Personal System Essay, Research Paper

PERSONAL SYSTEMS

Location: Dubai, United Arab Emirates.

Personal Systems based on the style of living in Dubai.

Identifying all Inputs and Outputs of daily living and tracing all sources of supply and charting the movement of demands.

United Arab Emirates: Overview

The United Arab Emirates (UAE) is enjoying strong economic growth as a

result of the rise in oil prices which began with OPEC production cuts in

March 1999. While the UAE has a relatively diversified economy for a

Persian Gulf oil exporter, the collapse in oil prices from late 1997 to early 1999 resulted in a decline in real gross domestic product (GDP) of 5.0%. Real GDP growth for 1999 was 9.5%, and it is projected at 10.5% for 2000.

Political System

The UAE is a federation of seven emirates – Abu Dhabi, Dubai, Sharjah, Ajman, Fujairah, Ras al-Khaimah, and Umm al-Qaiwain. Political power is concentrated in Abu Dhabi, which controls the vast majority of the UAE’s economic and resource wealth. The two largest emirates — Abu Dhabi and Dubai — provide over 80% of the UAE’s income.

DEMANDS: Basic

Physical Environment:

- Shelter: Multi storey housing, bungalows, and apartments.

Material Flows:

- Air: Atmosphere.

- Water: Groundwater, Rain water, Seawater (Desalinized).

- Exergy: Air conditioning, cooking, transportation etc.

- Information systems

- Food systems

Explanations:

Water: The sources of water are basically ground water, rain water and natural springs. Drinking water is bottled by various companies that own natural springs like Masafi. Masafi is the a spring in the northern part of the country which supplies bottled water and running water. The ground water reservoir is also quite sufficient. Various de-watering companies pump out the water for construction purposes. The water is then filtered and sold to the Government for running water purposes.

Rain water is also collected and used.

Exergy: There are various sources of exergy. There are electrical appliances, ventilation, air conditioning, transportation (vehicle, air),

Oil refineries, industries and many more.

Information systems: This aspect is provided by only Government means and privatization isn’t allowed. Etisalat is the Telephone company run by the government that provides internet access, telephone access, mobile phone access and fax services. EDTV and Dubai TV provide channels for information and entertainment. There are various companies that give cable access too.

Waste: There is always waste generated through usage of resources.

Input = Output+Waste+Storage.

It is generated in various forms such as heat, pollution, solid waste, liquid waste and compost. There is no evident recycling service available in comparison with N.America. There is no segregation of waste from the end user. It is segregated by the government agency operating waste services. Liquid waste is dumped into the sea by various pipelines. It is first detoxified and then dumped. Solid waste is segregated and sent to compost

Food: The country is basically a desert with mountainous growth. Agriculture is nearly impossible due to extreme climate. Artificial methods have been adopted to grow certain crops. Mostly fruits like Mango, Strawberry, Apples etc are grown. Vegetables are grown too.

But, most of the food is imported. It is imported from India. Wheat and corn are imported from Punjab (state of India). Vegetables and fruits are imported from all over the country. Delicacies and special food items are imported from various parts of the world including Europe and North America. Even Africa provides quite a percentage of imported food. The only staple crop in UAE is date. Palm trees are abundant and they export fine quality dates.

Supply Sources:

-OIL

The UAE contains proven crude oil reserves of 97.8 billion barrels, or slightly less than 10% of the world total. Abu Dhabi holds 94% of this amount, or about 92.2 billion barrels. Dubai contains an estimated 4.0 billion barrels, followed by Sharjah and Ras al-Khaimah, with 1.5 billion and 100 million barrels of oil, respectively.

The majority of the UAE’s crude oil is considered light, with gravities in the 32o to 44o API range. Abu Dhabi’s Murban 39o and Dubai’s Fateh 32o blends are the UAE’s primary export crudes. Most of the UAE’s oil fields have been producing since the 1960s or early 1970s. Proven oil reserves in Abu Dhabi have doubled in the last decade, mainly due to significant increases in rates of recovery. Abu Dhabi has continued to identify new finds, especially offshore, and to discover new oil-rich

structures in existing fields.

