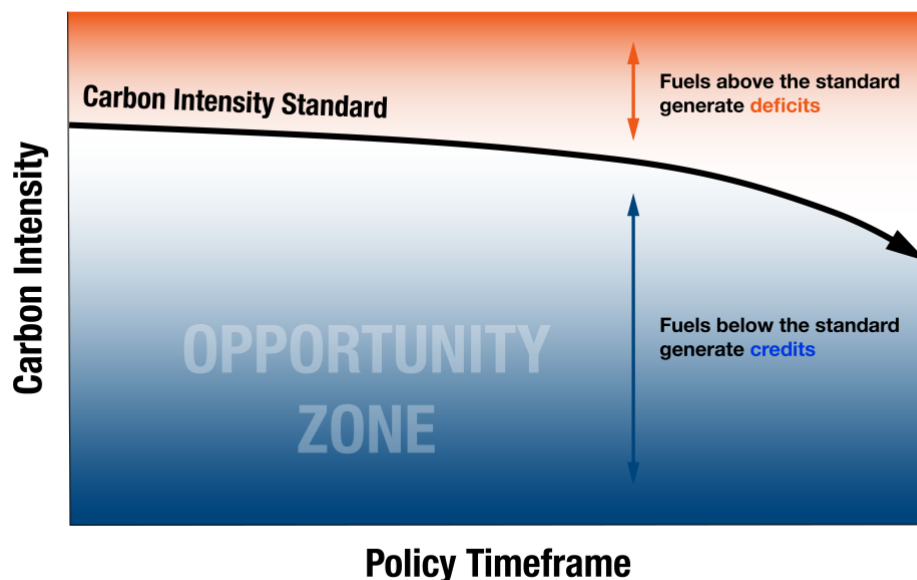


Figure 3 shows how the carbon intensity standard set by the policy declines overtime. Throughout the policy, fuels with carbon intensities above the standard generate deficits while fuels with carbon intensities below the standard generate credits. As the standard declines, there is additional opportunity to reduce a fuel's carbon intensity. Figure authored by Elizabeth Abramson, GPI, 2020.

<sup>33</sup> Jacob Lipson, "Clean Fuels Program Comparison Chart: California, Oregon, and Proposed Washington Program," Office of Program Research, Washington House Environment & Energy Committee, February 11, 2019, <https://app.leg.wa.gov/committeeschedules/Home/Document/194104>.

Clean fuel policies determine carbon intensity values for conventional fuels (gasoline and diesel) and lower-carbon fuels already in use (e.g., ethanol, biodiesel, RNG, and electricity). Figure 4 shows the range of carbon intensity scores of low-carbon fuels compared to diesel and gasoline operating in the California LCFS market.

**Figure 4. Modeled carbon intensity scores for alternative fuel pathways**

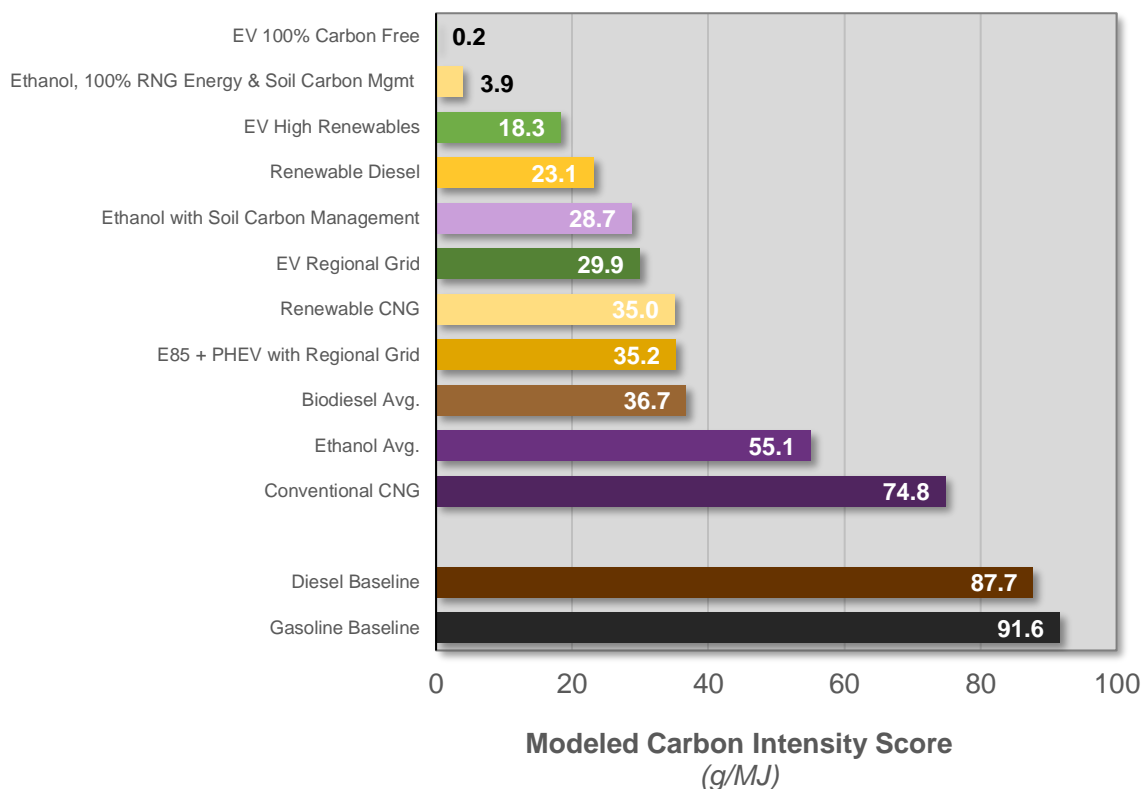


Figure 4 shows the range of carbon intensity scores of average low-carbon fuels compared to diesel and gasoline operating in the California LCFS market. Based on a fuel's lifecycle analysis, its carbon intensity score could be higher or lower than what is shown. Descriptions and sources for each modeled pathway are explained in appendix B. Figure authored by Jessi Wyatt, GPI, 2020.

**Benefits:** Existing clean fuels policies in California and Oregon have provided several benefits:

- Increased investment in a portfolio of cleaner fuels and subsequent economic benefits.
- Reduced air pollution.
- Increased market access for clean fuels, including RNG, that are often lower cost than conventional fuels and face barriers to marketplace entry.
- Financial incentive for increased use of biogas for transportation.

- Creation of opportunities for RNG producers to access the programs and fuel pricing incentives by injecting biogas into an interstate pipeline connected to either state.

Under the California LCFS, the share of alternative fuels in California's transportation energy grew from 6.1 percent to 8.5 percent between 2011 and 2017. During this time, natural gas use in transportation grew 111 percent to 178.1 gasoline gallon equivalent (gge). Biogas accounted for approximately two-thirds of the total natural gas use in transportation in 2017.<sup>34</sup>

**Shortcomings:** While clean fuels policies generally receive broad support, there are a few shortcomings worth noting:

- With clean fuels policies existing today only in certain jurisdictions (e.g., California, Oregon, British Columbia), there is a limited market for RNG produced in Minnesota in those markets.
- LCFS pathways must be approved by the overseeing agency where the policy exists (e.g., California Air Resources Board), which can delay desired price incentives.
- The program provides the highest level of incentive for the lowest-carbon intensity fuels. For biogas specifically, biogas from dairy farms generally receives the lowest-carbon intensity scores, especially dairy farms that previously managed their manure in open lagoons. However, it's important to note that RNG produced from food waste also receives a favorable carbon intensity score.

**Examples of use:** In California, only two applicants have received pathways from the California Air Resources Board, which administers California's LCFS, to produce compressed natural gas (CNG) using biogas produced from food and/or yard waste:

- California Renewable Power LLC received its certification on December 20, 2018. At its California Renewable Power and Anaerobic Digestion Facility in Perris, CA, it produces biogas from the AD of 100 percent yard waste and then upgrades it to biomethane on-site, injects it into the SoCalGas pipeline, and compresses it into transportation fuel.<sup>35</sup> Its certified carbon intensity is 0.34 gCO<sub>2</sub>e/MJ.
- Blue Line Transfer, Inc. received its certification on September 25, 2018, and produces biomethane from the AD of food and green wastes, further compressing it into transportation fuel. Its certified carbon intensity score is -22.93 gCO<sub>2</sub>e/MJ. According to Zero Waste Energy, the dry AD facility expects to convert 11,200 tons of food and yard waste per year into compressed RNG and digestate, helping to meet the City of South San Francisco's goal of diverting 95

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<sup>34</sup> "Status Review of California's LCFS," UC Davis Institute of Transportation Studies, accessed July 21, 2020, <https://its.ucdavis.edu/research/californias-low-carbon-fuel-standard/>.

<sup>35</sup> The digester involved in this process is one of the case studies provided in the "Anaerobic Digestion Evaluation Study," prepared for the Partnership by GPI in September 2018.



percent organic waste from landfills. By doing so, the facility expects to produce over 100,000 diesel equivalent gallons of bio-CNG per year.<sup>36</sup>

Many other biogas pathways have been approved using biogas from other sources, including dairy manure, swine manure, and landfill gas. Additionally, there are several products that can be derived from biogas, including RNG, hydrogen, and electricity.

Under Oregon's Clean Fuels Program, applicants that have an approved carbon intensity from the California Air Resources Board can apply to the Oregon Department of Environmental Quality to receive a similar approval.<sup>37</sup>

## MINNESOTA

Minnesota has several regulations, policies, and other incentives that drive development of food waste digesters, including the Bioincentive Program, the Renewable Energy Standard, state general obligation bonding, and Minnesota Business First Stop.

### Bioincentive Program<sup>38</sup>

**Background:** The Agricultural Growth, Research, and Innovation Bioincentive Program, administered by the Minnesota Department of Agriculture, was established by the Minnesota Legislature during the 2015 session to encourage commercial-scale production of advanced biofuels, renewable chemicals (e.g., biobased plastics, dissolving wood pulp, and biobutanol), and biomass thermal energy through production incentive payments from the Minnesota Department of Agriculture. RNG is an eligible fuel under the advanced biofuel program with an EPA pathway, and biogas used for heating would be eligible under the biomass thermal program.

**What it is:** Through the program, eligible facilities can receive incentive payments for three types of production: advanced biofuels, renewable chemicals, and biomass thermal energy.

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<sup>36</sup> "Blue Line Biogenic CNG Facility," Zero Waste Energy, 3rd quarter 2014, <https://zerowasteenergy.com/our-projects/blue-line-biogenic-cng-facility/>.

<sup>37</sup> "Fuel Pathways- Carbon intensity Values," Oregon Department of Environmental Quality, accessed June 9, 2020, <https://www.oregon.gov/deq/aq/programs/Pages/Clean-Fuel-Pathways.aspx#:~:text=The%20Clean%20Fuels%20Program%20aims,by%20the%20Oregon%20GREET%20model.>

<sup>38</sup> "Biomass Thermal Energy Production Incentive Program," Minnesota Department of Agriculture, accessed June 16, 2020, <https://www.mda.state.mn.us/environment-sustainability/biomass-thermal-energy-production-incentive-program>.



**Table 3. Payment rates of the Minnesota bioincentive**

Program	Price	Unit	Feedstock	Production Thresholds
Advanced biofuels	\$2.1053	MMBtu equivalent	Cellulosic biomass	23,750 MMBtu per quarter
Advanced biofuels	\$1.053	MMBtu equivalent	Sugar or starch	23,750 MMBtu per quarter
Renewable chemicals	\$0.06	Pound	Cellulosic biomass	250,000 pounds per quarter
Renewable chemicals	\$0.03	Pound	Sugar, cellulosic sugar, starch, oil, or animal fat	250,000 pounds per quarter
Biomass thermal	\$5.00	MMBtu	Cellulosic biomass	250 MMBtu per quarter

Sources: Based on information from “Advanced Biofuel,” Advanced Biofuel Production Incentive Program, Minnesota Department of Agriculture, accessed June 8, 2020, <https://www.mda.state.mn.us/environment-sustainability/advanced-biofuel-production-incentive-program>; “Renewable Chemicals,” Advanced Biofuel Production Incentive Program, Minnesota Department of Agriculture, accessed June 8, 2020, <https://www.mda.state.mn.us/environment-sustainability/renewable-chemical-production-incentive-program>; and “Biomass Thermal Energy,” Advanced Biofuel Production Incentive Program, Minnesota Department of Agriculture, accessed June 8, 2020, <https://www.mda.state.mn.us/environment-sustainability/biomass-thermal-energy-production-incentive-program>.

**Practical considerations:** To receive payments from the program, facilities must meet the minimum eligibility requirements:

- Begin producing biofuels, renewable chemicals, or biomass thermal energy before June 30, 2025.
- Meet quarterly minimum production thresholds (noted in table 3).
- Use biomass from agricultural or forestry sources, or the organic portion of solid waste.
- Source 80 percent of renewable biomass from Minnesota.
- Harvest agricultural and forestry biomass following specified sustainable production and harvesting requirements.

**Benefits:** The program incentivizes the production of advanced biofuels, renewable chemicals, and biomass thermal energy, creating economic, environmental, and health benefits.

Since the program was enacted in 2015, twelve facilities have received incentive payments. These facilities contributed to the economy through direct, indirect, and induced effects during construction and ongoing operation. Direct effects include total sales, jobs, and labor income paid by the facilities while indirect and induced effects

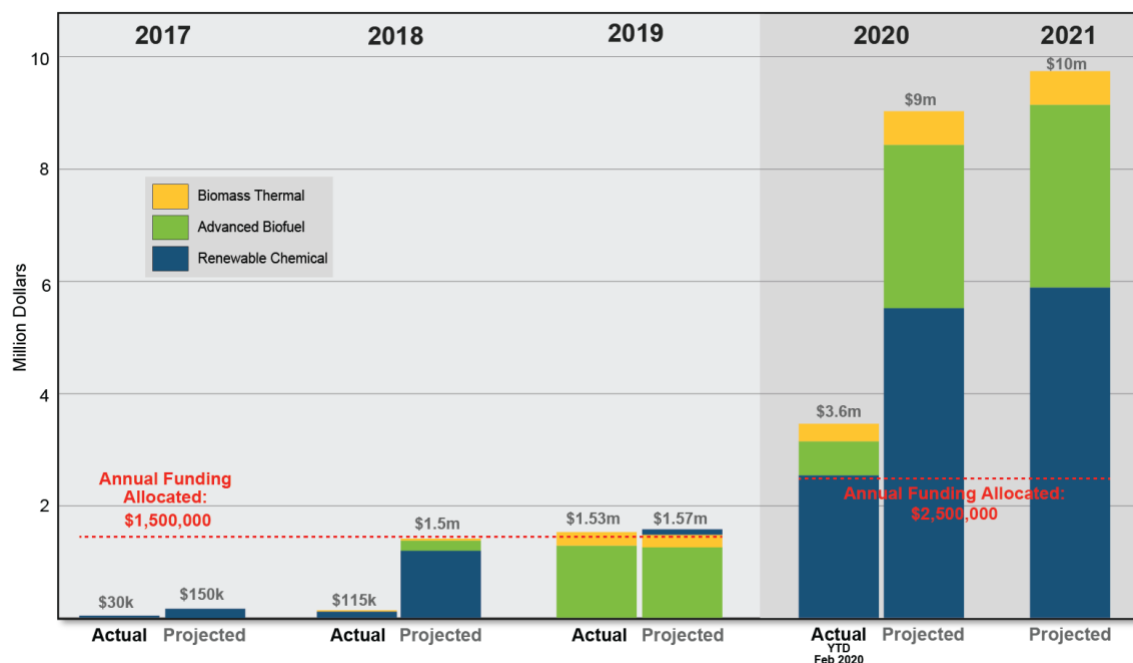
include economic activity beyond direct effects, such as employees spending earned wages in the local economy.

The Bioincentive Program creates environmental benefits by encouraging the production of biofuels and renewable chemicals using cellulosic biomass. Biofuels and chemicals made with cellulosic biomass are typically less carbon-intensive than conventional biofuels, like corn ethanol and biodiesel made from soy, and chemicals.

Finally, the program provides health benefits from improved air quality due to the production and use of advanced biofuels instead of fossil fuels, and from safer chemicals made with biomaterials.

**Shortcomings:** The main drawback of the program is a lack of funding appropriated by the Minnesota Legislature. In 2019, seven companies drew on the program for a range of projects around Minnesota. The requested amount surpassed the allocated funding of \$1.5 million in the fiscal year budget. That meant one company did not receive about \$30,000 it was entitled to according to Bioincentive Program guidance in statute. While the allocated amount in the FY 2020-21 budget increased to \$2.5 million per year, it is far below the amount required for projects that have already made investments in Minnesota, as shown in figure 5.

**Figure 5. Minnesota bioincentive projections and claimed reimbursements**



According to data received from the Minnesota Department of Agriculture, projections far surpass the amount allocated by the legislature for the program in fiscal years 2020 and 2021. Figure authored by Elizabeth Abramson, GPI, February 2020, based on information from the Minnesota Department of Agriculture.

Claims operated on a first-come, first-served basis through FY2019. Beginning in FY2020, claims are reimbursed pro rata, meaning that in any quarter where allocated funds are less than the total of eligible claims, the funds remaining in that quarter are awarded proportionally to projects. Once funds have been depleted in a given fiscal year, additional payments are not made until the next fiscal year. The [Bioeconomy Coalition of Minnesota](#), facilitated by GPI, is actively working to increase the amount allocated to the program.

**Examples of use:** A food waste digester could be eligible for both the advanced biofuel program and the biomass thermal program, depending on how the biogas is used. If upgraded to pipeline quality, the digester would be eligible under the advanced biofuel program with an EPA pathway. If the biogas is used as a heat source, it would be eligible under the biomass thermal program. The project would be eligible for either program for a 10-year period if it meets the quarterly minimum production levels and other program requirements.

There are no food waste digester projects in Minnesota that have received payments from the program. One company, Amp Americas LLC, is undergoing permitting to site a dairy digester in Minnesota with the intention of producing CNG from biogas. Once sited, it could be the first commercial digester project to become eligible for the bioincentive.

## Renewable Energy Standard

**Background:** The Minnesota Legislature passed the Minnesota Renewable Energy Objectives statute in 2001, which required electric utilities to work toward obtaining 10 percent of Minnesota energy sales from eligible sources by 2015 and 0.5 percent of renewable energy from biomass. In 2007, the legislature passed an amendment creating a renewable energy standard that redefined eligible energy technologies, required the PUC to establish a trading system for renewable credits, and established criteria to waive or extend deadlines for meeting the new energy standard targets. The amendment also revised the original objective to state, “commencing in 2005, at least one percent of the electric utility’s total retail electric sales to retail customers in Minnesota is generated by eligible energy technologies and seven percent of the electric utility’s total retail electric sales to retail customers in Minnesota by 2010 is generated by eligible energy technologies.”<sup>39</sup>

Commonly known as the Minnesota renewable energy standard (referred to in statute as the eligible energy technology standard), it mandates that electric utilities increase the amount of electricity provided from eligible energy technologies to customers, beginning with 1 percent by 2005 and increasing to 25 percent by 2025, as indicated below:

- 12 percent by 2012
- 17 percent by 2016

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<sup>39</sup> Minnesota Department of Commerce Division of Energy Resources, “*Minnesota Renewable Energy Standard: Utility Compliance*,” Minnesota Department of Commerce, January 15th, 2019, <https://www.leg.state.mn.us/docs/2019/mandated/190330.pdf>.

