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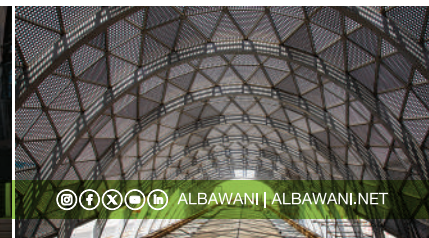
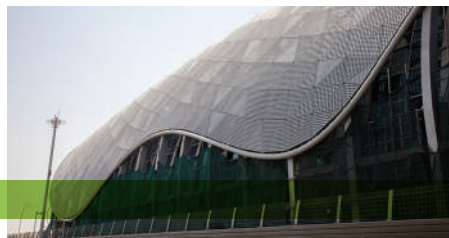
Focus: Evolving Jobs Market



KUWAIT



**Building Dreams,
Creating Futures**



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Kuwait's Waterfront
Development ... newly
revamped (see Page 32).

PROSPECTS BRIGHTER



Photo courtesy: SSH

Despite its oil wealth and ambitious Vision 2035 plan, Kuwait continues to grapple with bureaucratic and procedural hurdles in its developmental journey. However, according to a recent NBK report, prospects for progressing key reforms appear stronger than in previous years. This is much needed to drive the country's mega projects that target infrastructure, housing and renewable energy.

KUWAIT is a nation that boasts the world's sixth-largest known oil reserves and a population of just around 4.25 million. Yet, it faces a number of challenges in translating its oil wealth into broader economic development. Bureaucracy and political stalemate have hampered progress – issues that Kuwait's new ruler acknowledged when he addressed the parliament as he took on the reigns of the country at the end of last year.

The country has witnessed frequent government turnovers (eight formed between December 2020 and December 2023) due to clashes between the executive and legislative branches of parliament. It is this issue that HH Sheikh Mishal Al Ahmad Al Sabah will be keen to resolve as he takes the country onwards on the path to reform and progress.

Kuwait is unlikely to boost spending in the short term with the budget for the next fiscal year starting April (FY24/25)

projecting yet another large deficit – the ninth in the past decade. Although higher oil prices are likely to reduce the budget gap, the country will increasingly seek foreign investment and private sector participation to drive its ambitious Kuwait Vision 2035 plan.

With oil being its main revenue earner, Kuwait intends to invest around \$10 billion annually over the next five years in the oil sector.

Among the mega infrastructure developments under way are the \$4.3-billion Kuwait Airport expansion (Terminal 2) and the \$1.4-billion Umm Al-Hayman Wastewater Treatment Plant expansion. Other big-ticket projects proposed including the new airport in northern Kuwait, valued at \$12 billion, the South Al-Mutlaa City project, worth \$11.6 billion, the

\$6.9-billion Al Zour North IWPP and the \$5.5-billion South Saad Al-Abdullah Residential City.

Plans to build the 1,001-m-high Burj Mubarak Al Kabir – initially proposed in the 1990s as a centrepiece of the Madinat Al Hareer (Silk City) in the Subiya district of Kuwait City – resurfaced early last year, but there have been no further announcements on the ambitious development.

In the annual plan for 2023-24 which concluded last month, nearly KD1 billion (\$3.3 billion) was allocated for development projects. This comprised KD886 million for 20 large projects, said the Arabic language daily *Al Qabas*, quoting a government report. These large projects included Kuwait's airport expansion at a cost of around KD158 million, of which around 19 per cent has been spent. Other projects comprise Mutlaa Residential City, two other housing projects, Al-Zour Refinery, Al-Sabah University, Al-Addan Hospital, a new medical city and Al-Shuaiba Port expansion.

Quoting a report issued by the General Secretariat of the Supreme Council for Planning and Development (GSSCPD) on the status of the 2023/2024 annual plan projects, *Al Qabas* also indicated that some 77 per cent of the projects were behind schedule. The report revealed that the percentage of spending on projects at the end of September amounted to 10.6 per cent out of the total budgeted KD1 billion. According to the report, projects have suffered due to administrative, regulatory, technical and legislative challenges.

