Anaerobic Digestion

at U.S. Water Resource Recovery Facilities

American Biogas Council

September 2026



AMERICAN BIOGAS COUNCIL

Introduction

In early 2024, the American Biogas Council (ABC) launched a nationwide survey of wastewater treatment plants (WWTPs) and water resource recovery facilities (WRRFs) to establish a clearer picture of anaerobic digestion (AD) use across the country.

The Unites States Environmental Protection Agency (EPA) counts a total of 17,544 publicly owned treatment works (POTW) nationwide, of which 4,718 have an average daily flow rate of over one million gallons per day (1 MGD)[1].

To qualify for the ABC survey, a facility needed to treat an average flow of at least 1 MGD — generally considered the minimum scale at which AD becomes viable. Using this threshold, ABC identified more than 5,000 WWTPs and WRRFs with potential for anaerobic digestion.

Over the 18-month research period ending September 1, 2026, ABC's research team made more than 33,000 calls to these facilities and spoke directly with managers, operators and other key personnel at 3,271 of them.

Researchers first interviewed facility personnel to collect key operational data. When those interviews confirmed that a facility operated an AD system, the team followed up with a detailed questionnaire. ABC ultimately identified 1,213 facilities operating anaerobic digesters, including 225 previously newly discovered facilities, and 190 that had shut down or for which the data was faulty (i.e., a digester was never built). We received 380 completed, detailed questionnaires after the initial interviews.



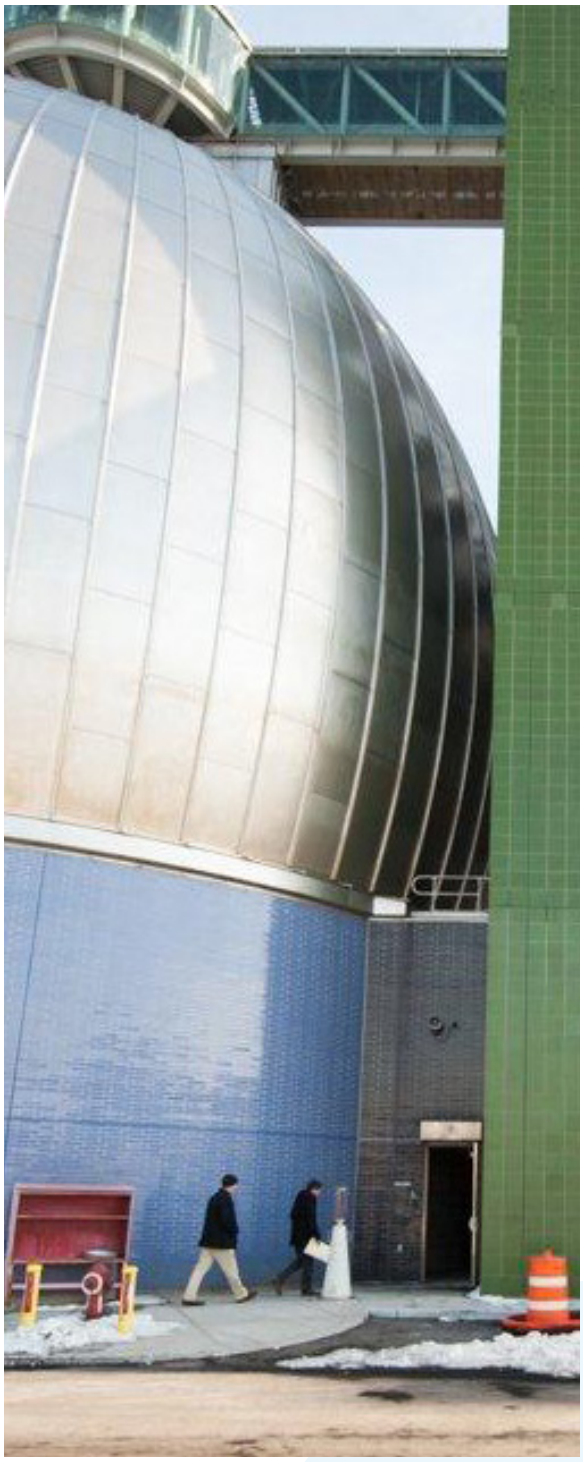
1 U.S. Environmental Protection Agency, Clean Watersheds Needs Survey 2022

Overview

In delivering the first comprehensive assessment of anaerobic digestion at U.S. wastewater facilities in more than a decade, this survey confirms both how far the sector has come and how much room remains for growth. Anaerobic digesters now operate at 1,213 WRRFs nationwide, capturing more than 100 Bcf of biogas each year and help to process 63% of all wastewater that U.S. WRRFs treat. The oldest wastewater AD systems have been operating for over 100 years!

The survey shows that AD adoption tracks closely with facility size: more than three-quarters of the largest WRRFs (over 30 MGD) operate digesters, while adoption falls to about half among mid-size facilities (5–30 MGD) and below 30% among facilities under 5 MGD. The same size-driven concentration extends beyond adoption itself: RNG upgrading and off-site electricity export are concentrated among the largest biogas producers; commercial fertilizer sales from digestate occur almost exclusively at high-flow facilities; and the sharp rise in average capital investment since 2018 suggests that modern AD installations increasingly bundle digestion with RNG upgrading, CHP or codigestion infrastructure (digesting other feedstocks in combination with the wastewater sludge).

That concentration is also the sector's opportunity. Three-quarters of the roughly 5,000 WRRFs larger than 1 MGD do not yet operate a digester. Full adoption across that group could lift annual biogas capture by roughly 70%, to 172 Bcf — enough to generate 12.1 million MWh and power up to 1.9 million U.S. households each year — while expanding the country's supply of domestically produced renewable energy and fertilizer and potentially reducing municipal costs for thousands of American cities and towns.



Key Findings

- **1,213 U.S. WRRFs operate anaerobic digesters.**
- **24% of U.S. WRRFs** treating at least one million gallons per day (MGD) use anaerobic digestion (AD).
- **1960–1990 was the peak period for AD adoption** at U.S. WRRFs.
- WRRFs with AD treat an **average of 15 MGD**.
- **More than 75% of U.S. WRRFs** treating more than 30 MGD use anaerobic digestion.
- Today, U.S. WRRFs have the capacity to capture more than **100 billion cubic feet (Bcf) of biogas annually**.
- U.S. WRRFs could capture an **additional 70 Bcf of biogas annually**.
- **55% of WRRFs with AD** use captured biogas to generate electricity.
- **89% of the electricity generated** from biogas at WRRFs is used on-site.
- **Land application is the primary use of digestate** produced by AD systems at U.S. WRRFs.



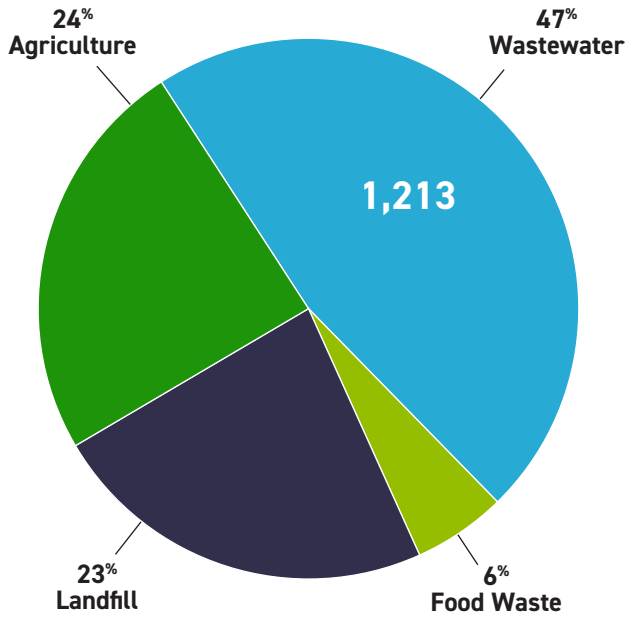
Facilities

The survey identified 1,213 water resource recovery facilities (WRRFs) across the U.S. which currently employ anaerobic digestion (AD) as part of their wastewater treatment process.

These facilities represent 24% of the approximately 5,000 U.S. wastewater treatment plants identified by the survey as treating at least one million gallons per day (1 MGD), the scale at which AD can become viable.

WRRFs now account for 47% of the 2,580 biogas systems operating nationwide. The remaining systems produce biogas from other sources, including landfills, agricultural waste and food waste.

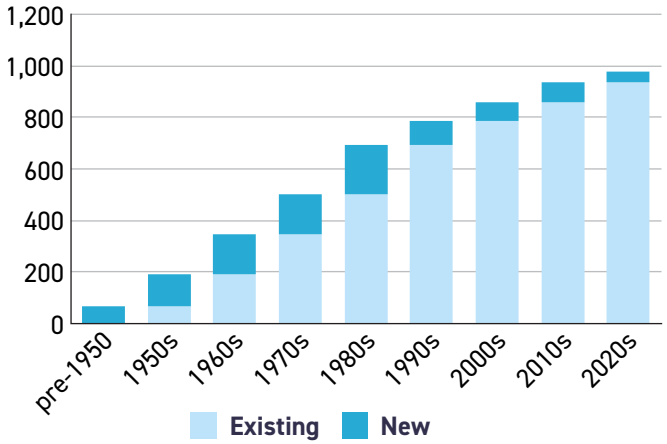
2,580 U.S. Biogas Capture Facilities by Sector (Total = 2,580)



U.S. WWRFs have used anaerobic digestion for more than a century. The earliest system reported to the survey began operating in New York in 1914.

