RESIDUALS/ENERGY CONSERVATION

It is all about energy—power generation through heat recovery in Hartford

Co-digestion with food waste organics—the next step toward net zero operation at Greater Lawrence Sanitary District

Energy recovery using raw wastewater—Barnstable pilot project

After 40 years of successfully composting biosolids, Merrimack plans for the future
You have to take my sludge! INCINERATOR SHUTDOWNS TEST THE CAPACITY OF SOLIDS MANAGEMENT by Ned Beecher, Executive Director, North East Biosolids & Residuals Association

This year has seen major strains in the markets for wastewater solids (sludge) management, especially in southern New England. From January through June, some managers of wastewater solids scrambled to find disposal and end-use options. Trucks stood in lines for hours at some incinerators, waiting to dispose of solids. Others hauled solids to upstate New York and New Jersey. The routine flow of solids from some southern New England facilities into northern New England increased. Some municipalities were caught off guard and scrambled to find disposal options, incurring thousands of dollars in extra expense.

Sequence of Events
One factor in this market upset was the March 21, 2016 compliance deadline for new Environmental Protection Agency (EPA) air emissions regulations for sewage sludge incinerators (SSIs). The new regulation (Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units; Subparts LLL, MM and MMM of 40 CFR Part 60), finalized in 2011, requires all SSIs to meet prescribed ceiling limits on emissions of specific contaminants, including particulates, carbon monoxide (CO), nitrous oxides (NOx), and mercury (Hg). In addition, the new regulation requires site-specific emissions monitoring tests and plans, operator training, and record-keeping. As the regulations compliance deadline approached, some SSI operators took only limited steps to prepare, in part because of involvement in a major, multi-party legal challenge brought against EPA that may have changed or delayed the requirements. In contrast, other SSIs had prepared for several years, including installing new emissions control equipment. In response to the regulation, each SSI owner and operator had to analyze its needs and best options, and the local decisions and actions regarding each of the SSIs in New England (as well as some in New York) had their impact on what became a crisis in the solids management market in 2015. But the March 21 compliance deadline was not the only factor. There was the normal uptick in solids production that occurs each year in late winter and spring as wastewater flows increase from snowmelt and precipitation. And, over the past few years, there had been other solids management capacity reductions that played a role as well, such as:
- Rhode Island’s 2010 floods wiped out the biosolids compost operation at West Warwick, Rhode Island, and eventually that operation was closed permanently, pushing about 6,000 wet tons (5,600 tonnes/year) (1,000 dry tons (900 tonnes/year)) onto the market.
- In recent years, several communities (e.g., most recently Dover, New Hampshire) abandoned on-site composting, and their solids have entered the market.
- In 2012, Fitchburg, Massachusetts, faced aging infrastructure upgrades in addition to the projected cost of meeting the new SSI air emissions regulations. The SSI, which had processed liquid solids from Fitchburg and many smaller communities, was closed. Communities that relied on Fitchburg scrambled to find other options for their liquid solids disposal—a preview of what was to come in 2015.
- In 2013, the Montevent, Vermont landfill closed; it had taken in mostly Vermont wastewater solids.
- For several years, the WeCare Environmental alkaline stabilization facility in Plymouth, Maine, has faced increasing local opposition due to its inability to control malodors. It has received numerous Notices of Violation (NOVs) from the Maine Department of Environmental Protection. In the past year, managers reduced the volumes of incoming solids, some of which had been hauled from as far away as Rhode Island. The facility, which has a permitted capacity of 60,000 wet tons (54,000 tonnes per year) per year, was receiving only about 10,000 (9,100 tonnes) in 2015. By June 2016, the facility was closing and all solids on-site were being removed. Facility management talks about developing a gasification system on the same site, but that is only in the early, exploratory stage, and because of technical and financial challenges no operating full-scale gasification system for wastewater solids in North America exists despite several attempts.
- In 2015, the Barre, Massachusetts landfill closed and that town’s solids went onto the market. The same thing may happen in the next year or two in Manchester, Connecticut.
- And, in April 2016, not far away, Mansfield, Massachusetts, stopped taking in outside solids from area towns as the plants treatment system hit capacity, local politics arose, and its solids destruction system came under increased scrutiny.

