

COUNTRY ANALYSIS BRIEFS

United Arab Emirates

Last Updated: January 2011

Background

The UAE is an important producer of natural gas and oil, ranking seventh globally in total proven reserves of both.

The United Arab Emirates (UAE) is a federation of seven different emirates which together comprise the third largest economy in the Middle East behind Saudi Arabia and Iran. Its per capita GDP is second only to Qatar. The UAE is an important producer of natural gas and oil, ranking seventh globally in total proven reserves of both. Abu Dhabi possesses the majority of oil and natural gas reserves followed by Dubai, with small amounts in Sharjah and Ras al-Khaimah. The country is also a member of the Organization of Petroleum Exporting Countries (OPEC).

Despite having the most diversified economy in the Middle East, the UAE remains largely dependent upon the hydrocarbons sector for economic growth. The government's hydrocarbon policy will continue to focus on oil, however natural gas projects are gaining significance and investment. Rising domestic demand for subsidized energy and electricity has caused the UAE to become a net importer of natural gas and strained volumes of liquids available for export.



The UAE government is pursuing economic diversification through investment in infrastructure in transport, trade and tourism. Abu Dhabi has made a concerted effort to increase its industrialization through projects such as the Khalifa Industrial Zone Abu Dhabi (KIZAD), which will allow 100 percent foreign ownership of companies. This infrastructure project will be one of the largest integrated industrial zones in the world and will further serve the aims of economic diversification held by the government.

Dubai has burgeoning financial, real estate, and tourism sectors. Although the economic crisis necessitated Abu Dhabi to bail out the most prominent of Dubai's state-run firms, Dubai World, these financial difficulties have not precipitated a flight of foreign capital. The UAE has returned to positive and increasing growth once again, with a real GDP growth forecast of 3.1 percent for 2011.

Consumption of total primary energy reached 3.257 quadrillion BTUs in 2008. Of that total, approximately 70 percent came from natural gas for electricity generation, consuming 2.198 quadrillion BTUs, while 1.06 quadrillion BTUs of petroleum products were consumed.

Oil

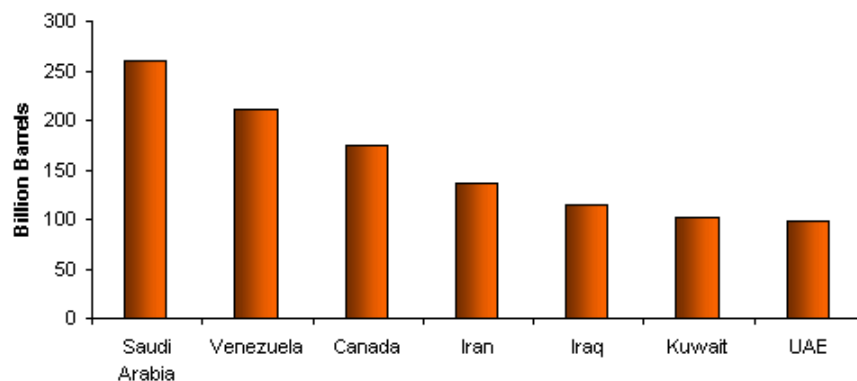
The UAE has been able to maintain its proven reserves over the last decade primarily due to enhanced oil

According to *Oil & Gas Journal*, the UAE has 97.8 billion barrels as of January 1, 2011, making up 7 percent of global oil reserves. The UAE has been able to maintain its proven reserves over the last decade primarily due to enhanced oil recovery (EOR) technologies increasing extraction rates of mature oil projects combined with higher oil prices making more reserves commercially viable. Few new concessions have been made, as exploration has met with little success and most

recovery (EOR) technologies increasing extraction rates of mature oil projects.

foreign companies lack market access. However, in late 2008, Occidental Petroleum won the first concession offered in decades, earning the right to develop the Jarn Yahpour and Rahman oil fields.

