NATIONAL BIOSOLIDS DATA PROJECT

biosolidsdata.org

PENNSYLVANIA

BIOSOLIDS MANAGEMENT 2018 - STATE SUMMARY

This summary, a dashboard of state statistics, & further data are at www.biosolidsdata.org

In Pennsylvania...

- *Approximately half of Pennsylvania's biosolids are beneficially used, mostly applied as soil amendment on agricultural lands or used in mine land reclamation (of which PA was a pioneer). The other half is disposed in landfills (~30% of state biosolids total) or incinerated. Sewage sludge incinerators (SSIs) were operating at six facilities in 2018; a brand new SSI came online in the early 2020s (a rarity in North America).*
- *Pennsylvania receives thousands of tons of wastewater solids from other states for disposal and beneficial use – the Commonwealth is actually a net importer of biosolids. As such, regulations on nutrient management in PA – largely due to concerns about water quality in the Chesapeake Bay and Lake Erie – have a large influence on biosolids in the whole region.*
- *The PA Department of Environmental Protection (PA DEP) Bureau of Clean Water administers Pennsylvania's wastewater management program, which includes three types of General Permits plus Individual Permits, and many requirements beyond the federal biosolids rule.*
- *Septage can be and is land applied, though most is hauled to water resource recovery facilities (WRRFs) for treatment.*

Biosolids Management in Pennsylvania

Pennsylvania is a large "keystone" state, straddling coastal watersheds (Delaware and Susquehanna) and the northeastern reaches of the Mississippi basin. It encompasses regions with iconic histories in manufacturing (e.g., shipbuilding and woolens), agriculture (dairy) and mining (coal, oil and natural gas). The southeastern corner is dominated by metropolitan Philadelphia (~5.7 million, with the city alone at ~1.5 million, the largest city in PA), and with other eastern cities of Allentown (~121,000, the third largest in PA), Reading (~88,000), and Bethlehem and Scranton (~76,000 each). The western boundary has the commonwealth's second and fourth largest cities, Pittsburgh (~300,000, with ~2.4 million total with suburbs) and Erie (~93,000). In the vast middle is rural agriculture and forests, punctuated by cities of Lancaster (~59,000), the capitol Harrisburg (~49,000), and State College (~41,000).

Pennsylvania is a net importer of biosolids, a reflection of twin features of extensive field crop agriculture and numerous privately-owned solid waste landfills. A majority of wastewater solids generated in Pennsylvania is landfilled, and a large majority of water resource recovery facilities (WRRFs) – including the many hundreds of smaller ones – have long relied on landfill disposal. As a large and important destination for biosolids from elsewhere in the mid-Atlantic region, Pennsylvania serves communities in Maryland, Delaware, New Jersey, and New York, with both landfill disposal and land application. Flows of biosolids across state lines can be hard to track; it's safe to say that, every year, thousands more tons of biosolids are land applied and landfilled in Pennsylvania than what are included in the NBDP 2018 data shown here. NBDP has attempted to report only

those wastewater solids and biosolids that were generated in PA; those generated in other states and used or disposed in PA are counted in those other states' reports.

Beneficial use of biosolids in PA is most often by land application of bulk Class B or bulk Class A biosolids as fertilizers and soil amendments on agricultural lands. A dozen or so PA WRRFs produce Class A EQ biosolids that are land applied in bulk and, to a lesser extent, marketed and distributed in horticulture, turf management, and landscaping. Pennsylvania was an early and extensive user of biosolids for mine reclamation, with Philadelphia as the main source of bulk Class B and Class A (in the past, compost; now heat-dried pellets). Bituminous coal mines in northcentral PA were the main destinations for the decades 1975 to 2005, and the Anthracite region in eastern Pennsylvania in recent years. Biosolids used at mines in Pennsylvania are typically deployed to satisfy land restoration requirements in active mining permits. Several hundred thousand acres of historically mined lands remain untreated, and may one day be candidates for reclamation use of biosolids and afforestation for climate change mitigation.

