

Inventorying Emissions from Water Resource Recovery Facilities: Finalized Survey Questions

Take the actual survey [here!](#)

This textualized version is not intended for use with actual submissions.

Legend

- * represents mandatory
- represents multiple choice questions
 - represents follow up question(s) if above answer is selected
- represents checkboxes allowing for multiple selections
 - represents follow up question(s) if above checkbox is selected
- __ represents prompt for text input
- represents follow up question if answer to previous question is yes or maybe

Please note that anything in {brackets} is not included in the actual survey, and is just listed here for organizational purposes

{Facility Identification}

Thank you so much for participating in our survey!

Please provide your contact information below.

All information collected through this survey will be anonymized.

Name: _____

Email: _____

What is the name of your water resource recovery facility/wastewater treatment plant? _____

What is the address of your facility? _____ (including address, city, state, & zip code prompts)

What is your facility's average observed incoming flow rate?

- Please record your value here if reporting in million gallons per day (MGD) _____
- Please record your value here if reporting in cubic meters per day _____
- Please record your value here if reporting in billion liters per year _____
- Please record your value here if reporting in different units (please specify which) _____
- Unknown or unsure

What is the maximum flow rate that your facility is designed to treat?

- Please record your value here if reporting in million gallons per day (MGD) _____
- Please record your value here if reporting in cubic meters per day _____
- Please record your value here if reporting in billion liters per year _____
- Please record your value here if reporting in different units (please specify which) _____

Finalized Survey Questions

- Unknown or unsure

{Emissions Inventory}

Does your facility have a greenhouse gas emissions inventory?* (Yes/No/Unsure)

→ If yes:

- ◆ Are you willing to share your facility's emissions inventory? (Yes/No)
 - If yes: In what format are you able to share your emissions inventory?
 - Accessible online (please include link below) _____
 - File upload
 - ◆ Please upload your emissions inventory here.
 - Other _____
 - Unable to retrieve right now
- ◆ Who is the best person to contact about greenhouse gas emissions at your facility? ____ (including name, email and phone number prompts)

Has your facility ever conducted on-site emissions monitoring?* (Yes/No/Unsure)

→ If yes:

- ◆ What type of on-site emissions monitoring has your facility conducted?*
- Leak detection
- Periodic monitoring with quantification
- Continuous monitoring with quantification
- Unknown or unsure
- ◆ What types of emissions have you monitored?*
- Carbon dioxide
- Methane
- Nitrous oxide
- Other _____
- Unknown or unsure
 - See below section for followup questions based on selections here
- ◆ Where do you measure emissions in proximity to?*
- Floating digester covers with pumped mixing
- Biosolids holding tanks to control odor (also known as post-digestion tanks)
- Biosolids thickening & conveyance infrastructure
- Pressure relief valves on biogas systems
- Sewer rising main manhole
- Other (please feel free to list multiple responses here) _____
- Unknown or unsure
- ◆ Would you be willing to share your emissions data?* (Yes/No/Unsure)

For the following questions, it may be helpful to consult the reference document below.

Finalized Survey Questions

[Access the emissions measurement method reference document here.](#)

For each type of emissions selected above in response to the “What types of emissions have you monitored?” question:

- Which emissions sampling and/or measurement method(s) have you used for [carbon dioxide, methane, nitrous oxide, or the other type(s) of emissions you’ve listed] emissions? You can view method descriptions in the file above.*
 - Aerial survey (drone, satellite, airplane)
 - What type of aerial survey do you use for [emissions type] emissions?*
 - Airplane
 - Drone
 - Satellite
 - Other ____
 - Unknown or unsure
- Remote sensing via car
- Optical gas imaging (OGI)
 - Do you use Quantitative Optical Gas Imaging (QOGI) for [emissions type] emissions?*
 - Yes
 - No
 - Unknown or unsure
 - What type of Optical Gas Imaging (OGI) monitoring do you perform for [emissions type] emissions?*
 - Periodic handheld survey
 - Continuous monitoring via infrared camera
 - Other ____
 - Unknown or unsure
- In-situ liquid or gas sensor
- Tracer gas dispersion method (TDM)
- Continuous monitoring with ground sensor networks (metal oxide or similar)
- Grab sample (gas or liquid)
- Flux chamber (FC)
- Headspace method (HM)
- Offgas exhaust channel (OEC) sampling
- Other ____
- Unknown or unsure

{Process Identification}

We are happy to work towards estimating greenhouse gas emissions from your facility if you share the following information with us.

Finalized Survey Questions

Which of the following **preliminary/primary treatment** processes does your facility use?*

- Bar racks & coarse screens
- Mechanical bar screens
- Fine and microstrainer screens
- Other screening ____
- Pre-treatment aeration
- Post-treatment aeration
- Flow equalization
- Gravity thickening
- Primary sedimentation
- Imhoff Tank
- Other(s) not listed above ____
- None
- Unknown or unsure

Which of the following **secondary treatment** processes does your facility use?*

- Activated sludge
- University of Cape Town activated sludge
- Modified Ludzack-Ettinger activated sludge
- Conventional anoxic-aerobic
- Conventional anaerobic-anoxic-aerobic
- Oxidation ditch
- Sequencing batch reactor
- Anaerobic reactor
- Granular sludge reactor
- Moving bed biofilm reactor
- Continuous stirred tank reactor (CSTR)
- Single reactor system for high activity ammonium removal over nitrite
- Other suspended growth process(es) not listed above ____
- Membrane bioreactor
- Integrated fixed-film activated sludge
- Biological aerated filter
- Trickling biofilm filter
- Rotating biological contactor (RBC)
- Other attached growth process(es) not listed above ____
- Anaerobic pond
- Aerated lagoon
- Facultative lagoon
- Other pond system(s) not listed above ____

