

# THE COLLECTION OF BIOGAS UTILIZATION DATA FROM MUNICIPAL WASTE WATER IN THE U. S.

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MID ATLANTIC BIOSOLIDS  
ASSOCIATION**

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YINAN QI, BLACK & VEATCH, PE, PRESENTATION AUTHOR



# AGENDA

- Background
- Project Partners
- Data Collection Approaches
- Results
- Coming Soon...
- Future Development



## BACKGROUND

# 17,000

- Estimated number of POTWs in the U.S.

# 3%

- Estimated total of U.S. electricity consumption used by water/wastewater operations

# 100

# Billion

- water/wastewater operations use ~100 billion kWh/yr electricity in the U.S.

# 600 MW

- CHP potential from POTWs > 1 MGD

# 730,000

- Could offset emissions equivalent to 730,000 cars

# BACKGROUND

- Potential methane production from wastewater is 20 billion scf – enough for 200,000 homes or to make 2 billion kWh of electricity (NREL).

*ABC Biogas 101 Handout, American Biogas Council, 2011*

- Digester gas production from WWTFs in the U.S. is estimated to be between 229 million and 343 million standard cubic feet per day (scfd).

*Analysis of Compiled Data Set from US EPA, CASA, NACWA, Black & Veatch, April 2011*



**The goal of this project is to populate a consensus-driven, publicly-available database.**

# PROJECT PARTNERS



- Fall 2011
- WEF kick-started the Biogas Data Collection project with \$25,000
- WEF Project Manager: Barry Liner, Ph.D.
- Co-leads: Ned Beecher / NEBRA & Lori Stone / Black & Veatch
- Project team across the country:
  - NEBRA (Ned Beecher, Maggie Finn)
  - Black & Veatch (Lori Stone, Yinan Qi)
  - Mid-Atlantic Biosolids Assoc. (Bill Toffey, Sam Oldak, Devon Purves, Ilke Schaart)
  - American Biogas Council (Pat Serfass, Mike Carter, Nandi Mbazima)
  - CASA – Biosolids Program (Greg Kester)
  - Northwest Biosolids Management Association (Maile Lono-Batura)
  - HDR Inc. (Michael Moore, Roxanne Follis, Megan Yoo)
  - Insinkerator (Michael Keleman)
  - others (e.g. Water Environment Assoc. of Texas Biosolids Committee)

**The project team and advisory group represent diverse experience and expertise.**



# PROJECT APPROACH

- Set up consensus project approach and scope
- Identify issues and recommend “critical” (Phase I) and “good to have” (Phase II) data
- Initial construction of the database from multiple data sources:
  - Insinkerator database
  - Clean Water Needs Survey
  - EPA DMR reports
- **Data verification:**
  - Cross check database
  - Validate data with knowledgeable people (e.g., federal/state biosolids coordinators)
  - Contact individual facility (e.g., online survey, direct phone calls)



**The project team strives to provide accurate and up-to-date data.**

# DATA COLLECTION TOOL



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## Facility

- **FRS ID:**
- **NPDES #:**
- **Name:**
- **Data Sources:** EPA ECHO, Michael Keleman (Insinkerator)
- **Authority/Operator:**
- **Facility Address**
  - Street:**
  - City:**
  - State:**
  - Zip:**
  - County:**
  - Latitude:**
  - Longitude:**
- **Facility Phone:**
- **Design Flow:**  MGD  
*Put best data on design flow here.*
- **Average Flow:**  MGD  
*Put best data on average flow here.*
- **Flow Capacity:**  MGD
- **Flow MGD:**  MGD
- **Flow Permit:**  MGD
- **Anaerobic Digestion:**
- **Does the WWTP take in hauled or piped additional waste that is fed directly into the digester(s)?:**

## Contacts

- [MEDFORD STP](#)
- [Don Walker](#)
- [Ed Sturtevant](#)
- [JIM HILL, ADMINISTRATOR](#)

[Add a Contact](#)

## Comments

- [Maile Lono-Batura](#) 
  - Updated per conversation with Dana Devin-Clarke, Brown & Caldwell. They work directly with Medford on their cogeneration. May 2012

