

2016 Top Markets Report **Environmental Technologies** Country Case Study

Saudi Arabia

Saudi Arabia has a limited domestic environmental technologies industry and therefore imports the balance of the goods and services required to meet its environmental goals. Its preference for imported goods, pronounced water scarcity issues, and vast oil and gas industry make it a top market for U.S. environmental technologies. Recent budgetary tightening resulting from low oil prices, however, could slow implementation of the project pipeline.



Saudi Arabia ranked sixth globally on the 2016 Top Markets Study (TMS) with a composite environmental technologies score of 25.9. Within the environmental industry segments, Saudi Arabia ranked fifth for water with a score of 12.0, highlighting the relatively important role that water and wastewater technology plays in Saudi's desert climate. Saudi Arabia ranked seventh for air pollution control markets with a score of 10.9 and sixth for waste and recycling with a score of 3.03 (see Appendix 1 for global rankings).

reflects a slightly higher perception of stringency from the perspective of international businesses operating there.

State of the Environmental Regime

Saudi Arabia hosts a moderately stringent environmental regime. The Environmental Business Journal-OECD Environmental Stringency Survey, which ranks environmental regimes on a scale from 1 to 7 (with 1 being lax and 7 being among the most stringent in the world), scored Saudi Arabia a 4.2 in 2012, a 0.7 point improvement from its 2005 score of 3.5. Saudi Arabia's score of 4.81 on the World Economic Forum's 2011 Index for Regulatory Stringency (on a similar scale to that of EBJ-OECD)

Figure 1: Saudi Arabia Environmental Technologies Market



Source: Environmental Business International with OEEI Analysis, 2016.

Saudi Arabia's ranking in the same survey for enforcement is 21st globally with a score of 4.87, reflecting the Kingdom's improving enforcement efforts. This is evidenced both by the government's recent allocation of USD 300 million for environmental protection and pollution control¹ and its 2009 announcement of the formation of a Green Police unit to improve monitoring and enforcement of environmental rules.² Saudi Arabia also named several environmental protection goals in its 10th Development Plan (2015-2019), including improvement of waste management and mobile and stationary source emissions reduction and protection of coastal and territorial waters.

Market Barriers

The Environmental Technologies Trade Advisory Committee (ETTAC) identified the following barriers as most problematic for environmental technologies companies attempting to export to or work in Saudi Arabia:

1. Local partnership is required.

American exporters are not required to appoint a local Saudi agent or distributor to sell to Saudi companies, but commercial regulations restrict importing for resale and direct commercial marketing within the Kingdom to Saudi nationals, wholly Saudi-owned companies and Saudi-foreign partnerships where the foreign partner holds 25 percent equity.³ Furthermore, the Saudi government appears to favor joint-venture arrangements with Saudi partners in the lead in public tenders over those led by foreign firms.

2. Certification and safety approvals fail to recognize equivalents from the exporting market.

The Saudi Food and Drug Authority applies unnecessary additional testing requirements for products that have dual use in water analysis and medical applications (such as spectrophotometers). Additional testing imposes undue burden in terms of cost and time-to-market for technologies that are applied to environmental rather than medical uses.

Market Opportunities

Air Pollution Control

Air Emissions Control and Monitoring

The Presidency of Meteorology and Environment (PME) not only monitors and regulates air quality but also issues tenders. In late 2012, PME introduced new ambient air quality and stationary and mobile source emissions standards. In March 2014, the agency decreed that all companies would have five years to meet the new requirements, bringing maximum pollutant levels into line with international benchmarks.⁴ The Kingdom is a signatory to the Kyoto Protocol and has undertaken an effort to enforce emissions standards for large industrial facilities.

In its Nationally Determined Contribution (NDC) under the December 2015 Paris Climate Agreement, the Kingdom committed to achieve mitigation co-benefits of up to 130 million tons of CO₂ equivalent avoided annually by 2030 through contributions to economic diversification and adaptation. The NDC specifically emphasized the need to expedite conversion of its single cycle power plants to combined cycle as part of its overall emissions reduction strategy. It also included a plan to build the world's largest carbon capture and use facility, which would capture and purify about 1,500 tons of carbon dioxide per day for use in Saudi Arabia's petrochemical plants.

