



Gulf Research Center
Knowledge for All

GCC and Türkiye INFRASTRUCTURE OUTLOOK

November 2023

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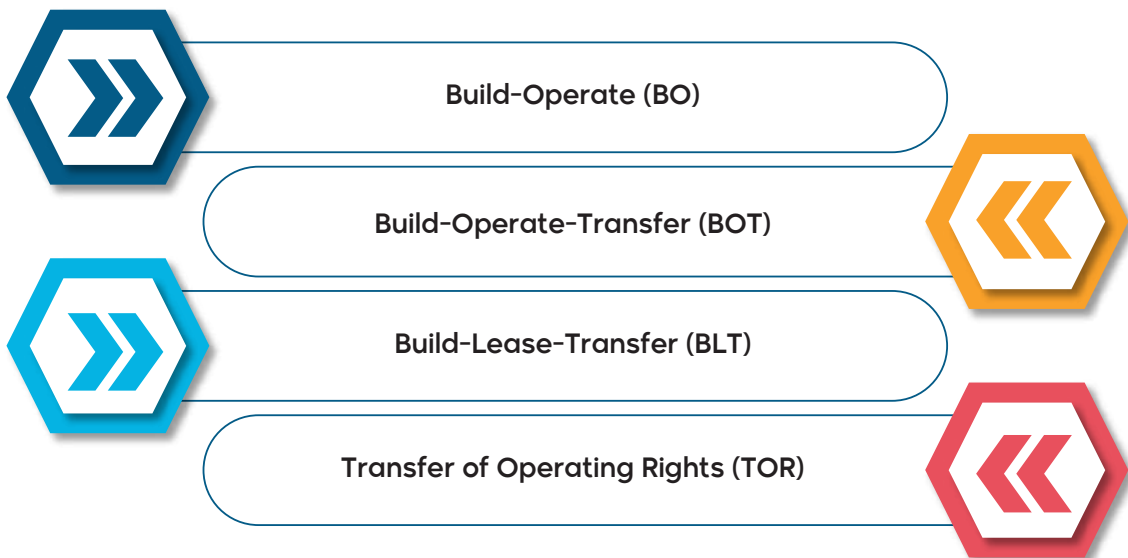
1. Executive Summary

1.1 Overview

Infrastructure often refers to the set of systems and facilities that serve a region, and involves the facilities and services necessary for households, organizations, and economy to function. The document splits infrastructure into three types – residential, commercial, and industrial. Under scope of residential infrastructure, the development of various residential areas and residential projects were considered. Under commercial, development of various commercial buildings, water and wastewater facilities, roadways, bridges, transportation facilities and other public infrastructure were considered. Industrial infrastructure covers the development of various industrial areas, free zones, and other related facilities.

1.2 Türkiye

Türkish economy has proven remarkably resilient, with a GDP growth from US\$ 720.29 billion in 2020 to US\$ 905.99 billion in 2022. This economic momentum has bolstered the government's confidence in mapping out its ambitious long-term goals for the infrastructure sector. The Türkish government relies heavily on public-private partnership (PPP) model and privatization for fast improvement of infrastructure. The public-private partnership (PPP) model and privatization history of Türkiye can be traced back to the 1980s. The country enacted initial laws to propel the involvement of the private sector in the public sector during that period. The privatization model was utilized for building new public facilities and completing the construction of unfinished ones. Despite financial and political insecurities since 2017, Türkiye has managed to attract investments, resulting in some of the world's highest values of private infrastructure investments and PPP deals. The privatization portfolio of the country now includes various assets and sectors, including roadways, airports, and power plants. Türkiye has introduced different PPP models under separate laws. Some of these models are mentioned below:

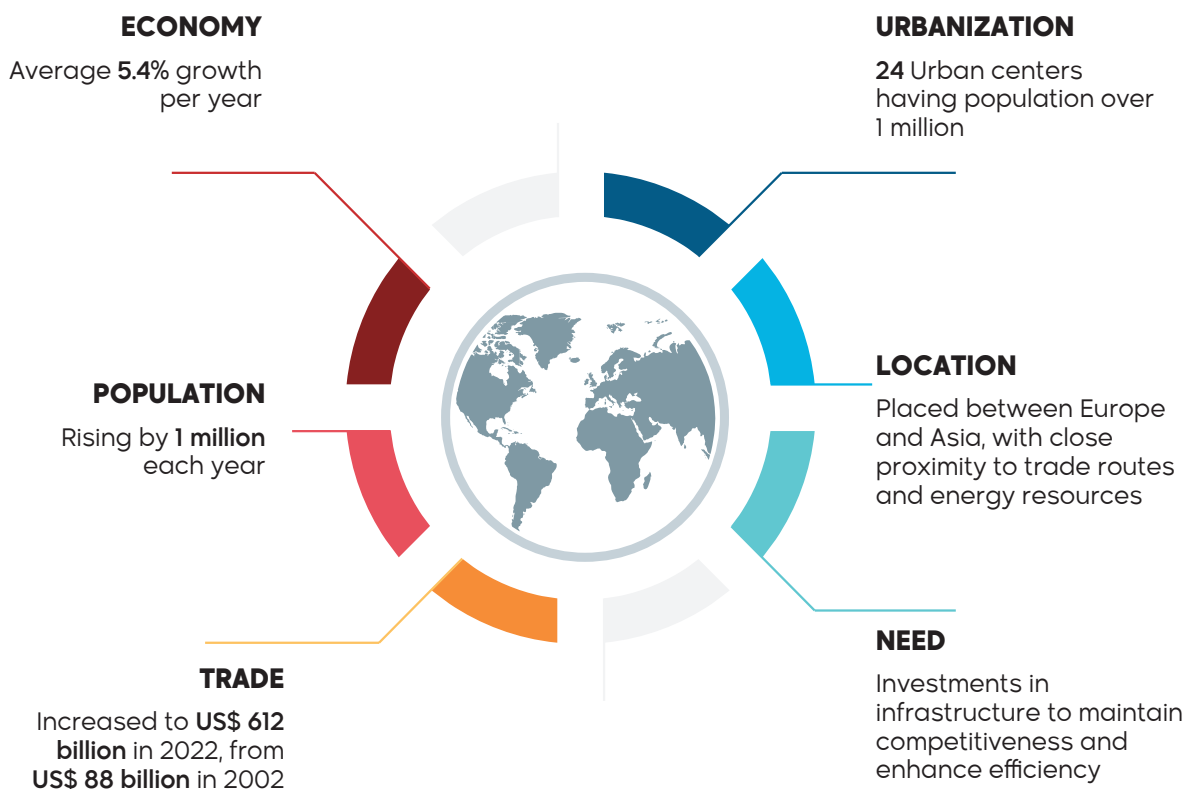




The government of Türkiye has introduced different investment incentive programs to enable corporate tax reductions, income tax withholding allowances, customs duty exemptions, land allocation, value-added tax (VAT) exemption, and VAT refunds. These programs also provide support for social security premiums and interest rate support for investment loans.

Apart from privatizing existing assets, there has been a considerable rise in the number and size of projects carried out under the PPP model in Türkiye. The first notable PPP projects were in the energy sector of the country, which were followed by projects in the transportation, water supply & wastewater treatment, and healthcare sectors.

Rising demand for infrastructure and government support for such projects create investment opportunities in the infrastructure sector through PPP models. Per World Bank data, Türkiye's average investment for PPP projects is one of the highest among emerging countries. The below figure showcases some of the driving forces of Türkiye's infrastructure growth.



Source: International Trade Administration (ITA); Investment Office of Presidency of the Republic of Türkiye

The overall outlook for Türkiye's infrastructure sector is positive, thanks to a fast-growing economy, a government with long-term vision for the sector, and mounting interest from private investors eager to participate in the country's economic rise.



1.2.1 Potential Future Outlook



1.3 Gulf Cooperation Council

The Gulf Cooperation Council (GCC) is a regional organization of Qatar, Saudi Arabia, Bahrain, Kuwait, Oman, and the UAE, set up in 1981. The alliance was formed to enhance its members' integration, coordination, and interconnection. Despite a global economic downturn, the GCC witnessed relatively strong economic growth, moderate inflation, and fiscal surpluses in 2022. Much of the region has seen an impressive rebound in economic activity, with Gulf energy output providing stability during the global energy crisis. This has also enabled GCC nations to ramp up their efforts to progress strategically important activities ranging from trade facilitation to infrastructure development. Infrastructural development is critical for these countries, as the participating nations focus on diversifying economies and attracting foreign direct investment (FDI). The GCC states are already seeking to transform the basis of their economies with the help of private-sector participation (PSP). Greater PSP offers other longer-term benefits to the GCC states. Well-structured PSP projects would attract interest from international investors around the world, thus promoting foreign direct investment in infrastructure development. Governments of GCC countries are also striving to develop detailed policy outlines for planning and managing public investments.



Additionally, development plans across the GCC emphasize logistical infrastructure as a driver of economic diversification. GCC plays a pivotal role in the worldwide circulation of goods. The reasons for the growth of the GCC's logistics infrastructure can be attributed to its strategic geographic position along the Europe–Asia trade route, which has boosted massive expenditure on mega transport infrastructure in various GCC states, including airports, ports, trains, and roads. China's growth as a manufacturing hub triggered a substantial increase in the export of oil, gas, and petrochemical materials from the GCC region eastwards. It also prompted the import of a vast array of commodities from East Asia for internal GCC consumption and re-export to Europe and other areas.

1.3.1 Potential Future Outlook





2. Türkiye

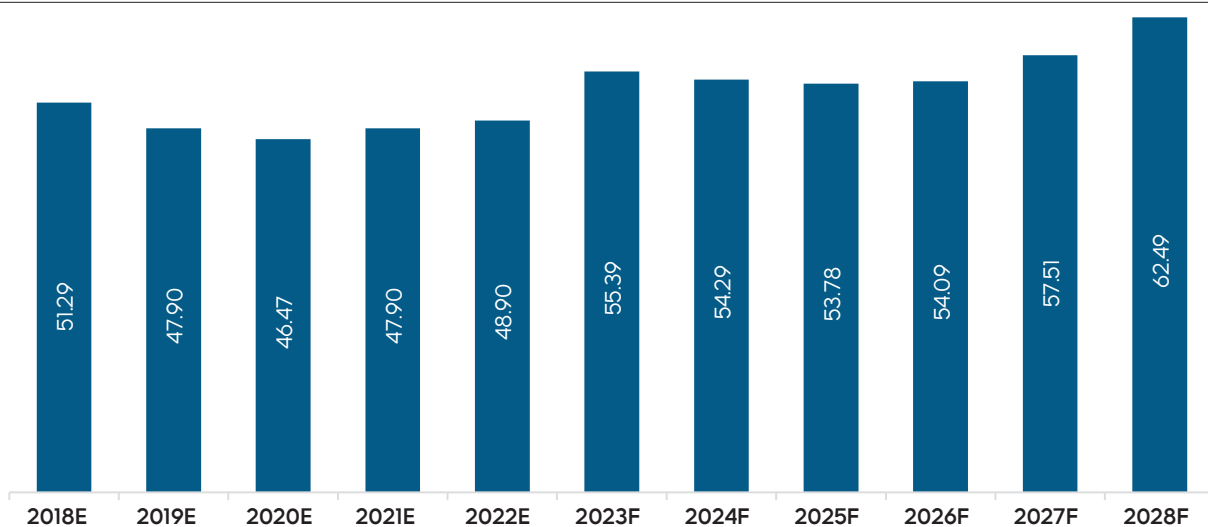
2.1 Introduction to Infrastructure Sector

2.1.1 Overview and Key Industry Trends

Türkiye has a developing economy, which presents attractive opportunities for investments in healthcare, building, transportation, and energy infrastructure, among others. As per the Turkish government, over 50% of the public-private partnership (PPP) projects signed by Türkiye in the last few decades have reached financial closure in the last 10 years. The country exhibited good GDP growth in 2021 (11.4%) and 2022 (5.6%), post the disruptions caused by the COVID-19 pandemic in 2020. Türkiye is a link between the Eastern and Western hemispheres, and it has favorable legislation for PPP investments. Moreover, strong public finance management and supportive macroeconomic policies complement these geological and economic advantages, creating a sustainable environment for the growth of the infrastructure sector. The country favors the adoption of modern technologies, and technology-related services tend to be one of the primary export commodities of the country. The infrastructure sector in Türkiye is also keen on technology adoption. For instance, several cities have initiated the installation of intelligent transportation systems (ITS), and local municipalities are planning and implementing various smart transportation projects. Further, Türkiye is prioritizing the prevention of water wastage, and hence, the relevant authorities in different Turkish cities have been implementing advanced solutions and upgrading water distribution facilities. Such factors offer notable opportunities for the growth of the infrastructure sector.

2.1.2 Infrastructure Market Size and Forecasts (2018–2028)

Figure 1. Türkiye Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



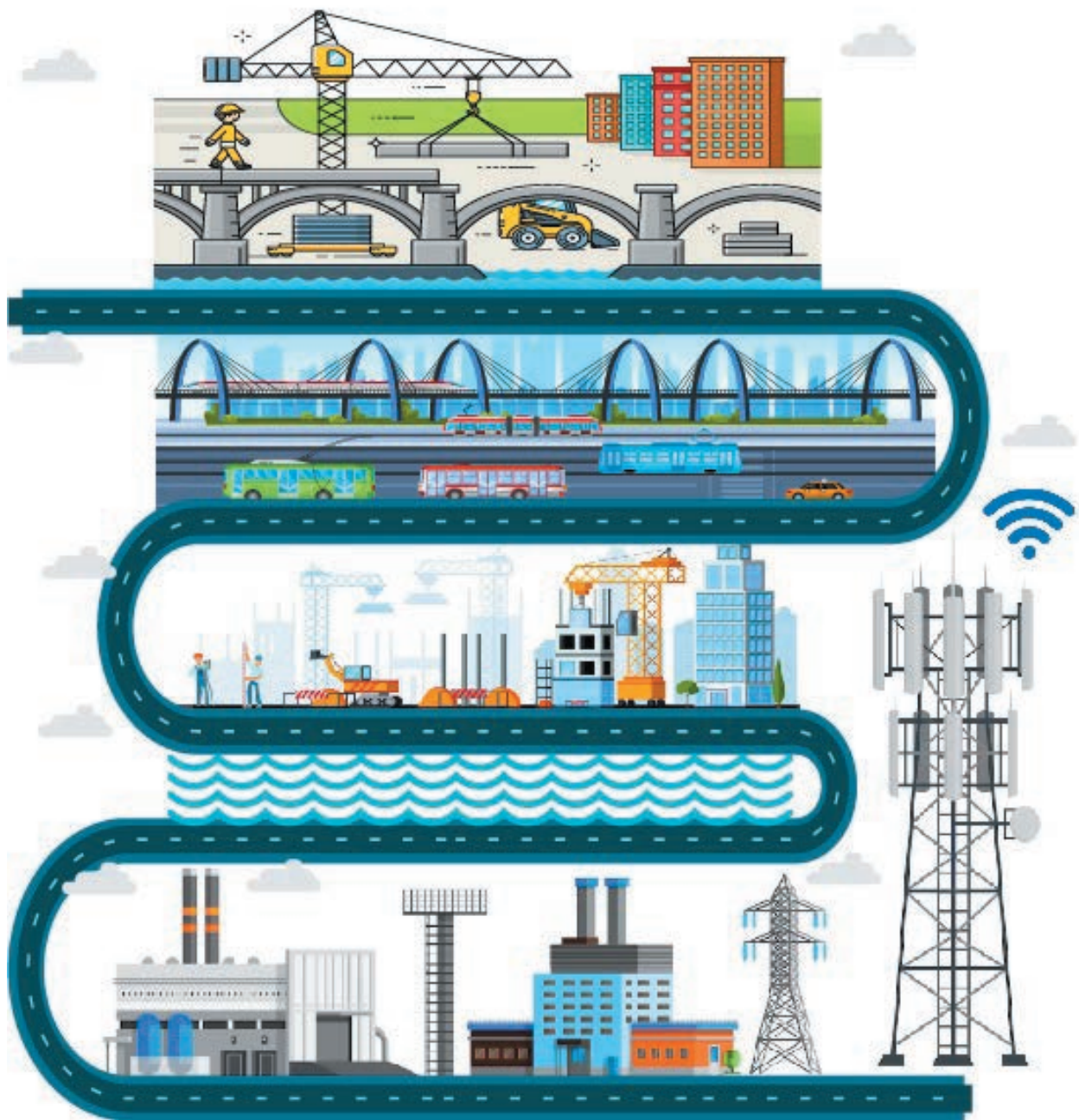
Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others



The earthquake in early 2023 compelled the country to increase its spending on reconstruction of damaged infrastructure, and the same trend is expected to be continued in 2024. Hence, the above graph shows a sudden increase in expenditure in 2023, and is tapered down in 2024 and 2025. Post 2025, the normal trajectory of growth is estimated to ensue Türkiye's growing international trade volume and strategic location drive the country's infrastructure development. Additionally, the government provides various incentives and undertakes different initiatives to accelerate project development. The investment climate for the infrastructure sector is further reinforced by international and domestic laws that protect investments and provide arbitration when necessary.

2.2 Infrastructure Sector in Details





2.2.1 Type of Infrastructure



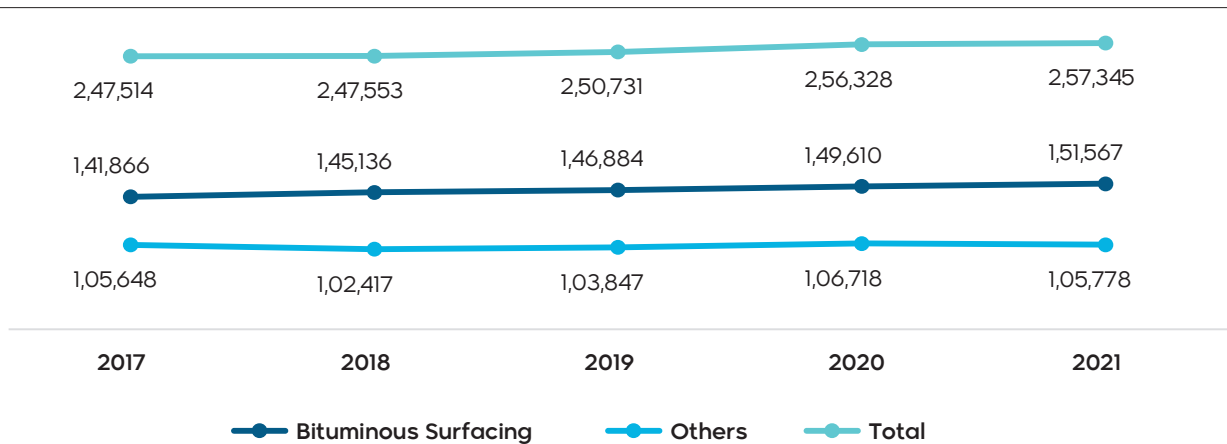
2.2.1.1 Commercial

Improving transportation infrastructure is being prioritized by the Turkish government. The Ministry of Transport & Infrastructure, under the auspices of the 2013–2023 Action Plan, is implementing intelligent transportation systems (ITS) such as smart traffic light systems, digital traffic signs, green wave systems, and solar-powered bus stops with digital arrival-time displays. Green wave systems are expected to improve fuel efficiency and decrease pollution, as they allow vehicles to pass through subsequent green lights while maintaining a specific speed after encountering red light signal. The ITS of Gaziantep can share messages and signs with drivers, and it can predict and analyze region-based arrival times based on the interaction.



