

ENERGY INVESTING 101

Investing in oil and gas stocks is actually quite simple, even if you don't know anything about the energy industry.

Investors have two basic choices when starting out:

- 1) Do I want to get a stockbroker who specializes in oil & gas (probably based in Calgary or Texas) and do what (s)he tells me; or
- 2) Do my own research and stock-picking

If your answer is 2), then you may find useful the Top 20 Answers I try to determine in my first round of research I am doing on oil and gas companies. This is hardly an exhaustive list. But I've tried to use simple language to help even the most novice oil and gas investor understand what questions and answers will help them decide on the potential of an energy company.

Where do you go to find these answers?

In order, I suggest:

- A) Corporate Presentation on the company website
- B) Call management directly (though the bigger the company the harder this is, and few energy companies have investor relations people)
- C) Read the quarterly financial statements – the numbers and the notes (the more you get into it, the more you will find that most good information is in the notes and the management discussion)

Before reading these starting points, also consider – what type of investor are you? Do you want to invest in large stable companies with a long history and strong cash flow? Or can you tolerate higher risk, and want to look for more leverage in the junior stocks, where a discovery could either give you a multiple return or lose most of your investment?

THE TOP 20 ANSWERS YOU NEED TO KNOW:

How much of their production is oil and how much is natural gas? (gas prices are very low right now and doesn't produce much, if any, cash flow for companies)

- 1) How many barrels of oil per day (bopd, or "boe" for natural gas – barrels of oil equivalent) is the company producing, and how quickly have they grown production in each of the last 3 quarters.
- 2) How much net cash or net debt do they have? This industry uses a lot of debt, so if a company actually has net cash, they could grow more quickly because they have an entire untapped line of credit waiting to go drilling, and grow the business. And of course no debt means no debt payments and flexibility in doing business.
- 3) Where are the properties? Investors give North American assets a slight premium, unless the company is either growing very fast or has a management team that has built and sold an oil & gas company. Political risk shows up in the stock price.
- 4) How many wells will the company be drilling in the coming nine months? This will give you an idea of how fast they may grow. Companies usually say in their presentation how many wells they will drill property by property, but don't often give an overall number in one slide. Odd, but true.
- 5) How much will all this drilling cost, and do they have the money or cash flow to do it? Most companies have a slide in their corporate presentation that shows their estimated cash flow for this year or next, along with their estimated capex, or capital

expenditure, which is their drilling budget. Or do they have to raise money in the market to do the drilling they want? (This is not good—when the market smells a financing coming, it drives the stock lower.)

- 6) Are these wells higher risk exploration wells or lower risk development stage wells? Development wells are just filling in an already discovered oil field. It means these wells will almost certainly repeat the success of the discovery well; the oil or gas formation is large and drilling success is “repeatable”. The market loves certainty, and most companies go out of their way to crow about their “undeveloped land acreage” and “X year drilling inventory”; the number of wells they could drill on this development stage land.

As an example, the new, big shale formations in North America are very “repeatable”. The Bakken oil field in Saskatchewan is “repeatable” in large scale, i.e. it could support many wells.

- 7) If the company is doing exploration drilling, what has been the company’s success rate in each of the last two years? HINT: if it’s not on the PowerPoint, guess what... There is new technology called *3D seismic* that allows companies to see the producing oil/gas formations much better – and now means a much higher success rate for exploration. Anything under 70% success in raw exploration and I get nervous.
- 8) What has management done in the past – have they ever built and sold a producing energy company?
- 9) How many research analysts follow the story? If the answer is 3 or less, why hasn’t management been able to secure more coverage – there is a reason. It might be because your target investment is small. It might be that it is just not a compelling growth story as you think. Or it might be just because management doesn’t raise money much, i.e. rarely (if ever) issues equity. Analysts get partly

compensated on the business they can bring into their brokerage firm. If they cover a producer who will never raise money, they’ll never get paid, so who cares?

- 10) Without analyst coverage there is no institutional money flow in the stock. And without institutional support, your stock will need A LOT of drilling success to move up, and will likely always trade at a big discount to its peer group.
- 11) Decline rates are something management teams don’t really hide, but don’t really talk about either. Every well has declining production until it’s uneconomic. The new shale gas plays often have 85% decline in production in the first year. Tight oil plays (shale gas and shale oil) have 75% initial decline rates. Decline rates are increasing over time now as the industry drills deeper and tighter plays. Ask management what the *initial* decline rate is, both company wide, and specifically on their main, big play that they believe will be the growth engine of the company. Then ask what the decline rate flattens out to – it’s usually 20-30%. This is called the “long tail” of production.