Saudi efforts to monitor air quality have increased alongside efforts to develop and enforce environmental standards and regulations, creating demand for ambient air quality surveys and emission source monitoring. The Saudi government has ordered all major industrial projects to conform to international air standards and allocated USD 300 million for environmental protection and pollution controls in 2010. Major emitting industries in Saudi Arabia include oil refineries, power generation, petrochemical development, cement plants and metals foundries. Saudi's annual imports of air pollution control and monitoring equipment is estimated at USD 50 million,⁵ with U.S. companies meeting almost 75 percent of demand.

The industrial cities of Jubail and Yanbu are prime examples of adoption of advanced monitoring and control technologies within a finite industrial zone for existing and new facilities, presenting continued vast opportunities to U.S. technology providers.

Technologies and Services in Demand:

- Continuous emissions monitoring systems
- Fenceline monitoring equipment
- Ambient air monitoring equipment
- Source emissions measurement technologies
- Environmental testing and laboratory instrumentation and services
- Dry sorbent injection technologies
- Flue gas desulfurization equipment
- Activated carbon injection technologies
- Inspection, adjustment, maintenance and repair services
- Selective catalytic reduction technologies
- Selective non-catalytic reduction controls

Waste Management and Recycling

Municipal and Industrial Waste

In July 2013, the Saudi Cabinet approved new Municipal Solid Waste (MSW) management regulations. The new regulations aim to ensure the implementation of an integrated framework for municipal solid waste management in the country. Studies conducted by the Ministry of Municipal and Rural Affairs in collaboration with the Saudi Arabian Basic Industries Corporation (SABIC) recommend that the ministry establish a joint stock company for the treatment and recycling of solid waste in the Kingdom using the latest technology to dispose of the massive quantity of waste generated in the country in an environmentally friendly manner. The ministry is known to be finalizing the executive bylaws for the management of solid waste.

Recycling and solid waste management is regulated, and related tenders are issued by the Ministry of Municipal and Rural Affairs in conjunction with local municipalities. A substantial portion of the USD 3 billion budget of Saudi Arabia's Ministry of Municipality and Housing is dedicated to handling, processing, managing and disposal of solid waste.⁶ Saudi Arabia generates 15.3 million tons per year, the majority of which ends up untreated and landfilled.⁷

While few recycling initiatives exist, there is increasing demand for incineration technologies to deter the creation of more landfills. Production of domestic, industrial, chemical and hazardous wastes is also growing in Saudi Arabia. The burgeoning healthcare sector, which generates an estimated 50,000 tons of healthcare waste per year, also offers increasing commercial opportunities. The Kingdom currently boasts 1,850 health centers, with 79 hospitals under construction, and plans to establish an additional 250 new primary care centers,⁸ creating demand for a variety of incineration and medical waste handling technologies.

Technologies and Services in Demand:

- Hazardous waste transportation
- Waste sampling, characterization and analysis
- Waste minimization
- Hazardous waste removal and tank cleaning
- Contaminated land site assessment and remediation
- Industrial and hazardous waste treatment and disposal
- Air pollution control equipment and monitoring devices
- Solid waste management systems

Water and Wastewater Treatment

Water resources are regulated by the Ministry of Water and Electricity and tendered by the National Water Company (NWC). The NWC was created in 2008 to oversee water tenders and manage the development of Public Private Partnerships (PPP) for water infrastructure development.⁹ The NWC is currently a government-owned entity but is designed to evolve into a private sector holding company as the Saudi water sector becomes completely privatized.¹⁰

According to the NWC's plans, between 2012 and 2020 approximately USD 66.4 billion will be invested in new water infrastructure and related services, USD 30 billion of which will be directed towards capital expenditures.¹¹ Similarly, the Water and Electricity Company (WEC) was created in 2003 as a limited-liability corporation to manage the consumer market for water and power with an overarching mission of keeping tariffs low.¹² The Saline Water Conversion Corporation (SWCC) operates the state's 36 desalination facilities.

