Septic system savvy

Advanced onsite technologies offer environmentally sound alternatives for cost-effective wastewater treatment.

By Bob Drake

Onsite wastewater treatment may initially evoke thoughts in the minds of many homeowners, regulators, and even civil engineers, of clogged septic tanks and malfunctioning drain fields. However, today's advanced technologies — when properly applied, designed, installed, and maintained, like any engineered system — can be a better alternative to centralized wastewater collection networks and treatment plants, according to system designers, and they deserve consideration.

Market stimulus

According to system manufacturers, residential development trends, cost and funding issues, new technologies, sustainable development initiatives, and regulations are helping drive the onsite wastewater treatment market. "Although overall housing is down in the current market, the demand for larger lot sizes, lower population densities, and low-impact developments are further driving the onsite wastewater treatment market," said Kevin Jehl, P.E., onsite market manager for Advanced Drainage Systems (ADS), which offers a variety of onsite products for a wide range of applications. "A growing percentage of the home-buying public is drawn to property not served by public sewer systems."

New home growth will always be the main factor stimulating the market for onsite, said Dennis Hallahan, P.E., technical director, Infiltrator Systems, Inc., which manufactures plastic leachfield drainage chambers. Although housing is currently in a slump, Hallahan said there are many indicators that show the market may be rebounding or is at least ready for some positive growth.

However, rebounding new home construction may not be enough to drive the current market. "In these difficult economic times, people are trying to save money however possible," observed Gina Carolan, chief operating officer and director of marketing for CULTEC, a manufacturer of plastic septic chambers. "Sometimes that means going back to more conventional septic systems rather than using possibly more costly, innovative alternatives, even though they can save on required space. Individuals are trying to get the most bang for their buck, so there is a fine line between saving money and utilizing the best system available."

But cost is also impacting the market for centralized wastewater systems. Will Kirksey, senior vice president at Worrell Water Technologies, which developed a system that uses plants and beneficial microorganisms to turn wastewater into clean water, pointed out that, according to the American Society for Civil Engineers, an estimated $255 billion is needed to upgrade the nation's drinking and wastewater systems. With current estimated spending creating a $108.6 billion shortfall, many utilities are increasing water and sewer rates, Kirksey said.

Regardless of the great need, federal subsidies for large-scale wastewater treatment plants and collection systems

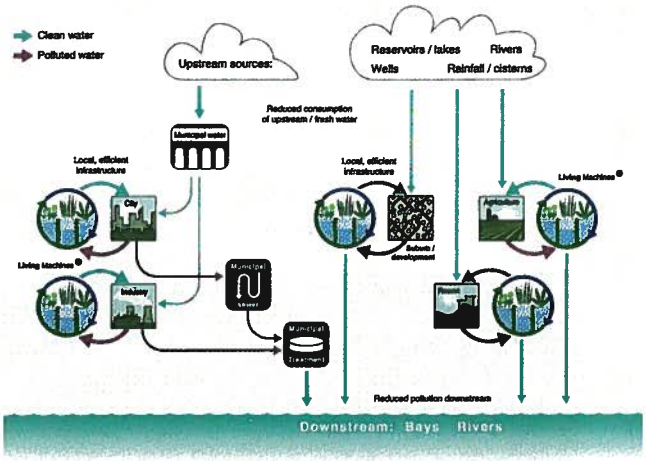
CULTEC said its Charger and Contactor underground septic chambers offer an effective wastewater management alternative to concrete galleries and conventional pipe and stone systems, especially for sites with space constraints.

According to Advanced Drainage Systems, its ARC leaching chambers and other onsite wastewater treatment systems are suitable for a wide range of applications.

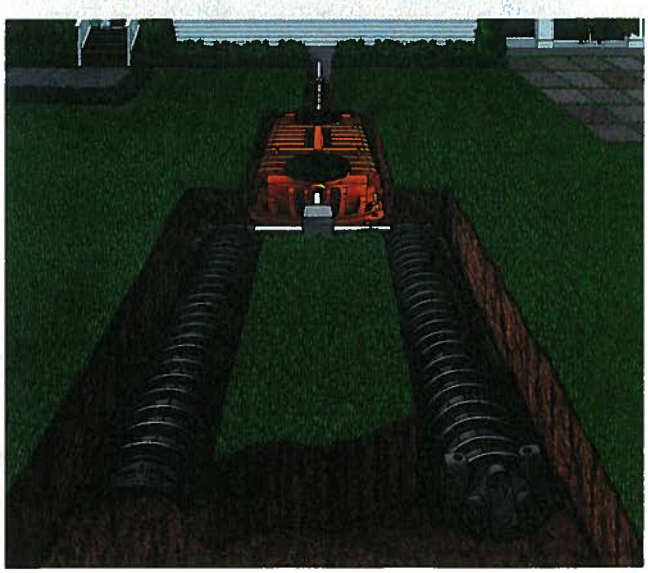
have declined, Hallahan said. "In many cases, when priced comparatively to centralized systems, onsite systems can be the better economical choice," he said.