**Top World Oil Reserves by Country
January 1, 2011**



Source: *Oil and Gas Journal*

Sector Organization

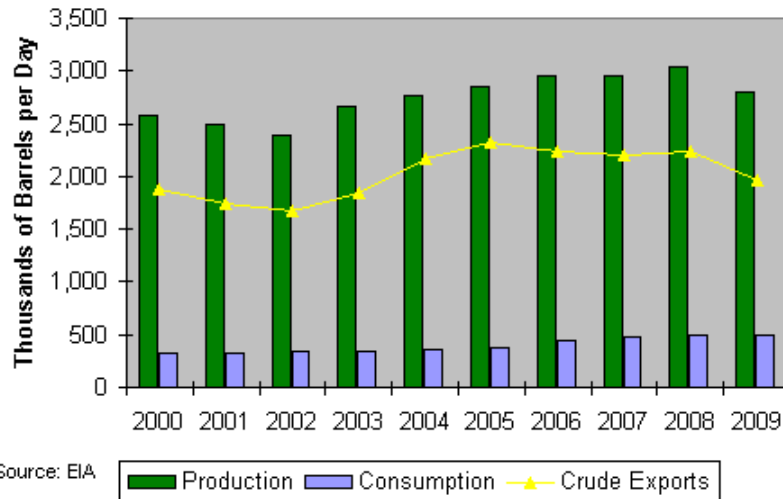
The oil policy of the UAE government is carried out mainly by the Supreme Petroleum Council (SPC) through the Abu Dhabi National Oil Company (ADNOC), operating 14 subsidiaries which participate at every level of the oil and natural gas sectors. The contract structure is based on a long-term, production-sharing basis with the state mandated to own a majority of the equity stake in a project, often through joint venture companies. The most noteworthy of the oil-producing consortia include the Zakum Development Company (ZADCO), the Abu Dhabi Company for Onshore Operations (ADCO), and the Abu Dhabi Marine Operating Company (ADMA-OPCO). International oil majors operating in the UAE include the following: BP, Shell, Total, ExxonMobil, Petrofac, and Partex.

In November 2010, the ruler of Sharjah, Shaikh Sultan bin Muhammad al-Qasimi, issued a decree which created the Sharjah National Oil Corporation (SNOC). The new firm is owned by the emirate of Sharjah and has legal, financial and administrative independence to carry out operations in the upstream and downstream markets, as well as investing in other firms engaging in similar activities. SNOC manages those projects formerly operated by Crescent Petroleum in the emirate.

Exploration and Production

In 2010, the UAE produced approximately 2.81 million barrels per day (bbl/d) of total oil liquids, of which 2.3 million bbl/d was crude oil. Crude oil production capacity is currently estimated at 2.6 million bbl/d. However, increases in capacity have not affected production due to limits imposed by OPEC, which constrain UAE's production around the quota of 2.223 million bbl/d. The government has pushed back plans to increase capacity to 3.5 million bbl/d to 2018, pending acceptance of fellow OPEC members.

UAE Oil Production and Consumption, 2000-2009



Much of the oil production in the UAE is from the Zakum oil system, a collection of oil fields which together make up the third largest oil zone in the world. The Upper Zakum field is run by ZADCO, 60 percent owned by ADNOC with the Japanese Oil Development Company (JODCO) and ExxonMobil holding the remaining stakes. In order to boost production capacity, ZADCO is reviewing the possibility to use extended reach drilling from four artificial islands to expand production from the current 550,000 bbl/d to 750,000 bbl/d by 2015, increasing the oil recovery rate to 70 percent.

The largest onshore oil fields are operated by ADCO. ADCO operates the Bu Hasa oil field, which produces as much as 600,000 bbl/d, as well as the Murban Bab, Sahil, Asab, and Shah oil fields, contributing another 705,000 bbl/d of light, sweet crude. Additionally, two new fields are being developed by ADCO, Qusahwira and Bab oil fields, adding 250,000 bbl/d by 2014. ADCO will also redevelop Bida al-Qemzan field, adding 20,000 bbl/d to its current production of 225,000 bbl/d by the third quarter of 2012. These projects are components of a plan to boost ADCO's aggregate production to 1.8 million bbl/d from its current 1.4 million bbl/d by 2017.

ADMA-OPCO operates the main offshore assets in Abu Dhabi, which have been in redevelopment to maximize output. The Umm Shaif and Lower Zakum offshore oil fields have a capacity of 520,000 bbl/d combined, although after an expansion at each they will have a production capacity of 425,000 bbl/d and 300,000 bbl/d, respectively. Two new oil fields have also come into development: Nasr and Umm al-Lulu. These will add a further 170,000 bbl/d capacity by 2018.

