



UN-ESCWA

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Energy, Energy Efficiency, & Renewable Energy.
In Escwa Region

By
Eng. Abdul Halem Kassem





- As is known the **ESCWA includes Arab countries located in western Asia (12 countries) as well as Egypt and Sudan** in eastern Africa with a population about 250 million person (3.3% of the world population).
- This region is considered one of the richest regions in the world **with oil reserves (86 billion tons, 47% of total world reserves) and natural gas (44 billion tons oil equivalent or about 26% of the total world reserves)** according to 2009 statistics.

Most of these reserves are concentrated in the countries of the Arabian Peninsula in which:

- The lands are mostly desert
- There are no rivers
- Rain is scarce
- There is little vegetation
- low Population density
- Foreign Migrant workers out number local people in some countries such as Kuwait, UAE, and Qatar.

- They have a higher personal income in comparison to the neighboring countries.
- The economies of these countries depend on the export of oil and gas and a large portion of the revenues are used to develop other economic sectors.
- Temperature degrees are very high in these countries most of the year which causes heavy usage of air conditioning systems, which in turn puts high stress on the power grid.

- In the other countries apart from those in the Arabian Peninsula we can see:
- A high density of population
- Limited oil and gas reserves in Syria and Egypt
- No reserves at all in other countries like Jordan, Lebanon, and Palestine
- In Sudan electricity covers only 30% of population and there is low consumption 144 KWH per capita, while in Yemen 50% of the population has electricity of 202 KWH per /capita. In all other countries in the region 100% of the population is covered by the power grid. The average consumption is over 2000 KWH per/capita.

Reserves, Production, Consumption, and Exportation of Energy. 2009

Oil



2009	Population 1000000	Proved Reserves Billion tones	Production Million tones	Consumption Million tones
Iraq	31.5	15.5	122	–
Kuwait	3.5	14	121	19.2
Oman	3	0.8	38.5	–
Qatar	1.7	3.8	58	8.2
Saudi Arabia	25.6	36.3	460	121.8
Syria	20	0.34	19	21.8
United Arab Emirates	5.2	13	121	–
Yemen	22.8	0.4	14	–
Egypt	76	0.6	37	33.7
Sudan	39.2	0.9	24.5	–
Other Escwa	16.8	0.05	1.7	81.7 *
Total Escwa	244.3	85.6	1013	313.4 *
The World	6750	181.7	3820	3882

Note: * without Sudan

- Reserves: 85.6 billion tons or 47% of the World .
- Production: 1013 million tons or 26.5 %.
- Consumption: 313.4 million tons or 8% of world consumption.
- 700 million tons of oil are exported from the region, constituting 37% of world oil exports

Natural Gas



	Proved Reserves Trillion m ³	Production Billion m ³	Consumption Billion m ³
Iraq	3.17	N.A	
Kuwait	1.78	12.5	13.4
Oman	0.98	24.8	
Qatar	25.37	88.3	21.1
Saudi Arabia	7.92	77.5	77.5
Syria	0.28	5.6	6.4
United Arab Emirates	6.43	48.8	59.1
Yemen	0.49	N.A	
Egypt	2.19	62.7	42.5
Sudan	N.A	N.A	
Other Escwa	4.5 *	17.3 *	42.9 *
Total Escwa	48.76 *	338.7 *	256.6 *
The World	187.5	2987	2940.4

Note: * without Sudan

Billion m³ = 0.9 Mtoe (Million tone oil equivalent).