In September 2020, Türkiye inaugurated its "smartest" highway that connects Ankara (the capital) with the Nigde province. As a part of this project, a fiber network was laid along the **330 km road**, with an expectation to save **US\$ 220 million** annually.

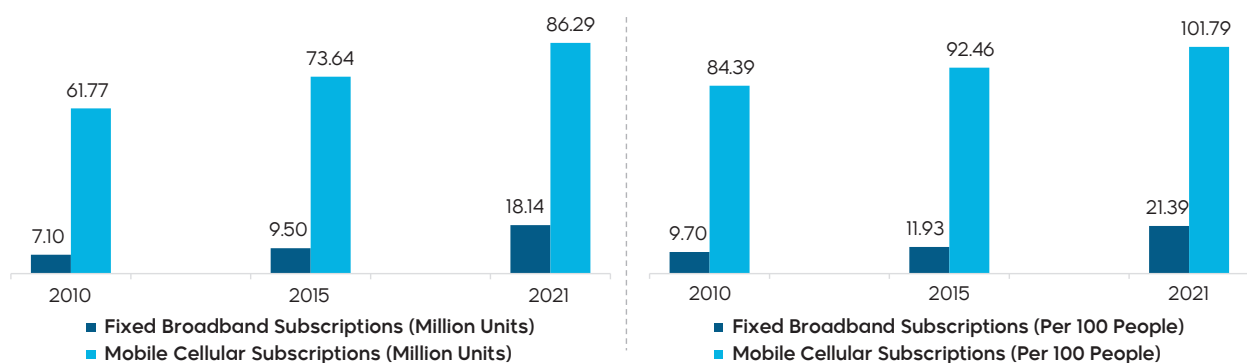
Cameras and accident detection systems, which are managed through a single command center, have been deployed to ensure smooth traffic flow. Additionally, Türkiye has continuously improved the share of metaled/bituminous surfaced roads in the total road network. The below chart depicts the growth in different types of roads in Türkiye.

**Figure 2. Total Length of Roadways (Kms)**

Source: Tuik Info, World Bank

The share of these roads rose from ~57% in 2017 to ~59% in 2021. The total bituminous surfaced roads increased from 141,866 kms in 2017 to 151,567 kms in 2021, showcasing the growing importance of roadways development in the country. Similar efforts are being put into the improvement of the overall transportation infrastructure. MBB-Gari-Mezitli Metro and IMM-Ucyol-Buca Koop Light Rail projects are a few of the largest transportation-related infrastructure projects undertaken in Türkiye. In November 2021, Altintel port, a port located in Kocaeli (Western Türkiye) for liquid bulk containers, secured a loan of US\$ 8.5 million from the EBRD to construct and install 18 chemical storage tanks and related infrastructure.

Likewise, the communication infrastructure is also being focused upon by the government. Telecommunications is one of the fastest-growing sectors in Türkiye, and the government is strongly focusing on improving the information and communication technology (ICT) infrastructure in the country. As per Türkiye's Investment Office, the Turkish ICT market totaled US\$ 30 billion in 2021, with 23% average growth in the past five years and utilizes more than 1,200 Research & Development (R&D) centers for expansion of the sector. The sector employed ~185,000 people in 2021 and is also one of the largest export sectors of Türkiye.

Figure 3. Telecommunication Statistics

Source: Tuik Info, World Bank

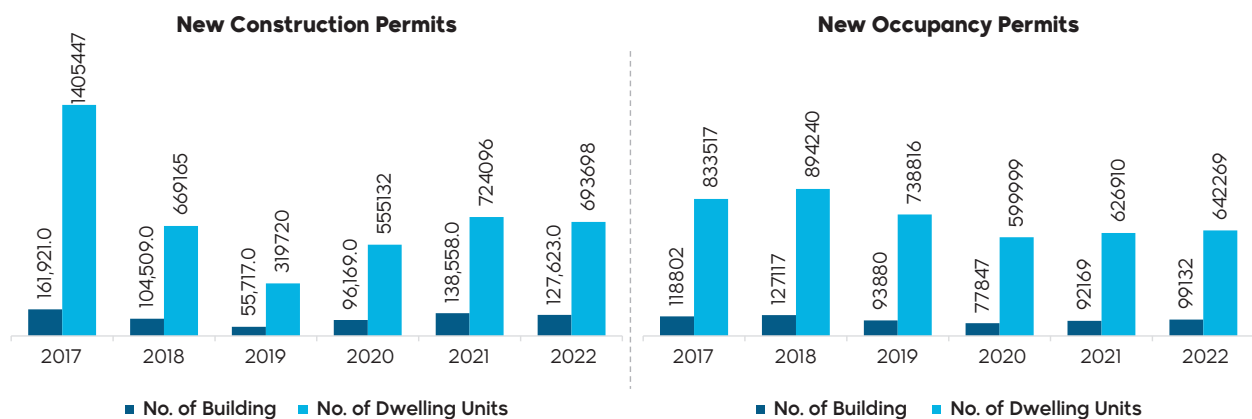


As can be seen from the above charts, the telecommunications sector’s user base has been rising phenomenally. It is primarily driving the development of telecommunications infrastructure in the country. Additionally, the rollout of 5G technology across the country has been providing notable opportunities for the growth of the telecommunications sector. Telecommunication operators are partnering with network providers such as Nokia, Huawei, and Ericsson to develop advanced networks. In September 2022, Nokia collaborated with MEXT to deploy its 5G private wireless Digital Automation Cloud (DAC) solution at the MEXT Technology Center. Nokia and Türk Telekom, in agreement with Arcelik Global in June 2021, announced plans to roll out the country’s first 5G commercial private network. In tandem with such advancements, the number of mobile phone users is also rising at a fast pace. Per the data of the World Bank, mobile cellular subscriptions per 100 people rose to 102 in 2021 from 97 in 2019; the number of cellular subscriptions rose from 80.79 million in 2019 to 86.29 million in 2021. These stats signify opportunities for the expansion of cellular infrastructure and connectivity throughout the country. Such varied developments across different sectors showcase Türkiye’s potential to be an attractive investment destination.

2.2.1.2 Residential -

Housing sales to the non-Türkish population decreased from 45,483 units sold in 2019 to 40,812 units sold in 2020, recording a drop of 10.3%. Additionally, the COVID-19 pandemic led to a rise in work-from-home trends and the adoption of new working models, adversely impacting general leasing activities and investments in 2020. The Türkish government is now undertaking several policy reforms to boost the residential construction sector. The Ministry of Environment and Urbanization announced an action plan to transform 1.5 million houses by the end of 2025. Under this action plan, the country also intends to transform 300,000 houses, including 100,000 from Istanbul, yearly. Such steps are being taken to mitigate the ill-effects brought upon by the COVID-19 pandemic on the residential sector.

Figure 4. Türkiye’s Housing Statistics



Source: Tuik Info, World Bank

The above figures showcase the burgeoning demand of the residential sector in Türkiye. Such demand is expected to promote investments in the residential sector.

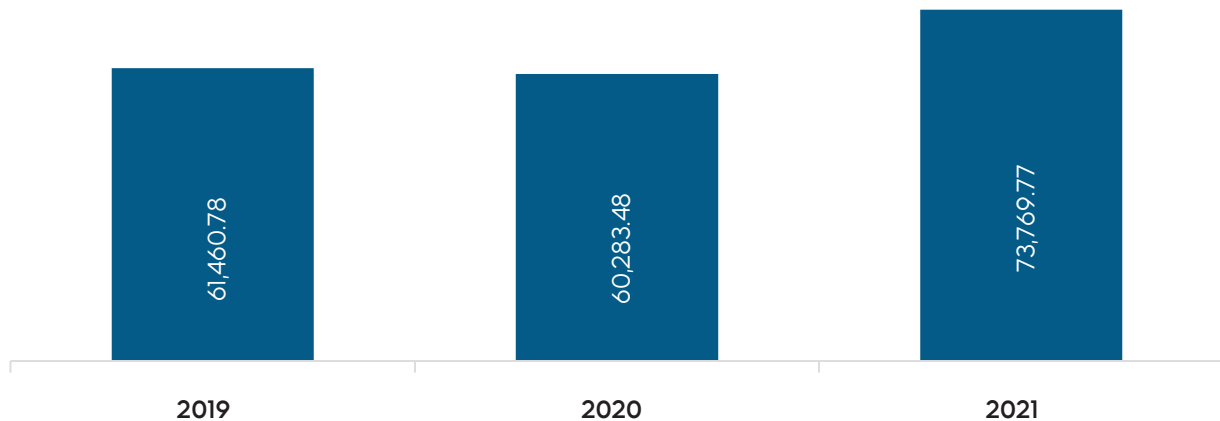


2.2.1.3 Industrial -

Türkiye has one of the most pronounced industrial bases in the Middle East, and it has been witnessing steady growth over the years. The industrial sector is one of the largest employers in the country, and hence, the government has been constantly promoting the progress of this sector.

The deployment of smart grid systems has been ongoing in Türkiye, and the stages of implementation vary from one distribution company (DISCO) to another. Most DISCOs utilize supervisory control and data acquisition (SCADA) and global information systems (GIS) to expedite smart grid deployment and decrease losses while enhancing dependability and quality. Under its Smart Grid 2023 Vision and Strategy Roadmap of Türkiye, the country has established several targets for full smart grid system implementation in Türkiye. However, the COVID-19 pandemic, geopolitical tensions, economic downturn, and natural disasters have led to delays in project completion. In December 2021, a leading Turkish utility company, secured a loan of US\$ 110 million from the European Bank for Reconstruction and Development (EBRD) for the modernization of grids, and upgrading and expansion of the distribution network and generation capacity of its renewables industry to ensure grid reliability and decarbonization. Such trends are evidence of the growing investment in the development of energy infrastructure. The below image showcases the rising revenue generation of electricity and associated companies, owing to rising demand and infrastructure improvement.

Figure 5. Turnover of Electricity, Gas, Steam and Air Conditioning Supply Companies (US\$ Million)



Source: Tuik Info, World Bank

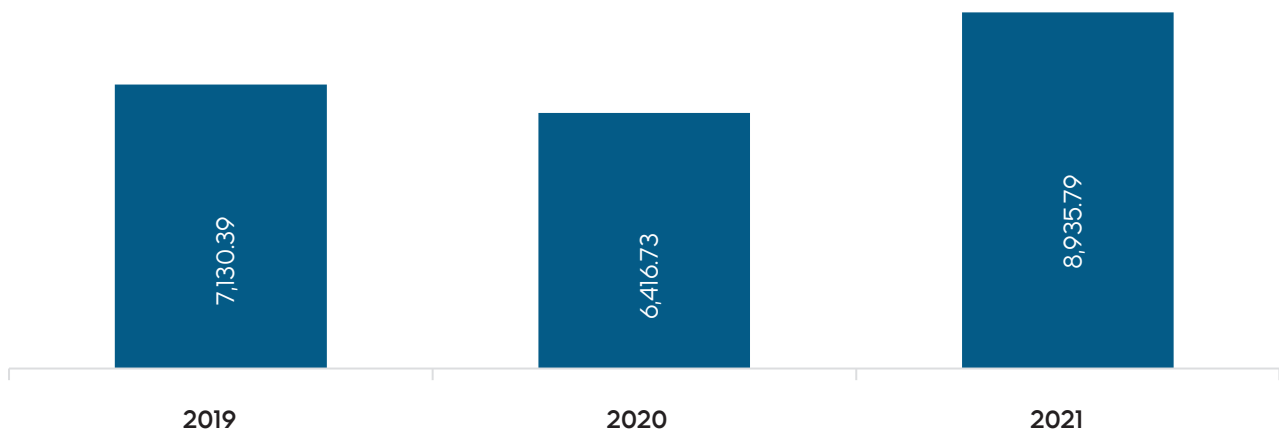
The government of Türkiye has announced its plans of investing US\$ 3.39 billion (TL 66.7 billion) in electricity distribution infrastructure during 2021–2025. With this initiative, the country plans to expand its electricity network in Türkiye, and ~US\$ 51 million will be invested in the R&D activities. Further, Türkiye has also introduced a new roadmap for the gas trade center, which includes



five LNG facilities, seven natural gas pipelines, and two underground gas storage facilities. The country has earmarked three locations—Akkuyu, Thrace, and Sinop—for implementing three different nuclear power plant (NPP) projects. These planned NPPs are expected to have 4,000–5,000 MW capacities.

Water losses from water distribution networks (WDNs) have become a crucial problem in Türkiye, as almost 45% of system input volume (SIV) accounts for average non-revenue water (NRW). The government of Türkiye is emphasizing on water conservation and efficient sewage treatment to end water losses, preserve wetlands, and curb water woes. The Ministry of Agriculture and Forestry aims to cut water loss levels to 25% in 2023 from 37% in 2022, saving US\$ 67.2 million annually. Hence, expenditure on the development of such infrastructure is rising rapidly. The below image showcases the rising revenue generation of water and wastewater associated companies, owing to rising urbanization and infrastructure improvement.

Figure 6. Turnover of Water Supply; Sewerage, Waste Management and Remediation Companies (US\$ Million)



Source: Tuik Info, World Bank

The country launched a Water Council in October 2021 to comprehensively address water problems, bringing together every stakeholder in the water and wastewater industry, from farmers to industrialists. Türkiye has spent US\$ 1.7 million since 2012 on preserving 95 designated wetlands. Certain Turkish municipalities also utilize SCADA systems to prevent water loss and efficiently detect network failures. Thus, the burgeoning focus on reducing water losses leads to the requirement for various advanced infrastructural modifications, thereby providing opportunities for infrastructure investments in this industry.



2.2.2 Economic Contribution

2.2.2.1 Government Initiatives and Programs

Government Initiatives and Programs



Türkiye offers incentives for infrastructure investments based on the region chosen. Businesses targeting less developed regions attract higher incentives.

The country provides various types of support—ranging from qualified personnel support to cashback support—depending on the investment type.

It offers loans at a fixed interest rate for up to 10 years. Advance loans that require investment commitments are given through the Development Investment Bank of Türkiye, as well as other banks.

Türkiye offers different types of state guarantees, such as construction safety, licenses, and delivery dates, depending on the type and volume of the project.

It supports increased private participation in power, renewable energy, and natural resources.

The country facilitates the commercialization of municipal infrastructure services to promote financial and operational autonomy.

Under the auspices of Transport Vision 2035, the country plans to enhance all modes of transport and invest US\$ 197.9 billion in rail, road, maritime, and air transport and communications. It strives to improve its inter-modal transportation infrastructure to support small and medium enterprises (SMEs) exporting their products to neighboring countries. Its rail liberalization legislation reforms for the railway sector provide access to third parties.

Türkiye has collaborated with the International Maritime Organization (IMO) to minimize pollution in the country's maritime sector.

The country offers financial aid for investments in social infrastructures, such as hospitals and schools.

The government focuses on improving its commitment to build-operate-transfer (BOT)/public-private partnership (PPP) infrastructure projects.

Türkiye offers favorable investment legislation for PPP investments.

The country is working on decreasing the climate vulnerability of infrastructure and other assets.

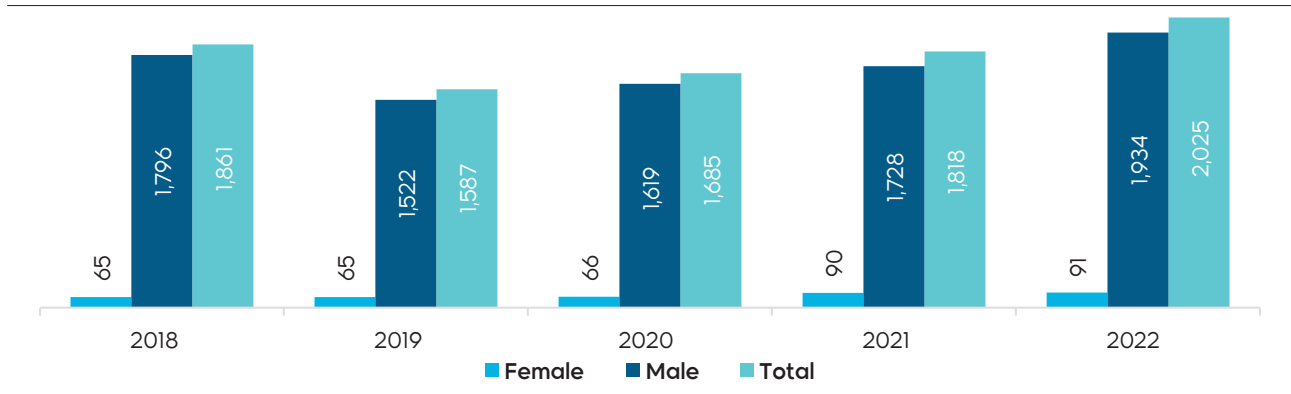
Türkiye offers feed-in tariff benefits for renewable power plants, such as solar, biomass, wind, geothermal, and hydropower projects.



2.2.3 Labor and Regulatory Outlook

Türkiye is one of the most prominent industrial nations in the Middle East, and its economy is not excessively dependent on the oil & gas sector. The country has a diverse industrial mix, including construction, and it also claims to have one of the largest labor forces in the region. Additionally, Türkiye is not dependent on an expatriate labor force.