- 20 percent by 2020
- 25 percent by 2025<sup>40</sup>

An electric utility with a nuclear facility as of January 1, 2007, has more stringent requirements; the standard requires it to provide at least 30 percent of its energy from eligible technologies by 2020. Additionally, 25 percent must be generated from wind power, while the other 5 percent can be generated from other eligible technologies. Xcel Energy is the only utility that meets this description and is required to comply.

**What it is:** The Minnesota Renewable Energy Objectives statute (Minnesota Statute section 216B.1691) defines eligible energy technologies (i.e., renewable energy) as follows:

*Generates electricity from the following renewable energy sources: (1) solar; (2) wind; (3) hydroelectric with a capacity of less than 100 megawatts; (4) hydrogen provided that after January 1, 2010, the hydrogen must be generated from the resources listed in this clause; or (5) biomass, which includes, without limitation, landfill gas; an anaerobic digester system; the predominantly organic components of wastewater effluent, sludge, or related by-products from publicly owned treatment works, but not including incineration of wastewater sludge to produce electricity; and an energy recovery facility used to capture the heat value of mixed municipal solid waste or refuse-derived fuel from mixed municipal solid waste as a primary fuel (Minnesota Statute section 216B.1691, subdivision 1).*

All electric utilities in Minnesota are required to submit an annual compliance filing to the Minnesota Public Utilities Commission by June 1.<sup>41</sup>

**Benefits:** The renewable energy standard supports electric sector emissions reductions by mandating that electric utilities provide increasing percentages of renewable energy to customers. Along with decarbonization comes cleaner air, leading to a reduction of health impacts caused by poor air quality, such as asthma. According to the *2019 Minnesota Renewable Energy Standard: Utility Compliance* report prepared by the Minnesota Department of Commerce; all electric utilities currently required to comply with the standard have enough renewable energy resources to do so. Several utilities have enough renewable energy resources to comply with the standard through 2040 while others only have enough resources through 2020.

In addition to air quality benefits, the standard helps encourage electricity production from biogas, as it counts toward the eligible energy technologies that electric utilities are required to provide customers.

**Shortcomings:** Many electric utilities are able to meet the standard by sourcing solar, wind, and hydroelectric energy, which limits the demand for electricity from biogas. Additionally, the Solar Energy Standard adopted by the Minnesota Legislature in 2013 further requires Minnesota Power, Otter Tail Power Company, and Xcel Energy to obtain

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<sup>40</sup> Minnesota Department of Commerce Division of Energy Resources, “*Minnesota Renewable Energy Standard: Utility Compliance*,” 4.

<sup>41</sup> Minnesota Department of Commerce Division of Energy Resources, “*Minnesota Renewable Energy Standard: Utility Compliance*,” 9.

at least 1.5 percent of their electricity from solar energy by 2021 and 10 percent of their electricity from solar energy by 2030. Without additional policies or incentives, biogas used for electricity is not able to compete with lower cost sources of renewable electricity.

**Examples of use:** It is unknown as to what extent utilities are sourcing electricity produced from biogas to meet the standard.

## State General Obligation Bonding

**Background:** Article XI, section 5, paragraph (a) was added to the Minnesota constitution in 1962, which provides the legislature with the power to authorize the issuance of state general obligation bonds for acquiring and improving public land, buildings, and other capital improvements with a three-fifths majority of the House and Senate.<sup>42</sup> This occurs every two years, during even year legislative sessions. Once the legislature authorizes the issuance of bonds, the commissioner of Management and Budget is required by law to then issue the bonds.<sup>43</sup>

**What it is:** State general obligation bonds are sold on the bond market to investors, and the proceeds are granted to the capital improvement projects named in the enacted bonding bill. The funds are repaid to investors at a specified time and interest rate through debt service paid by the state. Bonds can only be issued for publicly-owned capital projects with a public purpose. Additionally, the state cannot borrow more than 3.25 percent of its income.<sup>44</sup>

**Benefits:** State bonding enables funding for large capital projects that benefit the public, which can stimulate the economy and create jobs. State bonds could fund the capital for food waste digesters and other AD facilities run by local governments.

**Shortcomings:** The process to receive state bonding funds is very competitive and frequently leads to long debates at the capitol during bonding years. Additionally, there is always a risk that certain capital projects will not be incorporated into the final bill, the legislature will not approve the issuance of bonds, or the governor will veto the final bill, all of which depend on various political pressures within each branch. Moreover, once a project receives bonding funds, the state holds restrictions on the property, preventing the public entity from selling, mortgaging, or otherwise encumbering it without approval from the Minnesota Management and Budget Commissioner.

**Examples of use:** Prior to the 2020 legislative session, the MPCA submitted a preliminary request of \$100 million in grant funds to local governments to construct regional AD facilities utilizing food waste, wastewater by-products, and/or animal waste.

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<sup>42</sup> Deborah A. Dyson, "Capital Investment and State Bonding," Minnesota House Research Committee, 2019, accessed June 15, 2020, <https://www.house.leg.state.mn.us/hrd/pubs/stbonding.pdf>.

<sup>43</sup> "About State Bonds," Minnesota Management and Budget, accessed June 16, 2020, <https://mn.gov/mmb/debt-management/bonding/overview/>.

<sup>44</sup> Deborah A. Dyson, "Capital Investment and State Bonding," 6.

The request indicated that, if funded, grants would be managed by the MPCA.<sup>45</sup> While the original request did not make it into the final proposed bill, Governor Walz included \$10 million in grants to expand organics infrastructure in his bonding proposal, and \$5 million made it into the House omnibus capital investment bill<sup>46</sup> but not in the Senate version. The Minnesota Legislature passed a bonding bill in October 2020, but it did not include grant funding for AD facilities.

## Minnesota Business First Stop

**Background:** Minnesota Business First Stop was established by former Governor Mark Dayton in 2012 to make it easier for companies to conduct business in Minnesota. Prior to its creation, there were several other state government initiatives designed to ease the regulatory burden for companies:

- Minnesota Green Enterprise Assistance was created in 2009 by the state legislature to coordinate projects related to renewable energy and similar goals.
- Minnesota Mining Subcabinet formed in 2011 and involves commissioners from the Minnesota Department of Iron Range Resources and Rehabilitation, Minnesota Department of Natural Resources, MPCA, and Minnesota Department of Employment and Economic Development. The subcabinet works to coordinate proposed mining projects while protecting the environment.
- Clean Energy Commercialization Opportunities Network coordinated projects related to clean energy startups from 2007 to 2009.<sup>47</sup>

**What it is:** Minnesota Business First Stop is a collaboration of nine state agencies created to streamline the development process for companies undergoing licensing, permitting, financing, or other processes that require multi-agency assistance. The following agencies participate in Minnesota Business First Stop:

- Minnesota Department of Employment and Economic Development
- Minnesota Department of Agriculture
- Minnesota Department of Commerce
- Minnesota Department of Iron Range Resources and Rehabilitation
- Minnesota Department of Labor and Industry
- Minnesota Department of Natural Resources
- Minnesota Department of Revenue
- Minnesota Department of Transportation
- Minnesota Pollution Control Agency<sup>48</sup>

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<sup>45</sup> “*State of Minnesota Preliminary Capital Budget Requests*,” Minnesota Management and Budget, July 2019, accessed June 17th, 2020, <https://mn.gov/mmb-stat/documents/budget/capital-budget/preliminary-capital-budgets/2020/pollution-control.pdf>.

<sup>46</sup> 91st Legislature (2019-2020), “*HF 2529 2nd Engrossment*,” Minnesota Legislature, May 12, 2020, accessed June 17th 2020, [https://www.revisor.mn.gov/bills/text.php?number=HF2529&type=bill&version=2&session=ls91&session\\_year=2019&session\\_number=0](https://www.revisor.mn.gov/bills/text.php?number=HF2529&type=bill&version=2&session=ls91&session_year=2019&session_number=0).

<sup>47</sup> Minnesota Business First Stop, “*Minnesota Business First Stop Highlights and accomplishments*,” July 2018, accessed June 18th, 2020, [https://mn.gov/deed/assets/business-first-stop-report\\_tcm1045-348408.pdf](https://mn.gov/deed/assets/business-first-stop-report_tcm1045-348408.pdf).

<sup>48</sup> Minnesota Business First Stop, “*Minnesota Business First Stop Highlights and accomplishments*,” 3.



**Benefits:** Minnesota Business First Stop’s primary goal is to reduce the regulatory burden for companies wanting to conduct business in Minnesota. Former Governor Dayton issued an executive order in 2011 directing the MPCA and Minnesota Department of Natural Resources to allow electronic permitting and shorten permitting time. The two agencies have worked to comply with the order and subsequent Permitting Efficiency Law, with the MPCA reaching permitting decisions within 150 days 77 percent of the time and the Minnesota Department of Natural Resources 99 percent of the time. Additionally, other agencies, including the Minnesota Department of Transportation and Minnesota Department of Labor and Industry, have moved permitting processes online and shortened permitting times.<sup>49</sup>

Companies have been satisfied with the level of assistance provided through Minnesota Business First Stop. Project developers have stated that the program expedited construction cycles, streamlined permitting processes, and strengthened relationships.<sup>50</sup>

**Shortcomings:** When used, Minnesota Business First Stop is an effective program for connecting project developers with relevant staff and programs at various state agencies. However, some stakeholders have reported that they are not aware of the program, and marketing of the program is limited at present. Minnesota Business First Stop’s effectiveness is also limited by what programs are available within state government. It cannot substitute for lack of policies or incentives, or issues that increase permitting time.

The Minnesota Business [First Stop program](#) currently offers a [four-page brochure online](#) that describes the program, lists the member state agencies, and provides a map of the state with six regions, each specifying a representative and contact information. However, more detailed information about these representatives, what agencies they represent, and how the program works would further illuminate how project developers can access the program to navigate the permitting process. There is also [a 2018 report of highlights and accomplishments](#). The webpage, on the Department of Employment and Economic Development (DEED) website, mentions permitting assistance, but again lacks specificity on contacting the member agencies. The program’s branding appears focused on business development and does not mention environmental assistance.

**Examples of use:** As covered in the “permitting survey analysis results” section of this report, there was one AD project that responded to the GPI survey that used Minnesota Business First Stop while applying for permits. The respondent reported a very positive experience with its services.

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<sup>49</sup> Minnesota Business First Stop, “*Minnesota Business First Stop Highlights and accomplishments*,” 5.

<sup>50</sup> Minnesota Business First Stop, “*Minnesota Business First Stop Highlights and accomplishments*,” 6.



## IV. POLICY AND REGULATORY ENVIRONMENTS IN OTHER STATES

To understand how Minnesota's policy and regulatory environment compares nationally, GPI conducted a literature review of the policy and regulatory environment in four other states: California, Oregon, Wisconsin, and Iowa. GPI chose these states for geographical representation across the United States as well as to examine policy and regulatory environments in states with various numbers of food waste digesters. This section describes unique policies enacted in each state, followed by descriptions of two policies that exist in all four states: net energy metering and renewable portfolio standards. Lastly, this section presents information on permitting guides that were published in several states.

**Table 4. State comparison of policies and number of food waste digesters**

State	Policies/Incentives	Number of operating food waste digesters (including stand-alone, co-digesters, and WRRFs)
California	<p><b>The Pollution Control Tax-Exempt Bond Financing Program (1972):</b> this program provides private activity tax-exempt bond financing in the form of loans to California businesses for the acquisition, construction, or installation of qualified pollution control, waste disposal, or waste recovery facilities, and the acquisition and installation of new equipment.</p> <p><b>Natural Gas Research and Development Program (2004):</b> this program aims to increase the energy efficiency of existing natural gas and increase the use of alternatives to natural gas, including biogas and RNG. It is part of a suite of energy research and development programs administered by the California Energy Commission.</p> <p><b>Global Warming Solutions Act of 2006 (AB 32):</b> this act requires California to lower its GHG emissions to 1990 levels by 2020, encouraging GHG reduction activities like diverting organics from landfills and using RNG for transportation.</p> <p><b>Assembly Bill No. 341 (2011):</b> the bill requires 75 percent of the state's waste to be reduced, recycled, or composted by 2020.</p> <p><b>Electric Program Investment Charge (2012):</b> the program was established by the California Public Utilities Commission and invests over \$130 million annually in technologies that benefit ratepayers and decarbonize electricity, including biogas development.</p> <p><b>Cap-and-Trade Program (2013):</b> a market-based mechanism aimed at reducing GHG and other emissions.</p>	30

	<p><b>Greenhouse Gas Reduction Grant and Loan Programs (2013):</b> using revenue from California’s cap-and-trade program, CalRecycle established a suite of grant and loan programs to fund capital investments that reduce GHG emissions, including anaerobic digesters.</p> <p><b>Assembly Bill 1826 (2014):</b> this bill required businesses generating eight or more cubic yards of organic waste per week and businesses generating four or more cubic yards of commercial solid waste per week to recycle organics. It also required local jurisdictions to implement organics diversion programs to assist businesses in recycling organics.</p> <p><b>Short-Lived Climate Pollutants Strategy SB 1383 (2016):</b> this bill established emissions reductions targets for short-lived climate pollutants and specified targets to reduce organics in landfills by 50 percent by 2020 and 75 percent by 2025 from 2014 levels.</p>	
Oregon	<p><b>Energy Trust of Oregon (2002):</b> this nonprofit organization provides project development assistance to facilities looking to generate renewable electricity from biogas.</p> <p><b>Rural Renewable Energy Development (RRED) Zones (2011):</b> Business Oregon provides a three- to five-year exemption from property taxes on new investments in solar energy farms, geothermal power generation, biofuel production facilities, and other eligible projects in designated rural areas.</p> <p><b>Senate Bill 98 (2019):</b> this bill established voluntary goals for adding up to 30 percent RNG into Oregon’s pipeline system by 2050.</p>	4
Wisconsin	<p><b>Focus on Energy (formed in 1999, operating since 2001):</b> this is a statewide program within Wisconsin’s Office of Energy Innovation offering information, services, and financial incentives for a variety of energy efficiency and renewable energy initiatives.</p> <p><b>Renewable Energy Competitive Incentive Program (RECIP) (created in 2012, started awarding projects in 2013):</b> administered by Focus on Energy, this program is a grant process that provides financial support to eligible renewable energy projects, including biogas, biomass, solar thermal, and wind, based on cost-effectiveness.</p> <p><b>Biogas, Solar, and Wind Property Tax Exemption (2013 AB 40/2013 Wisconsin ACT 20) (2013):</b> this is a property tax exemption for biogas or synthetic gas, solar, and wind energy systems in Wisconsin.</p>	14
Iowa	<p><b>Iowa Energy Center Grant Program (2019):</b> this is a grant program funded by gas and electric utilities across Iowa for projects that would aid in the implementation of a key focus area of the Iowa Energy Plan, including biomass conversion.</p> <p><b>Alternate Energy Revolving Loan Program (2019):</b> this program provides zero-interest loans for the development of alternative energy production facilities in Iowa.</p>	5

## CALIFORNIA

### Background

The current permitting environment for food waste digesters in California is multi-layered and time consuming. Different aspects of food waste digesters fall under different regulatory entities that require coordinating with several agencies and entities that issue permits, especially if the project is sited in a location with overlapping jurisdictions. Further complicating matters, digesters can be regulated as waste processing/transfer facilities, composting materials handling facilities, energy facilities, and potential point sources of pollution.<sup>51</sup>

In 2011, Robert Crandall, who worked for the Central Valley Regional Water Control Board, published the second version of *Permit Guidance for Anaerobic Digesters and Co-Digesters* to provide guidance for project developers. It served as a comprehensive manual, identifying permits required as well as the steps to obtain them, contact information for agencies, estimates of costs and time to complete processes, and more. Since then, there has not been another publication with updated information. The information provided in table 5 draws on Crandall's guidance and the permitting toolkit compiled by the Humboldt Waste Management Authority.

**Table 5. Required permits in California for AD projects**

Agency	Permit Required
County/City	<ul style="list-style-type: none"> <li>• Conditional Land Use Permit</li> <li>• Building Permit</li> </ul>
Regional Water Quality Control Board	<ul style="list-style-type: none"> <li>• Waste Discharge Requirements</li> </ul>
California Department of Resources Recycling and Recovery	<ul style="list-style-type: none"> <li>• Full Solid Waste Facilities Permit</li> </ul>
Local Air Pollution Control District	<ul style="list-style-type: none"> <li>• Authority to Construct Permit</li> </ul>

Sources: Based on information from Robert Crandall, *Permit Guidance for Anaerobic Digesters and Co-Digesters*, version 2, (California: California Environmental Protection Agency, 2011), [http://resources.cleanenergyroadmap.com/BIO\\_P\\_PermittingGuideDigester.pdf](http://resources.cleanenergyroadmap.com/BIO_P_PermittingGuideDigester.pdf); and Juliette Bohn, *Permitting Toolkit for Food Waste Anaerobic Digesters*, (California: Humboldt Waste Management Authority, 2013), <https://archive.epa.gov/region9/organics/web/pdf/hwma-permitting-toolkit.pdf>.

During GPI's multi-state survey, which is further explained in appendix C, stand-alone food waste digesters also listed the following additional permits:

- Business license
- Conditional Use Permit
- Air permit from Air Quality Management District
- Air Pollution Control District permit
- Air quality permit

<sup>51</sup>Juliette Bohn: Humboldt Waste Management Authority, "Permitting Toolkit for Food Waste Anaerobic Digesters," United States Environmental Protection Agency, March 2013, accessed July 18, 2020, <https://archive.epa.gov/region9/organics/web/pdf/hwma-permitting-toolkit.pdf>.

- Business license for end products
- Environmental health permit
- EPA permits
- Fire permit
- Flare permit for biogas
- Hazardous Waste Generator Permit
- Regional Water Control Permit

In addition to the permits listed in table 5, operators need to comply with the California Environmental Quality Act and may be subject to further permits from local agencies depending on the location of the proposed facility. The project may also require oversight from the California Public Utilities Commission, US Department of Transportation, California Department of Transportation, California Highway Patrol, California Department of Toxic Substances Control, and others depending on the nature of the digester and end products.<sup>52</sup>

CalRecycle [provides additional information on its website](#) regarding the requirements to land apply digestate. It specifies the maximum metal concentrations allowed, pathogen density limits, frequency and depth limits, physical contamination limits, and other requirements.

## Policies and Incentives

In addition to the California Low Carbon Fuel Standard previously described, there are several policies and incentives supporting food waste digester development in the state. These opportunities include programs like low-interest loans, loan guarantees, grants, and tax incentives.

### THE POLLUTION CONTROL TAX-EXEMPT BOND FINANCING PROGRAM

**Enactment:** 1972

**Goal:** “Control pollution, recycle valuable materials, and safely handle solid waste.”<sup>53</sup>

**What it is:** This program is administered by the California Pollution Control Financing Authority and provides private activity tax-exempt bond financing in the form of loans to both small and large California businesses for the acquisition, construction, or installation of qualified pollution control, waste disposal, or waste recovery facilities, and the acquisition and installation of new equipment. Bond proceeds may also be used toward the purchase of machinery and furnishings, costs of architects, engineers, attorneys, and permits. Financing is provided in conjunction with allocation from the California Debt Limit Allocation Committee.

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<sup>52</sup> Robert Crandall, “*Permit Guidance for Anaerobic Digesters and Co-Digesters*, version 2,” California Environmental Protection Agency, 2011, accessed June 18, 2020 [http://resources.cleanenergyroadmap.com/BIO\\_P\\_PermittingGuideDigester.pdf](http://resources.cleanenergyroadmap.com/BIO_P_PermittingGuideDigester.pdf).

