

NYC DEP Expansion of Co-digestion Program

Request for Expressions of Interest (RFEI)

1. Purpose of RFEI

This RFEI is a public solicitation to identify new partners and strategies to leverage New York City Department of Environmental Protection's (DEP) infrastructure to manage organic waste streams in New York City. DEP intends to offer its expertise in digesting organic material to process organic waste generated in the city. We are looking to partner with waste haulers and pre-processors to offer a space-effective, cost-effective and sustainable option to process organic waste into renewable products within the borders of New York City.

This is the second of a series of three RFEIs that DEP has issued to solicit input from stakeholders to comment on the agency's plans and help shape the future of organics management in New York City.

1. Beneficial reuse of biogas (issued on April 12, 2023; closed on May 16, 2023)
2. Expansion of Co-digestion Program (this RFEI; responses accepted until September 22, 2023, 4PM)
3. In-city beneficial use of biosolids (expected to be issued in September 2023)

Anaerobic digesters are a well-established stabilization process that turns organic material into a methane-rich biogas that can be used for energy, and digestate, a nutrient rich material that when treated to meet EPA's standards for recycling, can be used as a fertilizer replacement - an alternative to composted material. The anaerobic digestion process significantly reduces pathogens to levels typically encountered in the environment and greatly reduces the mass of organic material after digestion. Modern anaerobic digesters are marvels of engineering that combine human infrastructure with naturally occurring microbes to process organic waste in the absence of oxygen.

DEP is an expert in anaerobic digestion; sewage is one of the many types of organic waste that can be managed in anaerobic digesters. Our Bureau of Wastewater Treatment operates 75 digesters at our 14 in-city Wastewater Resource Recovery Facilities (WRRFs), treating an average of 1.4 billion gallons of wastewater per day.

The same anaerobic digesters that process sewage can be used to process other organic wastes such as food scraps. The process of mixing additional feedstocks into anaerobic digesters at WRRFs is known as co-digestion and is becoming more common at wastewater utilities across the globe. DEP has shown that co-digestion can be implemented alongside its core mission of treating the city's wastewater because DEP operates a full-scale demonstration project at its Newtown Creek WRRF in partnership with Waste Management. At that facility, DEP has the capacity to accept up to 500 tons per day of pre-processed food scraps that are mixed into our digesters.

DEP is planning to expand its capacity to receive pre-processed organic material for co-digestion. Our vision is to use our geographically distributed network of digesters to manage organic material collected from residential and commercial sources across the city. Because of its role in wastewater treatment, anaerobic digestion will continue to play a role in the city's responsible management of organic wastes. DEP is now taking steps to ensure that co-digestion will be a viable tool for additional organic waste streams.

Our willingness to accept additional material at our facilities is paired with a commitment to be responsible stewards of that organic material. With a previous RFEI, DEP solicited feedback on achieving 100% beneficial use of the digester gas made at our facilities; any decision we make about expanding our co-digestion program will be informed by responses to that RFEI to ensure we use all of the biogas we produce. Additionally, this RFEI will be followed by another focused on identifying new uses for our biosolids within the city that builds on our commitment to achieve zero waste-to-landfill by 2030.

Through this RFEI, DEP seeks responses to better understand what material might be available for co-digestion, how that material will be transported to DEP's facilities, and how we will receive the material to be added to our process for co-digestion. Questions are grouped into the following categories:

1. Organic material availability
 - a. Pre-processed Source Separated Organics
 - b. Industrial feedstocks
2. Transportation options
3. Receiving capacity at DEP WRRFs

2. Background

2.1 The Importance of Diverting Organics from Landfills

Keeping organic material out of landfills is a critical strategy for reducing greenhouse gas emissions. While DEP's digesters are designed to capture and use biogas, material that decomposes in landfills creates raw methane that, if not aggressively collected and managed, escapes to the atmosphere where it acts as a greenhouse gas 85 times more potent than carbon dioxide over a 20-year time frame. Keeping organic material out of landfills is a critical strategy for fighting climate change and New York City is developing programs and policies that will ensure every New Yorker has access to responsible waste management for their organic materials.