Figure 7. Labor in Construction Sector, Türkiye (Thousand Heads)

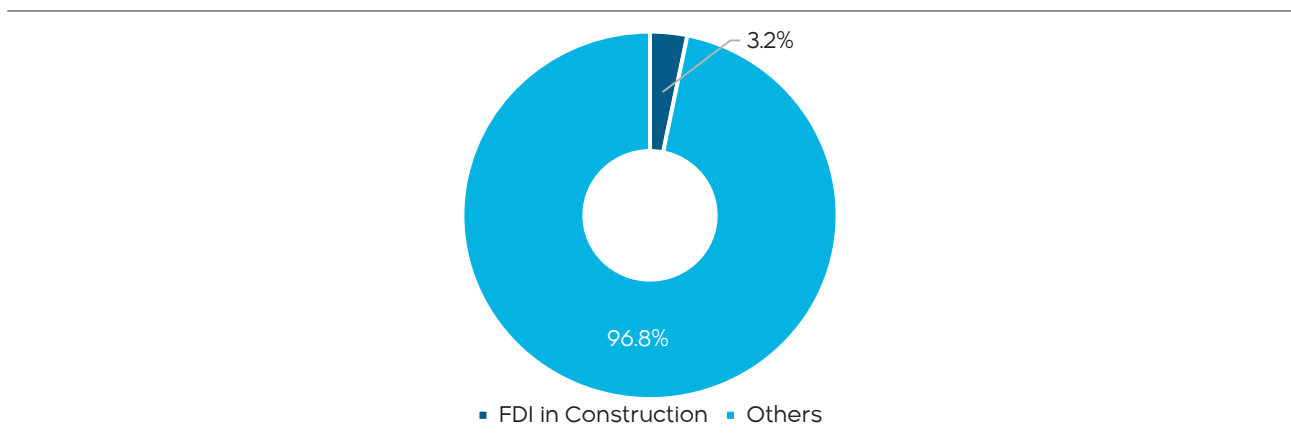


Source: Tuik Info, ILO, and World Bank

The graph showcases that the number of laborers in the construction sector has risen significantly since 2019. While males dominated the sector, the percentage of females has been rising steadily over the past few years. Such a trend is expected to continue in the future as well. The country has adopted new regulations for complying with the 19th International Conference of Labour Statisticians (ICLS) Resolutions by the International Labour Organization (ILO) and the relevant EU regulations. Labor laws framed by the Ministry of Labor are the primary legislation guiding the working of employees and employers in Türkiye. The Work Health and Safety Law guides employers in maintaining healthy and safe workplaces, whereas the International Workforce Law and other legislation enable the implementation and enforcement of guidelines, along with ensuring clarity regarding them. The Law of Unions and Collective Bargaining Agreements specify rules applicable to collective bargaining arrangements and unions.

2.2.4 Foreign Direct Investments

Figure 8. FDI in Türkiye's Construction Sector (2021)



Source: Central Bank of the Republic of Türkiye, World Bank, UNCTAD, and ITA



After two consecutive years of decline (2020 and 2021), FDI inflows in Türkiye reached US\$ 13 billion in 2022, with a rise in new equity investments. Investment deals included the refinancing (totaling ~US\$ 1.3 billion) of project debt across several oil and gas assets in Türkiye by the State Oil Company of Azerbaijan (SOCAR). Türkiye receives the largest share of investments from the Netherlands, the US, and the UK. Considering the proximity, European nations have also been dominant investors in Türkiye. The country has developed guidelines for sustainable banking for directing more investments into key sustainable development areas, including social infrastructure and agriculture.

2.2.5 Capital Investments and Major Investors

Per Türkiye's Investment Office, the major investors in Türkiye's Infrastructure sector includes Asian Infrastructure Investment Bank (AIIB), International Finance Corporation (IFC), European Bank for Reconstruction and Development (EBRD), Khazanah Nasional, Sojitz Corporation, Astaldi SpA, Meridiam SAS, and the State Oil Company of the Republic of Azerbaijan (SOCAR).





2.2.6 Ongoing and Upcoming Infrastructure Projects

- May 2023** In May 2023, Hektas Ticaret TAS, a leading Turkish veterinary medicine manufacturer, announced its plan to establish a second production facility in Sincan, Ankara.
- May 2023** In May 2023, Eczacıbaşı Group's Eczacıbaşı Tüketim Ürünleri announced plans to invest ~US\$ 5 million to construct a factory in Sinop Organize Sanayi Bölgesi (OSB) campus. The expansion aims to increase the brand's multipurpose care oil production capacity.
- April 2023** In April 2023, Azerbaijan's energy ministry announced that it would soon begin the construction of the Turkish portion of the Igdir-Nakhchivan pipeline project. In December 2020, a memorandum of understanding (MoU) was inked between SOCAR and Turkish BOTAŞ Petroleum Pipeline Corporation to construct the line.
- April 2023** In April 2023, Chery Group, a leading automotive manufacturer from China, announced its plan to open a factory in Türkiye to enter European markets. The company expects 15% of the group's sales from the automobiles manufactured in the new facility.
- April 2023** In April 2023, Eczacıbaşı Group's Eczacıbaşı Tüketim Ürünleri announced its plans to invest ~US\$ 70 million in increasing the capacity of its tissue paper factory. With this investment, the group intends to increase its production capacity to ~250 thousand MT annually.
- January 2023** In January 2023, a leading Japanese car manufacturer announced its plans to manufacture the first Türkiye-made plug-in hybrid passenger car. Its plant at Sakarya will also become the company's first European plant equipped with a vehicle battery production line.
- December 2022** In December 2022, Türkiye announced its plans for technical and administrative cooperation with Panama for its ongoing Kanal İstanbul project. The ambitious canal project (valued at US\$ 9.2 billion) would connect the Marmara Sea on the south of Istanbul to the northern Black Sea. The project was designed as an alternative global shipping lane, and is estimated to cost ~US\$ 9.2 billion (TL 75 billion).
- November 2022** In November 2022, a leading air conditioner manufacturer announced its plan to invest ~US\$ 4 million to double the currently available R&D space by April 2024.
- July 2022** In July 2022, a leading Turkish glass manufacturer invested ~US\$ 193 million in a new frosted glass plant at Tarsus Organized Industrial Zone (OIZ). The plant is expected to have a glass processing line specific to the energy industry with an annual capacity of 20 million sq. m. and a furnace with a capacity of ~600 MT/day.
- December 2021** In December 2021, Enerjisa Enerji, a Turkish utility company, secured a loan of US\$ 110 million from the European Bank for Reconstruction and Development (EBRD) for the modernization of grids, and upgrading and expansion of the distribution network and generation capacity with renewables for grid reliability and decarbonization.
- November 2021** In November 2021, UK Export Finance and GE Energy Financial Services announced their decision to invest ~US\$ 290 million in Kalyon Enerji's 1.35 GW Karapınar solar project, the largest solar facility in Türkiye. The facility is expected to power 2 million households and support Türkiye's clean energy goals in the future.



2.3 Industry Dynamics

2.3.1 Driver

High-Value Public-Private Partnerships

Türkiye has a developing economy, and the Türkiye government is investing in infrastructural projects in various sectors, including health-care, energy, and Transportation. Türkiye has a favorable legislation framework for PPP projects that may be implemented through investment models such as build-operate (BO), build-operate-transfer (BOT), build-lease-transfer (BLT), and transfer of operational rights (TOR). Certain thermal and combined cycle power plants in the country are based on the BO model. BOT and BLT models are most typically utilized in green-field infrastructure and energy PPPs, while the TOR model is frequently used in brownfield privatization projects. With these models, Türkiye is receiving increasingly high amounts in investments. For instance, contracts were signed for 265 PPPs valued at US\$ 195 billion during 1986–2022. According to the World Bank, the total investment in infrastructure during 2018–2022 was US\$ 19,354 million.

The Turkish PPP market is concentrated with domestic and foreign banks and international financial organizations such as the International Finance Corporation (IFC), the European Bank for Reconstruction and Development (EBRD), the Black Sea Trade and Development Bank (BSTDB), and the Islamic Development Bank (IsDB).

Rapid Urbanization

Over the past 60 years, Türkiye's Urbanization has progressed rapidly. Türkiye's population has become more urbanized, increasing from 25% in 1950 to about 75%. With such rapid urbanization, the development of various infrastructures is becoming crucial for accommodating the growing population and meeting the needs of urban occupants.

Hence infrastructure gains diverse opportunities in transportation facilities and wastewater treatment, among others. For instance, Türkiye has invested heavily in building and improving road networks, bridges, tunnels, and highways to connect urban areas and improve accessibility to urban facilities. Projects including New Istanbul Airport, Istanbul's first third bridge, and various metro rail systems in major cities have contributed to better transportation infrastructure.

Moreover, urbanization has led to a surge in housing demand. As cities expand, there is more need for residential complexes, affordable housing projects, and improved utilities such as water supply, sewage systems, and electricity distribution. The government of Türkiye and the private sector have also been working to develop new housing projects and upgrade utility networks to meet the rising demand. For instance, Türkiye saw a 15% year-over-year increase in residential real estate transactions in 2021. The number of homes sold in 2021 increased from 119,574 to 137,401, according to the Turkish Statistical Institute (TÜK).

Focus on Sustainable Infrastructure

As per the United Nations Environment Programme (UNEP), sustainable infrastructure systems are those that are planned, designed, constructed, operated, and decommissioned in a manner that ensures economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire infrastructure life cycle. Türkiye has several large infrastructures needs as the population's share in urban areas increases. The country plans to invest in water, wastewater, and public transport areas to accommodate the needs of the rising urban population. At the national level, more investment in roads, railways, ports, and telecommunications is planned to allow Türkiye to become a regional transit hub and support regional convergence. Moreover, the country's healthcare infrastructure is being improved due to a surge in demand and need for infrastructural and efficiency upgrades. Support from international banks and organizations allows for commercializing key municipal utilities and mobilizing private capital to develop roads, ports, airports, hospitals, and railways.

Thus, it also reduces the country's dependence on public finance while promoting sustainable infrastructure growth. For instance, through the EBRD's flagship program, EBRD Green Cities, several Turkish cities were able to address their most pressing environmental challenges and achieve sustainable infrastructure investment, policy, and capacity building. EBRD also pioneered public-private partnerships for Turkish hospitals and facilities management services provided by the private sector. Similarly, the development of the EBRD-backed Bosphorus tunnel has allowed for a fuel-saving commute of approximately ~35,000 vehicles daily while increasing the capacity of Izmir Ferries, Asya Port, Tekirdag Port, and Mersin Port have allowed for business growth between Asian and European nations. Such trends in sustainable infrastructure development aid the growth of the infrastructure sector in Turkey.

Long-Term Vision and Strategy a key enabler

Türkish government has been undertaking strategic steps and a planned approach towards various forms of infrastructure development. The '5 Yearly Development Plans' are an example of the same. In June 2022, the government published a circular on the 12th Development Plan for 2024 - 2028 that included several short-term goals per the long-term Vision 2053 strategic framework. A success for the government includes the digital public infrastructure established pre-COVID era, which was successfully leveraged to tackle the pandemic through responsive, inclusive, and efficient delivery of social assistance. The government's investment in setting up and modernizing interoperable digital platforms and information systems allowed for an efficient flow of information and data sharing across different government databases. It was integral to the social assistance program and allowed 7.2 million households to receive social assistance payments from the government. For instance, fifty of Türkiye's social protection programs process applications and payments through the Integrated Social Assistance System (ISAS). Similarly, with appropriate data protection measures, the foundational identification (ID) system provides a unique ID for all citizens and can be used to cross-reference information across different government databases. The National Address System (NAS) creates a registry of unique addresses, while the Social Assistance and Solidarity Foundations (SASFs) verify each recipient's eligibility. The Treasury Single Account (TSA) facilitates electronic fund transfers from the Central Bank to the banking system, sending the allocated funds to recipients. All such systems work in tandem to efficiently distribute government aid. Thus, such long-term visions and plans are strong enablers for the country's infrastructure growth.



2.3.2 Challenge

Temporary Shortage of Labor

The earthquake that hit Türkiye and Syria in February 2023 damaged several buildings, which resulted in an opportunity for the construction industry to rise. The government of Ankara decided to initiate 10,000 housing and infrastructural projects to complete them within a year. Completing the construction in such a short span requires a huge workforce. However, raising such an enormous manpower quickly is a challenging task, likely resulting in delayed project completion and increased construction costs.

The earthquake caused total damage. 53% (\$18 billion) were direct damages to residential buildings. In comparison, 28% (\$9.7 billion) damages nonresidential buildings such as hospitals, schools, public buildings, and private sector buildings, and 19% (\$6.4 billion) damages infrastructure such as roads, power, and water supply. The damage estimates do not include the wider economic repercussions and losses for the Turkish economy nor the cost of recovery and reconstruction, which could be substantially higher than the direct damages and require a more thorough evaluation. To recover this amount of damage, more labor will be required. The Labor index will also probably increase.

The construction cost index (CCI) in October 2022 increased by 117.07% compared to the same month in 2021. The CCI rose by 3.44%, the material index increased by 3.88%, and the labor index surged by 1.94% in October 2022 compared to September 2022. Further, the material index climbed by 128.41% and the labor index by 85.65% in October 2022 compared to October 2021. The CCI in 2022 was high and will increase evidently after the earthquake.

Cyberattacks

Like most nations, Turkey's Telecom infrastructure is often a target of cyberattacks. The telecommunication infrastructure utilizes mobile phones, internet providers, cloud infrastructure, satellites, and IoT devices. The widespread adoption of telecommunication solutions and services makes this sector a prime cybercriminals target. Telecom providers are witnessing a constant rise in attacks since a successful attack can provide access to sensitive information of several persons. Such information can be sold on the dark web or benefited by different entities for collecting intelligence on other countries. In January 2020, a leading Turkish telecom provider's DNS addresses were attacked, leading to customers facing problems with internet access.

Similarly, in October 2019, a nationwide internet outage was witnessed in Turkey since several telecom service providers faced distributed denial-of-service (DDoS) attack. Hence such attacks pose a challenge in improving and developing the telecommunication infrastructure in the country. With increasing adoption of 5G technology in Turkey, the threats are expected to expand, and provide attackers additional opportunities. In order to decrease the impact of this challenge, the government is continuously working with cybersecurity teams at telecom companies for evaluating and developing options, by leveraging new technology and automation, in an effort to stay ahead of attackers and counteract the challenges.

Türkisch Lira's (TL) Depreciation

Türkiye has positioned itself as an investment hotspot for European nations, offering low-cost labor and raw materials. It has allowed the country to attract large amounts of FDI in different sectors, including infrastructure. However, consecutive events starting from the pandemic, followed by the Russia-Ukraine conflict and the earthquake in early 2023, led to a highly depreciated Türkisch Lira (TL). The depreciation of TL reflects the ongoing challenges the country's currency and economy face. Reducing state controls on the foreign exchange (forex) market indicates a change in policy approach, possibly towards a more market-driven exchange rate. This change could, however, lead to heightened variations and volatility in the TL's value against key international currencies. Such fluctuation of TL impacts the cost of ongoing and upcoming infrastructure projects and can result in overshooting the anticipated project cost, long delays, or even cancellation. Hence, it acts as a challenge for the growth of the infrastructure sector.



2.3.3 Opportunities

Development of Transportation Infrastructure

According to the World Bank, Türkiye ranked third in PPP projects globally, with a total contract value of US\$ 165 billion from 1990 to 2015. It is at the heart of the Middle Corridor, serving as the central connection between the East and the West. The Middle Corridor, i.e., the Trans-Caspian International Transport Route (TITR), is a multilateral development that links China's containerized rail freight transport networks and the European Union through Central Asia, the Caucasus, Türkiye, and Eastern Europe. Türkiye's Transportation and Infrastructure Ministry invested US\$ 5.7 billion from March to October 2021 amid the continued progress of all its initiatives despite the COVID-19 pandemic. In 2023, the freight transported by railroads through TITR is estimated to surge to ~40.8 MT from ~27.2 MT per year recorded in 2021.

According to the Ministry of Transport and Infrastructure, Türkiye, the share of railway passengers is expected to increase from 0.96% to 6.20% from 2023 to 2053, with an upsurge in passenger traffic from 19.5 million to 270 million. Therefore, the share of rail cargo transport in total cargo transportation is predicted to rise from 5.08% in 2023 to 21.93% in 2053. Türkiye plans to build an investment pool of US\$ 400 billion by 2023 for its intended goals. Transportation projects, among other sectors, would be the prime projects attracting a large percentage of these financial investments.

Thus, such high proposed and ongoing investments in the transportation sector is expected to create significant growth opportunities for the infrastructure sector in Türkiye.

Increasing Investments in Charging Infrastructure

The sales of electric vehicles (EVs) have been increasing at a fast pace in Turkey, primarily fueled by the entrance of new EV brands and demand for the country's first indigenous EV. Per June 2022 data from Automotive Distributors and Mobility Association (ODMD), EV sales in Türkiye increased by over 465% year-on-year. Additionally, the delivery of the first indigenous EVs has increased, supported by production growth. A consortium of five Turkish companies called the Automobile Initiative Group of Türkiye (Togg) manufactures the vehicle in cooperation with the Union of Chambers and Commodity Exchanges of Türkiye (TOBB). Mass production of the fully electric C segment SUV began in October 2022, and deliveries started in late April 2023. The manufacturer plans to deliver 20,000 units by the end of 2023, from 808 units till the end of June. With such heightened adoption of EVs, charging infrastructure must be developed in tandem to ensure an efficient and extensive transition. In Turkey, a large share of the urban population lives in apartments and thus has limited access to residential charging areas. Hence, such a population is expected to rely heavily on public charging infrastructure, which offers a growth opportunity for the infrastructure sector.

Additionally, a rising number of energy providers worldwide are becoming charge point operators and e-mobility service providers. The same trend is also expected to be introduced in Turkey. Furthermore, in the near future, smart charging applications such as vehicle-to-grid (V2G) and vehicle-to-home (V2H) integration are expected to link EV owners and energy providers. V2H integration functions as a local storage system that can draw electricity from the EV battery. At the same time, the EV can feed excess energy into the home, allowing bidirectional energy usage between the home and EV. This trend is expected to encourage hardware manufacturers to develop bidirectional V2H chargers and further aid infrastructure development.