Adoption accelerated during the 1950s and peaked between 1960 and 1990. Growth has continued in recent years, with 29 new AD systems beginning operation since the end of 2020.

Anaerobic Digestion Systems at U.S. WRRFs by Original Date of Installation[2]

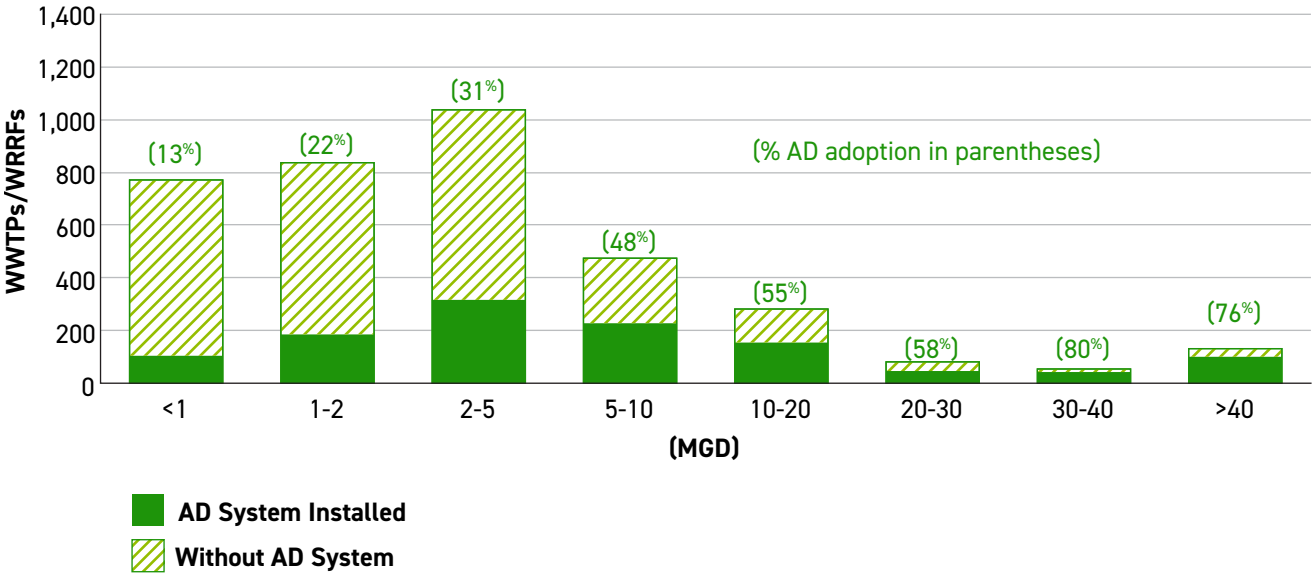


2 This refers to year the AD system was originally installed, irrespective of subsequent upgrades.

The survey found a clear relationship between facility size and the use of anaerobic digestion. More than 75% of U.S. WRRFs treating over 30 MGD use AD as part of their wastewater treatment process, making it a common practice among the nation's largest facilities.

AD adoption declines as facility size and average flow decrease. About half of WRRFs treating between 5 and 30 MGD use anaerobic digestion, while adoption falls further to below 30% among facilities treating less than 5 MGD.

Penetration of Anaerobic Digestion Systems at U.S. WRRFs



The ABC survey identified 108 facilities that have decommissioned their anaerobic digesters. Among facilities that reported both installation and decommissioning dates, digesters operated for an average of 34 years, with a median operating life of 25 years.

Decommissioning has become more common in recent years. Since 2020, 26 facilities have taken anaerobic digesters out of service, including two systems originally installed in the 1950s.

The most common reason facilities cited for decommissioning AD was a transition to aerobic digestion. Other reasons reported by respondents included the closure of the wastewater treatment plant and the adoption of technologies such as screw presses, rotary drum thickeners and hydrothermal carbonization. These technologies do not all serve the same function as anaerobic digestion: screw presses and rotary drum thickeners are used primarily to dewater or thicken biosolids, while hydrothermal carbonization is a thermal treatment process. However, respondents identified their adoption as factors in decisions to discontinue anaerobic digestion.

In many of the decommissioned cases, facilities have repurposed their former anaerobic digestion tanks as sludge holding tanks rather than removing them entirely.

Average Flow

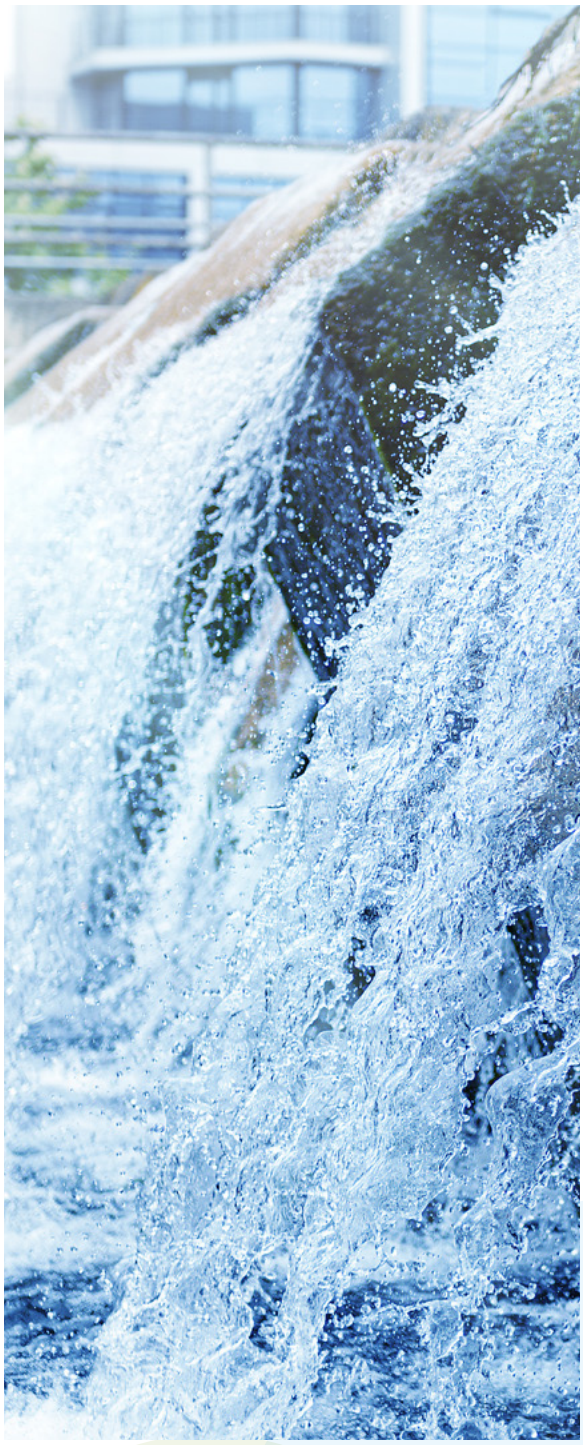
Collectively, the 1,213 WRRFs with biogas systems receive an average of 18,200 million gallons of wastewater each day, equating to 6.7 trillion gallons in a year — enough wastewater to represent well over half the U.S. population, based on typical per-capita flow assumptions of about 100 gallons per day. The average flow for each facility is 15.0 MGD.

Despite making up just 24% of all WRRFs considered viable for AD, the facilities that use AD process 63% of the 10.6 trillion gallons of wastewater that all U.S. WRRFs receive each year. This gap between facility count and flow share confirms that AD adoption concentrates at the largest treatment plants, which handle a disproportionate share of the nation's wastewater.

Although this indicates that larger WRRFs are more likely to adopt AD, the survey also identified a meaningful number of small-scale adopters, including 103 facilities (9%) below the targeted 1 MGD threshold. These sub-threshold sites, while outside the survey's original scope, suggest AD is viable below the conventional 1 MGD benchmark under the right local conditions.

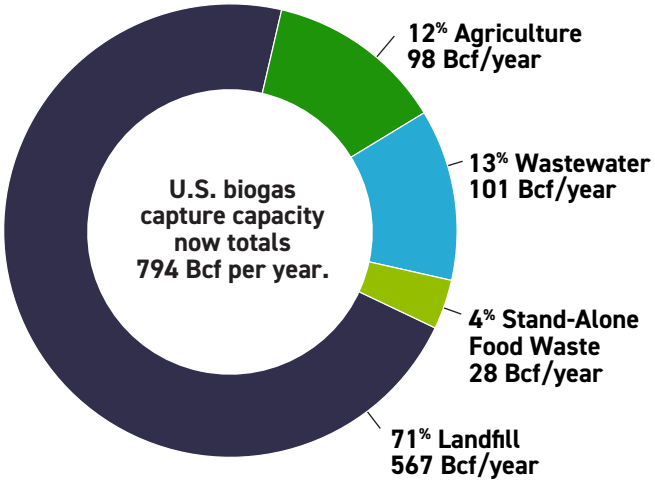
Average Daily Flow (MGD)	WRRFs with Anaerobic Digesters	% of Total
<1	103	8.8%
1 to 2	187	15.9%
2 to 5	317	27.0%
5 to 10	226	19.2%
10 to 20	154	13.1%
20 to 30	47	4.0%
30 to 40	42	3.6%
40 to 50	10	0.9%
50 to 100	52	4.4%
100 to 200	28	2.4%
> 200	10	0.9%

Base: *n* = 1,176 (of 1,209 surveyed). Just over half of all AD-equipped WRRFs (51.7%) treat under 5 MGD, although these smaller facilities account for a modest share of total treated volume.



