UNDERSTANDING AND INVESTING IN OIL AND NATURAL GAS DRILLING AND PRODUCTION PROJECTS

PETROLEUM, LLC

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Chapter 1

Introduction to Oil and Gas

The purpose of this book is to educate potential investors on the fundamentals of oil and gas investment opportunities as it pertains to both drilling and production projects. In addition, it's designed to assist you in evaluating the inherent risk of any oil and gas opportunity. Its scope includes: the geology of oil and gas deposits; where and how they are found; the history of exploration technology; mineral rights leasing; the significance of the deal structure; and a little-known formula that will help you evaluate your ROI based on estimated production.

The economies of all industrialized and emerging nations depend on petroleum resources - not only for transportation but for thousands of products we all use on a daily basis. Together, oil and natural gas allow us unprecedented mobility, help generate our electricity, and are used to produce everything from fertilizer to synthetic clothing to product packaging and countless other items. Most oil is now used to create fuel for automobiles and airplanes, accounting for almost 57 percent of the total world oil consumption. More than half of the U.S. population depends on natural gas to heat their homes while 16 percent of our electricity comes from using natural gas to fire generators. Each year, more and more fuel is needed for the ever-increasing global transportation needs and the demand for natural gas climbs as more and more homes are built. As a result, the demand for both fuels continues to increase. An abundant supply of oil and natural gas remain vital in helping us and the industrialized countries of the world sustain their prosperity and way of life.

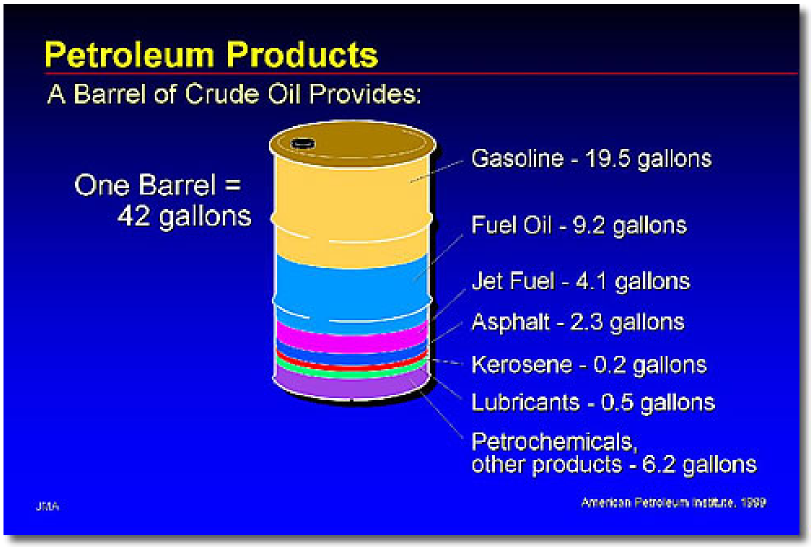
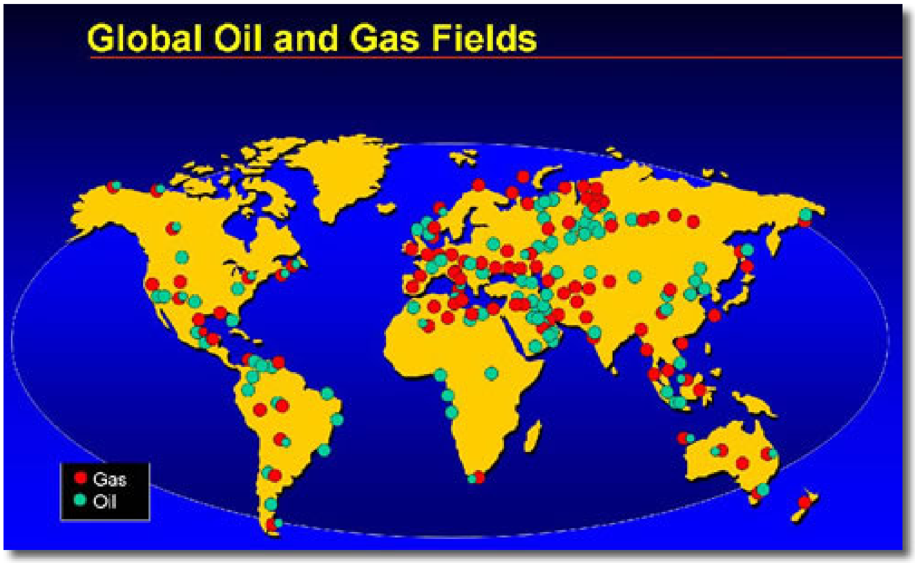


Chart courtesy of Earth Science World and Exxon-Mobil

Global Oil and Gas Outlook

Oil has been discovered on every continent and is produced in more than 100 countries today. In 2006, the ten top oil-producing countries were, in order: Saudi Arabia, Russia, United States, Iran, China, Mexico, Canada, United Arab Emirates, Venezuela, and Norway. The United States Department of Energy estimated world oil production at 24 billion barrels in 2002 produced by over 830,000 oil wells with more than 520,000 of those wells located in the United States. On average, an oil well in the United States produces only eleven barrels a day compared to hundreds or thousands of barrels a day in other countries such as Russia and Saudi Arabia. The U.S. Energy Information Administration predicts world natural gas consumption and production will increase by more than 50 percent from 2005 through 2030. As China's economy grows 6.4 percent annually, Asia is expected to become the world's number one natural gas consumer, taking over that spot from North America.



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Chapter 2

Oil and Natural Gas Formation

Oil and natural gas are products of plant and animal remains or organic material. For the most part, these plants, corals, and animals lived in seas. Over millions of years, the remains settled on the ocean floor together with sediment which washed down from exposed earth and rock. This sediment may have ranged in size from molecules that dissolve in water to small boulders. In later periods, these layers of organic material and sediment were covered by more sediment which, as a result of time and pressure, converted to layers of sedimentary rock. To get a clearer picture of how this process occurred we need to understand some geological history.

The earth is believed to have formed some 4.6 billion years ago from a cloud of cosmic dust and ice. As the planet pulled itself together by gravity, compressing matter ever more densely, it became molten. The heaviest components, such as nickel and iron, sank to the center to form the planet's core while the lighter materials, including silicon, aluminum, magnesium and other light elements, solidified into a thin rocky crust. Water vapor moved to the surface to form oceans.

Over time the earth's crust has become thicker and more stable. Today, the planet can be viewed as a system of plates that fit together like a puzzle, which slowly move and change shape.

Pangaea

During the Permian Period 225 million years ago, the world's continents were still connected together in a single super continent called Pangaea. As the sequence of maps on the following page illustrates, Pangaea fragmented into several pieces, each piece being part of a mobile plate of the earth's outer crust called the lithosphere. These pieces later became earth's current continents. The time sequence shown through the maps reveals how the continents arrived at their current positions.

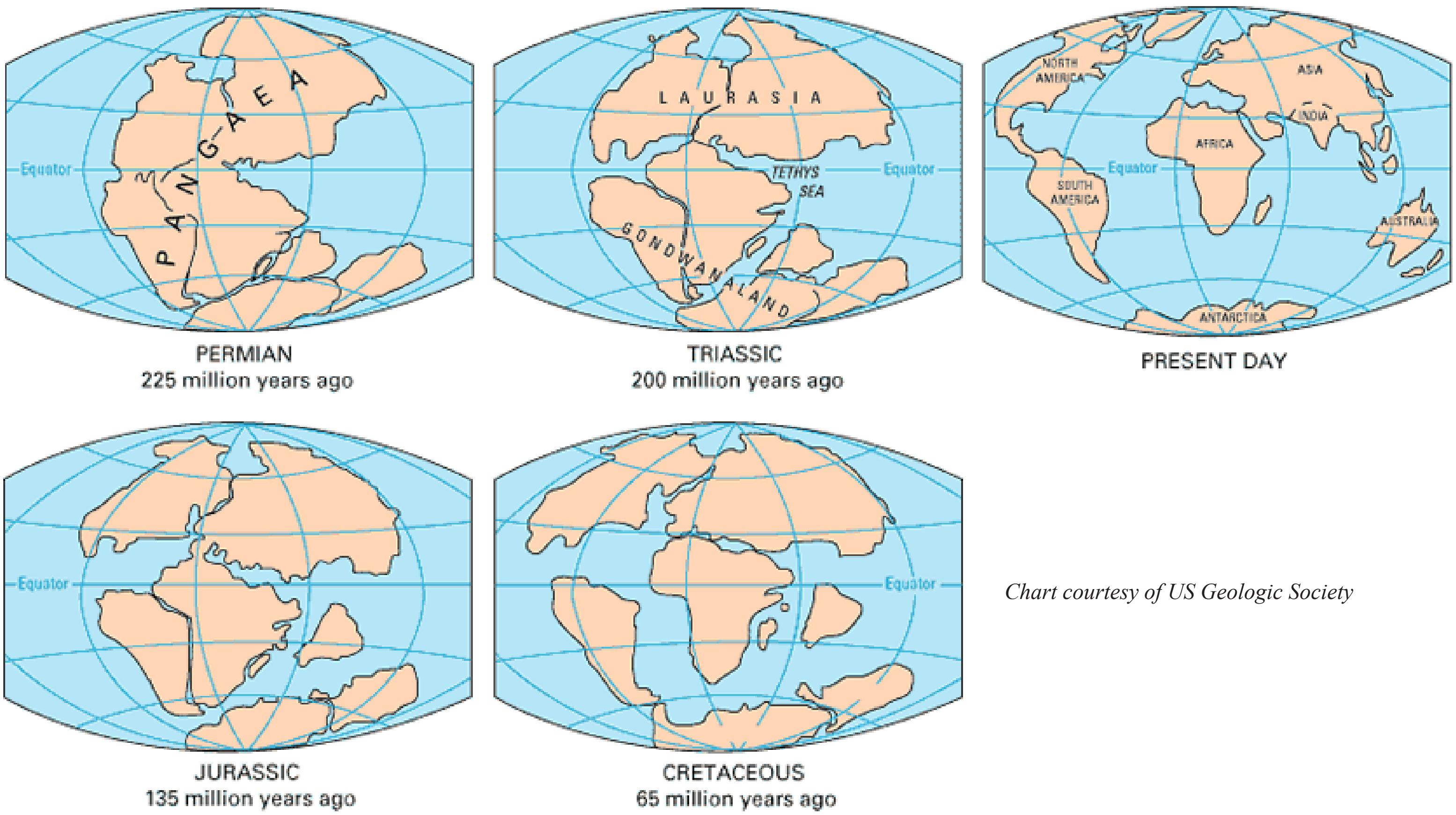

Chart courtesy of US Geologic Society

Throughout this 225 million year period, the continents and oceans experienced additional changes. As the earth's plates moved against one another, the forward or leading edges either lifted up on top of the next plate or moved below it causing edges to crumple and increase in height producing the mountains we see today. As plates separated, magma rose from the mantle and solidified in the rift, forming mid-ocean ridges. The new crust, which was thinner than the continents, spread out between the plates. While the rate of movement is very slow over the time span we are considering, the results are dramatic. The theory that explains these plate movements is called plate tectonics.