Incineration is the third most common biosolids management practice in PA. The Commonwealth had six facilities for sewage sludge incineration in 2018 (and as of 2022). On the west side of the state are the incinerators at Allegheny County Sanitation Authority (ALCOSAN), with two fluidized-bed incinerators serving the greater Pittsburgh area, and the Erie WWTP with two multiple-hearth incinerators. On the east side, the recently upgraded multiple hearth incinerators at the DELCORA facility in Chester, PA, serve a large number of small plants that send liquid sludges for incineration. Other SSIs, also typically serving multiple utilities, are at Hatfield Township Municipal Authority, Wyoming Valley Sanitary Authority (Wilkes-Barre area), and the Upper Moreland-Hatboro Joint Sewer Authority.

Many (~40% or more) Pennsylvania municipalities and utilities contract with companies for transportation (e.g. Koberlein in NE PA), land application of biosolids, and operation of WRRFs. Synagro is one of the largest contractors, operating the biosolids drying facility in Philadelphia and biosolids management operations around the state, mostly land application. Denali Water Solutions is another other major land application contractor. Burch-Hydro provides land application services for a portion of ALCOSAN (Pittsburgh) biosolids. Another service provider is Amerigreen Inc. Two separate preparer merchant facilities – A&M Composting (Manheim, PA) and Natural Soil Products (Good Spring, PA) – accept both in-state and out-of-state solids for composting. WOF NE Blackwood (Tremont, PA) accepts solids for lime stabilization. American Green (Pottsville, PA) is a subsidiary of the Reading Anthracite company and accepts biosolids for application on its lands. Several nationally-recognized biosolids management consulting companies are based in and focused in PA, including Material Matters and Garvey Resources.

To further emphasize the important role that private PA-based separate preparer merchant facilities and PA landfills play in biosolids management in the region, here are examples of in- and out-of-state tonnages handled by one of each kind of facility in 2018:

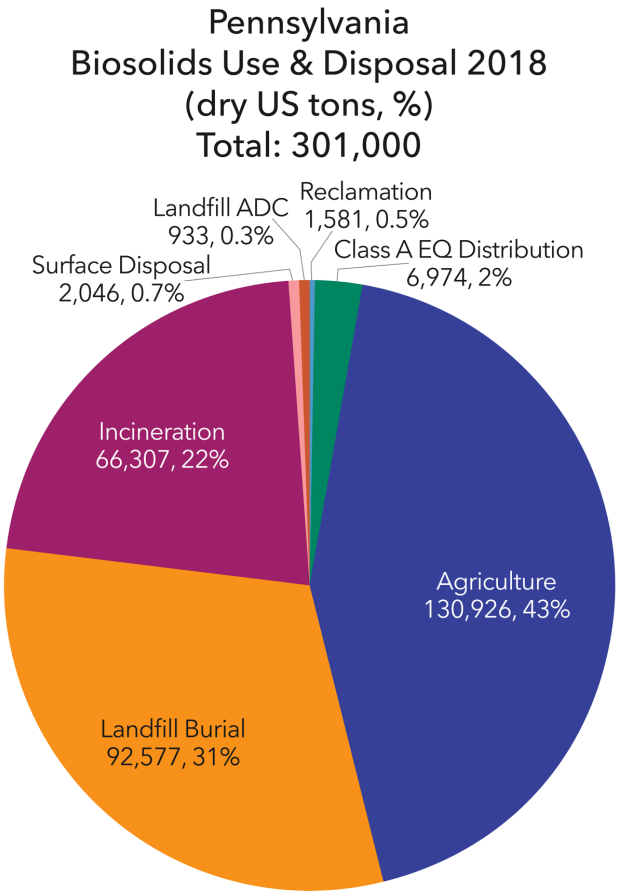
Northeast PA compost operation, 2018 wet tons wastewater solids received:

From PA:	9,583
From out-of-state:	67,121
Total:	76,704

Eastern PA landfill, 2018 wet tons wastewater solids received:

From PA:	15,029
From out-of-state:	9,384
Total:	24,413

Septage can be and is land applied in PA, but most is hauled to WRRFs by the ~780 septage haulers licensed by the PA Department of Environmental Protection (PA DEP). Each year, PA's onsite septic systems generate about 605 million gallons of septage. More information on septage management can be obtained from the Pennsylvania Septage Management Association (https://www.psma.net/).