Looking ahead, prospects for progressing key reforms appear stronger than in previous years, amid a greater sense of political urgency, according to a recent NBK report.

Meanwhile, NBK's latest Economic Research report states that solid activity is expected for the year, although project awards in Kuwait was soft in February. The value of awarded projects in February came in at KD43 million (-54% y/y), bringing the cumulative year-to-date total to KD81 million (-72% y/y), said the report quoting MEED Projects. Two out of the three awarded projects during the month related to the construction of public buildings in Al-Mutlaa City by the Public Authority for Housing Welfare (PAHW), the report said.

Kuwait's current development plan



Image courtesy: Heerin Architects & Planners Co., Ltd.

The 64-sq-km South Saad Al-Abdullah Residential City ... China Gezhouba Group Company broke ground on the project early this year.

2024-25 has outlined three priorities that impact the construction sector and involve a concerted drive to encourage private sector investment: It calls for setting up a special international economic zone; developing a cohesive infrastructure; and creating sustainable living areas.

The new economic zone, which will be the country's largest, will be located in northern Kuwait, and have an independent institutional structure that ensures its global investment appeal.

The plan places an outlay of KD428 million on developing Kuwait's infrastructure in line with the state's vision of transforming into a financial and commercial centre. Its goal is to provide advanced land, sea, and air transportation networks as well as a competitive information technology sector.

In terms of a sustainable living environment, a budget of KD37.65 million has been set aside to rationalise the use of natural resources and reduce pollution rates, increase the percentage of energy production from renewable sources, achieving integrated water resources, high air quality and improving the solid waste management systems.

Kuwait's longer-term plans also include the creation of companies specialised in the construction of new residential cities and other housing projects and a project to build a railway line linking the Saudi and

Kuwait capital cities.

Kuwait is now encouraging private sector participation and improving government efficiency. It has received major interest from China; Chinese companies are already engaged in developing one of its largest residential cities – South Saad Al-Abdullah housing scheme. The two nations have reached an agreement for bilateral cooperation from 2024 to 2028, focusing on renewable energy, infrastructure construction and environmental governance. Seven memoranda of understanding (MoUs) have been signed covering the completion of Mubarak Al Kabir Port; and for projects including renewable energy, creation of a green low-carbon waste recycling system, wastewater treatment station infrastructure, and economic and free zones.

AIRPORT & PORT

Work on the Kuwait International Airport T2 project, designed by the acclaimed architecture firm Foster + Partners, is well advanced. Construction is being carried out by Limak İnşaat of Turkey, which is currently managing the construction of the Kuwait International Airport Terminal 2 (T2) project's Package One, involving a new state-of-the-art airport terminal building, and Package Two, which comprises a car park, service buildings, and roads leading to T2.

Last October, Limak secured yet another contract, worth KD236 million to build a package of aircraft parking aprons, taxiways and service buildings.

Once the new airport terminal gets operational, it is expected to triple the capacity of Kuwait's airport to 25 million passengers a year.

Kuwait's civil aviation ministry had in June last year sought bids from six pre-qualified companies for the operation, maintenance and development of the international airport, including T2 and its affiliated aircraft aprons. These included GMR Airports (India), Fraport AG Frankfurt Airport Services Worldwide and Munich Airport International (Germany), Incheon International Airport Corporation (South Korea), TAV Airport Holding (Türkiye) and Daa International (Ireland).

Another key transportation sector project is the Mubarak Al Kabeer Port project, which is over 53 per cent complete, according to a report released last October by the GSSCPD. Last month, the country announced plans to allocate KD186 million to the Ministry of Public Works for the completion of the port project during the FY 2024-2025. The port, which covers a 11.6-sq-km area, will feature 24 berths and have a capacity of 8.1 million containers, according to *Al Qabas*.

