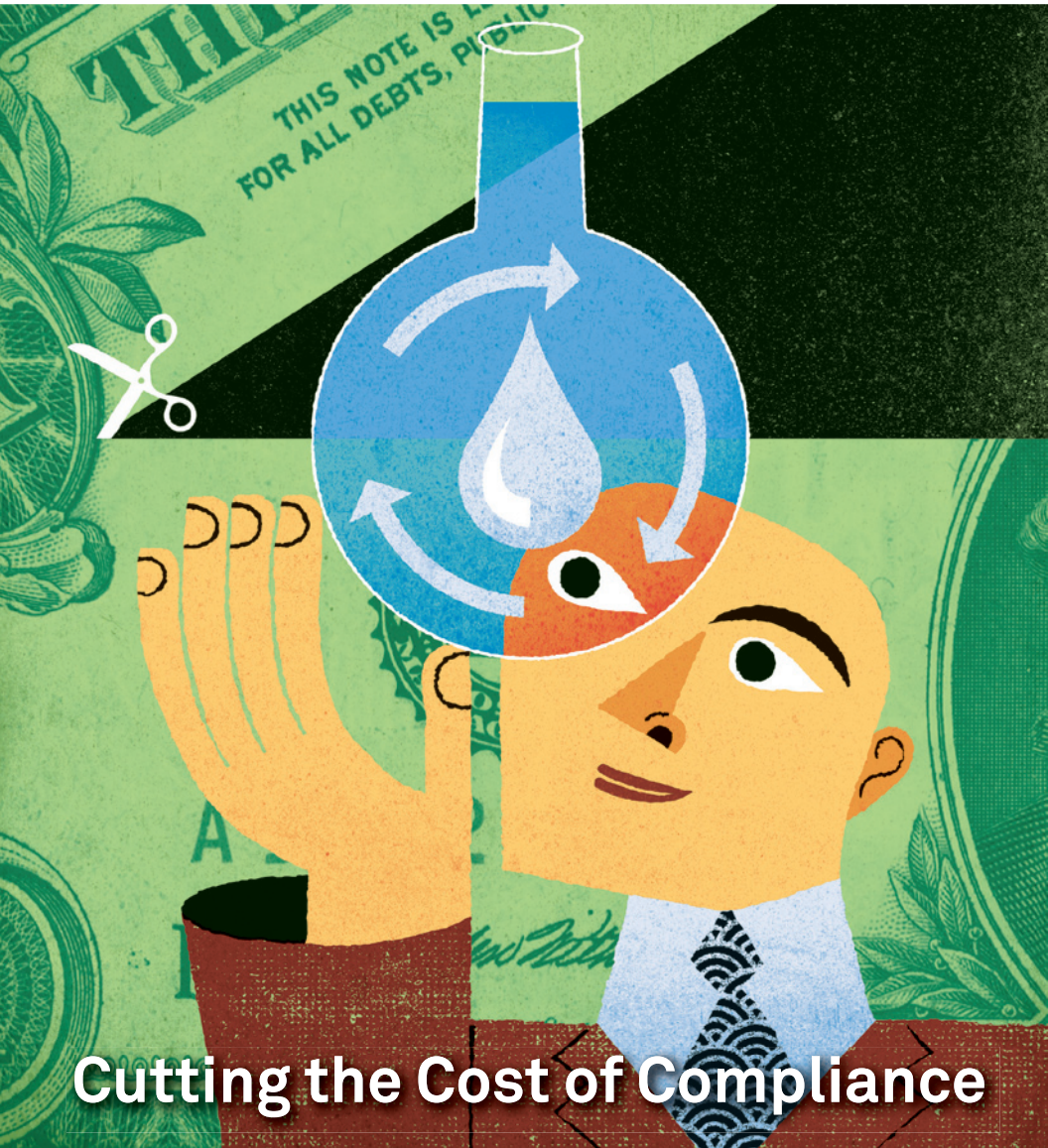
Brown AND Caldwell

BC Today

SERVICE:
Wastewater Treatment



Cutting the Cost of Compliance

Smart Technology Solutions

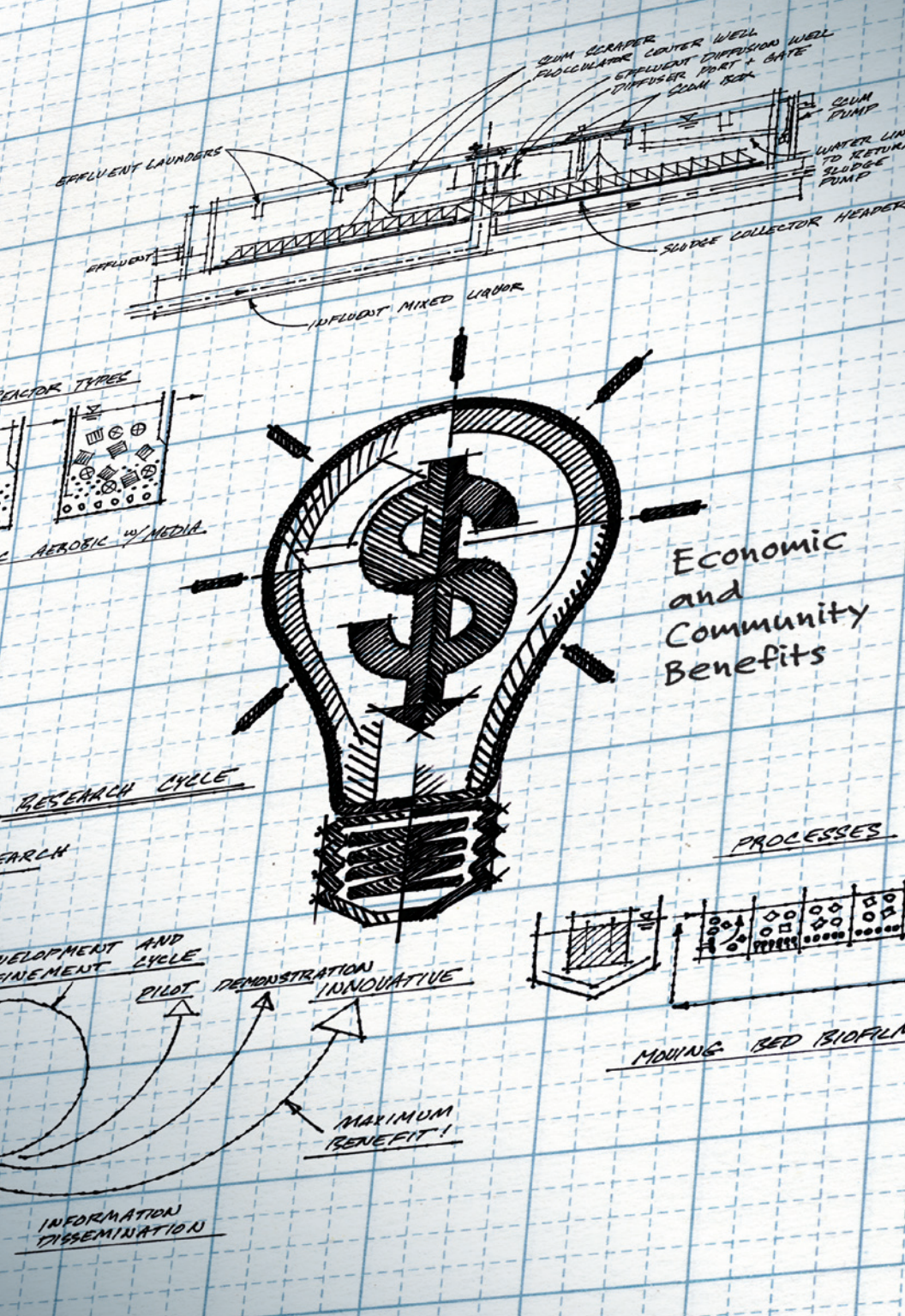
New strategies can help water agencies and utilities lower the risks and speed the rewards of innovation

New technologies often bring dramatic cost reductions and performance improvements to wastewater treatment, helping agencies improve results and meet onerous regulations without breaking the bank. And the need to leverage technology to cut the cost of compliance is more urgent than ever. The latest EPA needs survey indicates that public agencies will have to spend $105 billion to meet current secondary and advanced treatment regulations—a price tag that doesn't account for pending regulations.

But the disproportionate levels of risk that adopters assume can slow and even jeopardize innovation, according to research by Dr. Denny Parker, senior vice president and director of technology for Brown and Caldwell. Parker has also identified measures that increase the capture of benefits from new technology introduction, including government funding for research and demonstrations, transparency of information, and independent technology evaluations.

The best strategy for managing risk while avoiding failure in adopting new technologies involves research on a small scale, then ramping up to learn from the first large-scale applications. This approach can help utilities choose the right treatment technology—traditional or emerging—and make better bets when designing or upgrading facilities.

Decade after decade, Brown and Caldwell has introduced new technologies from our own labs and from around the world to help our clients find the right solution for their environmental requirements. And we continue to do so. Read on for details of BC's past, present and future innovation. You'll find summaries of promising new technologies now in the works—such as Anammox, biological contact, and Cambi™ thermal hydrolysis—that might help close the widening gap between compliance and funding.