New York City operates the largest curbside organics collection program in the country in Queens and will be expanding that program to the rest of the city by the end of 2024. This valuable service will provide city residents with the opportunity to have their organic waste collected by the Department of Sanitation's fleet. In addition to residential organics, beginning in 2026, commercial producers of organic waste will be required to separate their organic waste as well. Diverting these organic materials from landfills will create a new stream of material that needs to be responsibly managed. DEP's intention is to offer in-city processing capacity to a growing number of stakeholders who can bring acceptably pre-processed organics from residential and commercial sources in the city.

2.2 The Role of Co-digestion

As the city grows its organics collections program, it must simultaneously expand its processing capacity, be it through composting or anaerobic digestion. Investing in collections without adequate processing capacity will ultimately lead to landfilling. On the other hand, growing processing capacity without securing a steady stream of material would result in costly, underutilized investments.

Refining post-consumer organic materials into useful bioproducts within the city requires more collaboration between city government and local stakeholders but yields better outcomes than paying to export those materials as waste. As examples:

- Finished digestate biosolids (the material produced by anaerobic digesters) can be used to replace soil amendment products that would otherwise need to be purchased such as synthetic fertilizer, the production of which generates greenhouse gas emissions. If treated to high enough standards, with further processing biosolids derived products can be sold to end users.
- Biogas made from anaerobic digestion can replace fossil natural gas. Furthermore, the volume reduction from processing reduces the amount of solid material to be exported and associated costs. In-city processing generates value and reduces disposal costs.

Anaerobic digestion can play a complimentary role to composting in the City’s organics processing strategies. As with every endeavor in New York City, space is one of the greatest limiting factors in our ability to manage organics material. Anaerobic digestion does not require oxygen; this means that where compost piles must be spread out horizontally for aeration, digesters extend vertically. The same way that an apartment building can house more people than a single-family house on the same footprint, a digester can process more organic material on the same footprint than a composting facility could.

Another critical advantage of digesters is that they can manage materials that are not accepted at composting facilities such as Fats, Oils and Grease (FOG) or meat and dairy byproducts. Including co-digestion alongside composting in the City’s plans increases the types of organic wastes that can be managed in-city.

2.3 Existing and Planned Capacity

Implementing co-digestion requires two features at participating WRRFs: digester capacity and receiving food waste capacity. Digester capacity comes from digesters that have sufficient volume to treat sewage sludge and still have capacity for more material without compromising treatment standards; receiving capacity requires feed-in stations on site that accept material from tanker trucks or similar vessels and transfer that material into digesters. Building on the success of our demonstration project at Newtown Creek, we are now taking steps to increase the number of WRRFs equipped for co-digestion.

Digester capacity for co-digestion exists at multiple DEP facilities. Because DEP uses anaerobic digestion to treat our wastewater, we already dedicate space in the city to digesters and have excess capacity distributed throughout our system. Each WRRF operates multiple digesters with total capacity being designed to treat estimated flows and loads; our facilities are often over-sized to ensure redundancy should an individual digester need to be taken offline. We currently have excess digester capacity at Newtown Creek WRRF; planned upgrades will open significant digester capacity at Hunts Point and Oakwood Beach WRRFs by 2026. Beyond that, process upgrades could establish additional capacity by 2030 at some combination of North River, Owls Head, Red Hook, and Wards Island WRRFs (see table 1).

Please note that the values in the table below come from average digester loading. At times throughout the year, peak flow conditions may result in less food waste capacity for limited durations of time.

Table 1: Forecasted digester capacity for accepting pre-processed food waste by 2030.

WRRF	Food Waste Capacity in Wet Tons/Day
HP	1,000*
NC	1,100**
NR	70
OB	190***
OH	350
RH	270
WI	550
Total	3,800

*450 tons per day available in 2026; subject to change based on future operations.

**Currently available

***Available in 2026

Establishing food waste receiving capacity is a separate challenge for DEP. Currently, Newtown Creek is the only facility equipped with a feed-in station. The existing feed-in station is owned by Waste Management and capable of processing 500 wet tons per day. Additional feed-in stations will be added at WRRFs distributed across the city. Because of the demonstrated success and existing capacity at Newtown Creek, additional feed-in stations are being planned to increase capacity at Newtown Creek. DEP plans to add feed-in stations to Hunts Point WRRF, which will be getting new digester tanks with excess capacity and mechanical thickening (see table 2).