<sup>53</sup> “*Pollution Control Tax-Exempt Bond Financing Program*,” California Pollution Control Financing Authority, accessed June 24, 2020, [https://www.treasurer.ca.gov/cpcf/tax\\_exempt.asp](https://www.treasurer.ca.gov/cpcf/tax_exempt.asp).

**How it supports AD:** Tax-exempt bond financing provides qualified borrowers with lower interest rates than are available through conventional financing mechanisms. In 2019, the state ceiling for qualified private activity bonds was over \$4 billion. The program has supported the construction and operation of anaerobic digesters as well as the purchase of clean-air vehicles by waste companies.<sup>54</sup>

## NATURAL GAS RESEARCH AND DEVELOPMENT PROGRAM

**Enactment:** August 2004

**Goal:** According to the California Energy Commission, the program was created “to support investments in improving natural gas energy efficiency and environmental equality, develop renewable technologies, and otherwise provide benefits to the public.”<sup>55</sup>

**What it is:** The Natural Gas R&D Program is part of a suite of energy research and development programs administered by the California Energy Commission funded by ratepayer dollars. The natural gas program aims to increase the energy efficiency of existing natural gas as well as increase the use of alternatives to natural gas, including biogas and RNG. The California Energy Commission requests about \$20 million annually for the program from the California Public Utilities Commission.<sup>56</sup>

**How it supports AD:** The Natural Gas R&D Program supports AD through a variety of ways:

- It helps to capture and promote the use of biogas.
- It supports development of RNG infrastructure, reducing barriers for AD operators to connect to pipelines.
- It increases the market for RNG as a transportation fuel in medium- and heavy-duty vehicles.
- It helps make RNG more competitive in the marketplace.

Additionally, the program’s 2019 annual report recognized the importance of capturing methane from waste, including MSW, for energy to meet state GHG emission reduction targets. While recognizing the promise of RNG to decarbonize the natural gas sector, it stated a need for continued research and development to lower costs of producing RNG since they are currently higher than conventional natural gas supplies.<sup>57</sup>

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<sup>54</sup> “Pollution Control Tax-Exempt Bond Financing Program,” California Pollution Control Financing Authority, accessed June 24, 2020, [https://www.treasurer.ca.gov/cpcf/tax\\_exempt.asp](https://www.treasurer.ca.gov/cpcf/tax_exempt.asp).

<sup>55</sup> “Natural Gas Research and Development Program Information,” California Energy Commission, accessed August 31, 2020, [https://www.energy.ca.gov/sites/default/files/2019-05/naturalgas\\_faq.pdf](https://www.energy.ca.gov/sites/default/files/2019-05/naturalgas_faq.pdf).

<sup>56</sup> “Natural Gas Research and Development Program Information,” California Energy Commission, accessed August 31, 2020, [https://www.energy.ca.gov/sites/default/files/2019-05/naturalgas\\_faq.pdf](https://www.energy.ca.gov/sites/default/files/2019-05/naturalgas_faq.pdf).

<sup>57</sup> Braden Henderson, *Natural Gas Research and Development Program: 2019 Annual Report* (November 2019): 8-9, <https://www2.energy.ca.gov/2019publications/CEC-500-2019-057/CEC-500-2019-057.pdf>.

## GLOBAL WARMING SOLUTIONS ACT OF 2006 (AB 32)

**Enactment:** 2006

**Goal:** Reduce GHG emissions to 1990 levels by 2020

**What it is:** The Global Warming Solutions Act requires California to lower its GHG emissions to 1990 levels by 2020, which includes carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride. The California Air Resources Board is tasked with implementing the act. To finance the program, annual fees are collected from high emitters of GHGs, including oil refineries, electricity power plants, and other industrial sources.<sup>58</sup>

**How it supports AD:** Because landfills emit methane, which is caused by the decomposition of organic materials, California encourages the development of technologies, including food waste digesters, that divert organics from landfills. Regulating landfills has been identified by AB 32 as one of nine early action measures to reduce GHG emissions. Additionally, biogas produced from AD can be upgraded to a transportation fuel, helping to lower GHGs emitted by fossil transportation fuels, further contributing to reducing the statewide level of GHG emissions, which is the goal of AB 32.<sup>59</sup>

## ASSEMBLY BILL NO. 341 OF 2011 (AB 341)

**Enactment:** October 6, 2011

**Goal:** Reduce, recycle, or compost 75 percent of California's waste by 2020

**What it is:** The bill amended several existing waste management laws in California. Main provisions of the bill included requiring 75 percent of the state's waste to be reduced, recycled, or composted by 2020 and requiring commercial or public entities that generate greater than four cubic yards of solid waste per week to recycle.<sup>60</sup>

**How it supports AD:** To meet the ambitious 75 percent goal, CalRecycle identified eight initiatives, which includes moving organics out of landfills. One of the ways CalRecycle encourages this is by redirecting organics to AD facilities.

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<sup>58</sup> "Assembly Bill 32 Overview," California Air Resources Board, accessed June 24, 2020, <https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006>.

<sup>59</sup> "Anaerobic Digestion," CalRecycle, June 18th, 2020, accessed June 24, 2020, <https://www.calrecycle.ca.gov/swfacilities/compostables/anaerobicdig>.

<sup>60</sup> "Assembly Bill No. 341," AB-341 Solid waste: diversion, California Legislative Information, accessed August 31, 2020, [https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201120120AB341](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB341).

## ELECTRIC PROGRAM INVESTMENT CHARGE (EPIC)

**Enactment:** 2012

**Goal:** Established by the California Public Utilities Commission, the program funds research and development for technologies that could benefit investor-owned utility electric ratepayers.<sup>61</sup>

**What it is:** The program invests over \$130 million each year in technologies that benefit ratepayers and decarbonize electricity. It provides funds for research and development along an energy innovation pipeline, which consists of applied research and development, technology demonstration and deployment, and market facilitation.<sup>62</sup>

**How it supports AD:** Commercialization of low-carbon gases, which includes biogas, was identified as one of the top ten priorities to transform low-carbon energy in California at the 2016 EPIC Symposium. Additionally, the 2018-2020 EPIC Investment Plan recognizes a need to fund additional ways to divert organics from landfills. The program targets funds toward pre-commercial technology advancements for AD, which is different from the support that other programs in California, such as the CalRecycle Organics Grant Program, provide to commercially available systems. Funding initiatives for 2018-2020 related to AD focus on improving the value proposition of bioenergy while helping to manage organic waste.<sup>63</sup>

## CAP-AND-TRADE PROGRAM

**Enactment:** 2013

**Goal:** Reduce GHG and other emissions; help meet objectives of Assembly Bill 32

**What it is:** Launched in 2013, California's cap-and-trade program is a market-based mechanism aimed at reducing GHG and other emissions. Under the program, sources that emit more than 25,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e)/year are regulated, which includes those that import electricity.<sup>64</sup> The policy places a cap, or limit, on the amount of emissions that sources can produce. Sources that are unable to meet the cap must trade allowances with others that have banked allowances or purchase them at auction from the California Air Resources Board, which implements and enforces the program. Revenue generated at auctions is placed into the Greenhouse Gas Reduction Fund and then appropriated by the California legislature to various state agencies to implement programs that further reduce GHG emissions, with 35 percent of the revenue legally required to be directed toward disadvantaged communities. Two

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<sup>61</sup> Pamela Doughman, "Electric Program Investment Charge 2019 Annual Report," California Energy Commission, April 2020, <https://ww2.energy.ca.gov/2020publications/CEC-500-2020-009/CEC-500-2020-009-CMF.pdf>.

<sup>62</sup> "How to Apply for EPIC Grant Funding Opportunities," California Energy Commission Research & Development, accessed October 26, 2020, [https://www.energy.ca.gov/sites/default/files/2019-05/how\\_to\\_apply.pdf](https://www.energy.ca.gov/sites/default/files/2019-05/how_to_apply.pdf).

<sup>63</sup> Aleecia Gutierrez, Virginia Lew, Anthony Ng, Fernando Pina, Linda Spiegel, and Erik Stokes, "Electric Program Investment Charge: Proposed 2018-2020 Triennial Investment Plan," California Energy Commission, April 2017, <https://efiling.energy.ca.gov/getdocument.aspx?tn=217117>.

<sup>64</sup> "California Cap and Trade," Center for Climate and Energy Solutions, accessed June 18, 2020, <https://www.c2es.org/content/california-cap-and-trade/>.



2012 laws, AB1532 and SB 535, established distribution guidelines for the revenue generated from the auction. AB 1532 requires that the revenue be spent on environmental purposes, particularly air quality improvement, and SB 535 requires that at least 25 percent of the revenue be directed toward programs that benefit disadvantaged communities. AB 1150, which came out in 2016, further stipulated that an additional 10 percent of revenue go to low-income households or communities, bringing up the percentage of revenue required to go towards disadvantaged communities to 35 percent.<sup>65</sup> The prospective revenue from trading incentivizes sources to reduce emissions further.<sup>66</sup>

**How it supports AD:** According to the California Climate Investments 2020 Annual Report, the cap-and-trade program has generated \$12.5 billion in revenue since inception. Revenue from the program is deposited into the state's Greenhouse Gas Reduction Fund, which has been invested in local projects that improve air quality, including food waste digesters.<sup>67</sup> For example, this funding provided the Rialto Bioenergy Facility, LLC with a \$4 million grant to install an anaerobic digester for its new Southern California facility where it expects to process 300,000 tons of organic waste annually.<sup>68</sup>

## GREENHOUSE GAS REDUCTION GRANT AND LOAN PROGRAMS<sup>69 70</sup>

**Enactment:** 2013

**Goal:** Reduce GHG emissions by providing financial incentives for investments in aerobic composting, AD, and recycling and manufacturing facilities.

**What it is:** Revenue from California's cap-and-trade program is deposited into the Greenhouse Gas Reduction Fund, which funds CalRecycle's Greenhouse Gas Reduction Grant and Loan Programs. These programs are a suite of grants and loans to help fund capital investments that reduce GHG emissions by diverting organics from landfills, including anaerobic digesters:

- Food Waste Prevention and Rescue Grant Program
- Organics Grant Program
- Recycled Fiber, Plastic, and Glass Grant Program

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<sup>65</sup> "California Cap and Trade," Center for Climate and Energy Solution, accessed August 31, 2020, <https://www.c2es.org/content/california-cap-and-trade/>.

<sup>66</sup> "How cap and trade works," Environmental Defense Fund, accessed June 18, 2020, <https://www.edf.org/climate/how-cap-and-trade-works>.

<sup>67</sup> "California Cap and Trade," Center for Climate and Energy Solutions, accessed June 18, 2020, <https://www.c2es.org/content/california-cap-and-trade/>.

<sup>68</sup> "2020 Project Profiles," California Climate Investments, accessed June 18, 2020, <http://www.caclimateinvestments.ca.gov/2020-project-profiles>.

<sup>69</sup> Jeffrey L. Rabin, Colleen Callahan, J.R. DeShazo, "A Guide to Greenhouse Gas Reduction Fund Program Designs, Expenditures, and Benefits," UCLA Luskin School of Public Affairs, August 2015, [https://innovation.luskin.ucla.edu/wp-content/uploads/2019/03/A\\_Guide\\_to\\_Greenhouse\\_Gas-Reduction\\_Fund\\_Program\\_Designs\\_Expenditures\\_and\\_Benefits.pdf](https://innovation.luskin.ucla.edu/wp-content/uploads/2019/03/A_Guide_to_Greenhouse_Gas-Reduction_Fund_Program_Designs_Expenditures_and_Benefits.pdf).

<sup>70</sup> "Greenhouse Gas Reduction Grant and Loan Programs," CalRecycle, January 7, 2020, <https://www.calrecycle.ca.gov/climate/grantsloans>.

- Greenhouse Gas Reduction Loan Program
- Pilot Reuse Grant Program
- Community Composting Grant Program

**How it supports AD:** Grants and other financial incentives provided by these programs promote infrastructure developments in California that achieve GHG emission reductions by diverting organic materials from landfills and producing beneficial materials such as soil amendments, renewable fuels, and recycled-content products. A stated target of the grants is to build or expand organics infrastructure, including anaerobic digesters.

#### **MANDATORY COMMERCIAL ORGANICS RECYCLING OF 2014 (ASSEMBLY BILL 1826)<sup>71</sup>**

**Enactment:** Signed into law September 28, 2014 with effective dates of January 1, 2016 (organics diversion required of jurisdictions) and April 1, 2016 (organics recycling required of businesses).

**Goal:** To help achieve California's GHG emission goals by recycling organic waste.

**What it is:** Related to AB 341, AB 1826 required businesses generating eight or more cubic yards of organic waste per week and businesses generating four or more cubic yards of commercial solid waste per week to recycle organics. Over time, the law increases organics recycling by decreasing the threshold at which businesses are required to comply. In 2017, the law stated that businesses generating four cubic yards of organic waste needed to begin recycling organics. The threshold decreases to two cubic yards in 2020, which will be determined by CalRecycle.

AB 1826 also required local jurisdictions to implement organics diversion programs to assist businesses in recycling organics from their waste streams. To help recover costs and comply with the law, the bill afforded local agencies with the authorization to collect fees from organic waste generators.<sup>72</sup>

**How it supports AD:** Language included in AB 1826 allowed the flexibility for local jurisdictions to determine the best methods to divert organic waste from landfills. Specifically, the statute stated that "the organic waste recycling program required by this section shall be directed at organic waste generators and may include, but is not limited to, one or more of the following: (1) implementing a mandatory commercial organic waste recycling policy or ordinance that addresses organic waste recycling, (2) requiring a mandatory commercial organic waste recycling program through a franchise contract or agreement, (3) requiring organic waste to go through a source separated or mixed processing system that diverts material from disposal."<sup>73</sup> The third statement in particular indicates that AD would be a suitable way to divert organics from landfills.

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<sup>71</sup> "Frequently Asked Questions," CalRecycle, June 30, 2020, <https://www.calrecycle.ca.gov/recycle/commercial/organics/faq>.

<sup>72</sup> "Assembly Bill No. 1826," AB-1826 Solid waste: organic waste, California Legislative Information, [http://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201320140AB1826](http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826).

<sup>73</sup> "Assembly Bill No. 1826," AB-1826 Solid waste: organic waste, California Legislative Information, [http://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201320140AB1826](http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826).

## SHORT-LIVED CLIMATE POLLUTANT STRATEGY OF 2016 (SB 1383)

**Enactment:** September 19, 2016

**Goal:** Reduce the impact that short-lived climate pollutants have on human health, particularly in vulnerable communities.

**What it is:** In working to reduce the impact of short-lived climate pollutants on human health, SB 1383 established short-lived climate pollutants emissions reduction targets, including methane, and specified targets to reduce the amount of organic waste in landfills. To reduce methane emissions, the bill stated targets to reduce organics in landfills by 50 percent by 2020 and 75 percent by 2025 from 2014 levels.<sup>74</sup>

**How it supports AD:** The decomposition of organic waste in landfills significantly contributes to GHG emissions. Expanding the composting and in-vessel digestion of organic waste through processes such as AD will help reduce methane emissions from organic waste typically disposed of in landfills.

## Food Waste Digestion Prevalence and Growth

According to 2018 data reported by the US EPA, California had at least 11 operating stand-alone food waste digesters, 19 water resource recovery facilities co-digesting food waste, and four facilities under development.<sup>75</sup> The following summarizes several food waste digesters in the state:

- CR&R Environmental Services AD in Perris converts regional organic waste into RNG for its refuse and recycling collection fleet vehicles. Funding for the project comes in part from CalRecycle's Organics Grant Program.<sup>76</sup>
- South San Francisco Scavenger Company (SSFSC) and Blue Line Transfer have been operating a dry digester since 2014, located in South San Francisco. It processes 11,000 tons of food waste and yard waste annually from commercial buildings and residences from South San Francisco, Brisbane, Millbrae, and San Francisco International Airport. The resulting biogas is converted into RNG for SSFSC's collection trucks, and the digestate is composted at Napa Recycling and Waste Services.<sup>77</sup>
- Zero Waste Energy Development's AD in San Jose is the largest dry digester currently operating in the world. Its 16 AD tunnels and four in-vessel composting tunnels process 90,000 tons of organic waste annually from a combination of

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<sup>74</sup> "Senate Bill No. 1383," SB-1383 Short-lived climate pollutants: methane emissions: dairy and livestock: organic waste: landfills, California Legislative Information, accessed August 31, 2020, [http://leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=201520160SB1383](http://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383).

<sup>75</sup> Melissa Pennington, "Anaerobic Digestion Facilities Processing Food Waste in the United States (2016)," Environmental Protection Agency, September 2019, [https://www.epa.gov/sites/production/files/2019-09/documents/ad\\_data\\_report\\_v10\\_-\\_508\\_comp\\_v1.pdf](https://www.epa.gov/sites/production/files/2019-09/documents/ad_data_report_v10_-_508_comp_v1.pdf).

<sup>76</sup> "Anaerobic Digestion," CR&R Environmental Services, accessed September 21, 2020, <https://crrwasteservices.com/sustainability/anaerobic-digestion/>.

<sup>77</sup> Nora Goldstein, "Facilitating Food Waste Digestion," BioCycle, May 1, 2018, <https://www.biocycle.net/facilitating-food-waste-digestion/>.

- pre- and post-consumer food waste and yard waste. The biogas is upgraded to provide electricity on Pacific Gas & Electric's grid.<sup>78</sup>
- Agromin, based in Oxnard, partnered with Zero Waste Energy to construct four anaerobic digesters to convert up to 5,000 tons of organic waste, including food waste, per year into biogas and compost. The biogas is used on-site to provide power and heat for Agromin's operations while the compost is sold to local farmers, landscapers, and gardeners.<sup>79</sup>
  - The ReSource Center, a Santa Barbara County project, is under construction and expected to open in 2021. The facility will recover 60 percent of its incoming waste stream, diverting 30 percent to AD to produce compost and electricity. The center estimates it will generate enough energy to power 2,000 homes.<sup>80</sup>
  - The University of California, Davis Renewable Energy Anaerobic Digester is a stand-alone food waste digester that utilizes thermophilic wet digestion to process 10,500 tons of source-separated organics, and fats, oils, and greases. The facility produces around 3,000,000 standard cubic feet per minute of biogas that is used on-site for heating, as well as 2,500,000 gallons of digestate that is used for compost.<sup>81</sup>
  - Hitachi Zosen INOVA's Kompogas Anaerobic Digestion system in San Luis Obispo is a stand-alone high-solids AD system processing food waste and yard waste. The facility processes 36,500 tons per year of source-separated organics, food processing waste, fats, oils and greases, and yard waste. It produces 2,907,000 Nm<sup>3</sup> of biogas annually, which is then used to produce electricity and sell back to the electric grid. It also generates 21,000 tons of digestate annually to be used on farms.<sup>82</sup>

Despite California's layered and complex permitting environment, its policies, legislation, and financial incentives appear to be a driving force behind the number of food waste digesters operating in the state and will likely provide continued support of digester growth.

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<sup>78</sup> "Facility," ZeroWaste Energy Development, accessed September 21, 2020, <https://www.zankerrecycling.com/zwedc/facility/>.

<sup>79</sup> "Agromin Smartfarm Facility," ZeroWaste energy, LLC., 2013, accessed June 24, 2020, <http://zerowasteenergy.com/wp-content/uploads/2013/11/ZWE-SmartfarmOxnardFlyer.pdf>.

<sup>80</sup> "ReSource Center," Santa Barbara County Resource Recovery and Waste Management Division, accessed June 29, 2020, <http://www.resourcerecoveryproject.com/>.