Dubai and Sharjah produce relatively minor amounts of crude oil. Dubai adds 100,000 bbl/d from four separate fields, the older and more abundant Fateh and Southwest Fateh oil fields, with extra production from the Falah and Rashid fields. Sharjah's only significant oil field is the Mubarak field, which produces 60,000 bbl/d. Sharjah-based Crescent Petroleum operated this field for 35 years before handing control to the government in December 2009.

Oil Pipelines

The Emirates have a network of domestic pipelines linking fields with processing plants and ports. There are also inter-emirate pipelines primarily for natural gas injection to increase oil recovery rates in mature Dubai oil fields. There are two pipelines which deliver natural gas to Dubai for injection and use for electric generation: one originating in Sharjah, while the other begins in Abu Dhabi.

The largest export pipeline project in development currently is the Abu Dhabi Crude Oil Pipeline (ADCOP) Project. The International Petroleum Investment Corporation (IPIC) is spearheading the project, along with the China Petroleum Engineering & Construction Corporation (CPECC), a subsidiary of the China National Petroleum Corporation (CNPC). The 230-mile pipeline is scheduled for completion by August 2011 and will transport 1.5 million bbl/d from ADCO's Habshan facility to the Fujairah export terminals. This will allow more than half of UAE's exports to bypass the strategic chokepoint at the [Strait of Hormuz](#).

Exports

In 2009, the UAE exported 2.32 million bbl/d, predominantly to Asian markets. Japan is the main market for UAE petroleum exports, encompassing 40 percent of its export volumes. South Korea and Thailand are the other major destinations for Emirati crude. The Abu Dhabi National Tanker Company (ADNATCO) is the subsidiary of ADNOC responsible for the transportation of petroleum

products. Its fleet includes 2 build carriers and 2 tankers, however it is currently in negotiations to acquire a further 6 tankers and 7 bulk carriers of various sizes.

Fujairah is rapidly expanding its export capability. A second oil terminal, composed of 3 moorings and a new 4-berth facility for tanker bunkering, has been built, as well as storage capacity and a 400,000 bbl/d terminal for refined products and petrochemicals, all of which are expected to be operational before the end of 2012. Due to its location on the coast of the Arabian Gulf, the UAE also has a number of ports for shipping its oil exports.

Export Terminal	Products	Source (Oil Field)
Jebel Dhana	crude oil	Asab, Bab, Bu Hasa, Murban, Sahil Shah
Zirku Island	crude oil	Upper Zakum, Umm al-Dakh, Satah
Das Island	crude oil	Lower Zakum, Umm Shaif
Ruwais	petrochemicals, jet fuel, gas oil	N/A
Umm al-Nar	crude oil, refined products	Bab
Fujairah	crude oil, petrochemicals, refined products	Habshan
Jebel Ali	crude oil, liquefied petroleum gas (LPG), refined products	Fateh, Southwest Fateh, Falah, Rashid

Downstream/Refining

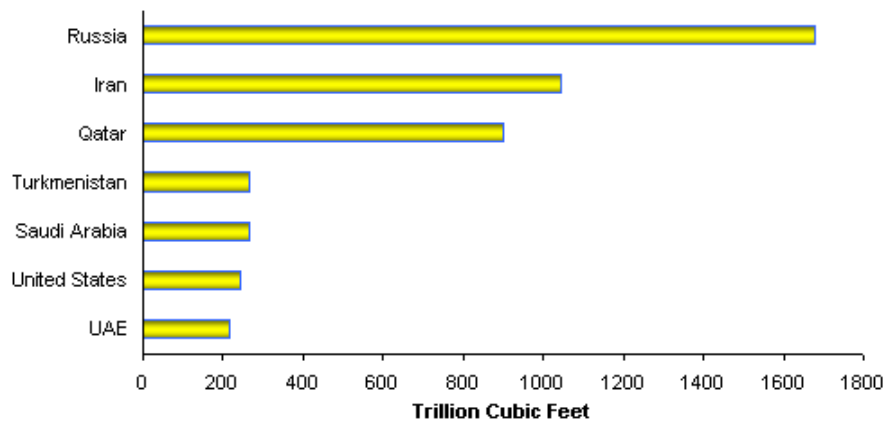
According to *Oil and Gas Journal*, the UAE had 773,250 bbl/d of refining capacity at 5 facilities as of January 1, 2011. The two largest refineries are found in Abu Dhabi – Ruwais and Umm al-Nar – with capacities of 350,000 bbl/d and 150,000 bbl/d, respectively. The third notable refinery is the 120,000 bbl/d Jebel Ali facility, located in Dubai and operated by the Emirates National Oil Company (ENOC). IPIC is also planning a 300,000 bbl/d refinery integrated to the export facilities at Fujairah, although this has been on hold since 2007, when Conoco announced a pull-out from the project.