The two basic types of crust are oceanic and continental. While the oceanic crust is thin - about five to seven miles thick - and composed of heavy igneous rock that formed from magma flows, the continental crust is 10 to 30 miles thick. As a result, the continents tend to float, rising high above sea level as in the mountainous regions. These continental mountains were gradually worn down by rain and the action of ice, and the freed particles of rock were carried to the sea where they were deposited in thick sedimentary beds, cemented together by minerals and the pressure of more sediment deposited above.

At various times (some spanning tens of millions of years), much of North America was covered by water. This occurred in warmer periods when the polar ice caps were much smaller and consequently held less water. This phenomenon of changing sea levels helps explain why oil and gas deposits are present far inland from any existing ocean.

The right conditions for oil and gas

Since sediment and deceased sea organisms are heavier than water, they naturally migrate toward lower areas or basins in the sea. These lower areas were caused by tectonic action between the plates and eroded valleys that were created in colder periods before the rise in ocean levels submerged them.

As these ocean basins gradually filled with layers of sediment, the weight of the newer layers increased on the layers below. This weight or pressure created friction and heat and began the process of converting the organic material to oil and gas. The story becomes more complicated because, along with organic material, salt water was invariably captured in the source rock. Under the weight and pressure of subsequent sediment layers, all three substances attempt to migrate along a path. Since oil is lighter than water, and gas is lighter than both, when a reservoir rock formation is found, it is stratified with gas on top, oil between, and water on the bottom.

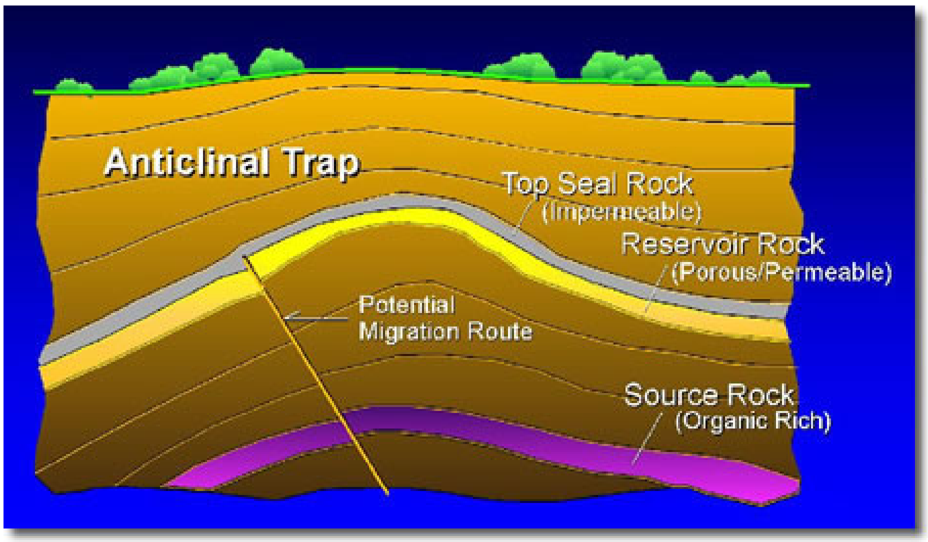

Chart courtesy of Earth Science World and Exxon-Mobil

In certain places, tectonic plate movement has caused the earth's crust to bunch up, creating folds or uplifts in rock strata. This movement also resulted in earthquakes that caused faults or fractures in the strata. These fractures and folds create the opportunity for oil and gas to move out of their source rock toward the surface. If the oil and gas make it to the surface, the gas is lost in the atmosphere while the oil ultimately evaporates. However, if the conditions are right, the hydrocarbons remain trapped under a layer of impermeable rock in another sedimentary rock called a reservoir. In some instances, oil and gas may be trapped under a layer of sediment that deposited down into a basin, later migrating up from the source rock to reservoir rock.

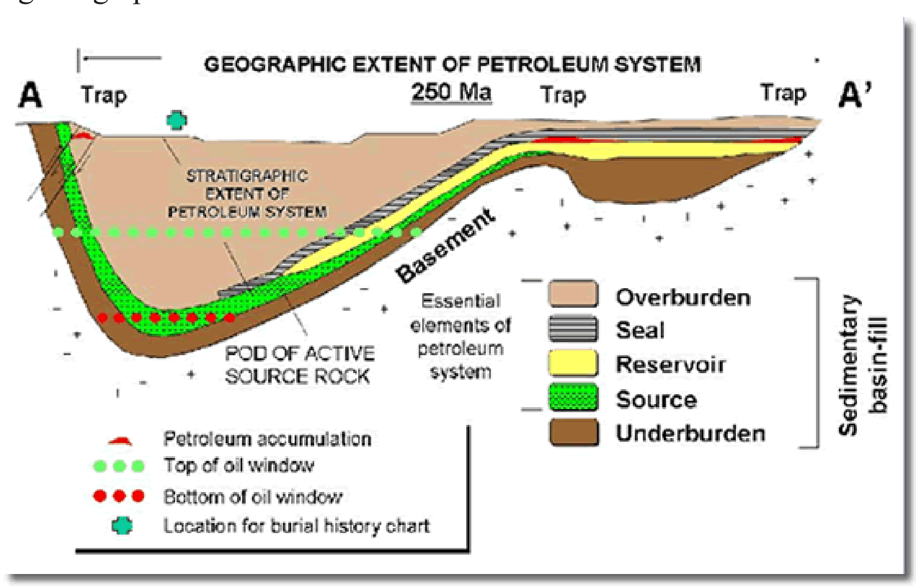

Chart courtesy of Earth Science World and Exxon-Mobil

Generally, oil and gas are found in a geologic structure called a "trap" that prevents the oil and gas from escaping. There are two general types of reservoir traps: a) structural and b) stratigraphic. Structural traps are formed by the deformation of the reservoir formation while stratigraphic traps are the result of an up-dip seal of porosity and permeability.

The anticline trap is formed by the folding of rocks into a dome. These anticlinal traps contain petroleum that has migrated from a source below. Further upward, migration of hydrocarbons was prevented by an impenetrable layer of rock above the reservoir. Fault traps are formed by the shearing and offsetting of rock strata. The escape of petroleum from a fault trap is prevented by non-porous rocks that have moved into position opposite the porous petroleum bearing rock formation. Dome and plug traps are porous formations on or around great plugs of salt or serpentine rock that has pierced or lifted the overlying rock layers. Stratigraphic traps are caused either by a nonporous formation sealing off the top edge of a reservoir or by a change in the porosity and permeability of the bed itself (see pinchout below).

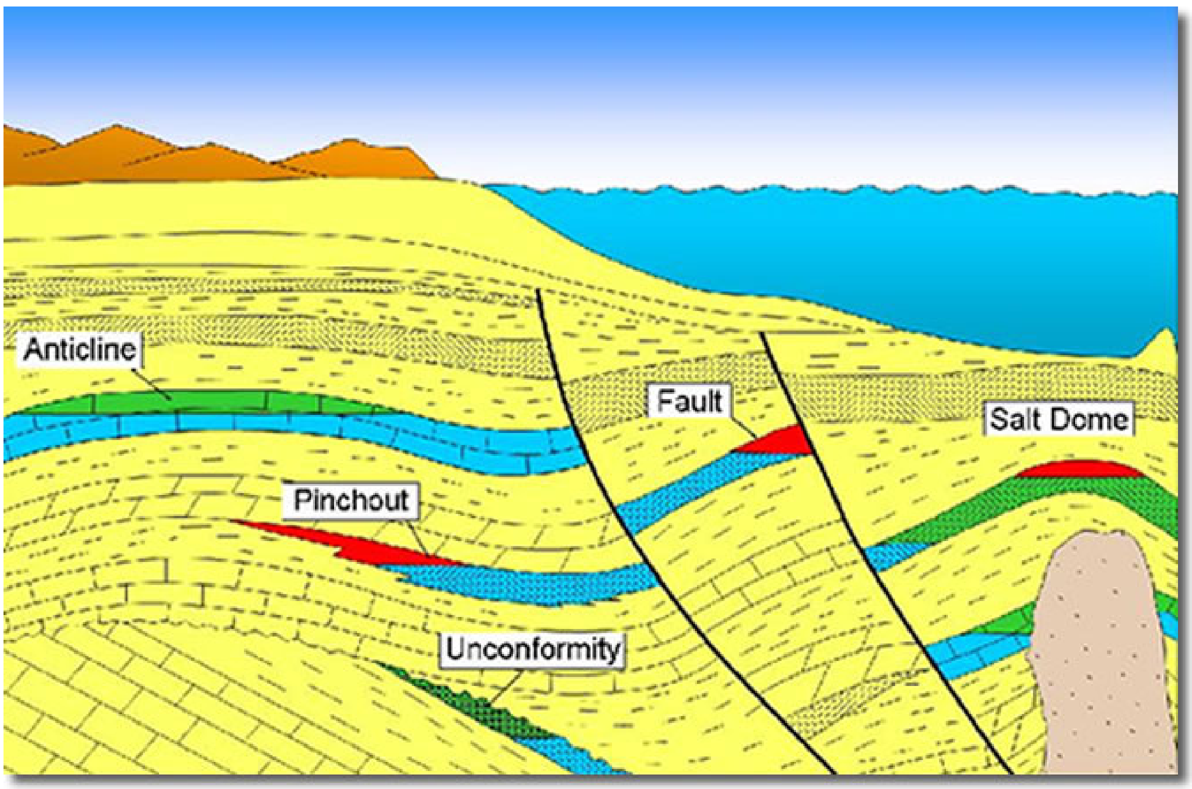

Chart courtesy of Earth Science World and Exxon-Mobil

Permeability and Porosity of Rock Structures

Petroleum deposits are called reservoirs. These are trapped layers of sandstone or limestone, or dolomite. Exploration and production companies are most interested in reservoirs that have good permeability and porosity. As we have seen, both oil and gas co-exist in their natural state with grains of sand, pebbles, rocks and boulders in a rock layer. Porosity is a measure of the spaces within the rock layer compared to the total volume of rock. Though both are porous, a sponge is much more porous than a brick. And though both can hold water in their pores, the sponge has a much higher capacity for holding liquids. Permeability is a measure of how well liquids and gases can move through the rock and thus is a function of how well the pores within the rock are connected to each other. In the formation below, porous areas are in blue.