Under the UAE’s constitution, each emirate controls its own oil production and resource development. Although Abu Dhabi joined OPEC in 1967 (four years before the UAE was formed), Dubai does not consider itself part of OPEC or bound by its quotas.

In response to the period of low oil prices in 1998 and early 1999, OPEC agreed in March 1999 to reduce output in an effort to shore up the price of crude. The UAE’s production quota was lowered to 2.00 million bbl/d. Actual production fell from a 1999 high of 2.25 million bbl/d in February 1999 to 2.05 million bbl/d in May 1999. After

three rounds of OPEC quota increases in 2000, the UAE quota rose to 2.29 million bbl/d on October 1, 2000. Production in the third quarter of 2000 was 2.27 million bbl/d, and may climb to 2.35 million bbl/d in the fourth quarter of 2000. The UAE’s total capacity is 2.60 million bbl/d, making it second only to Saudi Arabia for excess

production capacity among OPEC member states.

-REFINING

The UAE has two refineries operated by ADNOC. The Ruwais refinery underwent a $100-million upgrade in 1995 to a capacity of 145,000 bbl/d. It produces light products mainly for export to Japan and India. Fuel oil from Ruwais is sold as bunkers by ADNOC and also used for domestic power generation. A $1.2-billion second-phase Ruwais expansion is to include a new 135,000-bbl/d crude distillation unit, a 130,000-bbl/d fractionation plant, and expansion of residual oil conversion facilities with a 40,000-bbl/d hydrocracker and a 36,000-bbl/d visbreaker. ADNOC began processing condensate from the Bab and Asab fields at the fractionation unit in May 2000. When the rest of the project is completed by 2003, Ruwais’ total capacity will be around 415,000 bbl/d.

UAE has four smaller refineries. Umm al-Nar, in Abu Dhabi, with a capacity of 88,500 bbl/d. Since its construction in 1976, the Umm al-Nar plant has undergone debottlenecking as well as a recent expansion. The refinery primarily supplies the domestic market. Metro Oil has a 75,000-bbl/d refinery in Fujairah. The Emirates National Oil Company (ENOC) Jebal Ali condensate refinery, with a capacity of 140,000 bbl/d, began operation in Dubai in May 1999. A 40,000 bbl/d second-hand gasoline unit, owned by the private firm ISO Octane, opened near Jebal Ali in May 2000.

-NATURAL GAS

The UAE’s natural gas reserves of 212 trillion cubic feet (Tcf) are the world’s fourth largest after Russia, Iran, and Qatar. The largest reserves of 196.1 Tcf are located in Abu Dhabi. Sharjah, Dubai, and Ras al-Khaimah contain smaller reserves of 10.7 Tcf, 4.1 Tcf, and 1.1 Tcf, respectively. In Abu Dhabi, the non-associated Khuff gas

reservoirs beneath the Umm Shaif and Abu al-Bukhush oil fields rank among the world’s largest. Current gas reserves are projected to last for about 150-170 years.

Increased domestic consumption of electricity and growing demand from the petrochemical industry have provided incentives for the UAE to increase its use of natural gas. Over the last decade, gas consumption in Abu Dhabi has doubled, and is projected to reach 4 billion cubic feet per day (bcf/d) by 2005. The development of gas fields also increases exports of condensates, which are not subject to OPEC quotas.

-SUPPLYING DUBAI

Dubai’s gas consumption is expected to grow by nearly 7% annually through 2005, due to expansion of the emirate’s industrial sector, a switch to gas by its power stations, and the need for an enhanced oil recovery (EOR) system based on gas injections for its dwindling oil formations. Dubai projects future demand will average 810

Mmcf/d in 2005, with major swings between summer and winter consumption patterns. Currently, Dubai’s entire gas supply comes from fellow UAE member Sharjah, which transports about 430 Mmcf/d at approximately $1.25/million Btu. Amoco operates three fields and the 800-Mmcf/d Sajaa processing facility in conjunction with the

Sharjah government.