<sup>81</sup> "UC Davis Renewable Energy Anaerobic Digester (READ)," UC Davis Biological and Agricultural Engineering, accessed October 23, 2020, <https://bae.ucdavis.edu/about/facilities/renewable-energy-anaerobic-digester>.

<sup>82</sup> "Kompogas Plants," Hitachi Zosen INOVA, accessed October 23, 2020, [http://www.hz-inova.com/cms/en/home?page\\_id=1870](http://www.hz-inova.com/cms/en/home?page_id=1870).

## OREGON

### Background

In Oregon, AD facilities planning to receive and process food waste in excess of 40 tons per year in an in-vessel system are subject to composting rules and require a composting facility permit.<sup>83</sup> Obtaining a permit follows a six-step process, which is detailed on the [Department of Environmental Quality's website](https://www.oregon.gov/deq/mm/swpermits/Pages/Composting-Facilities.aspx) and provided in summary form in table 6:

**Table 6. Permitting requirements in Oregon**

Agency	Requirements
Oregon Department of Environmental Quality	<ul style="list-style-type: none"> <li>• Application for Solid Waste Disposal Site Permit</li> <li>• Land Use Compatibility Statement</li> <li>• Disposal Site Compatibility with Solid Waste Management Plan</li> <li>• Certificate of Business Registry</li> <li>• Environmental Risk Screening</li> <li>• Site Operations Plan*</li> <li>• Registration permit or individual composting facility permit</li> </ul>

\*Required if the environmental risk screening indicates the project is higher risk.

Source: Based on information from "Instructions: Permit Application for Composting Facilities and Anaerobic Digesters," Oregon Department of Environmental Quality, accessed August 31, 2020, <https://www.oregon.gov/deq/mm/swpermits/Pages/Composting-Facilities.aspx>.

### Policies and Incentives

Like California, Oregon has several policies and incentives in place to support food waste digesters, including the Oregon Clean Fuels Program, which was discussed earlier.

### ENERGY TRUST OF OREGON

**Enactment:** 2002

**Goal:** Increase the amount of clean, affordable energy for utility customers

**What it is:** Energy Trust of Oregon is a nonprofit organization committed to delivering clean energy to 1.6 million utility customers in Oregon and Southern Washington by investing in and aiding renewable electricity projects.<sup>84</sup>

<sup>83</sup> "Composting Program Overview," Oregon Department of Environmental Quality, accessed August 31, 2020, <https://www.oregon.gov/deq/mm/swpermits/Pages/Composting.aspx>.

<sup>84</sup> "Explore Energy Trust," Energy Trust of Oregon, accessed June 29, 2020, <https://www.energytrust.org/about/explore-energy-trust/>.

The nonprofit's funds for renewable energy investments come from a public purpose charge on the large investor-owned electric utilities in the state. These funds must be used to benefit ratepayers, which limits funding to renewable electricity projects.<sup>85</sup>

**How it supports AD:** Energy Trust provides project development assistance, such as feasibility studies, permitting assistance, utility interconnection, and more to facilities looking to generate renewable electricity from biogas, up to a maximum of \$200,000. Additionally, the nonprofit may be able to contribute dollars to install the project in exchange for a negotiated share of the project's renewable energy certificates (RECs). There is no cap for installation assistance.<sup>86</sup> Energy Trust assisted in developing the Pacific Northwest's first food waste digester, JC-Biomethane, LLC in Junction City by contributing \$2 million toward the project. The facility provided an estimated 12,250-megawatt hours of electricity per year, which provided enough power for about half of Junction City's homes each year<sup>87</sup> (the United States Census Bureau reports the number of households as 2,290 between 2014 and 2018).<sup>88</sup>

## RURAL RENEWABLE ENERGY DEVELOPMENT (RRED) ZONES

**Enactment:** Each city, county, or multiple contiguous counties can establish a RRED Zone. The earliest effective date was May 3, 2011 in Clackamas County.

**Goal:** Encourage new investments to harness several forms of renewable energy to generate electricity or produce, distribute, or store a variety of biofuels.

**What it is:** Business Oregon, the state's economic development agency, provides a three- to five-year exemption from property taxes on new investments in solar energy farms, geothermal power generation, biofuel production facilities, and other eligible projects in designated rural areas. A city, county, or multiple contiguous counties can establish a RRED Zone in areas outside of regional urban growth boundaries, wherein the construction or modification of infrastructure and machinery for renewable energy activities qualify for a temporary abatement from local property taxes. There are currently 14 designated RRED Zones in Oregon.<sup>89</sup>

**How it supports AD:** RRED Zones provide an incentive to encourage investments that harness wind, geothermal, solar, biomass, or other unconventional forms of energy to generate electricity or produce, distribute, or store a wide variety of biofuels. Food waste digesters that produce biogas for electricity are eligible under this program.

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<sup>85</sup> Joshua Reed, email message to Katelyn Bocklund, September 1, 2020.

<sup>86</sup> "Biopower," Energy Trust of Oregon, accessed June 29, 2020, <https://www.energytrust.org/incentives/renewable-energy-biopower/#tab-two>.

<sup>87</sup> "Success Stories," Energy Trust of Oregon, accessed June 29, 2020, <https://www.energytrust.org/success-stories/?storyID=6357>.

<sup>88</sup> "Quick Facts: Junction City, Oregon," United States Census Bureau, accessed August 28, 2020, <https://www.census.gov/quickfacts/fact/table/junctioncitycityoregon#>.

<sup>89</sup> "Rural Renewable Energy Development Zone," Business Oregon, accessed June 29, 2020, <http://www.oregon4biz.com/Oregon-Business/Tax-Incentives/Renewable-Energy/Zones/>.



## SENATE BILL 98

**Enactment:** Signed into law July 15, 2019 with an effective date of September 29, 2019

**Goal:** Aid in working toward a clean energy future by increasing the amount of RNG in the state.

**What it is:** Senate Bill 98, signed into law in September 2019 by Oregon Governor Kate Brown, established voluntary goals for adding up to 30 percent RNG into Oregon's pipeline system by 2050, allowing utilities to acquire it for their customers by investing in interconnections.<sup>90</sup> This bill includes provisions for large RNG programs for large gas utilities and small RNG programs for small utilities. Large gas utilities may make qualified investments and procure from third parties to meet a specified portfolio of targets for the percentage of RNG purchased by the utility for distribution to retail natural gas customers in Oregon that is RNG. Small utilities are subject to a rate cap that will be established by the Oregon Public Utilities Commission that will limit their costs or procuring RNG from third parties and qualified investments in RNG infrastructure.<sup>91</sup>

**How it supports AD:** The bill creates incentives for more RNG production by increasing targets for the use of RNG in Oregon from 5 percent in 2020-2024 to 30 percent by 2045-2050, which can be supplied when biogas produced from AD is upgraded to pipeline quality. It also creates a potential revenue source for local communities to turn waste into energy (via AD) by increasing the value of RNG.

## Food Waste Digestion Prevalence and Growth

According to 2018 data reported by the US Environmental Protection Agency (EPA), Oregon has one operating stand-alone food waste digester—Stahlbush Island Farms in Corvallis. The facility, which still operates today, generates electricity and digestate to use on-site from its fruit and vegetable by-products like corn husks and cobs.<sup>92</sup> JC-Biomethane, LLC was acquired by Shell in May 2018 and renamed Shell New Energies. Upon acquisition, Shell expanded the facility but changed the feedstock to solely agricultural wastes with the intention of producing pipeline-quality biogas (i.e., RNG).<sup>93</sup>

Additionally, Oregon has three wastewater resource recovery facilities co-digesting food waste: Gresham Wastewater Treatment Plant, City of Pendleton Wastewater Treatment Facility, and Clean Water Services-Durham Advanced Wastewater Treatment Facility.

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<sup>90</sup> Stefanie Week, "Governor Kate Brown Holds Ceremony to Sign SB98 for Renewable Natural Gas," NW Natural, September 17, 2020,

<https://www.nwnatural.com/AboutNWNatural/PressRoom/2019PressReleases/GovernorSignsBillIntoLaw>.

<sup>91</sup> Erin Voegelé, "Oregon Governor signs RNG bill," August 5, 2019, <http://biomassmagazine.com/articles/16372/oregon-governor-signs-rng-bill>.

<sup>92</sup> "Our Story: Meet the Chambers Family," Stahlbush, accessed June 29, 2020, <https://www.stahlbush.com/our-story/>.

<sup>93</sup> "Shell New Energies Junction City, Biomethane Facility," Shell in the United States, accessed June 29, 2020, <https://www.shell.us/about-us/projects-and-locations/shell-new-energies-junction-city--biomethane-facility.html#iframe=L2ZvcmlzL2VuX3VzX2Jpb21ldGhhbmU>.



Like other states, food waste digestion is a nascent technology in Oregon. However, recent policies like SB 98, the Renewable Portfolio Standard, and the Clean Fuels Program should help develop the market.

## WISCONSIN

### Background

All permits required to develop an anaerobic digester in Wisconsin can be obtained from the Wisconsin Department of Natural Resources (DNR), as shown in table 7. An interactive “Permit Primer” is available on the Wisconsin DNR website to help project developers identify which permits are relevant to them.<sup>94</sup> However, the Wisconsin Office of Energy Innovation has indicated that a lack of permitting guidance specific to AD is a source of confusion for AD system operators in Wisconsin.<sup>95</sup> Additionally, published guidance specific to the use of food waste as a feedstock for AD appears to be limited.

**Table 7. Required permits in Wisconsin for AD projects**

Agency	Permit Required
Wisconsin Department of Natural Resources	<ul style="list-style-type: none"> <li>• Submission of a Storm Water Pollution Prevention Plan</li> <li>• Notice of Intent for Tier 2 Industrial Storm Water Discharge General Permit*</li> <li>• Wisconsin Pollutant Discharge Elimination System General Permits</li> <li>• Registration Operation Permit</li> <li>• Construction Permit</li> </ul>

\*Unless a “No Exposure” certification is granted. AD facilities may be eligible for this exception if exposure to rain, snow, snowmelt, and/or runoff are prevented for all materials and activities at the facility.

### Policies and Incentives

Wisconsin has two unique policies and a program that help drive AD development in the state, which are characterized below.

#### FOCUS ON ENERGY

**Enactment:** Formed in 1999 and operating since 2001

**Goal:** Focus on Energy serves to assist residential and non-residential utility customers in reducing fossil fuel usage by providing incentives, helping to assure that energy efficient and renewable energy options are the more economical choice for consumers.

**What it is:** Formed by the Wisconsin legislature in 1999 and operating since 2001, Focus on Energy is a statewide program within Wisconsin’s Office of Energy Innovation offering information, services, and financial incentives for a variety of energy efficiency and renewable energy initiatives. This program is funded by Wisconsin’s investor-owned

<sup>94</sup> “Permit Primer,” Wisconsin Department of Natural Resources, January 24, 2020, <https://dnr.wi.gov/topic/SmallBusiness/Primer/>.

<sup>95</sup> Wisconsin Office of Energy Innovation, “Wisconsin Biogas Survey Report,” accessed July 1, 2020, <https://psc.wi.gov/Documents/OEI/WisconsinBiogasSurveyReport.pdf>.

energy utilities, as required under Wisconsin statute, and by participating municipal and electric cooperative utilities.

**How it supports AD:** Focus on Energy provides feasibility study grants to encourage the development of biogas projects at existing or new AD.<sup>96</sup> Grants are provided for the study of anaerobic pretreatment and AD. These grants assist in breaking down financial barriers to the study and engineering of upgrades for existing biogas generating facilities or the construction of new facilities. Focus on Energy also provides the Renewable Energy Competitive Incentive Program, which provides incentives for the installation of renewable energy systems, including those fueled by biogas and biomass.

### RENEWABLE ENERGY COMPETITIVE INCENTIVE PROGRAM (RECIP)

**Enactment:** RECIP was created in 2012 and began awarding projects in 2013.<sup>97</sup>

**Goal:** To provide financial support to entities with the most cost-effective renewable energy projects not likely to move forward without the incentive for installation and operation at eligible facilities.

**What it is:** RECIP, administered by Focus on Energy, is a competitive grant process that awards renewable energy projects at eligible facilities based on cost-effectiveness. Eligible renewable energy technologies include biogas, biomass, solar thermal, and wind. The higher the energy content per dollar spent, the more cost-effective the project.

The total amount available to projects varies each round based on what Focus on Energy is authorized to spend. During 2019-22, Focus on Energy can spend up to \$5.5 million on renewable energy projects, and it allotted \$700,000 for the [Round 2 request for proposal \(RFP\)](#) that requested submissions by June 2020. The actual incentive amount is determined based on the project's estimated first year net energy production up to \$0.50 per kWh and/or \$1.00 per therm, and the incentive cannot exceed 50 percent of the total project cost.<sup>98</sup>

**How it supports AD:** Based on the Round 2 RFP, RECIP incentivizes the production of biogas for electricity generation or RNG for sale to a participating utility.

Projects that produce RNG for injection into interstate pipelines or for use as a transportation fuel are not eligible for RECIP dollars.

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<sup>96</sup> Focus on Energy Partnering with Wisconsin utilities, “Focus on Energy’s Biogas Feasibility Study Grants for Anaerobic Pretreatment and Anaerobic Digester Facilities,” January, 2020, [https://focusonenergy.com/sites/default/files/inline-files/Feasibility%20Study%20Guidelines\\_2020.pdf](https://focusonenergy.com/sites/default/files/inline-files/Feasibility%20Study%20Guidelines_2020.pdf).

<sup>97</sup> Scott Bloedorn, CEM, email message to Katelyn Bocklund, August 31, 2020.

<sup>98</sup> Focus on Energy, “Renewable Energy Competitive Incentive Program: Request for Proposal,” Focus on Energy, May 15, 2020, [https://www.focusonenergy.com/sites/default/files/inline-files/2020\\_RECIP\\_Q2\\_RFP.pdf](https://www.focusonenergy.com/sites/default/files/inline-files/2020_RECIP_Q2_RFP.pdf).

## BIOGAS, SOLAR, AND WIND PROPERTY TAX EXEMPTION (2013 AB 40/2013 WISCONSIN ACT 20)

**Enactment:** June 30, 2013; includes property assessed as of January 1, 2014

**Goal:** To modify the previous property tax exemption that only applied to solar and wind energy to include biogas and synthetic gas energy systems.

**What it is:** This is a property tax exemption for biogas or synthetic gas, solar, and wind energy systems in Wisconsin. Biogas or synthetic gas energy systems are defined as equipment that directly converts organic material into biogas or synthetic gas; equipment which generates electricity, heat, or compressed natural gas exclusively from biogas or synthetic gas; equipment used exclusively for direct transfer or storage of biomass, biogas, or synthetic gas; or any structure used exclusively to shelter or operate the aforementioned equipment. It does not provide property tax exemption for equipment or components tied to a conventional energy system.<sup>99</sup>

Prior to 2013, the property tax exemption only applied to solar and wind energy. Biogas and synthetic gas energy systems were added via an amendment as part of the executive budget act from 2013, which was introduced as Assembly Bill 40 on February 2, 2013, by the Joint Committee on Finance at the request of then-Governor Scott Walker.<sup>100</sup>

**How it supports AD:** With this incentive, biogas systems are exempt from general property tax, potentially increasing the financial feasibility of AD projects in Wisconsin.

## Food Waste Digestion Prevalence and Growth

According to 2018 data reported by the US EPA, Wisconsin has two stand-alone food waste digesters, three on-farm digesters co-processing food waste, and nine water resource recovery facilities (WRRF) co-processing food waste. Additionally, the Green Bay Metropolitan Sewerage District, a WRRF co-processing food waste, is under construction.

Wisconsin has the second highest number of food waste digesters in the United States (after California).

During GPI's multi-state analysis, further detailed in appendix C, respondents from Wisconsin indicated that Focus on Energy and the Biogas, Solar, and Wind Property Tax Exemption were particularly helpful in developing their digesters. Additionally, respondents cited the Wisconsin DNR as being a helpful resource. However, the majority of respondents were WRRFs co-digesting food waste, so it is unclear whether these incentives and resources are also a driving force for stand-alone food waste digesters.

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<sup>99</sup> Wisconsin Department of Revenue, "Renewable Energy Systems: Biogas, Solar & Wind- Property Tax Exemption," April 11, 2014, <https://www.revenue.wi.gov/DORFAQ/renewable-energy.pdf>.

<sup>100</sup> "Assembly Bill 40," Wisconsin State Legislature, accessed August 25, 2020, <https://docs.legis.wisconsin.gov/2013/proposals/reg/asm/bill/ab40>.

Additional factors driving the state's food waste digester development could include the state's large agricultural footprint and need to manage manure (which creates the opportunity for co-digestion with food waste), support from the state in research and development, and the ability to procure all necessary permits from one state agency. Given the current prevalence of food waste digestion in Wisconsin, the industry will likely continue to grow in the state.

## IOWA

### Background

The Iowa Department of Natural Resources administers all permits for anaerobic digesters in the state, as shown in table 8. Though all AD permits are obtained from a single agency, the Iowa Energy Office's 2018 Biomass Conversion Action Plan recommended further streamlining and consolidating the permitting process for bioenergy facilities and identified reconciling conflicting regulatory requirements as a primary strategy to develop Iowa's bioeconomy.<sup>101</sup>

**Table 8. Required permits in Iowa for AD projects**

Agency	Permit Required
Iowa Department of Natural Resources	<ul style="list-style-type: none"> <li>• Submission of a Storm Water Pollution Prevention Plan</li> <li>• Notice of Intent for NPDES (National Pollutant Discharge Elimination System) Coverage Under General Permit*</li> <li>• Joint Application Form submitted to US Army Corps of Engineers and Iowa Department of Natural Resources to begin permitting process**</li> <li>• Construction Permit Standard Application***</li> <li>• Annual Permit</li> </ul>

\*Unless a "No Exposure" certification is granted. AD facilities may be eligible for this exception if exposure to rain, snow, snowmelt, and/or runoff are prevented for all.

\*\*Required if filling in, excavating, or performing construction on streams, lakes, wetlands, or flood plains.

\*\*\*Construction permit required for the construction, installation, or modification of any wastewater disposal system including sanitary sewer extensions. Not required for stormwater disposal systems that transport only stormwater or that receive wastewater from 15 persons or less.

### Policies and Incentives

Iowa has two unique programs that encourage anaerobic digester development by making projects more financially feasible, which are characterized below.

#### IOWA ENERGY CENTER GRANT PROGRAM

**Enactment:** Adopted in early 2019 through administrative rulemaking

**Goal:** Provide benefits to Iowa ratepayers and assist in the implementation of the Iowa Energy Plan, which includes the following focus areas: technology-based energy research and development, energy workforce development, support for rural and underserved areas, biomass conversion, natural gas expansion in underserved areas, electric grid modernization, and alternative fuel vehicles.<sup>102</sup>

<sup>101</sup> Iowa Economic Development Authority, "Biomass Conversion Action Plan," Iowa Energy Office, August 2018, [https://www.iowaeconomicdevelopment.com/UserDocs/BiomassPlan\\_ExecSummary\\_082018.pdf](https://www.iowaeconomicdevelopment.com/UserDocs/BiomassPlan_ExecSummary_082018.pdf).

<sup>102</sup> "Iowa Energy Center Competitive Grant Program Policies and Procedures handbook," Iowa Energy Office, 2.

**What it is:** This competitive grant program is funded by gas and electric utilities across Iowa and is administered by the Iowa Economic Development Authority in consultation with the Iowa Energy Center Board. Funding requests that are eligible for this grant must be no less than \$10,000 and no more than \$1 million.<sup>103</sup> To be eligible for a grant, projects must provide a benefit to Iowa ratepayers and must aid in the implementation of a key focus area of the Iowa Energy Plan, noted above. Iowa businesses, colleges and universities, and private nonprofit agencies are eligible to apply and may apply the funds to equipment purchases, salaries and wages, and supplies and materials, among other uses.