A significant factor is that onsite (or decentralized) wastewater treatment systems require minimal infrastructure, according to Steve Kingsland, National Sales Marketing & Engineering Group, Oldcastle Precast. The company produces three decentralized systems that use algae to provide advanced wastewater treatment. "With today's budget struggles in local communities, investing in major infrastructure projects can be difficult," Kingsland said. "Unlike central sanitary sewer systems that have large networks of sewer lines, pump stations, and municipal wastewater treatment plants (that require significant maintenance budgets), decentralized systems have relatively small components that are at, or near the source of the waste stream. In addition, using decentralized wastewater systems can allow communities to grow while eliminating the added burden placed on existing municipal wastewater treatment facilities."

According to Worrell Water Technologies, a new decentralized, more natural architecture can be designed to evolve from the current model.



Color rendering of an Infiltrator Systems' onsite wastewater treatment system shows a simple, low-cost, low-energy method to provide a high level of treatment. The recycled material content of the products can apply for LEED points.



Terry Bounds, P.E., owner and executive vice president, Orenco Systems, Inc., noted, "The [U.S. Environmental Protection Agency's] (EPA) 1997 'Response to Congress on Use of Decentralized Wastewater Treatment Systems' identified a number of benefits of onsite systems [that] continue to stimulate the market. Decentralized systems are capable of collecting and treating wastewater to levels that meet or exceed treatment levels from centralized systems, but at a fraction of the upfront costs, and with reduced power and operating and maintenance (O&M) costs." Orenco's patented packed bed filter uses textile media and biochemical processes for wastewater treatment.

Manufacturers have made significant investments in research and development to deliver reliable collection, treatment, and dispersal technologies, according to Infiltrator Systems' Hallahan. "Most or all of the technologies available for large-scale treatment plants are also available for decentralized systems," he said.

"The advancement in onsite technologies, such as low-flow water conservation, watertight septic tanks with effluent screens, disinfection, remote monitoring, nitrogen-removing systems, and small-scale clustering into neighborhood leaching fields, have all improved the function and maintenance compliance of these systems," said Jennifer Cisneros, manager, marketing communications for Bio-Microbics, Inc., which offers pre-engineered, modular treatment systems that use multiple biological, biochemical, and physical processes. "New areas such as membrane technology offer potentially greater possibilities for recycling wastewater techniques."

Kingsland agreed that advanced technologies can broaden the application of onsite wastewater treatment. "[Because of] the spotlight on the quality of our groundwater and surface waters, plus the fact that, according to the EPA's Onsite Wastewater Treatment Systems Manual, 'only about one-third of the land area in the United States has soils suited for conventional subsurface soil absorption fields,' there is a growing trend to require more than just a conventional septic system," he said. "Advanced treatment systems feature added processes above what a conventional septic system typically includes and significantly reduce the strength of the waste before it is discharged to the ground. Reducing the waste strength serves to protect the discharge field and increase its longevity, while protecting local groundwater and surface waters. Some of the advanced systems will treat the wastewa-

ter to a quality that would allow discharge directly into surface waters if local regulations would allow it."

The advantage of this technology, said Eric Evans, RS, program manager for OnlineRME, is that "as more advanced wastewater treatment systems are developed and approved for use, many pieces of property that were once unusable or located within sensitive areas may now be developed." OnlineRME provides web-based services that enable regulatory jurisdictions and other entities to manage onsite wastewater treatment systems with the participation of service providers, system manufacturers, and other stakeholders.

Scott Wallace, chief technology officer, Natural Systems Utilities, a water-management company that plans, designs, builds, owns, and operates onsite, ecologically based water systems, noted that not only are more jurisdictions adopting more stringent treatment standards (such as total nitrogen limits), but also the concept of onsite wastewater treatment is becoming linked more to onsite water reuse and green buildings.

There is an overall trend to more ecological, natural systems and reusing water to reduce demand for fresh water, according to Kirksey. "We need to think about creating a smarter, more natural water system," he said.

According to the EPA's 1997 report, onsite systems "promote better watershed management by avoiding the potentially large transfers of water from one watershed to another that can occur with centralized treatment."

"Onsite wastewater treatment is the best approach to sustaining long-term watershed protection, claimed ADS's Jehl. "In my view, the best wastewater treatment is one that returns clean water back into the same watershed system it was taken from. I firmly believe onsite systems are the best way to do this."

