



THE GCC'S WASTEWATER TREATMENT TRAILBLAZER



Pioneering firm TANQIA – the first privately held wastewater collection and treatment utility in the UAE and wider Middle East – is moving forward at a pace with its system expansion, in tandem with the robust demand growth experienced by UAE emirate Fujairah. Here, Ibrahim Elwan – TANQIA’s Executive Chairman – reveals the market dynamics and investments behind the firm’s finely-tuned expansion strategy up to 2034, alongside the renewable innovations and pilot projects set to ensure the company’s lasting – and wide-reaching – legacy as a wastewater treatment trailblazer.

Like much of the Arabian Gulf Region, the UAE has long faced water scarcity – a challenge only set to intensify as growth and development continue at a pace across the federation of seven emirates. Indeed, after outperforming the rest of the GCC in terms of economic growth last year, the UAE is set to almost double its growth rate to 3.4 per cent in 2018, according to recent forecasts by the International Monetary Fund (IMF). Maintaining such momentum in the economy – and for the advancement of society in general – will require a considerable ramp-up in treated water capacity, connecting new industrial and residential developments, upgrading existing facilities, and improving water treatment quality, to make sustainable growth a reality.

With manufacturing and tourism two of its most vibrant sectors, the emirate of Fujairah is becoming an attractive destination for investment and advancement in the UAE, with a flurry of new residential and industrial developments set to rise from the ground in the years ahead. Securing a quality, reliable potable water supply for the city of Fujairah and surrounding communities – one that is treated and delivered as efficiently and reliably as possible – has been the unerring focus of TANQIA since 2004, when the wastewater treatment specialist was granted a 33-year concession by the Government of Fujairah.

As the first privately-held wastewater collection and treatment utility – not only in the UAE but also

throughout the wider Middle East – TANQIA is undeniably a pioneer in the market. Its name, ‘TANQIA’ – meaning ‘purify’ in Arabic – encapsulates in one word the mission of a company that has become a regional reference point for how efficiently and reliably wastewater systems can operate, even in highly challenging conditions. Now, as the company pushes ahead with the ambitious expansion of its wastewater treatment plant and associated network infrastructure, the true mettle of this expert player is truly coming to light.

A fine balancing act

Aside from operating in one of the most arid climates in the world, TANQIA needed to accommodate what Mr Elwan refers to as an “imbalance” created in the concession area by an expanding economy and the “exceptionally high” rate of water consumption that has more than doubled over the past decade to become one of the highest in the world today. This dynamic has clearly compounded an already difficult task for TANQIA, although it is one that the firm has clearly responded to with no shortage of vision and vigour.

Back in 2005, TANQIA secured a loan from the Royal Bank of Scotland (RBS) – under the guarantee of the Government of Germany – to finance the greenfield wastewater collection and treatment system. And, with that loan having been retired last year, the award-winning company is now moving forward with its long-term plan to vastly expand the installed capacity at its wastewater treatment plant (WWTP). “TANQIA’s plan for the financial years 2018 through to 2034 is for four new treatment trains – of 8,000 m³/day each – to be added, as the demand for wastewater services increases,” advises Mr Elwan. “And to ensure flexibility in meeting the forecast demand, the detailed design for the entire 32,000 m³/day capacity has already been completed and approved by the Government of Fujairah.”

The forecast demand for wastewater services indicates that the first two trains – of 8,000 m³/day each – will be urgently required in the second quarter of 2019, at the latest. “This would meet the forecast demand for TANQIA’s services in the Concession Area of 31,855 m³/day by 2022,” states Mr Elwan, who goes on to report that contracts for the civil

Dr Ibrahim I. Elwan,
Executive Chairman



and electromechanical works have already been awarded, and construction is set to commence shortly.