## Anaerobic Digestion Details

### Type of Digestion:

### Biogas Use Details

#### Biogas/Digester Gas Utilization:

#### Flare:

#### Drive Process Machinery/Blowers:

#### Digester Heating:

#### Building Heat/AC:

#### Direct Injection into Pipeline:

### Electricity Generation

#### Internal Combustion Engine:

#### Turbine:

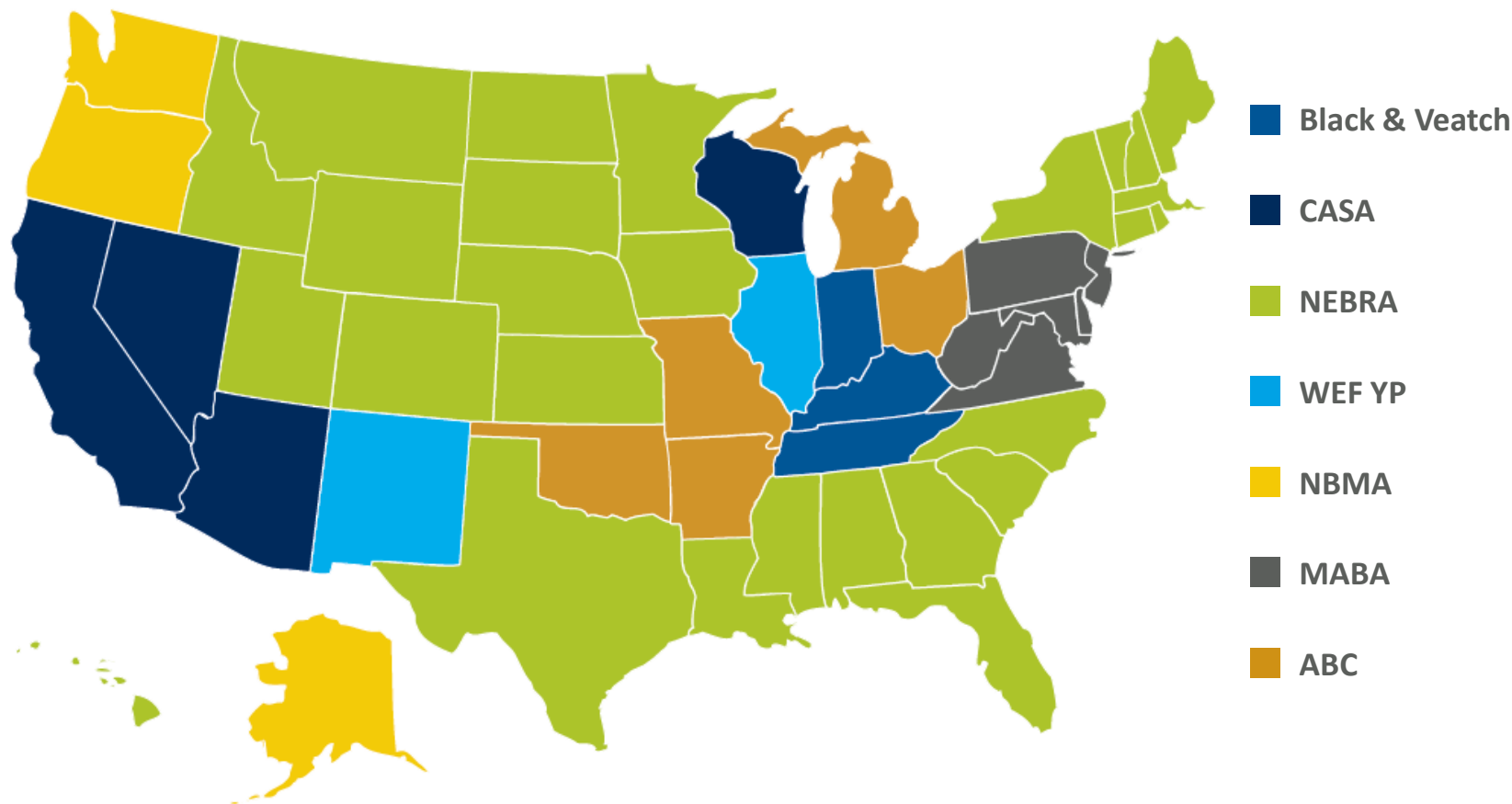
#### Microturbine:

#### Fuel Cell:

### Power Generation to Grid:

Phase 2

# PROJECT APPROACH



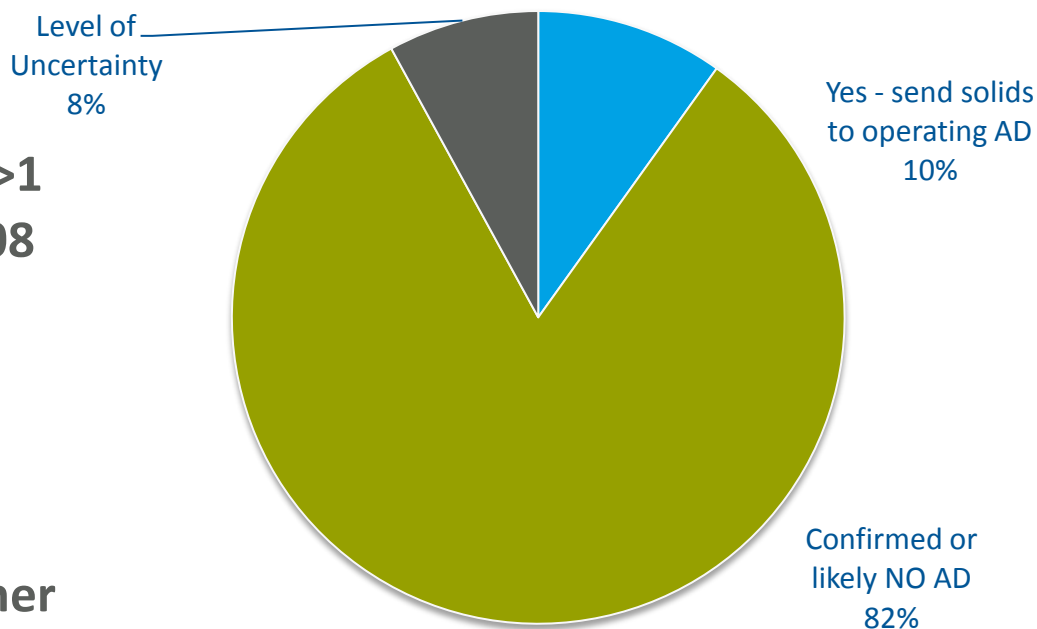
**Non-profit organizations were gatekeepers to data collection and verification...resulting in on-line database for future updates.**



