



University of Thi -Qar

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PETROLEUM ENGINEERING ECONOMICS (I)

(Lecture 4)

Lecturer

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Oil reserves

Oil reserve: represents the amount of oil and natural gas inventories in the oil fields or represents the volume of oil and natural gas, which has not been brought out from the earth.

The subject of estimating oil reserves one of the core issues to determine the possibility of exploiting oil wells according to the prevailing conditions economically and technically.

Methods adopted in estimating oil reserves are classified as follows:

First: Classification on the basis of the degree of confidence in the estimates

According to this classification the oil reserves can be divided into three sections which shown in below:

1. Proven oil reserves (certainly):

This reserve represents the amount of crude oil their makes their presence sure incised, through the information available engineered and geology, so that it can be extracted in accordance with the technical and economic prevailing conditions.

Where Iraqi proven oil a reserve in the past was estimated about 115 billion barrels, but in recent years Iraq's oil reserves become are estimated at more than 145 billion barrels of oil as a result of new studies and modern techniques that have been used.

2. Probable oil reserves

This is the kind of reserve quantities that have been discovered and is probably to enter production stage depending on the conventional

techniques. This reserve is technically known quantity but unknown economic cost to extract it.

Where the Iraqi oil reserves up to 500 billion barrels in 2010 while it was up to 230 billion barrels in the previous year. This type of reserve can be divided into, **two types** as follows:

- A. Oil field sectional that cannot be accessed, so it cannot enter in the process of oil production, However depending on the- special methods (such as activation field operations or field processing with sophisticated equipment, especially for the production).
- B. Isolated fields which are inadequate of economic returns, either because of low production capacity or because of the type of crude oil located where (such as heavy oil).

3. Possible oil reserves;

These reserves are not yet been to exploration, but we can assume that its presence with a reasonable degree. These reserves are located in areas that previously discovered oil or in areas with geological nature similar to other areas where oil was discovered.

Second: Classification on the basis of the degree of oil well development

This type of classification based on proven reserves only and it can be divided into two types as shown below:

- 1. Proven oil reserves development: expected crude oil extraction according to the technical and economic prevailing conditions.
- 2. Proven oil reserves not development: a defending as crude oil which can be extracted through a process of deepening the existing wells

and production facilities as well as doing through high investment costs.

Base oil reserves

Base oil reserves are characterized as not static fixed value, but being dynamic effective changed value depending on the level of technology and economic prevailing conditions. This is depending on the size of investment and the prevailing price levels. or this there is no boundary between the types of reserves (the length of time , changes in demand, technological change, and economic conditions), which it can be convert the probable oil reserve to proven oil reserve.

Previous studies showed that Iraq has reserves that make it the owner of the longest lifespan of the oil reserves in the world where as much as more than 165 years, according to statistics for 2006 which is the longest lifespan in the world.

Demand for oil

Oil does not consume as crude nor did the energy generated unless undergo refining operations and then conversion to energy. Crude oil is a raw material and will become the volume of consumption of energy as reflects to level of economic development of the country with variations in the proportion of energy consumption between the country and the industry with other.

Factors affecting the demand of crude oil:

- 1. The demand for energy, especially oil associated to the level of overall economic activity in the country. Also to the growth rates of the economy and income levels.**

2. **Price of energy itself and in particular the prices of oil products, which include a great deal of consumption taxes, which amount in the Europe countries about .%70**
3. **The exchange rate of the dollar and its impact on oil prices, with the effects of climate and speculation.**
4. **The production of OPEC and its oil policy, also the strategic storage of oil in the world.**
5. **National production level of the country, taking into account the average income and energy prices.**
6. **Energy consumption laws, with taking into account the population growth in the countries.**
7. **Energy consumption patterns and the expected about the future of the oil markets.**

Oil investment patterns

Oil investment represents the style or method by which the exploitation of the oil wealth was happened in the time and place designated by a group of investment o: companies working in the oil industry

Oil and gas industry trial a range of investment styles as shown below, according to their historical development:

- 1- Oil privileges (classical) investment.**
- 2- Participation or equal sharjng profits.**
- 3- Oil contract.**
- 4- National direct investment.**
- 5- Participation and ownership of total oil.**

1- Oil privileges (classical).

This type is one of the classic patterns of the oil investment which has been prevalent in the Arab region since the period beginning from the twenties-until the end of the sixties. This type was known as the first oil investment patterns, which is a continuation in the period and the concession period may be reach up to 75 years, this type of investment regards as more types (monopoly)and utilization of the oil wealth for the countries.

2- Participation or equal sharing profits

This type of investment depends on the participations of oil-producing country, which may start work in the Arab region in the period of the fifties and depends on the equally profits with the signature country of the contract and duration limits (25 years) after the discovery of oil.

Oil companies bear the benefits of the government signed the contract from the taxes and fees, and it is possible that the percentage of profits reach to about 75%, as well as the foreign party shall bear the prevision of the necessary funds to finance the operations and development of the discovery of oil fields.

3- Oil contract

This type of investment began to work by the country after the nationalization of oil movements that took place in some oil producing countries. This pattern depends on the oil country in order to share of oil revenues (cash returns, crude oil, and investments).

This type is considered as a contract and service contract in the same time, the period up to 20 years and brings great benefits to the oil countries,

where the characteristics bear all financial burdens resulting from the exploration the oil.