SCUM SCRAPER
FLOCCULATOR CENTER WELL
EFFLUENT DIFFUSION WELL
DIFFUSER PORT + GATE
SCUM BOX
SCUM PUMP
EFFLUENT LAUNDERS
WATER LIN
TO RETURN
SLUDGE
PUMP
EFFLUENT
SLUDGE COLLECTOR HEADER
INFLUENT MIXED LIQUOR
REACTOR TYPES
AEROBIC w/ MEDIA
Economic
and
Community
Benefits
RESEARCH CYCLE
EARCH
PROCESSES
VELOPMENT AND
INEMENT CYCLE
PILOT
DEMONSTRATION
INNOVATIVE
MOVING BED BIOFILM
MAXIMUM
BENEFIT!
INFORMATION
DISSEMINATION

Early adoption,

Brown and Caldwell has been the first to develop and implement ma
improve performance and compliance, lower energy use and increas

COST SAVINGS

1950s
First automated sewer flow measurement

1970s
First use of tertiary facilities for algae removal

1980s
First use of co-thickening DAFTS

First use of IWA model for BNR design in North America

1990s
First use of trickling filters for odor control

First design with CFD model for flocculator clarifier

First use of nitrifying trickling filter for odor control

2000s
First plant protocols (3) for optimizing and re-rating WWTPs (with WERF)

First biological contact process for secondary wet weather treatment

ENERGY SAVINGS

1950s
First biogas cogeneration engines

1960s
First automated dissolved oxygen control in activated sludge

1970s
First application of TF/SC process

1980s
First effluent heat pump

1990s
First high rate TF/SC process

2000s
First use of effluent siphon energy recovery

First use of high efficiency cogeneration engines

First use of CBFT3 Class A digestion

, early benefits

any wastewater treatment technologies—helping utilities cut costs,
se sustainability—with more breakthroughs on the horizon...

PERFORMANCE

1960s
First digitally controlled WWTP

1970s
First to get 10-10 effluent with flocculator clarifier

1980s
First BNR plant to produce less than 2 mg/L TN annually

First use of high efficiency cross flow media with TF/SC

1990s
First classifying selector for nuisance foams

First biofilm control in nitrifying trickling filter

First high rate flocculator clarifier for wet weather

2000s
First classifying selector to completely eliminate nocardioforms

First solids-free fermentation product for BioP process

SUSTAINABILITY

1960s
First photosynthetic oxidation ponds at large scale

1970s
First sludge lagoon for solids stabilization

1980s
First use of overland flow algae removal

1990s
First granulated fertilizer production

First submerged digester fixed cover

First thermophilic digestion in North America

2000s
First nitrified effluent recycled at headworks

First FOG digester and biogas capturing system

First denitrification filters with individual carbon dosing

SOLUTION:
Biosolids Management

TECHNOLOGY:
Thermal hydrolysis and advanced digestion

BENEFITS:
Smaller anaerobic digesters, increased biogas production, Class A biosolids, improved dewatering.

IMPLEMENTATION:
DC Water Blue Plains Advanced Wastewater Treatment Plant
Washington, DC

World-Class Innovation in DC

The Cambi™ thermal hydrolysis process typically doubles digester throughput, making digesters more economically viable. More organics are destroyed during digestion and more biogas is produced with Cambi, and the final dewatered cake has less moisture. The biosolids product is Class A and has major beneficial reuse value.

Brown and Caldwell is managing DC Water's large and innovative biosolids program—the first of its kind in North America, at the world's largest advanced treatment facility—the Blue Plains Advanced Wastewater Treatment Plant. The $400 million program, built on only 6 acres, will provide one of the most extensive sludge digestion systems ever developed, constructing four Cambi thermal hydrolysis trains, four digesters, new dewatering equipment, and a combined heat and power (CHP) system generating 13 MW.

With Cambi, DC Water will require fewer digesters, cut greenhouse gases, produce more energy and create higher quality biosolids—all combining to save the authority millions of dollars annually when facilities begin operating in 2014—to continue to protect the Potomac River estuary.

*For more information, contact **Phil Braswell** (in BC's Program Management office at the Blue Plains AWTP) at **pbraswell@brwncald.com***

SOLUTION:
Nutrient Removal

TECHNOLOGY:
Anaerobic Ammonium Oxidation

BENEFITS:
Potential to remove nitrogen and ammonium, reduce energy demands and CO_2 emissions.