Biogas Capture

Annual biogas capture capacity at WRRFs currently totals 100.8 Bcf and represents approximately 13% of total U.S. biogas capture capacity from all feedstocks. That share is notable given WRRFs operate 47% of all U.S. biogas capture systems by count, signifying that WRRF-based digesters tend to be smaller in scale, on average, than agricultural or landfill biogas systems.





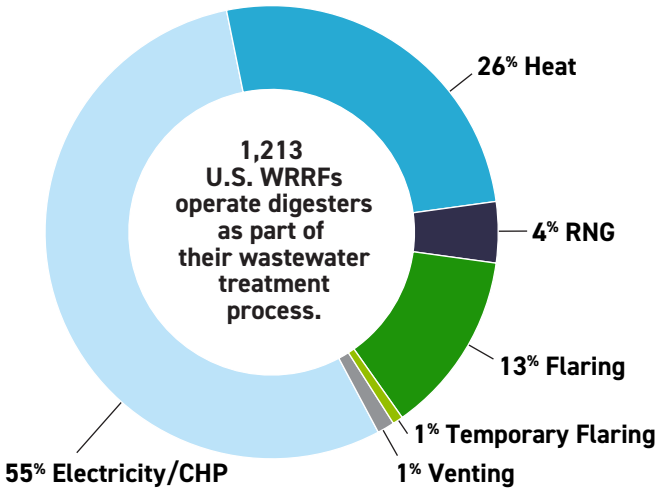
Primary Use Of Captured Biogas

Historically, WRRFs incorporated AD into the wastewater treatment process to stabilize sewage sludge and reduce the volume of biosolids requiring handling and disposal; over time, they have complemented that core function with the beneficial capture of biogas.

Today, more than 80% of biogas capture systems at WRRFs utilize their biogas output for on-site energy production. Of the systems surveyed, 55% list electricity generation or cogeneration as the primary end-use for the biogas, followed by heat production at 26%. A further 4% of systems upgrade their biogas to renewable natural gas (RNG) for end-use as vehicle fuel or for injection into natural gas pipelines. Together, electricity and heat production account for 81% of primary biogas use, underscoring that most WRRFs treat captured biogas mainly to offset their own energy costs rather than as a marketable product. RNG upgrading, though it accounts for only 4% of systems, involves substantially higher volumes per facility, as the data below show — pointing to a small number of large-scale WRRFs pursuing biogas as a distinct revenue stream.



Primary Use of Biogas Captured at U.S. WRRFs



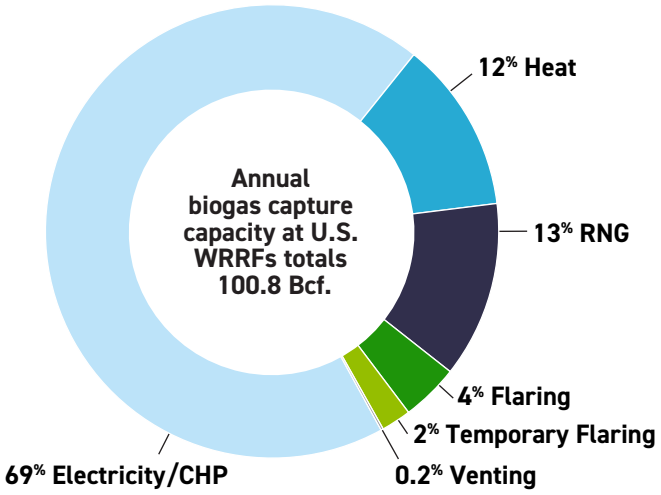
The way the captured biogas is used shows a correlation with the volume captured at each WRRF. Facilities capturing the largest volumes are more likely to upgrade biogas to RNG, while those capturing progressively smaller volumes tend to favor electricity generation, followed by thermal energy production, with only the smaller volume sites likely to flare or vent. The average capture volumes reported for each use case bear this out: RNG facilities average 504 scfm, more than double the 192 scfm averaged by electricity-generating facilities and over 25 times the 19 scfm averaged by venting sites.

Nine facilities are flaring biogas only as a temporary measure while completing upgrades — four transitioning to RNG, five to electricity generation. These nine facilities are far larger than typical flaring sites and together account for 31% of the current total volume of captured biogas attributed to flaring.

Biogas Use	Average Biogas Capture Volume per WRRF (scfm)
RNG	504.1
Temporary flaring	439.8
Electricity generation/CHP	191.9
Heat production	87.6
Permanent flaring	48.5
Venting	19.4

n = 1,209. The elevated average for temporary flaring (440 scfm) — nearly matching the RNG average — reflects the presence of the nine large facilities noted above that are mid-upgrade; once their projects are complete, this category should largely disappear as its volume shifts into the RNG and electricity generation figures.

Volume of Biogas Captured at U.S. WRRFs by Primary Use





Electricity Generation / CHP

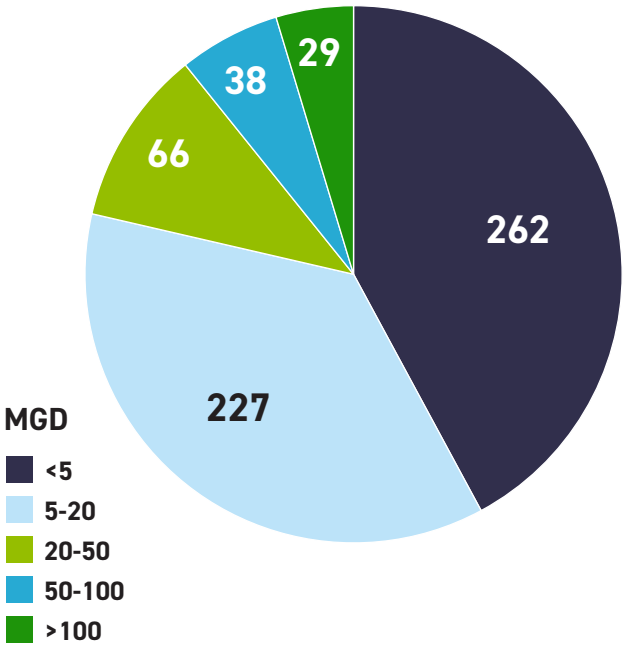
Electricity generation is the most common use of biogas captured at U.S. WRRFs. Today, 669 facilities generate electricity from biogas, primarily through combined heat and power (CHP) systems that allow facilities to produce electricity while also recovering useful thermal energy.

Most of that electricity is used where it is produced. The survey found that 89% of WRRFs generating electricity from biogas use it on-site, helping offset the significant power demands of wastewater treatment and resource recovery operations. The remaining 11% export at least some electricity off-site, supplying power to the grid or local consumers and creating an additional source of revenue.

WRRFs generating electricity from biogas treat an average of 18.3 MGD and collectively process 12,125 MGD—approximately 4.4 trillion gallons of wastewater annually. These facilities have an average biogas capture capacity of 192.1 scfm and collectively capture 67.0 Bcf of biogas each year. That represents about two-thirds of the 100.8 Bcf captured annually by all U.S. WRRFs, underscoring the central role electricity generation plays in utilizing the sector's biogas.

Facilities that export electricity tend to be larger and produce substantially more biogas. The 55 WRRFs that confirmed exporting electricity off-site have an average biogas capture capacity of 421.2 scfm, more than twice the 192.1 scfm average among all facilities generating electricity. Several of these exporting facilities, located in California, Texas and Indiana, have biogas capture capacities exceeding 1,000 scfm.

Average Flow at Facilities Using Captured Biogas for Electricity Generation



Base: *n* = 622 (of 669 respondents)

Using captured biogas for electricity generation is common irrespective of facility flow rate capacity. Exporting electricity off-site is confined to WRRFs with daily average flow rates above 20 MGD.

Heat

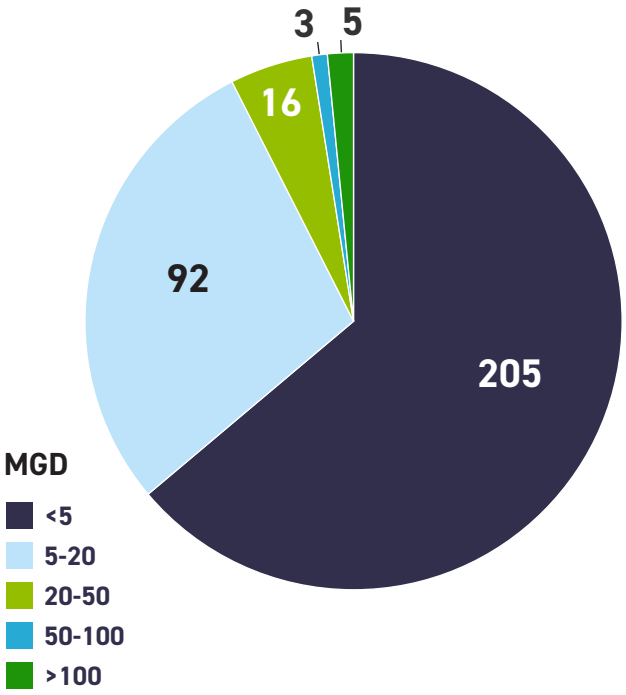
Thermal energy plays an important role in wastewater treatment, including drying and pasteurizing biosolids, supporting thermophilic treatment processes and maintaining anaerobic digesters at optimal operating temperatures.