Why is this important? Because many investors, when forecasting growth, use the only public numbers given for a well – the ones in the press release. Most companies have a production decline graph in their PowerPoint, but few actually say what the production levels in the wells in the area flatten out at (and many research reports from analysts don’t either)

- 12) If the company is operating in a foreign country, what kind of political connections do they have – who from that country is in management or on the board of directors?
- 13) What is the break even cost, companywide, and in their main play, in terms of price per barrel? Management should have a very good ballpark number at hand.

- 14) How much does it cost them to bring up a barrel of producing oil? Costs can range from \$8000 per flowing barrel to over \$30000. Obviously, the lower the better, as this will be more profitable. Then you compare it to what companies are being bought out for. If a company can produce a barrel of oil for \$10,000, and the stocks are being bought or merged at valuations of \$70,000 per barrel, that's a very accretive oil or gas play! Again, management should be able to answer that question on the phone.
- 15) What is the *recycle ratio*, both overall corporately and specifically on their main play that will be the growth engine for the company. The *recycle ratio* is a key measure of profitability for an energy company. It's a fairly simple calculation, and many companies put it in their quarterly and a few even put it in their PowerPoint. Management will know this number off the top of their head like they know their wife's name, so don't be afraid to ask.

The *recycle ratio* is the profit per barrel (called the "netback") divided over the cost of finding that barrel – "F&D" – Finding and Development Costs. Both the netback and the F&D costs are in all the quarterlies – usually broken out in simple charts and language in the notes. The higher the recycle ratio, the better. Anything over 3 is great, 2 is really good and under 2 can still be OK if it's a big field and lots of wells can be drilled. Different companies report differently so not all recycle ratios are equal, but it will give you a general idea. The higher the recycle ratio, the higher the valuation should be.

- 16) How much of their own infrastructure do they own? And are they the operator of their plays? Infrastructure includes things like local or regional

pipelines, storage facilities, processing facilities. If they don't own them, they have to pay charges to use them, and are subject to somebody else's maintenance and upkeep. And the market often pays a lot less for a non-operating interest in a play, as the operator gets to call the shots most of the time.

- 17) Ask management what kind of discount or premium they get for their production, from quoted prices like WTI crude or Brent Crude – and why that is. For example, heavy oil gets a discount – up to 50% – from the WTI price or Brent crude price that is always quoted in the media. Maybe their oil or gas has a high sulphur content (which would also give them a tougher time with environmental permits). A company may say they are producing 10,000 bopd, but if their price is much lower than world price, their future cash flow could be much lower than you think.
- 18) How much stock does management own, which people on management are the largest shareholders in the group and how much hard cash – not stock options – does management have in the company.
- 19) Look at the stock chart – is the stock moving up or down – ask management what is the market missing in terms of appreciating the company and stock?
- 20) And lastly, ask open ended questions, like – what else is there about your company that you want to tell me? Where do you want to improve the most over the next 2-3 quarters?

The list of questions goes on and on. I suggest that investors remember that the answers to these questions are already priced into the stock; it's highly unlikely you will find any bargains in the stock market from these questions. But the answers will give you a better understanding of how stocks are valued and why, and give you more confidence in acting on your own intuition about a stock.

OIL SECTOR OVERVIEW- THE PRODUCERS, THE DRILLERS

Some basic terms and how the industry sectors are related

THE PRODUCERS (E&P)

Exploration and production (E&P) companies focus on finding hydrocarbon reservoirs, drilling oil and gas wells and producing and selling these materials to be later refined into products such as gasoline. This activity is usually referred to as upstream oil and gas activity. Today, there are hundreds of public E&P companies listed on U.S. stock exchanges. Virtually all cash flow and income statement line items of E&P companies are directly attached to oil and gas production; therefore, investors should develop an understanding of basic production terminology when assessing E&P stocks.

Exploration and production companies measure oil production in terms of barrels. A barrel, usually abbreviated as "bbl", is 42 U.S. gallons. Companies often describe production in terms of bbl per day or bbl per quarter. A common methodology in the oil patch is to use a prefix of "m" to indicate 1,000 and a prefix of "mm" to indicate 1 million. Therefore, one thousand barrels is commonly denoted as "mbbl" and one million barrels is denoted as "mmbbl". For example, when an E&P company reports production of 7 mbbl per day, it is referring to 7,000 barrels of oil per day.