To that end, Cisneros said that Bio-Microbics' advanced wastewater treatment systems are engineered to treat wastewater to standards that can harness renewable water sources from wastewater to provide for water redistribution (such as landscape irrigation or back flow through toilets). "The reclaimed water adheres to the water efficiency standards in coding guidelines in green building certification programs," she said. "This allows for required water reduction and an 'Innovative use of Wastewater Technologies' credit."

But use of advanced technologies for onsite wastewater treatment, including for clustered community environments, requires greater oversight because of system complexity, said OnlineRME's Evans.

An engineered textile is used as the treatment media in all of Orenco's AdvanTex Textile Treatment Systems. This manifold uses a spray nozzle to drizzle wastewater over the treatment media in small microdoses, which results in clear, odorless, reusable effluent.

Oldcastle Precast's Bacpac Pretreatment System, shown here during construction, was installed at the OFS Cool Springs Corporate Education Center in Huntingburg, Ind.

A 32-unit, private development in build-out mode in Marine on St. Croix, Minn., takes advantage of a decentralized wastewater treatment system designed by Natural Systems Utilities.

"One of the primary factors stimulating the onsite wastewater treatment market today is regulation," agreed Jehl. "Regulations requiring increased O&M are driving a more vibrant service market; regulations requiring existing system inspection are driving the replacement system market; and regulations directed at management of specific effluent characteristics are driving the pretreatment product market."

Management and regulations

However, increased management requirements for advanced onsite wastewater treatment systems can hinder greater acceptance and successful application, if not appropriately handled. "The lack of oversight and management tends to create an inventory that will prematurely have problems," said Evans. "Those problems, while real, are a result of the lack of regulations that enable the sustainable management of the wastewater inventory."

"In the last decade, we experienced enormous growth of the decentralized wastewater treatment market," said Wallace. "As the systems that were installed come into the middle of their asset life, we are seeing increased importance in the role of the entities that own and operate the systems. This focus creates a trend toward development of management entities that play a role in every aspect of a decentralized system — from planning and design to ownership and sustainable operations."

Kirksey suggested that centralized management and ownership of onsite systems by a municipality or regional authority may offer advantages in cost effectiveness, quality control, and coordination of treatment. In other cases, ownership by a cooperative or by a design-build-own-operate company could be appropriate, he said.

"With the growing insight into the importance of professional management and maintenance, qualified providers are now performing the regular maintenance/inspections to improve the functioning and life-expectancy of the septic system," Cisneros noted.

But Sam Carter, government relations manager for Orenco Systems, called for greater regulation relative to field testing and monitoring. "Many advanced treatment systems have passed 'test-center testing' but are failing in the field," he said. "These failures frustrate property owners, endanger health, and give the onsite industry a black eye. If the public loses confidence in decentralized wastewater treatment, governments will start imposing construction moratoria and mandating costly centralized sewer systems that have their own failings and may not be the best solution. Regulators must start requiring in-field watertight testing of tanks and field-testing of treatment systems. They must also track the systems in their jurisdictions and audit/enforce field performance."

However, some regulating bodies lack the resources to understand and regulate onsite systems effectively, according to Natural Systems Utilities' Wallace. "This makes education of the governing body on successful decentralized treatment

critical to gaining overall acceptance of these systems and their use in community and development planning," he said.

All suppliers contributing to this article mentioned the need for greater education by the industry of policy makers, regulators, developers, and homeowners to counteract a sometimes negative perception and reluctance to use onsite technologies. "Onsite wastewater systems provide excellent water quality, protect watershed dynamics, and do it all with a holistic approach," said Jehl. "Policy makers in Washington need to be educated on the issue to make informed, fact-based decisions."

Worrell Water Technologies' Kirksey also observed a need for "appropriate design standards that are reviewed and approved by engineering societies and research organizations to ensure that there are clearly defined performance standards that protect public health and the environment, and support innovation of ecological systems design."