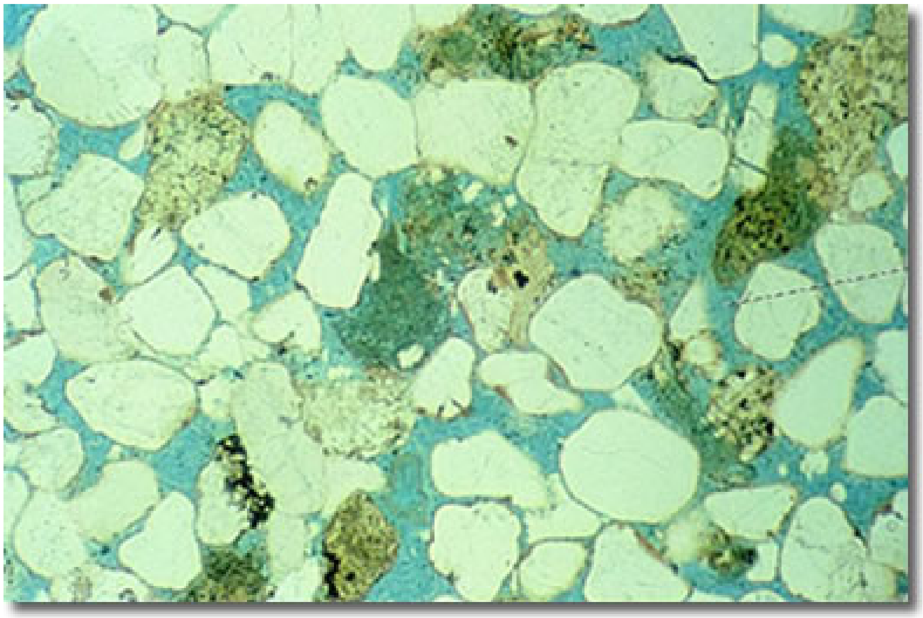

Chart courtesy of Earth Science World and Exxon-Mobil

Porous areas are in blue

Petroleum porosities are measured in percent with the average reservoir ranging from seven to forty percent. Permeability is measured in units named darcies and the number of darcies range variously throughout each reservoir from millidarcies to over forty darcies.

Our accumulated knowledge about rock structure and formation processes is helpful if not essential in determining where to drill for oil.

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Chapter 3

Petroleum Exploration History and Technology

From the moment mankind discovered petroleum seeping from the earth's surface we have sought after ways to put it to use - early on as pitch for canoes and fuel for lamps. But modern methods of drilling for oil revolutionized the use of petroleum, and it all began in Titusville, Pennsylvania as a result of the determined efforts of Colonel Edwin Drake.

Cable-Tool Drilling

While petroleum oil was known prior to this, there was no appreciable market for it until it was discovered to be a good source of kerosene. As a result, Drake's employers were on a quest to establish an enterprise that would fuel kerosene lamps if only they could unearth enough oil.

With oil seeping at the surface as an indicator of more below, Drake decided to drill for the oil using an old steam engine to power the drill. In 1857 and again in 1858, Drake had limited success, extracting a maximum of 10 barrels of oil per day. This, however, was not enough to a commercial enterprise. When attempts to dig huge shafts in the ground failed due to water seepage, Drake decided to drill in the manner of salt drillers using a cable–tool system.

In cable-tool drilling, the drill bit is suspended in the hole by a rope or cable. By means of a powered walking beam operated by a steam engine, the cable and attached bit are raised and then allowed to drop. This up and down motion is repeated again and again. Each time the bit drops it hits the bottom of the hole and pierces the rock; however, there were two features of the cable-tool method that were unfavorable. First, the drilling had to be stopped often and the bit pulled up so that cuttings of chipped rock could be removed. Secondly, it could not drill soft rock formations because the splintered rock fragments tended to close back around the bit and wedge it in the hole.

The Drake well was dug on an artificial island on Oil Creek. It took some time for the drillers to get through the layers of gravel. At 16 feet, the sides of the hole began to collapse and despair was setting in. It was at that point that he devised the idea of a drive pipe. This cast iron pipe consisted of 10 foot long joints. The pipe was driven down into the ground. At 32 feet they struck bedrock. The drilling tools were then lowered through the pipe and steam was used to drill through the bedrock. The going, however, was slow. Progress was made at the rate of just three feet per day. On August 27, his drill bit had reached a total depth of 69.5 feet At that point the bit hit a crevice, and the men packed up for the day. The next morning, Drake's driller, a blacksmith named William Smith, looked into the hole. He was surprised to see crude oil rising up the pipe. Drake was summoned and the oil was brought to the surface with a hand pitcher pump. The oil was collected in a bath tub. After Drake's breakthrough success, many flocked to Pennsylvania to drill for oil, and Drake became a fixture in history. The cable-tool drilling method was in common use until the 1920's.

Rotary Drilling

The first rotary drilling rig was developed in France in the 1860's. However, it was seldom used because it was erroneously believed that most petroleum was under hard-rock formations that could be easily drilled with cable-tool rigs. Then, in the 1880's, two brothers named Baker were using a rotary drill to locate water in the soft rock formations of the Great Plains. They used a rotary drilling system that employed a circulating fluid to remove the rock cuttings. Later, the system was successfully used in Corsicana, Texas where drillers searching for water discovered oil in the unconsolidated soft rock structure.

Rotary drilling operates by pressing the teeth of the drill bit firmly against the rock and turning, or rotating it. Simultaneously, a fluid, usually a liquid including clay and water called drilling mud, is forced out of special openings in the bit at high velocity. This forces the mud and rock chips away from the drill bit and back up the casing and finally out into a holding tank.

In 1899, Patillo Higgins, living near Beaumont, Texas, observed the flammability of the gas springs on his property and concluded there must be oil under the enormous hill on his land Spindletop Lucas oilwellnamed Spindletop. He placed an advertisement in the paper searching for a driller to find oil on his property. It was answered by Captain Anthony Lucas who made a deal with Higgins to drill. Lucas made a lease agreement in 1899 with the Gladys City Company and a later agreement with Higgins. Using a rotary system, Lucas drilled to 575 feet before running out of money. After securing additional funding, Lucas continued drilling and made history. On January 10, 1901, at a depth of 1,139 feet, what became known as the "Lucas Gusher" blew oil over 150 feet in the air at a rate of 100,000 barrels a day. It took nine days before the well was brought under control. Spindletop was the largest gusher the world had ever seen and catapulted Beaumont into one of the United States' largest oil-fueled boomtowns. Beaumont's population of 10,000 tripled in three months and eventually rose to 50,000. Speculation led land prices to increase rapidly. By the end of 1902 over 600 companies were formed, including ExxonMobil and Texaco, and 285 active wells were in operation.

In the rush to develop Spindletop, Howard Hughes, Sr. patented a two-cone rotary rock drill bit that revolutionized drilling. It was unlikely that he actually invented the bit, but his law training helped him understand that the patent was the most important part of the financial life of any invention. This design has been improved over the years, but remains the most widely used system today.

Seismography

Seismic surveys give petroleum explorers details on the structures and strata beneath the surface of the land. Data is collected by creating and then recording vibrations and then depicting them on a seismogram. This data gives geologists a dimensional view of the boundaries between rock layers.

While seismographs were in use as early as 1841, they then focused exclusively on measuring earthquakes. Then, during World War I, Dr. L. Mintrop, a German Scientist invented a portable seismograph which he set up in three places facing the Allied lines. When an enemy artillery piece fired, he used the vibrational data to calculate the location so precisely that that the Germans could wipe out the gun with one try.

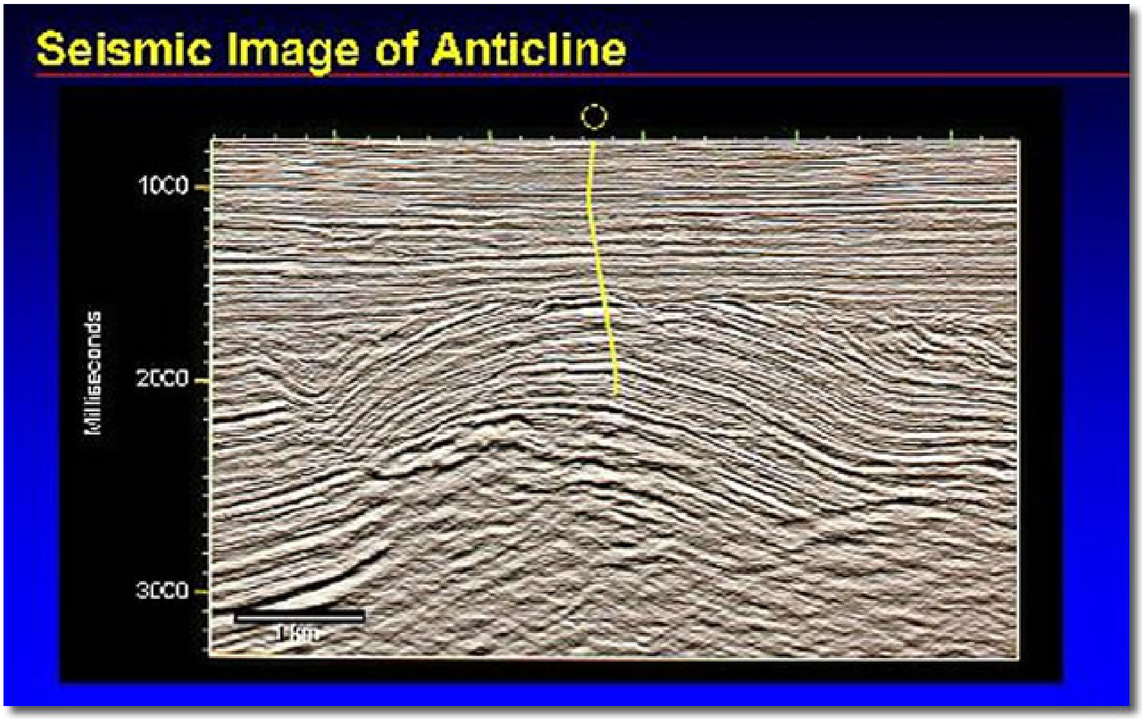
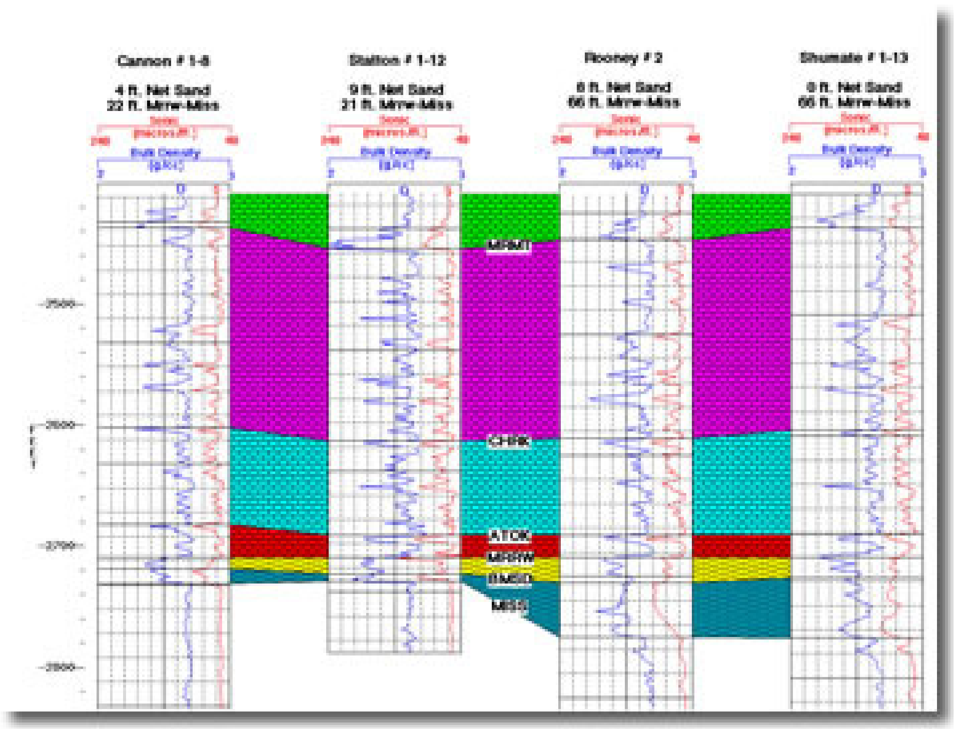


Chart courtesy of Earth Science World and Exxon-Mobil

After the war, Mintrop reversed the process by setting off an explosion at a known distance and, by measuring the time of subsurface shock wave reflections, he was able to estimate the depth of rock formations. After proving his theories in the field, Mintrop formed Seismos, the first seismic exploration company. Seismos was hired by the Gulf Production Company and quickly proved the effectiveness of the tool in locating likely oil reservoir formations. Later improvements developed in the 1960's allowed 2-D subsurface imaging, and, by the 1980's, 3-D seismic was introduced.