Regarding the volume of wastewater collected and treated by TANQIA today, Mr Elwan advises that the peak volume of inflow collected and treated in FY2017 was about 22,000 m³/day. “This exceeds the installed capacity of the wastewater plant (16,000 m³/day),” he points out. “Nonetheless, the plant can cope because of its design, which allows it to handle – for short intervals throughout the year – peak demand for treatment of up to 30 per cent more than its installed treatment capacity.”

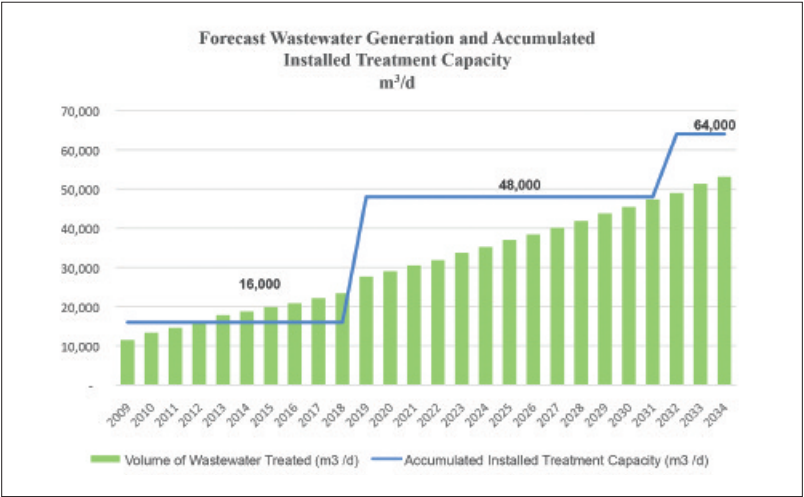
Sustainable supply strategies

However, until the installed treatment capacity is doubled, TANQIA’s Executive Chairman believes that balancing the demand for services in 2018 and the first half of 2019 – managing the installed treatment capacity and the forecast of inflow – will be challenging. “This imbalance is created by the high growth of the economy because of immigration (of both national and expatriate workforce) to the Concession Area, and as a consequence of exceptionally high water consumption, which has increased at an average annual rate of eight per cent over the past decade – from about 170 litres per capita per day in 2007 to about 370 litres per capita per day in 2017,” Mr Elwan informs

Fortunately, the Government’s gradual increase in water tariffs is successfully correcting this issue,

as TANQIA’s Executive Chairman points out: “In the past three years, water tariffs were increased by FEWA by as much as 50 per cent, and by 31 per cent for the households in Abu Dhabi. This is a courageous policy decision – a sustained increase in tariffs is what would be required to achieve effective restraint in the consumption of water. Indeed, the sustained increase in water and wastewater tariffs is the only means that has been tested globally and been found to successfully restrain growth in water demand – that is, by inducing the rationalisation of consumption.”

Concurrently, accelerating the substitution of desalinated and underground water with less



sive effluent in non-potable applications would be another desirable move. “This would obviously decrease the demand for investments in water and wastewater infrastructure,” Mr Elwan asserts. “Accordingly, the UAE has issued a directive to increase the use of effluent throughout all sectors – and such a mandate is now being pursued throughout the country,” he reports, adding that successful substitution would require the further treatment of tertiary-treated effluent to allow for increased substitution in key applications throughout the economy. “The cost of further treatment is lower than desalination – it would also be lower than the cost of pumping underground water, if the pricing of underground water incorporated a depletion premium that reflects its scarcity,” he continues.

“Increasing the availability of further treated effluent would require a sustained increase in tariffs for desalinated water, to induce commercial substitution of further treated effluent for potable water.”

An effective network

In alignment with TANQIA’s growing treatment capabilities, expansion of the firm’s wastewater collection network has been a significant development over the past decade – in terms of the number of kilometres covered, number of properties and customers connected, and the total population serviced by the network – as Mr Elwan is keen to describe. “Under the greenfield wastewater system in the Concession – that is, Phases I and II – the Network to be constructed was 169 km on 30th June 2007, while the





length of the Network, including the pressure mains, has grown to reach 400 km as of 31st December 2017 – an average annual rate of increase of around 10 per cent over the past decade,” he tells us. “Meanwhile, the number of connected properties has increased from 5,231 to 6,800 over the same period, and the number of customers has risen from 13,441 to 20,536.”