The overall cost of developing the port has been put at KD990 million and will be completed through nine contracts. Work includes implementation of the road link-



Photo courtesy: SSF

The 789-bed Maternity Hospital along the Kuwait Bay coast within the Al-Sabah Health Zone ... one of the newly completed projects in Kuwait.

ing Subiya area to the east of Bubiyan Island; completion of the port dock and reclamation of the land as well as completion of the design of handling equipment and quay deepening.

RAILWAY

Saudi Arabia and Kuwait have appointed France-based transport and mobility specialist Systra to conduct a feasibility study for a high-speed railway line linking their capitals. The feasibility study, to be funded equally by the two countries, is expected to be completed by mid-2024.

Kuwait is also reported to have issued a study and design tender for the first stage

of the 565-km Kuwait Railway Project, which will link with the proposed GCC railway.

HOUSING

Among the largest projects that are being spearheaded by Kuwait's Public Authority for Housing Welfare is the South Saad Al-Abdullah housing project. Leading construction group China Gezhouba Group Company (CGGC) has early this year broken ground on the key development located in the Jahra Governorate, about 25 km west of the capital city. ■

Read more at www.gulfconstructiononline.com



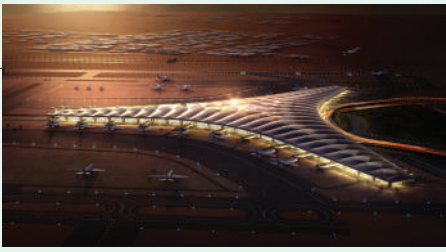
Kuwait International Airport Terminal 2 ... the largest ongoing infrastructure project in the country.

Photo courtesy: Limak İnşaat

KUWAIT AT A GLANCE

Package name	Owner	Status*	\$ Million **
Al Abdali Economic Zone	Kuwait Direct Investment Promotion Authority (KDIPA)	Feasibility Study	1,600
Al Adan Hospital Expansion	Ministry of Public Works	Commissioning	772
Al Jahra Waterfront (Al Corniche) Project	Kuwait Municipality	Design	1,250
Al Khafji Joint Operations (KJO) – Dorra Gas Field Development	Al Khafji Joint Operations (KJO)	Design	3,000
Al Khiran Independent Water and Power Project (IWPP)	Kuwait Authority for Partnership Projects (KAPP)	EPC ITB	4,100
Al Khiran Real Estate Development	Tamdeen Real Estate	Construction	831
Al Sabah Hospital Expansion	Ministry of Public Works	Construction	700
Al Zour North Independent Water and Power Project (IWPP) – Phase 2/3 (2700 MW)	KAPP	EPC ITB	1,500
Al-Dibdibah Power & Shagaya Renewable Energy Phase 3 Project – 2000 MW	KAPP	Project Announced	3,600
Amiri Diwan – Palace of Justice	Amiri Diwan	Construction	1,000
Bubiyah Seaport Project (Mubarak Al Kabeer) – Overview	Ministry of Public Works	Construction	6,500
Entertainment City Project	Amiri Diwan	Feasibility Study	650
Expansion of Effluent Waste Disposal Plant – 1	KOC	FEED	650
Expansion of Effluent Waste Disposal Plant – 2	Kuwait Oil Company (KOC)	FEED	700
Kuwait Bay Exploration	KOC	E&P	904.5
Kuwait City Cancer Centre	Ministry of Health	Construction	650
Kuwait International Airport Expansion – Overview	Directorate General of Civil Aviation (DGCA), Ministry of Public Works	Construction	7,000
Kuwait International Airport Expansion – Package 1 – Main Terminal Building (Terminal 2)	DGCA, Ministry of Public Works	Construction	4,500
Kuwait International Airport Expansion – Package 2 – Service Buildings, Roads & Car Park – Overview	DGCA, Ministry of Public Works	Construction	552.6
Kuwait International Airport Expansion – Package 3 – Aircraft's Apron, Taxiways, and Service Buildings	DGCA, Ministry of Public Works	E&P	764.5
Kuwait National Railroad (KNRR)	KAPP, PART	Feasibility Study	980
North Kuwait Effluent Water Treatment and Injection Plant (EF-1761)	KOC	Commissioning	1,000
Nuwiseeb IWPP – Phase 1 – 3600 MW	MEW	Feasibility Study	2,500
Rehabilitation of Al Ghouse Road – Overview	Ministry of Public Works, PART	Construction	775
Sabah Al Salem University – College of Social Sciences, Law, Sharia & Islamic Studies	Kuwait University	Construction	550
Shuwaikh Children's Hospital	Ministry of Public Works	Design	1,440
South Al Mutlaa City – Housing Package	Public Authority for Housing Welfare (PAHW)	Construction	1,200
South Al Mutlaa City – Infrastructure Package – Overview	PAHW	Construction	2,300
South Al Mutlaa City – Infrastructure Package – Wastewater Treatment Plant	Ministry of Public Works	E&P	582
South Al Mutlaa City – Overview	PAHW	Construction	20,000
South Saad Al Abdullah City (Nawaf Al Ahmad City)	PAHW	Construction	6,800
South Sabah Al Ahmad Residential City	PAHW	Construction	2,300
Special Needs School Complex	Ministry of Public Works	FEED	1,226
Subiya Power Plant – Phase 4 – 900 MW Expansion	MEW	E&P	840
The Silk City Project (Madinat Al-Hareer)	PAHW	Design	82,200
Umm Al Hayman Wastewater Treatment Plant (WWTP) – Overview	KAPP, Ministry of Public Works	Construction	1,760