In the last five years, the only new capacity offsetting these losses has been minor expansion at a few merchant facilities, filling of excess capacity here and there (e.g., Merrimack, New Hampshire, and Lewiston-Auburn, Maine), are now composting solids from a few other water resource recovery facilities (WRRFs), and a new digestion facility opening this year in Brunswick, Maine plans to take in outside wastewater solids. Incinerator capacity had expanded considerably in the 2000s (Table 1), creating a sense of plenty of capacity, and prices actually were stable for about 10 years and even fell, as merchant SSI competed for solids to fill their increased space.

Table 1. Status and capacity of New England’s sewage sludge incinerators (dry US. 5 tons of solids per day)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Manchester, NH (Manchester)</td>
<td>—</td>
<td>36</td>
<td>No</td>
<td>Fluidized bed; has proactively worked toward compliance with new air emissions regulation.</td>
</tr>
<tr>
<td>Lynn, MA (Veolia)</td>
<td>—</td>
<td>15</td>
<td>No</td>
<td>Fluidized bed; has installed upgrades to comply with new air emissions regulation.</td>
</tr>
<tr>
<td>Fitchburg, MA</td>
<td>CLOSED (in 2012)</td>
<td>Yes, until closed</td>
<td>Fitchburg solids go to landfill now.</td>
<td></td>
</tr>
<tr>
<td>Brockton, MA (Veolia)</td>
<td>18</td>
<td>18</td>
<td>No</td>
<td>Multiple hearth; completed upgrades to meet new air emissions standards in January 2011.</td>
</tr>
<tr>
<td>Fall River, MA (Fall River)</td>
<td>CLOSED (in 2016)</td>
<td>No, now closed</td>
<td>Costs to meet new air emissions regulation; too great; solids now going to merchant incineration facilities.</td>
<td></td>
</tr>
<tr>
<td>Upper Blackstone WPCF (Upper Blackstone)</td>
<td>91</td>
<td>144</td>
<td>Yes, but more selective than before</td>
<td>Multiple hearth; SSI permitted throughput is now limited by stack test.</td>
</tr>
<tr>
<td>Hartford WPCP (MDC)</td>
<td>60</td>
<td>120</td>
<td>Yes, but less than before</td>
<td>3 multiple hearth units (permit limits operations to 2 units at one time). Takes in less solids now. Has energy recovery system.</td>
</tr>
<tr>
<td>New Haven, CT (Synagro)</td>
<td>—</td>
<td>42</td>
<td>Yes, but less than before</td>
<td>Multiple hearth; takes in less solids now. Has energy recovery system.</td>
</tr>
<tr>
<td>Mattabassett – Cromwell, CT (Mattabassett District)</td>
<td>—</td>
<td>36</td>
<td>Takes in liquid only, but less than before</td>
<td>Fluidized bed; has proactively worked toward compliance with new air emissions regulation.</td>
</tr>
<tr>
<td>Naugatuck, CT (Veolia)</td>
<td>54</td>
<td>84</td>
<td>Yes</td>
<td>Fluidized bed; provides significant capacity; contract for operations expires in 2020.</td>
</tr>
<tr>
<td>Waterbury, CT (Synagro)</td>
<td>—</td>
<td>60</td>
<td>Yes</td>
<td>Fluidized bed; currently seeking input on future options; current contract expires soon.</td>
</tr>
<tr>
<td>West Haven, CT (West Haven)</td>
<td>—</td>
<td>10</td>
<td>No</td>
<td>Fluidized bed.</td>
</tr>
<tr>
<td>Cranston, RI (Veolia)</td>
<td>40</td>
<td>66</td>
<td>Yes</td>
<td>Multiple hearth; takes liquid solids only; has been reliable outlet.</td>
</tr>
<tr>
<td>Woonsocket, RI (Synagro)</td>
<td>70</td>
<td>110</td>
<td>Yes</td>
<td>Fluidized bed; has completed significant upgrades to meet new air emissions regulation.</td>
</tr>
</tbody>
</table>

Note: Glen Falls, NY (Sawtova Springs) have taken New England wastewater solids in the past. Glen Falls and Sawtova Springs incinerators are now closed due to costs of aging infrastructure and upgrades to meet new air emissions regulation.