Production of gas is described in terms of standard cubic feet, which is a measure of quantity of gas at 60 degrees Fahrenheit and 14.65 pounds per square inch of pressure. Similar to the convention for oil, the term "mmcf" means 1 million cubic feet of gas. One billion cubic feet is denoted as "Bcf" and one trillion cubic feet is denoted as "Tcf". Note that gas market prices are sold on the New York Mercantile Exchange futures market in terms of million British thermal units, or "mmbtu", which is roughly equivalent to 970 cubic feet of gas. Investors frequently think of an mcf of gas as being equivalent to one mmbtu.

E&P companies often describe their production in units of barrels of oil equivalent (BOE). In calculating BOE, companies usually convert gas production into oil equivalent production using an energy equivalent basis. In this basis, one BOE has the energy equivalent of 6,040 cubic feet of gas - or roughly one bbl to 6 mcf. Oil quantity can be converted into gas quantity in a similar fashion and gas producers often refer to production in terms of gas equivalency using the term "mcf". Note that the energy conversion basis often is not reflected in the respective market prices of oil and gas.

E&P companies report their oil and gas reserves - the quantity of oil and gas they own that is still in reservoirs in the ground - in the same bbl and mcf terms as above. Reserves are often used to value E&P companies and make predictions for their revenue and earnings. Note that reserves' values are not GAAP figures and they are not directly booked into a company's [financial statements](#).

Because new reserves are the primary source of future revenue, E&P companies spend a lot of time and effort in finding new petroleum reserves. If an E&P company stops exploring, it will generate revenue from a finite and depleting quantity of petroleum and, therefore, revenue will naturally decline over time. As a result, E&P companies can only maintain or grow a revenue base by acquiring or finding new reserves.

DRILLING AND SERVICE

E&P companies do not usually own their own drilling equipment or employ drilling rig staff. Instead, they hire contract drilling companies like Grey Wolf Inc. or Nabors Industries Ltd. to drill wells for them. Contract drilling companies generally make a living based on the amount of time they work for the E&P companies. Drilling companies do not generate revenue in a way that is tied directly to oil and gas production as is the case of E&P companies.

Once a well is drilled, there are many activities involved with generating and maintaining its production over time. These activities, such as well logging, cementing, casing, perforating, fracturing and maintenance are collectively referred to as well servicing. As is the case for drilling, there are many public companies, like Halliburton Company and Schlumberger, that are involved with well-service activity. Revenue of service companies is tied to the level of activity in the oil and gas industry, sometimes measured by the "rig count" or the number of rigs working in the United States at any given point in time.

Investing in energy stocks can be a complicated business. As is the case for most company analysis, a good starting point is to understand how the businesses derive revenue. For E&P companies, investors should strive to understand production and the production potential tied to current and planned exploration activity. For drilling and service companies, investors should develop a feel for the energy cycle, the drilling and service companies' competitive landscape and the omnipresent impact of oil and gas price changes over time.

The Oil Services Industry

There is no doubt that the oil/energy industry is extremely large. According to the Department of Energy (DOE), fossil fuels (including coal, oil and natural gas) makes up more than 85% of the energy consumed in the U.S. as of 2008. Oil supplies 40% of U.S. energy needs.

Before petroleum can be used, it is sent to a refinery where it is physically, thermally and chemically separated into fractions and then converted into finished products. About 90% of these products are fuels such as gasoline, aviation fuels, distillate and residual oil, liquefied petroleum gas (LPG), coke (not the refreshment) and kerosene.

Refineries also produce non-fuel products, including petrochemicals, asphalt, road oil, lubricants, solvents and wax. Petrochemicals (ethylene, propylene, benzene and others) are shipped to chemical plants, where they are used to manufacture chemicals and plastics.

There are two major sectors within the oil industry, upstream and downstream. For the purposes of this

tutorial we will focus on upstream, which is the process of extracting the oil and refining it. Downstream is the commercial side of the business, such as gas stations or the delivery of oil for heat. Oil Drilling and Services Oil drilling and services are broken into two major areas: drilling and oilfield services.