Table 2: Planned Receiving Capacity by 2026.

WRRF	Planned Receiving Capacity (wet tons per day))
HP	450*
NC	1,000
NR	-
OB	-
OH	-
RH	-
WI	-
Total	1,450

*DEP intends to build a 500 ton per day receiving station at Hunts Point which will be limited by digester capacity until the thickening project is completed in 2030.

**DEP will add a second 500 ton per day receiving station to bring total capacity to 1,000 tons per day.

Not discussed in this RFEI is importance of achieving full beneficial use of biogas produced from organic material brought to DEP facilities for co-digestion. Please note that DEP will not operate a feed in station at a location that does not have a use for 100% of the biogas produced from co-digested organic material. Respondents may request a copy of the RFEI for Beneficial Reuse of WRRF Biogas for additional context.

Figure 1 below summarizes our current and planned receiving capacity alongside forecasted digester capacity that will be available after sludge mechanical thickening improvements and addition of feed-in stations by approximately 2030.

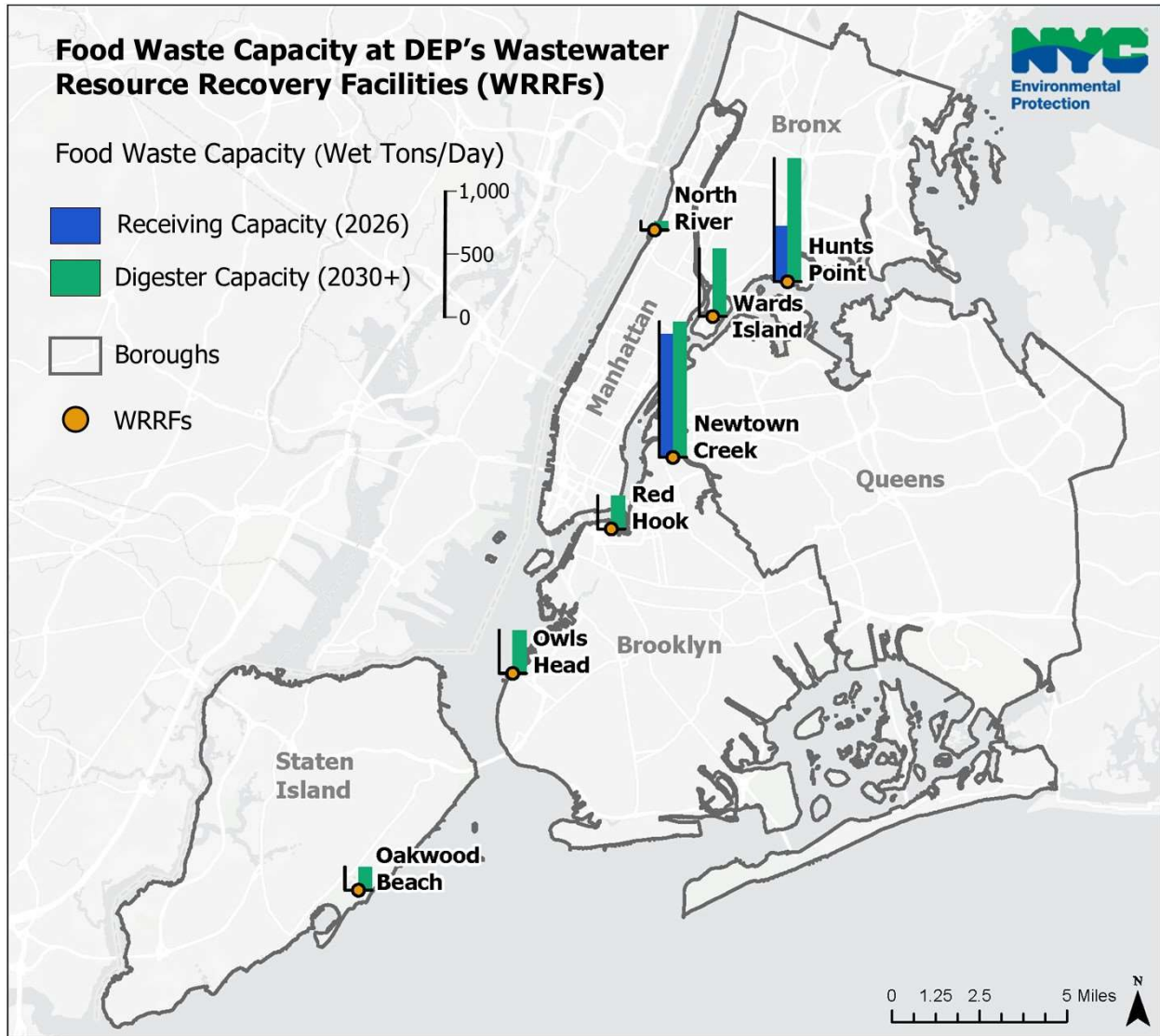


Figure 1: Geographical distribution of planned digester capacity and receiving capacity

3. Project Overview and Points of Interest

Expanding our co-digestion program to the necessary scale for a city of over 8 million will require affecting change in three distinct areas. Those are:

1. Identifying partners for pre-processing of organic material
2. Transportation or transmission of a pre-processed bioslurry to DEP facilities
3. Growing receiving capacity at WRRFs.

Our hope is that by providing information about our plans, stakeholders can comment as to what actions DEP can take that would enable other stakeholders to provide services or investments to further the responsible management of organic material within New York City through co-digestion.

3.1 Pre-Processing Specifications

A critical step for co-digestion of food scraps and other organic wastes is pre-processing. The mechanics of digestion at our WRRFS require that material be pumped into digesters. The active microbes that do the work of digestion work best when solids particles are suspended in a liquid to maximize surface area; optimizing digestion requires a proper consistency and that the contents of the digesters be mixed. Contents of brown bins cannot be added into our digesters as collected; material collected from across the city must be blended into a pumpable slurry before it is brought to a feed-in station.