Agency Oversight, Regulations, and Permitting

The PA Department of Environmental Protection (PA DEP) Bureau of Clean Water administers Pennsylvania's wastewater management program, which includes NPDES and biosolids permitting and compliance. DEP issues three different statewide General Permits for biosolids and septage land application; coverage under these permits requires first a Notice of Intent, which must be approved by PA DEP.

1. Beneficial Use of Exceptional Quality (EQ) Biosolids – this is for WRRFs or, more often, separate preparers, that generate EQ biosolids that are then land applied or marketed and distributed. EQ biosolids have few restrictions on how or where they are used.
2. Beneficial Use of Biosolids by Land Application – often WRRFs that treat biosolids to Class B standards and land apply on agricultural, forest, or mine lands. There are management and site restrictions for Class B biosolids outlined below.
3. Beneficial Use of Residential Septage by Land Application – this is for septage haulers that screen and lime-stabilize septage and directly land apply it. Restrictions on use are similar to land application of Class B biosolids, outlined below.

In addition to these General Permits, there are Individual Permits for Biosolids Generators (WRRFs and separate preparers) and for Land Sites where biosolids application is not covered by a General Permit; for example, biosolids land application in exceptional value watersheds requires an Individual Permit.

PA DEP has the following management and site requirements beyond the federal biosolids rules, 40 CFR Part 503, for land application of non-EQ biosolids:

- Biosolids land appliers (contractors or WRRF staff) must be certified by PA DEP;
- 30 days before first site use, notice must be given to adjacent landowners, county conservation districts, and PA DEP;
- PA DEP must review and approve sites (after 30-day notice);
- Pennsylvania Natural Diversity Index (PNDI) must be completed before land application to ensure that endangered or threatened species will not be affected;
- Specific setback distances from residences, water supplies, groundwater tables, streams, sinkholes, exceptional value wetlands must be met;
- Slope cannot exceed 25% for agriculture or 35% for mine reclamation;
- Site area must have implemented a farm conservation or erosion and sedimentation control plan;
- Nutrient needs of site must be assessed prior to land application; if a farm produces enough manure to meet its nutrient needs, biosolids cannot be applied there;
- PA has had a P Site Index, with biosolids included, for many years, developed by Penn State; in 2021, there is work on updating the P Site Index. Biosolids are granted source coefficient factors that recognize that P in most biosolids is of lower availability and concern.
- Signs must be posted around perimeter of proposed site;
- 7 days prior to first application, landowner/occupant must receive instructions on restrictions for biosolids use.

When land application is in process, additional requirements include:

- Ensuring farm conservation or erosion and sedimentation plan is continuing to be implemented;
- Soil pH is kept around 6.0;
- Setback distances are maintained; access, harvest, and grazing restrictions are met.
- Agronomic loading rate is not exceeded – this is based on nitrogen (N) needs of the crop associated with the land application site. A P Site Index is also used to monitor phosphorus levels. (See more below on nutrient management.)
- If applicable, the DEP's Biosolids Quality Enhancement program requirements are being met to reduce odors and other nuisances (only applies to some biosolids generators).

Pressures on Biosolids Management and Land Application

Pennsylvania is a regional destination for biosolids for land application and landfill disposal. Rivers in eastern PA, most notably the Susquehanna, feed into Chesapeake Bay, where nutrient levels have been a cause for concern and a focus of regulators and environmental groups. In the northwest of the state, waters flow into Lake Erie. As part of regional efforts to control nutrient (especially P) runoff, as of 2022, PA DEP is considering new restrictions on phosphorus in biosolids that are land applied. These new restrictions, when implemented, will influence biosolids management beyond state lines, as neighboring states start treating solids to meet PA's requirements or seeking alternate destinations for biosolids.

Major WRRFs and Notable Projects

Philadelphia is home to three of the largest WRRFs in Pennsylvania – the Northeast, Southwest, and Southeast Water Pollution Control Plants (WPCPs). Solids from these plants are anaerobically digested and delivered to the Philadelphia Renewable Bio-fuels Facility (PRBF), a thermal drying and pelletizing facility operated by Synagro under a 20-year contract that began when the facility came online in 2012. EQ pelletized biosolids are sold as Synagro's Granulite Fertilizer and as renewable fuel pellets. Prior to 2012, Philadelphia's biosolids were either composted, land applied as Class B biosolids, or landfilled. The PRBF is partly powered by biogas produced by anaerobic digesters at the nearby Southwest WPCP. The Northeast WPCP also captures methane from anaerobic digesters and feeds it to a cogeneration facility, which heats the plant and provides up to 85% of its electricity needs.