# RESULTS - SUMMARY

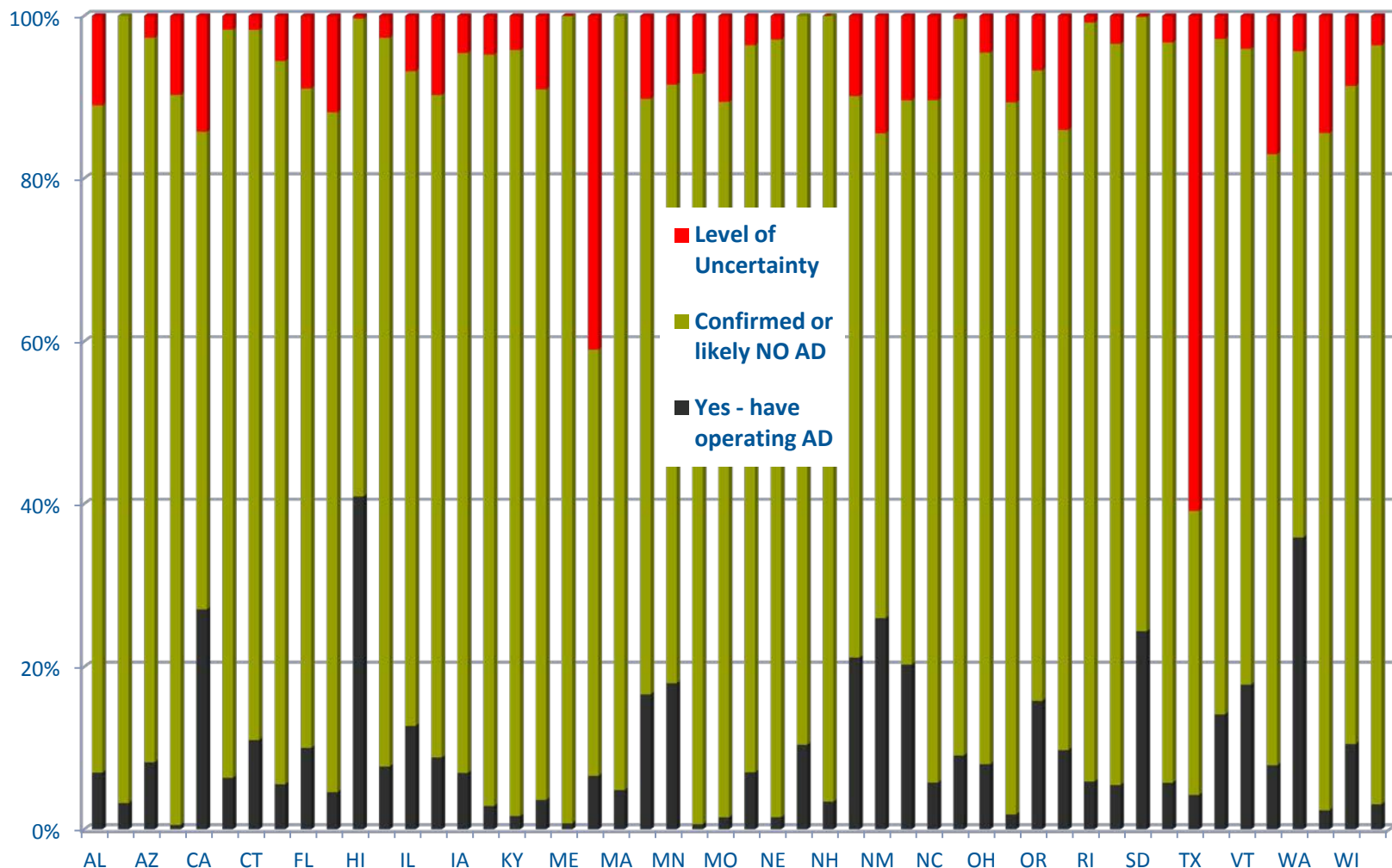
- **14,886** total facilities in 50 states reported by 2008 Clean Watershed Needs Survey
- **3,208** Major facilities (>1 mgd), according to the 2008 Clean Watershed Needs Survey
- **1,238** facilities whose solids are treated with AD (some send solids to another facility) – we have a relatively high level of confidence in this number – almost all of these are Major facilities

**Percentage of Facilities Sending Solids to AD**  
and showing level of uncertainty  
(comparing survey data to CWNS 2008 total WWTPs )



# RESULTS – % AD FACILITIES BY STATE

Based on total number of WWTPs per state (CWNS 2008)