A benefit of processing food scraps into a slurry is that it also provides an opportunity to remove contamination. Inert materials such as plastic, glass and metal must be removed from collected organic material prior to co-digestion. Depending on how organic material is collected, it may have contaminants ranging from fruit stickers and plastic bags to accidentally-discarded silverware. All of these must be removed before being brought to a DEP facility. Those materials do not break down during digestion and can damage pumps and other equipment if introduced into our processes; they can also pass through our process and lead to contamination in the biosolids, impacting quality and reducing the number of beneficial use outlets willing to receive our biosolids.

In addition to removing contaminants, material must be turned into a pumpable liquid in order to be metered into our digesters. DEP can only accept liquid wastes or solid wastes that have been blended with liquids into a pumpable slurry. Vendors could arrange with DEP to bring high-solids slurries with the ability to add plant effluent water for dilution, but DEP cannot accept dry, unmixed scraps even if they are clean.

To help the vendor community better understand what materials we would accept for co-digestion, we provide specifications below including recommended testing methodologies. Any agreement to accept material at participating WRRFs would be contingent upon vendors being able to provide samples of materials that meet the criteria listed below.

Table 3: Quality specifications for acceptable material for co-digestion

Parameters	Proposed Value	Testing Methodology
Total Solids (%)	12-18%	SM 1684 G (EPA, 2001)
Total Volatile Solids (%)	>85%	SM 1684 G (EPA, 2001)
pH	3.0 - 8.0	SM 4500-H+ B (APHA, 2005)
Total Inerts	%dw <0.5%	Method TMECC 0306
COD/TKN	>12:1	COD: SM 5220 D (APHA, 2005); TKN: EPA Method 1687 (2001)

3.2 Transportation or transmission of organic material to WRRFs

Like most solid waste in the city, organic material has historically moved through the city by diesel-powered trucks; as we grow our capacity for co-digestion, we will change the way in which material is delivered to our gates to a more environmentally just solution. Some of our WRRFs are located in what have been designated as “Environmental Justice Communities,” i.e. regions where the residents bear a disproportionate burden of environmental impacts such as air quality. While convenient, these trucks impact the air quality surrounding our WRRFs; any increase in organics deliveries should be paired with improvements in transportation options that reduce the impact on local communities. DEP is open to multiple new strategies for delivering pre-processed organic materials to our facilities such as barging or pumping that would decrease the burden of truck traffic that might result from a co-digestion program on the surrounding communities.