Well Logging

Some time in the early 1920's, drillers began keeping well logs to record the depth, kinds of rocks, fluids, and anything else of interest that might occur during the drilling process. Log data is useful for comparison purposes when considering nearby wells that might be drilled later or wells that may have been drilled in the past. More useful are core and cutting logs. This data comes from core samples that are taken during drilling and by examination of the drilling chips that are brought to the surface in the drilling mud. The core sample contains the most information since it is a slender column of rock that shows the sequence of rock layers as they appear in the earth. A special core bit is used to cut and bring up the sample. Once the sample reaches the surface it is packaged and sent to a laboratory for analysis. Core samples can provide a clear understanding of the strata's porosity, permeability, lithology, fluid type and content, as well as geological age. This information helps determine the oil-bearing potential of the sampled beds.



As technology advanced, electric logging came into widespread use. An instrument called a sonde is lowered into the bore on a conductor line, or electric wire line. The sonde measures and records electrical, radioactive, or acoustic properties of the various drilled formations. The sonde transmits its information up the wire to a recorder.

A Spontaneous Potential (SP) log records the electrical currents that flow in rock formations. Most minerals are non-conductors of electricity when dry. However, some, like salt, are excellent conductors when dissolved in water. As drilling fluids invade a permeable formation, spontaneous potential causes weak current to flow from the un-invaded saltier rock into the invaded rock. The SP log can be visually analyzed to understand formation bed boundaries and thickness, as well as the relative permeability of formations.

Resistivity logging devices measure and record the resistance of a formation to the flow of electricity. High saltwater saturation lowers resistivity, while oil and gas raise resistivity, since hydrocarbons are poor conductors. Common resistivity logs include the lateral focus log, the induction log, and the microresistivity log.

Radioactivity logging devices measure natural and induced radioactivity. Gamma ray logs record the emissions of naturally radioactive elements in formation sediments. Since these elements leach out of porous and permeable rock, a gamma ray logging device can identify impermeable formations such as shale and clay-filled sands. Another type of radioactive log is the neutron log, which emits radiation from the sonde, bombarding the rock around the wellbore. Readings can provide useful information about water, hydrocarbon saturations, salt content, rock types and porosity.

Acoustic logging devices are also called sonic logs and operate on the understanding that sound travels better through dense rock than through more porous rock. Correlating data provided by several different logging methods can provide a clear picture of the strata of interest.

It's important to note that, due to the expense of logging a well and the overlapping information provided, not all types of logs are run on each well being drilled.

Formation Test Data

As more wells are drilled and logged in a given field, it becomes easier to predict and determine where the productive petroleum reservoir will extend and end. However, with a new discovery, it is imperative to take some pressure readings to help estimate the lateral extent of the reservoir. Pressure can be taken through a DST or drill-stem test or wireline. Both involve isolating the potential reservoir to recover a sample of fluids and take pressure readings. What is recovered and the pressure data gained from the sample helps determine if a commercially viable reservoir has been found

Offshore Drilling

By the 1930's petroleum exploration companies realized that oil and gas reservoirs existed in shallow waters offshore. But the problem remained how to drill when your drilling rig must float and at the same time stand steady against any heavy wave action. The solution was to create a drilling platform a system of legs or supports that would anchor or hold the platform in place - eventually these type of rigs became know as submersibles.

Drilling BargeThe earliest form of submersible rig was a posted barge. It consisted of a barge with several steel posts attached. A deck was laid across the top of the posts, and the drilling equipment was installed on the deck. Posted barges cannot be used in waters exceeding 30 feet. Later improvements on this concept resulted in ship-shaped barges and drill ships. While the ship-shaped barge must be towed into place, the drill ship travels under its own power. In deep waters, drill ships and ship-shaped barges are anchored much like an ocean-going boat may be anchored or may be held into position by dynamic positioning. Here computer-controlled thrusters are used to maintain the ships position.

Another early drilling platform was the bottle-type submersible rig. These have several steel cylinders, or bottles, that when flooded with water come to rest on the ocean floor. When it comes time to move the rig, the water is pumped out, and the rig is moved by tugboats to the new location. Bottle-type rigs are usually designed to operate in maximum water depths of 100 feet, although some have been built that can work in up to 175 feet of water.

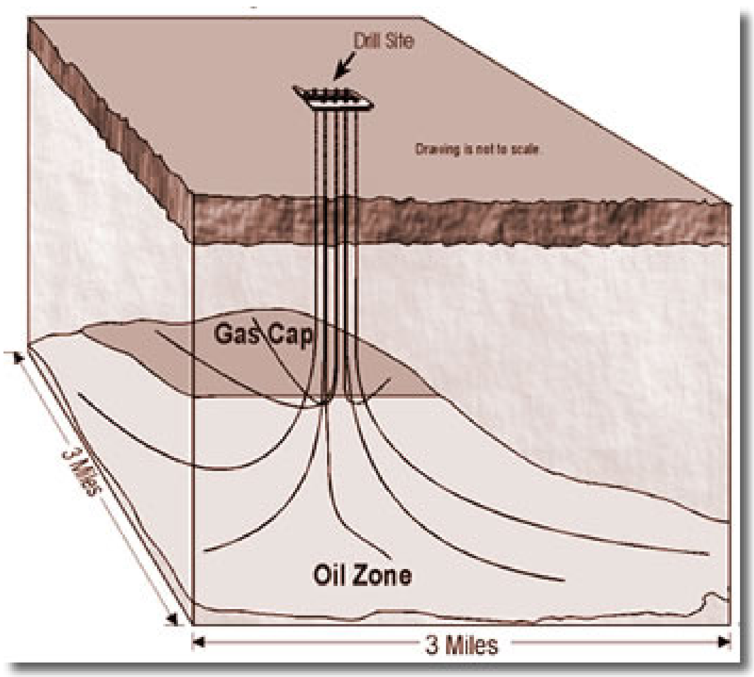
Jackup off-shore drilling rigContinuing exploration to further offshore drilling in deeper waters resulted in new submersible designs. The Jackup rig made it possible to drill in waters up to 350 feet with a few operable in up to 600 feet. Jackups are bottom-supported rigs that can be either column- or truss-supported. Columnar legs are steel cylinders while open truss legs resemble a derrick. Both types have water-tight hulls that can float on the surface of the water while being moved into position.

Today the most common type of offshore rig is the steel-jacket platform. This consists of the jacket, which is a tall vertical section manufactured from tubular steel. The steel jacket is pinned to the ocean floor using driven piles. Additional sections of tubular steel are placed on top of each other. Above the water level are quarters for the drilling crew and the drilling rig. This system has been used to drill wells in up to 1,000 feet of water.

There are other ocean drilling rig designs that are used in special situations, including the concrete gravity platforms used in the North Sea and the steel-caisson platform used in the Cook Inlet of Alaska.

Directional Drilling

Directional drilling techniques began to be employed in the 1970's. Normally wells are drilled vertically; however, there are many occasions when it is helpful to be able to drill at an angle. Directional wells are drilled straight to a predetermined level and then gradually curved. By changing the direction of the drill bit in small increments of no more than 2 to 3 degrees at a time, it is possible to drill many wells into a reservoir from a single offshore platform. Directional wells may also be deflected from a shoreline to reach a reservoir under nearby water. In addition, directional wells are very useful in avoiding fault lines, which can cause hole problems, as well as in instances where it is undesirable to set a rig in a given spot because of an obstruction or for environmental reasons.



Directional well bits can be used to straighten a hole, deflect the hole from the original dry well to intersect a reservoir, kill a wild well that is burning, or sidetrack around a "fish" (an object that has become lodged in the hole and cannot be removed).

Several special tools are available to assist in directional drilling. The most common involves the use of a bent sub and a downhill motor. A bent sub is a short piece of pipe that is threaded on both ends and bent slightly in the middle. It is installed in the drill stem between the bottom most drill collar and the downhill motor. A downhill motor is driven by drilling mud, thus eliminating the need to rotate the drill stem. Shaped like a piece of pipe, the downhill motor can have turbine blades or it can have a spiral shaft that turns inside an elliptical opening in the housing. In the case of the turbine tool, the force of the circulating mud inside the tool turns the turbine blades.

3D Seismography and 3D Simulation

Beginning in the 1980's, 3-D seismic data collection systems came online. As a result, seismic readings can be gathered in three dimensions allowing the construction of 3-D simulations that literally paint more accurate pictures of potential reservoir formations.