* E&P = Engineering and procurement; EPC ITB = Engineering, procurement and construction invitation to bid; FEED = Front-end engineering and design.



Consultant	Contractor	Start date	End date
-	-	2014-Q3	2030-Q1
Hill International, SPDM	Sayed Hamid Behbehani and Sons Company	2013-Q1	2024-Q1
-	-	2017-Q4	2024-Q1
Not Yet Appointed	-	2019-Q4	2034-Q1
Not Yet Appointed	-	2011-Q1	2028-Q1
-	Al Ghanim International General Trading & Contracting Company	2014-Q4	2024-Q2
-	Al Sager General Trading & Contracting, Shapoorji Pallonji & Company	2013-Q1	2024-Q3
-	-	2017-Q3	2028-Q1
Not Yet Appointed	-	2021-Q1	2028-Q1
Atkins, Gulf Consult	Mohammed Abdul Mohsin Al Kharafi & Sons	2015-Q1	2024-Q1
-	China Harbour Engineering Company (CHEC), Copri Construction, Gulf Dredging, Hyundai Engineering & Construction, Kharafi Group, Shaheen Al Ghanim Roads and Bridges	2006-Q1	2024-Q4
-	-	2015-Q4	2025-Q1
-	-	2021-Q1	2025-Q1
-	-	2021-Q1	2025-Q1
Kuwait Oil Company (KOC)	KOC	2014-Q1	2026-Q1
Hill International, SPDM	Al Ghanim International General Trading & Contracting Company	2010-Q4	2024-Q2
Dorsch Consult, Ineco, Ingenieria & Consultoria de Transporte, SSH	Al Dar Engineering & Construction Company, Avic International, Kharafi National, Limak	2007-Q2	2027-Q1
Ineco, Ingenieria & Consultoria de Transporte	Kharafi National, Limak	2007-Q2	2024-Q3
-	Limak Insaat	2007-Q2	2024-Q1
-	Limak	2019-Q1	2024-Q1
-	-	2008-Q3	2028-Q4
-	Dodsai	2012-Q1	2024-Q1
Not Yet Appointed	-	2012-Q1	2029-Q1
-	Ahmadiyah Contracting & Trading Company, Combined Group Contracting Company (CGCC)	2015-Q2	2024-Q4
-	Al Sager General Trading & Contracting, Shapoorji Pallonji & Company	2012-Q1	2024-Q1
-	-	2016-Q1	2025-Q4
Hill International	Bayan National Construction Contracting Company, Limak Construction, Real Estate Construction & Fabrication Company (Recafco), Canar Trading & Contracting Company (CTCC)	2010-Q3	2024-Q1
Not Yet Appointed	Cengiz, China Gezhouba Group, China State Construction Engineering Company, Kolin, Limak, Polatyol, Salini Impregilo (Webuild)	2010-Q1	2025-Q1
-	China State Construction and Engineering Corporation (CSCEC)	2020-Q2	2025-Q4
Egis Group, Hill International	Bayan National Construction Contracting Company, Cengiz, China Gezhouba Group, CTCC Kolin, Limak, Polatyol, Recafco, Webuild	2010-Q1	2025-Q1
-	China Gezhouba Group	2014-Q3	2029-Q2
-	Alamiah Building Company, CGCC, First Kuwaiti General Trading & Contracting Company M A Al-Kharafi & Sons, Nusaiba Company for General Contracting for Building United Building Company, United Gulf Construction Company	2006-Q1	2029-Q3
Gulf Consult	-	2012-Q1	2024-Q1
-	Al Ghanim International General Trading & Contracting Company	2022-Q1	2025-Q1
-	-	2011-Q1	2036-Q1
-	WTE Wassertechnik	2007-Q2	2025-Q1