Many WRRFs recover both heat and electricity from biogas through combined heat and power (CHP) systems. The survey also identified 321 facilities that use captured biogas exclusively to produce heat on-site, without generating electricity.

These heat-only facilities tend to be considerably smaller than those generating electricity. They treat an average of 8.9 MGD—less than half the 18.3 MGD average for electricity-generating facilities—and collectively process 2,812 MGD, or just over one trillion gallons of wastewater annually. Their average biogas capture capacity is 88 scfm, and together they capture 14.6 Bcf of biogas each year for on-site thermal use.

The difference in facility size and biogas production reflects a broader pattern in how WRRFs use captured biogas. Smaller-volume producers are more likely to use biogas directly for heat, while facilities with greater biogas production are more likely to invest in electricity generation or, at still larger volumes, upgrade biogas to renewable natural gas (RNG).

Average Flow at Facilities Using Captured Biogas Exclusively for Producing Heat



Base: *n* = 321 (of 321 respondents)

Almost two thirds of facilities surveyed that use their captured biogas exclusively to produce heat have a flow rate of below 5 MGD.



RNG

Upgrading biogas to renewable natural gas (RNG) remains relatively uncommon at U.S. WRRFs. The survey identified 46 facilities currently producing RNG, representing just 4% of WRRFs with anaerobic digestion. By comparison, RNG upgrading is more prevalent in other biogas sectors, including 66% of agricultural systems, 29% of landfill systems and 27% of food waste systems.

RNG production at WRRFs is growing, however. Nine new RNG systems have begun operating since the end of 2020, increasing the number of RNG-producing WRRFs from approximately 37 to 46—a 24% increase in less than six years. Four additional facilities reported that they are currently transitioning to RNG production.

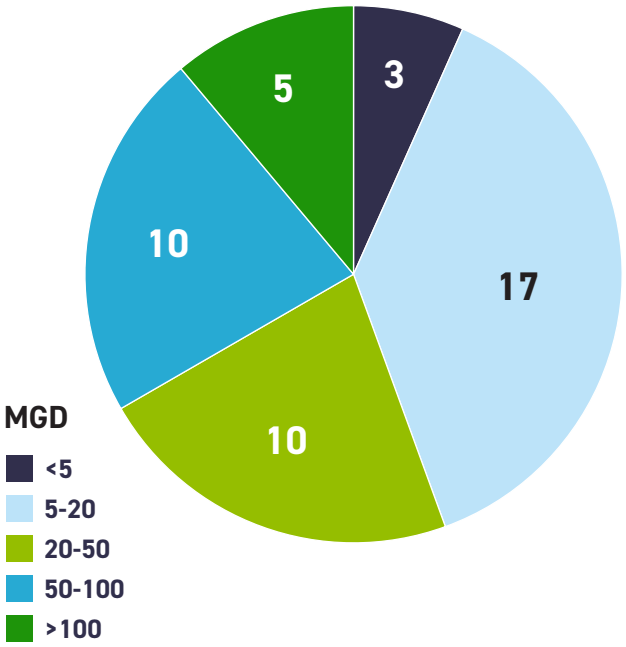
WRRFs producing RNG are among the largest biogas producers in the wastewater sector. Six facilities—two each in California and Texas and one each in Kansas and Arizona—report biogas capture rates between 1,000 and 3,250 scfm.

Together, RNG-producing WRRFs capture 23,191 scfm of biogas, equivalent to approximately 12.2 Bcf annually. Their average capture rate of 504 scfm per facility is the highest of any biogas end-use category identified by the survey.

RNG-producing facilities are also the largest by wastewater flow. They treat an average of 41.0 MGD, more than twice the 18.3 MGD average for electricity-generating facilities and more than four times the 8.9 MGD average for heat-only facilities. Collectively, they process 2,117 MGD, equivalent to approximately 773 billion gallons of wastewater annually.

These findings demonstrate a clear relationship between facility scale and biogas end use. While direct use for heat is more common among smaller facilities and electricity generation becomes more prevalent at higher volumes, RNG production is currently concentrated among the wastewater sector's largest biogas producers.

Average Flow at Facilities Upgrading Captured Biogas to RNG



Base: *n* = 45 (of 46 respondents)

While 56% of facilities with an average flow over 20 MGD upgrade their biogas to RNG, a significant number of smaller facilities reported the production of CNG for local vehicle use.

Flaring

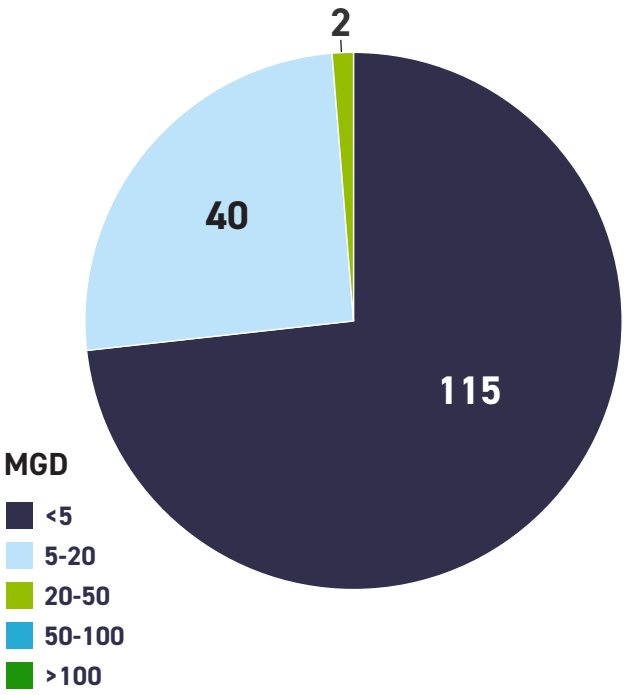
The survey identified 159 WRRFs, or 13% of facilities with anaerobic digestion, that primarily manage captured biogas through flaring to prevent methane emissions rather than recovering the biogas for beneficial use. Most of these facilities began operating their AD systems before 1980.

Not all of this flaring represents a long-term approach to biogas management. Nine facilities are temporarily flaring while completing upgrades to new energy recovery systems—four are transitioning to RNG production and five to combined heat and power (CHP). Although these nine facilities represent just 6% of the sites currently relying primarily on flaring, their larger size means they account for 31% of the total volume of biogas being flared.

Excluding these facilities in transition, the remaining 150 sites represent the sector's more typical, long-term flaring profile: generally smaller, older facilities that have not yet invested in, or had the funding to maintain, the equipment needed to put their captured biogas to beneficial use. These facilities represent an opportunity to expand energy recovery while continuing to prevent methane emissions.



Average Flow at Facilities Flaring All Captured Biogas*



Base: *n* = 157 (of 159 respondents)

* Excluding nine facilities which are temporarily flaring while upgrading works are in progress.

Facilities flaring all their biogas predominantly fall within the 0-5 MGD range.

Venting

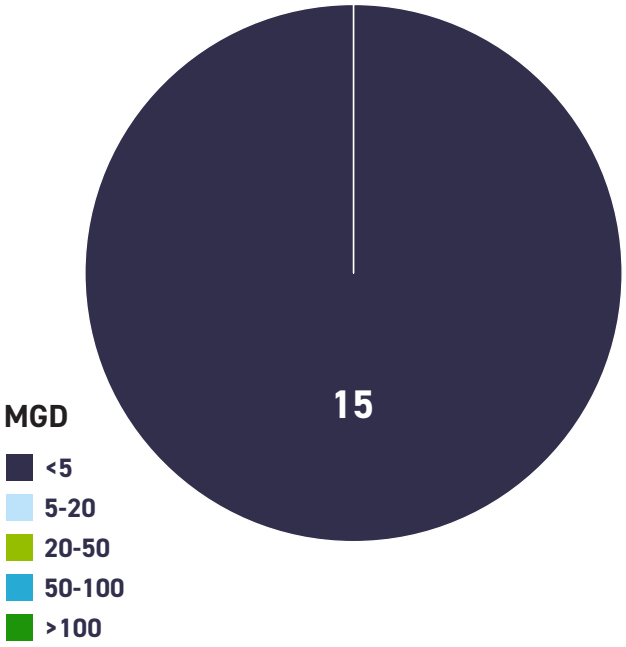
Venting is uncommon among U.S. WRRFs with anaerobic digestion. The survey identified just 15 facilities that currently vent biogas. One reported that venting was temporary, resulting from an equipment failure, as the facility awaits diagnosis, municipal funding and repairs. The remaining 14 facilities reported that they considered their biogas production negligible.