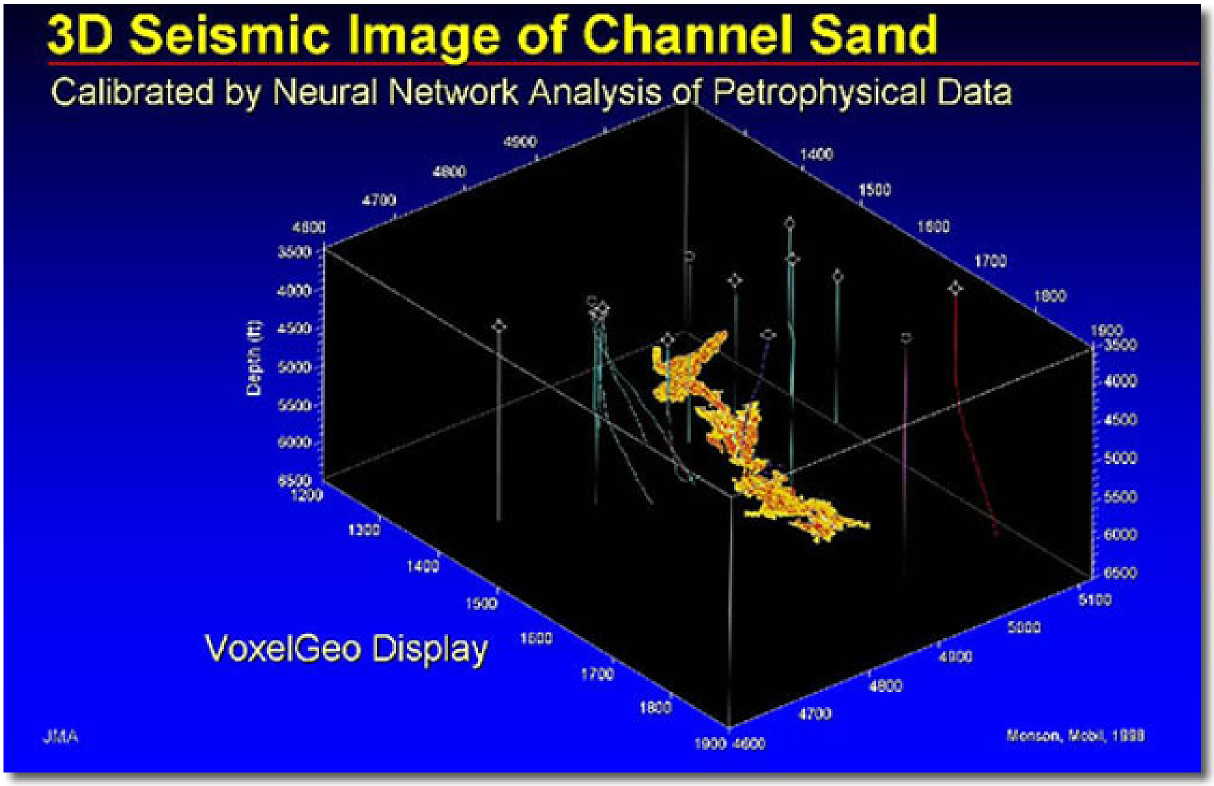


Chart courtesy of Earth Science World and Exxon-Mobil

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Chapter 4
Drilling Oil Wells

While the equipment used to drill and complete an oil well is usually quite simple, the engineering required to drill one properly can be highly complex. Whether the drilling rig is offshore or onshore, they all have the same basic structure and use the same equipment.

Anatomy of an Oil Rig

The purpose of a rotary oil rig is to drill a hole to a predetermined depth. And, hopefully, in the drilling process, passing to or through one or more oil and gas bearing reservoir rock formations. Since rigs are expensive to manufacture, they need to be movable. In addition, since the rock chips created by the drilling bit must be removed, mud is pumped through the drill pipe to the bit and back up the annulus or space between the drill pipe and the outer casing that is added as drilling proceeds. The mud is mixed, usually with water but sometimes with chemicals, in a chemical tank, then sucked from the mud pit and pumped via a standpipe and rotary hose to a swivel that is attached to a Kelly, which is itself attached to the drill pipe. The returning mud and rock chips that reach the surface move by gravity down a return line to a shale shaker designed to separate the returning mud from the shale for reuse. The remaining rock chips travel down a shale slide to a reserve pit.

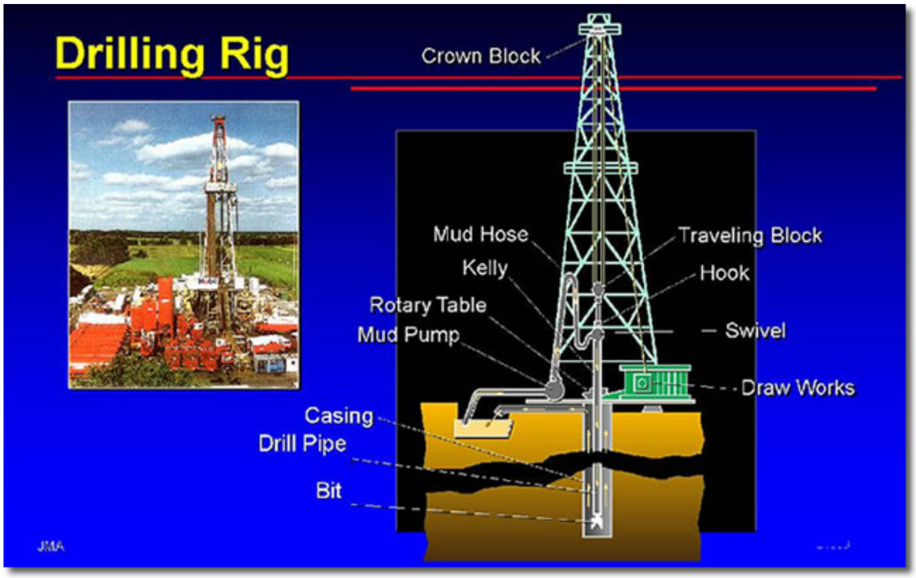


Chart courtesy of Earth Science World and Exxon-Mobil

The kelly is a special section of pipe that has flattened sides that are either square or hexagonal in shape. The kelly fits inside an opening called a kelly bushing. The kelly bushing, in turn, fits into a part of the rotary table called the master bushing. As the master bushing rotates, the kelly bushing rotates. The turning kelly rotates the drill stem and thus the bit. Since the kelly slides through the opening in the kelly bushing, the kelly can move down as the drilling progresses.

Rotary Drilling TablePower to rotate the drill stem comes from the rotary table. This is equipped with its master bushing and kelly bushing. When the kelly and kelly bushing are removed, the hole left in the master bushing accommodates slips that have teeth-like gripping elements called dies. These are placed around the drill pipe and keep it suspended in the hole when the kelly is disconnected and an additional section of drill pipe and/or casing is attached.

A recent innovation is the advent of the power swivel. This is a top drive system that eliminates the need for the kelly and rotary table. With a power swivel drill pipe, joints can be added three at a time versus one at a time, vastly speeding drilling time.

Both the mud transfer pumps and drilling pipe require power to operate. Usually both are handled by two or more 500 hp to 1,000 hp diesel engines. Additional power and engines are required to supply electricity to the rig since the rig typically drills 24 hours a day.

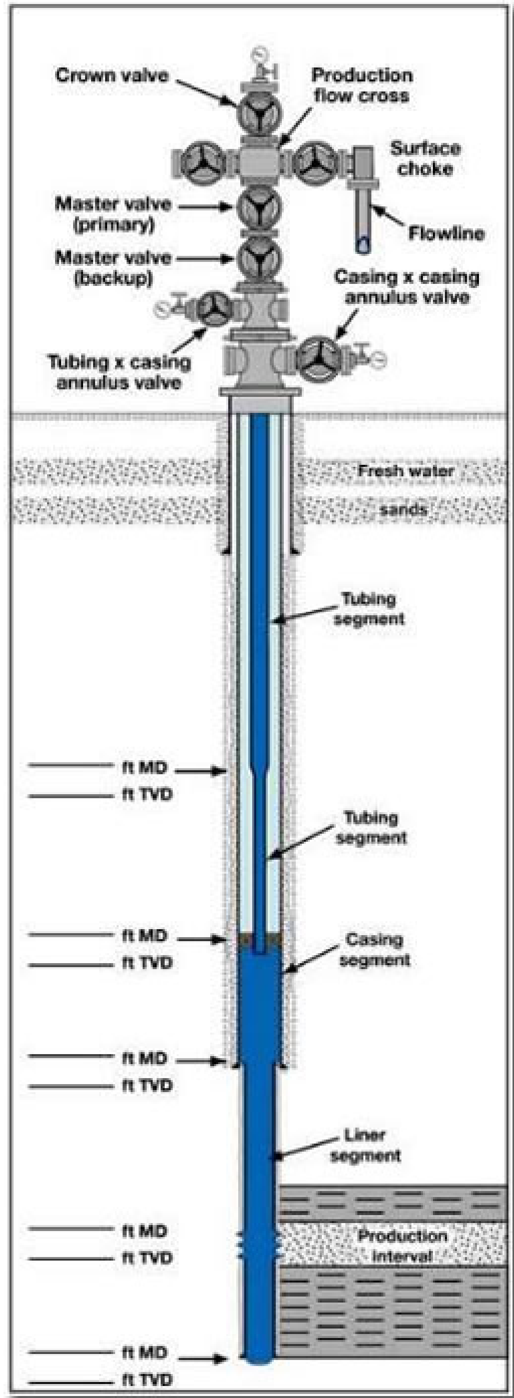
Well Bore Engineering

The engineering becomes more complex as the well is being drilled to its total depth. The deeper one drills, the more pressure that is exerted on the lower strata. Drilling engineers maintain a density (weight) of mud in the hole in order to counter the natural pressures of fluids and gases that might otherwise release into the well hole. But at certain depths and conditions, it becomes impossible to either keep the mud from penetrating a formation or for fluids to release into the well hole. A control panel on the surface is linked to various parts of the rig to keep an eye on down-hole pressure, mud volume, weight on the drill bit and other aspects of the drilling operation. At some point, however, it becomes necessary to pull the drill stem and bit from the hole, insert casing in the hole, and fill the annulus (space) between the casing and the wall of the hole with concrete.

Anytime the drill stem and bit are removed, whether to case the well or retrieve a broken tool, the process is call "tripping out." The cement used to cement wells is not very different from ordinary concrete. The cement is pumped into a special valve called a cementing head. As the cement arrives at the head, a plug called a bottom plug, is released from the cementing head and precedes the concrete slurry down the inside of the casing. This plug keeps the cement and the mud ahead of it from mixing. The plug travels downward until it reaches the float collar. At the collar, the plug stops, but continuing pump pressure breaks the seal in the top of the plug and allows the slurry to pass on. The slurry flows through the plug and starts up the annulus.

When the estimated amount of cement required has been pumped into the casing, a top plug is inserted and water, usually salt water, is pumped in behind the top plug. The top plug keeps the cement from being contaminated by the following displacement water. When the top plug reaches the bottom, the pumps are stopped, and the cement is allowed to harden. Depending on well conditions, it may take from a few to 24 hours or more for the cement to harden. Then drilling may be resumed. To resume drilling, the drill stem and a new, smaller drill bit that fits inside the casing must be tripped back into the hole. This process is called "tripping in."

Well Completion



World Oil Magazine Drawing

Once a well has been drilled and logged, a decision must be made whether to complete the well or plug it. The vast majority of wells drilled in existing fields do produce petroleum. However, examination of pierced reservoir rock formation porosity and permeability may indicate that the potential flow of oil and gas from the well will be worth less than the cost to complete the well. In these cases, the well is plugged with concrete, sometimes in several places, and the well is abandoned.

If, however, the well readings indicate that the well will be commercially productive, the well is completed. If the well is to be completed, production casing is run down the hole and cemented. Once the casing is in place, a tool called a "perforating gun" is lowered into the well-bore to blast holes through the casing, cement and into the reservoir. These holes are made in order for the oil bearing reservoir to have access to the production casing. Tubing may then be lowered into the casing. A plug may then be set below the perforations and a packer set above the perforations as a barrier between the production casing and the tubing. This allows the earth's natural pressure to push hydrocarbons to the well-bore and to the surface through the tubing unless a pumpjack is necessary to raise the fluids to the surface.