** List includes projects worth over \$550 million only.

Source: DMS Projects

REDEFINING URBAN LANDSCAPE



The J3 Project features a mix of residential, commercial, and recreational amenities.

TWO ambitious development projects – South Sabah Al-Ahmad City, taking shape 80 km south of the capital and the mixed-use J3 Project within Jaber Al-Ahmad City – are currently under construction in Kuwait representing a transformative vision for the country’s urban landscape.

By combining innovative design and a focus on sustainability, these developments are expected to set a new standard for modern living in the country. Another common factor shared by these two projects is the consultancy services of leading multidisciplinary firm Pace, which will provide infrastructure supervision services for the South Sabah Al-Ahmad City, a monumental project which will spread over an expansive 61.5 sq km; and design services from start to finish on all disciplines as well as construction supervision services for the mixed-use J3 Project.

Speaking to *Gulf Construction* about these two key projects, Pace’s CEO Tarek Shuaib says: “In Kuwait, we see the beginnings of



Work is under way on the J3 Project.

a reinvigorated construction market, as the country expands and develops to accommodate its accelerating rate of development and its growing population. New residential and commercial projects – like South Sabah Al-Ahmed City and J3 – are critical

to these ambitious development plans.”

“At Pace, we are proud to have been partners in development for the State of Kuwait for almost six decades now. We witnessed its various booms and helped shape its landscape throughout, and we are

delighted to continue to do so in this very exciting phase of the country’s development,” he adds.

SOUTH SABAH AL-AHMAD CITY

Infrastructure works – massive in scale – are well under way on South Sabah Al-Ahmad City, an ambitious city that is poised to redefine urban living in the country and will be home to 280,000 people eventually.

South Sabah Al-Ahmad City embodies the aspirations of the New Kuwait 2035 Vision, championed by the late Amir of Kuwait, Sheikh Sabah Al Ahmed Al Jaber Al Sabah and is projected to create 145,000 jobs across diverse sectors such as construction, medicine, manufacturing, and culture.

Over a span of 36 months, Pace will meticulously supervise a diverse array of components, including road works, stormwater management systems, sanitary infrastructure, water supply networks, electrical installations, and finishing touches, among others. This extensive scope underscores Pace’s pivotal role in guaranteeing the seamless realisation of this ambitious urban development initiative, aligning with Kuwait’s visionary objectives, says the leading consultancy.

South Sabah Al-Ahmad City is designed with 11 distinct neighbourhood clusters orbiting the central business district, accompanied by a perimeter of light industrial structures.

Within the central district lies a rich tapestry of amenities, including a sports stadium, museum, city university, and a sprawling city park that serves as the focal point of the masterplan. Central to this blueprint is an intricately designed landscape strategy, featuring verdant green spaces inspired by the gentle contours of desert sand dunes. These interconnected green corridors not only enhance the city’s aesthetic appeal but also promote environmental sustainability and community well-being. Moreover, it is located 66 km from Kuwait International Airport, providing smooth connectivity and accessibility with multi-layered public transport systems designed to enhance the quality of life for residents and visitors alike.