In Pittsburgh, the Allegheny County Sanitary Authority (ALCOSAN) serves over 80 municipalities, treating 250 MGD of wastewater at its wastewater treatment plant (WWTP) on Pittsburgh's North Side. ALCOSAN employs a variety of biosolids management practices. Wastewater solids are thickened with polymer and dewatered in centrifuges. From there, some of the solids are incinerated in ALCOSAN's two fluidized-bed incinerators – almost ⅔ of the total solids in 2018. The rest of the solids get treated with lime and are either landfilled or land applied as ALCOSOIL, a Class B biosolids. (ALCOSAN's website, as of early 2022, reports 32% of solids is incinerated, and 68% is land applied.) In 2018, ALCOSAN ran a biosolids composting trial with Akron WWTP/KB Bioenergy in Akron, OH, sending about 9 dmt of biosolids to Akron to be composted. ALCOSAN is planning to expand its WWTP's treatment capacity to 480 MGD by the end of 2027, to better manage high flows in wet weather.

The Delaware County Regional Water Quality Control Authority (DELCORA) owns and operates the Western Regional Treatment Plant (WRTP) in Chester, as well as collections systems serving half a million people in the greater Philadelphia area. DELCORA operates two multiple hearth SSIs, which were upgraded to run on natural gas and to meet new federal air quality standards in 2016. In 2018, the facility treated, dewatered, and incinerated 20,000+ dry metric tons of its own biosolids and liquid municipal sludges and high-strength organic wastes from throughout the Philadelphia metropolitan region. As it was transitioning back to full incinerator operation in 2018, a portion of its solids (~1300 dmt) went to a merchant composting operation. DELCORA is in the process (as of 2022) of being acquired by a private utility, Aqua Pennsylvania, a company that provides water and wastewater services in PA and other states, as a strategy for managing future upgrades to sewer systems and to treatment plant facilities.

The Capital Region District operates the advanced wastewater treatment facility in the city of Harrisburg, the state capital. Over the past several years, it has upgraded its solids handling facilities to include expanded anaerobic digesters intended to accept high strength organic wastes and to generate biogas for energy production. It has developed a land application program that is in part operated by its own staff, with farms and reclamation sites utilizing its biosolid cake.

The Erie WWTP serves the city of Erie and surrounding communities. Wastewater solids are burned in two multiple-hearth incinerators at the plant.

The Lehigh County Authority is a regional utility that operates treatment plants within the City of Allentown and at an industrial park serving mostly commercial customers including a brewery. LCA operates the Kline's Island WWTP, treating wastewater from 15 municipalities, and its industrial pretreatment plant produces biogas that is captured to fuel a combined heat and power plant (CHP), providing ~25% of WWTP's electricity. Dewatered biosolids are land applied on area farms by a service company (Synagro, in 2018).

The City of Reading Fritz Island WWTP services the city and 12 municipalities in the region. The WWTP has garnered scrutiny over the decades, with PA DEP often forcing upgrades. As of the early 2020s, plans are in progress to upgrade older treatment technologies and expand the solids handling facilities to install belt thickeners and centrifuges. Near-future improvements may also include nutrient removal in anticipation of the state restricting P (as well as N) in biosolids. Biosolids from Fritz Island WWTP are landfilled by a third-party waste disposal service.

Scranton's wastewater treatment plant was operated by the Scranton Sewer Authority until 2016, when the Authority dissolved and Pennsylvania American Water took over plant operations. Solids from the Scranton WWTP are disposed at the city-owned municipal landfill.

The ***Wyoming Valley Sewer Authority*** serves 36 municipalities, including Wilkes-Barre, in northeast PA. Solids from the WVSA's wastewater treatment plant are incinerated onsite.

Lancaster PA has two WRRFs. The City of Lancaster Advanced Wastewater Treatment Plant (AWWTP) features nutrient removal in its treatment process (Veolia's OASES technology). Solids are lime stabilized and land applied or landfilled. The Lancaster Area Sewer Authority (LASA) services municipalities around the City of Lancaster. Solids at LASA's Susquehanna Water Pollution Control Facility move through anaerobic digesters, centrifuges, and a thermal dryer, before being stored, ready for land application or landfill.