Facilities that vent biogas are among the smallest identified by the survey. They treat an average of just 1.7 MGD, with flows ranging from 0.3 to 4.5 MGD, and report an average biogas production rate of 19 scfm — the lowest of any biogas management category. By comparison, facilities producing RNG average 504 scfm.

The small scale of these facilities illustrates one of the challenges of putting biogas to beneficial use. At very low production volumes, the capital investment required to capture, condition and use biogas can be difficult to justify economically, leaving facilities with fewer practical options for managing the gas.

The venting facilities also tend to operate older AD systems. The earliest began operation in 1945, while the newest dates to 1995.

Average Flow at Facilities Venting Captured Biogas



Base: *n* = 15 (of 15 respondents)

All the facilities currently venting biogas have average daily flow rates below 5 MGD.

Codigestion

Codigestion can expand the role of WRRFs beyond wastewater treatment by providing communities with infrastructure to recycle food waste, fats, oils and grease (FOG), and other organic materials that might otherwise be disposed of. By accepting these materials from outside sources, WRRFs can provide an additional community waste-management service while generating tipping-fee revenue and, in many cases, improving digester performance and biomethane yield.

Of the 308 WRRFs that responded to this part of the survey, 92 (30%) reported accepting external organic waste for codigestion. Food waste represents the largest share of the reported material, with 63% of these facilities accepting food waste that was not further characterized.

FOG was the most commonly identified specific feedstock, accepted by 18% of facilities, followed by residential and commercial food waste at 8% and industrial food waste at 7%.

Waste Type	No. of Facilities	%
Fats, Oils, Grease (F.O.G.)	17	18%
Residential/Commercial Food Waste	7	8%
Industrial Food Waste	6	7%
Beverage & Distillery Waste	2	2%
Biosolids	2	2%
Unspecified Food Waste	58	63%

Base: *n* = 92 (of 308 respondents).



Capital Investment

Of the 380 WRRFs that completed the AD-specific questionnaire, 89 provided information on the capital investment required to install their digesters and supporting infrastructure. ABC asked respondents to report their initial investment only, excluding subsequent expansions, repairs and improvements. Together, these 89 facilities reported $1.3 billion in capital investment, averaging $14.6 million per facility.

Reported investment generally increases with installation year, but the data also show a growing range in project size and cost. Facilities with installations completed before 2018 (n=72) reported an average investment of $7.5 million, with the largest project totaling $40 million. By comparison, projects completed since 2018 (n=17) averaged $44.6 million, with the largest reaching $120 million.

Recent projects still include installations costing less than $10 million, but they also include several investments exceeding $80 million—a scale not reported among earlier projects. The increase in the average therefore does not suggest that the cost of a typical digester has simply increased sixfold. Instead, the data points to the emergence of a class of much larger and more capital-intensive AD projects.

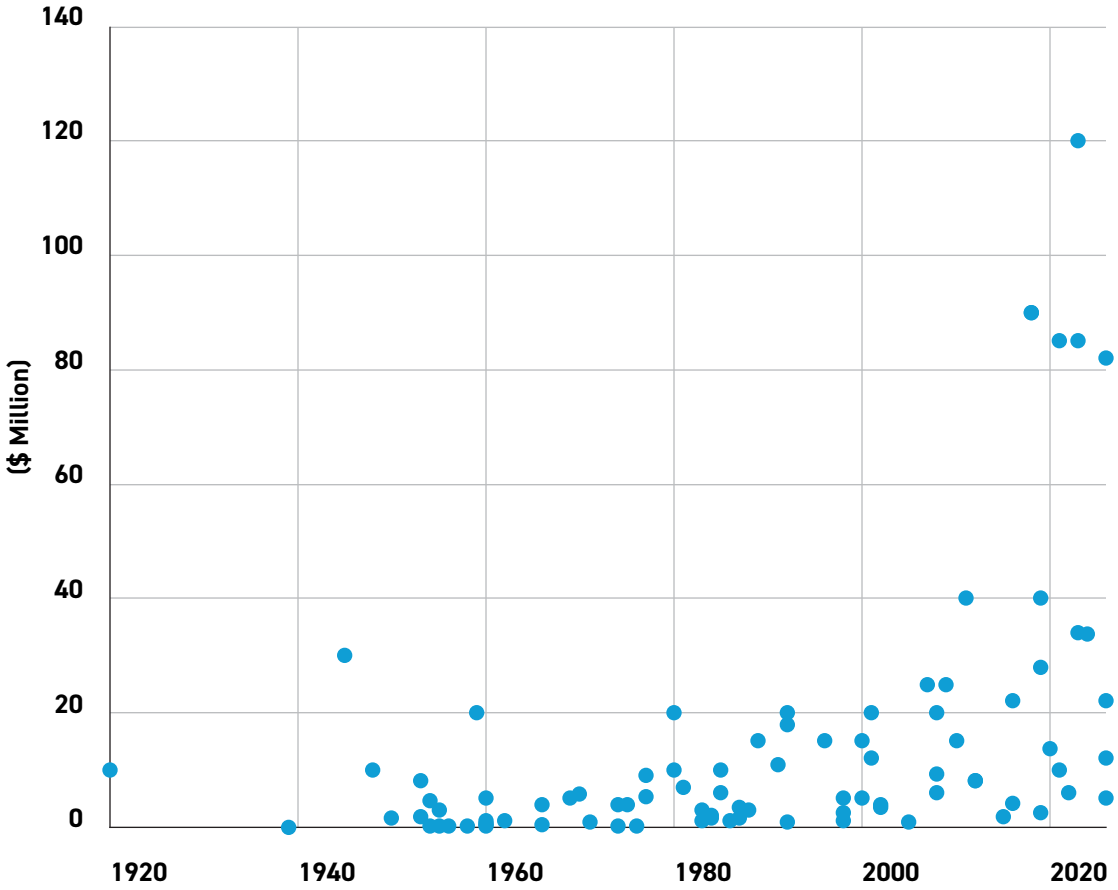
Inflation explains only part of this change. The increase in reported investment far outpaces general construction cost inflation over the same period, suggesting that project scale and scope are also important factors. Modern AD projects can incorporate biogas upgrading equipment, combined heat and power (CHP), codigestion receiving and handling systems, and other infrastructure that allows WRRFs to recover more value from biogas and recycle a wider range of organic wastes.



The figures should nevertheless be interpreted with some caution. Reported investments are in nominal dollars and span installations from 1920 through 2026, without adjustment for inflation or differences in facility scale and project scope. The survey also did not collect sufficiently detailed cost breakdowns to determine how much of the increase results from each of these factors.

Taken together, the data point to an important shift in the role of anaerobic digestion at WRRFs. Early systems were installed primarily to reduce the volume of wastewater solids requiring handling and disposal, lowering costs for municipalities. Modern AD projects increasingly build on that fundamental benefit by incorporating broader resource-recovery capabilities—recycling additional organic wastes, generating renewable electricity and heat and producing RNG. As the role of AD has expanded, so too has the range and scale of capital investment in these projects.

Capital Invested in AD Facilities at WRRFs



Employment

WRRFs appear to take a different approach to staffing anaerobic digesters than many other types of biogas facilities. Of the 110 facilities that answered the survey's staffing question, fewer than 10 reported employing staff exclusively to operate and maintain their digesters. Most instead integrate digester responsibilities into the duties of their existing plant operations and maintenance teams.

Among facilities with dedicated digester staff, all but one reported staffing levels of just 0.5 or 1.0 full-time equivalent (FTE). The exception was one of the sector's largest RNG projects, which reported six dedicated FTEs.

This staffing model reflects an important advantage WRRFs bring to anaerobic digestion. Wastewater facilities already employ operators, engineers and other technical personnel with expertise in biology, chemistry, mechanical systems, fluid dynamics, process control and other disciplines directly applicable to digester operation. Rather than building a separate workforce around the digester, WRRFs can draw on this existing pool of technical expertise and incorporate AD responsibilities into broader plant operations.

This ability to leverage an existing skilled workforce can reduce the additional staffing required to operate AD and lower one of the operating-cost barriers to adoption. More complex projects—particularly those incorporating RNG upgrading or other advanced biogas utilization systems—may require additional dedicated personnel as their operational requirements expand.



Digestate

The survey identified how 339 WRRFs manage the digestate produced by anaerobic digestion. Most put this material to beneficial use, primarily through land application that returns nutrients and organic matter to soils. Of the reporting facilities, 181 (53%) use land application exclusively, while another 69 combine it with commercial fertilizer sales, heat recovery or landfill disposal. In total, 250 facilities, or 74%, use land application for at least some of their digestate.

Digestate Management at WRRFs

Digestate Destination	No. of Facilities	% of Total
Land Application	181	53%
Commercial Sale	8	2%
Commercial Sale & Land Application	21	6%
Heat Recovery	3	1%
Heat Recovery & Land Application	13	4%
Landfill Disposal	73	22%
Land Application & Landfill Disposal	35	10%
Heat Recovery & Landfill Disposal	4	1%
Biochar	1	0%

Base: *n* = 339 (of 380 respondents)

A smaller group of facilities has taken beneficial use a step further by developing digestate into a commercially marketed fertilizer product. Eight WRRFs rely exclusively on commercial sales, while another 21 combine commercial fertilizer sales with land application. Together, 29 of the 339 reporting facilities (8.6%) sell fertilizer products made from digestate.