Several steps are taken at this time to cut out excessive costs from the production process. A large drilling rig will be replaced by a smaller, moveable completion rig. Also, a completion team will use a swabbing method to force the reservoir to give up fluids naturally. This natural flow rate will be measured and compared to other wells in the area. If it is not up to par, then further measures will be taken to increase the volume of production. These measures include chemically or physically treating the reservoir to stimulate the flow of fluids. Acid treatment can be used in a reservoir containing limestone to open pore spaces by dissolving sections of limestone. Using a physical method, fluid containing small beads is pumped into the earth under great pressure to crack open the reservoir. Then the beads are used to keep the fractures open and allow the flow of fluids to increase.

When a satisfactory rate of production has been established, the well will be tested to calculate the maximum production for the well over a period of twenty-four hours. This is termed the "open flow potential." This and other completion information may be required by the state and will aid other geologists and analysts scouting for oil and/or natural gas in the same area.

If a well contains more than one zone of interest, the operator will usually begin by producing the lowest zone in the well bore first and then work their way up the well bore as each zone becomes depleted. When a zone is completed and the well is near the production process, a multi-valve device will be connected to the surface called a "Christmas tree." This device is placed at the top of the production casing and will allow connections to flow the oil and gas. Equipment to process the recovered oil and gas is placed near the well to make sure that no contaminants remain in the oil or gas. This equipment is used to make the oil or gas ready for transportation.

Production

Production is the process of extracting petroleum from the underground reservoir and bringing it to the surface to be separated into gases and fluids that can be sold to refineries. Production begins with a high level of production and decreases through time until the well is ultimately plugged and abandoned. This decrease in production is a natural result of the inevitable decline in original pressure within the reservoir. The time period for commercial production can span from three to 50 years, and the production amount can vary between 30 to over 1,500 barrels a day.

Either gas expansion and/or water encroachment provides the principal natural energy for most petroleum reservoirs to produce. Both can operate as reserves are taken from the reservoir. The reduction in pressure around the well bore as hydrocarbons are extracted causes other hydrocarbons to move into their space. This process continues until the energy is depleted and/or the well makes too much water to be commercially productive.

Engineers take the past performance of a well and use it to project the future reserves of a well. One way of predicting future production is to measure the percentage of decline in production over a given period of time and use this rate of decline to estimate future reserves.

Reservoir Engineering

Reservoir engineering is the application of scientific principles to develop and maintain petroleum reservoirs to maximize economic benefit. For example, carefully spacing wells over a reservoir can make a huge difference in its overall productivity. In 1904, Anthony Lucas, who had discovered Spindletop, spoke about the decline in production. He claimed that "the field had been poked with too many holes and that the cow was milked too hard." Oil operators in that day gave little thought to reservoir depletion as they completed wells. They produced a well at the highest rate they could without regard for well spacing. As a result, in the 1920's the federal government questioned the wasteful treatment of reservoirs and decided to initiate studies. These studies consisted of applied mathematics, geology, chemistry, fluid dynamics, and physics to aid in the analysis of hydrocarbons within a reservoir. Reservoir engineering began as engineers implemented what the government learned.

Enhanced Oil Recovery

Enhanced oil recovery once the natural flow of gas and oil ceases, the reservoir will have yielded only 10 to 25 percent of the total volume of the oil it contains. The rest is trapped in unconnected rock pockets or is thick enough to cling to the rock and refuses to migrate toward the well-bore.

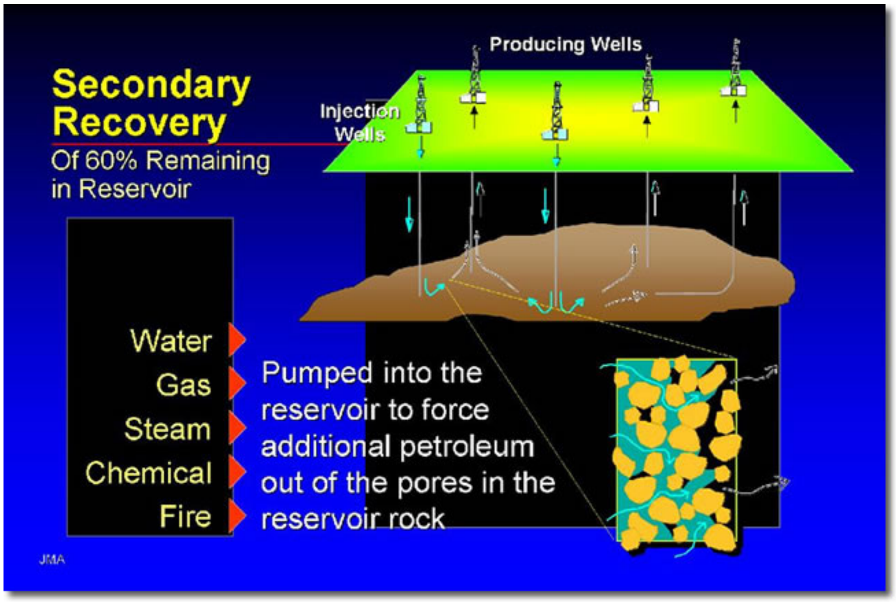


Chart courtesy of Earth Science World and Exxon-Mobil

Petroleum engineers have developed a number of ways to coax this reluctant oil to migrate. The most common approach is to drill adjacent wells and use them to inject water into the reservoir to force the oil to move toward the production well. Another is to inject gas into adjacent wells to slow the rate of production decline or to enhance gravity drainage. Both approaches are referred to as secondary recovery processes. Even after secondary recovery steps have been taken, more than 50 percent of the oil in the reservoir will remain.

Enhanced oil recovery, also known as tertiary recovery method, is a technique used for increasing the amount of oil, which can be extracted from an oil field after secondary recovery efforts are no longer effective. Using this method, 10 to 20 percent more of the reservoir's original oil can be extracted versus the amount retrieved using primary or secondary methods. Gas injection, thermal recovery, or chemical injection can be used to encourage additional flows, although gas injection is the most commonly used. Thermal recovery involves using heat to improve the flow rates and chemical injection is used rarely to lower the surface tension in the reservoir. The cost of using these types of recovery is usually high; however, when the costs of oil are at historically high levels, the economics of the enhanced oil recovery methods rapidly improve.

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Chapter 5

Leasing and Working Interest

Once an area has been determined to be viable for drilling, it is necessary to get a lease to drill on the property. The rights to the surface and the hydrocarbons beneath can be owned separately. An oil and gas lease is a contract between the person or corporation that owns the oil and gas rights to a property and a party who wants to drill a well on that property. If a lease is signed by both parties, the owner of the oil and gas rights is the "lessor" and the recipient of the rights is referred to as the "lessee."

The bonus, royalty, and the primary term of the lease are the three most important items considered during lease negotiations. The bonus is the amount of money required up front by the lessor and is paid whether or not a well is drilled or produces. The royalty is the interest the lessor is to receive if any oil and gas pumped or taken from the well. The primary term is the time period that a company will be allowed to explore or drill. Most leases are taken on a standard form with additional negotiated terms added at the end.

It is important to note that there are costs associated with preparing oil and gas leases, including: expenses to evaluate the property; bonuses to landowners to secure the leases; and legal fees to establish ownership of a property to make the leases legally valid.

Landman

A "landman" is an independent agent who works for an oil company to establish ownership of land and, ultimately, negotiate the lease terms between two or more parties. The landman also understands laws and rules concerning leasing in a certain area and how to file the proper paperwork with the local government. In addition, the landman works to resolve problems that may occur in disputed ownership rights, and they're generally knowledgeable about drilling that has taken place in a certain area,

Types of Legal Instruments Used for Oil and Gas

There are five main agreements an average surface or oil and gas rights owner could enter into with an oil and gas company. The first is the oil and gas lease described above. The second is a surface easement, which oil companies would need to use to create a pipeline or road. Next is a seismic agreement which permits necessary seismic testing on an owned property. Fourth is a general damage agreement for use of roads and clearing a location to drill the well. On land, rigs need a minimum of one acre to work. The final type of agreement is a water rights agreement that an oil company needs to make sure they have proper access to surface or underground water to complete their drilling.

Working Interest

Major oil companies have the capital to fund the entire cost of drilling wells. However, there are also small companies, known as "independents."

Oil well donkey pumpTypically small independents do not engage in wildcatting–drilling exploratory wells to discover new fields. Rather they choose to drill in existing fields where logs from previous wells can be analyzed to improve the likelihood of hitting productive reservoirs.

If an independent doesn't feel that it can take on the full financial risk of drilling, it will sell working interests in the well, usually to other independents. This allows several independents to spread their risk over more wells.

Another method of raising capital to fund a drilling project is by allowing individual investors who have the financial means to participate either directly or through a partnership.

There are many ways to structure a drilling project partnership. In some instances the partners are proportionally liable for any cost overruns versus estimated expenses. In other arrangements, the individual partners are at risk only for their initial investment.

Taxes

Because of the high risk associated with drilling for oil and gas, the government provides tax incentives that allow individual investors to write off the entire cost of their investment regardless of the outcome of the well. Generally, only high income or high net worth investors can take advantage of these incentives. In fact the government discourages those with limited financial resources from making direct investments in oil and gas drilling projects.

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Chapter 6

Investing in Oil and Gas

There are many ways in which one can invest into the oil and gas industry. One can buy the mineral rights to a property which can yield a high profit but will have to wait for the minerals to be leased and the oil and gas reserves are not proven. There are three main forms of investing, which are listed below.

Buying Stock

The most common way to invest in oil and gas is through publicly traded stock companies. Here you are betting that the major oil company will be able to find and effectively develop new fields.

Production Projects

Production projects are oil and gas properties that are already in production, producing and selling oil and gas. This approach allows you to enjoy an immediate income from their investment. However, it's important to know for certain how long the oil and gas is expected to go on producing.

Drilling Project Partnerships

oil rig Direct participation programs enable investors to directly participate in the potential cash flow and unique tax benefits associated with oil and gas investments. These private placement drilling projects offer high net-worth / high-income investors tax deductions and income potential. But drilling for oil and gas is a risky business due to its inherent nature and dependence upon natural resources. And, as previously explained, drilling is a complex business. Many wells that are drilled either do not hit commercial reserves or the well being drilled/completed experiences unexpected problems.

Sophisticated investors realize that they may have to participate in several projects in order to obtain a paying interest in a well. So the rewards of a producing well will have to make up for losses on past projects as well as future projects that may come up dry or prove uneconomical to produce. This being the case, it is important to invest in deals that offer a promising chance for success and a reasonable return on your investment. There are three key areas we urge potential investors to consider when evaluating an oil and gas investment opportunity: the company and its team; the deal structure; and the projected production over the life of the well.

Who Am I Doing Business With?

When evaluating an oil and gas drilling project, we look first at the people who originated the deal, and we recommend the same to investors considering various investment opportunities. You must know who you're doing business with, their track record, how long they've been in business, and their staff. When oil prices are high, more and more people enter the oil business and start assembling and marketing oil and gas deals. Therefore, look first at the company offering the project to determine how long they have been in the oil business and in what capacities. We suggest looking for a company with at least five years experience in managing projects. This criterion will help keep you out of deals with people who are inexperienced and less likely to manage the project properly.