Drilling - Drilling companies physically drill and pump oil out of the ground. The drilling industry has always been classified as highly skilled. The people with the skills and expertise to operate drilling equipment are in high demand, which means that for an oil company to have these people on staff all the time can cost a lot. For this reason, most drilling companies are simply contractors who are hired by oil and gas producers for a specified period of time. In the drilling industry, there are several different types of rigs, each with a specialized purpose. Some of these include:

- Land Rigs - Drilling depths range from 5,000 to 30,000 feet.
- Submersible Rigs - Used for ocean, lake and swamp drilling. The bottom part of these rigs are submerged to the sea's floor and the platform is on top of the water.
- Jack-ups - this type of rig has three legs and a triangular platform which is jacked-up above the highest anticipated waves.
- Investopedia.com – the resource for investing and personal finance education.
- Drill Ships - These look like tankers/ships, but they travel the oceans in search of oil in extremely deep water.

Oilfield Services - Oilfield service companies assist the drilling companies in setting up oil and gas wells. In general these companies manufacture, repair and maintain equipment used in oil extraction and transport. More specifically, these services can include:

- Seismic Testing - This involves mapping the geological structure beneath the surface.
- Transport Services - Both land and water rigs need to be moved around at some point in time.
- Directional Services - Believe it or not, all oil wells are not drilled straight down, some oil services companies specialize in drilling angled or horizontal holes.

The energy industry is not any different than most commodity-based industries as it faces long periods of boom and bust. Drilling and other service firms are highly dependent on the price and demand for petroleum. These firms are some of the first to feel the effects of increased or decreased spending.

If oil prices rise, it takes time for petroleum companies to size up land, setup rigs, take out the oil, transport it and refine it before the oil company sees any profit. On the other hand, oil services and drilling companies are the first on the scene when companies decide to start exploring.

Oil Refining The refining business is not quite as fragmented as the drilling and services industry. This sector is dominated by a small handful of large players. In fact, much of the energy industry is ruled by large, integrated oil companies. Integrated refers to the fact that many of these companies look after all factors of production, refining and marketing. For the most part, refining is a slow and stable business. The large amounts of capital investment means that very few companies can afford to enter this business.

From the refinery, oil is piped, shipped, railed or trucked (usually several of the above) to your corner gas station.

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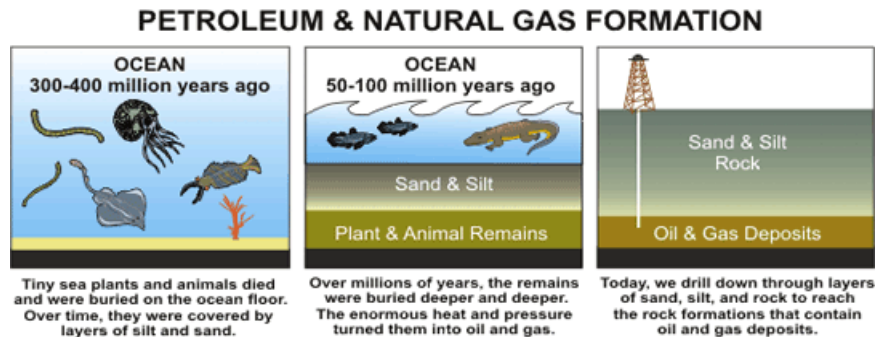
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OIL OVERVIEW

(synthesized from public domain sources)

HOW OIL IS FORMED

Oil is formed from the remains of animals and plants (diatoms) that lived millions of years ago in a marine (water) environment before the dinosaurs. Over millions of years, the remains of these animals and plants were covered by layers of sand and silt. Heat and pressure from these layers helped the remains turn into what we today call crude oil. The word "petroleum" means "rock oil" or "oil from the earth."



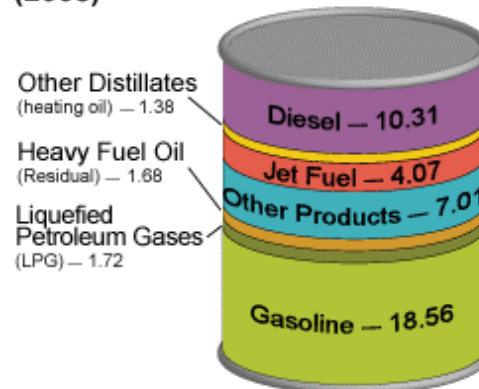
PRODUCTS MADE FROM A BARREL OF CRUDE OIL

Crude oil is called "sweet" when it contains only a small amount of sulfur and "sour" if it contains a lot of sulfur. Crude oil is also classified by the weight of its molecules. "Light" crude oil flows freely like water, while "heavy" crude oil is thick like tar.