Nuagatuck, Connecticut, for example, was taking in solids from as far away as Long Island, to keep the SSI full and to help offset high fixed costs. But by 2015, that sense of excess capacity was fading. Coming into 2016, the capacity for solids management in New England had been diminishing. So the new SSI air emissions regulation compliance deadline in March was the last straw—a point in time on which SSIs focused. Decisions at SSIs began to pile up, with facility shut-downs increasingly overlapping:
- The SSI at Glen Falls, New York, closed, unable to afford the upgrades needed for compliance, shutting off an outlet on which several Vermont facilities especially had relied.

ARTICLE

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...the capacity for solids management in New England had declined significantly. So the new SSI air emissions regulation command deadline in March was the last straw

- Likewise, Fall River, Massachusetts, evaluated its options and found the prospect of upgrades too costly. It shut down its SSI permanently this year, selling its solids into the market.
- The Brockton, Massachusetts WRRF addressed the new air emissions requirements early, completing upgrades in 2011 that allow it to meet the new standards. But it only processes Brockton solids.
- The Upper Blakely site (serving the Woonsocket, Massachusetts area) has addressed the new SSI air emissions requirements and trucked in as much outside solids as it was allowed during SSI stack tests required by the new regulations. However, the solids throughput tested was lower than the rated capacity of the incinerators, and therefore the SSI throughput is currently limited by the stack test results.
- The SSI at Lynn, Massachusetts, invested in new air emissions controls more recently. After running the new system for several months in 2012, it shut down the entire system due to operational problems. New Haven’s multiple hearth incinerator (HMI) seemed able to meet the new standards applicable to that kind of SSI, but upgrades at the WRRF have meant it can’t take in as much outside solids as just with the Metropolitan District Commission in Hartford. The fluidized bed incinerator at Mattabassett required investment of considerable time and money to meet the stricter limits for that kind of SSI. Both facilities had to reduce the amounts of outside solids taken in.
- Operators of West Haven, Connecticut’s MHI, which was rebid in 2012 and have been evaluating its compliance needs in early April, a mechanical failure shut it down. Hartford Metropolitan District helped out (as did other SSIs), but the deliverers to Hartford were sporadic a truckload one day none for a few, and then suddenly five in a day. To ease its own operations, Hartford stopped taking it. Thus, a considerable portion of West Haven’s solids have had to be hauled out of state. In August, the SSI shut down again.
- The larger privately run merchant facilities in Connecticut and Rhode Island mostly planned ahead for online upgrades before this year. More than $6 million were spent on upgrades at the Woonsocket, Rhode Island SSI. The Cranston, Rhode Island MHI facility can meet the new air emissions standards, but it has retained a reliable outlet for liquid and solids. But that reliability has led to lines of trucks waiting at the gate, as other options for liquid solids have diminished.
- Waterbury, Connecticut, is facing challenges. Barrister infrastructure repairs are needed, and upgrades needed to meet the new air emissions requirements add to the cost of continued operations. In the past 18 months, the city has issued three requests for proposals of interest seeking suggestions—upgrade the SSI or do something else with the solids. Three bidders presented ideas at a meeting in early July and a decision was expected in late summer.
- And most significantly in late January, the Naugatuck SSI, one of the large merchant facilities (its dry tons [16 tonnes] / day), had mechanical issues and shut down. Repairs continued until close to the March command compliance deadline, and rather than operate out of compliance, the shut-down was extended. (A contract dispute with the town of Naugatuck was an added complication.) Negotiations with the enforcement staff at EPA Region 1 resulted in a plan to move forward, and the facility started up again on June 29.
- The facility operator absorbed the costs of the shutdown and was aware that larger amounts of capacity heightened the solids management crisis.
- Suddenly, haulers now have to take loads of solids—especially liquid and smaller facilities with more municipalities trying to have them to deal with the service they found there locally. So they came back to our facility and accepted a substantial rate increase to cover the increased transportation costs of our operators, for the most part, fixed. It is extremely difficult to site new disposal facilities, and the ones we have operating now are becoming increasingly expensive due to their age and new regulatory requirements” (Jager, 2008). At the same time, the 1990s had seen a public controversy over biosolids land application that led to restrictions in numerous towns in New England, with up to a third of large SSI systems having to shut down. As the result, municipal officials responsible for establishing safe, environmentally and economically sound programs are dealing with a “mountain crisis” to keep their plants running.