In terms of potential upcoming infrastructural projects to further expand the collection network, Mr Elwan praises the decision of the Government of Abu Dhabi to develop Sheikh Mohamed bin Zaid City (MBZ City) – a new city in the Concession Area. “This noteworthy development plan would involve tying the new city to TANQIA’s wastewater system to collect the wastewater generated and deliver it to the Wastewater Treatment Plant – and, in turn, to deliver effluent to MBZ City for landscaping.” Phase I of the internal network in MBZ City will cover about 45km, with connection to TANQIA’s system stretching a further 22.5km – and both such developments will be financed by the Government of Abu Dhabi under the programme of H.H. the President of the UAE.

In addition, FEWA is executing the effluent distribution line connecting TANQIA’s system to MBZ City. “Construction is underway on Phase I of MBZ City, which is expected to be ready for occupancy by Q4 2018,” reports the Executive Chairman. “The internal and external network connection to MBZ

City will be owned, operated and maintained by TANQIA, adding a further 67.5km to TANQIA’s existing 400 km-long network.

Reaching out to communities

On the subject of effluent distribution, at the time we last spoke to Mr. Elwan a year ago, construction was soon to commence on TANQIA’s effluent distribution network (EDN) – a response to the strong demand that exists for irrigation amongst the area’s farming communities, with an estimated 3,879 farms covering 6,585 hectares (65,847,000m²) of land. Annually, it is estimated that TANQIA’s new EDN would provide 1.3 billion gallons of effluent, which would act as a substitute for higher-value desalinated and underground water. “Substantial progress has been made in the development of the key market for effluent, and in developing the network to deliver it to key demand centres,” reports Mr Elwan, whose company generated 1.58 billion gallons of high-quality effluent at its plant last year. “The new EDN will deliver effluent to Bidya and Dhadna – located respectively about 24km and 37km from our plant. There, the effluent will be used for agriculture irrigation, as a substitute for the desalinated and underground water currently being utilised.”

Construction is now underway on the EDN pipeline between TANQIA’s plant, Bidya and Dhadna – the work is being executed by state-owned FEWA (the Federal Water & Electricity Authority) and will



be completed by Q4 2018. TANQIA will then maintain and operate the pipeline and its related infrastructure including, but not limited to, the pumping stations and the storage tanks. In addition, FEWA is financing a pipeline in TANQIA’s concession area that would deliver the firm’s effluent to MBZ City.

TANQIA is also promoting extension of its EDN to planned new residential properties – particularly for single-family properties – for landscaping, with the use of a specialised effluent network. “We’re currently preparing a report and the estimated cost related to taking advantage of the construction of the wastewater network in MBZ City. Doing so would require excavation for the lines and house connections to install the effluent network and the connections to single-family houses in the city,” Mr Elwan advises, adding that the report will be discussed with the authorities for their decision.

Investing in efficiency

All expansions following completion of the Greenfield System – as per the concession agreement – have been financed from TANQIA’s internally-generated revenue, and such investments have been substantial, totalling AED 728 million (over US\$198m) to date for the wastewater system (including greenfield system). Furthermore, since 2008 TANQIA’s investment in the expansion has been about AED 159 million (over US\$43m) – all related to the extension of the network to connect new properties to the wastewater system.

Given the substantial financial outlays that TANQIA has made over the past decade or so, there is little wonder why the company has placed energy efficient technologies and processes as a key focal point, and the firm is today pursuing numerous projects related to that. “Expansion I will cover the cost of the first two trains of the total of four trains to increase the Plant’s installed treatment capacity from 16,000m³/day to 32,000m³/day,” reports Mr Elwan. “In addition, installation of a state-of-the-art sludge dewatering unit to handle 31 tons/day of sludge will be powered with a roof solar energy system.”