After crude oil is removed from the ground, it is sent to a refinery by pipeline, ship, or barge. At a refinery, different parts of the crude oil are separated into useable petroleum products. Crude oil is measured in barrels (abbreviated "bbls").

A 42-U.S. gallon barrel of crude oil provides slightly more than 44 gallons of petroleum products. This gain from processing the crude oil is similar to what happens to popcorn, which gets bigger after it is popped.

Products Made from a Barrel of Crude Oil (Gallons) (2008)



CRUDE OIL EXTRACTION

Because oil and gas are less dense than water (which occurs in huge quantities in the earth's subsurface), oil and gas migrate UP through relatively porous sedimentary source rock toward the earth's surface.

When the hydrocarbons (oil and gas) are trapped beneath a non-porous rock, an oil and gas reservoir is formed. This type of rock is called a cap rock, as it caps

the upward migration of oil and gas. This is also called a "trap", as the oil and gas are trapped and cannot move. These reservoirs, which are simply layers of rock containing relatively large quantities of oil and gas, are our source for crude oil and gas.

To find these traps, geologists use satellite imagery, 3D seismic, gravity meters, and magnetometers. Once a

steady stream of oil is found, underground the drilling can begin. In order to bring the hydrocarbons to the surface, a well must be drilled through the cap rock and into the reservoir. Drilling rigs work in a similar fashion as a hand drill; a drill bit is attached to a series of drill pipes and the whole thing is rotated at high speeds to make a well in the rock. Once the drill bit reaches the reservoir, a productive oil or gas well can be completed and the hydrocarbons can be pumped to the surface.

When the drilling activity does not find commercially viable quantities of hydrocarbons, the well is classified as a "dry hole". Dry holes are typically plugged and abandoned.

OIL SANDS

Oil can also be extracted from oil sands, often called tar sands. Oil sands are typically sand or clay mixed with water and a very viscous (or "goeey") form of crude oil known as bitumen.

The extraction process for oil sands can be quite different from drilling due to the high viscosity of this extra-heavy oil. It can be strip mined or a variety of other techniques can be used to reduce the viscosity of the oil. This process can be far more expensive than traditional drilling and is found in high abundance only in Canada and Venezuela. As oil demand continues to rise, and reserves become depleted, oil sands could provide one of the last viable methods for extracting crude oil from the Earth.

WORLDWIDE OIL PRODUCTION

While just about every country in the world depends on oil, not all countries produce it. The top five oil producing countries are: Saudi Arabia, Russia, United States, Iran, and China. It is important to note that the term production here refers to crude oil extracted from oil reserves.

The top five oil consuming countries are: United States, China, Japan, Russia, and Germany. At the current rate of consumption it is estimated that worldwide reserves will become extinguished by 2039. Scientists and engineers are working hard to find ways of more efficiently extracting and processing crude oil to delay what could one day become a global energy crisis.

WHAT IS OPEC (WIKIPEDIA)

The Organization of the Petroleum Exporting Countries (OPEC) is a cartel of twelve countries made up of Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela.

OPEC's influence on the oil market has been widely criticized, since it became effective in determining production and prices. Arab members of OPEC alarmed the developed world when they used the "oil weapon" during the Yom Kippur War by implementing oil embargoes and initiating the 1973 oil crisis.

OPEC's ability to control the price of oil has diminished somewhat since then, due to the subsequent discovery and development of large oil reserves in Alaska, the North Sea, Canada, the Gulf of Mexico, the opening up of Russia, and market modernization.

OPEC nations still account for two-thirds of the world's oil reserves, and, as of April 2009, 33.3% of the world's oil production, giving them considerable control over the global market. The next largest group of producers, members of the OECD and the Post-Soviet states produced only 23.8% and 14.8%, respectively, of the world's total oil production.

As early as 2003, concerns that OPEC members had little excess pumping capacity sparked speculation that their influence on crude oil prices would begin to slip.

THE FUTURE

There is an organization called the Energy Information Administration, or EIA, that's part of the US government, which issues what is generally considered the most accurate statistics on the oil and gas industry, from production to consumption.

In early 2010 the EIA estimated that energy consumption would rise by 44% from 2006 – 2030, with usage by non-OECD countries increasing by 73% and only 15% for OECD countries. The EIA estimates that in 2007 dollars, the price of light sweet crude oil in the United States will rise from \$61 per barrel in 2009 to \$110 per barrel in 2015 and \$130 per barrel in 2030.