Natural Gas

According to *Oil and Gas Journal*, the UAE possesses 214.4 trillion cubic feet (Tcf) of proven natural gas reserves as of January 1, 2011, although some industry estimates place it slightly higher at 227.2 Tcf. This amounts to the seventh largest natural gas reserves globally, following Russia, Iran, Qatar, Saudi Arabia, Turkmenistan and the United States. The majority of these reserves are located in Abu Dhabi (198.5 Tcf), with marginal amounts found in Sharjah (10.7 Tcf), Dubai (4 Tcf), and Ras al-Khaimah (1.2 Tcf).

Most electricity generated in the UAE uses natural gas as a feedstock, causing the government to look for ever increasing volumes to compensate for increased demand from economic expansion and high population growth.

**Top World Natural Gas Reserves by Country
January 1, 2010**

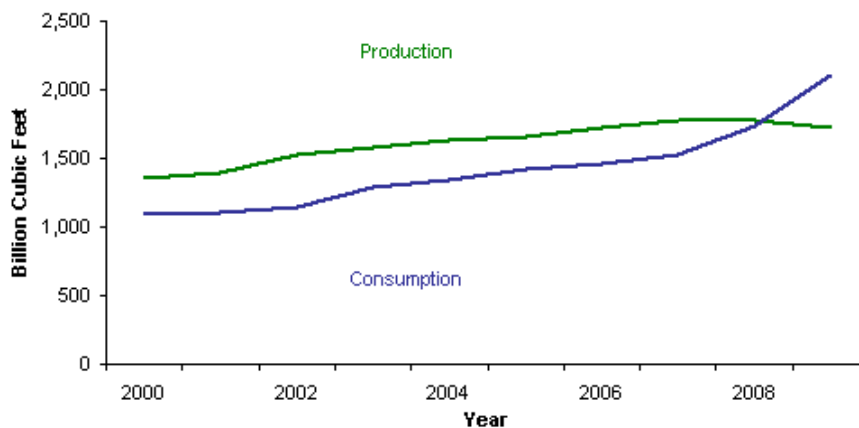


Source: *Oil and Gas Journal*

Exploration and Production

In 2009, the UAE produced 1.865 Tcf of marketed natural gas, which is equal to 5.1 billion cubic feet per day (Bcf/d). In 2007, domestic consumption outstripped production for the first time. Domestic demand for electricity continues to rise, spurred by subsidies. Most electricity generated in the UAE uses natural gas as a feedstock, causing the government to look for ever increasing volumes to compensate for increased demand from economic expansion and high population growth. The reliance upon natural gas for injection into mature oil fields further compounds the strain on natural gas supplies. Despite the UAE's large natural gas reserves, capital costs and high sulfur content present major impediments to development.

UAE Natural Gas Production and Consumption, 2000-2009



Source: EIA

Abu Dhabi Gas Industries Limited (GASCO), a consortium between ADNOC, Shell, Total, and Partex, is responsible for the processing of associated and non-associated onshore natural gas production. Two onshore mega-projects have brought on-line more than 1.5 Bcf/d in the past two years for reinjection into oil fields and other industrial uses. The Onshore Gas Development (OGD) program completed its third phase in 2008, adding 1.2 Bcf/d of associated natural gas from the Bab oil field. A third phase is also set for completion at Asab and Sahil fields by 2012, bringing production there to 450 Mcf/d.