Advancement of Water and Wastewater Infrastructure

There are 25 government-defined river basins in Turkey, and River Basin Protection Action Plans have been formed for each of them to regulate their water usage. Post joining the EU, the country has undertaken major efforts to harmonize its legislation with the EU's all-encompassing Water Framework Directive (WFD) and with Water Supply and Sanitation (WSS)-related Drinking Water Directive (DWD) and Urban Wastewater Directive (UWWD). The Ministry of Forestry and Water Affairs (MoFWA) was responsible for developing the action plans and ensuring WFD compliance both centrally through the Water Management Coordination Board and locally through basin management committees. While the country has made great progress towards compliance with the DWD and the UWWD, the growth of population and changing urban dynamics are leading to the requirement for additional measures. Financial support from various global banks is also aiding in infrastructure growth. In June 2021, International Finance Corporation (IFC) signed an investment agreement to financially aid Turkey's third largest city in adding several hundred kilometers of sewers and water pipes, to promote water conservation and enhance public services. The loan was part of a multiyear policy dialogue between Turkish municipalities, the Ministry of Treasury and Finance, and the World Bank Group.

In addition, implementing regulations on urban transformation and renewal has also been integrated with water management planning. Increasing demographic and economic demand for water combined with resource reduction due to the impact of climate change led to the prioritization of non-revenue water (NRW) reduction. Turkey is focusing on better energy efficiency and capacity building since these are critical to operating wastewater treatment plants (WWTP) and sludge management to meet discharge targets sustainably. Thus Turkey is increasing its focus on the core principles of WFD, improving and applying water-related regulations accordingly, and developing infrastructure for optimizing resource usage and wastewater recycling. Such developments offer great growth opportunities for the infrastructure sector.

Promotion of Urban Green Infrastructure







Green infrastructure is an emerging approach to making cities sustainable, healthy, and more habitable. It involves a strategically planned network of natural and seminatural areas in different landscapes. Its primary aims are providing sustainable urban development and linking green and blue spaces at both urban and regional scales. Several cities in Turkey offer great green infrastructure development opportunities, owing to overlapped green infrastructure typologies, which provide connectivity between city and ecology and also between people and nature. City of Antalya and Erdemit in the province of Van are two most favored locations in the country for green infrastructure. Benefits of urban green infrastructure can include:

- Stormwater management - aids in carbon dioxide reduction, efficient use of energy, improvement of air quality, prevention of disasters, and water quality.
- Greenspace Accessibility - determining the livability and the quality of life of a city, apart from contributing to the improvement of air quality, mitigating climate change, and aiding stormwater control.
- Urban Heat Island Effect - reduce the urban heat island effect through low construction density and higher greenery.
- Landscape connectivity - arrest decline of natural habitats and promote the volume of passive green areas
- Air Quality - reduce air pollution in urban areas and improve the health of inhabitants

As a member of the EU, Turkey is expected to strongly focus on developing urban green infrastructure, thus providing high growth opportunities for the infrastructure sector.



2.3.4 Macroeconomic Factors Impacting the Sector

GOVERNMENT		<ul style="list-style-type: none"> • The Turkish government is expected to work on improving its project planning process to capitalize by disseminating project pipelines and infrastructure plans and performing market research and evaluations. • According to the World Bank, Türkiye had the largest average investment per PPP project, i.e., US\$ 600 million, among all developing nations in the last decade. • Such trends are largely due to supportive government policies and initiatives.
ECONOMICAL		<ul style="list-style-type: none"> • Türkiye has experienced a strong private infrastructure investment of 0.9% of GDP in the past 5 years, compared to the average of 0.3% in upper-middle-income countries. • Energy, transport, water, and healthcare sectors have been the major infrastructural investment targets. The Turkish economy exhibited a robust annual GDP growth rate of 5.4% during 2003–2022. • Türkiye has a diversified economic contribution, allowing the country to hedge against the downturns in any specific sector.
SOCIAL		<ul style="list-style-type: none"> • The population of Türkiye (currently 85.3 million) is increasing by 1 million yearly, and the urban population accounts for 76.5% of the national population. • This growth is accompanied by a rapid urbanization trend that has resulted in more than 24 urban centers with populations above 1 million, 10 of which have over 2 million of population. • Owing to the country's need for reliable housing and infrastructure due to the yearly population growth, the construction industry is anticipated to expand significantly during the projected period.
TECHNOLOGICAL		<ul style="list-style-type: none"> • Türkiye is a relatively fast adopter of technology, and a large chunk of its exports are technology related services. Additionally, there is a rapid growth in usage of internet and cellular services, necessitating higher investments in telecommunications infrastructure. • The Information and Communication Technologies Authority (BTK) is the main organization overseeing 5G efforts in Türkiye. To foster localization and cooperation between vertical industries, BTK recently established the «New Generation Mobile Communication Technologies Türkiye (5GTR) Forum,» which comprises representatives from the government, universities, manufacturers, telecom operators, and NGOs.
ENVIRONMENTAL		<ul style="list-style-type: none"> • Mining and construction activities notably influence the health of the environment. Major cities in Türkiye, including Istanbul, Ankara, Izmir, Bursa, and Adana, serve as economic hubs of the country and substantial sources of emissions. Further, emissions and industrial pollutants have a considerable impact on greenery and residents' health in urban areas. • However, several municipal governments are taking measures to lessen the release of environmental pollutants and enhance the quality of life, thereby guaranteeing the concurrent growth of the economy.
LEGAL		<ul style="list-style-type: none"> • Numerous energy and infrastructure projects in Türkiye have been conducted following the General BOT Law. Under this paradigm, numerous greenfield energy and transport (airports, highways, bridges, ports) projects are being created. • In accordance with the General BOT Law, the winning bidder and the state enter into an implementation agreement, the length of which may be up to 49 years. The project must be returned to the state in excellent working order after the operational term, free of charge, and without any encumbrances.

Source: The Analyst Team



3. GCC

3.1 Introduction to Infrastructure Sector

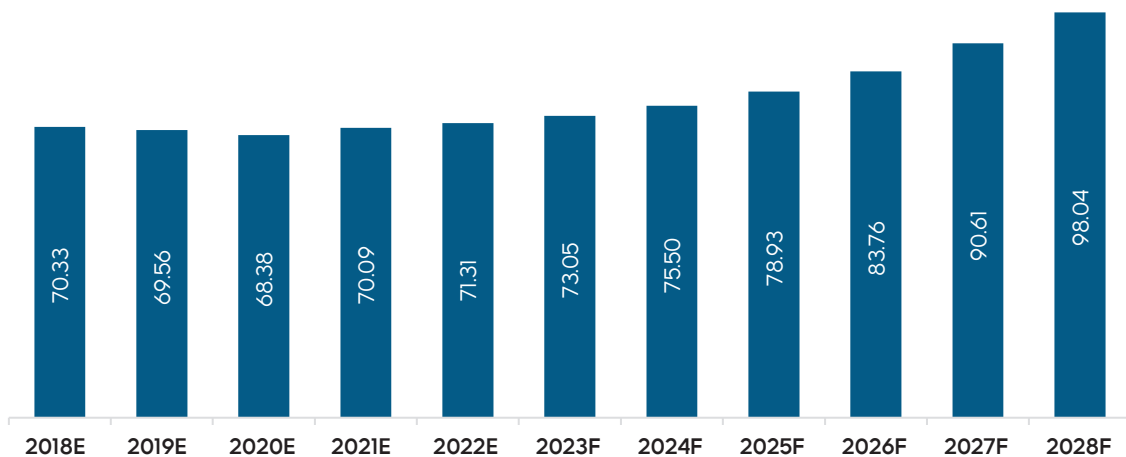
3.1.1 Overview and Key Industry Trends

The infrastructure sector in the Gulf Cooperation Council (GCC) is growing at a significant pace in the world. Since most of the GCC countries seek diversification of their country's income source, they have a wide focus on developing infrastructure in different sectors. Unlike Türkiye, the oil & gas sector is presently the major contributor to the GDP of the GCC, and the region emphasizes on reducing its share in the sectoral composition of the economy. Most GCC countries have devised a long-term vision plan to guide the growth of diverse sectors. Such plans subsequently encourage the progress of the infrastructure sector as its growth positively impacts the associated upstream and downstream industries. All the GCC countries have initiated several large infrastructure projects, ranging from civil engineering projects to educational institutions. Most GCC countries also have strong balance sheets, healthy funding, and stable earnings profiles. However, global macroeconomic factors are expected to create some downturns in the infrastructure sectors' growth in 2023.

3.1.2 Infrastructure Market Size and Forecasts (2018–2028)

3.1.2.1 Saudi Arabia

Figure 9. Saudi Arabia Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others

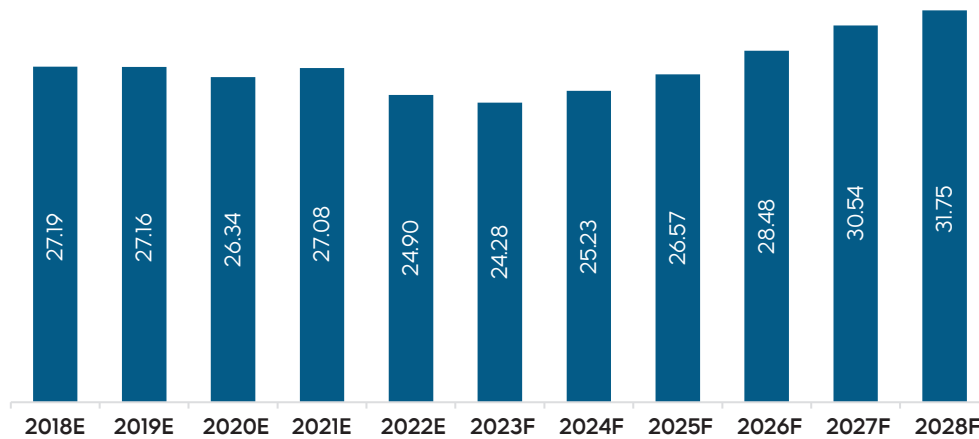
As illustrated in the above graph, the country is the largest spender on infrastructure in the GCC region and is witnessing an unprecedented boom in construction and urban mega projects. Around 200 small, medium and large infrastructure projects are at different stages of completion or implementation under the PPP model in the country. Prime examples of infrastructure development include 400MW capacity Dumat Al-Jundal wind farm and the 2.65GW Ras Al-Khair power and water



plant. The government's efforts to increase private sector involvement in infrastructure development and its fiscal sustainability goals are important drivers of the country's infrastructure sector.

3.1.2.2 Qatar

Figure 10. Qatar Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



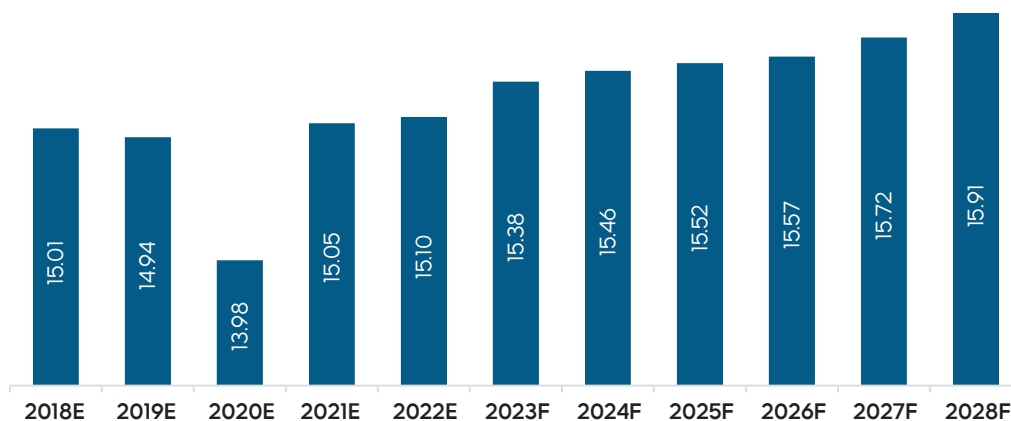
Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others

As depicted in the above graph, owing to preparations for the 2022 FIFA World Cup, expenditure on infrastructure development has been high since 2018. Disruptions from the pandemic caused a slight dip in 2020, which again increased in 2021. Post the World Cup, the expenditure on infrastructure witnessed a slight dip. Currently, main infrastructure projects include expanding water and electricity networks, completing highways, and the Sharq Crossing Project linking the Ras Abu Aboud area of Doha and the West Bay Highway District.

3.1.2.3 Kuwait

Figure 11. Kuwait Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

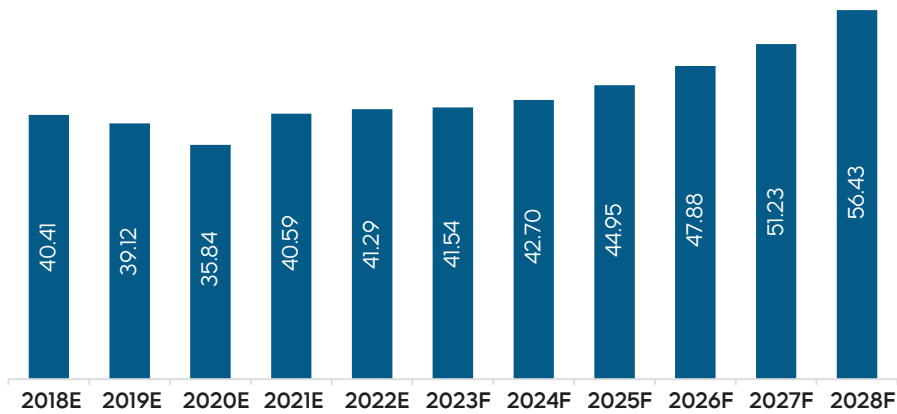
Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others



Infrastructure development is a vital agenda in Kuwait's Vision 2035, and the country has ~US\$ 27.6 billion strong pipeline of infrastructure projects in the bidding stage. Additionally, the government has recognized the need for a comprehensive digital transformation to drive better investment timelines, resource commitments and attract more capital into the infrastructure sector. Hence the above graph shows a significant jump in infrastructure expenditure by 2028 compared to 2020.

3.1.2.4 UAE

Figure 12. UAE Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



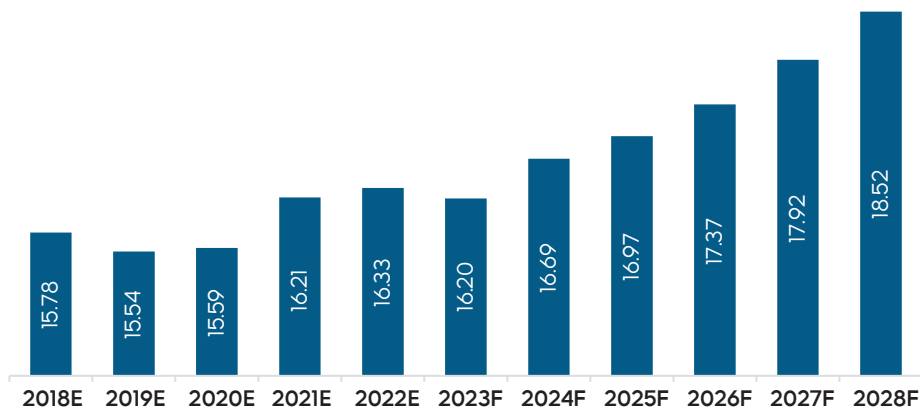
Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others

As shown in the above graph, UAE's expenditure on infrastructure is expected to increase significantly by 2028. The government strives to ensure sustainable and environment-friendly development to perfectly balance economic and social development. It aims to develop quality, consistent, sustainable, and robust infrastructure, including regional and transborder infrastructure, to support economic development and human well-being.

3.1.2.5 Oman

Figure 13. Oman Infrastructure Market - Revenue and Forecast to 2028 (US\$ Billion)



Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

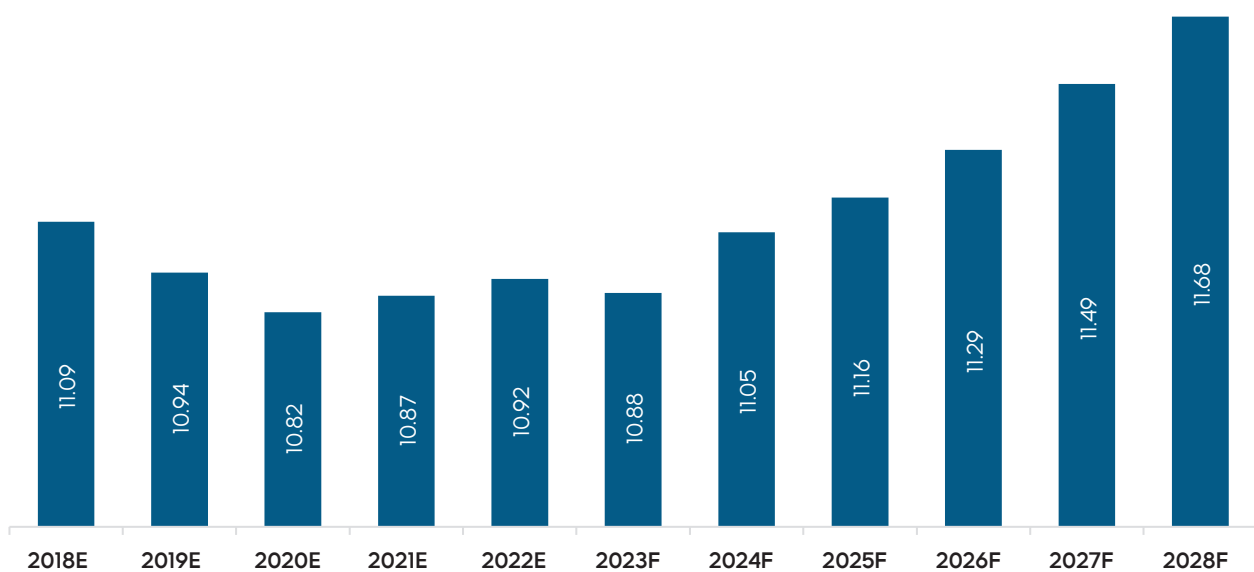
Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others



As depicted in the above graph, Oman's expenditure on infrastructure is rising at a good pace, guided by the Vision 2040 economic development strategy. Current fiscal consolidation notwithstanding, economic diversification plans will support the growth of various infrastructure sectors. Substantial investment in the country's transportation and the potential expansion of green hydrogen production capacity also represent positive intent, especially with signs of definite progress in these areas.