Reserves: 48.8 trillion cubic meters or 26% of world reserves

Production: 338.7 billion cubic meters or 11.3% of world production

Consumption: 256.6 billion cubic meters or 8.6% of world consumption

Export: 86.5 billion cubic meters or 9.9% of global exports

Generated Electricity (GWh) and Efficiency (average) 2009



	GWh	Eff=%	Fuel Consumption In Elec.Sector Mtoe	Elec. Losses %
Iraq	46063	–	10	43
Kuwait	53216	30.2	14.68	12.4
Oman	14576	–	4.55	25.2
Qatar	21616	–	10 *	–
Saudi Arabia	217082	31.1	51.58	11
Syria	43308	36.2	9.3	25
United Arab Emirates	86250	–	29.55	–
Yemen	4994	31.5	2.17	31.2
Egypt	131040	38%	24.9	14.7
Sudan	6372	29	0.27	21.1
Jordan	14272	35.8	3.44	17.5
Bahrain	12056	27.1	3.8	15.5
Palestinian	300	–	0.1	–
Lebanon	10293	–	2.17	–

Note: * evaluation.

Primary Energy



	Population 1000000	Proved Reserves GTOE	Production MTOE	Consumption MTOE
Iraq	31.5	15.5	122	—
Kuwait	3.5	14	121	19.2
Oman	3	0.8	38.5	—
Qatar	1.7	3.8	58	8.2
Saudi Arabia	25.6	36.3	460	121.8
Syria	20	0.34	19	21.8
United Arab Emirates	5.2	13	121	—
Yemen	22.8	0.4	14	—
Egypt	76	0.6	37	33.7
Sudan	39.2	0.9	24.5	—
Other Escwa	16.8	0.05	1.7	81.7 *
Total Escwa	244.3	85.6	1013	313.4 *
The World	—	181.7	3820	3882

Note: * without Sudan

Primary Energy Consumption and Production



	Population 1000000	Consumption MTOE	Consumption TONE/ capita	Total Production Oil+ Gas +Hydro MTOE	Consumption Production %
Iraq	31.5	–	–	123 *	–
Kuwait	3.5	31.3	8.94	140.2	22.3
Oman	3	–	–	63.3	–
Qatar	1.7	27.2	16	146.3	18.6
Saudi Arabia	25.6	191.5	7.5	537.5	35.6
Syria	20	24	1.2	24.6	97
United Arab Emirates	5.2	75	14.4	170	44
Yemen	22.8	–	–	14 *	–
Egypt	76	76.3	1	104	70.5
Sudan	39.2	–	–	25.3 *	–
Other Escwa	16.8	–	–	–	–
Total Escwa	244.3	530.5	2.17	1447.2	37
The World	–	1164.3	1.65	11275	99

* Without sudan

- Hydroelectric generation: 6 million oil ton equivalents or 0.8% of world production
- Renewable energy sources: 0.25 million oil ton equivalents
- Small portions of biomass are used in a primitive manner
- No nuclear energy is used in the region

- The total primary energy that is produced is 1447 MTOE which constitute 13% of world production.
- The total consumption of primary energy in the region is 530 MTOE or 4.7 of world consumption and 37% of the total production for the countries in this region
- The average consumption growth for the region is very high and it reached 62% for the period between 1999 – 2009 with a yearly average of 5%

- Saudi Arabia's growth was 70% over 10 years with a yearly average of 5.5%
- 6% yearly average for UAE
- 5% yearly average for Kuwait
- 6.7% yearly average for Qatar

- Saudi Arabia has the second biggest reserves of oil in the world in addition to sizeable gas reserves.

If the increasing demand continues at the same rate that it has increased over the last ten years and no steps are taken to increase energy efficiency (by using alternative energy for instance), Saudi Arabia will be forced to stop exporting oil (which is considered the mainstay of their economy) by 2030 and its reserves of oil and gas will be depleted by 2060.

- For this reason all the countries in this region, especially the Gulf countries (GCC) should invest a great portion of their oil export revenues to build advanced systems of renewable energy plants, increase the efficiency of energy usage, and to rationalize the use of energy.

There are many ways of increasing energy efficiency in the ESCWA region such as:

1. Thermal insulation as 70% of electricity goes to air-conditioning systems in the Gulf countries.
2. Making greater use of public transportation and smaller, more fuel efficient cars
3. Increasing the efficiency of generation plants.
 - ✓ Thermal power plant need about 200 MTOE/year.