Most recently, Saudi Arabia moved to restructure water tariffs, which have been among the lowest in the world. The impact of declining oil prices combined with years of wasteful overuse has moved the Ministry of Water and Electricity (MOWE) to increase industrial and commercial water tariffs by 125 percent.¹³ Increases for residential customers have also been implemented, though they will be negligible up to 15m³ per month. From that departure point the new graduated tariff scheme more than doubles for every 15m³ increment providing users ample incentive to limit consumption and fueling a fundamental shift in how water resources are managed in the Kingdom.¹⁴

Municipal Water Treatment and Water Efficiency

Demand for water services in Saudi Arabia is high as urbanization and population growth increases but groundwater resources dwindle. The 2014 Saudi Arabia Country Commercial Guide estimates that USD 5 billion are need annually over the next 20 years for new water infrastructure investments. With the development of 12 Operations-and-Management joint ventures, in the near-term, there are substantial opportunities for management of existing facilities as well as new facility construction and upgrades. The NWC is expected to invest USD 12.8 billion in capital expenditures and USD 17.9 billion in operations expenditures in fresh water treatment and distribution between 2012 and 2020.¹⁵

The NWC privatization scheme will transfer management to private companies to ameliorate the problem of non-revenue water. This will be achieved by improvements in transmission infrastructure, use of leakage detection systems and enhancements to revenue collection, which include upgrading metering and billing technologies and services. There is also an emphasis on improving the sewer system and creating separate systems for storm water management. Approximately 40 percent of the Saudi Arabia utilizes combined sewers which has exacerbated flooding in recent years.¹⁶

Technologies and Services in Demand:

- Engineering services
- Operations and management services
- Pipes, pumps and valves
- Advanced filtration
- Membrane filtration

- Reverse osmosis
- Multiple Effect Distillation (MED)
- UV disinfection
- Ozone disinfection
- Water loss technology
- Smart metering

Desalination

Water demand surpasses renewable water resources by approximately 10 billion cubic meters a year.¹⁷ Saudi Arabia meets excess demand through seawater desalination, though desalination remains critical for groundwater treatment in the Kingdom as well due to high groundwater salinity. The SWCC currently operates 36 desalination facilities that address 60 to 70 percent of freshwater demand.¹⁸ Expansion of the Saudi desalination program will be needed to meet future fresh water needs in the Kingdom.¹⁹

The SWCC plans to invest USD 11.7 billion in capital expenditures and USD 4.5 billion in operations expenditures through 2020,²⁰ highlighting the vast opportunities for desalination technology and Engineering, Procurement, and Construction (EPC) firms. The SWCC has traditionally granted large EPC contracts for the development of facilities and continues to do so; however, it has also recently included Build Own Operate models in its portfolio that will expand the desalination market further into services. This trend may accelerate as budgetary shortfalls due to falling oil prices create demand for alternative financing models.

There are six major projects expected to tender during the 2016 timeframe. The largest is the Jubail 3 thermal and reverse osmosis project estimated to be worth USD 3 billion.²¹ The remaining five projects are all saline water conversion plants utilizing reverse osmosis; they include Haradh BWRO, USD 1.6 billion; Rabigh Phase 4, USD 1.2 billion; Yanbu 4, USD 900 million; Jeddah 4, USD 800 million; and Al Khafji Solar-powered SWRO phase 2, USD 600 million.²²

Technologies and Services in Demand:

- Engineering services
- Management and operations services
- Multistage flash distillation
- Multiple Effect Distillation (MED)
- Reverse osmosis membrane technology

- Solar and energy efficient desalination technology

Industrial Wastewater Treatment and Water Reuse

Saudi Arabia's lack of a fee system for wastewater treatment services makes it a difficult economic prospect for privatization without government subsidies, but new fees for industrial freshwater make effluent treatment and reuse an attractive prospect.

Wastewater treatment is growing robustly in the Kingdom; the NWC is expected to invest USD 23.9 billion in capital expenditures and USD 11.9 billion in operations expenditures in wastewater treatment between 2012 and 2020.²³ The Kingdom's wastewater treatment capacity is expected to expand by 12.8 percent annually.²⁴ The NWC plans to enhance the economic attractiveness of wastewater projects by facilitating waste-to-energy programs within treatment plants and promoting the sale of treated wastewater for industrial uses.²⁵ Waste-to-energy projects are key components of the national wastewater management program and are likely to emphasize biogas combined heat and power facilities.²⁶