Facility size appears to play an important role in determining which WRRFs pursue commercial fertilizer production. Surveyed facilities that rely exclusively on commercial fertilizer sales treat an average of 79.6 MGD, while those that combine commercial sales with land application average 67.0 MGD. By comparison, facilities that rely exclusively on land application average 14.0 MGD, those that rely exclusively on landfill disposal average 14.1 MGD, and those that combine land application with landfill disposal average 17.3 MGD.

Volume of Wastewater Received at WRRFs with AD, by Digestate Management Type

Digestate Destination	Wastewater Supply (MGD)	Average Wastewater Supply per WRRF
Land Application	2,528	14.0
Commercial Sale	637	79.6
Commercial Sale & Land Application	1,407	67.0
Heat Recovery	38	12.7
Heat Recovery & Land Application	57	4.4
Landfill Disposal	1,032	14.1
Land Application & Landfill Disposal	604	17.3
Heat Recovery & Landfill Disposal	13	3.3
Biochar	na	na

Base: *n* = 339 (of 380 respondents)

These differences suggest that larger WRRFs can more readily support the additional processing, product development and marketing required to turn digestate into a commercial fertilizer product. Smaller and mid-size facilities more often use direct land application, which provides a simpler pathway for recycling nutrients and organic matter.

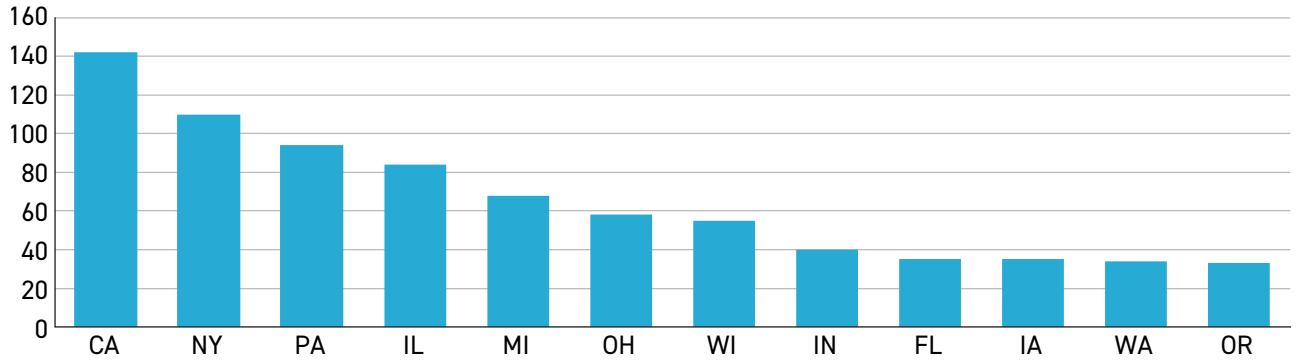
For the 112 facilities that still use landfill disposal for at least some of their digestate, the data point to an additional opportunity. As markets, infrastructure and treatment options expand, more of these facilities may be able to shift digestate from disposal toward beneficial use, reducing disposal costs while recovering greater value from the material.

Overall, the findings show that the WRRFs surveyed already recycle most digestate through land application or commercial fertilizer production. Expanding these beneficial-use pathways offers an opportunity to capture even more of the nutrient and resource value that remains after anaerobic digestion.

State Overview

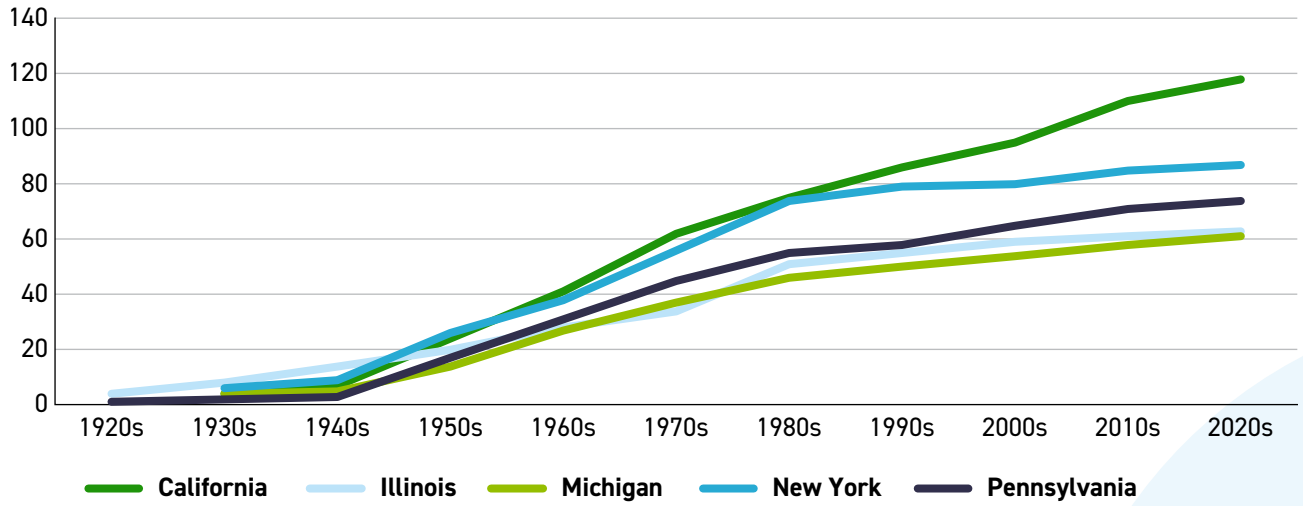
California leads the nation in the number of WRRFs operating anaerobic digestion systems, with 142 facilities identified by the survey. New York ranks second with 110 facilities, followed by Pennsylvania with 94. Illinois and Michigan round out the five states with the largest number of WRRF-based AD systems.

States Ranked by Number of AD Facilities at WRRFs



The history of AD development in these leading states reveals a different story than the current rankings alone. All five states expanded their use of wastewater AD substantially during the middle decades of the twentieth century, particularly from the 1950s through the 1980s. Since then, their growth trajectories have diverged.

Development of AD at WRRFs in Leading States*



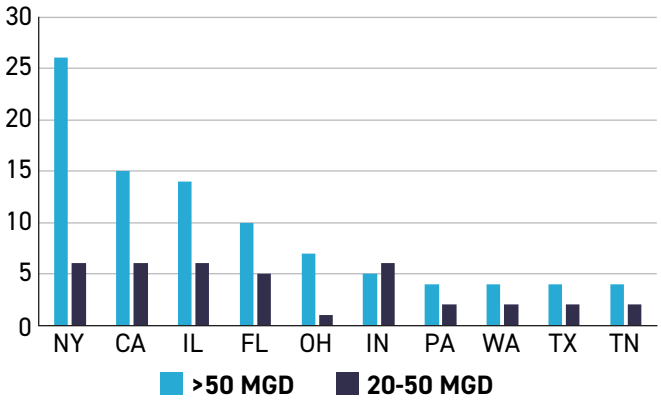
* Not all WRRFs surveyed reported the initial installation date: coverage was CA 83%, IL 75%, MI 90%. NY 79%, PA 79%.

California has continued adding WRRF-based AD systems at a comparatively strong pace, widening its lead since the 1990s. Since 2020 alone, California has brought eight new systems online, more than any other state. New York, Pennsylvania, Illinois and Michigan continue to operate some of the nation's largest networks of wastewater digesters, but they have added new facilities at a slower pace than during their earlier decades of growth.

Recent development extends beyond the states with the largest installed base. Minnesota has added four WRRF-based AD systems since 2020, while Pennsylvania, Michigan and Washington have each added three. These additions show that communities continue to invest in wastewater AD across several regions of the country.

The number of facilities alone, however, does not capture important differences in the scale of wastewater AD among states. New York has the greatest concentration of very large facilities, with 26 WRRFs treating more than 50 MGD—well ahead of California with 15 and Illinois with 14. New York, California and Illinois each also operate six facilities in the 20–50 MGD range, as does Indiana.

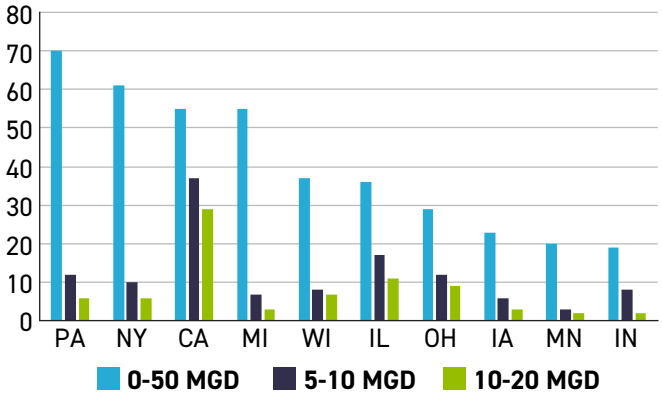
Large WRRFs: States Ranked by Most Facilities With >50 MGD Average Flow



At the other end of the spectrum, Pennsylvania leads the nation in small WRRFs using AD, with 70 facilities treating less than 5 MGD. New York follows with more than 60, while California and Michigan each operate roughly 55 facilities in this size range. Pennsylvania therefore presents a markedly different profile from New York: Pennsylvania's AD network consists predominantly of smaller facilities, while New York combines one of the nation's largest populations of small systems with the greatest number of very large ones.