3.1.2.6 Bahrain

Figure 14. Bahrain Infrastructure Market – Revenue and Forecast to 2028 (US\$ Billion)



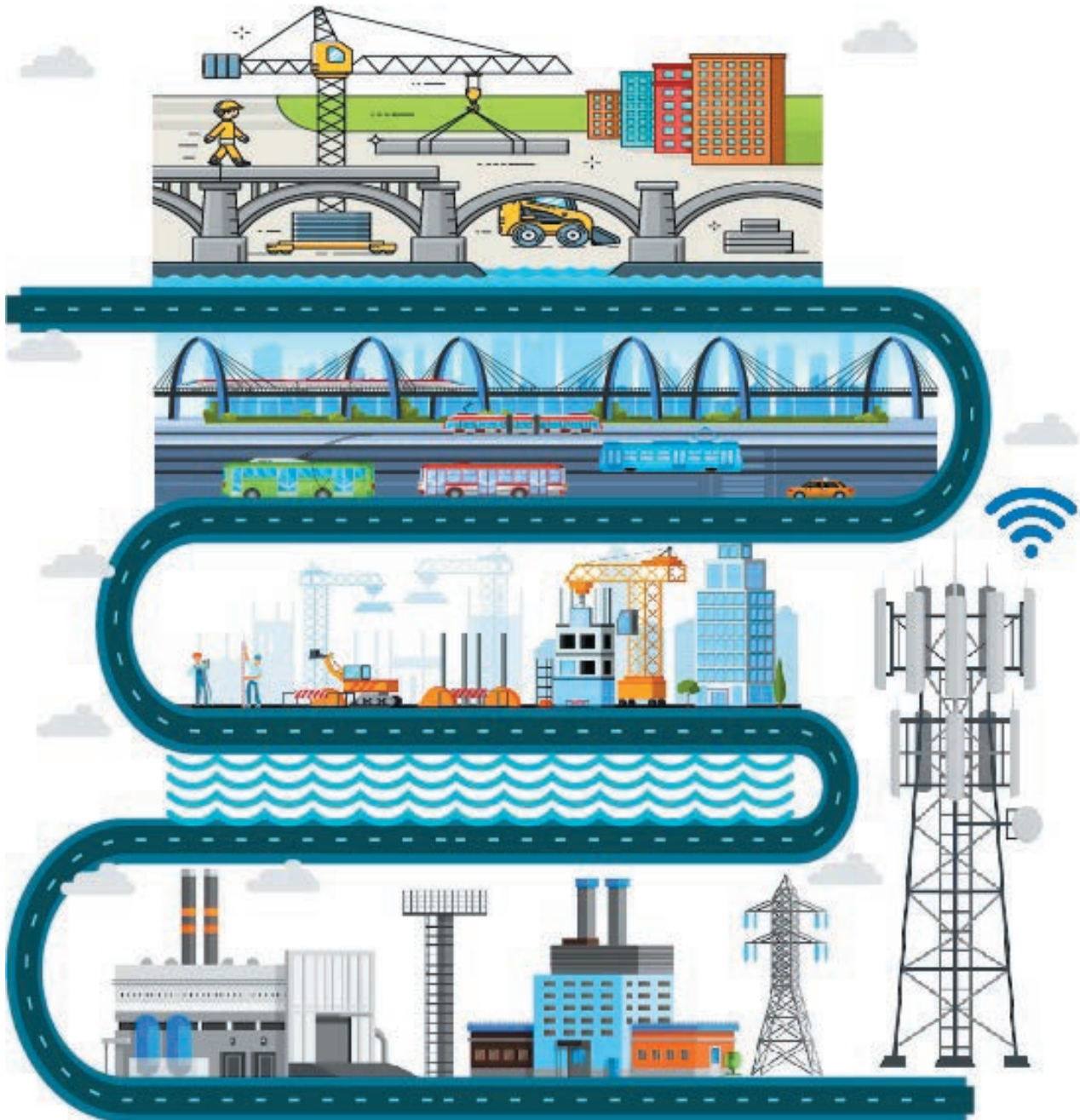
Source: The Analyst Team; A-Actual, E-Estimated, and F-Forecast

Note: The market numbers have been forecasted based on various parameters such as current GDP growth rate, share in GDP, inflation rate, sector growth, projected investment in the infrastructure sector, vision document, revenue of related companies, and others

Bahrain's infrastructure sector remained resilient, as depicted by the above graph, in the face of adversities, including the pandemic and the decline of global oil prices, and is gradually returning to steady growth levels. As part of Bahrain's 2021 Economic Recovery Plan, the government announced over 22 strategic infrastructure projects worth over US\$ 30 billion, including the construction of five artificial islands in the PPP model. Such emphasis on infrastructure development is aligned with the Kingdom's Vision 2030 economic development strategy. The approach seeks to improve infrastructure, industry, housing, and connectivity and thus requires a more diverse economic base, with broader industrialization, training, and education of the national workforce.



3.2 Infrastructure Sector in Details





3.2.1 Type of Infrastructure

3.2.1.1 Commercial



3.2.1.2 Residential

The increasing focus on infrastructure development has been driving the construction of roadways, airports, hospitality buildings, and commercial structures in the GCC. Additionally, the growing trend of smart cities is expanding the horizon for advanced buildings and transportation in GCC countries.

The UAE government plans to implement a series of projects to accelerate economic development and attract a significant amount of FDIs in the commercial sector over the next 9 years. The country is developing its transportation networks at great speed and using innovative new methods to reach ambitious goals. Transportation and road infrastructure development continue to be important across the country. The UAE has several transportation and road infrastructure projects in the pipeline, such as the US\$ 2.7 billion Sheikh Zayed double-deck road scheme and the US\$ 5.9 billion proposed hyperloop project between Dubai and Abu Dhabi. Dubai's Roads and Transport Authority (RTA) led Shindagha Corridor project involves the development of a 13km long road network in Dubai.

The construction industry accounts for ~15% of the national GDP of Qatar. It became the largest nonminerals industry in the country after it started working on developing infrastructure for hosting the 2022 edition of the FIFA Men's World Cup. Additionally, with the rising subscriber base and growing internet usage, the country strongly focuses on upgrading its telecom infrastructure. In March 2023, a Qatari multinational telecommunications company announced its plans to roll out Fibre to the Room (FTTR) technology for home internet customers. Similarly, a UK-based provider partnered with a US-based technology company to offer enhanced 5G services, thereby enhancing its network and providing better user experiences.

The commercial sector in Bahrain is driven by large-scale, government-funded infrastructure projects, such as the King Hamad Causeway transportation infrastructure project worth US\$ 3.5 billion. Additionally, the country is striving to improve its healthcare infrastructure. It opened two modern multispecialty hospitals in January and March of 2023. The government of Bahrain also makes efforts to improve connectivity with neighboring countries by developing its transportation infrastructure. In February 2023, Turkmenistan and Bahrain signed several agreements to develop rail connectivity and take other economic and trade development initiatives. Thus, such ongoing developments in the transportation and healthcare sectors create investment opportunities in the infrastructure sector in Bahrain.

The Civil Aviation Authority (CAA) of Oman plans to open the new southern runway and taxiways of Muscat International Airport by the end of 2023 with a planned cost of US\$ 54 million. The air freight building at Muscat Airport is part of the 200,000 sq.m. logistics gateways, which is a space set aside for logistics and air freight services. Similarly, the country focuses significantly on the healthcare sector. According to a press release published in May 2023, ~11 hospitals are being constructed in Oman and are scheduled for completion between 2023 and 2025. The two major projects are the Al Suwaiq Hospital in North Al Batinah Governorate and the Sultan Qaboos Hospital in Salalah in Dhofar Governorate. In September 2022, the Ministry of Health invited companies to submit proposals for three hospitals in Al Falah in South Sharqiyah, Al Nama in North Sharqiyah, and Samail Hospital in Dakhliyah. Thus, the transportation and healthcare trends propel infrastructure investments in Oman.

Saudi Arabia is investing in developing the skyline of various cities within the kingdom. In January 2023, the country signed agreements and MoUs worth US\$ 2.7 billion at a real estate forum organized in Riyadh. These deals would focus on developments related to tourism, commercial, and residential projects. Additionally, the country is focused on improving its road infrastructure to boost religious tourism. To simplify visa processing and ensure a smooth journey for pilgrims, Pakistan and Saudi Arabia signed the Road to Mecca agreement in May 2023. The total length of the road network in the Kingdom is more than 75,000 km of roads and the total length of operating highways is more than 5,000 km. The government is developing 49,000 kilometers of secondary roads to become double roads. Thus, a rise in the focus on the progress of the tourism, healthcare, and transportation sectors indicates an upsurge in investment opportunities in the commercial infrastructure sector in Saudi Arabia.



Owing to a rising population and increasing migration of people from rural to urban areas, countries in the GCC focus on expanding their urban capacities by promoting the initiation and completion of different dwelling projects. As per the Dubai Statistics Centre and the Government of Dubai, 1,780 private villa permits and 117 multi-story building permits were granted in the city in 2022, as compared to 1,166 and 87 permits granted, respectively, in 2019.

The data showcases a tremendous rise in demand for residential buildings. On the contrary, in Oman, land plots granted for residential buildings decreased from ~28,000 in 2019 to ~2,000 in 2021. Although the situation was aggravated due to the COVID-19 pandemic-led downturn in 2020, the residential construction industry is expected to recover in the next 5 years, i.e., 2021–2025. In Kuwait, an upsurge in demand for public housing is projected to drive long-term residential construction growth.

The Public Authority for Housing and Welfare of the Kuwaiti government plans to build 250,000 housing units by implementing a public-private partnership model in the next 15 years. This plan includes 11,000 units under the Sabah Al-Ahmad project and is expected to house up to 100,000 people upon completion. The South Al-Mutlaa City project will have the capacity to house 28,000 families upon completion.





3.2.1.3 Industrial –

The industrial infrastructure landscape in GCC is quite dynamic and is changing rapidly. Most countries in the GCC are focusing on attracting foreign investments for the proliferation of their industrial sectors since there is a growing focus on diversification. Hence, different GCC countries have been providing various incentives for attracting multinational organizations to open plants in the region.

For instance, in March 2023, IFFCO Group opened Middle East's first 100% plant-based meat factory in Dubai Industrial City. As per the Ministry of Climate Change and Environment of the UAE, the plant would support the country's Food Security Strategy while mitigating the impact of climate change. The ministry also expects the new facility to support its efforts to protect the country's ecosystems, enhance food and water security, and diversify its food sources.

Similarly, according to the Saudi Vision 2030 strategic framework, Saudi Arabia strongly focuses on localizing key product manufacturing abilities. In November 2022, the Saudi arm of a UK based engineering products manufacturing company opened a 5,000 sq. m. manufacturing plant in Dammam to supply valve solutions and actuating systems.

The energy sector is one of the most promising sectors in GCC. For instance, UAE is planning to revisit its energy strategy to attract more investments in solar energy and green hydrogen projects. It has set a target to propel its renewables capacity at an annual average rate of 16.7% during 2021–2030 to be able meet the 11.3% of the power mix target by 2030. Similarly, Saudi Arabia plans to set up projects to generate 10 GW of renewable energy, and plans to generate 50% of its electricity from renewables by 2030. The NEOM Green Hydrogen plant being constructed for US\$ 8.4 billion is the world's largest green hydrogen plant that will produce green ammonia at scale. The plant is expected to utilize up to 4GW of wind and solar energy for producing up to 600 MT/day of carbon-free hydrogen by the end of 2026.

Like the energy sector, the GCC nations are strongly focusing on improving the water and wastewater sectors. UAE's Water Security Strategy 2036, devised in 2017, seeks to make certain sustainable access to water during normal and emergency conditions. Under this strategy, the UAE intends to undertake several infrastructural development projects in the future. The Government of Bahrain approved the National Water Strategy 2030 in 2018 to ensure the effective management of water resources and provide sustainable water supplies of the needed quality for the various economic sectors. Despite its relatively small population, Kuwait produces the third largest amount of desalinated water in GCC, after Saudi Arabia and the United Arab Emirates. The country is striving to improve its existing infrastructure in a bid to incorporate sustainable methods for desalinating water. Such trends are expected to boost the growth in infrastructure investments in the region.





3.2.2 Economic Contribution

3.2.2.1 Government Initiatives and Programs

Government Initiatives and Programs



GCC nations focus on decarbonization, energy generation, transportation, utilities, and water security infrastructure developments. For instance: Qatar targets 20% of its energy consumption from renewable sources by 2030, and a carbon zero footprint by 2050. With their plans to expand water desalination and renewable energy capacities, they are expected to attract higher investments in these infrastructures.

The GCC is developing proactive regulations, laws, and governance to achieve leadership in advanced manufacturing. For instance, the UAE has set Key Performance Indicators (KPIs) to measure its performance against its yearly targets.

GCC Unified Water Strategy, approved by the GCC Supreme Council in 2016, seeks to overhaul the GCC's water production, utilization, and management. Most GCC nations have aligned their water strategy to this unified strategy.

Saudi Arabia aims to recycle 35% of all types of waste by 2035, and it plans to treat the waste that cannot be recycled through the production of derivative fuels or the production of energy. Such plans are estimated to require over 1,300 treatment facilities and landfills. Similarly, Integrated Waste Management Strategy 2021- 2041 has been implemented in the UAE while Ministry of Municipality's Zero Waste campaign aligned sustainable strategic plan for waste management and recycling is being implemented in Qatar.

GCC nations strive to promote themselves as logistics hubs, generating scope for investments in transportation and road infrastructure development. Efforts made for urbanization and the tourism sector's reinforcement also support improvements in transportation and road infrastructure. Various GCC countries are planning and implementing metro-rail connectivity projects, offering further investment opportunities in transportation infrastructure.

Real estate market players are witnessing higher demand owing to improving urban infrastructure and rising FDIs in the sector. Different governments are providing aid for subsidized housing to the economically weaker demographic section; they have undertaken ambitious programs for the same, promoting the residential infrastructure market.

The rising focus on social infrastructure projects offers great investment opportunities for developing schools and hospitals.

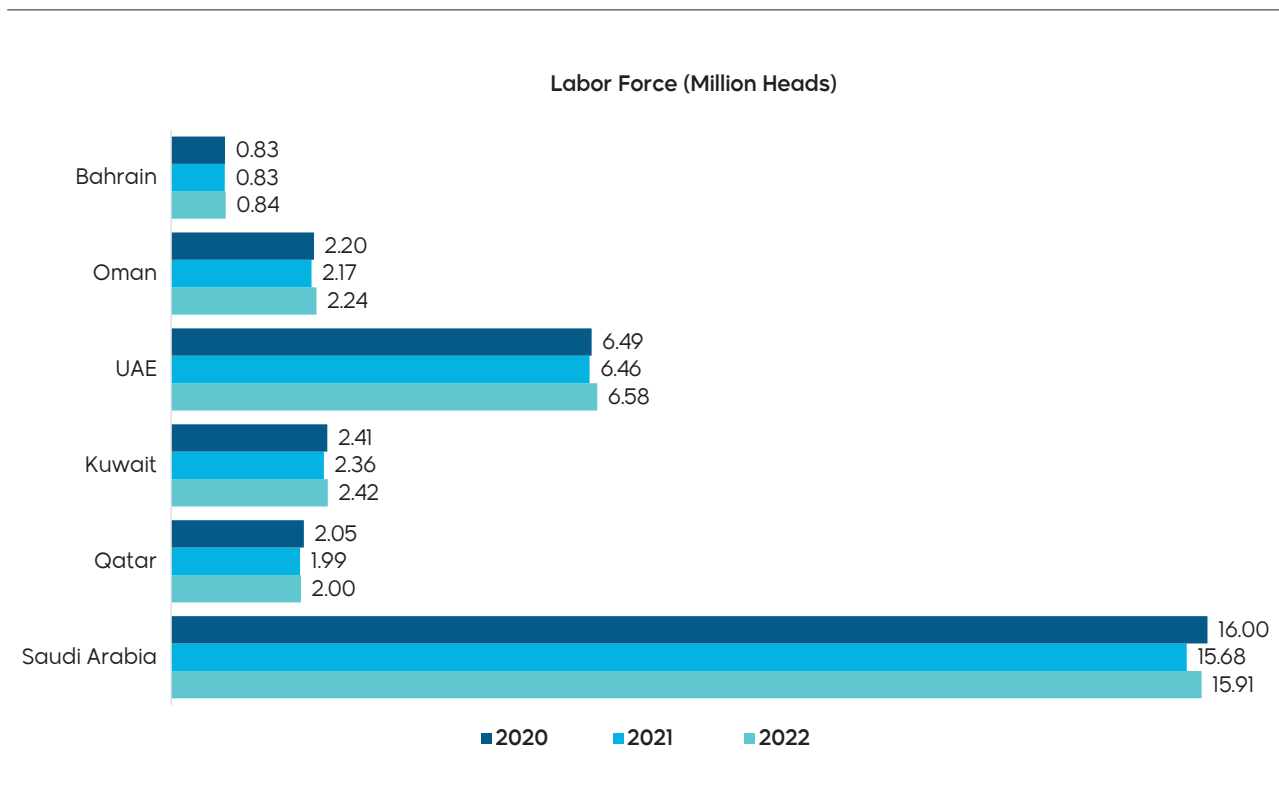
The launch of new economic reform policies aimed at developing high-productivity finance and service industries, and diversifying sources of state income is expected to promote industrial infrastructure growth in the GCC.



3.2.3 Labor and Regulatory Outlook

The high dependence on expatriate laborers, especially in infrastructure projects, is the primary challenge faced by GCC nations. The labor force in these countries primarily comprises people from India, Bangladesh, the Philippines, Pakistan, Nepal, and North African nations. Despite global disruptions amid the COVID-19 pandemic in 2020, GCC countries continued to invest in infrastructural development, leading to a buoyant labor market and the creation of new jobs across multiple sectors and geographies in the region. The COVID-19 pandemic caused a significant reduction in employment in the region since several expatriates decided to return to their homelands. They mostly rejoined the worksites post Q4 of 2021 after the reopening of borders, which led to the recovery of the labor market in 2022. According to estimates by several private recruitment firms, salaries across GCC countries are expected to rise by an average of ~5% in 2023. Saudi Arabia and the UAE face relatively low inflationary pressure due to their strong financial positions. The economic growth of both these countries is further supported by an upsurge in hydrocarbon prices. On the other hand, the scenario is expected to be completely different in Kuwait since the country is under tremendous inflationary pressure and has depleted capital reserves. Hence, investment in infrastructure projects is not being pursued enthusiastically enough by the government.