The Integrated Gas Development (IGD) is the largest natural gas project currently in development. GASCO is working with Abu Dhabi Gas Liquefaction Company Ltd. (ADGAS) to develop a new facility at the Habshan oil field, called Habshan-5. The project is based around a new facility at Habshan that will produce 900 million cubic feet per day (Mcf/d), and 124,800 bbl/d of natural gas liquids (NGLs). GASCO also awarded a contract for a fourth natural gas liquid (NGL) train at the Ruwais facility to Petrofac. Much of the gas drawn for the project will derive at the Umm Shaif offshore oil field operated by ADMA-OPCO. GASCO is also pursuing the offshore associated gas (OAG) project, which envisions a further 200 Mcf/d brought onshore from mature oil fields.

Ultra-Sour Gas Projects

In April 2010, ConocoPhillips pulled out of the ultra-sour Shah gas field, leaving ADNOC to go it alone on a project which few analysts believe can be done without an international oil company (IOC) as a partner. Royal Dutch Shell has been mentioned as a suitable replacement for Conoco. The sulfur content is at such high levels that the gas produced will be toxic and highly corrosive, necessitating sophisticated technology to strip the sulfur from the raw gas. The project will provide 1 Bcf/d to UAE's grid, plus associated liquids and sulfur and is forecast to start production in the third quarter of 2014. The government is spending \$1billion to install sophisticated facilities that will convert the volatile sulfur gas into commoditized, granulated sulfur fit for export to international markets.

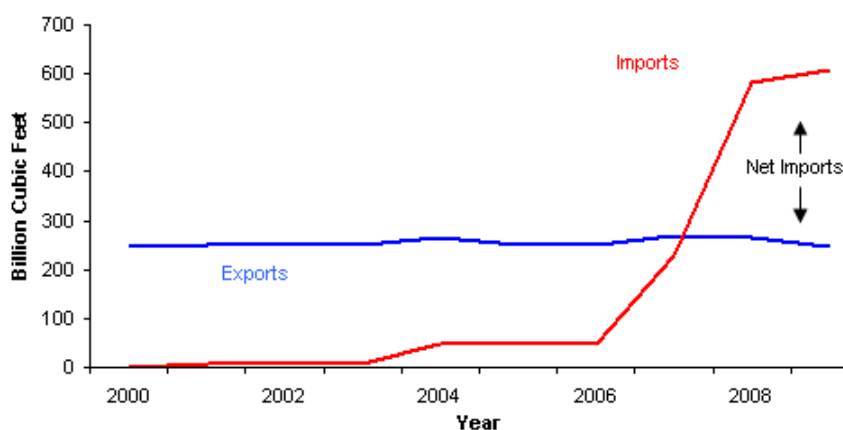
The Bab natural gas field went on tender along with Shah in 2007. Total has recently indicated its interest in developing Bab with ADNOC, as the gas is dryer and more suited to Total's capabilities. Executives at ADNOC have stated that their focus is on Shah currently and do not expect to offer a final tender on Bab until 2015. The Bab project will pipe the resulting natural gas to Abu Dhabi for use as feedstock in electricity generation.

Exports and Imports

In 2009 the UAE exported 248 Bcf of natural gas whereas 609 Bcf (1.6 Bcf/d) were imported. This net deficit of 361 Bcf in natural gas will only continue to widen, unless new supplies are exploited. Despite the difficulties presented by such a concentration of sulfur, the government is advancing natural gas development in order to mitigate the amount necessary for importation and increase its volumes of sulfur exports. Exports are entirely in the form of liquefied natural gas (LNG) from the ADGAS project at Das Island. Imports are both piped and transported LNG, both mainly from

Qatar.

UAE Natural Gas Trade Balance, 2000-2009



Source: EIA

In 2001, Iran concluded an agreement spanning 25 years with Crescent Petroleum to build a subsea natural gas pipeline. This pipeline would deliver 525 million cubic feet per day (Mcf/d) to Sharjah and Dubai and allow some spare feedstock for times of peak electricity demand. Although the project was to come on-stream in 2005 and despite Crescent maintaining its development obligations, Iran refused to proceed without renegotiating the price, which had increased so much by 2005 that the Iranian parliament blocked the start-up. Crescent has announced that arbitration will be sought in the matter.