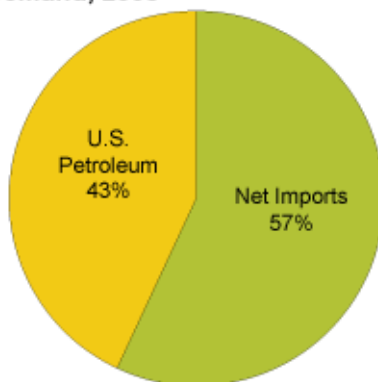
THE UNITED STATES AND FOREIGN OIL

WHERE DOES OUR OIL COME FROM

The United States imported about 57% of the petroleum, which includes crude oil and refined petroleum products, that it consumed during 2008. Nearly half of these imports came from the Western Hemisphere. Its dependence on foreign petroleum is expected to decline in the next two decades.

Although the US is the third largest crude oil producer, most of the petroleum it uses is imported.

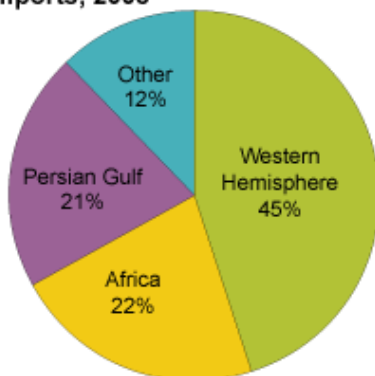
Net Imports and Domestic Petroleum as Shares of U.S. Demand, 2008



Source: U.S. Energy Information Administration.

Western Hemisphere nations provide about half of its imported petroleum.

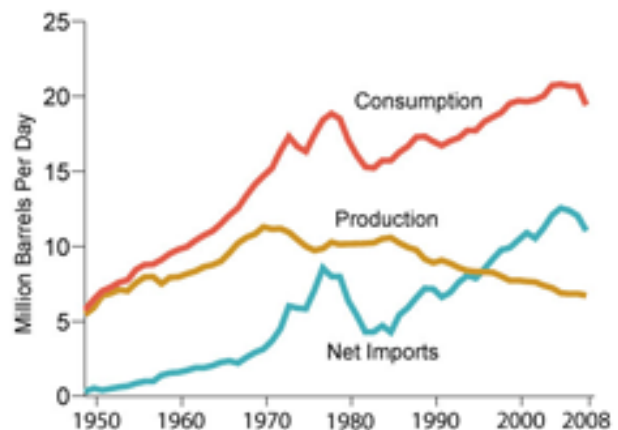
Sources of U.S. Net Petroleum Imports, 2008



Source: U.S. Energy Information Administration.

Net imports have generally increased since 1985 while U.S. production fell and consumption grew.

Consumption, Production, and Import Trends (1949-2008).



Source: Energy Information Administration, *Annual Energy Review*, Table 5.1. (June 2008)

The United States consumed 19.5 million barrels per day (MMbd) of petroleum products during 2008 making us the world's largest petroleum consumer. The United States was third in crude oil production at 4.9 MMbd. But crude oil alone does not constitute all U.S. petroleum supplies. Significant gains occur, because crude oil expands in the refining process, liquid fuel is captured in the processing of natural gas, and we have other sources of liquid fuel, including biofuels. These additional supplies totaled 3.6 MMbd in 2008.

In 2008 the United States imported 12.9 million barrels per day (MMbd) of crude oil and refined petroleum products. We also exported 1.8 MMbd of crude oil and petroleum products during 2008, so our net imports (imports minus exports) equaled 11.1 MMbd.

Petroleum products imported by the United States during 2008 included gasoline, diesel fuel, heating oil, jet fuel, chemical feedstocks, asphalt, and other products. Still, most petroleum products consumed in the United States were refined here. Net imports of petroleum other than crude oil were 7% of the petroleum consumed in the United States during 2008.

Some may be surprised to learn that almost 50% of U.S. crude oil and petroleum products imports came from the Western Hemisphere (North, South, and Central America and the Caribbean including U.S. territories) during 2008. About 20% of our imports of crude oil and petroleum products come from the Persian Gulf countries of Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia, and United Arab Emirates. The largest sources of net crude oil and petroleum product imports are Canada and Saudi Arabia.

Sources of Net Oil Imports:

Canada (20.1%)
Saudi Arabia (13.8%)
Venezuela (10.5%)
Nigeria (8.8%)
Mexico (8.7%)

It is usually impossible to tell whether the petroleum products you use came from domestic or imported sources of oil once they are refined.