A few years later; another NEWEA Journal article counted 14 SSIs in New England, which, along with thermal-drying facilities at Greater Lawrence Sanitary District (GLSD) and the Manhattan, New York Water Resources (billion tonnes) served "some 8.5 million people and managed “more than 75 percent of the municipal wastewater sewage solids generated in Connecticut, Massachusetts, and Rhode Island” (Donovan, 2004). The author touted the benefits of regional facilities, especially the cost benefits for smaller communities that transport their solids—often in liquid form— to a moderately distant disposal facility. For example, he noted that Plymouth, Massachusetts, decided to abandon a plan to build a new dewatering system, "owing to a considerable decrease in the solids service market in southern New England.” By simply transporting liquid (not dewatered) solids to incineration, they saved $1 million in capital costs. In 2004, there was adequate capacity, and costs for solids disposal were reasonable.

Indeed, according to several solids management professionals, for much of the past decade there had been adequate, or excess capacity in the solids management marketplace in New England—especially in the incineration market. As Donovan reported in 2004, several of the region’s larger SSIs at that time were installing new fluidized bed burners or flue gas recirculation systems, significantly increasing the amount of solids they could process (Table 1). So was this year’s capacity crisis an anomaly? Perhaps some.

But the timing of the crisis could have been foreseen, with the March 21 compliance deadline for the new EPA air emissions regulation piling on the fact that the region’s incinerators—like other infrastructure—have been aging while municipal budgets and regulations have been tightening.

Was Over-Reliance a Factor?

The constraints of the new air emissions regulation strained the New England markets for wastewater solids use and disposal in part because of southern New England’s long-term heavy reliance on incineration. That region holds the operators of seven or eight SSIs in North America Table 1. New England’s wastewater solids facilities. As it had done before the 1980s, Connecticut and Rhode Island especially have relied on incineration for disposal (Donovan, 2004), and a good amount of Massachusetts’ wastewater solids (Table 1) have been generated as well. At the turn of the century, New England produced roughly 280,000 dry U. S. tons (256,000 tonnes) of solids annually, and 90% of New England’s wastewater solids were incinerated at many smaller, single- or co- operated sludge facilities in Connecticut, Massachusetts, New York, and Rhode Island (Jager, 2004). In 2004, 34 percent of the 18,000 dry tons (10,070 tonnes) of Massachusetts’s solids (Figure 1) were dewatered (8,590 dry tons [7,800 tonnes]) of solids produced in Rhode Island were incinerated, mostly at SSIs in those two states. Much of Massachusetts’ wastewater solids have been incinerated at several in-state SSIs, and one SSI has long served New Hampshire’s largest city, Manchester. In 2004, 20% WRRFs (40 percent of New England’s facilities) were sending solids to a Connecticut incineration facility, and through 2006 New England was about 370,000 dry U. S. tons (337,000 tonnes) (East Biodisposals & Remaining Association (NEBRA) et al., 2007). Today more than 400,000 dry U. S. tons (365,000 tonnes) of wastewater solids are produced in New England (Figure 1).
What’s next for New England’s SSIs?