Liquefied Natural Gas (LNG)

Exports

Natural gas exports are managed by ADNOC subsidiary ADGAS. The UAE set up its first LNG plant in 1977 on Das Island operated by ADGAS. The plant is run on associated natural gas from the Umm Shaif, Lower Zakum and Bunduq oil fields. The National Gas Shipping Company (NGSCO) handles all shipments from Das Island, with a fleet of 8 LNG carriers. Approximately 85 percent of the LNG produced at Das Island is destined for Japan as feedstock for Tokyo Electric Power Company (TEPCO).

Imports

In 2008, Qatar, with its partner Shell, and Dubai agreed to a long-term LNG supply contract. In December 2010, the first of these LNG shipments arrived in Dubai. The shipments of LNG will come from the Qatargas 4 train going forward, which starts production in the first quarter of 2011. The LNG contract with Dubai is valid for 15 years for volumes totaling 146 Bcf per year (400.3 Mcf/d), helping the emirate to meet peak electricity demand.

Dolphin Pipeline Project

The Dolphin natural gas pipeline project, which links Qatar's vast natural gas reserves to UAE and Oman, is the first cross-border pipeline in the Gulf region. Natural gas is imported from Qatar's North Field to Abu Dhabi, Dubai, and Fujairah, where it continues on to Oman. The first natural gas deliveries from Qatar began in 2007. The Dolphin Pipeline System will have an initial throughput of 2 billion standard cubic feet per day (Bscf/d), with a design capacity to supply an additional 1.2 Bscf/d pending negotiations between Dolphin Energy and Qatari authorities. The system itself consists of a 226 mile subsea pipeline from Qatar to processing facilities in Taweelah, Abu Dhabi, where a 152-mile will bring up to 1.6 Mscf/d of gas to two new power stations, including the Qidfa power and desalination facility in Fujairah. The Taweelah-Fujairah pipeline was completed in December of 2010. Oman receives volumes of natural gas from a pipeline from Fujairah, a pipeline through which Oman originally exported natural gas to the UAE starting in January 2004. The pipeline was reversed in October 2008 and now Dolphin provides up to 200 million standard cubic feet per day (Mscf/d) to Oman to supplement domestic production.

Electricity

This need for an expanded grid and greater stability in generation has prompted the increased

The UAE has an electricity production capacity of 18.747 gigawatts, which is strained by a lack of spare capacity at peak seasonal times. However, past service interruptions have been the result of a lack of natural gas feedstock rather than production capacity. This need for an expanded grid and greater stability in generation has prompted the increased development of natural gas, as well as nuclear and renewable energy to diversify sources for electricity production.

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Gulf Cooperation Council (GCC) Grid

The Gulf Cooperation Council (GCC), of which the UAE is a member, faces rapidly increasing demand growth in electricity. As a result, the six Gulf countries of UAE, Kuwait, Qatar, Bahrain, Saudi Arabia, and Oman began a region-wide power grid. The integrated power grids will reduce power outages in the short-term and increase power exchange across seasons and time zones. Gulf countries have been plagued with strained electric grids and prospective shortages of natural gas as a feedstock, as the UAE has no spare power capacity. Phase III of the GCC Grid will connect the Northern System – Kuwait, Bahrain, Saudi Arabia, Qatar – to the Southern System – UAE, and Oman by 2011. Some analysts believe the GCC Grid has the potential to expand into North Africa and eventually linking with Europe's power grids.

In December 2009, the UAE government awarded a \$20 billion contract to Korea Electric Power (KEPCO) to build four nuclear reactors. Each reactor will have a capacity of 1,400 megawatts (MW) and free up domestic gas production for export. The first of the reactors is projected to come on-line in May 2017. The nuclear facilities will be the first in the Arab Gulf region and will provide enough electricity to export to its Gulf neighbors through the newly integrated regional power grid.

The diversification sought by the government in the energy sector extends to large renewable energy projects. These projects include the Shams-1 development project, which will be operated by Total and Spain's Abengoa Solar and a geothermal plant near Abu Dhabi. This project is expected to deliver power to the grid by 2012. Another planned solar project is being negotiated between Masdar, Abu Dhabi's renewable investment firm, and the Abu Dhabi Water and Electricity Company (ADWEC). This solar project will be installed at Noor, Abu Dhabi and will ultimately have a capacity of 100 MW. These projects are a component of Abu Dhabi's plan to generate 7 percent of electric generation from renewable sources by 2020, requiring the installation of 1,600 MW of capacity.