Figure 15. Labor Statistics, GCC Countries (Million Heads)



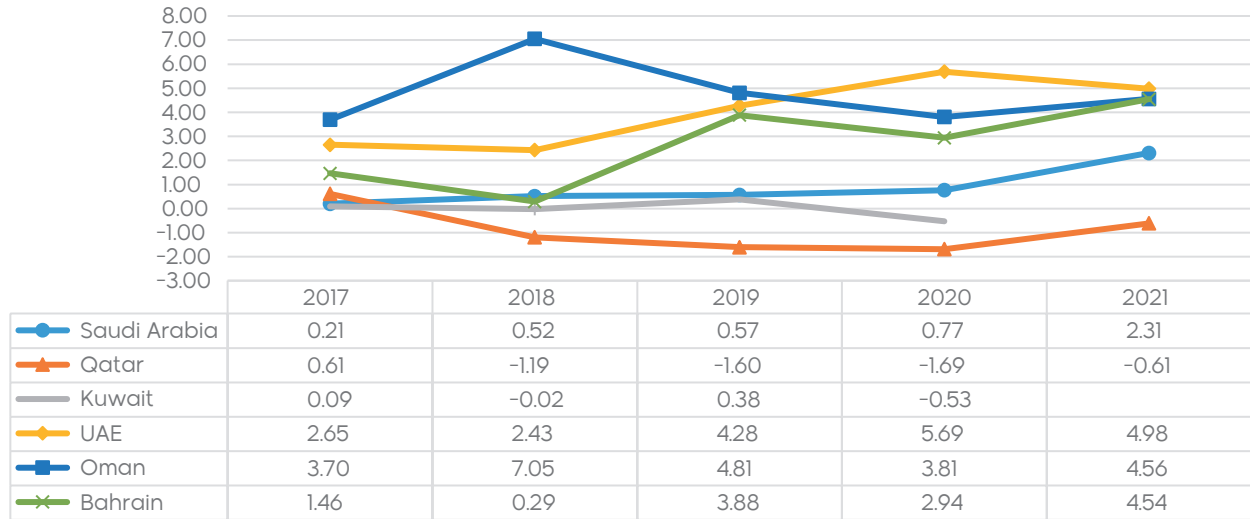
Source: World Bank

As showcased by above graph, Saudi Arabia had the highest labor force, and is expected to continue its domination for the forecast period. UAE and Kuwait had the second and third largest labor force in GCC, while Bahrain had the smallest labor force.



3.2.4 Foreign Direct Investments

Figure 16. Foreign Direct Investment, Net Inflows (% of GDP)



Source: World Bank, UNCTAD, ITA, Regional Press Releases

FDI inflow in the GCC's infrastructure sector has been rising steadily, despite challenges such as conflicts in Europe, higher interest rates in major economies, and negative sentiment in financial markets. Per the World Investment Report of 2022 by the United Nations Conference on Trade and Development (UNCTAD), FDI inflows in the UAE surged by 11% to reach US\$ 20.6 billion in 2021 from US\$ 19.8 billion in 2020, affirming its leading destination for FDIs in the Middle East. Construction and real estate were two of the leading sectors to receive FDIs in the UAE. Saudi Arabia successfully tripled its inflows to US\$ 19 billion in 2021 from US\$ 5.3 billion in 2020.

3.2.5 Capital Investments and Major Investors

Saudi Arabia

- Saudi Arabia intends to raise investment US\$ 1 trillion in the real estate and infrastructure sector by 2030. Under the Vision 2030 plan, 8 new cities with ~1.3 million new homes will be developed, most of which will be situated along the coast of the Red Sea. The country also plans to position Riyadh among the world's 10 largest cities. Debt capital markets are expected to support a significant portion of these new developments, even though the government has carved out a significant capital expenditure (CAPEX) budget with support from strong liquidity and healthy balance of trade.
- In March 2023, Saudi Aramco, a leading oil-exporting company, announced plans to increase its CAPEX to US\$ 45-55 billion for 2023 to ramp up its maximum sustained output capacity in Saudi Arabia. The expenditure will entail construction and engineering activities for scaling up production and oil-to-chemical projects.
- Saudi Arabia's information and communication technology market has received ~25 billion in investments since 2017, becoming one of the fastest growing and largest digital infrastructure markets in the Middle East. In October 2021, Saudi Arabia launched the National Infrastructure Fund (NIF) to develop projects worth US\$ 53 billion until 2030. The NIF is one of the funds offered under the National Development Fund (NDF), and it was set up to make the country less reliant on the oil and gas sector by supporting investments in the energy, health, transportation, and water sectors.



Bahrain

- Bahrain plans to boost its infrastructure development through 50 megaprojects worth ~US\$ 3 billion across the education, housing, health, and technology sectors by 2024. The plans were announced through the 2023-2024 national budget draft presented to Parliament in May 2023. The megaprojects include Bahrain Metro, the completion of the fourth bridge between Manama and Muharraq, the construction of a new National Assembly, the development of all roads leading to the airport, the establishment of Salman Industrial City, the revamping of Salmaniya Medical Complex (SMC), and giving a facelift to the media sector.
- In April 2023, Bahrain introduced the Golden License to benefit corporations intending to make large-scale investments in the Gulf state. It was announced as part of the economic recovery plan launched in October 2021 to boost growth and create jobs.

Oman

- The Oman Vision 2040 document guides the planning of nationwide multisector activities. The Sultanate has significantly increased its CAPEX, guided by the vision document, across different sectors. According to data published by the Ministry of Heritage and Tourism in April 2023, 363 projects in the tourism sector, worth ~US\$ 6 billion, have either been completed or will be completed by 2025 in Oman; the ministry banks on integrated tourism complexes, which have attracted most investments in this sector.
- Investments in alternative energy sources are anticipated to significantly benefit investors owing to the increasing importance of green energy in the Sultanate. Oman plans to utilize renewable sources to meet 35-39% of the national electricity consumption by 2040 and is seeking international partners to achieve this goal. It is also planning several renewable energy projects to achieve this target; these projects include the Waste to Energy Plant in Barka and Manah Solar Plant. The coastline of Oman is being used to harness wind power to generate electricity.
- Oman is also investing strongly in its transportation sector; the country aims to position this sector among the top 10 logistics centers in the world by 2040. The government plans to rely on PPPs to operate the four terminals at the Port of Duqm and build ports at Khasab and Shinas in the north. The National Aviation Strategy 2030, developed in February 2023, focuses on the logistics industry through an elaborate air freight strategy designed to help domestic enterprises operating in foreign markets. Thus, the ongoing developments in the energy & power, and transportation sectors make Oman an ideal destination for investments.

Kuwait

- Kuwait focuses on economic reform through its 2020-2025 development plan by facilitating the implementation of several long-stalled mega infrastructure projects. It involves infrastructure upgrades such as the Mubarak Al-Kabeer Port development on Boubyan Island, a new airport terminal construction (project valuation of US\$ 4 billion), and a new oil refinery. Hospital projects worth ~US\$ 4 billion are also part of the government's plan to improve the bed capacity of hospitals across the country. Additionally, the operating budget of the Ministry of Health is anticipated to reach ~US\$ 18 billion by 2030. The country also plans to increase the power generation capacity in the country through investments in power plants.
- In April 2023, Kuwait's Public Authority for Housing Welfare (PAHW) awarded a leading engineering firm a contract worth US\$ 367 million for the South Sabah Al Ahmad City project. The contract entails constructing and maintaining main road works for the city, setting up rainwater tanks, and providing infrastructure services. The project is scheduled for completion by 2026.

UAE

- The UAE boasts of some of the world's tallest buildings and groundbreaking cityscapes and is at the forefront of creating innovative skylines of the future. The government attributes great significance to infrastructure construction, as it considers it the foundation of economic and social development. The country is also prioritizing transportation-related infrastructure development, and several projects are currently in the pipeline, including the ~US\$ 6 billion proposed hyperloop project between Abu Dhabi and Dubai and the ~US\$ 3 billion Sheikh Zayed double-deck road scheme.

Qatar

- CAPEX of Qatar has mostly followed an upward trend, buoyed by the country's financial and political stability and efficient corporate tax system. The country has undertaken a series of reforms that were designed to create a pro-business competitive environment while supporting transformation. The country is also proactively investing in residential infrastructure, driven by a resilient economy with lower equity and securities risk. The residential market in Qatar has been a significant beneficiary of ~US\$ 229 billion spent on infrastructure to transform the country ahead of the FIFA Men's World Cup 2022. It resulted in the creation of ~850,000 jobs over the past 10 years. Qatari high-net-worth individuals (HNWIs) are increasingly focusing on real estate, mostly eyeing residential and office spaces for investments.



3.2.6 Ongoing and Upcoming Infrastructure Projects

- In May 2023, Public Works Authority (Ashghal) unveiled the "Ashghal 2023" plan for construction projects. Ashghal plans to float tenders for several new projects, including 22 building projects with an approximate value of ~US\$ 1.1 billion. Additionally, 10 projects worth ~US\$ 800 million are already under construction. These include establishing the Madinat Khalifa Health Center, developing Hamad General Hospital, constructing Qatar Sidra Academy, and rehabilitating the Ministry of Municipality's veterinary laboratory building.
- According to the Ministry of Industry and Mineral Resources of Saudi Arabia, the infrastructure sector has attracted foreign and joint investments worth more than US\$ 144 billion as of March 2023. Projects such as King Salman Park in Riyadh and Qiddiya Project are under construction in line with the Saudi Vision 2030, which is guiding the country's growth path.
- In April 2023, Kuwait's Public Authority for Industry announced plans to select a consultant to issue tenders for building the country's first industrial zone for housing companies specialized in waste recycling, particularly industrial waste.
- In March 2023, the EDB stated that a leading Indian insulation materials manufacturer and a wristwatch manufacturer are investing US\$ 45 million to launch their operations in Bahrain.
- In February 2023, Saudi Authority for Infrastructure Cities and Technology Zones (Modon) announced that the country had 1,171 operational food factories in total at the end of 2022. Also, Modon signed an agreement with a leading food company to allocate new land in Dammam Second Infrastructure City. These developments align with the goals of the National Industry Strategy and the initiatives of the National Infrastructure Development and Logistics Program (NIDLDP).
- In January 2023, an investment firm and a US-based technology vendor signed an investment deal to develop a GMP-certified facility for manufacturing essential raw materials for advanced biologics. Further, in March 2023, a UAE-based conglomerate opened four new factories to produce value-added food products. Three of these four factories in the Dubai Investment Park would process meat, poultry, and seafood items. The fourth factory in Jebel Ali Free Zone (JAFZA) would process herbs and spices. As of April 2023, 3 new food processing plants, valued at ~US\$ 232 million in total, were under construction in Abu Dhabi's Khalifa Economic Zones (KEZAD).
- In January 2023, Bahrain's Ministry of Municipalities Affairs & Urban Planning announced its plan to invite proposals for its residual waste-to-energy (WTE) treatment plant. The project is expected to include the development and operation of an incinerator equipped waste treatment plant with a maximum design input capacity of 1,306.51 thousand MT per annum and a minimum operation period of 25 years.
- In December 2022, a Canadian green energy and environmental services firm announced the setting up of Oman's first e-waste recycling project covering an area of around 9,000 sq. m. The facility is expected to have a processing capacity of ~225 MT per annum in its first year, with plans to double the same by second year of functioning.
- In December 2022, the Ministry of Finance provided construction updates on the two largest projects of Saudi Arabia through its budget statement for fiscal year (FY) 2023. The country is expected to undertake the rehabilitation and afforestation of urban valleys, afforestation of residential neighborhoods, and completion of treated water networks of 533 km for the Green Riyadh project by the end of 2023. Further, the status of the King Salman Park project as of 2022 revealed the completion of a visitors' pavilion and the royal arts complex, soil withdrawal from the park, and the initiation of excavation. Saudi Arabia is also expected to complete most bridges and tunnels and begin the work on a "smart city" by the end of 2023.
- In November 2022, a leading US brand signed a project deal worth US\$ 4 billion with a leading Saudi Arabian real estate developer to build a complex on the outskirts of Muscat. The project would include several villas, hotels, stores, and a golf course.
- In November 2022, a UAE-based manufacturer of disposable food packaging products launched its manufacturing plant in Doha's new industrial area. Further, an ammonia-7 project (worth ~US\$ 1 billion) located in Mesaieed Industrial City (MIC), with a capacity of 3,500 metric tons/day, is expected to become the world's largest blue ammonia facility upon its completion, which is due in the first quarter of 2026.
- The 1,200-km-long Etihad Rail (worth ~US\$ 11 billion) is a railway infrastructure project under construction in the UAE. The project was started in 2016 and is scheduled for completion by 2024. The railway is expected to run from the Saudi Arabian border to Fujairah in the UAE, on the Indian Ocean coast.



3.3 Industry Dynamics

3.3.1 Driver

Flourished Telecommunications Market

For the past two decades, the GCC countries have mobile penetration rates of more than 100%, indicating that more than one mobile phone is in use per person. These high rates also mean the market is well penetrated. The growth is expected to come from increased revenue per user from higher usage and/or higher rates offered for more value-added services. GCC countries have supported large-scale implementation of industry-leading technologies like 5G and the Internet of Things (IoT). Moreover, consumers in these countries are tech-savvy and prefer migrating to cutting-edge technologies.

These favorable conditions have propelled telecommunication companies in the GCC to introduce modern services proactively. A leading , a telecom provider, has begun preparing for the switch to 6G, which is anticipated to be 100 times faster than 5G, while the rest of the world is still in the process of 5G implementation. Thus, the matured and steady telecom business in the GCC exhibits consistent financial performance every year. These enterprises generate strong cash flows, allowing consistent dividend payments.

Focus on Diversification

Economic diversification efforts to increase contribution to GDP from non-oil sectors result in increased infrastructure project funding. The GCC nations are shifting their focus towards infrastructural development to assist industries such as tourism, manufacturing, banking, and logistics. Hence CAPEX on utilities, roads, telecommunications networks, airports, seaports, and building railways is rising. For instance, GCC has started making significant railroad investments in recent years. Plans for the area call for building approximately 8,000 km of mainline trains over the next ten years, some across rugged terrains. Such investments may result in the development and expansion of the infrastructure sector, opening new prospects for building and development projects.

In Saudi Arabia, the government is striving to involve the more efficient private sector to achieve the diversification program according to Vision 2030. It entails developing robust policy frameworks for planning and managing public investments, focusing on infrastructure development, generating jobs, and ensuring sustainable growth without requiring significant financial support from the government.

Similarly, in the UAE, several initiatives have been taken, including adopting structural reforms to liberalize residencies, offering funding to attract start-ups and boost entrepreneurship, and building international connectivity along with a robust logistics network to boost the emirate's role in the global economy. Other GCC nations are also following similar patterns in an effort to diversify their sources of income and reduce dependence on the oil & gas sector. Such trends in diversification efforts are boosting infrastructure development in the country.

Awareness of Water Sustainability

Water demand is swiftly rising throughout GCC, promoted by factors such as population growth, urbanization, agricultural growth, increase in industrial projects, and real estate development. As a result, a recent report by a leading research firm estimates that the GCC's water demand will increase by 62% by 2025 and that the GCC countries will invest ~US\$ 80 billion in water and wastewater projects. Strategies are being rolled out across the GCC to conserve and reuse water resources. For instance, the UAE's Water Security Strategy 2036 plans to reduce water demand by 21% and increase the reuse of treated water by 95%.

Similarly, Saudi Arabia's Qatrah initiative strives to cut daily per capita water consumption from 263 liters to 150 liters by 2030. Similarly, water sustainability in agriculture is also being prioritized since it is responsible for ~82% of Saudi Arabia's non-renewable water consumption. Hence, several of GCC's utility providers are leading the region's water innovation initiatives to deliver consistent, long-service, and low-maintenance water treatment plants. This in turn, is strongly driving infrastructure growth, respective to sustainable water usage, in the region.

3.3.2 Challenges

Lack of Public Investment Management Framework

Irrespective of the unpredictability of the global economy, the GCC is in a relatively good place because of its robust economic growth, low inflation, and budgetary surpluses. However, these projects fall short of their objectives without strong regulatory frameworks for managing and planning public investments. Sound public investment management (PIM) requires the right selection and correct implementation of investments. The PIM ensures clarity on demand for additional infrastructure, coordination between investment projects and sectoral & national plans, maximum synergies between government organizations, and adequate risk management.

According to the International Monetary Fund's (IMF) analysis, ineffective PIM processes typically cause GCC countries to lose ~30% of the returns on their investments. Non-standard methods for evaluating proposed investments, financing demands that don't match budgetary allocations, insufficiency of inter-agency coordination, a lack of investment of ex-post evaluations, and inadequacy of performance data and reporting are among the major causes of inefficiencies in the GCC. The IMF suggests that improvements in PIM can help GCC eliminate up to two-thirds of its inefficiencies. An effective PIM framework can also enhance GCC's fiscal stability and fiscal planning legitimacy. It can assist the governments with economic diversification, a prime strategic objective for most GCC nations to advance toward their national sustainable development goals.



Dependence on Hydrocarbon

Although the GCC nations have been undertaking major initiatives to diversify their economies, most are still strongly reliant on the hydrocarbon sector. Gulf countries have two main advantages - the lowest extraction costs and lower emission of greenhouse gases during extraction, than other oil producers. The demand for Gulf oil from various nations has been strong due to such advantages. It has increased the difficulty of GCC nations in transitioning to renewable energy sources and, hence, has been somewhat hindering the growth of the renewable energy sector. Additionally, macroeconomic challenges often lead to strong volatility of oil prices. GCC nations are thus exposed to the consequences of a sharp fall in the worth of their main productive asset due to a sudden decline in global demand for oil. The consequences are anticipated to be more pronounced as it can affect public oil companies, public finances, and external accounts. On the other hand, the lack of focus on non-oil sectors, perceived and real political risks, and a limiting business environment impede the inflow of FDIs in GCC countries. Thus, the slow diversification of the economy and high dependence on hydrocarbon-generated finance challenges the growth of the infrastructure sector.

Marginal Climate

GCC nations are characterized by marginal climate, referring to poor soil quality, high temperatures, and low annual rainfall. It challenges infrastructural growth in various ways. Firstly, it often leads to the lower operational life of different public infrastructures. Secondly, the marginal climate often leads to lower functioning capability of laborers and reduced efficiency, which also restrains construction activities. Thirdly, the region is highly dependent on desalinated water, which restrains the setting up of high-growth but water-intensive industries, such as semiconductor manufacturing, hindering industrial infrastructure growth. Again, such an environment also leads to higher opportunities for infrastructure development. While the climate cannot be changed, adopting sustainable advanced methods, such as aquaculture and renewable energy-powered desalination plants, is expected to lower the challenge's impact to a large extent.