A project to pipe gas from the offshore Khuff field to Dubai and the Taweelah industrial complex was abandoned in May 1999. Instead, Dubai will be connected to the main Abu Dhabi gas receiving station by a pipeline.

-ELECTRICITY

The UAE’s soaring demand for electric power, coupled with volatile swings in peak loads, led the Emirates in 1997 to form a Privatization Committee for the Water and Electricity Sector. In early 1998, the committee called for a comprehensive restructuring, including the elimination of the state-owned Abu Dhabi Water and Electricity

Department (ADWED) in favor of sweeping privatization. ADWED will be tranformed into a regulatory body, the Abu Dhabi Water and Electricity Authority(ADWEA). The government plans to take a majority holding in the new ventures with minority interests held by foreign firms. Gradually, the government will privatize its shares through initial public offerings (IPOs), allowing UAE nationals to become shareholders.

TotalFinaElf and Tractebel were awarded a contract by ADWEA in August 2000 for an upgrade to the Taweelah A-1 plant, which will also give a 20% ownership stake to each of the foreign partners, with the rest remaining with ADWEA. The upgrade will bring the capacity of the plant to 1,350 megawatts (MW).

Another step in the reorganization is the expansion of the Taweelah cogeneration facility. The expansion, known as Taweelah A-2, is the UAE’s first independent water and power project (IWPP), and reached financial close in April 1999. It is the second independent power project in the Gulf after Oman’s al-Manah facility. With a price tag of some $800 million, the expansion is to add about 763 megawatts (MW) of power and 50 million gallons of desalinated water to the UAE’s supplies. The first 370-MW came online in July 2000. The rest of the project is scheduled for completion by August 2001. The Taweelah A-2 project is to be run by Emirates CMS Power, a joint venture between CMS Energy (40% ownership interest) and the newly-formed Emirates Power Company (EPC) (60%).

The al-Taweelah Power Company will manage the Taweelah B facility. The plant, which currently has six 122-MW steam turbines and six 13 million gallon-per-day (g/d) multi-stage flash units, is now undergoing a $360 million expansion. The addition of two new gas-turbine units will bring the plant’s capacity to 1,220 MW and 103 million g/d of water. The Umm al-Nar Power Company will operate the plant by the same name with a 1,215-MW, 97-million-g/d facility, which will be upgraded with two new 3.5 million g/d desalination units. The new units will run on steam already available at the site. The company will also operate the 120-MW Baniyas station.

The Abu Dhabi Water and Electricity Authority (ADWEA) currently is soliciting bids, due in January 2001, for the Shuweihat IPP project. The first phase of the project would have a capacity of 1,500 MW, with later additions possibly bringing capacity to 5,000 MW by 2009.

The UAE also is taking part in a $1 billion plan to build a regional power grid throughout the countries of the Gulf Cooperation Council (GCC). The first phase of the plan would link Saudi Arabia, Kuwait, Bahrain and Qatar; the UAE and Oman would join the grid in the second phase of the plan. GCC electricity ministers signed a final agreement on the project in June 1999. The plan is based on the assumption that each country will have its own unified power grid, and the UAE is doing its part by connecting all the power stations along its western coast with the central region.

ENERGY OVERVIEW

Proven Oil Reserves (1/1/00E): 97.8 billion barrels

Crude Oil Production (3rd Quarter of 2000E): 2.27 million bbl/d

OPEC Crude Oil Production Quota (10/1/00): 2.29 million bbl/d (for whole UAE)

Oil Consumption (2000E): 321,000 bbl/d

Net Oil Exports (2000E): 2.0 million bbl/d

Major Crude Oil Customers (2000E): Japan (60%), other Far East (20%)

Crude Oil Refining Capacity (1/1/00E): 428,500 bbl/d

Natural Gas Reserves (1/1/00E): 212 trillion cubic feet (Tcf)