- ✓ The average efficiency of the power plants in the ESCWA countries is currently low (less than 32%).
- ✓ Some of the plants exceed 40% efficiency (combined cycle).
we can save (40 MTOE/year) by increasing the efficiency from 20% to 40%.

4. Increasing the efficiency of appliances used in buildings, especially air conditioning and water heating systems (the peak of load in a country such as Kuwait reaches 10000 MW in summer and 3000 MW in winter).
5. To benefit from the climate differences between the countries of the northern and southern countries of the region on one hand, and the eastern and western countries on the other, and to extend the electrical connection between the HV power grids

6. Reducing the electrical losses to a reasonable limit. Losses of only 10% will be saved from primary energy equal to:
 $(16.3-10)*200/100=11$ MTOE in 2009.
7. Raising the level of public awareness for all of the citizens with a special focus on students
8. A pilot project in energy auditing and increasing energy efficiency should be executed.

9. Restructuring the energy Prices and tariffs

so that it is sold at production cost according to the world fuel prices.

Saudi Arabia consumes 2.5 times the amount of energy that Egypt consumes although the population of Egypt is three times that of Saudi Arabia.

Most of the ESCWA countries sell their oil derivatives and electricity to their citizens at very cheap, and subsidized prices.

Renewable Energy



- The sunshine covers the ESCWA countries for an average of 4,000 hours per year.
- A square meter receives 2000-3000 KWH per year.
- Some ESCWA countries have areas that are promising for wind energy.
- Water resources have been exploited to a large extent (at more than 95%) in Egypt, Syria, and Lebanon. There is a potential for more hydro-generated electricity in Sudan and Iraq.

- Egypt is the only country that established a wind farm projects (550 MW capacity and 1000 GWH generated).
- There are also small wind projects in Syria, Lebanon, and Bahrain.
- Syria announced carrying out a 50 MW wind farm as well as two other projects of 100 MW each for the private sector on the basis of BOT.
- Studies have been prepared to measure the winds in various countries however there is a need for more studies and measurement.

- A factory has been built for photovoltaic panels capable of producing 15 MW per year.
- Currently a pilot project is being carried out with a capacity of 1 MW.
- A private investment factory under construction for producing and assembling windmills with a production capacity of 180 MW per year. Production will begin soon.
- Solar water heaters have spread widely throughout the countries of the region. There should be even more widespread use of these heaters and there should be more government incentives for their use.

- Some countries in the ESCWA region have strategies to meet 20 percent of their energy demands from renewable sources.
- Egypt plans to reach this percentage in 2020 and other countries hope to reach this same goal by 2030.
- The countries in this region aim to strengthen the cooperation and coordination between themselves through the Arab League by putting in place a comprehensive plan to expand the electrical grid and to raise the level of energy efficiency.
- The U.A.E. aims to accomplish an important project (Green City) with Masdar (a private corporation).

- The majority of the ESCWA countries founded research centers for renewable energy. They have established and continue to found pilot projects. They have issued legislation and regulations to encourage the use of renewable energy.
- In reality, if the Gulf countries have the willingness and conviction to benefit from renewable energy, the results will be positive and quick since these countries possess ample money and open markets and the investment atmosphere is very encouraging. The U.A.E. aspired to host international agencies.
- There is still a need for more legislation, for technical assistance from more advanced countries, and for special facilities.

Recommendations



- Strengthening the cooperation between the 5 committees of the U.N. (holding joint meetings, conferences, and workshops).
- Publishing and evaluating the results of studies and research
- Recommendation to focus on studies on developing thermal insulation and its techniques and materials.

- Development of solar powered air conditioning systems
- Suggestion to the U.N., the international organizations and the wealthy countries to allocate funds to support processes to raise energy efficiency and to develop renewable energy resources and to carry out pilot projects and encourage research in these areas.

Thank you