**How it supports AD:** The program has potential to support the development of anaerobic digesters in Iowa, given that biomass conversion, natural gas expansion in underserved areas, and alternative fuel vehicles comprise three of the seven key focus areas of the Iowa Energy Plan. According to a February 7, 2020, article in the *Globe Gazette*, the program is only in its second year, so it is too early to know what the longer impact on AD may be.<sup>104</sup>

### ALTERNATE ENERGY REVOLVING LOAN PROGRAM

**Enactment:** Adopted in early 2019 through administrative rulemaking

**Goal:** To encourage development of alternative energy production facilities in Iowa

**What it is:** The Alternate Energy Revolving Loan Program provides zero-interest loans for alternative energy production facilities in Iowa. It is administered by the Iowa Economic Development Authority in consultation with the Iowa Energy Center Board. Iowa residents, businesses, water and wastewater utilities, and rural water districts and sanitary districts can apply to receive loans through this program. State agencies, cities, and counties, among others, cannot apply to receive loans. These loans may be used to cover property costs, materials and equipment for site preparation, project construction and installation, and labor for site preparation. Loan amounts must be a minimum of \$25,000 and can reach up to 50 percent of eligible project costs. A maximum of \$1 million per project may be awarded, with no more than \$1 million per borrower outstanding at any time.<sup>105</sup>

**How it supports AD:** AD and biogas production projects producing energy are eligible for loans through this program. This program may increase the financial feasibility of AD projects.

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<sup>103</sup> "Iowa Energy Center Competitive Grant Program Policies and Procedures handbook," Iowa Energy Office, accessed July 1, 2020, <https://www.iowaeconomicdevelopment.com/userdocs/programs/ieg-handbook.pdf>.

<sup>104</sup> "Energy grants available," *Globe Gazette*, February 7, 2020, [https://globegazette.com/news/state-and-regional/energy-grants-available/article\\_1393e685-7024-55ed-9ee6-577b8003e752.html](https://globegazette.com/news/state-and-regional/energy-grants-available/article_1393e685-7024-55ed-9ee6-577b8003e752.html).

<sup>105</sup> "Alternate Energy Revolving Loan Program Application Handbook," Iowa Energy Center, accessed July 20, 2020, <https://www.iowaeconomicdevelopment.com/userdocs/programs/aerlp-handbook-2020.pdf>.



## Food Waste Digestion Prevalence and Growth

According to 2018 data reported by the US EPA, Iowa has five wastewater resource recovery facilities (WRRF) co-processing food waste.<sup>106</sup>

Based on the information obtained from the EPA report, food waste digestion remains an underused technology in Iowa. Potential reasons for this include a lack of policies and incentives driving technology development, in addition to a focus on corn and ethanol production.<sup>107</sup>

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<sup>106</sup> The City of Waterloo Anaerobic Lagoon was classified by the EPA as a WRRF in the 2018 report but as a stand-alone facility in the 2019 report. Based on the process used, GPI report authors are treating it as a WRRF.

<sup>107</sup> "Iowa State Profile and Energy Estimates: Profile Analysis," United States Energy Information Administration, accessed July 1, 2020, <https://www.eia.gov/state/analysis.php?sid=IA>.

## ADDITIONAL POLICIES, REGULATIONS, AND GUIDANCE

In addition to the unique policies and regulations explored earlier in this section, many states share similar policies, regulations, and guidance that could support food waste digesters in those states. These include net metering, renewable portfolio standards, and permitting guides. This section provides general information about each policy in addition to distinctions across each state and concludes with information about permitting guides.

### Net Metering

**What it is:** Net metering policies, sometimes called net energy metering, provide customers that supply renewable energy to the electric grid with compensation or credits on their electric bill based on the amount of electricity supplied. Many policies have system caps and only allow customers generating electricity under that cap to net meter, which in most cases is too small to be practical for most AD projects.

**How it supports AD:** In states where biogas is considered an eligible renewable energy source, and where the size cap is not too small, AD facilities supplying biogas in the form of electricity to the grid can receive credits on their electric bills, adding an ongoing revenue source for their facility. Only one facility, a WRRF in Oregon, indicated that it benefitted from net metering during GPI's multi-state survey efforts, detailed in appendix C.

Table 9 provides a comparison of net energy metering policies across the four states reviewed in addition to Minnesota.

**Table 9. State comparison of net metering policies**

	<b>Minnesota</b>	<b>California</b>	<b>Oregon</b>	<b>Wisconsin</b>	<b>Iowa</b>
<b>Eligible technologies</b>	Solar photovoltaics, wind (all), biomass, hydroelectric, MSW, combined heat & power, landfill gas, wind (small), hydroelectric (small), AD, other distributed generation technologies.	Solar thermal electric; wind; certain biomass resources; geothermal electric; certain hydroelectric facilities; ocean wave, thermal and tidal energy; fuel cells using renewable fuels; landfill gas; and MSW conversion, not the direct combustion of MSW.	Solar power, wind power, hydropower, fuel cells, landfill or digester gas, biomass resources, geothermal energy, or marine energy.	Biomass, geothermal electric, solar thermal electric, solar photovoltaics, wind (all), hydroelectric, MSW, combined heat and power, other distributed energy generation technologies.	Biomass, solar photovoltaics, wind (all), hydroelectric, MSW.
<b>Includes AD or biogas as eligible technology</b>	Yes	Yes	Yes	Not specified	Not specified
<b>System size caps</b>	Investor-owned: Less than 1,000 kW in capacity.  Municipal electric utilities and cooperative utilities: less than 40kW in capacity.	100% of customer's annual load.	PGE and PacifiCorp customers: 2 MW for non-residential; 25 kW for residential.  Muni, co-op, and people's utility district customers: 25 kW for all customers.	20 kW	1 MW but cannot net meter more than 100% of their load.
<b>Eligible customers</b>	All customers of all utilities.	All customers except those of Los Angeles Department of Water & Power.	All customers except those of Idaho Power.	Customers of investor-owned and municipal utilities; cooperatives are voluntary.	Customers of MidAmerican Energy and Alliant Energy.

<b>Net excess generation</b>	Systems less than 40 kW: compensated in payment or bill credit at average retail utility energy rate.  Systems 40 kW-1,000 kW: credited at avoided cost rate or kWh credit.	Carried forward to next bill within 12-month period; excess at end of 12-months rolled over indefinitely or granted to utility with compensation provided to customer.	IOU customers: Carried to next bill at retail rate.  Varies for muni, co-op, and people's utility district customers.	Compensation provided at avoided cost rate; generally \$0.03-0.04/kWh.	Credited to customer's next bill at retail rate; excess credits cashed out annually at avoided cost rate.
<b>Ownership of renewable energy credits (RECs)</b>	Customer owned	Belong to customer if produced and used on-site; utility granted surplus RECs if customer chooses to be compensated for excess generation.	Customer owned	Not addressed	Not addressed

Source: Based on information from "Programs," Database of State Incentives for Renewables & Efficiency, NC Clean Energy Technology Center, accessed July 2, 2020, <https://programs.dsireusa.org/system/program>.

## Renewable Portfolio Standards

**What it is:** Renewable portfolio standards, sometimes referred to as renewable energy standards or renewable electricity standards (or Alternative Energy Production law in Iowa), require electric utilities to source a percentage of their overall energy from qualifying renewable sources. Typically, renewable sources include solar, wind, geothermal, biomass, and hydropower. When facilities generate eligible renewable energy sources to the electric grid, utilities receive renewable energy certificates (RECs).

A REC represents property rights of renewable electricity and is created when one megawatt-hour (MWh) of electricity is generated and delivered to the electric grid from a renewable energy source. RECs contain valuable information regarding how renewable energy was generated, its origin, utility attribution, and other data. They are primarily used to track renewable energy and comply with programs such as renewable portfolio standards.<sup>108</sup>

**How it supports AD:** Under the mandate, utilities are required to purchase a certain percentage of their electricity supply from renewable sources. According to Lawrence Berkeley National Laboratory's 2019 status report on US renewable portfolio standards, "roughly half of all growth in US renewable electricity (RE) generation and capacity since 2000 is associated with state RPS [renewable portfolio standard] requirements."<sup>109</sup> While the report did not specify historic impacts on specific renewable energy sources, many renewable portfolio standards include electricity generation from biogas as an eligible renewable energy technology. This means biogas production can be helpful in meeting compliance with these programs, but it is unknown to what extent. During GPI's multi-state survey effort, detailed in appendix C, only one facility, a stand-alone food waste digester in California, indicated that it benefitted from the state's renewable portfolio standard.

Table 10 provides a comparison of renewable portfolio standards across the four states reviewed in addition to Minnesota.

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<sup>108</sup> "Renewable Energy Certificates (RECs)," Green Power Partnership, United States Environmental Protection Agency, accessed August 24, 2020, <https://www.epa.gov/greenpower/renewable-energy-certificates-recs>.

<sup>109</sup> Galen L. Barbose, "US Renewables Portfolio Standards: 2019 Annual Status Update," Electricity Markets & Policy, Lawrence Berkeley National Laboratory, accessed August 24, 2020, <https://emp.lbl.gov/publications/us-renewables-portfolio-standards-2>.

**Table 10. State comparison of renewable portfolio standards**

	<b>Minnesota</b>	<b>California</b>	<b>Oregon</b>	<b>Wisconsin</b>	<b>Iowa</b>
<b>Regulated parties</b>	Investor-owned, generation and transmission electric cooperatives, municipal power agencies, and power districts.	Large and small investor-owned utilities, electric service providers, and community choice aggregators.	Electric utilities and retail electricity suppliers.	All municipal, investor-owned, and cooperative electric utilities.	MidAmerican Energy and Alliant Energy.
<b>Renewable energy targets</b>	Xcel Energy: 31.5% by 2020 (25% wind or solar; 1.5% solar)  Other investor-owned utilities: 26.5% by 2025 (1.5% solar)  All other utilities: 25% by 2025	60% by 2030; all state's electricity to be carbon free by 2045	Large investor-owned utilities: 50% by 2040  Large consumer-owned utilities: 25% by 2025  Small utilities: 10% by 2025  Smallest utilities: 5% by 2025	10% by 2015	105 megawatts combined between MidAmerican Energy and Alliant Energy by 1999
<b>Eligible sources</b>	Solar, wind, hydroelectric facilities less than 100 MW, hydrogen generated from other renewable sources, and biomass (landfill gas, AD, MSW, organic components of wastewater effluent, sludge from public treatment plants).	Solar thermal electric; wind; certain biomass resources; geothermal electric; certain hydroelectric facilities*; ocean wave, thermal and tidal energy; fuel cells using renewable fuels; landfill gas; and MSW conversion, not the direct combustion of MSW.	Solar, wind, hydropower, ocean thermal, wave, and tidal power, geothermal, hydrogen derived from certain renewable sources, MSW, and biomass, including biogas.	Tidal and wave action, fuel cells using renewable fuels, solar thermal electric, solar photovoltaics, wind power, geothermal, hydropower, biomass, biogas, and landfill gas.	Solar, wind, waste management, resource recovery, refuse-derived fuel, agricultural crops or residues, wood-burning facilities, or small hydropower facilities.

Includes AD or biogas as an eligible source	Yes	Yes	Yes	Yes	Not specified
<b>Program specifics</b>	<p>Demonstrate compliance by retiring RECs; tracked through Midwest Renewable Energy Tracking System.</p> <p>Minnesota Public Utilities Commission authorized to impose penalties on non-compliant utilities.</p> <p>One REC awarded per 1 MWh of renewable energy.</p>	<p>Demonstrate compliance through purchase of RECs through Western Renewable Energy Generation Information System.</p> <p>California Public Utilities Commission authorized to impose penalties on non-compliant utilities.</p> <p>One REC awarded per 1 MWh of renewable energy.</p>	<p>Demonstrate compliance through purchase of RECs through Western Renewable Energy Generation Information System.</p> <p>Only 11 MW per year of municipal solid waste can count toward RPS.</p> <p>RECs used under program cannot be used toward RPS of another state or in voluntary green power programs.</p>	<p>Demonstrate compliance by retiring RECs; tracked through Midwest Renewable Energy Tracking System.</p> <p>One REC awarded per 1 MWh of renewable energy.</p>	<p>No credit trading or tracking system; utilities can trade RECs beyond renewable energy required by program.</p> <p>Utility must own renewable energy producing facilities in Iowa or contract with other facilities located in service area.</p>

Source: Based on information from “Programs,” Database of State Incentives for Renewables & Efficiency, NC Clean Energy Technology Center, accessed July 2, 2020, <https://programs.dsireusa.org/system/program>.



## Permitting Guidance

To demystify the permitting process, several states developed permitting guides outlining what permits are needed for AD facilities. Noteworthy examples include California, Maryland, and Oregon.

**California:** As noted earlier in this report, Robert Crandall, who worked for the Central Valley Regional Water Control Board, published the second version in 2011 of *Permit Guidance for Anaerobic Digesters and Co-Digesters* to provide guidance for project developers. It served as a comprehensive manual, identifying permits required as well as the steps to obtain them, contact information for agencies, estimates of costs and time to complete processes, and more. Since then, there has not been another publication with updated information.

**Maryland:** In the spring of 2017, Governor Larry Hogan signed House Bill 171, which required the Maryland Department of the Environment to launch a study and make recommendations on diverting yard waste, food residuals, and other organics from waste facilities. The department held ten public meetings with a study group composed of state agencies, the University of Maryland, Johns Hopkins University's Center for a Livable Future, farm industry and environmental nonprofits, food service trade groups, the Maryland Food Bank, organic materials recycling businesses and trade groups, and other stakeholders. One study component directed the study group to review the current process for permitting AD facilities and recommend improvements. As a result, the study group recommended that the department develop a guide for permitting AD facilities, which was published in July 2019.<sup>110</sup>

The permitting guide provided a list of potential requirements for AD along with descriptions of each permit, including potential requirements for exporting generated renewable energy.<sup>111</sup>

**Oregon:** Oregon provides permitting guidance for AD, which follows a six-step process, on the Department of Environmental Quality's website. While not as detailed as California's or Maryland's guides, the online format allows Oregon to readily update information.

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<sup>110</sup> Land and Materials Administration Resource Management Program, "Yard Waste, Food Residuals, and Other Organic Materials Diversion and infrastructure study group," Maryland Department of the Environment, July 2019, accessed June 29, 2020, <https://mde.maryland.gov/programs/LAND/RMP/Documents/HB%20171%20final%20report.pdf>.

<sup>111</sup> Land and Materials Administration, *Permitting Guidance for Maryland Anaerobic Digestion Facilities*, (Baltimore, MD: Maryland Department of the Environment, 2019), <https://mde.maryland.gov/programs/LAND/AnalyticsReports/permitting%20guidance%20for%20md%20anaerobic%20digestion%20facilities.pdf>.

## V. POLICY AND REGULATORY CONSIDERATIONS FOR MINNESOTA

A thorough literature review examining the regulatory and policy environments in California, Oregon, Wisconsin, and Iowa indicated that while the AD of agricultural wastes is common across the United States, food waste digestion is an underdeveloped, underutilized technology. However, a common thread that can be seen across the states examined is that they have either implemented recent policies that could help incent the development of food waste digesters or are poised to take significant action soon. With knowledge gained from the literature review and after examining the current regulatory and policy environment in Minnesota, GPI lists several considerations below that could help develop food waste digestion in Minnesota.

### POLICIES, INCENTIVES, AND PROGRAMS

While food waste digestion is a fully mature technology, it is underutilized in Minnesota and in the United States. To support additional project development, there need to be policies and incentives in place. Without policies and incentives, more conventional strategies for managing waste (e.g., landfilling) are likely to remain the norm, and meeting waste management and recycling goals will be more difficult. Policies and incentives are needed to support up-front capital investment as well as investment in end products so that food waste digestion is more attractive economically. The following section lists several types of potential policies, incentives, and other strategies that, if implemented, could spur food waste digestion in Minnesota.

#### Policies

##### MINNESOTA CLEAN FUELS POLICY

###### ***Implement a clean fuels policy in Minnesota***

The Midwestern Clean Fuels Policy Initiative, a broad coalition of fuels producers and marketers, nonprofit and research organizations, scientists and engineers, and agriculture and industry stakeholders, has been exploring a clean fuels policy for the Midwest. A clean fuels policy is a performance-based incentive program that supports the commercial deployment of fuels with lower lifecycle carbon intensities. Several stakeholders from Minnesota have participated in these proceedings, including the Center for Energy and Environment, Partnership for Waste and Energy, Conservation Minnesota, Fresh Energy, Minnesota Bio-Fuels Association, Xcel Energy, the University of Minnesota, several state agencies, and others. The initiative released its white paper entitled [A Clean Fuels Policy for the Midwest](http://www.betterenergy.org/cleanfuelspaper) in January 2020 where they presented principles and policy considerations for a Midwestern approach.<sup>112</sup>

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<sup>112</sup> Great Plains Institute, *A Clean Fuels Policy for the Midwest* (January 7, 2020), <http://www.betterenergy.org/cleanfuelspaper>.

Building on the work of the initiative, the Minnesota Governor's Council on Biofuels, a 15-member group formed by Governor Tim Walz in September 2019, included developing a clean fuels policy proposal in its policy recommendations to the governor on November 2, 2020.<sup>113</sup> Additionally, there is strong stakeholder support to use the information presented in the initiative's white paper to develop a clean fuels policy for Minnesota and other Midwestern states. Considering the impact that similar policies have had in California and Oregon, a policy in Minnesota could help grow the market for RNG and, consequently, improve the economics for food waste digesters. A Minnesota policy offers several benefits for food waste digesters:

- It would reduce infrastructure barriers since they would not need to transport RNG to California or Oregon.
- It could be crafted in a way that is most effective for MN biogas producers, compared to out-of-state markets where they might not have as much of a representation.
- It mitigates some of the business risk by assuring a stable, favorable market for RNG.
- It creates a new and local market for RNG to help guard against saturation of supply in other clean fuels markets, such as California.

An analysis conducted by GPI using data from Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model shows that the carbon intensity score for RNG produced through high-solids AD of food waste and organics is considerably lower than traditional natural gas, as well as RNG produced from landfills and yard waste. A food waste digester that meets the requirements of a state-approved pathway would generate credits (i.e., revenue) under a Minnesota clean fuels policy. Modeled carbon intensity scores from GPI's analysis are shown in figure 6.

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<sup>113</sup> Brendan Jordan and Katelyn Bocklund, "Governor's Council on Biofuels Supports Vision for Minnesota Clean Fuels Policy," Great Plains Institute, December 7, 2020, <https://www.betterenergy.org/blog/governors-council-on-biofuels-supports-vision-for-minnesota-clean-fuels-policy/>.