March 21 was the deadline for sewage sludge incinerators (SSIs) to comply with new EPA air emissions regulations. The rule was originally instituted by a court order and first proposed in October 2010, with new emissions standards finalized on March 21, 2011 (Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units, Subparts LLL and MMM of 40 CFR Part 60). Five years later, after some litigation, the rule and the original compliance deadline remained intact.

But what looks, in retrospect, like a change from new rule promulgation in 2011 to implementation in 2016 was anything but. The new air emissions regulations are complicated—for more than the air emissions requirements under 40 CFR Part 503 (EPA biosolids rule), applied to SSIs before. In addition, the SSI air emissions rule was linked to other developing rules (e.g., definition of sludge as a solid waste), which created even more confusion. And as the court challenges against the rule progressed, led by the National Association of Clean Water Agencies (NACWA) and several municipalities (including, for example, Hartford Metropolitan District), it was not unreasonable for stakeholders to assume that the final rule would be changed or delayed. So, when March 21 came around, almost all the 14 SSIs in the region were not ready, and some had not prepared for compliance, despite several EPA assurances that the rule was going to happen—vindicated on time. Of course, EPA was also behind in, for example, developing the final implementation guidance for the new rule (under 40 CFR Part 62), that document was finally signed by EPA Administrator Gina McCarthy on February 27, 2016, only a month before the compliance deadline. And EPA Region 1 air program and enforcement staff, who started out little experience with SSIs and their unique operations and complications (and their associated water resource recovery facilities), were burdened with applications and reports submitted by SSIs beginning to work toward compliance.

Thus, looking back, it is easy to see how these and other forces led to the most stressful testing of the region’s solids management markets in decades for many operators. This spring’s crisis understandably headlined misunderstandings and apprehensions regarding the new EPA air emission regulations and how it will be enforced. As the March compliance deadline moves into the past, some things become clearer:

• EPA Region 1 is enforcing the rule. So far, as of mid-August, it had sent Notices of Violation (NOVs) to eight SSIs (Brockton, Cranston, Manchester, Naugatuck, New Haven, Waterbury, West Haven, and Woonscott), listing numerous compliance violations as of the rule’s effective date of March 21. The rest have had or will soon have site visits from EPA. Most of the facilities seem able to meet all or most of the new air emissions limits. (Mercury is a challenge for some, and that has been the target of many of the most extensive emissions control upgrades in recent years.)

• The regulation requires far more than SSIs have had to do before, and operators as well as EPA staff are still continuing learning. For example, the new regulation requires strict control and monitoring protocols that will help ensure continuous compliance with the new emissions limits. Most of the violations being identified by EPA pertain to those control and monitoring systems, including the need for approved emission testing for specifying operating parameters. A control plan is required for each of the nine regulatory units. This is challenging for mercury emissions since an SSI does not need to install new controls to meet the applicable standard. According to EPA, an option is to use theoretical calculation and mass balance of mercury in the wastewater and incineration system, and apply conservative assumptions to demonstrate the likelihood of an exceedance is very low. But, as one SSI operator noted, it is hard to complete mass balance calculations in the complexity of a sewer system, a WRF, and an incineration system.

• The NOV process is unlikely to shut down any facility. As Steve Rapp, EPA Region 1, has pointed out, “We have not required facilities to shut down while they are working toward compliance.” He noted, for example, that in response to apprehensions at Naugatuck (and the defeat of a bond vote that would have funded the needed upgrades), EPA wrote the city a letter saying EPA would work with the borough to establish a compliance schedule for the design and installation of any necessary air emissions controls. “We recognize these agencies want to ensure that there are safeguards in place and they are not creating an immediate or imminent danger to public health. I don’t think that most of the things that need to be done at these facilities is a significant endangerment of public health. However, we do require that they work toward minimizing emissions.” He pointed to the operations at the Lynn SSI as an example of good practice: “As they have been working toward full compliance, operators have taken back the solids feed rate as a hedge toward reducing emissions.”