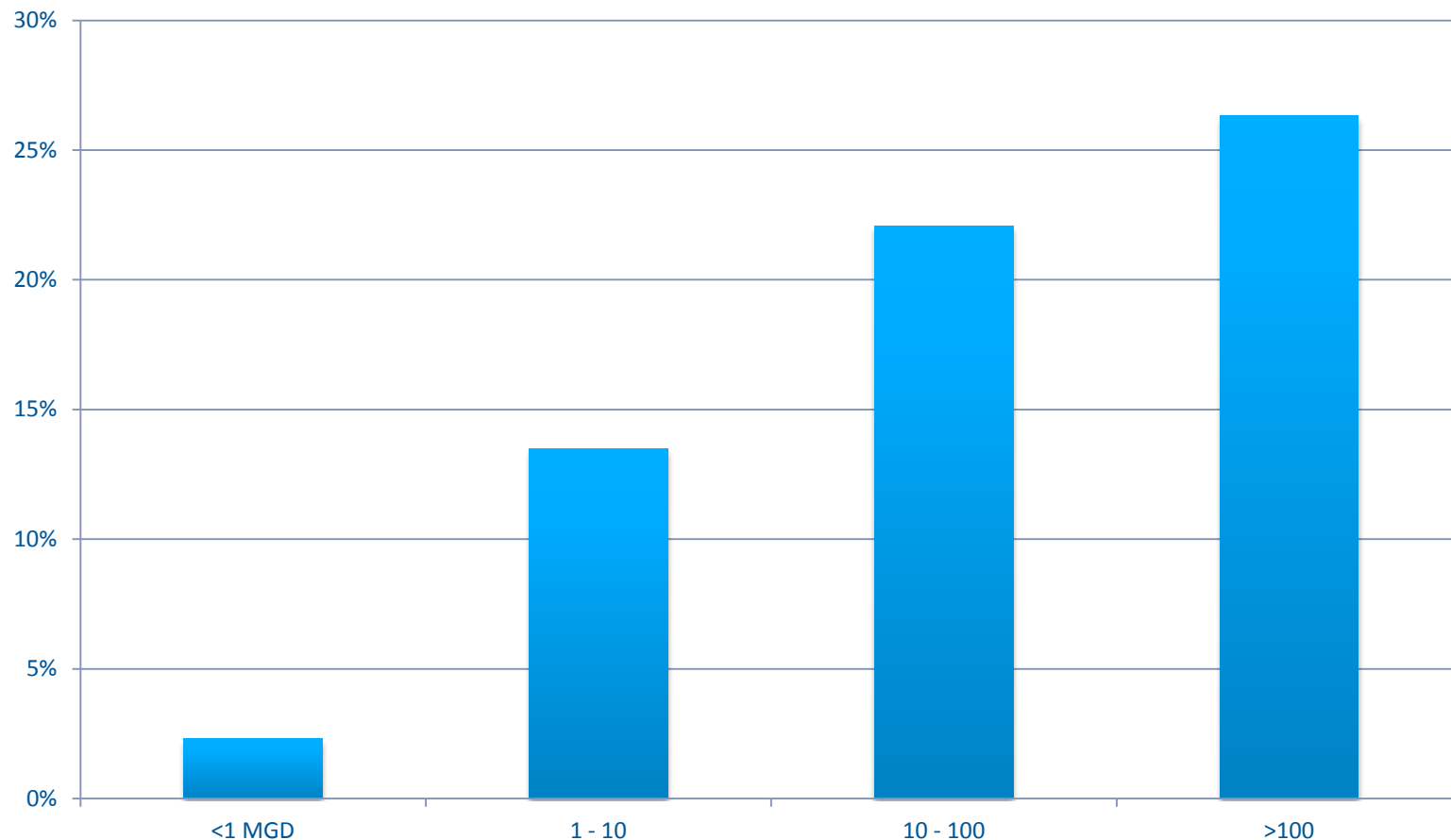


**Purple = confirmed facilities with solids to AD**  
**Red = level of uncertainty in data for each state**



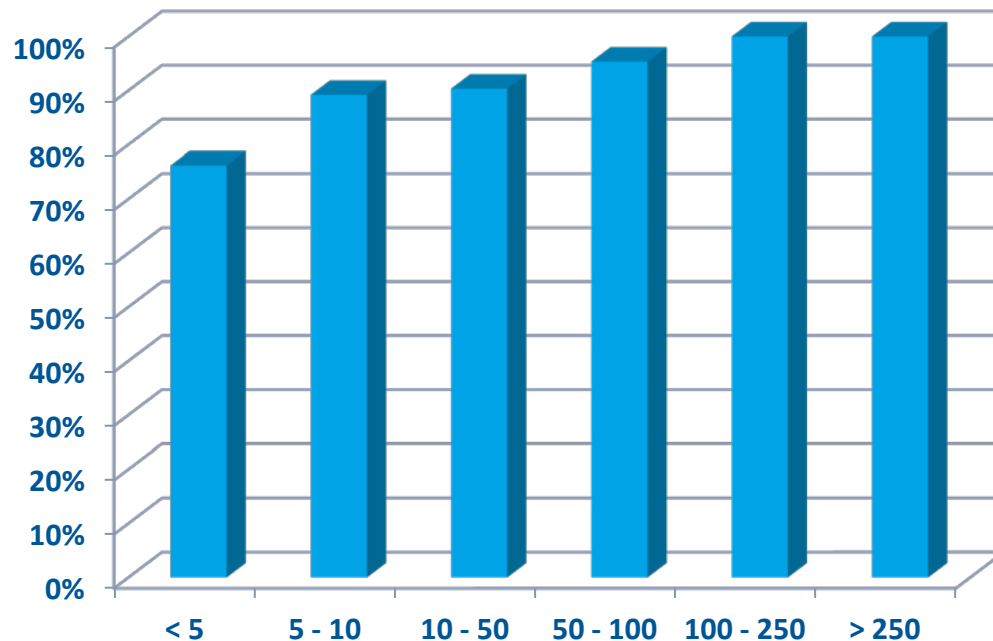
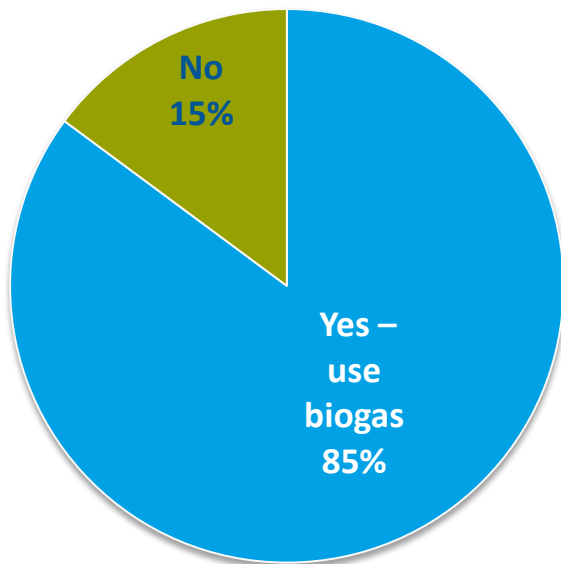
# RESULTS – % FACILITIES SENDING SOLIDS TO AD

Based on total number of U. S. WWTPs in each size grouping (CWNS 2008)