4- National direct investment

This type of investment depends on the government through its oil companies in order to exploit the oil wealth of the country independently and therefore all proceeds will go back to the country, this investment has achieved a range of economic and political benefits, including:

- 1- Total ownership for each activities of the oil industry.
- 2- Make oil in the service of the oil country's development process of economic, social and political.
- 3- Disposal of corporate control of the world's oil monopoly.
- 5- Participation and ownership of total oil.

This type-of investment depends on the regulate the relationship between the oil-producing countries and foreign companies, which have been worked by some countries,

the Arab Gulf countries were beginning in the seventies of the last century

Participation has many positives as possible benefit from the expertise and technology as well as provides protection for price stability and also the gradual transfer of ownership of the oil industry, where governments that rely on this pattern transfer of ownership of oil to governments and total possess of all assets, but keep the companies operating in the same country as it currently working now.

Estimate the cost of extracting a barrel of crude oil in Iraqi fields

The importance of Iraq's oil at the local, regional and global Iraq has a great importance at the local, regional and international for many reasons, which shown below:

1- Locally crude oil and revenue represent the main source of income in Iraq also the main financier of budgets as well as Iraq relying on inputs in foreign currency which determines the other economic activities.

2- The regional and international, Iraq to acquire much attention from the major world's oil companies, because there are great investment opportunities in the oil sector as well as the geo-strategic importance of Iraqi oil in the energy accounts for the major industrialized countries.

Features of Iraqi oil

Iraq occupies an advanced position among the most reserves in the world, their ranks third in the world and to the fact that oil exploration in Iraq have been stopped since the eighties and that 50% of the oil fields not being evaluated yet, since many areas not including such as Western desert, which is believed the presence of large reserves, as well as the northern, and East areas of Iraq.

Iraq's reserves were estimated according to the two-dimensional seismic surveys as well as unrest in Iraq and the migration of many of the experiences and minds of the Iraqi after 1991 all thus led to the collapse of the infrastructure for the oil sector. But after 2003, new surveys using modern technology has led to/ significant additions in the amounts of reserves in the Iraq.

Iraqi oil fields as possible can be divided into three types according to the stages of _implementation and evaluation of exploration and production, as shown below:

1- discovered and producing fields:

This fields, owns oil reserves have been developed, and production actually within the level of development technology and facilities available in the country. Where there are about 28 products field, which including 16 in the southern region and the rest in the northern regions.

These fields are suffering from a reduction in the quantities 'of reserves as a result of continuous output, example: Btmih field in Nineveh only left about 2.6% of remaining in some oil reservoir, for Ain Zala the proportion of the remaining are either up to 20.4%, in the greater reservoir drain process rates are medium where the remaining reservoirs in Kirkuk, up 43% from the original and the reserve for Zubair and Rumaila south fields is closer to 44% for both fields.

2- Discovered and undeveloped fields.

These fields represent fields that are in the process of evaluation before the actual production processes, and possess certain combinations of geological its proximity to crude oil reservoir, but the specifications are not known, as shown in the first type, Iraq has own from this kind of field up to 45.

3- Possible fields

It has the fields that are uncertain reserves but potentially the presence of oil because it is located in an area adjacent to an oil field, also it expected to increase the size of these fields by the completion of operations research and exploration of the Iraqi areas, where the geological studies indicate that about one-third of the total Iraqi area has not been explored so far.

*** Advantages of Iraqi crude oils**

The most important advantages that made the Iraqi oil occupy a respected position among the world countries:

A- natural or geological features:

- 1- Vacancy Iraqi territory from earthquakes.**
- 2- Prolific Iraqi oil wells as well as shallow the Iraqi oil is characterized by being close to the surface unlike many countries in the world that are big depths of the sea or the earth's surface.**
- 3- The quality of Iraqi oil as well as its geographical location.**
- 4- Easy exploitation of the giant fields discovered to its existence near the earth's surface as well as the lack of risk in exploration.**

Diversity of Iraqi oils between very heavy to very light oil note that most of light oil.

B- Economic benefits

- 1- Large oil reserves of Iraq (and certainly or uncertain reserves).**
- 2- Increase and growth of Iraqi oil production volume.**
- 3- Lower cost of production, which is as least in the world, which amounts to almost less than 10\$ per barrel, compared with the cost of oil production, which may range between (\$ 11-25) in the areas of the North Sea and the United States.**

The costs of exploratory drilling operations in Iraq up to (\$ 6- 10 million) and very few places in the world compared to up to ten times this amount.

4- Investment in Iraqi oil yield big returns and this attracts investment companies for needs (\$ 4-5 million) extra for the purpose of development, and these costs Iraq.

5- The hypothetical age of the Iraqi oil reserves is very high and that up to more than 160 year.

A series of activities related to the oil industry

- 1- Activities for research and exploration.
- 2- Activities relating to the fields development and prepare for production.
- 3- Activities related to the special development expenses fields.
- 4- Example of estimating the cost of a barrel for crude oil in the fields of al- Zubair and West Qurna (2).

1- Activities for research and exploration.

Expenses spent on productive areas of crude oil are capital expenditures. The cost spent for non-productive areas considered, as current expenses necessary, for research and exploration stage, which represents the total geological and geophysical operations expenses for the geological survey and sampling of the ground and analysed for the purpose of confirming the presence of crude oil.

2- Activities relating to the fields development and prepare for production.

This type of expenditure represents multiple accounts which are requiring installation this accounts and it can be seen below:

A- Business account under .construction (drilling, well equipped, machinery and other buildings).

B- Running days of the rig as well as the number of feet that have been drilled for each well.

C- Calculating the days in which they are drilling each well and s pending per well.