Pace aims to bring its signature quality delivery on projects to South Sabah Al-Ahmad City. With a focus on functionality and aesthetics, Pace says it is ensuring



Construction work on infrastructural networks such as roads, rainwater drainage and sanitary services in progress in various sectors of the South Sabah Al-Ahmed City.

that every facet of the city’s infrastructure adheres to the highest standards of excellence and efficiency.

THE J3 PROJECT

Situated within the dynamic urban fabric of Jaber Al-Ahmad City, the new J3 Project epitomises a forward-looking approach to urban development and community design. A 20-minute drive from the capital and Kuwait International Airport, J3 stands out as not only a real estate venture but also a testament to progressive

urban planning, addressing the needs of a growing population while nurturing a sense of connectivity and belonging, according to Pace.

At its core, J3 embodies modernity and sophistication, with a focus on creating luxurious living spaces and vibrant communal areas.

Comprising a diverse array of land uses, J3 features a mix of residential, commercial, and recreational amenities. Divided into two distinct zones, JE and JF, the

project encompasses investment residential towers, commercial units, retail shops, a neighbourhood park, and essential infrastructure facilities to ensure a thriving urban ecosystem.

The J3 project's residential architecture reflects a harmonious blend of contemporary design and functionality, with townhouses and low- to mid-rise buildings contributing to its rich skyline. The project features 21 residential complexes, characterised by contemporary aesthetics and carefully planned amenities. It offers a total of 204 spacious apartments and 72 three-level townhouses with a villa-like ambiance. Each residence is carefully designed to prioritise privacy, natural light, and ventilation, with state-of-the-art facilities and sophisticated finishes, enhancing the living experience, says Pace

Central to the design philosophy of J3 is fostering a cohesive environment, underpinned by principles of inclusivity and connectivity, it adds. The project prioritises the integration of green spaces and public amenities, including mosques and schools. A central neighbourhood park serves as a hub for various activities and gatherings, offering a myriad of recreational opportunities, from playgrounds to sports courts, catering to the diverse lifestyles of its inhabitants. A network of pedestrian pathways and bike tracks criss-crosses the development, promoting active mobility and facilitating the flow of movement throughout the area.

Complementing the residential offerings is J3's world-class mall, imagined to be a modern icon and a focal point for the entire city. Boasting 300 retail shops, 70 gastronomic establishments, 14 cinemas, and a plethora of entertainment venues, the mall offers an engaging experience for visitors from Kuwait and beyond. A plaza enveloping the mall serves as an organic extension of the neighbourhood park, creating a sense of community, communal space, and engagement across all aspects of J3, says the designer.

In essence, the J3 project emerges as a transformative canvas for contemporary living in Kuwait's ever-evolving urban panorama. By combining innovative design principles with a commitment to connectivity, inclusivity, and sustainability, Pace aims to set a new standard for future living in the country. ■



The waterfront redevelopment project extends 9.7 km from the Kuwait Towers all the way to the Yacht Club.

Iconic waterfront gets new look

IN line with its vision to redevelop Kuwait's prime waterfront area, the Touristic Enterprises Company (TEC) has recently marked the completion of the newly revamped Phase One of the Waterfront Development.

The waterfront redevelopment project extends 9.7 km from the Kuwait Towers to the Yacht Club. The project is divided into two phases: the first completed phase is from Green Island to the Kuwait Towers, while the second phase is from Green Island to the Al Shaab slipway.

The project provides visitors with an immersive experience that beautifully represents the cultural and heritage essence of the State of Kuwait, says Kuwait-headquartered SSH, a design-led consulting firm which is the design and supervision consultant on the development.