Larger facilities are more likely to have AD.

# RESULTS – AD FACILITIES THAT USE BIOGAS

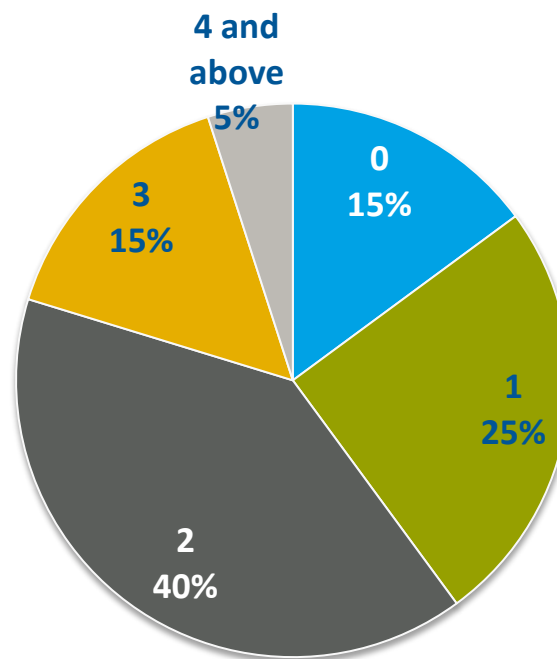
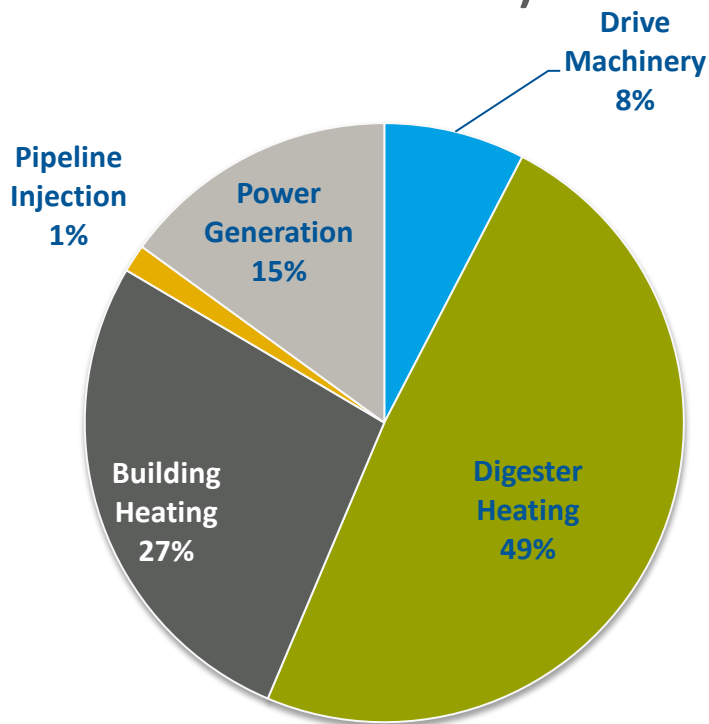


**Percentage of AD facilities that use biogas increases with plant capacity (based on only those facilities we have confirmed have AD)**