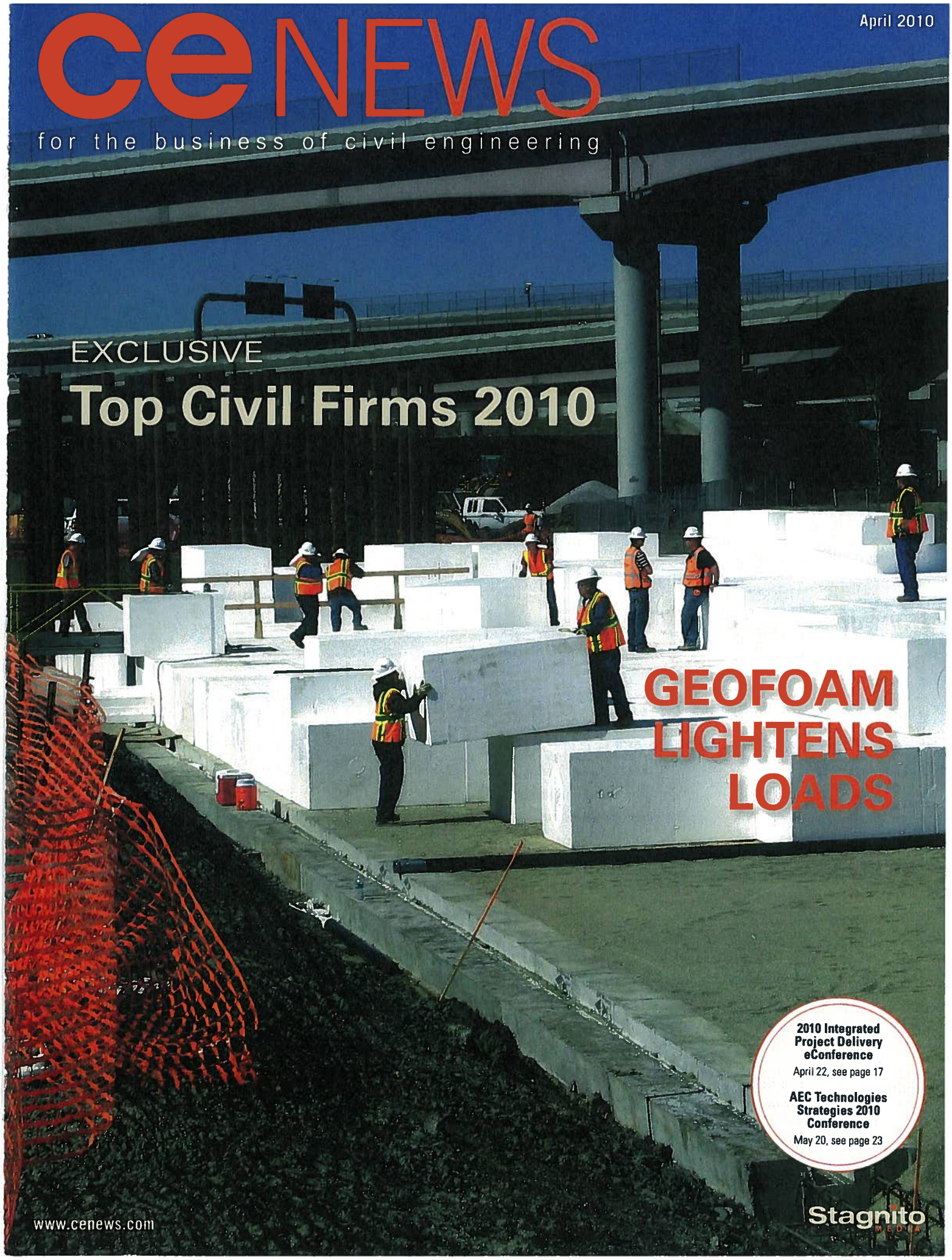
"Consumers want to 'flush and forget,'" said Hallahan, "and developers or towns want to deliver the centralized wastewater model carte blanche. It becomes a significant process to educate all parties involved — consumers, regulators, and designers/engineers — as to the options available to them."

And that education, according to CULTEC's Carolan, is a key factor in the acceptance of new products. However, Carolan admitted, "some products classified as 'new' have been in the marketplace for over 20 years, and the public still needs to be educated about them." ■

For more information on advanced onsite wastewater treatment systems and the issues discussed in this article, contact the following companies:

- Advanced Drainage Systems — www.ads-pipe.com
- Bio-Microbics, Inc. — www.biomicrobics.com
- CULTEC, Inc. — www.cultec.com
- Infiltrator Systems, Inc. — www.infiltratorsystems.com
- Natural Systems Utilities — www.natsyssolutions.com
- Oldcastle Precast — www.oldcastleprecast.com/wastewater
- OnlineRME — www.onlinerme.com
- Orenco Systems, Inc. — www.orenco.com
- Worrell Water Technologies — www.worrellwater.com

ceNEWS
for the business of civil engineering
April 2010



EXCLUSIVE

Top Civil Firms 2010

GEOFOAM LIGHTENS LOADS

2010 Integrated Project Delivery eConference
April 22, see page 17

AEC Technologies Strategies 2010 Conference
May 20, see page 23

www.cenews.com
Stagnito MEDIA