It's equally important to know the management team and the geologists they work with to identify and select projects. The geologist(s) will look at the geology and related data on a project and give their evaluation of its likeliness for success. While prospect-generating geologists are almost always reputable, they will have a certain natural bias towards their project. But while they may be focusing on a good prospect, there may be even better prospects elsewhere. That's why it's important that the management team tasked with selecting the projects it will ultimately offer to investors have long-term experience in the industry.

When looking at a project's issuer, we suggest you request to speak with existing / previous investors to learn about their experience with the company. It's important that investors be kept well informed as to the drilling status, which includes receiving timely progress reports as well as monthly well production and year-end reports. Sadly, not all companies are prompt in providing monthly progress reports or supplying essential year-end information that's needed for filing timely tax returns. So, ask to talk with the project manager's investors who have participated in prior drilling and production projects to see how the company has performed in these areas as well as the project's outcome. When discussing a company's track record, beware that "completing" a well does NOT mean the well was successful. The well's production is the only thing that matters in terms of the well's outcome, so be sure to ask specifically if the well produced at commercial levels.

How Is The Project Structured?

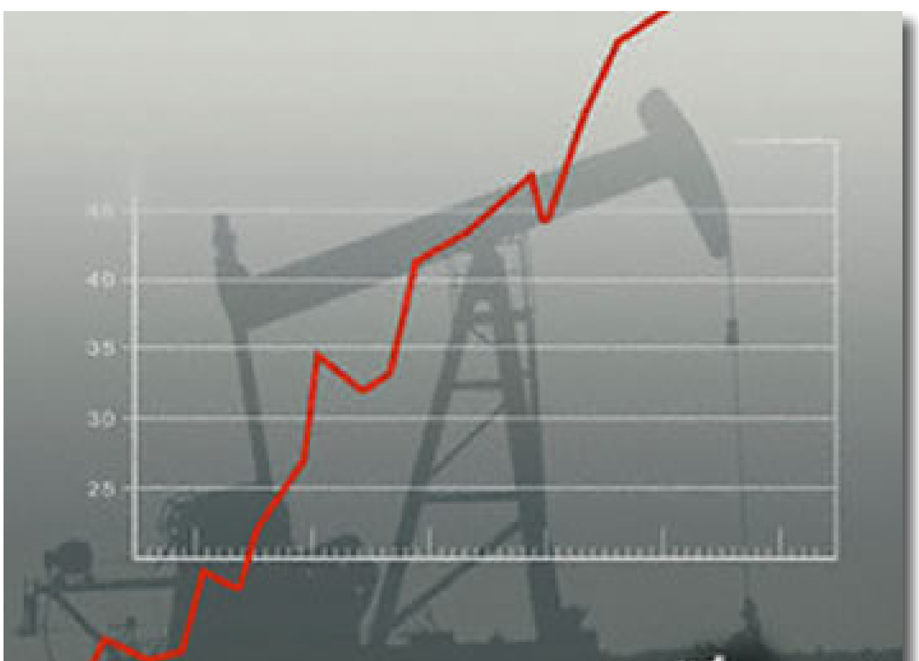
There are nearly as many ways to put together an oil and gas investment in a drilling or production project as there are oil companies in the industry. However, regardless of the project's structure or complexity, each can be boiled down to answering two simple questions: Who gets what percent of the revenue over the life of the project? And, are the anticipated costs within a reasonable range?

Most private placement oil and gas drilling projects have the following parties involved when it comes time to share revenues from a producing well: the landowner / mineral owner; the project manager; and the investor group that is financing the cost of drilling, completing and producing the well. Let's look at these in turn:

Traditionally, the landowner or mineral owner receives between 12.5% to 25% of the total production revenue of a producing well without paying any costs. This is called a royalty interest. The remainder of the revenue interest is divided up between the project manager and the investor group. When the deal is structured with a royalty interest greater than 25% it is usually because someone has carved out an overriding royalty interest.

On the cost side we are looking at the costs associated with buying the lease, drilling, and completing the well. The investor pays these costs on either an “invoice-cost” basis or a “turnkey” or fixed-cost basis. The invoice-cost basis means the investor will pay the actual cost associated with drilling and completing the well plus a small management fee to the issuer. The invoice-cost structure allows the project manager to come back to the investors with additional investment demands in the event of unexpected additional drilling and/or well completion costs. However, this rarely happens because the project manager will add a contingency to his estimates that usually covers any overruns. This contingency will be returned if not used. If the investor is concerned about being on an invoice-cost basis and wants his risk certain or capped, he should participate on a turnkey or fixed-cost basis. When a deal is capped or turnkeyed, the prudent project manager will add a reasonable allowance to the drilling and completion budget to cover unexpected expenses. This additional allowance will usually be more than the contingency mentioned above. If costs overrun this additional padding, the project manager will have to pay the additional expenses out of his pocket. If the well drilling and completion costs come in below budget, the project manager will keep the difference. The padding acts like an insurance policy paid for by the investor. The investor has a cap on his liability and the project manager assumes the added risk. The project manager should provide the drilling and completion costs estimate, called an AFE (Authorization for Expenditure), to the investor. A few calls to service companies and the drilling contractor used by the project manager could possibly reveal the extent of any markup on a turnkey basis. In the State of Louisiana, the Louisiana Mid-Continent Oil and Gas Association, www.imoga.com, offers average drilling cost information for previously drilled wells in areas based on depths so it’s not difficult to get a pretty good feel for the amount of drilling/completion costs for any well.

Does the Projected Monthly Production Justify the Money You Are Investing?



In an established oil and gas area, the petroleum geologist makes the production projections on a payout based on his or her analysis of the production of nearby wells. A simple rule of thumb is that you want to see projections that (at current oil and gas prices) will **return your entire investment in 24 months or sooner.** If the projected production doesn’t support a 24-month return or better on the investment, the investment risk is too high given the expected return. Allowing for the fact that a good portion of all wells drilled will be non-producing, you want to make certain that the ones that do produce make up for the ones that do not.

Acid Test: Evaluating Oil and Gas Projects

Potential investors are cautioned to look at oil and gas projects carefully. Investors need a reasonable opportunity for reward versus their investment. We advise you to look at the potential payout of a proposed project versus your investment. You'll need to do a little math to compare the risk/rewards associated with various project offerings. For example, suppose you are being offered a 1.25% net revenue interest in a project for $90,000. For your investment to break even, the well will need to produce a total of $7,200,000 in revenue ($90,000/.0125 = $7,200,000). If oil averages $50 a barrel, your investment well will have to produce at least 144,000 barrels over its productive life ($7,200,000/$50 = 144,000 barrels). You can do the same math for gas or combination oil and gas projects using an anticipated price for thousand cubic feet of gas. **Now here's the acid test: Look at the surrounding wells or fields and see if any have yielded the amount of gas and/or oil your project will need to produce to return your investment.** You always want to use a conservative price for oil and gas. If you buy into a project as a speculative bubble is growing for oil and gas, you don't want to get caught when the speculative bubble pops. Of course, if the project does pass the acid test, you still need to examine the geology to evaluate the risk.

Investing in a single oil and gas drilling project should not be looked at as a one-shot proposition. Most investors will have to experience a certain number of non-producing projects before they hit a producing project. When you do hit that producing well you want to be in partnership with people you trust, and you want to be in a project that's fair, and one that has a good likelihood for paying back your investment in short order. We believe the above guidelines will go a long way toward helping you achieve those objectives.

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Chapter 7

Future Trends in Energy Supplies

Oil supplies may not last forever. But oil will be available for use long beyond our children's lifetimes. While no one can accurately predict oil's relative supply and demand, even in the near future, several theorists have attempted to predict when and how the world will run out of oil. The most notable theorist on this subject is M. King Hubbert.

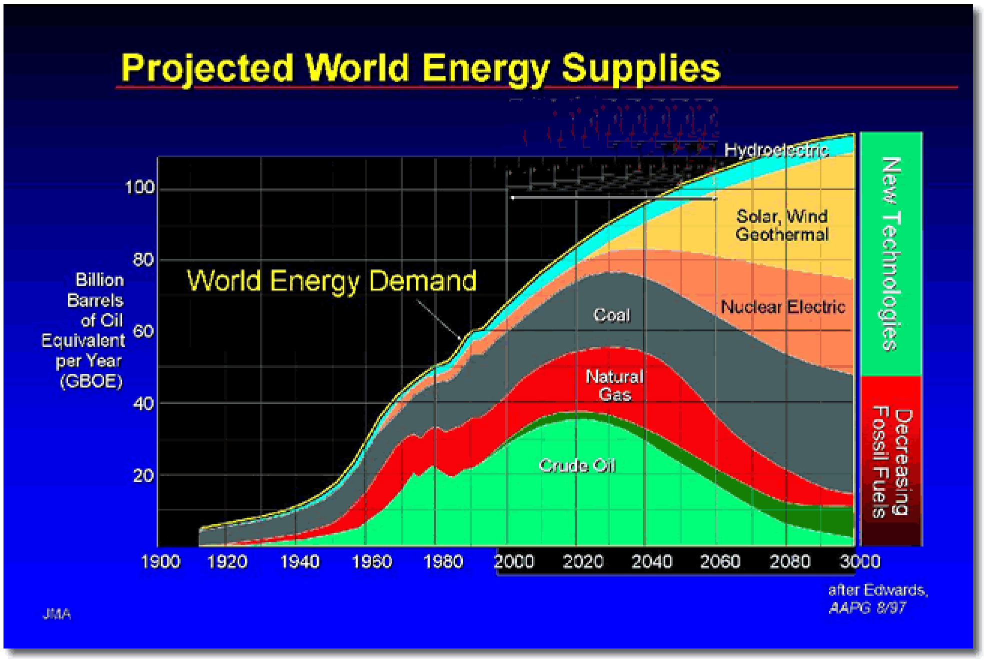

Chart courtesy of Earth Science World and Exxon-Mobil

Hubbert's Peak

Hubbert started out in the 1950's claiming that oil is a naturally occurring resource which will not last forever - production will rise to a point that cannot be sustained and then die down to a point of total depletion. This, to most, seems a fairly obvious assumption. Understanding his theories, one can conclude that once Hubbert's Peak has been reached, half of the world's oil reserves will have been depleted. This is also the case for a field with several wells. When one takes what has already been produced from the field and what can potentially be produced for the field combined this number becomes its ultimate potential. Its peak in production would be placed at the ultimate divided by two. The only way to precisely determine the ultimate for the world's oil reserves is to count them when they have been depleted.

The problem with determining the peak in world production is one must use estimates to determine ultimate world production. There are three main numbers or concepts used to do this: 1) cumulative production or what is known as reserved production; 2) knowable, undiscovered production; or 3) what is predictable from past trends. From these concepts, we can estimate that ultimate equals cumulative production plus reserved production plus undiscovered production. However, due to each country's different analysis for total production of oil and gas, determining the ultimate world oil production is relatively impossible. A Dr. C.J. Campbell took the time to understand how each country counts its oil and gas production and predicted that the ultimate world recovery is 1.8 trillion barrels of oil.