# RESULTS – BIOGAS USE TECHNOLOGIES

1,054 facilities use biogas

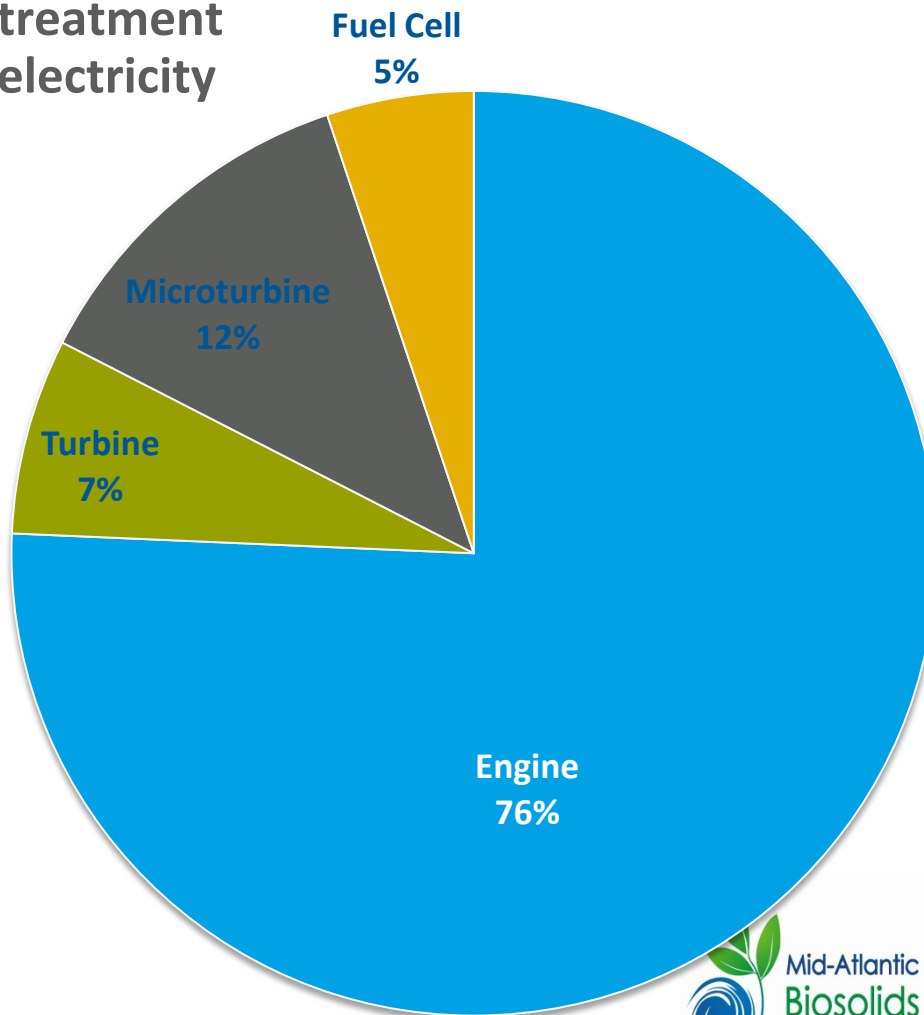
(1,666 distinct technologies are in use; some facilities use more than one)



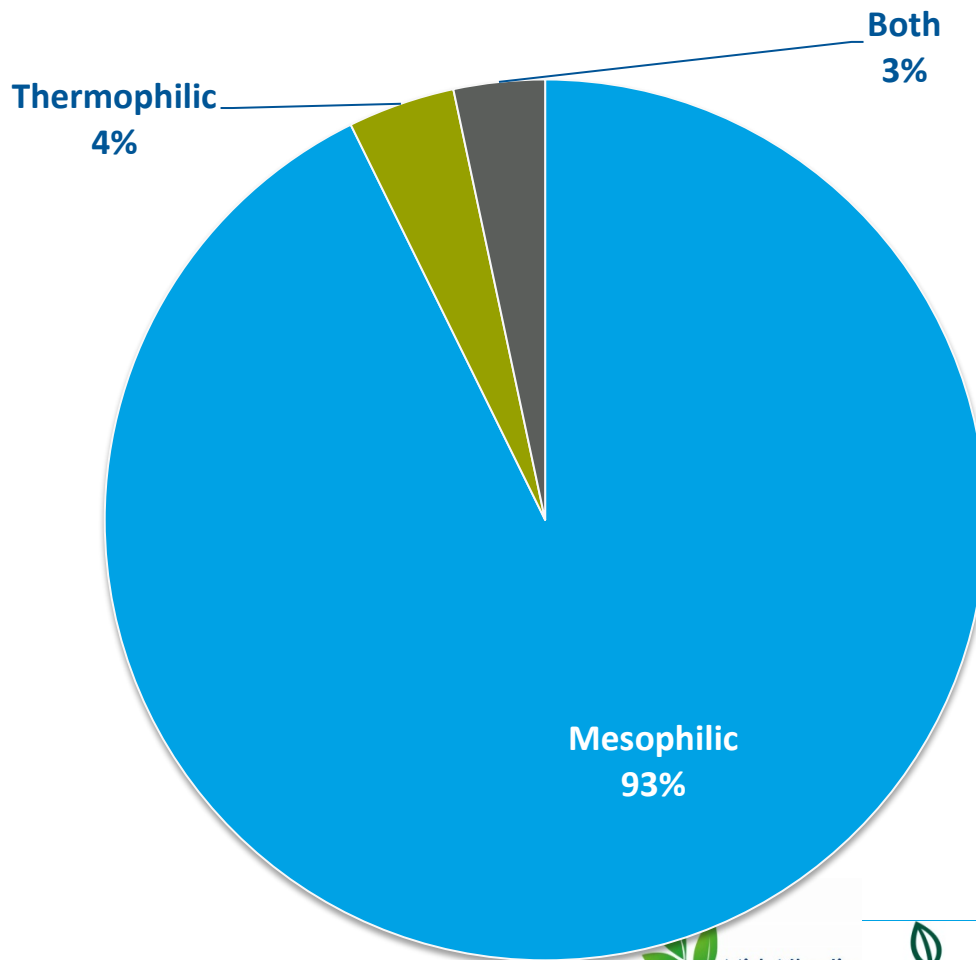
**No. of biogas use technologies used at each facility**