Operators have clear that EPA does not have any say or preference in how a WRF’s solids are managed. “EPA, I understand, is saying that we can’t meet the air standards and regulations. We are in the mode of seeing that people are following those standards, setting a level playing field. We are not saying that this way of managing this material should be stopped. A decision to no longer operate is outside our decision-making that is the municipality’s decision. All we are concerned about is people being in compliance with the standards.”

The NOV process now leads to meetings between each SSI and EPA, at which expectations, solutions, and timelines are agreed to. EPA understands that some upgrades will take a year or more to design and install. Rapp says EPA just needs to see plans and stay steady.
A stand-alone anaerobic digestion system can serve as a source of biogas for smaller facilities for the generation of various WRRFs (as noted above, outlets for liquid solids are particularly needed).

Anaerobic digestion can reduce solids volume dramatically, creating less to be managed.

Anaerobic digestion has received much attention in recent years. Many projects have been proposed, but few have come to fruition for a variety of technical, regulatory, and grant support from the Commonwealth of Massachusetts, including required diversion of food scraps from landfills. Many reasons account for the lack of progress on new anaerobic digestion capacity. One is that proponents of anaerobic digestion find it difficult to secure long-term, stable contracts for large enough volumes of food scraps and other organic residues, a problem that new proposed digesters also often overlook. It is that taking in wastewater solids can make a project more financially viable. For example, the most promising anaerobic digestion project recently was planned for Bourne. It was to take in wastewater solids. But, even in 2016, the plan was scrapped due to funding shortfalls related to a failed power-purchase agreement.

Massachusetts does have two successful on-farm digesters treating manures and source-separated organics (SSO), but, like many of the recently proposed anaerobic digestion projects, they are not permitted for, or do not accept, wastewater solids. Similarly, in Connecticut, which passed its large-scale food-waste ban legislation in 2011, only one of five proposed anaerobic digestion projects has moved ahead.

One significant issue in developing capacity for organics management through anaerobic digestion is co-digestion is discouraged. This seems to be the position of the Connecticut Department of Energy and Environmental Protection, and in contrast, organics management professionals—and some regulatory agencies such as the Massachusetts Department of Environmental Protection—has been concerned that wastewater solids are not that different from SSO; and, for anaerobic digestion projects to be economically and functionally viable and sustainable, the contributions of liquid and organic residuals provides flexibility and a better chance of success.

This is the model that seems to be working for Village Green Ventures in Brunswick, Maine. This new 60,000-gallon (500,000-liter) digester will co-process solids from the local WRF along with SSO, and will likely take in other WRRFs solids.

New capacity does not include all required processes in stand-alone, merchant anaerobic digestion systems advances more slowly, more immediate promise lies in expansions of existing capacity in anaerobic digestion systems at WRRFs. Such significant improvements are taking place at WRRFs throughout the country (e.g., California), and the markets for high-quality compost and other soil amendments remain strong.

Indeed, despite such two new regional facilities have been built for processing New England wastewater solids for beneficial use. The first is the Residuals Management Facility in New Hampton, New Hampshire. It treats raw and digested digesters with algae in addition to co-processing wastewater solids and organic residuals processing, and producing valuable products.

The second is actually not in New England. The Casella Grasslands facility in Chateaugay, New York, produces Class A advanced alkaline stabilized biosolids for use on farms, such as dairy and beef feedlots. The primary source of the wastewater solids it processes come from Chittenango County (Burlington, Vermont area). While it operated as a facility in New York, it does not meet any of the state’s residuals management regulations. In New York, the facility does not provide much for the rest of New England, because of its distant location in upstate New York.

What About Landfills?

Over the past 30 years, most local landfills have been closed, and standards for landfill construction and operations have tightened dramatically, leaving a relatively small number of large regional landfills to service New England (Table 2). Some of these landfills accept wastewater solids. They require the solids to be dewatered and to meet paint filter tests and sometimes other requirements. Landfill operators and neighbors dislike odorous solids, and prices for disposal are generally higher for solids. Some landfills for biosolids are continually addressing questions and concerns from the public. But, today, there is much information and help available for that from NEBRA, NEBRA’s and its Residuals Management Committee, WEF, and others.