Masdar

The Abu Dhabi Future Energy Company (Masdar) was established in 2006 as a drive to increase the incorporation of renewable and sustainable energy in UAE's economy. Masdar now manages a high-tech cluster which is powered solely by renewable energy. The sustainable focus of Masdar City has allowed the government to market Masdar as the first zero-carbon city on the planet. Located just outside Abu Dhabi, Masdar City is home to the Masdar Institute of Science and Technology, a cooperative effort with the Massachusetts Institute of Technology (MIT) to build a research complex for renewable energy and energy efficiency technologies and engineering. In November 2010, the first residents began moving into permanent housing in Masdar, all of whom are students at the Masdar Institute. These activities have already gained the UAE a prominent reputation in the field of renewable energy. In fact, in June 2009, the newly established International Renewable Energy Agency (IRENA) decided to base its interim headquarters in Abu Dhabi.

Profile

Energy Overview

Proven Oil Reserves (January 1, 2011E)	97.8 billion barrels
Oil Production (2010E)	2.81 million barrels per day, of which 2.3 million was crude oil.
Oil Consumption (2009E)	492,000 barrels per day
Crude Oil Distillation Capacity (2011E)	773,000 barrels per day
Proven Natural Gas Reserves (January 1, 2011E)	214.4 trillion cubic feet
Natural Gas Production (2009E)	1.725 trillion cubic feet
Natural Gas Consumption (2009E)	2.1 billion cubic feet
Recoverable Coal Reserves (2009E)	None
Coal Production (2009E)	None
Coal Consumption (2009E)	None
Electricity Installed Capacity (2008E)	18.5 gigawatts
Electricity Production (2009E)	80.9 billion kilowatt hours
Electricity Consumption (2008E)	70.6 billion kilowatt hours
Total Energy Consumption (2008E)	3.25 quadrillion Btus*, of which Natural Gas (70%), Oil (30%)
Total Per Capita Energy Consumption (2008E)	703.3 million Btus

Energy Intensity (2008E) 18,401 Btu per \$2005-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2008E) 199 million metric tons, of which Natural Gas (60%), Oil (40%)

Per-Capita, Energy-Related Carbon Dioxide Emissions (2008E) 43 metric tons

Carbon Dioxide Intensity (2008E) 1.1 Metric tons per thousand \$2005-PPP**

Oil and Gas Industry

Major Oil/Gas Ports Abu Dhabi: Das Island, Jebel Dhana, Ruwais, Zirku Island, Umm al Nar; Dubai: Jebel Ali, Port Rashid; Fujairah: port

Major Oil Fields Abu Dhabi: 'Asab, Bab, Bu Hasa, Murban, Al-Zakum; Dubai: Falah, Fateh, Southwest Fateh; Sharjah: Mubarak

Major Natural Gas Fields Abu Dhabi: Khuff, Abu al-Bukhush, Bab, Bu Hasa, Umm Shaif, Zakum

Total Refining Capacity 2011 and Major Refineries Abu Dhabi: Ruwais (350,000 bbl/d), Umm al-Nar (150,000 bbl/d); Dubai: Jebel Ali (120,000 bbl/d); Fujairah: Metro Oil (82,000 bbl/d); Sharjah: Hamriyah (71,250 bbl/d) = 773,250 bbl/d

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power.

**GDP figures from Global Insight estimates based on purchasing power parity (PPP) exchange rates.

Links

EIA Links

[EIA – UAE Country Energy Profile](#)

U.S. Government

[CIA World Factbook - United Arab Emirates](#)

[U.S. State Department Background Notes on UAE](#)

[U.S. State Department Consular Information Sheet, UAE](#)

[U.S. Embassy, Abu Dhabi](#)

Foreign Government Agencies

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[Official Portal of Abu Dhabi Government](#)

[Official Portal of Dubai Government](#)

[Abu Dhabi Future Energy Company \(MASDAR\)](#)

[Abu Dhabi National Oil Company \(ADNOC\)](#)

[Abu Dhabi Water and Electricity Authority \(ADWEA\)](#)

[British Petroleum](#)

[Dolphin Energy](#)

[Dubai Electricity and Water Authority \(DEWA\)](#)

General

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