3.3.3 Opportunities

Well-Developed Projects Pipeline

In GCC, the total contract value of projects climbed back to more than US\$ 100 billion in 2021 after a decline below US\$ 70 billion in 2020 amid the COVID-19 pandemic. Further, in the first half of 2022, the GCC won contracts worth ~US\$ 40 billion, and the total value of projects is anticipated to remain strong until the end of the year and beyond. According to projections by various official sources, the pipeline of planned projects or those in progress in the GCC was worth ~US\$ 2.65 trillion at the end of June 2022. Saudi Arabia and the UAE are responsible for ~60% and 20% of the GCC's planned future construction and transportation projects, respectively. The GCC project pipeline until 2026 would include significant real estate projects, energy transition, Transportation (particularly railway construction), energy sector capacity growth (oil and gas production), and industrial developments.

Focus on Renewable Energy

GCC nations are continuously investing in the development of green energy sources in an effort to harness the natural resources abundantly available in the nations. GCC countries are situated near the equator and have some of the highest solar exposures in the world. Solar power plants in the area are expected to have ~1,700 to 1,900 hours of full-load operation per year. European solar plants, in comparison, average ~900 to 950 hours of full-load operation per year. A solar-photovoltaic panel in GCC can produce twice as much output as in Germany or any other European country.

Furthermore, the output of a solar power plant in the GCC nations is aligned with daily and seasonal variations in demand. Air conditioning requirements drive peak electricity consumption in GCC countries and thus rise and fall in tandem with the output of solar power plants. In countries with colder climates, electricity demand is typically highest during winter, when solar plant outputs are lowest due to limited sun exposure. As a result, renewable energy sources are being focused upon in the GCC.

Besides solar energy harnessing infrastructure, GCC also focuses on harnessing wind energy and hydrogen power. Though wind power has been slow to develop in the Gulf region, it holds strong potential to increase efficiency in regional strategic industries and contribute to national development goals. Wind energy can be harnessed for areas having high wind power, but limits solar power generation due to high concentrations of mineral dust in the air. Qatar has 1,421 hour of full-load wind per year, whereas Duqm, Oman has 2,463 hours of full-load wind per year and could potentially generate up to 75GWh net annual energy production (AEP). Hence, it offers great growth opportunities for wind energy harnessing infrastructure.

The rising shift towards green hydrogen allows GCC nations to play a commanding role in this new industry. Green hydrogen could develop into a major and versatile power source of the decarbonized future. Due to abundant, low-cost solar energy, the GCC holds significant advantages in producing green hydrogen. Renewable energy can convert green hydrogen to green ammonia, then be exported to foreign markets. Developing a national strategy, initiating pilot projects, and creating a supportive policy, regulatory, and investment framework are the initial steps to develop green hydrogen harnessing infrastructure. Hence it offers GCC's infrastructure sector a great growth opportunity

Recycling of Brine from Desalination Plants

Freshwater is available at a premium in GCC, and hence the nations strongly depend on desalinated seawater. The GCC nations have been extracting groundwater significantly, far outpacing its ability to regenerate. Thus, desalination is a natural fit for them to meet the everincreasing demand for water. It is a capital-intensive and energy-exhaustive process, yet it has been widely used in the region. Cost and energy are not big challenges of desalination for GCC, but the primary issue is brine, the byproduct of the desalination process, which essentially is highly concentrated salty water. Brine also contains byproducts of the specific treatment process employed by the plant. Discharging brine in the surrounding seas can lead to several harmful effects, including rising salinity of surrounding shallow seas, affecting the natural currents, and threatening marine life.

Development of infrastructure for converting the brine to useful chemicals can aid in averting such threats to the surrounding marine ecosystem. It can include sodium hydroxide or caustic soda production, which can be further utilized for pretreating seawater going into the desalination plant. It is a strong base and can change the water's acidity, thus preventing fouling of the filter membranes of salty water — a key cause of interruptions and failures in most reverse osmosis (RO) desalination plants. Another significant chemical employed by desalination plants and several other industrial activities is hydrochloric acid, which can also be produced on-site from the waste brine utilizing verified chemical processing techniques. The acid can be used for cleansing parts of the desalination plant, for varied chemical production, and as a source of hydrogen. Thus setting up allied facilities for treating the brine solution offers great growth opportunities for the infrastructure sector.



3.3.4 Macroeconomic Factors Impacting the Sector

<p>GOVERNMENT</p>		<ul style="list-style-type: none"> • The GCC has invested US\$ 121.3 billion in plans to enhance land transport infrastructure, including road, bridge, and railway projects. Dubai, Saudi Arabia, Qatar, Kuwait, Oman, and Bahrain will likely benefit from this cash infusion. Major GCC countries are expected to focus on increasing their transport networks' capacity and effectiveness to meet the growing population's expectations. • Thriving economies and two global events—the World Expo 2020 and the World Cup 2022—also provided the impetus to their efforts toward infrastructure development.
<p>ECONOMICAL</p>		<ul style="list-style-type: none"> • The construction sector in the GCC is poised to exhibit strong growth in the short to medium term, outperforming growth in the economy. The region is projected to grow at a yearly rate of 3.5-4% in 2023-2024. • Most GCC nations don't have a diversified economic contribution and rely heavily on oil & gas revenue. Hence downturn in the oil & gas industry can render the nations vulnerable and hamper investments in infrastructure growth.
<p>SOCIAL</p>		<ul style="list-style-type: none"> • GCC is the main exporter of non-renewable energy, which contributes to the growth of the regional economy. The economic status of the GCC supports the elevated standard of living. More than 80% of GCC's population resides in urban areas, which leads to an increase in residential as well as commercial construction growth. • Urban construction accounts for 62% of the total construction activities in the region.
<p>TECHNOLOGICAL</p>		<ul style="list-style-type: none"> • According to different technology providers, the need to meet strict deadlines and the intent to deliver projects on time with accuracy are the main factors driving the adoption of cutting-edge innovative technologies, including building information modeling (BIM), connected construction, digital twins, robotics, and artificial intelligence (AI). Incorporating these technologies is important, particularly in complicated and large-scale projects such as Neom, the Red Sea Project, and the Etihad Railway. • The growth rate of the GCC construction sector is poised to surpass the pace of its overall economic growth with an average annual increase predicted in the range of 3.5-4% during 2023-2024.
<p>ENVIRONMENTAL</p>		<ul style="list-style-type: none"> • A survey conducted by a leading global real estate consultant in 2021, involving 373 corporate real estate professionals, ranked the UAE the world's 14th country in terms of the number of sustainable buildings. According to this global survey, the UAE is at the forefront of green buildings construction in the GCC. With 869 green-rated buildings, the UAE was the only GCC nation to rank in the top 30 countries in the world. Saudi Arabia stood 54th with 38 green-rated buildings, while Qatar ranked 32nd with 140 green-rated structures. Kuwait and Oman occupied 69th and 70th places, respectively, with 12 green-accredited structures apiece.
<p>LEGAL</p>		<ul style="list-style-type: none"> • The successful implementation and operation of any infrastructure project depend on the legal framework in a country. Although each GCC country has its laws, the region needs a uniform legal system in place to promote infrastructure growth. • For instance, the importance of a unified railway transport law across the GCC was recognized in 2019, which aims to promote harmonization and the enhancement of freight and passenger transport between the GCC countries. Introducing a unified transport law could transform the entire transport system by updating the regulations of each GCC nation to ensure they are aligned.

Source: The Analyst Team

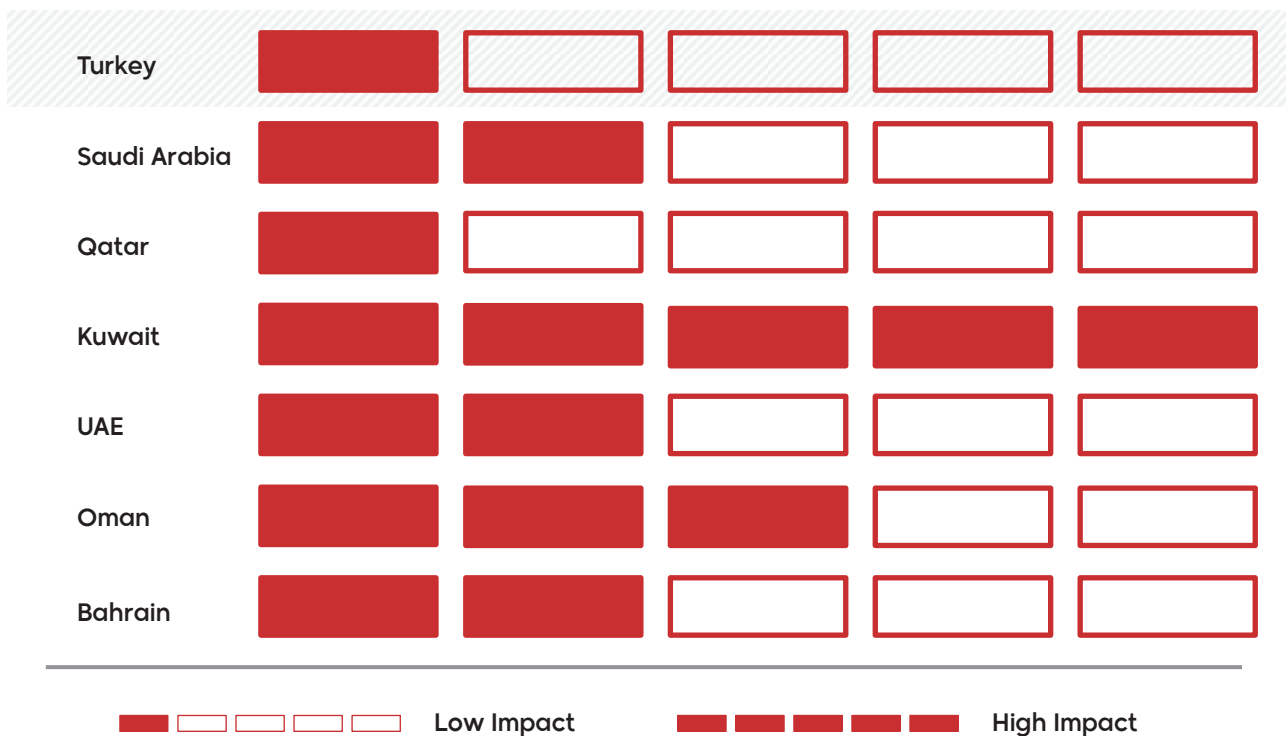


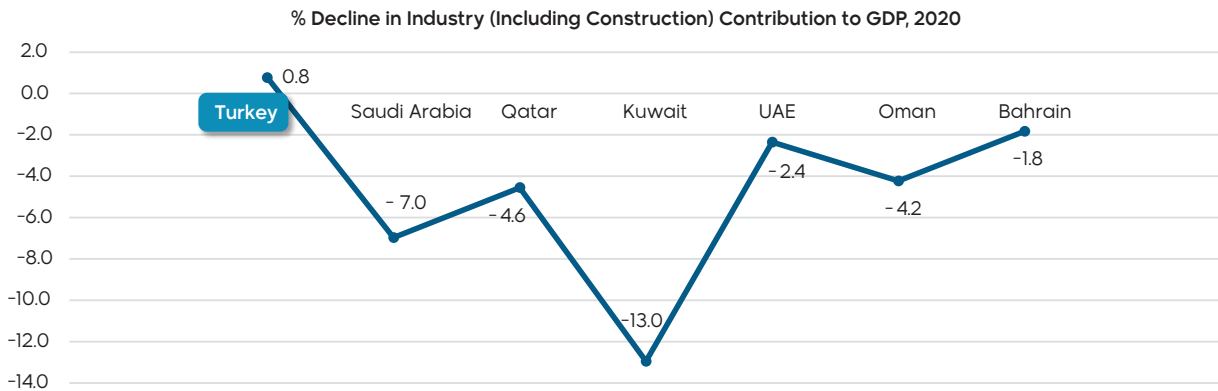
4. Country-Level Impact of COVID-19 On Infrastructure Sector

The impact of the COVID-19 pandemic differed from country to country across the Middle East as selected countries recorded a large number of cases and subsequently attracted strict and more extended lockdown periods or social isolation. These factors led to an overall decline in their GDP in 2020, further affecting the eagerness of governments to invest in infrastructure development. Additionally, labor and materials shortages led to a significant decline in infrastructure development for the first three quarters of 2020. This also resulted in delayed implementation or even cancellation of several infrastructure projects, as authorities focused more on adapting to the changing economic scenario and containing SARS-CoV-2 transmission. Thus, in 2020, the infrastructure sector experienced a notable downturn in both Türkiye and the GCC, though the magnitude varied. However, as the global economy recovers from the pandemic's ramifications, the infrastructure sector in the GCC and Türkiye is gradually regaining steady growth status. The estimated negative effect of the COVID-19 pandemic on the growth of the infrastructure sector in various countries is described below:

Figure 17. Impact of COVID-19 Pandemic

Assessment of COVID-19's Negative Impact on Infrastructure Sector





Source: World Bank

As evident from above line graph, a significant decline was witnessed in the industry's GDP contribution in 2020, compared to 2019. Better economic diversification and strong measures by the Turkish government, to contain the spread of the virus, allowed the nation to be relatively less affected compared to GCC nations.

4.1.1 Implications of COVID-19 Pandemic on Country-Level Infrastructure Sectors:

Türkiye

- The infrastructure sector witnessed a strong decline due to transport restrictions and supply chain disruption.
- Türkiye managed to contain the spread of SARS-CoV-2 through targeted lockdowns and support from its robust health services infrastructure.
- The country, thus, avoided severe consequences and resumed construction within a short span, as evident from higher domestic cement sales in 2020 from 2019.

Saudi Arabia

- A decline in GDP from fluctuating oil prices led to decreased investments in infrastructure development.
- The infrastructure sector was severely disrupted owing to the high dependence on expatriate laborers.
- Economic stress from the COVID-19 pandemic led to cancellations or postponements of several infrastructure projects.

Qatar

- The COVID-19 pandemic led to a 30% fall in oil sales in April 2020, which led to a decline in the GDP of Qatar.
- Better industrial diversification safeguarded the country against severe economic downturns.
- Construction activities resumed fast to continue preparation for the FIFA Men's World Cup 2022.

Kuwait

- Heavy dependence on the oil & gas sector and unstable global oil prices severely impacted Kuwait's economy.
- Kuwait's fiscal deficit sharply rose, and the General Reserve Fund almost got exhausted in 2021. Hence, the country cut down spending on infrastructure development.
- Global supply chain disruptions further impacted infrastructure growth.

UAE

- The COVID-19 pandemic caused moderate disruptions to UAE's economy, primarily due to restrictions on movement and high dependence on the expatriate workforce.
- Better industrial diversification shielded the country from severe economic downturns.
- Investments in infrastructure development resumed post-Q3 of 2020.
- The government launched several broad social and economic reforms to recover from the COVID-19 pandemic-related downturn.

Oman

- The COVID-19 pandemic led to weak economic growth and higher budget deficits in Oman.
- The government reduced its spending and increased taxation to counter the indebted finances.
- Subsequently, the pandemic hampered investment and focus on infrastructure development.

Bahrain

- Bahrain was relatively well-shielded from the adverse effects of the COVID-19 pandemic.
- Diversification of industries allowed the country to limit the damages and steep decline in GDP.
- The Government of Bahrain is focused on 22 specific infrastructure projects to drive the economic recovery plan.



4.1.2 Post Pandemic Outlook:

Türkiye



- Türkiye has been successful in recovering from the pandemic, marked by the Economic Stability Shield Program that included incentives on tax, credit, and labor-related issues.
- Future infrastructural policies need to tap into the wide international experience of developed and developing nations alike to be successful.
- Innovative and productive capabilities of domestic firms needs to be utilized for growth of the sector.

- Saudi Arabia undertook a concerted, whole-of-government approach to the recovery process and involved across-the-board effort by the different government layers.
- IMF forecast that Saudi Arabia would be the fastest-growing economy among the G20 nations.
- More than 15 large-scale projects have been launched in recent years to transform and diversify the country's economy..

Saudi Arabia



- Qatar has shown resilience and has emerged from the COVID-19 crisis in a strong position.
- Higher energy prices, progress in the North Field LNG expansion, restored relations with neighbours and preparations for the World Cup drove the infrastructure sector strongly.
- Preparations for hosting the World Cup led to rapid development of transportation infrastructure, including the metro and road.

Qatar



- Benefiting from high oil prices, Kuwait's economic recovery continued strongly in 2021, and inflation was largely contained.
- The fiscal and external balances have strengthened, and external buffers are increasing, mainly from high oil revenues and expenditure restraint.
- The strengthened fiscal position is expected to aid in continuation and restart of various pending infrastructure projects.

Kuwait



- The UAE's 10-year Industrial Strategy "Operation 300bn" aims to empower and expand the industrial sector to become the driving force of a sustainable national economy.
- In August 2020, the UAE Cabinet approved the launch of 33 initiatives' plan to support the economic sectors.
- Dubai launched a Creative Economy Strategy to double the contribution of its creative industries, and thus promoting growth of industrial infrastructure.

UAE



- The Sultanate is expected to improve gradually and strengthen in the medium-term.
- Frontloaded fiscal reforms, including VAT, and cuts in spending turned the country's fiscal and current account deficits into surpluses.
- Rising hydrocarbon production, improved non-oil revenues, and the rationalization of expenditure on infrastructure projects.

Oman



Bahrain



- In October 2021, the government of Bahrain announced an action plan to secure the economy's long-term competitiveness and aid in post-COVID 19 recovery..
- The current oil price outlook provides an opportunity to proceed with ambitious reforms under favorable macroeconomic and financing conditions to put debt on a firm downward path.
- In January 2023, Bahrain's government endorsed a new four-year program 2023-26, which prioritizes several objectives including improvement of infrastructure.



5. GCC and Türkiye Infrastructure Outlook

5.1 Comparison - GCC Vs Türkiye

The below segment compares Türkiye with the six GCC nations on various parameters. It showcases which country has better infrastructure, and in which sector. Additionally, it also showcases the improvement areas and collaboration potentials between the nations.