# RESULTS – POWER GENERATION TECHNOLOGIES

292+ wastewater treatment facilities generate electricity from biogas



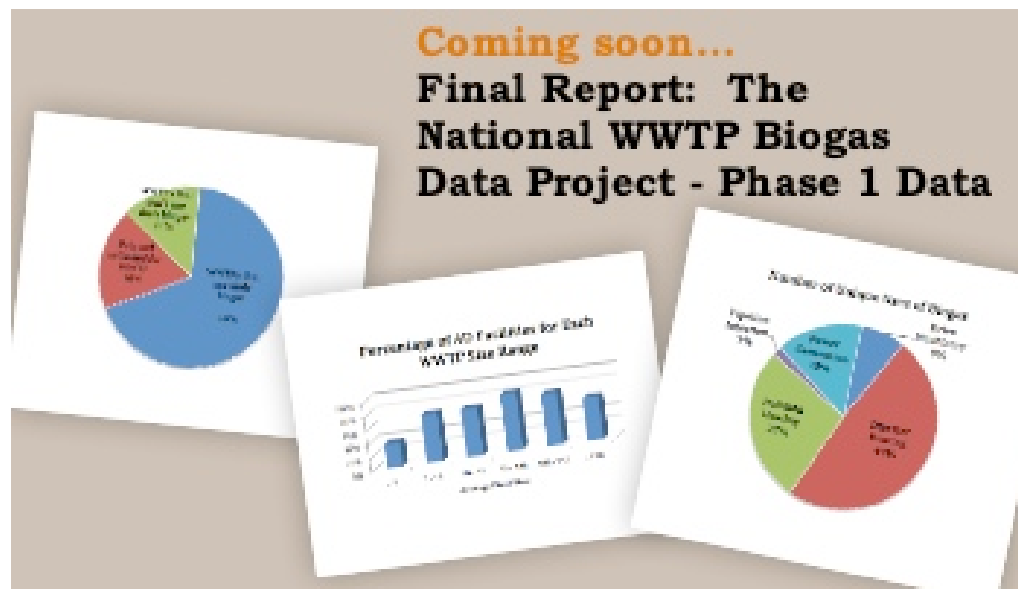
# RESULTS – TYPES OF DIGESTION IN USE



**NOTE:** We found that, in 2012, 17% of WWTPs with AD import outside waste directly into their digesters.

# A FINAL REPORT, WITH THESE & MORE DATA COMPILATIONS, IS COMING SOON....

IT WILL BE AVAILABLE FOR DOWNLOAD FROM [WWW.BIOGASDATA.ORG](http://WWW.BIOGASDATA.ORG).





# AND MUCH MORE AT THE ONLINE DATABASE

- [www.biogasdata.org](http://www.biogasdata.org)
- Interactive
- Search & browse WWTPs
- Data includes the following for facilities with AD: location, flow metrics, how biogas is used, whether and how electricity is generated
- Print data files for each WWTP
- Designed for future expansion
- Allows user to contact website administrators for submitting comments and updates



**The most comprehensive, accurate, and up-to-date U. S. WWTP biogas use database , free to anyone at any time.**

# ONLINE DATABASE



[www.biogasdata.org](http://www.biogasdata.org)



# ONLINE DATABASE

Home About Biogas **Search Data** Browse WWTPs Reports Contact Log In

## Search WWTPs with Anaerobic Digestion

**Enter search:**

**What you can find**

This database currently shows U. S. WWTPs with operating anaerobic digestion (AD) in 2012/2013.