Beyond that, conversion of the plant’s mammoth rotors – used in the Fujairah plant to deliver the oxygen required for biological breakdown of solid matter in the influent – from electricity to solar energy powered operation has further bolstered TANQIA’s energy efficiency goals.

Another initiative is the installation of a solar power plant, which will serve as the primary source of power supply for TANQIA’s facility, and shift power from the grid to back-up sources. “The proposed 10MW solar power farm will provide primary energy for the existing two trains and the four new trains set to come online, and the balance generation could be injected into FEWA’s system,” informs the Executive Director. “The feasibility study for the solar power farm has already been completed, and the design and land requirements identified, with installation due to commence by mid-2018.”

Innovation for a water-scarce world

In the last conversation with Mr Elwan, we discovered how TANQIA’s WWTP in Fujairah – designed according to 2008’s German Design Standards and equipped by Germany’s most reputable manufacturers – was playing a key role in developing technologies for the future advancement of wastewater treatment plant design around the world. This was due to its starring role as one of only seven utilities worldwide to be selected as a partner for the so-called EXPOVAL project – a €7.5-million German-government-funded R&D project. And today, TANQIA’s renown for innovation continues to perpetuate itself - not least through TANQIA Environment, a subsidiary of Elwan Group.

“TANQIA Environment entered into a joint venture with the new owners of Water4all and Jotem – both Dutch-based water treatment specialists,” reports the Executive Chairman, adding that TANQIA Environment will be the venture’s major shareholder in the Middle East and Africa region. The focus of the new tie-up is on manufacturing solar-powered auto-treatment plants that can be installed in containers that would treat surface water for human consumption. 📌



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“Two container-housed pilot plants of about 20,000m³/y treatment capacity – each powered by solar panels – will be set up at our Plant in the UAE,” reveals Mr Elwan. “These will further treat part of the tertiary-treated effluent, to produce water stripped of any contaminants. This will be achieved using ultra-filtration technology and nanofiltration combined with an electro-coagulation unit, thus negating the need for any water treatment chemicals to be utilised. The resultant further-processed effluent will meet the stringent standards of the World Health Organization (WHO) and the State of California relating to the reuse of effluent for irrigation of edible vegetables. However, as a minimum requirement of WHO’s standards, TANQIA Environment intends to monitor the quality of water generated, to assess its compliance over a period of two years,” he continues.

“Once the process setup for compliant, reliable water quality has been verified, the containerised units would be manufactured in the UAE alongside other possible locations in the target markets of water-scarce, low-income countries across the Middle East and Africa – in areas that currently only have access to potentially unsafe water resources such as surface and groundwater.”

Impressive achievements

As TANQIA nears the halfway mark of its 33-year concession period, the company can reflect on more than a decade of outstanding performance, alongside

an array of accolades demonstrating that such achievements have not gone unnoticed.

Recent awards include the ‘Recognition of Entrepreneurial Company’ award, bestowed on TANQIA in 2017 by the World Confederation of Business. Last year also saw the company receive an ‘Appreciation Certificate’ from the Ministry of Energy, and the ‘Best Environment, Social and Governance (ESG) Utility Management Team in the Middle East’ award for FY2017. Other accolades include recognition as ‘Best Wastewater Utility Management Team – Middle East’, awarded to TANQIA by Capital Finance International for FY2016, alongside ‘Best Infrastructure Utility Service Provider in the UAE 2015’, awarded to the firm by the Global Banking & Finance Review.

While unarguably impressive, such awards are merely an indication of the pioneering potential of TANQIA going forward. Aside from the management team’s ambitious – yet financially astute – expansion strategy for meeting Fujairah’s burgeoning water requirements, the firm’s aforementioned development of solar-powered pilot plants with water-scarce emerging markets top of mind suggests that TANQIA’s influence and achievements will be to the benefit of many more communities and businesses in the years ahead. □