Finalized Survey Questions

- Other secondary treatment process(es) not listed above ____
- None
- Unknown or unsure

Does your facility use secondary clarification?* (Yes/No/Unsure)

Which of the following **tertiary/advanced treatment** processes does your facility use?*

- Biological denitrification, separate stage
- Biological nitrification, separate stage
- Other nitrification/denitrification process(es) not listed above ____
- Biological phosphorus removal
- Chemical phosphorus removal
- Other phosphorus removal process(es) not listed above ____
- Subsurface wastewater infiltration system
- Rapid sand filter
- Sand filtration/recirculating
- Slow sand filter
- Intermittent sand filtration
- Activated carbon
- Other filtration system(s) not listed above ____
- Ultraviolet radiation
- Chlorination
- Dechlorination
- Ozonation
- Other chemical addition ____
- Other tertiary/advanced treatment processes not listed above ____
- None
- Unknown or unsure

Which of the following **on-site sludge treatment** processes does your facility use?*

- Gravity sludge thickening
- Dissolved air flotation thickening
- Aerobic digestion
- Anaerobic digestion
- Mechanical dewatering
- Air drying
- Heat treatment
- Aerated biosolids storage
- In-line storage
- Biosolids lagoons

Finalized Survey Questions

- Wet air oxidation
- Lime treatment
- On-site incineration
- On-site land application
- Other on-site sludge treatment processes that are not listed above ____
- None
- Unknown or unsure

Which of the following **off-site sludge disposal** methods does your facility use?*

- Transport to off-site third party landfill
- Off-site incineration
- Off-site land application
- Other off-site sludge disposal processes that are not listed above ____
- None
- Unknown or unsure

{Other Decarbonization Efforts}

Does your facility produce energy (i.e. solar, biogas)?* (Yes/No/Unsure)

→ If yes:

◆ What type(s) of energy does your facility produce?

- Biogas
 - What percentage of your facility's annual electricity usage is covered by biogas produced on-site?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Biogas is flared
 - Unknown or unsure
- Solar
 - What percentage of your facility's annual electricity usage is covered by solar power produced on-site?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Unknown or unsure
- Wind
 - What percentage of your facility's annual electricity usage is covered by wind power produced on-site?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Unknown or unsure
- Hydropower

Finalized Survey Questions

- What percentage of your facility's annual electricity usage is covered by hydropower produced on-site?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Unknown or unsure
- Hydrothermal
 - What percentage of your facility's annual electricity usage is covered by hydrothermal power produced on-site?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Unknown or unsure
- Other ____
 - What percentage of your facility's annual electricity usage is covered by the other type of power produced on-site that you've listed?
 - If known, please select this option and input percentage from 0 to 100 here ____
 - Unknown or unsure

Does your facility purchase electricity from outside providers separate from the local grid?*

→ If Yes:

- ◆ How many outside providers do you purchase electricity from?*
- 1
- 2
- 3
- 4
- 5
- 6
- 7+
- ◆ For number of times selected above, the following questions are repeated:
 - What type(s) of electricity does the [first, second, third, etc.] outside provider produce?*
 - Biogas
 - Solar
 - Wind
 - Hydropower
 - Hydrothermal
 - Other ____
 - Unknown or unsure
 - What percentage of your facility's annual electricity usage is covered by this [first, second, third, etc.] outside provider?*
 - If known, please select this option and input percentage from 0 to 100 here ____

Finalized Survey Questions

- Unknown or unsure

Does your facility participate in any of the following emissions reduction efforts not discussed above?

- Transportation reduction/optimization
- Chemical input reduction/optimization
- Electrical load shifting
- Increased energy efficiency
- Other _____

{Closing Questions}

Would you or someone else at your facility be willing to share information about water quality, such as metrics on influent and effluent flow, total bound nitrogen (TN), biochemical oxygen demand (BOD), and where effluent is discharged?* (Yes/No/Maybe or unsure)

→ If Yes or Maybe are selected:

- ◆ Who is the best person to contact about water quality metrics at your facility?
____ (including name, email and phone number prompts)

Would you or someone else at your facility be willing to share information about energy usage, such as metrics on what fuel types you use and how much as well as the amounts and types of energy you consume and produce?* (Yes/No/Maybe or unsure)

→ If Yes or Maybe are selected:

- ◆ Who is the best person to contact about energy usage metrics at your facility?
____ (including name, email and phone number prompts)

Would you or someone else at your facility be willing to share information about sludge disposal, such as metrics on how much sludge is disposed via which method, and how biogas is used in your facility (if at all)?* (Yes/No/Maybe or unsure)

→ If Yes or Maybe are selected:

- ◆ Who is the best person to contact about sludge disposal metrics at your facility?
____ (including name, email and phone number prompts)

Would you or someone else at your facility be willing to share information on treatment process inputs, such as the types of chemicals used in treatment processes, where they are sourced from, and how frequently chemical invoices are received?* (Yes/No/Maybe or unsure)

→ If Yes or Maybe are selected:

- ◆ Who is the best person to contact about treatment process chemical input metrics at your facility? ____ (including name, email and phone number prompts)

Do you have any other information you would like to share or questions you think we missed?

Finalized Survey Questions

Please provide below the contact information of anyone else at your facility you think we should contact. Feel free to input multiple names, emails, and/or phone numbers in each field. ____
(including name, email and phone number prompts)

We thank you for your time spent taking this survey.

Your response has been recorded.

A member of Princeton's Water and Energy Technologies (WET) Lab will reach out to you and the other contacts you have provided here within the next couple of weeks.

We are excited to help you and other facilities across North America to build and improve your greenhouse gas emissions inventories!