

## AWARDS

### HIGHLY COMMENDED: Tubli WWTP upgrade, Bahrain

#### What is it?

A unique solution to an all-too-common problem: how to increase treatment capacity without expanding a site's physical footprint. With an overloaded sewage works spewing sludge solids and ammonia-heavy effluent into Tubli Bay, Bahrain's Ministry of Works turned to Bluewater Bio for a bespoke capacity upgrade.

#### Who is responsible?

After initially considering a membrane bio-reactor system, the Ministry of Works contracted Bluewater Bio to retrofit its patented HYBACS (Hybrid Activated Sludge) technology and operate the system for one year.

#### What makes it special?

- Landtake in Bahrain is more than just an environmental consideration; in the country with the fourth-highest population density on earth, space is an existential issue. For this reason, a technology which can increase treatment capacity by 150% with minimal greenfield infrastructure was a godsend. HYBACS' use of biomass to remove nutrients and ammonia from sludge is at the core of Bluewater Bio's offering, and was a perfect solution to Tubli's overflow issue.
- Installation of the new technology was both quick and effective. Bluewater Bio upgraded two of the ten aeration lanes and four of the twelve clarifiers before deploying HYBACS to turn 40,000m<sup>3</sup>/d of capacity into 100,000m<sup>3</sup>/d. The technology was particularly suited to off-site development, allowing the existing works to continue operating at capacity during installation.
- This project falls under Bahrain Vision 2030, the Kingdom's ambitious state redevelopment master plan, which places a strong emphasis on infrastructure improvement and efficiency. For Bluewater Bio, the plant represents the first large-scale reference site for its proprietary HYBACS technology.

**Judges' verdict:** A groundbreaking retrofit to save Bahrain's beaches.

## Water Reuse Project of the Year

For the project, delivered during 2013, that represents the most significant advancement in terms of water reuse

#### WINNER

Big Spring Raw Water Production Facility,  
USA

WINNER  
Global Water Awards  
2014

#### What is it?

A groundbreaking reuse facility with a design capacity of 2.5 MGD (9,462m<sup>3</sup>/d), which in April 2013 started refining treated wastewater to potable standards. Although the produced water is blended with reservoir water in ratios as high as 20 parts to 80, the process is classified as direct potable reuse (DPR) since it channels treated wastewater into a conventional drinking water source without touching an environmental buffer.

#### Who is responsible?

Colorado River Municipal Water District (CRMWD) contracted Freese & Nichols to design the plant, and CSA Construction for the construction element. Tertiary effluent from the Big Spring WWTP is run through Pall Microza MF and Toray RO membranes before undergoing advanced oxidation treatment using a system supplied by Trojan UV.

#### What makes it special?

- This project constitutes the most serious advance in DPR applications in the USA to date. As the first large public agency to embrace DPR, CRMWD has demonstrated its untiring commitment to diversifying its water supply options in drought-stricken Texas. With reservoir levels dwindling to a critical 0.19% in 2012, and a population boom and industrial activity putting an increasing strain on water resources, Big Spring's decision came not a moment too late.
- The repurified effluent, subject to 75 operational and quality checks by the Texas Commission on Environmental Quality, emerges cleaner than the high-TDS raw reservoir supply. This exceptional standard is a gift to the DPR campaign, which has often struggled against a public convinced that 'natural' surface water must be cleaner. At just 1.41 kWh/m<sup>3</sup>, the power consumed by the streamlined MF/RO/UV system is little more than the 1.33 kWh/m<sup>3</sup> already required to pump water from the reservoir to the existing municipal WTP.
- At an estimated \$0.74/m<sup>3</sup>, Big Spring's DPR process comes in substantially below the average unit cost of generating desalinated water. With no need for changes to the distribution system, and few added operational costs, DPR is an essential weapon in the war against America's snowballing infrastructure deficit.

**Judges' verdict:** An astounding breakthrough for direct potable reuse.

#### DISTINCTION

Billund BioRefinery, Denmark

DISTINCTION  
Global Water Awards  
2014

#### What is it?

A dual-feed plant treating both solid waste and wastewater, covering a population of 70,000 and dealing with 2,500 tons of solid waste per year from both households and agriculture in the Billund area of Denmark.

#### Who is responsible?

The plant was built by a consortium of Billund Municipality, utility company Billund Vand and Veolia subsidiary Krüger A/S. Funding came courtesy of a €2 million grant from the Danish Ministry of the Environment, and the Foundation for Development of Technology in the Danish Water Sector.

#### What makes it special?

- The plant showcases an impressive array of both new and established treatment technologies, including the continuous thermal hydrolysis of sludge, post-polishing filtration, and advanced online dynamic control, to act as a lighthouse for technology development as well as a testbed for the most exciting new techniques in the industry.
- The biorefinery serves as a model for internal complementary technologies, with parallel wastewater and biomass treatment

lines working in synergy. The wastewater treatment process produces biomass, which is then treated to generate biogas for energy production, reducing the plant's power requirement and creating additional income through the sale of surplus energy to the local grid. Water treated by the wastewater treatment line is reused in the power generation and sludge treatment areas of the plant.

- The installation closes the local resource circle by linking agricultural and municipal waste treatment, acting as a model of holistic thinking for the industry.

**Judges' verdict:** A synergistic blend of wastewater and biomass recycling.

### HIGHLY COMMENDED: naked Stables water reuse, China

#### What is it?

A comprehensive 'Reduce, Treat & Reuse' water strategy at a luxury mountainside eco-resort in China, completed in July 2013 with the delivery of two containerised membrane bio-reactor (MBR) sewage treatment plants. The neat, pre-fabricated, low-maintenance units demonstrate how reuse is not just the province of industrial mega-projects.