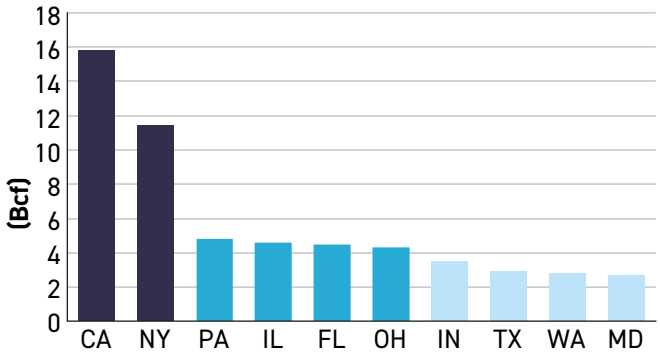
California also stands out for the breadth of its AD deployment across facility sizes. Among the states with the most WRRFs treating less than 5 MGD, California operates substantially more facilities in both the 5–10 MGD and 10–20 MGD ranges than any other state shown, demonstrating a strong presence across small, mid-size and large facilities.

Small WRRFs: States Ranked by Most Facilities With 0-5 MGD Average Flow



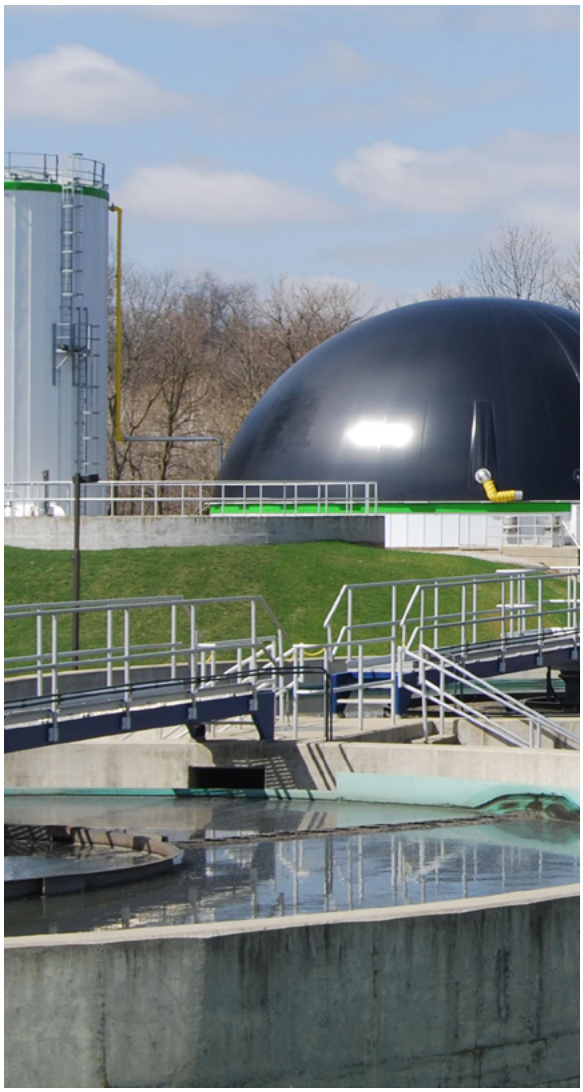
These differences in facility size help explain another important state-level distinction: the volume of biogas captured. California and New York stand well ahead of every other state in annual WRRF biogas production. California WRRFs capture 15.8 Bcf annually, while New York captures 11.8 Bcf. Pennsylvania, Illinois, Florida and Ohio form the next tier, with each capturing approximately 4–5 Bcf per year.

States Ranked by Annual Volume of Biogas Capture at WRRFs



Together, California and New York capture 27.6 Bcf of biogas annually—more than one-quarter of the 100.8 Bcf captured by WRRFs nationwide. Yet the two states account for only 205 of the country's 1,213 AD-equipped WRRFs, or about 17%. Their 27% share of national biogas capture therefore exceeds their share of facilities by a wide margin, showing that biogas production is even more concentrated in these two states than the number of AD systems alone would suggest.

Taken together, the state data show that wastewater AD has developed in distinctly different ways across the country. California combines the nation's largest installed base with continued development across a broad range of facility sizes. New York pairs a large population of small facilities with the greatest concentration of very large WRRFs, helping drive its high biogas production. Pennsylvania, meanwhile, has one of the nation's largest AD networks primarily through smaller facilities. These different profiles demonstrate that communities have successfully deployed wastewater AD across a wide range of plant sizes and operating environments.



Potential

With anaerobic digestion operating at just 24% of the approximately 5,000 U.S. WRRFs treating at least 1 MGD, the wastewater sector holds substantial untapped potential for additional resource recovery. Expanding AD would allow more communities to capture renewable energy from wastewater they already collect and treat, reduce facility energy and heating costs, and recover nutrients in digestate that can support domestic fertilizer production and improve soil health.

The opportunity is significant. The approximately 5,000 U.S. WRRFs large enough to support AD collectively process an estimated 20–30 billion gallons of wastewater every day. If all of these facilities incorporated anaerobic digestion and captured the resulting biogas, annual production could reach an estimated 171.8 Bcf—70% more than the 100.8 Bcf captured today. That total represents enough renewable energy to generate electricity for as many as 1.9 million U.S. households each year.

Reaching this potential would require adding AD at the 3,787 WRRFs treating at least 1 MGD that do not currently operate digesters, along with sustained capital investment in the infrastructure needed to capture and beneficially use the resulting biogas and digestate. Importantly, these communities do not need to create a new waste stream to realize this opportunity: their WRRFs already receive and manage the wastewater and organic material every day.

Expanding AD across these existing facilities could transform more of the nation's wastewater infrastructure into resource-recovery infrastructure—helping communities reduce waste-management and energy costs while expanding domestic renewable energy and fertilizer production, recycling nutrients and producing valuable soil amendments.



Acronyms

AD anaerobic digestion

Bcf billion cubic feet

CHP combined heat and power

EPA Environment Protection Agency

FOG fats, oils and grease

FTE full-time equivalent

kWh kilowatt hour

MGD million gallons per day

MW megawatt

MWh megawatt hour

POWT publicly owned treatment works

RNG renewable natural gas

scfm standard cubic feet per minute

US United States

WRRF water resource recovery facility

WWTP wastewater treatment plant



Appendices

Anaerobic Digestion at U.S. WRRFs – Key Data

	WWTPs/ WRRFs	WWTPs/ WRRFs with AD	% with AD	Aggregated Average Flow at Facilities with AD (MGD)	Average Flow per Facility with AD (MGD)	Aggregated Estimated Biogas Output (scfm)	Average Biogas Output per Plant (scfm)
Alabama	131	19	14.5	248.6	13.1	2,717.3	143.0
Alaska	16	1	6.3	1.0	1.0	11.0	11.0
Arizona	70	12	17.1	353.9	29.5	5,319.5	443.3
Arkansas	70	4	5.7	29.6	7.4	325.6	81.4
California	261	142	54.4	2,823.1	19.9	30,024.6	211.4
Colorado	306	20	6.5	375.8	18.8	4,146.0	207.3
Connecticut	67	12	17.9	47.0	3.9	517.0	43.1
Delaware	10	1	10.0	80.0	80.0	880.0	880.0
Florida	191	35	18.3	755.9	21.6	8,523.0	243.5
Georgia	141	20	14.2	287.5	14.4	3,172.0	158.6
Hawaii	22	8	36.4	111.6	14.0	1,147.9	143.5
Idaho	26	13	50.0	91.3	7.0	1,466.9	112.8
Illinois	232	84	36.2	1,631.8	19.4	8,896.6	105.9
Indiana	135	40	29.6	606.5	15.2	6,635.8	165.9
Iowa	102	35	34.3	265.6	7.6	3,497.1	99.9
Kansas	58	12	20.7	130.8	10.9	2,553.5	212.8
Kentucky	93	7	7.5	125.1	17.9	1,395.6	199.4
Louisiana	85	9	10.6	97.0	10.8	1,067.0	118.6
Maine	52	1	1.9	10.0	10.0	110.0	110.0
Maryland	80	15	18.8	459.1	30.6	5,059.3	337.3
Massachusetts	80	5	6.3	432.1	86.4	4,832.8	966.6
Michigan	159	69	43.4	264.4	3.8	2,860.8	41.5
Minnesota	72	28	38.9	145.7	5.2	1,710.6	61.1
Mississippi	73	3	4.1	10.8	3.6	118.8	39.6
Missouri	122	8	6.6	326.3	40.8	3,533.8	441.7
Montana	30	5	16.7	44.4	8.9	427.6	85.5
Nebraska	36	11	30.6	171.7	15.6	1,889.0	171.7
Nevada	19	5	26.3	79.6	15.9	1,127.9	225.6
New Hampshire	30	3	10.0	18.7	6.2	205.7	68.6
New Jersey	115	29	25.2	387.0	13.3	4,191.3	144.5
New Mexico	20	6	30.0	131.3	21.9	1,454.3	242.4
New York	243	109	44.9	2,216.4	20.3	21,701.4	199.1
North Carolina	173	24	13.9	242.9	10.1	2,701.4	112.6