**Figure 6. Carbon intensity scores of lower-carbon fuel pathways compared to the diesel standard and conventional (fossil) natural gas**

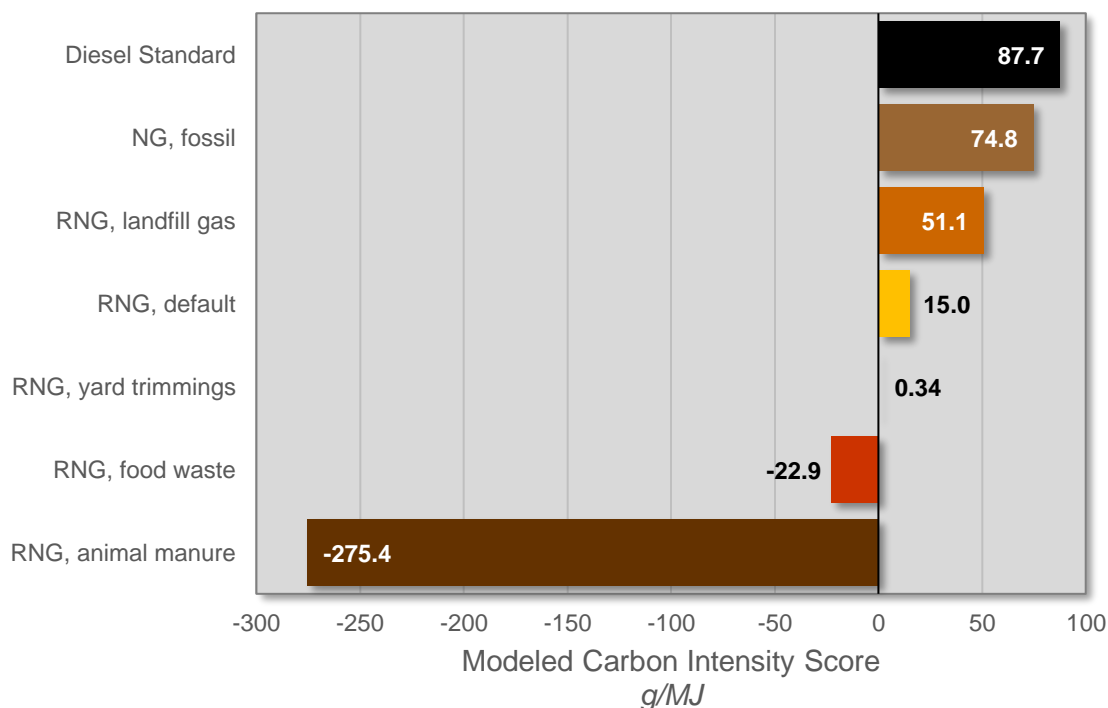


Figure 6 shows carbon intensity scores of modeled RNG pathways. Carbon intensity scores are based on feedstock and processes used to produce fuels, but they can also be influenced by criteria in policies. For example, the California Low Carbon Fuel Standard rewards RNG diverting methane from landfills and lagoons, which is how RNG pathways can achieve negative carbon intensity scores. Figure authored by Jessi Wyatt, GPI, 2020 based on GREET data.

## NATURAL GAS INNOVATION ACT

### ***Pass the Natural Gas Innovation Act to make AD more feasible***

During the 2020 legislative session, CenterPoint Energy supported the Natural Gas Innovation Act, which was authored by Representative Stephenson and Senator Weber. Like Oregon's SB 98, the legislation would encourage natural gas utilities to source clean energy resources and help Minnesota meet renewable energy and GHG reduction goals. Under the legislation, natural gas utilities could submit an alternative resource plan for approval to the PUC, which could include using RNG. Additionally, the legislation would require the PUC to establish a program for tradable RNG credits, which would further incentivize sourcing RNG, and require the Department of Commerce to develop an inventory of Minnesota's potential RNG sources. This legislation, supported by the Bioeconomy Coalition of Minnesota and the Partnership on Waste and Energy, passed the Minnesota Senate but did not receive a hearing in the House. There is a possibility that the legislation could be taken back up by the legislature during the 2021 legislative session.

Passing this act could increase demand for RNG, which would contribute to stronger, stable, and reliable markets for RNG. The result would be improved access to financing by freeing up natural gas utilities to make investments in projects, as well as more reliable revenue streams for facilities that use AD to manage organic waste.

## RENEWABLE ELECTRICITY POLICY

### ***Explore ways to encourage biogas as a source of renewable electricity***

Biogas is an eligible source of renewable electricity for existing policies like the RFS, renewable portfolio standards (RPS), and net metering. However, it tends to be higher cost than solar and wind, which many utilities source to meet their state's RPS. Nevertheless, renewable electricity production can be a strong source of revenue, especially for smaller AD facilities, when combined with the right set of policies. Minnesota should explore additional policies that can improve the economics of renewable electricity production for smaller AD facilities and help meet state renewable electricity goals.

Separate from the RPS, there are ways to leverage transportation policies like the RFS and LCFS to give additional credit for production of electricity from biogas, in place of the RPS. It should be noted that the use of biogas for electricity in compliance with the RFS or clean fuels policies precludes the use of the biogas for RPS compliance. If the EPA establishes a process for generating eRINs from the use of biogas for electric vehicle charging, renewable electricity generation from biogas could become more profitable. This could include supporting the efforts of other coalitions working to establish an eRIN process with the EPA. Furthermore, clean fuels policies will also create an incentive to produce electricity from biogas for use in EVs.

## CAP-AND-TRADE PROGRAM

### ***Explore the feasibility of implementing a cap-and-trade program in Minnesota***

California's cap-and-trade program has been largely successful in reducing GHG emissions and funding local projects that improve air quality. While a cap-and-trade program is far broader than the other policies under consideration and impacts a wide variety of different projects, it could be helpful for AD projects as it has been in California. More discussion would be required with Minnesota stakeholders to test the feasibility of implementing a similar program in the state and identifying program design principles. How a carbon emissions regulation impacts AD projects will depend on how the program is designed and implemented.

## Address Shortcomings in Existing Policies and Programs

As referenced earlier in this report, Minnesota has several existing policies that can support growth in food waste digestion if shortcomings are addressed.

## BIOINCENTIVE PROGRAM

### ***Fully fund the Bioincentive Program***

As discussed earlier in this report, the Bioincentive Program has higher demand than funding appropriated. Fully funding this program would not only provide companies that

have already invested with their full reimbursement; it would also help attract new projects to Minnesota. As shown in figure 5, fully funding the program would mean appropriating \$9 million in 2020 and \$10 million in 2021. Combined with other policies recommended for the state, including a clean fuels policy and the Natural Gas Innovation Act, a fully funded Bioincentive Program could greatly assist development of food waste digesters in Minnesota. The Bioincentive Program is supported by the Bioeconomy Coalition of Minnesota.

## MINNESOTA BUSINESS FIRST STOP

### ***Increase state funding for Minnesota Business First Stop***

The Minnesota Business First Stop program has been well-received by those that have used its services. However, state agency staff time to serve the program is constrained, which has prevented them from strongly marketing their services. Supplying the program with additional funding could mean adding additional staff capacity. Additionally, more funding dedicated to marketing would increase awareness of the program for AD developers (and other developers) looking to site facilities in Minnesota. Increased marketing efforts could be a combination of billboard ads, earned media, paid social media, magazine advertisements, online media stories, and others.

## Grants

### ***Support grantmaking through state general obligation bonds or other funding sources***

Leading up to the 2020 legislative session, the MPCA and the Walz Administration showed interest in funding grants to construct public AD facilities utilizing food waste through state general obligation bonds. The MPCA originally included a request for \$100 million to support AD, and the Walz Administration requested \$10 million for organics infrastructure where AD was included. Five million dollars in grants to expand organics infrastructure via AD facilities and other strategies were included in the House omnibus capital investment bill but unfortunately did not make it into the final bonding bill that passed in October 2020. A grant program funded with bonds or other means could help develop publicly-owned food waste digesters in Minnesota and should continue to be explored.

### ***Create a GHG reduction grant program***

Using California's Greenhouse Gas Reduction Grant and Loan Programs as an example, Minnesota could adopt a similar program if it implemented a cap-and-trade program. Revenue generated from the sale and purchase of credits in a cap-and-trade program could be deposited into a greenhouse gas reduction grant program, which could be administered by a state agency.

## STATE AGENCY ACTIONS

There are several actions that the MPCA can take that can further streamline the permitting process for project developers and increase education, which are characterized below.

## Permitting Process Outline

### ***Outline the permitting process for AD, including food waste digesters, on the MPCA's website***

As stated in the Permitting Guidelines section, several states compiled reports outlining the permitting process for AD facilities. Maryland and California, which provided static reports, stated concerns with the information becoming outdated in the future. Oregon provided its permitting process outline, which consists of six specific steps that are available online, making it easy to update if regulations changed.

By adopting Oregon's online approach, Minnesota could streamline the permitting process for developers in a format that can be readily updated when information or processes change. Because many of the permits required for an AD facility in Minnesota are issued by the MPCA, it would be most helpful for that agency to outline the general process for AD on its website and reference permits from other agencies where needed.

## Recognition of Anaerobic Digestion

### ***Recognize AD as a viable and preferred food waste management solution***

Agency websites can serve as clearinghouses for state information. However, on the existing MPCA's website, AD is not recognized as a waste diversion solution—it does not appear on the “Managing Solid Waste” or “Recycling and Composting” pages. In fact, conducting a search of AD yields recognition in PDFs but not on webpage content. To understand the MPCA's acknowledgment of AD, one would have to sift through the contents of each PDF. In other states studied in this report, AD is widely acknowledged by state agencies as playing an important role in managing organic waste and reducing GHG emissions, which is apparent by viewing agency websites. The Oregon Department of Environmental Quality references AD on its [Composting Program Overview](#) page and the California Environmental Protection Agency has an [entire page devoted to AD](#). Minnesota trails behind these other states by not acknowledging the role AD, and more specifically food waste digestion, has as a waste and energy solution.

To address this, there are two opportunities to consider. The MPCA could create a webpage specific to AD under its waste tab, acknowledging AD as a viable waste management solution. This may manifest as either a stand-alone subheading for AD or an update to the subheading “Recycling and Composting” to “Recycling and Organics Management,” adding AD to the recycling and composting sub-sections. Alternately or additionally, the MPCA could update existing web pages to acknowledge AD as a viable waste management solution, including AD where organics management methods are discussed or described when applicable.

## Minnesota Pollution Control Agency Permitting Navigator

### ***Identify a permitting navigator for project developers on the MPCA's website***

Several states, including California and Oregon, offer direct web access to environmental permitting information (see [California's online guide here](#)). The web sites list a primary contact person that developers should work with when navigating the



permitting process for AD projects. In Minnesota, the MPCA has expressed interest and willingness to work with project developers from project inception, reducing regulatory burden. By formalizing this role and identifying a contact person on the agency's website, this could further streamline permitting for developers. For more complex projects requiring multi-agency coordination, this individual could refer the developer to Minnesota Business First Stop.

## Reduce Per- and Polyfluoroalkyl Substances (PFAS) Concerns

### ***Limit or ban PFAS in consumer products and industrial uses***

If land application of digestate from the AD of food waste becomes a barrier in Minnesota due to PFAS concerns, state agencies should consider limiting or banning PFAS in consumer products and industrial uses. This would assure that the amount of PFAS entering waste streams is reduced as there is no other way to remove it from digestate or compost.<sup>114</sup>

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<sup>114</sup> Craig Coker, "Managing PFAS Chemicals in Composting and Anaerobic Digestion," BioCycle, January 21, 2020, <https://www.biocycle.net/managing-pfas-chemicals-composting-anaerobic-digestion/>.

## VI. CONCLUSIONS

A recurring theme in this report is that food waste digestion remains an underutilized technology in the United States. However, GPI's previous report, *Anaerobic Digestion Evaluation Study*, showed the prevalence of food waste digesters across Europe and Canada. In areas where the technology is deployed, food waste digestion is providing numerous benefits:

- It diverts organics from landfills, reducing methane, a powerful GHG.
- It produces biogas, which can be upgraded for use as electricity or RNG, reducing GHG emissions in both the electricity and transportation sectors and improving air quality.
- It produces digestate, which can be used as a nutrient--rich fertilizer or compost.

Food waste digestion serves a powerful role in both the energy and waste sectors. There are several measures that states reviewed in this report have taken that should help grow the national market for food waste digestion:

- California and Oregon enacted clean fuels policies that will help grow the RNG market, and consequently AD.
- California implemented many GHG emission laws that limit emissions in the state and provide funds for renewable energy projects, including anaerobic digesters.
- Wisconsin directs funding from investor-owned utilities for AD research and development.

While some policies in other states or at the national level can benefit projects in Minnesota, the food waste digestion market will be slower to develop in Minnesota without significant policy and regulatory changes. Despite several policies and regulatory measures in Minnesota that could help spur food waste digestion projects (e.g., the Bioincentive Program), the state trails behind others in its acknowledgment and incentivization of biogas as a renewable fuel and the role of AD as a viable and preferred waste management method to divert organics from landfills.

Actions needed to address the slow pace of food waste digestion project development in Minnesota are multi-faceted; there is no single change that will spur AD development. By working toward considerations provided in this report, local and state agencies can improve the policy and regulatory environment in a way that encourages food waste digestion development and helps meet climate goals in Minnesota.

## VII. APPENDICES

### A: ANAEROBIC DIGESTION BARRIERS IN MINNESOTA

#### About the Survey

The Great Plains Institute is working with the Partnership on Waste and Energy to understand the barriers that exist when siting an anaerobic digestion project in Minnesota. The information you provide will help inform the next steps in creating a positive anaerobic digestion market in the state.

Thank you for participating in our survey. Your feedback is important.

#### Project Details

This section pertains to the anaerobic digestion project in Minnesota you were involved with.

1. What was/is the name of your project?
2. Where was/is your project located?
3. What type of feedstock(s) did/does your project accept?
4. What was/is your annual capacity?
5. What type of technology did/do you utilize (type of digestion and/or technology provider)?
6. What is the current status of your project?
  - a. Planning Phase
  - b. Permitting Phase
  - c. Operating
  - d. Canceled
  - e. If your project was canceled, please indicate why.
7. Did you use the Minnesota Business First Stop program?
  - a. Yes
  - b. No, I was aware of it but chose not to use it
  - c. No, I was not aware of the program
8. Why did you choose not to use the Minnesota Business First Stop program?

#### Minnesota Business First Stop

This next set of questions pertains to your experience using the Minnesota Business First Stop program.

9. How did you use the Minnesota Business First Stop program?
10. Please rate your level of satisfaction when using the Minnesota Business First Stop program?
  - a. Not at all satisfied
  - b. Partly satisfied
  - c. Satisfied
  - d. More than satisfied

- e. Very satisfied
- 11. What did you like about using the Minnesota Business First Stop?
- 12. What could have been done to improve your experience using Minnesota Business First Stop?

## Acquiring Permits

This next set of questions pertains to your experience acquiring permits.

- 13. Please rate your level of satisfaction when applying for permits.
  - a. Not at all satisfied
  - b. Partly satisfied
  - c. Satisfied
  - d. More than satisfied
  - e. Very satisfied
- 14. How many years did your project go through permitting?
- 15. Please indicate specific permits you needed from each agency listed below. If you did not need any permits from one or more of the agencies listed, leave the relevant line(s) blank.
  - a. Minnesota Pollution Control Agency
  - b. Minnesota Department of Natural Resources
  - c. Minnesota Department of Transportation
  - d. Minnesota Public Utilities Commission
  - e. Minnesota Department of Labor and Industry
  - f. Minnesota Department of Agriculture
- 16. Please indicate any other permits you needed to acquire and from which agencies.
- 17. What challenges did you experience? Please be specific, including types of permit(s) and agencies involved, as applicable.
- 18. What obstacle could not be overcome? Please be specific, including types of permit(s) and agencies involved, as applicable.
- 19. Based on your experience, how could the process be modified to make it easier for a project of a similar nature? Please be specific.

## Other information

- 20. Please enter any other information you would like us to know about your project.

## Contact information

- 21. We may wish to follow-up with you to clarify some responses. Please enter your contact information.
  - a. Name
  - b. Company
  - c. Email Address
  - d. Phone Number

## B: SUMMARY OF MODELED ALTERNATIVE FUEL PATHWAYS

Table 11 provides a full description and data source for each alternative fuel pathway shown in figure 4.

**Table 11. Summary of modeled alternative fuel pathways**

Modeled Pathway	Description and Source
Biodiesel, average	REET default biodiesel with Argonne National Laboratory indirect land use change assumptions. Pure biodiesel (B100); not blended.
Conventional CNG	Conventional (fossil) natural gas, extracted as by-product of crude oil extraction.
Diesel (Baseline)	Standard diesel (distillate fuel oil) sold for motor vehicle use in the United States, extracted from crude oil; not adjusted for region-specific crude oil feedstocks.
Ethanol, average	Argonne National Laboratory's REET model default assumptions for ethanol carbon intensity and indirect land use change. Assumes dry mill, no corn oil, and located in the Midwestern region.
Ethanol with Soil Carbon Management	Argonne National Laboratory's REET model default assumptions for ethanol carbon intensity and REET indirect land use change. Assumes dry mill, no corn oil, with the Midwestern electric grid. This pathway also models agricultural producer engagement in soil carbon storage through nutrient management, nitrogen management, soil organic carbon increase, and efficiency in energy and transportation during production. Estimates of impact were based off of a Midwestern pilot operation that measured change in carbon intensity of various practices (fertilizer application, no tillage, cover crops, etc.) and results were integrated into REET to model how these changes would translate into a carbon intensity score. Specific measurements included: energy use associated with corn farming (e.g., diesel), nitrogen application from fertilizer, urea application from fertilizer, phosphorous ( $P_2O_5$ ) application from fertilizer, potassium (potash) application from fertilizer, lime from fertilizer application, pesticide application, fuel used for corn transportation, nitrous oxide from fertilizer and nitrogen from corn residue, as well as estimated exchange of soil carbon stock exchange from plant biomass. Assumes moderate yield (180 bushels).
Ethanol, 100% RNG and Soil Carbon Management	<p>Presumes benefits of both 100% renewable natural gas energy processing and soil carbon management. In short, combines the carbon intensity reduction benefits of both RNG energy processing and soil carbon management.</p> <p>To account for 100% RNG energy processing: Argonne National Laboratory's REET model assumptions with 100% renewable natural gas-powered facility electricity and REET indirect land use change. Assumes dry mill, no corn oil.</p> <p>To account for soil carbon management practices: Models agricultural producer engagement in soil carbon storage through nutrient management, nitrogen management, soil organic carbon increase, and efficiency in energy and transportation during production. Estimates of impact were based off a Midwestern pilot operation that measured change in carbon intensity of various practices (fertilizer application, no tillage, cover crops, etc.) and results were integrated into REET to model how these changes</p>

	would translate into a carbon intensity score. Specific measurements included: energy use associated with corn farming (e.g., diesel), nitrogen application from fertilizer, urea application from fertilizer, phosphorous ( $P_2O_5$ ) application from fertilizer, potassium (potash) application from fertilizer, lime from fertilizer application, pesticide application, fuel used for corn transportation, nitrous oxide from fertilizer and nitrogen from corn residue, as well as estimated exchange of soil carbon stock exchange from plant biomass. Assumes moderate yield (180 bushels).
EV Regional Grid	Represents an electric vehicle using the average regional grid to charge; assumes Midwest Reliability Organization (MRO) regional grid mix, no change assumed between present and 2025. Electricity carbon intensity score is adjusted for an energy economy ratio (EER) of 3.6 as an alternative to gasoline.
EV High Renewables	Represents an electric vehicle using an electric generation mix with a high proportion of renewable to charge; assumes an electric generation mix of ~50% renewable energy generation using example integrated resource plan documents from Midwestern utility companies. Electricity score is EER-adjusted for gasoline alternative (with a multiplier of 3.6).
EV 100% Carbon Free	Represents an electric vehicle using a zero-carbon electric generation mix to charge; assumes 100% renewable grid mix; upstream emissions included. Electricity score is EER-adjusted for gasoline alternative (with a multiplier of 3.6).
E85 + PHEV with Regional Grid	A hybrid vehicle using E85 (55%) and plug-in battery electricity (45%) assumed to be charged on the standard MRO or regional electricity mix. Electricity score is EER-adjusted for gasoline alternative (with a multiplier of 3.6).
Gasoline (Baseline)	Standard gasoline derived from crude oil and other petroleum liquids for use as engine fuel; assumes carbon intensity of typical gasoline blendstocks available in the US.
Renewable CNG	Assumes renewable compressed natural gas from a non-fossil source using GREET defaults; does not assign a particular feedstock.
Renewable Diesel	Assumes diesel from a non-fossil source using GREET defaults.