IMPLEMENTATION:
Chambers Creek Regional Wastewater Treatment Plant
Pierce County, WA

On Course for Success

The Anaerobic Ammonium Oxidation—Anammox—is a cost-effective and sustainable process that removes ammonium and nitrogen from wastewater without the need for an external carbon source. Using Anammox allows a treatment facility to remove harmful nutrients while cutting space requirements, operational costs, energy use and CO_2 emissions.

Brown and Caldwell engineers are planning to use this innovative, cost-effective and operationally compatible technology—the first time it would be implemented in the United States—in the $62 million upgrade of the Chambers Creek Regional Wastewater Treatment Plant in Pierce County, Wash. Pilot testing will be conducted to confirm these benefits and then the team will move forward with full-scale implementation. The 120-acre plant is part of the 900-acre Chambers Creek Properties and home of the Chambers Bay golf course (the U.S. Open will be played there in 2015) as well as a community destination park on the Puget Sound. The plant processes a maximum flow of more than 24 mgd using a combination of physical and biological treatment processes.

While the project is still in the design phase, using Anammox in the upgraded plant has the potential to achieve significant operational and capital cost savings.

For more information, contact project manager ***Chris Cleveland*** *at* ***360.943.4624***

SOLUTION:	TECHNOLOGY:	BENEFITS:	IMPLEMENTATION:
Wet Weather Treatment	Biological Contact	Wet weather treatment without adding more clarifiers and aeration tanks.	Orange Water and Sewer Authority *Chapel Hill, NC*

Peak Performance for Peak Flows

When the Orange Water and Sewer Authority (OWASA) expanded its Mason Farm Wastewater Treatment Plant in Chapel Hill, N.C., to 14.5 mgd, increased its Peak Wet Weather Flow (PWWF) capacity from 30 to 45 mgd, and added enhanced nutrient removal, a team from Brown and Caldwell came up with a facility plan—featuring biological contact technology—that required only a minor change in operations during wet weather events and lowered the cost of the expansion by $5 million.

Biological contact is a novel, cost-effective wet weather treatment technology that, unlike physical/chemical treatment alternatives, achieves secondary treatment requirements for both BOD5 and TSS during high-flow events. Often it can be implemented in existing wastewater treatment facilities with few modifications, saving capital dollars for treatment that is only needed a few times per year. That translates into improved protection of the Morgan Creek watershed at a lower cost than traditional solutions.

“With biological contact, OWASA can provide secondary stormwater treatment that meets BOD5 and TSS requirements without blending and without building additional secondary clarifiers,” says project manager Pete Schuler. “It allows them to handle extreme peak wet weather flows at a fraction of the cost of traditional treatment methods.”

For more information, contact project manager ***Pete Schuler*** *at* ***704.373.7111***

The next big thing

What technologies in development today promise to cut costs and improve performance in wastewater treatment? Some potential breakthroughs that BC engineers are researching are listed below.

Pilot

Bio-Actiflo

Driver
Secondary treatment for wet weather flows.

Benefit
Relieves secondary treatment load on main plant.

Microbial Fuel Cell

Driver
Energy production.

Benefit
Surplus energy production from wastewater; organic removal with low sludge production.

1st Demonstration

Granular Activated Sludge (Nereda process)

Driver
Secondary treatment for wet weather flows.

Benefit
Relieves secondary treatment load on main plant.

In-Itri

Driver
Nitrification.

Benefit
Nitrification (through bio-augmentation) with limited tankage and low costs.

Biomag

Driver
Nutrient removal.

Benefit
Nutrient removal in tanks sized for BOD removal; high levels of phosphorus removal without filtration.

1st Application

Demon (Anammox)

Driver
Nutrient removal, GHG reduction, reduce power consumption.

Benefit
High nitrogen and ammonium removal; Reduced energy/CO_2 emissions.

Biological contact

Driver
Secondary treatment of wet weather flows without blending.

Benefit
Reduces size of aeration tanks and clarifiers needed in main plant.

Cambi

Driver
Maximize plant capacity, reduce energy costs, meet biosolids land application regulations.

Benefit
Increases plant capacity up to 2 times; reduces sludge volume; high quality, highly combustible biosolids produced; increases energy production.

Ostara

Driver
Phosphorus production.

Benefit
Recovers phosphorus and creates fertilizer.

Make the right choice

History tells us that regulations will get stricter, and technology will continue to advance. Brown and Caldwell has remained a leader in wastewater treatment by listening to our clients, understanding their unique environmental needs, and finding the right solution—whether it's developed in our labs or on the other side of the world. Visit www.brownandcaldwell.com or call 1.800.727.2224 to learn more about how you can take advantage of the latest technology to cut your cost of compliance.

Brown AND Caldwell
advancing*innovation™

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