We encourage respondents to consider if barging material is feasible and what, if any, changes would be required to facilitate this mode of transportation. Barging organic material to our WRRFs is an attractive proposition because of our existing infrastructure and the inherent efficiencies that come with transportation by water. New York City’s history indicates that barging large volumes of material is feasible. Over a century ago (before the invention of diesel trucks), over 2,800,000 tons of material per year were transported through Newtown Creek by barge. Some of that cargo was heavy metals or petroleum that remains in the surrounding soil and riverbed sediments; dredging this material to navigable depths could enable a new era of efficient, barge transportation, revitalizing the ecosystem and alleviating truck traffic across the city.

Because our WRRFs are coastal assets (they discharge clean water into waterways), they are well suited to receiving material by barge. With the exception of Oakwood Beach, all of the WRRFs listed in Table 1 have docks currently used by a fleet of sludge vessels that move material (usually digestate) between WRRFs. To enable delivery of a bioslurry, we would need to construct pumps and piping for that specific material flow, but this could be accomplished if we receive sufficient interest in barging material for

processing. Respondents should note if waterways would need to be dredged to navigable depths in order to facilitate a network of barge transportation.

Another option DEP would consider is pumping pre-processed material through pipes to our facilities. The network of sewers that collect and convey wastewater to our WRRFs is proof-of-concept that piping material is feasible. The fact that pipes would eliminate the need for vehicles to move material makes it an attractive option if pre-processing is located close enough to our facilities that the costs of adding additional underground infrastructure do not outweigh the benefits.

We have listed barging and piping as examples of ways to transport pre-processed bioslurry to our facilities because these are methods that we are familiar with as a wastewater utility. Respondents with other ideas that would reduce the need for diesel trucks for material transport are encouraged to submit their ideas as well. DEP is open to reviewing all ideas around creative transport.

3.3 Receiving Capacity at WRRFs

The final step to unlocking our capacity to co-digest will be establishing receiving stations for food waste along with a system to track deliveries from multiple vendors. Each of the WRRFs that we operate is gated; for deliveries that arrive on wheels, we will need to create systems for haulers to access our sites and record deliveries for invoicing; we will also need to install and operate equipment to enable offloading from the truck into our digesters. As we plan to expand our co-digestion capacity, we will look for solutions ranging from specific technologies or equipment to facilitate receiving and tracking deliveries to partnerships with third parties that might manage the receiving of organics on-site for us.

We are specifically interested in solutions that can be rapidly deployed by 2026 to accommodate increased material flows from the city's Curbside Organics program. We have identified Newtown Creek, and Hunts Point WRRFs as priority sites for receiving capacity; if there is more demand for in city processing, we will also consider adding receiving capacity to Oakwood Beach, Owls Head, North River, Red Hook, or Wards Island.

4. Questions

DEP welcomes responses to any question or combination of questions listed below; respondents do not need to answer every section, nor do they need to answer every question within each section to which they are responding. Please feel free to provide information beyond what is requested should you think it relevant. Information provided in RFEI responses will inform DEP plans and may also inform the Citywide Organic Study and other planning efforts.

4.1 Pre-processing capacity for Source Separated Organics

DEP intends to offer its digester capacity to the city as a way to responsibly manage organic material within New York City's boundaries. In order to achieve this goal, we will need to partner with external stakeholders who are capable of pre-processing organic material into a pumpable slurry fit for digestion. With that context:

1. Please describe the technology you are proposing to prepare a material that meets the specifications from section 3.1. How would this material be pre-processed to remove contaminants such as glass, metal and plastic and to ensure a pumpable consistency that can be metered into our digesters?
2. Do you anticipate any challenges meeting the specifications laid out in section 3.1?
3. What quantity of organic material do you anticipate processing for delivery to a DEP facility? What variability do you expect in your operations?
4. How will your source organic material? What information (e.g., origin) will you be able to share about the source of the material you provide to DEP?
5. Where in the city is your planned or existing pre-processing capacity located?
6. What revenue sources will you rely on to manage collection and processing of organic material?
7. What actions can DEP take that might support your efforts to increase pre-processing capacity within New York City?