	WWTPs/ WRRFs	WWTPs/ WRRFs with AD	% with AD	Aggregated Average Flow at Facilities with AD (MGD)	Average Flow per Facility with AD (MGD)	Aggregated Estimated Biogas Output (scfm)	Average Biogas Output per Plant (scfm)
North Dakota	20	4	20.0	38.4	9.6	422.4	105.6
Ohio	206	58	28.2	733.1	12.6	8,222.9	141.8
Oklahoma	63	12	19.0	151.8	12.6	1,619.3	134.9
Oregon	64	33	51.6	346.3	10.5	3,954.6	119.8
Pennsylvania	301	94	31.2	828.7	8.8	9,146.9	97.3
Rhode Island	15	1	6.7	21.0	21.0	231.0	231.0
South Carolina	106	12	11.3	99.4	8.3	1,392.9	116.1
South Dakota	31	8	25.8	48.7	6.1	535.9	67.0
Tennessee	108	12	11.1	406.2	33.8	4,467.8	372.3
Texas	426	30	7.0	557.7	18.6	5,635.2	187.8
Utah	40	12	30.0	111.3	9.3	1,166.2	97.2
Vermont	25	11	44.0	24.8	2.3	359.9	32.7
Virginia	105	25	23.8	446.6	17.9	4,895.6	195.8
Washington	78	34	43.6	494.1	14.5	5,399.1	158.8
West Virginia	53	10	18.9	59.4	5.9	609.9	61.0
Wisconsin	93	57	61.3	419.8	7.4	4,975.1	87.3
Wyoming	26	4	15.4	20.0	5.0	220.4	55.1
United States	**5,081**	**1,213**	**23.9**	**18,199.6**	**15.0**	**191,766.1**	**158.1**

Operational data for states with only one facility has been removed in accordance with confidentiality guarantees.

AD Facilities at U.S. WRRFs by Primary Use of Biogas Captured

	Electricity/CHP	Heat Only	RNG	Venting	Flaring All
Alabama	12	5	0	0	2
Arizona	3	2	5	0	3
Arkansas	3	1	0	0	0
California	99	24	8	0	14
Colorado	6	5	5	0	4
Connecticut	4	7	0	0	2
Florida	26	3	0	0	6
Georgia	9	5	0	2	4
Hawaii	6	0	1	0	1
Idaho	6	7	0	0	1
Illinois	58	14	0	0	12
Indiana	21	13	0	3	3
Iowa	8	19	2	1	6
Kansas	1	5	3	0	3
Kentucky	3	1	0	1	2
Louisiana	5	3	0	0	1
Maryland	7	3	1	0	3
Massachusetts	3	2	0	0	0
Michigan	36	15	1	2	15
Minnesota	17	8	2	0	2
Mississippi	1	0	0	1	1
Missouri	1	5	1	0	1
Montana	0	4	0	0	1
Nebraska	1	3	3	0	3
Nevada	4	1	0	0	0
New Hampshire	3	0	0	0	0
New Jersey	16	8	0	0	5
New Mexico	4	0	0	0	2
New York	70	27	1	1	10
North Carolina	15	5	1	0	2
North Dakota	2	1	0	0	1
Ohio	31	16	3	0	9
Oklahoma	7	3	0	0	2
Oregon	19	11	2	0	2
Pennsylvania	47	30	0	2	13
South Carolina	6	4	1	1	0
South Dakota	1	5	0	1	0
Tennessee	9	2	1	0	0
Texas	16	3	2	0	10

	Electricity/CHP	Heat Only	RNG	Venting	Flaring All
Utah	3	0	0	0	9
Vermont	3	5	0	0	3
Virginia	13	10	1	0	1
Washington	19	11	2	0	3
West Virginia	4	5	0	0	1
Wisconsin	35	19	0	0	1
Wyoming	2	1	0	0	1
United States	**665**	**321**	**46**	**15**	**166**

Operational data for states with only one facility has been removed in accordance with confidentiality guarantees.

AD Facilities at U.S. WRRFs by Digestate Management Type

	Bedding	Heat Recovery Only	Heat Recovery in Combination with Other	Land Application Only	Land Application in Combination with Other	Landfill Disposal Only	Landfill Disposal in Combination with Other	Commercial Sale Only	Commercial Sale in Combination with Other
Alabama	0	0	0	2	2	1	1	0	0
Arizona	0	0	0	4	4	1	1	0	0
Arkansas	0	0	0	0	0	0	0	0	0
California	0	0	1	32	49	5	5	4	9
Colorado	1	0	0	5	5	1	1	0	0
Connecticut	1	1	1	1	3	1	1	0	1
Florida	0	0	1	2	3	1	1	0	0
Georgia	0	0	0	2	2	2	2	0	0
Hawaii	0	0	0	0	1	0	0	0	0
Idaho	0	0	0	3	6	1	1	0	1
Illinois	0	1	2	14	18	2	2	0	1
Indiana	0	0	0	4	6	1	1	1	1
Iowa	0	1	2	20	20	1	1	0	0
Kansas	0	0	0	2	2	0	0	0	0
Kentucky	0	0	0	0	1	0	0	1	2
Louisiana	0	0	0	2	2	1	1	0	0
Maryland	0	0	0	4	5	1	1	1	1
Massachusetts	0	0	0	7	7	3	3	1	1
Michigan	0	0	1	23	26	2	2	0	1
Minnesota	0	0	0	5	6	0	0	1	2
Mississippi	0	0	0	1	1	0	0	0	0
Missouri	0	0	1	2	3	0	0	0	1
Montana	0	0	0	1	1	2	2	0	0
Nebraska	0	0	0	5	5	0	0	0	0
Nevada	0	0	0	0	0	1	1	0	0
New Hampshire	0	0	0	1	1	0	0	0	0
New Jersey	0	0	0	1	5	6	6	1	4
New Mexico	0	0	0	0	1	0	0	0	1
New York	2	0	1	7	17	11	12	0	4
North Carolina	0	0	1	4	8	1	3	1	3
North Dakota	0	0	0	1	2	0	0	0	0
Ohio	0	0	4	9	10	5	5	1	1
Oklahoma	0	0	0	3	3	0	0	0	0
Oregon	0	0	1	11	13	0	0	0	1
Pennsylvania	2	0	0	7	15	6	6	1	2

	Bedding	Heat Recovery Only	Heat Recovery in Combination with Other	Land Application Only	Land Application in Combination with Other	Landfill Disposal Only	Landfill Disposal in Combination with Other	Commercial Sale Only	Commercial Sale in Combination with Other
South Carolina	0	0	0	1	1	0	0	0	0
South Dakota	0	0	0	2	2	1	1	0	0
Tennessee	0	0	0	2	2	0	0	0	0
Texas	0	0	0	2	4	6	6	0	1
Utah	0	0	0	1	1	2	2	0	0
Vermont	0	0	1	4	6	3	3	0	1
Virginia	0	0	1	16	19	1	1	0	1
Washington	0	0	0	10	15	0	0	1	3
West Virginia	0	0	0	1	1	0	0	0	0
Wisconsin	4	0	2	29	38	0	0	0	2
Wyoming	0	0	0	0	0	0	0	1	1

Base: *n* = 339 (of 380 respondents)

Operational data for states with only one facility has been removed in accordance with confidentiality guarantees.

Management of Digestate from U.S. WRRFs by Facility Flow Rate (MGD)

	Facility Mean Average Flow Rate	Facility Median Average Flow Rate	Facility Average Flow Rate Range
Heat Recovery	12.7	2.4	1 to 22
Land Application	14.0	5.5	1 to 354
Landfill Disposal	14.1	3.9	1 to 260
Commercial Sale	79.6	18.9	2 to 700

Base: *n* = 339 (of 380 respondents)

Special thanks to the ABC Research Team:

Makenzie Cotton

Kassandra Gabriel

Britton Loflin

Ryan Gonzalez

Dalia Arroyo

Sam Knight

Alondra Alonso

Jamee Hutchinson

For further information on this report, please contact:

Ian Taylor, Data & Analysis Manager, ABC
ian@americanbiogascouncil.org

The American Biogas Council is the voice of the U.S. biogas industry, representing all companies working to recycle organic waste into clean, locally made energy and fertilizer. Its mission is to maximize the economic and environmental benefits of biogas while advancing sustainable solutions for energy, agriculture, and waste management.

The American Biogas Council is a 501(c)(6) non-profit trade association based in Washington, DC.

For further information, please contact:
info@americanbiogascouncil.org

American Biogas Council, 1126 Street SE,
Washington, DC 20003, United States.

www.americanbiogascouncil.org

Copyright ©2026 American Biogas Council

While the best standards were used to ensure the reliability of the information contained in this report, ABC assumes no responsibility or liability for any errors or omissions. The information contained in this report is provided on an "as is" basis, ABC makes no representations or warranties of any kind, express or implied, with no guarantees of completeness, accuracy, usefulness, or timeliness with respect to the content contained within. ABC shall not be liable for any loss, damage, or injury arising from the use of this information. It is the responsibility of the reader/user to verify the accuracy and applicability of any information provided in this report/statement before acting upon it.