Table authored by Jessi Wyatt, GPI, 2020.

## C: MULTI-STATE SURVEY RESULTS

### Background

Following the conclusion of the Minnesota survey, the Partnership was interested in exploring how permitting barriers and experience in Minnesota compares to other states. GPI conducted a multi-state survey with food waste digesters in California, Oregon, Wisconsin, and Iowa to develop a better understanding of permitting environments and AD incentives in other states.

### Methodology

GPI compiled an electronic survey with questions about project characteristics, agencies involved in the permitting process, challenges, and timeline, as well as incentives helpful to digesters. GPI sent the survey to 19 facilities in California, six facilities in Oregon, 12 facilities in Wisconsin, and six facilities in Iowa. All facilities that received the survey were processing food waste. GPI followed up with outreach via email and telephone to improve response rates. GPI then analyzed results from the respondents.

Blank versions of the surveys are included in appendix D.

### California

#### RESPONDENTS

Ten out of 19 facilities responded to the survey in California. Of the ten facilities that responded to the survey, nine are currently operating and one is not. Five facilities are stand-alone food waste digesters, three are WRRFs co-digesting food waste, and two are WRRFs not digesting food waste. GPI did not include the facilities not processing food waste in the analysis.

#### **Facility #1: Perris Anaerobic Digestion Facility**

Status: Operating

Technology: Eisenman dry digester

Feedstock: 160,000 tons of mostly source-separated curbside green waste

Capacity/Products: 1 million diesel equivalent gallons of RNG and 80,000 tons per year of digestate.

#### **Facility #2: Agromin Organics Composting Facility**

Status: Not currently operating

Technology: Dry fermentation

Feedstock: 50,000 tons plus of yard waste (green waste)

Capacity/Products: N/A

#### **Facility #3: Los Angeles County Sanitation District- Joint Water Pollution Control Plant**

Status: Operating

Technology: Mesophilic digestion



Feedstock: 75,000 tons per year of mechanically-separated organics, fraction of MSW, source-separated organics, and food processing waste.  
Capacity/Products: 300 standard cubic feet per minute of biogas

**Facility #4: Kompogas SLO, LLC in San Luis Obispo**

Status: Operating  
Technology: Kompogas continuous high-solids plug flow system  
Feedstock: 36,500 tons per year of source-separated organics, food processing waste, fats oils and greases, and yard waste (green waste).  
Capacity/Products: 2,907,000 normal cubic meters annually of biogas, and 21,000 tons annually of digestate

**Facility #5: Zero Waste Energy Development Company**

Status: Operating  
Technology: Dry digestion  
Feedstock: 539.53 tons of animal waste in the form of manure, 9,094.34 tons of yard waste, and 67,992.74 tons MSW.  
Capacity/Products: 114,936,327 cubic feet of biogas, and 64,962.10 tons of digestate in 2019

**Facility #6: Victor Valley Wastewater Reclamation Authority**

Status: Operating  
Technology: Wet digestion  
Feedstock: 1.4 million gallons of feedstock per year: 90 percent of it is fats, oils, and greases, and 10 percent of it is anaerobic digestion material.  
Capacity/Products: 114,535,540 standard cubic feet per minute annually of biogas, and 54 million gallons per year of digestate

**Facility #7: Central Marin Sanitation Agency**

Status: Operating  
Technology: Wet digestion  
Feedstock: 2,200 tons of food waste, and 4.1 million gallons of fats, oils, and greases.  
Capacity/Products: 100 million cubic feet of biogas, and 6,500 wet tons of digestate

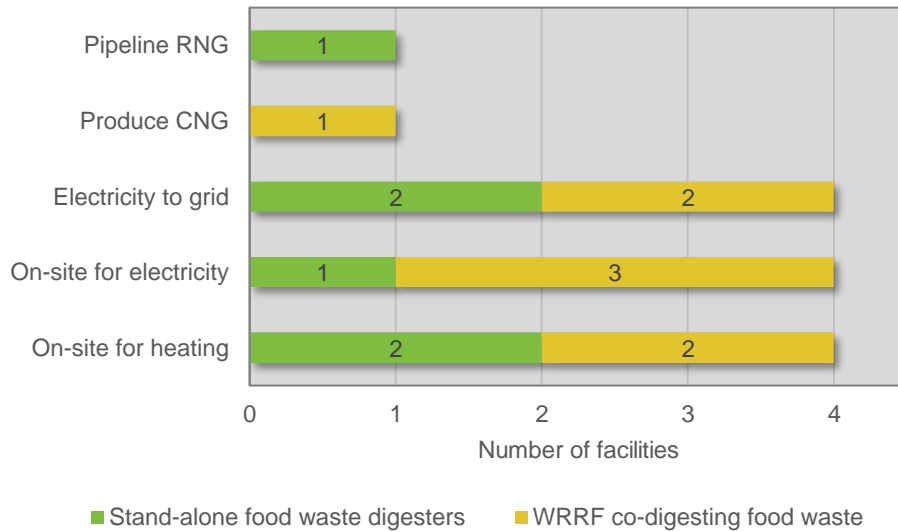
**Facility #8: UC Davis Renewable Energy Anaerobic Digester**

Status: Operating  
Technology: Thermophilic wet digestion  
Feedstock: 10,500 tons of source-separated organics, and fats, oils, and greases.  
Capacity/Products: 3,000,000 standard cubic feet per minute of biogas, and 2,500,000 gallons of digestate

## RESULTS

**Biogas use:** Most respondents use their biogas on-site for heating or electricity or sell electricity to the grid. Only one facility is producing compressed natural gas (CNG) and injecting RNG into the pipeline.

**Figure 7. Biogas use by digester type in California**



This figure shows the distribution of biogas use by facility type. Five stand-alone food waste digesters and three wastewater treatment plants answered this question. Figure authored by Mariem Zaghdoudi, GPI, 2020.

**Digestate use:** There are several ways that facilities use digestate produced:

- Dry to the point of class A biosolids and haul to farms for land application
- Send to compost facilities
- Use as landfill alternative daily cover

**Permits required:** The number of required permits varies depending on type of digester. Stand-alone food waste digesters indicated having to procure more permits than WRRFs. The full list of permits required by each type of facility is displayed in table 12.

**Table 12. Required permits by digester type in California**

Stand-alone food waste digester	WRRF co-digesting food waste
<ul style="list-style-type: none"> <li>• Air permit from Air Quality Management District</li> <li>• Air Pollution Control District</li> <li>• Air quality permit</li> <li>• Authority to Construct Permit</li> <li>• Building permit</li> <li>• Business license</li> <li>• Business License (for the end products)</li> <li>• Conditional Use Permit</li> <li>• Environmental Health Permit</li> <li>• EPA permits</li> <li>• Fire permit</li> <li>• Flare permit for biogas</li> <li>• Hazardous Waste Generator Permit</li> <li>• Regional Water Control Permit</li> <li>• Solid Waste Facility Permit</li> <li>• Waste discharge requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Authority to Construct Permit</li> <li>• Waste discharge requirements</li> </ul>

**Permit satisfaction:** Four facilities indicated that they were satisfied with the permitting process, two indicated that they were partly satisfied, one indicated that it was not at all satisfied, and one indicated that it was more than satisfied.

**Permitting length:** Respondents reported an average permitting time of 2.41 years.

**Incentives:** The Greenhouse Gas Cap-and-Trade Program was the most-used program according to respondents. Other government incentives used by facilities are show in figure 8.

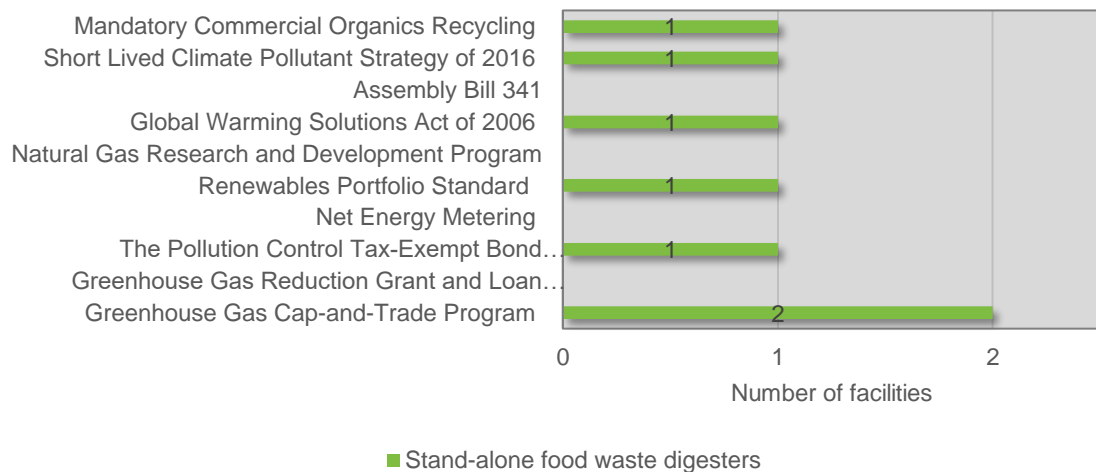
**Figure 8. Government incentives used by digesters in California**

Figure 8 shows the government incentives that the facilities indicated using in California. None of the wastewater treatment plants co-digesting food waste, and five stand-alone food waste digesters answered this question. Some additional incentives that facilities reported using include state grants, CalRecycle grants, California Energy Commission Epic grants, and the Pacific Gas and Electric energy selling program. Figure authored by Mariem Zaghdoudi, GPI, 2020.

**Resources and guidance:** When asked to indicate resources or guidance that was helpful for navigating the permitting process, none of the respondents pointed to specific resources.

## Oregon

### RESPONDENTS

Three out of six facilities responded to the survey in Oregon. Of the three facilities that responded to the survey, one is currently operating, one is in the design phase, and one is not operating. One facility is a WRRF co-digesting food waste, one facility is a WRRF co-digesting material that works and doesn't interfere with their permit, and the third facility is working to install pretreatment equipment at their solid waste transfer station to produce a clean food waste slurry that will be processed at a municipally-owned WRRF.

#### **Facility #1: City of Gresham Wastewater Treatment Plant**

Status: Operating

Technology: Wet mesophilic digestion

Feedstock: 12,000 gallons per day of food processing waste, and fats, oils, and greases.

Capacity/Products: 3,000,000 standard cubic feet annually of biogas, and 5,300,000 dry tons annually of digestate

#### **Facility #2: Pendleton Wastewater Treatment Plant**

Status: Operating

Technology: Wet digestion- complete mix digester

Feedstock: Agricultural waste, food processing waste, and fats, oils, and greases

Capacity/Products: 15-20 million cubic feet of biogas, and 300 dry metric tons of digestate, annually

**Facility #3: No name yet as this facility is still in the design phase**

Status: Design phase

Technology: This facility is currently working on installing pretreatment equipment at their transfer station to produce a clean food waste slurry that would be processed at a municipally-owned wastewater treatment facility. The wastewater treatment facility would use wet digestion.

Feedstock: The pretreatment equipment located at the solid waste transfer station would receive some source-separated food scraps from the commercial sector

Capacity/Products: This facility would produce a clean food waste slurry to be sent to a wastewater treatment plant. The wastewater treatment plant will process the food slurry to produce biogas to be upgraded to CNG and pipeline-quality RNG.

## RESULTS

**Biogas use:** Most respondents use their biogas on-site for heating or electricity. Only one facility is producing CNG and injecting RNG into the pipeline.

**Figure 9. Biogas use by digesters in Oregon**

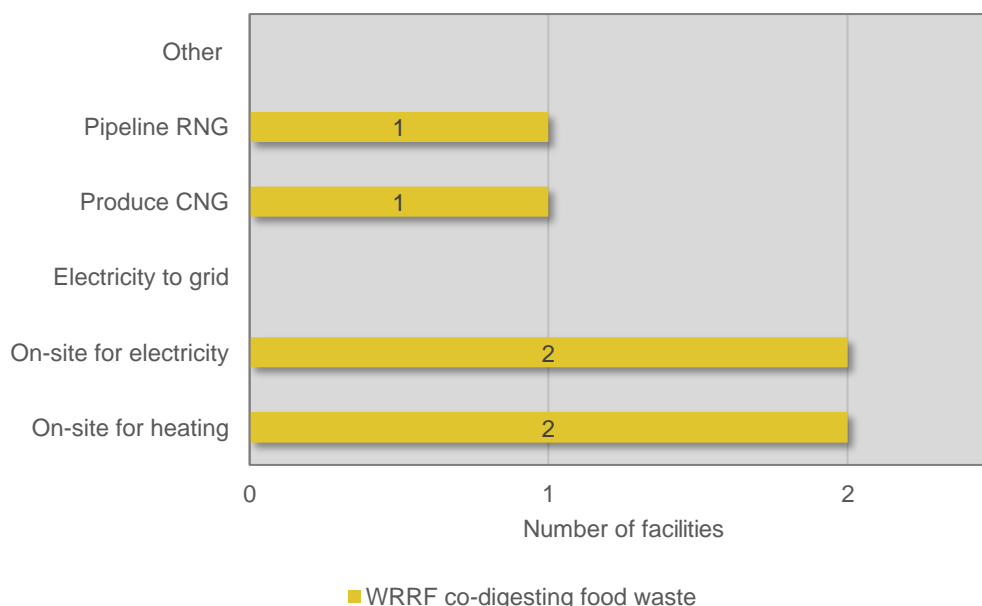


Figure 9 shows the distribution of biogas use by facility type. Three wastewater treatment plants answered this question. Figure authored by Mariem Zaghdoudi, GPI, 2020.

**Digestate use:** Respondents indicated that digestate is used primarily for land application on agricultural fields.

**Permits required:** Respondents indicated needing to procure the following permits:

- Application for Solid Waste Disposal Site Permit
- Certificate of Business Registry
- Land Use Compatibility Statement
- Site Operations Plan

**Permit satisfaction:** Two of the three facilities that responded answered this question: one indicated that they were partly satisfied, and the other indicated that they were very satisfied.

**Permitting length:** Respondents did not indicate how long it took them to acquire permits.

**Incentives:** Respondents indicated using net metering and the Energy Trust of Oregon.

**Figure 10. Government incentives used by digesters in Oregon**

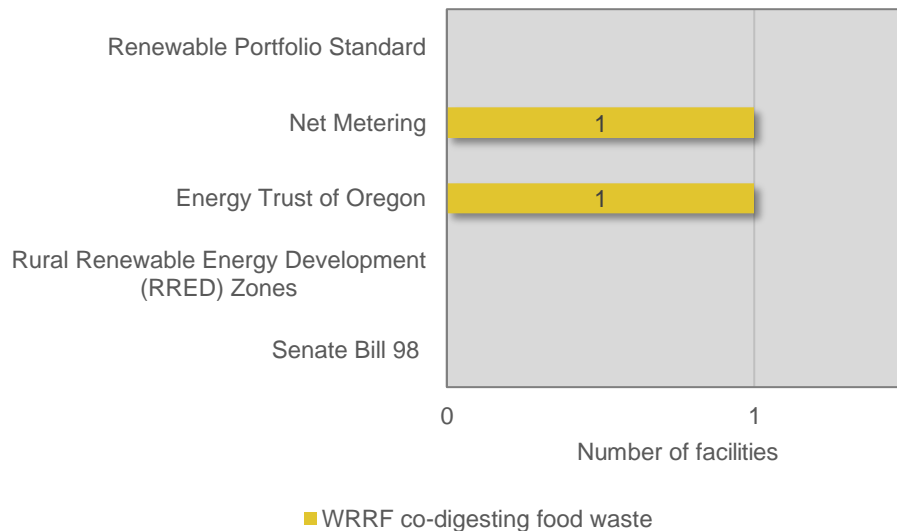


Figure 10 shows the government incentives that the facilities indicated using. Only one facility, a wastewater treatment plant co-digesting food waste, answered this question. An additional incentive reported by one of the facilities was a \$2 million grant from the American Recovery and Reinvestment Act. Figure authored by Mariem Zaghdoudi, GPI, 2020.

**Resources and guidance:** Respondents indicated that the Oregon Department of Environmental Quality provides a fact sheet and necessary forms, which has been helpful when navigating the permitting process. Additionally, facilities recommended working closely with all regulatory agencies.

## Wisconsin

Four out of 12 facilities responded to the survey in Wisconsin. Of the four facilities that responded to the survey, all are currently operating. One facility is a stand-alone food waste digester, and the other three are WRRFs co-digesting food waste.

### RESPONDENTS

#### **Facility #1: Fond du lac Wastewater Treatment & Resource Recovery Facility**

Status: Operating  
 Technology: Wet mesophilic digestion  
 Feedstock: 9 million gallons total of mechanically-separated organic fraction of MSW, source-separated organics, agricultural waste, and food processing waste.  
 Capacity/Products: 250,000 cubic feet of biogas, and 250,000 cubic feet of digestate

#### **Facility #2: UW Oshkosh Biogas Program**

Status: Operating  
 Technology: Dry AD batch system  
 Feedstock: 10,000 tons total annually of agricultural waste, food processing waste, and yard waste (green waste).  
 Capacity/Products: 60-80 standard cubic feet per minute of biogas

#### **Facility #3: City of Port Washington Wastewater Treatment Plant**

Status: Operating  
 Technology: mesophilic digestion  
 Feedstock: 60,000 to 100,000 gallons annually of fats, oils, and greases  
 Capacity/Products: 5 to 6 million cubic feet of biogas

#### **Facility #4: Appleton Wastewater Treatment Plant**

Status: Operating  
 Technology: Wet mesophilic digestion  
 Feedstock: 40 million gallons of food processing waste and municipal sewage  
 Capacity/Products: 146 million square feet of biogas and digestate

### RESULTS

**Biogas use:** Most respondents use their biogas on-site for heating or electricity. One facility sells electricity to the grid, and one flares its biogas.



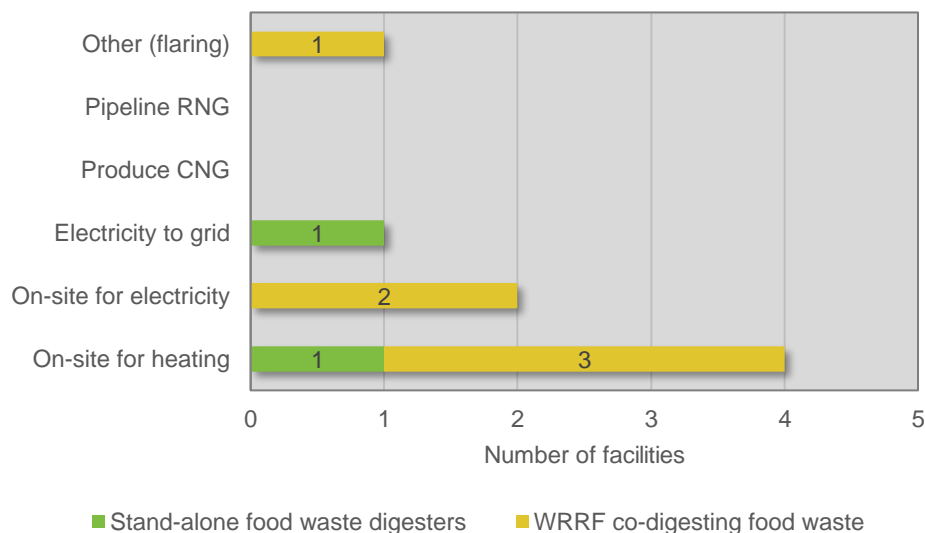
**Figure 11. Biogas use by digester type in Wisconsin**

Figure 11 shows the distribution of biogas use by facility type. One stand-alone food waste digester and three wastewater treatment plants co-digesting food waste answered this question. Figure authored by Mariem Zaghdoudi, GPI, 2020.