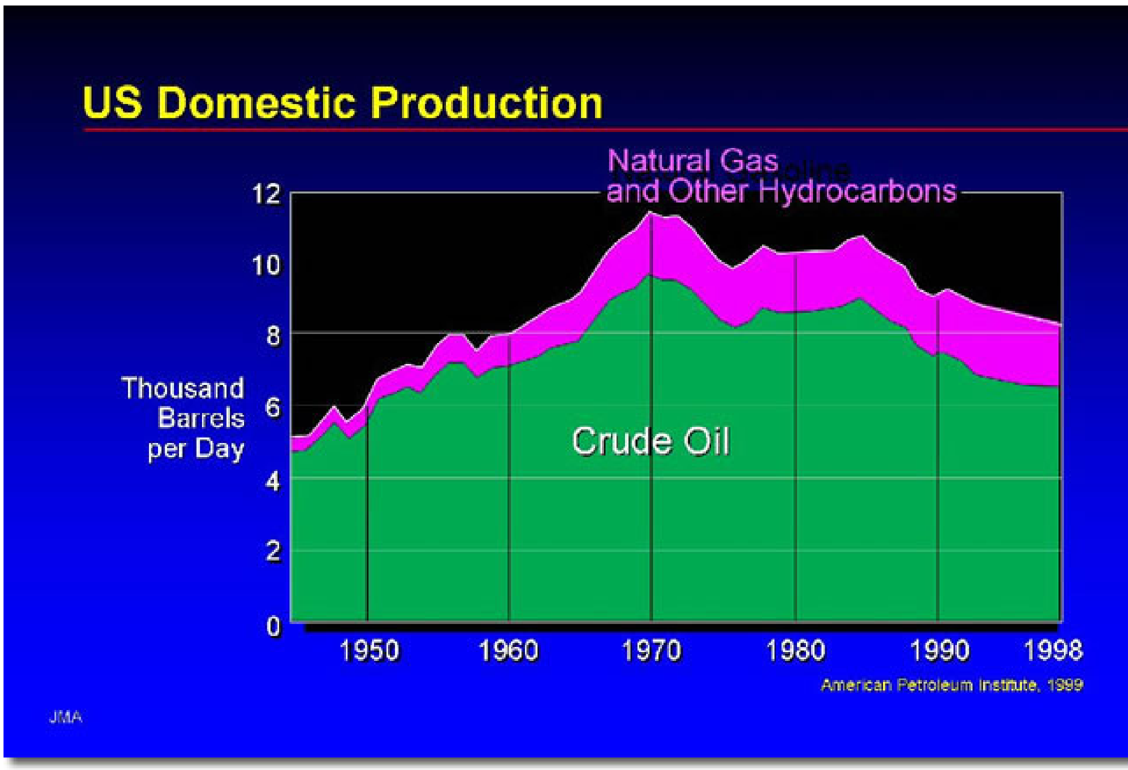

Chart courtesy of Earth Science World and Exxon-Mobil

Each country will have its peak. Hubbert predicted that the United States would reach its peak in the 1970's and it appeared to do so. The country was depending on Texas for the bulk of its oil when the Texas Railroad Commission announced in 1971 that Texas was at 100 percent production. That is when the Organization of Petroleum Exporting Countries (OPEC) was created to control the supply of oil and gas for the world market and drove the Texas oil industry into the ground for a few years.

Hubbert suggested that it will take many years to completely deplete the world's supply of oil. However, he also suggested that each country will have its peak and then experience decreasing production from there. We are already seeing that some Middle Eastern countries may be peaking today with their production approaching 100 percent of capacity. So, what does this mean for our industries? Cheap oil production in the Middle East will likely be a thing of the past in the next 10 to 20 years, sparking a feverous interest in alternative fuels.

While there is no denying that there is a finite amount of oil and gas on this planet, new technologies and recovery methods continue to increase the percentage of an existing field's recoverable oil and gas. At the same time, while the rate of discovery of new fields declines, we are getting better at finding them by digging deeper and in more isolated areas. Who's to say there will not be yet more advances that once again tip the scales in favor of more supply than demand?

Alternative Energy Sources

A theorist by the name of Walter Yongquist exposed several myths surrounding alternative energy sources. The first myth states that alternative energy sources can readily replace oil. Yongquist asserts that this is simply not true. Every means of transportation including airplanes and cars is powered by carbon-based fuels. When carbon based fuel is no longer used, every airplane and car will need to be replaced and this will cost trillions of dollars to do. He states that 97 percent of the world's 600 million cars are powered by gasoline or diesel fuel. That means that when the oil and gas is depleted, 582 million cars will have to be replaced by cars that run on alternative sources of energy. He also felt is was a myth to assume that alternative sources of energy can just be plugged into our present day economic system and our lifestyles will continue as usual. If we were to make better use of our most renewable source of energy, the sun, our current lifestyles would be impeded due to our modes of transportation being limited to necessity travel and not for recreational purposes as well. No longer would things look the way they do; however, each building and mode of transportation would have huge solar panels stretched across it. He claims that changing forms of energy would drastically change our lifestyles and standards of living. A third myth is that alternative energy sources are environmentally benign. This simply is not true. For a liquid version of coal to be used, huge mining endeavors would be taken on to fulfill the world's necessity of coal. If plants were used in the form of biomass to fuel the world, the value of soil would be compromised. Each type of alternative fueling brings its own environmental problems. A final myth claims that using biomass types of fuel (plants) can be a lifesaver to a fuel crisis. This is not true due to the huge costs in converting plants to liquid fuel and the detriment this would create in replacement of fuel crops. We can already see this effect with corn prices doubling in 2006, as more and more corn is converted to ethanol.

While Yongquist may be correct in calling each of these premises myths, the equation will surely change if the price of oil skyrockets. Change is usually not an instantaneous process, but rather a gradual evolution that occurs over time.

Types of Alternative Vehicular Fuel

One type of alternative fuel is biodiesel. Biodiesel is a diesel fuel replacement made from vegetable oils or animal fats. It contains methyl ester; so, most vehicles do not need to change engines to be able to use it. Claims are made that biodiesel reduces carbon dioxide emissions by up to 80 percent and also reduces the black smoke associated with fuel combustion by up to 75 percent. It's claimed that using biodiesel eliminates the smell of smoke emission and further emits a smell of doughnuts or popcorn depending of the type of oil used in the fuel. It also is biodegradable and assists with the lubrication of engines and can be mixed with normal fuel. The only downside of this type of fuel is the amount of vegetable oils and animal fats needed to ensure enough fuel for all diesel vehicles in the country. Biodiesel can also soften rubbers overtime causing problems with plastic and rubber hoses contained in engines.

The second type of alternative fuel is ethanol, which is a clear, colorless liquid formed from distilling starchy crops such as barley, wheat and corn. This is a gasoline-like biofuel. Bioethanol is a form of ethanol produced from trees and grasses and can be used in the same ways that traditional ethanol is used. Ethanol can be used without many additional costs since it is nearly as cheaply produced as gasoline. Vehicles are not required to make extreme changes to be able to run on ethanol and it is better for the environment than petroleum emissions. Similarly to the biomass fuel, however, it is difficult to imagine the additional quantity of crops that must be grown to satisfy potential demand. Clearly farmers could not keep up with demand if ethanol was the sole basis for vehicular fuel.

The third type of alternative fuel is electricity which can be used for certain types of battery operated vehicles and also fits in the no combustion category. The only waste products of this type of vehicle are heat and water. The primary problem with this type of fuel (mainly generated from fossil fuels) is the limited battery charge, meaning that cars can only travel a small distance without having to "plug up" and recharge their batteries. A vehicle of this type would have to be plugged into a source of electricity every night in order to run it during the day. Solar powered electrical cells can fuel a car that has panels fixed on the vehicle to collect sunlight. This type of transportation has not been sold commercially to date; however, solar powered machinery and homes will enjoy a greater share of the market as the price of oil and gas increases. Most houses can be covered in solar panels and it will provide all the electricity needed except for the air conditioning.

An external combustion type of vehicle would be one that was fueled by steam, coal or organic waste. However, coal can be used to produce gasoline or diesel. The process is highly expensive and is not worth it to most countries due to a limited coal supply. Coal is dangerous to mine and it is also a fossil fuel which will eventually run out just as petroleum will. In World War II, when the Germans were cut off from the oil and gas industry through embargos, they used the country's rich supply of coal to produce gasoline for their vehicles. Steam power is also a version of the external combustion vehicle. The Stanley Steamer was created and it effectively used steam just like steam boats would to power the car. However, steam powered automobiles require a burner and are slow. Gasoline powered automobiles continue to be much more efficient.

In the end, everything comes down to supply and demand. If the price of oil and gas rises, say doubling, and doubling again, the economics of alternative fuels will improve, and mass production technology will be employed to make vehicles that can take advantage of them, perhaps as cheaply as the vehicles we buy today.

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Chapter 8

Conclusion

Often, investors focus primarily on the potential rewards of an investment; however, you must be equally aware of the risk that accompanies it. When investing in oil and gas, you must be aware that it is possible you may lose your entire investment due to the inherent risk and complex process associated with locating these natural resources. For that reason and to encourage domestic drilling programs, the U.S. government effectively underwrites a portion of the risk by providing substantial tax benefits to investors – tax benefits which exist whether the well is successful or not.

It is particularly important to understand the nature of the business when considering an oil and gas investment. That is, as with any investment, there are no guarantees. Due to the risk and complexity, it is unlikely an investor will have success with every project. Therefore, it is important to ask yourself if you're willing and able to invest in multiple projects rather than approaching it as a one-time deal. For example, while eight out of nine wells may hit oil and/or gas, it's possible that only a fraction of those will be deemed economically viable for commercial production, thus generating profits for investors. With that in mind, it is best to consider a series of single well projects or a multi-well drilling program to mitigate your risk and diversify your investment.

completed oil well And, instead of just evaluating the prospect for hitting oil, break the deal down to make sure there is going to be a fair distribution of the rewards. Furthermore, find out how the deal is structured, whether it is "turnkey" or "invoice-cost" (aka "actual-cost"). The invoice-cost structure means investors pay the actual cost to drill and complete the well after paying a one-time overhead fee, which covers the expense of managing and offering the project. With the invoice-cost structure, investment capital is called for as needed. The turnkey structure, on the other hand, means the company sets a fixed price for drilling and completion efforts. In some instances, the invoice-cost structure is the preferred method as is the case with shallow wells where there is low mechanical risk. In other instances, the turnkey structure with a fixed cost is more appropriate as is the case with deeper wells where the mechanical risk may be higher.

Assessing the risk also requires a good understanding of how oil and gas reserves are formed, where these deposits are found, and how they got there in the first place. The sophisticated investor should also understand the basics of drilling, testing and completion. And he/she should understand who receives what portion of the reward if the well is commercially successful. Finally, oil and natural gas are finite commodities that have the potential to be replaced, or pressured, by alternative energy sources that either currently exist or are under development. Over time, these alternative fuels and technologies may impact the future demand for oil and gas; however, because oil and gas are so ingrained in industrialized nations, it would take decades upon decades for any real impact to occur.

For more information on direct participation investment opportunities,go to
www.G2Petroleum.com, or contact us at **Toll Free:** 888.723.2198 • **Direct**: 469.424.3440
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