NWC has signed private sales contracts of treated wastewater to Saudi Aramco and power generation company, Saudi Electric Company.²⁷ At the writing of this report, one major project was announced for the 2015 to 2016 tender period: the South Dhahran Wastewater Treatment Plant will provide municipal treatment services for Dhahran, and treated effluent will be used by Saudi Aramco for industrial purposes. The project is expected to have a daily capacity of 70,000 m³ and is estimated at USD 28 million.²⁸

Water reuse provides growing opportunities. The Saudi government has instituted treatment standards for various modes of reuse. A stated goal of increasing reuse by 16 percent by 2016 further underscores this priority.²⁹ Focusing water reuse on industrial purposes has the intended impact of reducing the amount of saline conversion necessary for potable uses and is economically more viable in terms of the operational costs associated with desalination versus membrane-based wastewater treatment. The NWC intends to play a major role in the water reuse market and estimates that sales from reused wastewater will exceed those for

potable water in six large cities by 2030, yielding USD 900 million in revenues over the forecast period.³⁰

Major industrial reuse projects announced include the Manfouha WWTP expansion valued at USD 320 million; the Al Hayer WWTP, Phase 2 valued at USD 160 million; and the Arana WWTP, Phase 2 valued at USD 100 million,³¹ all of which are being developed with the intention of selling treated effluent to industrial users.

Technologies and Services in Demand:

- Engineering and construction services
- Water reuse equipment and services (process specific)
- Advanced filtration
- Membrane filtration
- Reverse osmosis
- UV disinfection
- Anaerobic digestion
- Nitrification
- Biological denitrification

Environmental Engineering and Consulting

Four new Economic Cities are currently in various stages of development throughout the Kingdom: King Abdullah Economic City (KAEC) in Rabigh, Prince Abdulaziz bin Musaid Economic City (PABMEC) in Ha'il, Knowledge Economic City (KEC) in Medina and Jazan Economic City (JEC). Each city is intended to encourage growth in specific sectors - such as logistics, healthcare, education, energy and agriculture – that are associated with its theme. The goal is to generate domestic jobs through workforce development, professional training and academic institutions.³² The Saudi Arabian General Investment Authority (SAGIA) has stated that sustainability and energy efficiency are key elements of the cities' development strategy. All of these massive projects are being built entirely from scratch, creating huge demand for construction, engineering, design and related services.

Key Services in Demand:

- Environmental Impact Assessment (EIA)
- Engineering, design and construction services
- Environmental monitoring and analysis

ETWG Agency Initiatives and Programs

U.S. Environmental Solutions Toolkit

The Toolkit compiles the U.S. Environmental Protection Agency's (U.S. EPA) environmental regulations, related underlying research and a list of U.S. companies that provide technologies necessary to implement similar environmental regulatory actions abroad. The Toolkit is used by U.S. EPA officials or environmental consultants as a reference tool within bilateral activities that focus on addressing environmental concerns. In 2016, an Arabic-language version of the Toolkit will be introduced to facilitate ease of use in Saudi Arabia.

Power-Gen International Buyer Program

Power-Gen, one of the leading U.S. power generation equipment and services trade shows, has partnered with the U.S. Department of Commerce's International Buyer Program to encourage foreign participation in the show. This platform is leveraged to discuss policies and exchange technical information regarding power plant emissions control with Saudi participants and to foster business relationships between Saudi end-users and U.S. emissions control providers.

WasteExpo International Buyer Program

WasteExpo, one of the leading U.S. waste management trade shows, has partnered with the U.S. Department of Commerce's International Buyer Program to encourage foreign participation in the show. This platform was leveraged to exchange relevant technical information with Saudi participants and to introduce Saudi buyers to U.S. waste management technology providers.

Water Environment Federation Technical Exhibition and Conference (WEFTEC) International Buyer Program

The U.S. Department of Commerce, through its International Buyer Program, leads a delegation of Saudi officials and business representatives to WEFTEC to explore relevant U.S. technologies and work with U.S. exporters on approaches to water resource management.

Market Contacts and Program References

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Saudi Water and Power (SWPF), Jeddah, Saudi Arabia
www.ksawpf.com

WEPower, Dammam, Saudi Arabia
www.wepower-sa.com

WETEX, Dubai, UAE
www.wetex.ae

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