For TEC, the vision was to reactivate the waterfront for the public with key zones that offer national events, green sustainability elements, cultural entertainment, and lifestyle retail activities, creating diverse active spaces. It will also provide more than 60 business and investment opportunities for Ku-

waiti companies. Dedicated bicycle and running lanes have been incorporated with distance markers for fitness enthusiasts.

SSH says the project reflects the practice's commitment to sustainability by incorporating eco-friendly materials, including solar-powered lamps, 40 electric car charging stations, and landscaping suitable for the Kuwaiti climate. Creative artworks have been placed throughout the project, adding to its distinctive character.

"SSH takes pride in being the partner of choice for TEC on this fantastic project. We look forward to seeing the completion of Phase Two later this year," says Ali Hayat, Resident Director of SSH Kuwait. ■



The project incorporates eco-friendly materials.

World's first 3D printed tanks completed



Representatives of Abyan, Cobod, and Kuwait United Poultry Company are seen in front of the world's first on-site 3D printed large water tanks.

THE world's first on-site 3D printed large water tanks have been constructed in Kuwait by Abyan Building Construction Company using a Cobod 3D construction printer and achieving a 25 per cent savings on the amount of concrete and reinforcement that would be required in traditionally constructed tanks.

The two tanks were printed for Kuwait United Poultry Company and will be used for chicken drinking water at one of its many farms in the country.

The tanks measuring 4.5 m in height and with a diameter of 7 m were 3D printed with low-cost concrete in just five days and only contained macro fibres for the reinforcement of the tank walls and no traditional reinforcement meshes, according to a spokesman for Abyan.

"When constructing large tanks with the traditional method of formwork and concrete, the tank walls must be the same thickness from top to bottom because formwork cannot vary the thickness in height," explains a spokesman for Denmark-headquartered Cobod. "3D construction printing does not have this

limitation, allowing structural engineers to adjust the wall thickness where needed. Since gravity and water pressure make the bottom of the tank experience more stress, those areas need thicker walls. With 3D printing, the bottom walls can be made thicker and the upper walls thinner, saving materials and making the construction of the tanks both more economical and sustainable."

The tanks in Kuwait had 40-cm wall thickness at the bottom part, 30 cm in the middle, and 20 cm at the top, leading to 25 per cent less concrete and reinforcement used for the walls, compared to if they had been cast with 40 cm walls all the way up, says the Abyan official.

The tanks were printed with a low-cost real C40/50 concrete mixed on-site using the D.fab solution and related printing equipment invented by Cemex and Cobod, where 99 per cent of all raw materials used are locally sourced, he adds.

To further increase the speed of execution, Abyan insisted on using macro fibres for the reinforcement of the concrete. Macro fibers have not been used for reinforcement of 3D printed real-life structural

constructions before, so the requirements from Abyan presented a real challenge.

Henrik Lund-Nielsen, Founder and General Manager of Cobod, says: "Abyan pursues real innovations, which we really want to support and they wanted to try to avoid using any hard reinforcement in the walls, and just add fibres to the concrete. Of course, this challenged us a lot, but together with Cemex, the three of us were able to find a very good solution, which now can be replicated elsewhere in the future".

Abyan's willingness to be innovative and try out new solutions is a consequence of the scientific background of the CEO and co-founder of Abyan, Dr Ahmad Al-Nassem, a professor of structural engineer-



The tanks were printed with a low-cost real C40/50 concrete mixed on-site using the D.fab solution and related printing equipment invented by Cemex and Cobod, where 99 per cent of all raw materials used are locally sourced

ing at Kuwait University. Dr Al-Nassem says: "Abyan is wholeheartedly committed to revolutionising the construction industry at large by integrating cutting-edge 3D printing technology within concrete construction along with innovative solutions in design and construction materials, bringing forth a new era of efficiency and sustainability. So, when all of our calculations showed that with 0.95 per cent macro fibres in the concrete, we could remove all hard reinforcement of the tank walls, we were keen to prove this new design concept with a real-life project."

Due to the cost and time savings realised in the project, Kuwait United Poultry Company is keen to continue 3D constructing printing for tanks in the future. ■