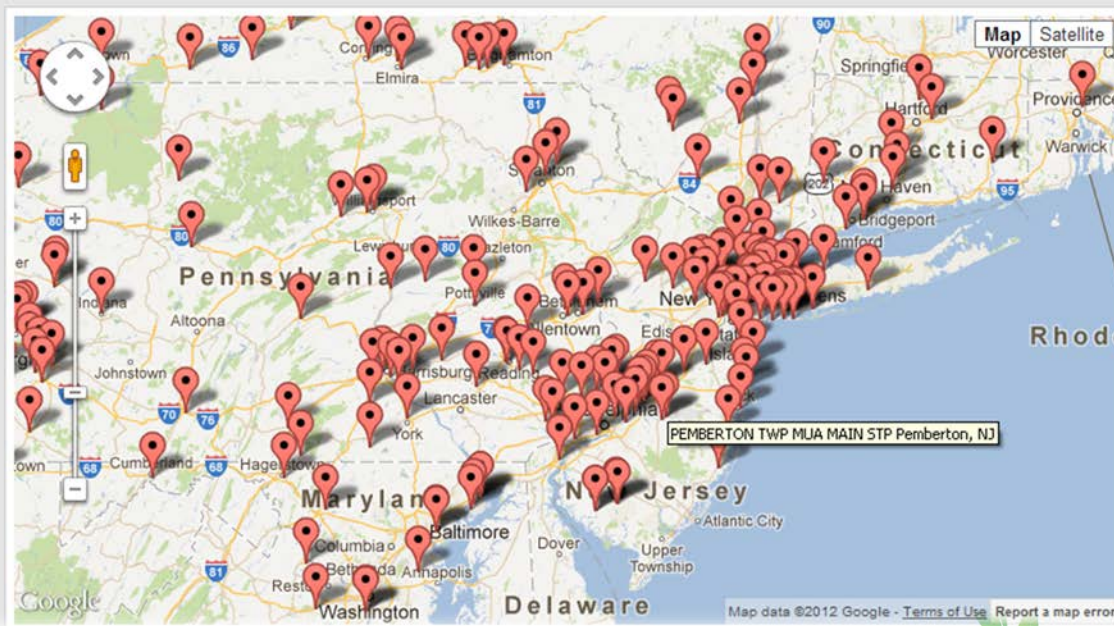
[more...](#)

**Instructions**

How to Search and Browse to find WWTPs with anaerobic digestion.

[more...](#)

WWTPs found: 1241



# ONLINE DATABASE

DATA TO INFORM AND INSPIRE SUSTAINABLE BIOSOLIDS MANAGEMENT

Home About Biogas Search Data **Browse WWTPs** Reports Contact Log In

## Browse Wastewater Treatment Plants

**Enter search:**

**What you can find**

This database currently shows U. S. WWTPs with operating anaerobic digestion (AD) in 2012/2013.

[more...](#)

**Instructions**

How to Search and Browse to find WWTPs with anaerobic digestion.

[more...](#)

WWTPs found: 1242

Displaying Facility **1 - 30** of **1242** in total

← Previous **1** 2 3 4 5 6 7 8 9 ... 41 42 Next →

City	County	State	Name ▲	NPDES	Average Flow	Anaerobic Digestion	
BROOKLYN	KINGS COUNTY	NY	26TH WARD WPCP - Brooklyn	NY0026212	52.0	Yes	<a href="#">Show</a>
ABERDEEN	HARFORD	MD	Aberdeen Area WWTP	MD0021237	1.8	Yes	<a href="#">Show</a>
ABERDEEN	HARFORD	MD	ABERDEEN SLUDGE COMPOSTING	MD0021563	0.0	Yes	<a href="#">Show</a>
ABERDEEN	BROWN	SD	ABERDEEN WWTF	SDL020702	4.0	Yes	<a href="#">Show</a>
ABINGTON	MONTGOMERY	PA	ABINGTON TWP COMM-WWTR TRTMT P	PA0026867	3.0	Yes	<a href="#">Show</a>
ADDISON	DUPAGE	IL	ADDISON SOUTH-A.J. LAROCCA STP	IL0027367	2.0	Yes	<a href="#">Show</a>
		NY	Addison WWTP	NY0020320	0.0	Yes	<a href="#">Show</a>
ADDISON	DUPAGE	IL	ADDISON WWTP NORTH	IL0032812	3.0	Yes	<a href="#">Show</a>



# ONLINE DATABASE

Home About Biogas Search Data Browse WWTPs Reports Contact Log In


## 26TH WARD WPCP - Brooklyn [Browse WWTPs](#)

Identity	
Name:	26TH WARD WPCP - Brooklyn
NPDES:	NY0026212
FRS:	110019834063
frs_link:	
Authority:	NYCDEP

Location	
Street1:	12266 FLATLANDS AVENUE
Street2:	
City:	BROOKLYN
County:	KINGS COUNTY
State:	NY
Zip:	11207
Phone:	7186427705
Latitude:	40.653561
Longitude:	-73.879441

Flow Metrics	
Flow Design:	85.0
Flow Average:	52.0
Outside Waste Fed to Digesters?	No

Biogas Production Attributes	
Digestion type (mesophilic, thermophilic, or both):	Mesophilic
Biogas Utilized?	Yes
Biogas Flared?	Yes
Biogas Drives Machinery?	No
Biogas Heats Digesters?	Yes



Other Attributes	
EPA Stabilization Code: Approved?	Yes

Key	
AC	Air Conditioning
AD	Anaerobic Digestion
FRS	Facility Registry System (a U.S. EPA system)
HVAC	Heating, Ventilation, and Air Conditioning
MGD	million gallons per day
NPDES	National Pollutant Discharge Elimination System (a U.S. EPA system)

**Notes**

# NEXT STEPS...

- **Phase II**
  - Biogas production
  - Power generation
  - Beneficial use of biosolids
  - Heat recovery
  - Distribution of Class A products
- **Future considerations**

[www.BiogasData.org](http://www.BiogasData.org)



# CONTACT THE TEAM

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**THANK YOU!**