**Digestate use:** Respondents indicated using digestate in two primary ways:

- Sell to farms
- Return to sewage plant as a side stream for processing

**Permits required:** Based on survey responses, WRRFs co-digesting food waste indicated having to procure more permits than stand-alone food waste digesters. A comparative list is provided in table 13.

**Table 13. Required permits by digester type in Wisconsin**

Stand-alone food waste digester	WRRF co-digesting food waste
<ul style="list-style-type: none"> <li>• Solid waste permit</li> <li>• Construction Permit</li> <li>• Registration Operation Permit</li> <li>• Submission of a Storm Water Pollution Prevention Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Air Emissions permit</li> <li>• Department of Agriculture, Trade and Consumer Protection biosolids compost</li> <li>• Registration Operation Permit</li> <li>• Wisconsin DNR must approve field applications for applying sludge</li> <li>• Wisconsin Pollutant Discharge Elimination System General Permits</li> </ul>

**Permit satisfaction:** Two of the four facilities that responded to the survey indicated being satisfied with the permitting process while one indicated that it was more than satisfied, and one indicated that it was very satisfied.

**Permitting length:** Two out of four respondents reported an average of one year to complete permitting. Two facilities did not provide an estimate.

**Incentives:** Focus on Energy was the most-used incentive according to respondents.

**Figure 12. Government incentives used by digesters in Wisconsin**

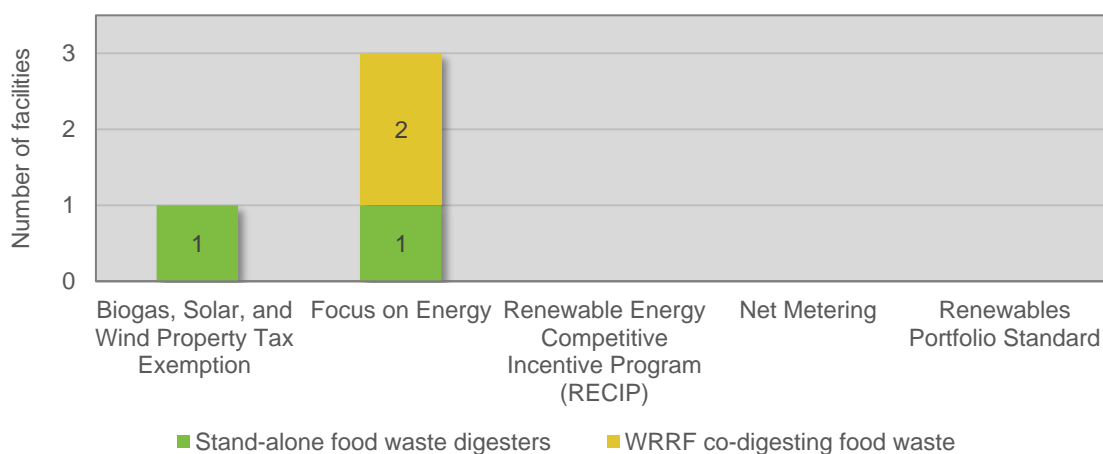


Figure 12 shows the government incentives that the facilities indicated using. Three out of the four facilities responded to this question (one of the WRRFs did not respond). Additional incentives mentioned by the facilities include the DNR Clean Water Fund loan, which is a low-interest loan from the state for various projects. Figure authored by Elizabeth Abramson, GPI, 2020.

**Resources and guidance:** Respondents indicated that state agencies, especially the Wisconsin Department of Natural Resources website, were helpful in navigating the permitting process.

## Iowa

Only one out of six facilities responded to the survey in Iowa. The facility that responded is a WRRF co-digesting food waste and is currently operating.

### RESPONDENTS

#### **Facility #1: City of Davenport Water Pollution Control**

Status: Operating

Technology: Wet digestion

Feedstock: 700,000 gallons of fats, oils, greases, and B-Grease

Capacity/Products: 150,700,000 cubic feet of biogas and 7,758,455 lbs. of digestate annually.

### RESULTS

**Biogas use:** The facility uses its biogas for heating and electricity on-site and sells excess electricity to the electric grid.

**Digestate use:** Digestate is dewatered, blended with compost, and sold to farmers as soil amendment and fertilizer.

#### **Permits required:**

- Storm Water Pollution Prevention Plan
- Notice of Intent for National Pollutant Discharge Elimination System Coverage under general permit
- Air quality permit

**Permit satisfaction:** The facility indicated being satisfied with the permitting process.

**Permitting length:** The facility did not indicate how long it took to secure permits.

**Incentives:** The facility used the Alternative Energy Production law.

**Resources and guidance:** The facility did not indicate using any specific resources or guidance.

## Observations

Overall, GPI did not receive as many responses to the surveys as desired, making definitive conclusions difficult to obtain. Nevertheless, a few observations can be drawn:

- Permits required and incentives available vary for facilities based on digester type and location. In California, stand-alone food waste digesters require more permits than WRRFs co-digesting food waste, but the opposite is true in Wisconsin.
- State agencies can be helpful navigators during the permitting process. Respondents in Oregon and Wisconsin cited receiving guidance from their respective state agencies.

- Respondents indicated it took less time to secure permits (1–2.4 years) than what was observed in Minnesota (3.5 years).
- Respondents were generally satisfied with the permitting process in their state. Only one respondent in California indicated that it was not satisfied.
- Biogas is primarily used on-site for heating and electricity or is sold to the electric grid as electricity. Very few respondents indicated that they are currently producing CNG or RNG. Facilities selling electricity to the grid could be receiving higher rates from prior power purchase agreements or are generating enough revenue from tipping fees and digestate. As these agreements phase out, more facilities may shift to producing RNG to earn higher value.

## D: MULTI-STATE SURVEY QUESTIONS

### California

The Great Plains Institute is working with the Partnership on Waste and Energy to understand the barriers that exist when siting an anaerobic digestion project in different states. The information you provide will help inform the next steps in creating a more positive anaerobic digestion market. Thank you for taking the time to participate in our survey. Your feedback is important. Please contact Mariem Zaghdoudi with any questions about the survey.

#### CONTACT INFORMATION

First Name

Last Name

Phone

Email Address

#### FACILITY DETAILS

What is the name of your facility?

What is the current status of your digester?

1. Permitting
2. Construction
3. Commissioning
4. Operating
5. Not currently operating

If your facility is no longer operating, please tell us why, how long it's been shut down, and what the future plans are for the facility.

Which description best matches your facility?

1. Stand-alone food waste digester
2. Wastewater treatment plant co-digesting food waste
3. On-farm digester co-digesting food waste
4. Industrial pretreatment digester that treats high strength wastewater
5. Other (specify) \_\_\_\_\_

Where is your facility located (City, State)?

What type of feedstock(s) does your facility accept? Check all that apply

1. Mechanically-separated organic fraction of MSW
2. Source-separated organics
3. Agricultural Waste
4. Food processing waste
5. Fats, oils, and greases
6. Yard waste (green waste)
7. Other (Specify) \_\_\_\_\_

How much of each feedstock do you process annually?

How much biogas does your digester produce annually?

How much digestate does your digester produce annually?

What type of digestion technology is used at your facility?

What type of process do you use?

1. Wet digestion
2. Dry digestion
3. Other (please describe)

What happens to the biogas produced? (check all that apply)

1. Use on-site for heating
2. Use on-site for electricity
3. Produce electricity and sell back to the electric grid
4. Produce CNG
5. Produce RNG and inject into a pipeline
6. Other (specify) \_\_\_\_\_

If the gas is used off-site, who does your facility sell the energy to?

What happens to the digestate produced? Who is the customer base for the digestate produced (e.g., farms, garden centers, etc.)?

## PERMITTING

Please rate your level of satisfaction when applying for permits

1. Not at all satisfied
2. Partly satisfied
3. Satisfied
4. More than satisfied
5. Very satisfied

Please explain your level of satisfaction.

How many years did it take to acquire permits for your facility?

Please indicate the permits required for your facility (check all that apply)

1. Building Permit
2. Waste Discharge Requirements
3. Solid Waste Facility Permit
4. Authority to Construct Permit

Please indicate any additional local or state permits or requirements (e.g., zoning) you needed to acquire and from which entities (e.g., municipalities).

What permits or additional approvals, if any, were required for the production/disposal/sale of the end products (biogas and digestate)? Please be specific.

What resources or guidance were available to you as you were navigating the permitting process (e.g., permitting process outline, state agency navigator, fact sheets, etc.)?

What lessons did you learn from the permitting process, including at the state and local levels?

## INCENTIVES

Which specific government incentives helped make your facility possible?

1. Greenhouse Gas Cap-and-Trade Program
2. Greenhouse Gas Reduction Grant and Loan Programs
3. The Pollution Control Tax-Exempt Bond Financing Program
4. Net Energy Metering
5. Renewables Portfolio Standard
6. Natural Gas Research and Development Program
7. Global Warming Solutions Act of 2006 (AB 32)
8. Assembly Bill 341
9. Short-Lived Climate Pollutant Strategy of 2016 (SB 1383)
10. Mandatory Commercial Organics Recycling (AB 1826)

Out of the options listed in the previous question, which had the greatest impact on your facility and why?

What other financial incentives, if any, helped make your facility possible? Examples may include grants, loans, tax credits, rebates, bonds, or private financing.

Please enter any other information you would like us to know.



## Oregon

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### CONTACT INFORMATION

First Name

Last Name

Phone

Email Address

### FACILITY DETAILS

What is the name of your facility?

What is the current status of your facility?

1. Permitting
2. Construction
3. Commissioning
4. Operating
5. Not currently operating

If your facility is no longer operating, please tell us why, how long it's been shut down, and what the future plans are for the facility.

Which description best matches your facility?

1. Stand-alone food waste digester
2. Wastewater treatment plant co-digesting food waste
3. On-farm digester co-digesting food waste
4. Industrial pretreatment digester that treats high strength wastewater
5. Other (specify) \_\_\_\_\_

Where is your facility located (City, State)?

What type of feedstock(s) does your facility accept?

1. Mechanically-separated organic fraction of MSW
2. Source-separated organics
3. Agricultural waste
4. Food processing waste
5. Fats, oils, and greases
6. Yard waste (green waste)
7. Other (specify)

How much of each feedstock do you process annually?

How much biogas does your digester produce annually?

How much digestate does your digester produce annually?

What type of digestion technology is used at your facility?

What type of process do you use?

1. Wet Digestion
2. Dry Digestion
3. Other (please describe)

What happens to the biogas produced?

1. Use on-site for heating
2. Use on-site for electricity
3. Produce electricity and sell to the electric grid
4. Produce CNG
5. Produce renewable natural gas and inject into a pipeline
6. Other (specify) \_\_\_\_\_

If the gas is used off-site, who does your facility sell the energy to?

What happens to the digestate produced? Who is the customer base for the digestate produced (e.g., farms, garden centers, etc.)?

## PERMITTING

Please rate your level of satisfaction when applying for permits

1. Not at all satisfied
2. Partly satisfied
3. Satisfied
4. More than satisfied
5. Very Satisfied

Please explain your level of satisfaction.

How many years did it take to acquire permits for your digester?

Please indicate the permits required for your facility (check all that apply)

1. Application for Solid Waste Disposal Site Permit
2. Land Use Compatibility Statement
3. Disposal Site Compatibility with Solid Waste Management Plan
4. Certificate of Business Registry
5. Environmental Risk Screening
6. Site Operations Plan
7. Registration Permit or individual composting facility permit

Please indicate any additional permits or requirements (e.g., zoning) you needed to acquire and from which entities (e.g., municipalities).

What permits or additional approvals, if any, were required for the production/disposal/sale of the end products (biogas and digestate)? Please be specific.

What resources or guidance were available to you as you were navigating the permitting process (e.g., permitting process outline, state agency navigator, fact sheets, etc.)?

What lessons did you learn from the permitting process, including at the state and local levels?

## INCENTIVES

Which specific government incentives helped make your facility possible? (check all that apply)

1. Senate Bill 98 (established voluntary goals for adding up to 30 percent RNG into Oregon's pipeline system by 2050)
2. Rural Renewable Energy Development (RRED) Zones
3. Energy Trust of Oregon
4. Net Metering
5. Renewable Portfolio Standard

Out of the options listed in the previous question, which had the greatest impact on your facility and why?

What other financial incentives, if any, helped make your facility possible? Examples may include grants, loans, tax credits, rebates, bonds, or private financing.

Please enter any other information you would like us to know.

## Wisconsin

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### CONTACT INFORMATION

First Name

Last Name

Phone

Email Address

### FACILITY DETAILS

What is the name of your facility?

What is the current status of your facility?

1. Permitting
2. Construction
3. Commissioning
4. Operating
5. Not currently operating

If your facility is no longer operating, please tell us why, how long it's been shut down, and what the future plans are for the facility.

Which description best matches your facility?

1. Stand-alone food waste digester
2. Wastewater treatment plant co-digesting food waste
3. On-farm digester co-digesting food waste
4. Industrial pretreatment digester that treats high strength wastewater
5. Other (specify)

Where is your facility located (City, State)?

What type of feedstock(s) does your facility accept?

1. Mechanically-separated organic fraction of MSW
2. Source-separated organics
3. Agricultural waste
4. Food processing waste
5. Fats, oils, and greases
6. Yard waste (green waste)
7. Other (specify)

How much of each feedstock do you process annually?

How much biogas does your digester produce annually?

How much biogas does your digester produce annually?

What type of digestion technology is used at your facility?

What type of process do you use?

1. Wet Digestion
2. Dry Digestion
3. Other (please describe)

What happens to the biogas produced?

1. Use on-site for heating
2. Use on-site for electricity
3. Produce electricity and sell to the electric grid
4. Produce CNG
5. Produce renewable natural gas and inject into a pipeline
6. Other (specify) \_\_\_\_\_

If the gas is used off-site, who does your facility sell the energy to?

What happens to the digestate produced? Who is the customer base for the digestate produced (e.g., farms, garden centers, etc.)?

## PERMITTING

Please rate your level of satisfaction when applying for permits

1. Not at all satisfied
2. Partly satisfied
3. Satisfied
4. More than satisfied
5. Very Satisfied

Please explain your level of satisfaction.

How many years did it take to acquire permits for your digester?

Please indicate the permits required for your facility (check all that apply)

1. Submission of a Storm Water Pollution Prevention Plan
2. Notice of Intent for Tier 2 Industrial Storm Water Discharge General Permit
3. Wisconsin Pollutant Discharge Elimination System General Permits
4. Registration Operation Permit
5. Construction Permit

Please indicate any additional permits or requirements (e.g., zoning) you needed to acquire and from which entities (e.g., municipalities).

What permits or additional approvals, if any, were required for the production/disposal/sale of the end products (biogas and digestate)? Please be specific.

What resources or guidance were available to you as you were navigating the permitting process (e.g., permitting process outline, state agency navigator, fact sheets, etc.)?

What lessons did you learn as part of the permitting process, including at the state and local levels?

### INCENTIVES

Which specific government incentives helped make your facility possible? (check all that apply)

1. Biogas, Solar, and Wind Property Tax Exemption (2013 AB 40/2013 Wisconsin Act 20)
2. Focus on Energy
3. Renewable Energy Competitive Incentive Program (RECIP)
4. Net Metering
5. Renewable Portfolio Standard

Out of the options listed in the previous question, which had the greatest impact on your digester and why?

What other financial incentives, if any, helped make your facility possible? Examples may include grants, loans, tax credits, rebates, bonds, or private financing.

Please enter any other information you would like us to know.

## Iowa

The Great Plains Institute is working with the Partnership on Waste and Energy to understand the barriers that exist when siting an anaerobic digestion project in different states. The information you provide will help inform the next steps in creating a more positive anaerobic digestion market. Thank you for taking the time to participate in our survey. Your feedback is important. Please contact Mariem Zaghdoudi with any questions about the survey.

### CONTACT INFORMATION

First Name

Last Name

Phone

Email Address

### FACILITY DETAILS

What is the name of your facility?

What is the current status of your facility?

1. Permitting
2. Construction
3. Commissioning
4. Operating
5. Not currently operating

If your facility is no longer operating, please tell us why, how long it's been shut down, and what the future plans are for the facility.

Which description best matches your facility?

1. Stand-alone food waste digester
2. Wastewater treatment plant co-digesting food waste
3. On-farm digester co-digesting food waste
4. Industrial pretreatment digester that treats high strength wastewater
5. Other (specify)

Where is your facility located (City, State)?

What type of feedstock(s) does your facility accept? (check all that apply)

1. Mechanically-separated organic fraction of MSW
2. Source-separated organics
3. Agricultural waste
4. Food processing waste
5. Fats, oils, and greases
6. Yard waste (green waste)
7. Other (specify)



How much of each feedstock do you process annually?

How much biogas does your digester produce annually?

How much digestate does your digester produce annually?

What type of digestion technology is used at your facility?

What type of process do you use?

1. Wet Digestion
2. Dry Digestion
3. Other (specify)

What happens to the biogas produced?

1. Use on-site for heating
2. Use on-site for electricity
3. Produce electricity and sell to the electric grid
4. Produce CNG
5. Produce renewable natural gas and inject into a pipeline
6. Other (specify) \_\_\_\_\_

If the gas is used off-site, who does your facility sell the energy to?

What happens to the digestate produced? Who is the customer base for the digestate produced (e.g., farms, garden centers, etc.)?

## PERMITTING

Please rate your level of satisfaction when applying for permits

1. Not at all satisfied
2. Partly satisfied
3. Satisfied
4. More than satisfied
5. Very Satisfied

Please explain your level of satisfaction.

How many years did it take to acquire permits for your digester?

Please indicate the permits required for your facility (check all that apply)

1. Submission of a Storm Water Pollution Prevention Plan
2. Notice of Intent for NPDES (National Pollutant Discharge Elimination System) Coverage Under General Permit
3. Joint Application Form submitted to US Army Corps of Engineers and Iowa Department of Natural Resources to begin permitting process
4. Construction Permit Standard Application
5. Annual Permit

Please indicate any additional permits or requirements (e.g., zoning) you needed to acquire and from which entities (e.g., municipalities).

What permits or additional approvals, if any, were required for the production/disposal/sale of the end products (biogas and digestate)? Please be specific.

What resources or guidance were available to you as you were navigating the permitting process (e.g., permitting process outline, state agency navigator, fact sheets, etc.)?

What lessons did you learn as part of the permitting process, including at the state and local levels?

## INCENTIVES

Which specific government incentives helped make your facility possible? (check all that apply)

1. Iowa Energy Center Grant Program
2. Alternate Energy Revolving Loan Program
3. Net Metering
4. Alternative Energy Production Law

Out of the options listed in the previous question, which had the greatest impact on your facility and why?

What other financial incentives, if any, helped make your facility possible? Examples may include grants, loans, tax credits, rebates, bonds, or private financing.

Please enter any other information you would like us to know.