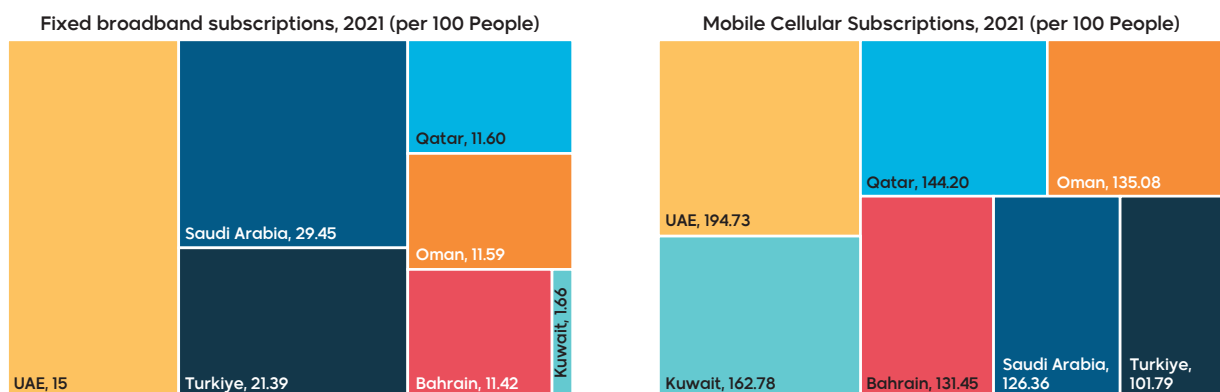
Table 1. Global Quality Infrastructure Index (2021)

Country	GQII Scores (2021)	GQII Rank (2021)
Türkiye	0.92	16
United Arab Emirates	0.75	49
Saudi Arabia	0.68	58
Qatar	0.56	73
Oman	0.53	82
Bahrain	0.51	91
Kuwait	0.50	93

Source: Global Quality Infrastructure Index (GQII) Program

As shown in the above table, Türkiye outscores all the GCC nations in terms of quality infrastructure. Better measuring development in standardization and accreditation is attributed to the country's better performance in this index. The Global Quality Infrastructure Index (GQII) brings together official data from national and international accreditation, standardization and metrology bodies and shows the development of quality infrastructure (QI). The index confirms the strong correlation between developing the national QI and export performance of a country or territory. It is an open initiative to promote quality infrastructure information transparency and intelligence worldwide, compiled by two reputed consulting firms.

Figure 18. Telecommunication Sector Comparison

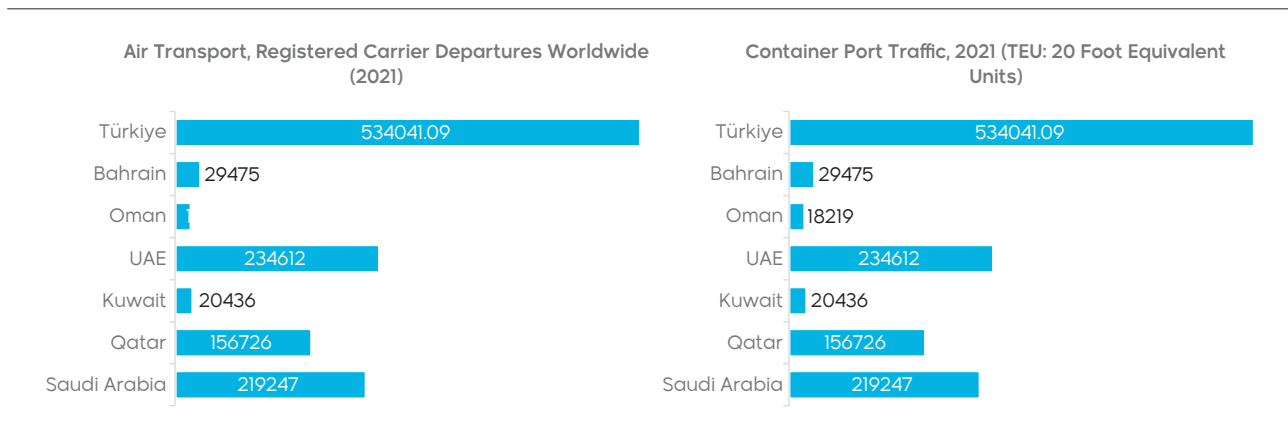


Source: World Bank



As seen from the above statistics, several GCC nations have a better customer base of the telecommunications sector, when compared to Türkiye. This can be primarily attributed to a higher % of people residing in urban areas in the GCC and also due to the higher focus of the government to develop 5G connectivity.

Figure 19. Transportation Sector Comparison



Source: World Bank

As seen from the above statistics, Türkiye has a clear advantage over GCC nations, with respect to the transportation sector's indicators. The country registered a larger number of flight and ship departures, indicating its superiority in such infrastructures. However, the GCC nations have significantly increased their capital investment in development of transportation sector's infrastructure and hence is expected to reduce the gap significantly by 2030.

5.2 Opportunities for Cooperation and Investment Between GCC Countries and Türkiye

The GCC and Türkiye play an influential role in the Middle East, aiding the region's economic growth. Most GCC countries consider Türkiye a strategic partner, with significantly improving relations between them. The GCC and Türkiye are playing new geopolitical roles as they are significantly involved in resolving critical issues in the Middle East. Various crises have been crucial in shaping the stature of this region, along with the roles played by the economies of the GCC countries and Türkiye in regional politics. With the conclusion of the election procedures, Türkiye is likely to continue the previously established harmony with the GCC and continue its growth trajectory. Further, Türkiye's detente with Saudi Arabia and the UAE is expected to increase, while its pre-existing strong alliance with Qatar is anticipated to deepen in the coming years. Such factors can offer good opportunities for the GCC and Türkiye to boost their infrastructure sectors. Some possible cooperation and investment opportunities in these countries are mentioned below.

5.2.1 Water Desalination and Wastewater Treatment

The GCC is expected to invest significantly in water desalination units, as the countries are plagued by low per capita water availability despite a fast-growing water requirement. The countries are expected to adopt reverse-osmosis (RO) based desalination plants powered by



renewable energy (solar and wind) instead of the high energy-consuming thermal desalination technologies.

With the rising population and rapid urbanization, the GCC countries exhibit a rapidly growing need for better wastewater treatment infrastructure. The Saudi government has undertaken 147 sewage treatment plants. Similarly, Qatar is planning on developing multiple wastewater facilities. Türkiye plans to boost its wastewater recycling capacity to 5% by the end of 2023. The country is under pressure due to low water availability caused by the over-abstraction of water resources. Hence, there is a growing demand for water and wastewater treatment products and systems based on zero liquid discharge (ZLD) and RO techniques. Municipal and domestic wastewater treatment plant design, planning, and construction expertise available in Türkiye can benefit the GCC. At the same time, GCC's funding capability and knowledge of different advanced technologies can help Türkiye in developing and implementing water and wastewater treatment plants.

5.2.2 Real-Estate

Türkiye and the GCC increasingly focus on transforming the real-estate scenario in their respective cities by significantly investing in residential and commercial infrastructure. This common focus offers great collaboration opportunities for both, to develop infrastructure. According to the International Trade Administration (ITA), the construction sector in the UAE is expected to witness good recovery rates till 2027, and valuation would increase by 3.7–4.7%. As of January 2022, Turkish contractors had undertaken 150 projects worth US\$ 13 billion in the UAE. Bilateral trade between the two countries was worth ~US\$ 8.5 billion in 2021, and it has been improving constantly since then. Additionally, there have been an increased involvement of the private sectors, for development of industries. In March 2023, a leading Türkiye-based property developer opened its office in Oman to build its presence and create more scope for cooperation between the two countries.

5.2.3 Transportation Infrastructure

The rising focus on attracting FDIs and the flourishing tourism sector result in the increased focus on developing transportation infrastructure in the GCC and Türkiye. For instance, Bahrain's Ministry of Works is expected to award two infrastructure contracts worth US\$ 85 million in the third quarter of 2023. Similarly, Türkiye plans to invest ~US\$ 200 billion by 2053 to improve its railway infrastructure and boost the share of the railways in passenger transport from 0.96% in 2022 to 6.2% by 2053.

5.2.4 Energy Infrastructure

Türkiye has been prioritizing investments in liquefied natural gas (LNG) and underground natural gas storage to ensure energy security. Several floating storage and regasification terminals have been established in recent years, and there has been an increase in existing LNG entry capacity. Additionally, new entry points are being connected to the gas network. Also, Türkiye is taking measures to expand its gas capacity by upgrading its storage facilities. The strong know-how of GCC countries on such projects can greatly aid Türkiye in developing infrastructure related to oil & gas. Similarly, GCC's efforts to increase the usage of renewable energy can be strongly aided by Türkiye's expertise in renewable energy technology. Türkiye is one of the largest producers



of solar panels in the Middle East, whereas GCC countries are one of the largest receivers of direct normal irradiation (DNI). Türkiye has the presence of established solar power harnessing technology manufacturers—such as CW Enerji, Gest Enerji, HT Solar, and Schmid-Pekintaş—who can readily export their technology to GCC countries and aid in improving trade relations.

5.3 Challenges and Possible Solutions

Both GCC and Türkiye have realized that infrastructure is central to addressing the development requirements of their respective countries, apart from ensuring regional harmony, and hence are collaborating on various aspects of the sector. In addition to enjoying a large volume of trade in goods and services with Saudi Arabia and the UAE, Türkiye has proactively tried to promote its bilateral investment and business relations with most GCC countries. These countries and Türkiye have offered attractive investment opportunities to each other in recent decades. The UAE traditionally and Saudi Arabia have maintained open and warm business environments to attract foreign capital. At the same time, the real estate boom and massive government investment in domestic infrastructure projects created many profitable investment opportunities for international investors in both countries. Owing to their large oil revenues and well-developed financial institutions, GCC nations have emerged as major suppliers of financial capital and foreign direct investment to the global economy, and these countries' investments in Türkiye have been rising significantly.

Although Saudi Arabia may be affected over the long term by the pandemic, the country remains in a comfortable position to back future infrastructure projects and maintain its reforms. A rapid redesign and development of the built environment and energy supply infrastructure is required to ensure a more sustainable future. Buildings, transportation, and energy systems may be built with sustainability at the forefront of the planning. Additionally, the country has been implementing significant economic reforms, including ease of doing business, access to credit, approval of construction permits, resolving insolvency, and other similar processes. Such reforms promote the entry of new businesses, improve procurement processes, and increase competition. Infrastructure is expected to play a key role in the success of the Saudi 2030 Vision as the nation has already committed to almost US\$ 1 trillion worth of various projects.

Kuwait is working on reducing the burden of public wages and social subsidies to improve the government's ability to allocate funds toward high-investment and long-duration infrastructure projects. Despite the slowdown in awarding and implementation of projects due to strain resulting from institution – and market-related factors, infrastructure development remains a key focus area for Kuwait to address widening gaps, meet the requirements of future generations and, ultimately, achieve the national aspirations articulated through Kuwait Vision 2035. Therefore, the country strongly focuses on its PPP program to drive its infrastructure agenda. Additionally, certain urban infrastructure development faces specific challenges. Hence steps are being taken to reduce the shortage of parking facilities in Kuwait while promoting smart parking and pay-to-use services, especially in areas with low – to medium-income populations.

The government in UAE is focusing on reducing desertification caused by drought and over-exploitation of natural resources, population growth, and land utility, among others. Government agencies of the UAE have been promoting plans to establish several innovative technologies that can modify how infrastructure is delivered and used within the federation while ensuring the conservation of the environment. The Hyperloop transportation system is one such initiative.



The planned technology is expected to reduce journey times between cities and involves transportation over wide locations at enormous speeds through a pipe or tunnel. Abu Dhabi and Dubai have been conducting viability studies for Hyperloop systems that could connect these cities with other major cities within the GCC. The government is also promoting 3D printing for infrastructure projects.

Despite certain constraints on the Bahrain government's capital expenditure budget, the demand for transportation and industrial facilities is set to rise and continue attracting government investments in the infrastructure sector. Notwithstanding slower regional growth, the sector has expanded continuously in recent years and is a major contributor to employment and GDP. Support from fellow GCC nations is expected to further negate the impacts of lower international oil prices and support infrastructure development. Bahrain has one of the region's most liberalized foreign investment frameworks, but foreign ownership of local construction operations is capped and thus causes some hindrance. While this might conceivably reduce competition in the segment, the Ministry of Industry and Commerce can grant exemptions to this limit. Privately financed projects are already fairly common in the electricity generation segment, but the penetration of private investment into other sectors has been slower. However, in a move that forms part of a broader regional trend, the authorities are increasingly turning to public-private partnership (PPP) models for other infrastructure works, particularly transportation.

In Oman, low oil prices and government budget adjustments have affected infrastructure projects in the past few years. There were fewer projects awarded and higher delays and cancellations. This caused increased competition in the market and resulted in lower margins, among other challenges. However, the government is focusing on economic diversification programs in a bid to reduce its dependency on oil-based revenues. It is leading to the growth of varied infrastructure projects across the country. Additionally, the government of Oman has taken several measures to ease the process of foreign investments, apart from existing tax breaks and custom duty exceptions. It includes the New Foreign Capital Investment Law (New FCIL) and New Commercial Companies Law (New CCL) enacted in 2019 and incentives related to the payment of income tax and indefinite carry-forward for declared tax losses announced in 2021. Additionally, the plan of a circular economy of Oman aims to amplify the value and eradicate waste through design improvements of locally made products, systems, produced materials, and business models. Such trends offer growth opportunities for the infrastructure sector.

Qatar enjoys an extensive and highly developed infrastructure. In addition to building stadiums specifically to host the 2022 FIFA World Cup matches, Qatar has invested and continues to invest in modernizing its infrastructure. The nation strives to become a transport hub for a significant portion of the globe. It is prioritizing the development of airports, a more extensive metropolitan network, and upgraded roadways and emerging cities. However, labor shortage is a significant concern in the country, leading to high dependence on expatriate labor. Despite the same, the country has been resilient in continuous infrastructure development, as exhibited by the successful hosting of the World Cup. Qatar had been the center of the world's attention leading up to the tournament. Continued improvement in domestic demand, buoyed by favorable hydrocarbon prices, the start of the North Field expansion project, and the World Cup induced buoyancy have supported a fast economy-wide recovery. The fiscal surplus rose from 0.2% in 2021 to 10.8% of GDP in 2022, allowing for an upsurge and infrastructure spending rationalization.



6. Appendix

6.1 Word Index

6.1.1 List of Abbreviation

Abbreviation	Expansion
AI	Artificial Intelligence
APAC	Asia Pacific
BAPCO	Bahrain Petroleum Company
BI	Business Intelligence
BSTDB	Black Sea Trade and Development Bank
BO	Build-Operate
BOT	Build-Operate-Transfer
BLT	Build-Lease-Transfer
CAA	Civil Aviation Authority
CAGR	Compound Annual Growth Rate
CBT	Central Bank of Türkiye
CCI	Construction Cost Index
CFR	Code of Federal Regulations
COVID-19	Coronavirus Disease 2019
CSR	Corporate Social Responsibility
DAC	Digital Automation Cloud
DISCO	Distribution Company
DNI	Direct Normal Irradiation
EC	European Commission
EBRD	European Bank for Reconstruction and Development
EU	European Union
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
FTTR	Fibre to the Room
FZ	Free Zone
GCC	Gulf Cooperation Council
GDNT	General Directorate for National Technology
GDP	Gross Domestic Product



Abbreviation	Expansion
GIS	Global Information Systems
ICLS	International Conference of Labour Statisticians
ICT	Information and Communication Technology
IEA	International Energy Association
ILO	International Labour Organization
IoT	Internet of Things
IMF	International Monetary Fund
ISA	International Society of Automation
IsDB	Islamic Development Bank
ITA	International Trade Administration
ITS	Intelligent Transportation System
KSA	Kingdom of Saudi Arabia
LNG	Liquefied Natural Gas
MEA	Middle East and Africa
MOCCAEC	Ministry of Climate Change and Environment
MoCIIP	Ministry of Commerce, Industry and Investment Promotion
MoHRE	Ministry of Human Resources and Emiratization
MoiAT	Ministry of Industry and Advanced Technology
MSE	Muscat Stock Exchange
MT	Metric Ton
NDP	National Development Plan
NPP	Nuclear Power Plant
NRW	Non-Revenue Water
OECD	Organisation for Economic Cooperation and Development
PESTLE	Political, Economic, Social, Technological, Legal, and Environmental
PPP	Public-Private Partnership
R&D	Research & Development
SAM	South America
SCADA	Supervisory Control and Data Acquisition
SEZ	Special Economic Zone
SIV	System Input Volume
SME	Small & Medium Enterprises
SOE	State Owned Enterprises
STEM	Science, Technology, Engineering, and Mathematics



Abbreviation	Expansion
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TL	Türkisch Lira
TOR	Transfer of Operating Rights
UAE	United Arab Emirates
UK	United Kingdom
US	United States
\$US	US Dollar
VAT	Value Added Tax
WDN	Water Distribution Network
WHO	World Health Organization
Y-o-Y	Year on Year
ZLD	Zero Liquid Discharge



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About the Gulf Research Center

The Gulf Research Center is an independent research institution, whose motto is "Knowledge for All." Its work serves the issues and goals of the peoples and countries of the Gulf region. The center was established in July 2000, and its headquarters are in Jeddah, Saudi Arabia. It has branches in Riyadh, Saudi Arabia, Cambridge University, United Kingdom, and Geneva, Switzerland.

Since its establishment, the Center has been committed to actively contributing to issues in the Gulf region, through all its activities, which include: conducting research and studies, organizing conferences, forums and workshops, media dissemination on security issues, politics, economy, military affairs, education and environment, media and others. The Center has also translated and published more than 500 major books, dictionaries and dictionaries specialized in politics, security, economics, international relations, strategic thought, environment, media, regional and international balance... etc.

For the twelfth consecutive year, the Gulf Research Center maintained its presence among the most prominent think tanks and civil society organizations in the world, and as one of the major independent think tanks in the Middle East and out of 8,162 organizations from all continents of the world, according to what was announced by the International Relations Program at the University of Pennsylvania on 30 January 2020, as a part of the program's annual classification of think tanks in the world. In addition, the Gulf Research Center was cited as one of the most prominent think tanks interested in foreign political and international affairs, and among the best institutions within the classification of institutional cooperation.



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