Another angle to consider is solid minimization. Less solids to manage means lower costs. While a quality biosolids product can have high demand (and some producers run out every year and have farmers on waiting lists), every ton that needs to be managed still has net costs associated with it, even accounting for any revenues. Therefore, if you can produce less, you save money. For Lawrenceville, that was the main economic driver behind its new anaerobic digestion system: most of the savings came from reduced solids end-use costs, and that was eventually passed on to customers in the form of lower charges for the wastewater material for use as outside waste. Anaerobic digestion is a proven form of solids minimization. Over the years, a variety of technologies or processes have been developed to take on a variety of feedstocks and to be magic black boxes that did not perform. Still, the goal is worth of consideration by any WRF solids management planner.

Diversity Options

Diversification of options has long been a cornerstone of the anaerobic digestion process. Many of North America’s largest WRFs use several different solids treatment processes as different digesters or markets for the products.

A benefit of making a quality biosolids product is an increased diversity of end-use and disposal options. MVRA and GLSD are currently the two producers of heat-dried Class A biosolids pellets. The new type of biosolids product has been used as an alternative fuel in a Maryland cement kiln, where it replaces some coal (with lower emissions). If this process proves successful, it will be magic black boxes that did not perform. Still, the goal is worth of consideration by any WRF solids management planner.

What About Biodegradable Wastes?

Waste water treatment continues to be a major challenge for utilities. Anaerobic digestion of the vast array of wastes that end up in wastewater systems can provide a long-term solution to problems currently being experienced. In many cases, anaerobic digestion can reduce the costs of treating wastewater solids, and can reduce the amount of volatile solids that end up in the air, water, and ground. In addition, anaerobic digestion can reduce the amount of solid waste that is disposed of in landfills or incinerators.
really only one place to go for disposal—an incinerator. For a small facility that is not a problem, because the incinerator still operating in this region today are likely to continue to do so, and many are large enough to absorb a few truckloads a week from a small plant. But a larger facility, or a lot of small facilities together, can begin to test the system’s capacity. Should the system reach capacity, liquid sludge cannot go to composting or landfill without deterring and quickly becomes ever harder to haul longer distances. A plant with a liquid-only program only can suddenly face large increases in disposal costs.

Cost Expectations

Providing a sense of the cost for solids management is challenging, because many factors affect tipping fees and the prices charged by contracted wastewater disposal management companies (Table 3). And calculating in-house costs of solids treatment and management is an even greater challenge. The simplest common indicators of disposal costs are tipping fees charged at a facility where solids are discharged and/or the contracted price for a biosolids management company or hauler to take solids from a WWRF. Most tipping fees are straightforward, but even they will change based on the nature of the particular wastewater solids. For example, some landfills charge more for lower solids (< 20% solids) material, because it requires more careful integration into landfill waste. Similarly at a compost facility, a lower-end solids means more amendment is needed. In New England, tipping fees are $35 to $120/ton ($35 - $120/ton) at landfills and $35 to $250/dry ton ($25 - $158/ton) at incinerators and composting facilities.

The prices in contracts for biosolids management companies to take raw or processed biosolids from a WWRF vary much more because factors influence the price calculation. Factors affecting the price a contractor charges for taking solids from a WWRF include:

- Changing fuel costs (Some contracts adjust the per-ton price based on actual fuel costs.)
- Odor potential or other nuisance concerns (more odorous biosolids require additional contractor care)
- Distance from the WWRF to the planned use or disposal site(s)
- Percent solids of the material
- Level of stabilization (Class A, Class B)
- Chemical quality (e.g., metals)

In general, use of biosolids on soils can be less expensive than for landfill disposal. But it does depend on the level of treatment at the WWRF. For taking raw dewatered solids and providing hauling, treatment, and land application, a biosolids management company may charge $150 to $300/ dry ton ($150 - $300/ton). However, if the WWRF treats its biosolids to Class A EQ standards, the biosolids management price will increase. The Biosolids marketing and distribution, and the price is around $350/dry ton ($350/ton). One contract for land application (or other use or disposal) of a low-odor; Class B biosolids produced in southern New Hampshire is priced at around $120/dry ton ($120/ton) for every one.