Natural Gas Production (1998E): 1.31 Tcf

Natural Gas Consumption (1998E): 1.07 Tcf

Natural Gas Exports (1998E): 0.25 Tcf

Natural Gas Imports (1998E): 0.02 Tcf

Electric Generation Capacity (1/1/98E): 5.5 gigawatts

Electricity Production (1998E): 20.1 billion kilowatthours

ENVIRONMENTAL OVERVIEW

Total Energy Consumption (1998E): 1.8 quadrillion Btu\* (0.5% of world total energy consumption)

Energy-Related Carbon Emissions (1998E): 31.3 million metric tons of carbon (0.5% of world carbon emissions)

Per Capita Energy Consumption (1998E): 670.3 million Btu (vs. U.S. value of 350.7 million Btu)

Per Capita Carbon Emissions (1998E): 11.5 metric tons of carbon (vs. U.S. value of 5.5 metric tons of carbon)

Energy Intensity (1998E): 46,300 Btu/ $1990 (vs U.S. value of 13,400 Btu/ $1990)\*\*

Carbon Intensity (1998E): 0.8 metric tons of carbon/thousand $1990 (vs U.S. value of 0.21 metric tons/thousand $1990)\*\*

Sectoral Share of Energy Consumption (1997E): Transportation (50.4%), Industrial (48.5%), Residential (1.1%)

Sectoral Share of Carbon Emissions (1997E): Industrial (63.6%), Transportation (34.5%), Residential (1.9%)

Fuel Share of Energy Consumption (1998E): Oil (38.4%), Natural Gas (61.6%)

Fuel Share of Carbon Emissions (1998E): Natural Gas (54.0%), Oil (46.0%)

Renewable Energy Consumption (1997E): 0.71 trillion Btu\* (3% decrease from 1996)

Number of People per Motor Vehicle (1997): 9.7 (vs. U.S. value of 1.3)

Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified December 29th, 1995).

Not a signatory to the Kyoto Protocol

Major Environmental Issues: Lack of natural freshwater resources being overcome by desalination plants; desertification; beach pollution from oil spills

Major International Environmental Agreements: A party to Conventions on Climate Change, Desertification, Endangered Species, Hazardous Wastes, Marine Dumping and Ozone Layer Protection. Has signed, but not ratified, Biodiversity and Law of the Sea

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar and wind electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 1998

-OIL AND GAS INDUSTRIES

Organizations: Abu Dhabi National Oil Company (ADNOC); Operates three main oil and gas operating companies, five Service companies, three joint ventures to fully utilize the produced gas, two maritime transport companies for crude oil, refined product and LNG and one refined product distribution company.

Major Refineries: Ruwais (145,000 bbl/d), Emirates National Oil Company (ENOC) – Dubai (120,000), Umm al-Nar (88,500 bbl/d), Metro Oil (Fujairah)(75,000 bbl/d)

Major Gas Processing Plants: Bab, Bu Hasa, Das Island, Habshan (2), Jebel Ali, Ruwais

Major Oil Fields: Abu Dhabi: ‘Asab, Bab, Bu Hasa, Al-Zakum Dubai: Fallah, Fateh, Southwest Fateh, Margham, Rashid Sharjah: Mubarak (near Abu Musa Island)

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

Ports: Abu Dhabi: Das Island, Delma Island, Jebel as Dhanna, Ruwais, Abu al Bukhush, Al Mubarraz, Zirku Island, Port Zayed, Umm al Nar Dubai: Jebel Ali, Fateh,

Port Rashid Sharjah: Mubarak

Sources:

http://cdiac.esd.ornl.gov/trends/emis/uae.htm

http://www.eia.doe.gov/emeu/cabs/uae.html

www.tradeport.org/ts/countries/uae/isa/isar0007.html

http://www.converger.com/eiacab/uae.htm

Bibliography

Sources:

http://cdiac.esd.ornl.gov/trends/emis/uae.htm

http://www.eia.doe.gov/emeu/cabs/uae.html

www.tradeport.org/ts/countries/uae/isa/isar0007.html

http://www.converger.com/eiacab/uae.htm