#### Who is responsible?

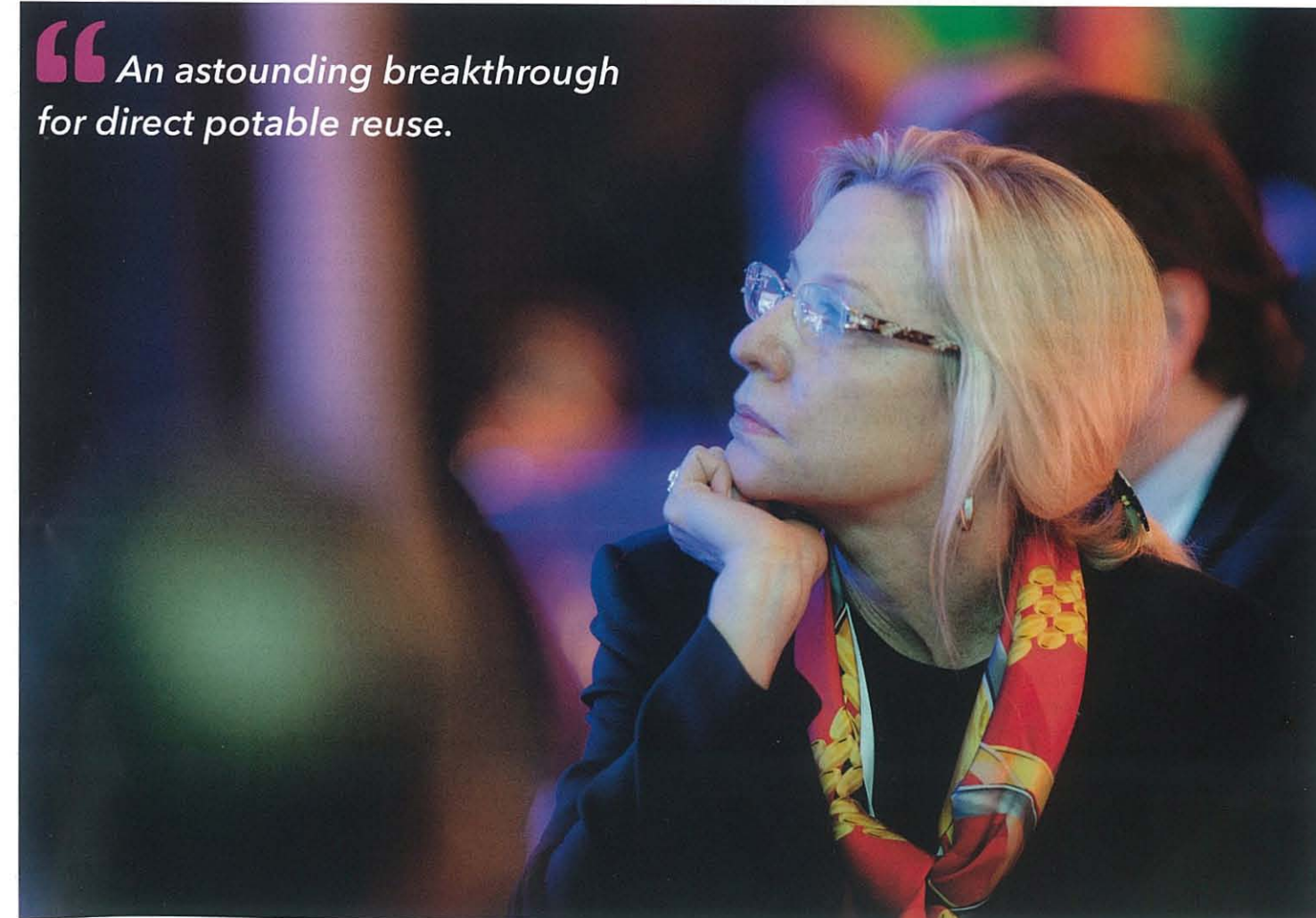
PACT Environmental Technology Co., Ltd. provided EPC ser-

vices to naked Retreats, a luxury rural resort company catering to Shanghai's wealthy weekenders. PACT's membrane bio-reactor employs Toray's submerged membrane technology.

#### What makes it special?

- naked Stables is the first resort in China to receive the LEED Platinum rating for its exceptional environmental pedigree. Sewage from guest rooms, staff quarters, stables and public areas is processed directly through the treatment plants and funnelled through the woodland as a man-made stream. This water feature aerates the treated effluent before it is reused for irrigation, toilet flushing, firefighting and landscaping.
- Small-scale energy production at the resort takes place courtesy of filters which strip grease and oil from kitchen and car wash effluent for use as biofuel. Meanwhile, a closed-loop water system eliminates water losses, while rainwater and stormwater is harnessed for use from roofs and roads. Any unused treated water is filtered through an on-site wetland for potable use in the local community.
- The result of this ambitious campaign is that the naked Stables luxury resort consumes 30% less water than the average hotel, offering a shining example to an industry often characterised by waste and excess. As China's wealthy urbanites continue to seek countryside idylls, the resort industry is a fantastic way to instill an ethos of sustainable, naked infrastructure.

**Judges' verdict:** A trailblazing first for the hospitality industry.



“An astounding breakthrough  
for direct potable reuse.”