The Upper Montgomery Joint Authority, in Pennsburg, has Bronze Recognition by the National Biosolids Partnership. Biosolids at UMJA's wastewater treatment plant are heat dried to Class A EQ standards and made available to the public for free as "Fertile Fuel" fertilizer. But, in 2018, the majority of UMJA's biosolids were land applied as Class B, and some were also landfilled.

The Greater Hazleton Joint Sewer Authority landfilled its solids in 2018 and prior years. The WRRF is designed for 8.9 MGD. Hazleton's population is ~25,000. In 2020, a new FBI SSI became operational, managing almost

all of that WRRF's solids as of 2021 (262 dmt still went to landfill) and taking in outside WRRF solids, septage, etc. This is a rare instance of a completely new SSI being installed in North America.

The Chalfont-New Britain Township Authority in Buck's County, northeast PA, can treat up to 4.65 MGD and recycled about 410 dmt of solids on area farmland in 2018, some as Class A "C' n' B Green." It proudly presents it biosolids program here: https://cnbsa.org/?page_id=36

References

This summary was co-authored by Bill Toffey of Effluential Synergies, former Executive Director at MABA, and former biosolids manager at Philadelphia's WPCP. The state biosolids coordinator and other regional biosolids experts provided additional data and information. The U.S. EPA's ECHO database was a helpful resource. Additional information was obtained from the following online sources:

DEP Biosolids Program:
https://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Biosolids/Pages/default.aspx

Biosolids Regulations:
https://www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/025/chapter271/chap271toc.html&d=

Philadelphia:
https://www.synagro.com/granulite-fertilizer-pellets-2/
https://water.phila.gov/pool/files/biosolids.pdf
https://www.waterworld.com/home/article/16193172/facility-to-transform-philadelphias-sludge-into-class-a-biosolids
https://www.synagro.com/wp-content/uploads/2020/03/CaseStudy-Philadelphia-Renewable-Bio-Fuels-Facility-2018.pdf
https://water.phila.gov/sustainability/energy/
https://www.wwdmag.com/biosolids-management/philadelphia-renewable-bio-fuels-facility-opens

Upper Moreland-Hatboro Joint Sewer Authority:
http://www.umhjsa.org/video.html

Reading:
https://www.readingpa.gov/wwtp-projects
https://www.readingpa.gov/wastewater-conveyance-and-treatment

Mine Reclamation:
https://clu-in.org/conf/tio/ecoresources3/resources/Toffey-2003-Paper-on-25-years-of-Reclamation.pdf

Pittsburgh:
https://www.alcosan.org/what-we-do/wastewater-treatment

DELCORA:
https://www.delcora.org/projects/natural-gas-fired-sludge-incinerator-project/
https://www.aquaamerica.com/our-states/pennsylvania.aspx
https://www.delcora.org/aqua-merger/

Lehigh County Authority/Allentown:
https://www.lehighcountyauthority.org/2019/06/the-sludge-report-what-happens-after-treatment/
https://chptap.lbl.gov/profile/9/allentown_wwtp_project_profile1.pdf
https://lecoau.maps.arcgis.com/apps/MapJournal/index.html?appid=11751cbec8b14c1d8f3b284890d593b3

Erie:
https://cityof.erie.pa.us/government/department-of-public-works/bureau-of-sewers/

Scranton:
https://www.wnep.com/article/news/local/lackawanna-county/whats-the-smell-in-south-scranton-pennsylvania-american-water-treatment-plant/523-c0eb57b5-e54d-4a84-8efb-7baaad858ff2

Wyoming Valley Sanitary Authority:
https://www.wvsa.org/who-we-are/pages/our-history

Lancaster:
https://www.cityoflancasterpa.com/wastewater/
https://lasa.org/what-we-do/wastewater-treatment/treatment-facility/

Upper Montgomery Joint Authority:
https://www.umja.org/bio-solids
https://www.umja.org/_files/ugd/447238_0486b67611fa4a32b439e86c6a355d98.pdf

Hazleton:
http://ghjsa.org/incinerator/

Koberlein:
https://www.koberlein.com/hauling-n-disposal

Burch-Hydro:
http://burchhydro.com/