4.2 Additional organic feedstocks for Co-digestion at WRRFs

Our specifications are meant for Source Separated Organic material that has been pre-processed, but we would entertain other organic material if we can determine that it would not be harmful to our process or deteriorate the quality of our biosolids. Respondents who have a material that might be well suited for co-digestion are encouraged to share as much information as possible about the material for our understanding. With that context:

1. What is the source of the organic stream you propose bringing to DEP?
2. Are there examples of this material being used as a feedstock for co-digestion in other municipalities?
3. What are anticipated volumes and rates of deliveries? Is there variability in feedstock production?
4. Where in the city is the material produced?
5. Which WRRF locations would you consider delivering to? What makes preferred locations more convenient than others?

4.3 Transportation of Organics to DEP WRRFs

DEP's plan is to accommodate deliveries from any parties that can ensure material meets the specifications laid out in section 3.1, table 3; we hope to encourage novel forms of transportation that reduce environmental impacts on the surrounding communities. Comments from the waste processing and hauling communities will inform the decisions we make as to where we invest in growing co-digestion. We are particularly interested in ideas for transporting organic material to our WRRFs by means other than diesel trucks. Given our experience with sewer infrastructure and the fact that each of our WRRFs included in this RFEI (other than Oakwood Beach WRRF) has a dock that is currently used for our fleet of sludge vessels, we are open to solutions that include barging or piping organic material for delivery into our digesters. With that context:

1. Which WRRF locations would you consider delivering to? What makes your preferred locations more convenient than others?
2. How do you plan to bring pre-processed material to our WRRFs for co-digestion?

3. If you will be using diesel trucks in the near future, please detail your plans to reduce emissions associated with transport, either through fleet electrification or other means.
4. Is barging material an option from the pre-processing facilities that you might collect from? Would any waterways need to be dredged in order to provide a navigable route from a pre-processing facility? What information would you need about DEP docks and surrounding waterways to determine if this is feasible?
5. Would pumping material through pipes be viable for your facility? What assistance or guarantees would you need from DEP for this to be feasible?
6. What revenue sources will you rely on to transport or transmit organics to a DEP facility?
7. Please indicate if there are other barriers preventing you from transporting material to DEP facilities using low carbon strategies.

4.4 *Material Receiving Technologies and Strategies*

Implementing co-digestion will require new infrastructure to receive material and create new tasks on site to accommodate deliveries. All of this must result in minimal disruptions to plant operations. Our hope is to identify pre-packaged solutions to enable rapid expansion of receiving capacity for co-digestion and to assess if we should pursue a public-private partnership to own and operate the feed in station. With that context:

1. Are there existing turn-key solutions for receiving stations that can pump material meeting the specification set out in section 3.1 of this RFEI from vessels and into our digesters?
2. What maintenance is required for continuous operation of a receiving stations?
3. What technologies are available for automating access, delivery, and invoicing for receiving materials delivered to DEP WRRFs?
4. Would you be willing to own and/or operate a receiving station on behalf of DEP? What contractual terms would you want from DEP to enter into such an agreement?
5. Which WRRFs with additional digester capacity would you recommend for deploying additional feed in stations? If there is no existing outlet for beneficial reuse of biogas, would you be willing to partner with DEP and/or other stakeholders to install a biogas system?
6. What revenue streams would be required to finance installation of a receiving station and associated infrastructure?
7. How long would it take to deploy such a system?

5.1 Response Format

The RFEI response must be in writing and in PDF electronic format (via email to the recipient designated in section 5.2 below). The RFEI response must include:

1. A completed Response Cover Sheet (see Exhibit A). If respondent is replying to multiple sections, the response to each section should include a separate cover sheet.
2. A summary of Respondent(s)' background and experience related to organics management.

5.2 Submissions and Inquiries

All submissions or inquiries concerning this RFEI should be directed by e-mail, under the subject line "NYC Expansion of Co-digestion Program", to glroman@dep.nyc.gov. Questions may be submitted until September 8th. The deadline for submission of RFEI responses is September 22nd, 2023 at 4:00 p.m. EST.

Exhibit A

Response Cover Sheet

1. Company Name:
2. Industry:
3. Primary Contact Name:
4. Primary Contact Email:
5. Response to Section (Circle all that apply appropriate selection): 4.1 4.2 4.3 4.4