This year, however, prices are changing. Said one hauler of liquid solids: “Customers have had it good for a very long time...As conditions expand, that will go up.” This sentiment was mirrored by all those interviewed for this article. Contract solids management prices for companies taking solids from a WWRF have increased from an average of around $30/tonne ($30/tonne) in 2005 to $90 ($90) or more in mid-2016. Some contracts now show more than $100/wet ton ($100/ton), which, assuming 25 percent solids, is more than $200/dry ton ($200/ton).

Conclusion

Since the spring of 2016, indications are that, for at least the next couple of years, New England will have little excess capacity in the solids management market. And when supply is short, prices go up. The companies that operate large commercial operations and are dominated to benefit from these with their contracts, standards, and pricing. Some public SSIs are doing the same. One incinerator operator said: “We’ve started to increase our rates. And we’re being more careful looking at what comes in. Settage rates are going up to go as well...”

To set the price for a sludge, I look at how much capacity I have. If we have a facility, I’m going to do that for a long-term duration you get a better rate. But if you’re bringing just one truck a week that’s digestate you’ll pay more. Also, I don’t have the ability to store solids, so we’ve economically incentivized people to come at off-hours to equalize loading to the plant. We just started doing this in the past two years. We also prefer to provide service for Connecticut, so comes every week. We don’t have the ability to store solids. And we encourage dry-ton contracts, not wet tons or gallons. We test every new customer for metals, do testing ourselves to ensure the data is from the recent past. We had one Massachusetts customer show some normally non-detect PCB congener, and we told the customer to clean it up before bringing in any more.”

In addition, solids managers and haulers are having to work harder on tracking the market to locate capacity. They need to be ready for unexpected shutdowns that may force them to haul solids to New York or New Jersey or wait hours in line at a disposal outlet—adding significant costs to their operations. Said one incinerator manager: “While the capacity used to be great enough for all of us to help each other out in a pinch, this spring that became no longer possible all the time. Each incinerator is having to protect its own operations and interests more carefully now.”

So the major message from this year’s crisis is that WWRF managers need to pay close attention to solids management. Review your options and contracts. Expect price increases in the next year or two. Have contingency plans. Talk regularly with your solids management partners to understand what you will do and when you get the call: “We have nowhere to go with your solids today.” Can you call on a back-up option? Have a plan in place to foot the increased cost? This year’s events also remind the wastewater profession—operators, managers, engineers, and regulators—that solids management is a constant challenge. An increasing number of states are restricting future impoundments, which may increase our working of solids management.

The growth of beneficial use on soils is stymied by excess regulation driven by public perception.

New England has always been known for our beautiful landscapes, and we want to keep it that way. But regulations sometimes don’t allow that. The market is naturally responding. Prices are increasing and will, perhaps stimulate new options and capacity. But for public utilities to be economically feasible for most of the past decade, these new costs will be competing with other vital local needs, including aging infrastructure and tighter regulatory requirements on the liquid and stormwater side.

Wastewater treatment is a challenging task in this region and across the continent. There are opportunities, but ever-increasing environmental regulations are driving many SSIs hard to keep their plants running. And many municipalities can manage. Solids management costs are a significant portion of any WWRF’s budget, and all the current drivers—regulations and aging infrastructure—are only driving those higher.

As one of those interviewed for this article noted, “It makes sense to think about this in terms of options for solids management. It’s important that treatment plants think about this.” Another person said, “I hope DEEP is paying attention. I think it is hoping this will not become an issue. But for municipal plants, it is big deal. Municipal budgets are still tight. When sludge management costs go up to 10 to 20 percent, other needs will become pressing to present the treatment with a not-to-budget increase. For many years, sludges have been a transactional material, just something you pay someone to put on a truck and take away. That’s no longer the case. This is a material that needs attention and expertise for use or disposal, and that costs something. A lot of facilities have ignored this fact.”

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