Alternate Oil Sources

The United States government and industry, as well as various countries around the world, are very interested in the pursuit and development of tar sands and oil shale as an alternative to conventional oil. Aging oil fields have begun to taper off, and oil companies have been frustrated for years with the Middle East’s refusal to open the doors to Western companies (#1). Every President from Nixon to Bush has stated their desire to become independent of foreign oil. Rising crude oil prices and the time-ticking alarm of the “peak oil,” are reasons enough to take action toward a replacement. Refining tar sands and oil shale into synthetic fuel will work equally as well as conventional oil.

Peak oil does not mean running out of oil, but it does mean running out of cheap oil. Of the sixty-five largest oil producing companies in the world, fifty-four of them, including the United States, have passed their peak and are now in decline. The “Bell shaped Curve” proven by, M. King Hurbert, predicted the U.S. lower states to peak in 1970-1971. Hurbert went on to predict a “Global” oil peak between 1995 and 2000 (#6). The very optimistic are predicting the worldwide oil peak in 2035 (#5). Since the 1980’s, oil companies have been finding less oil than we have been consuming (According to The Association for the Study of Peak Oil).

Until now, energy companies have bypassed the tar sands and oil shale alternatives to conventional oil, due to the high cost to develop the industry (#4). Currently, oil is not produced from tar sands on a commercial level in the U.S. Only
Canada has a large scale commercial Tar Sands Industry. It is centered in Alberta, where the largest deposits in the world are found. They are second only to Saudi Arabia. More than one million barrels of synthetic oil are produced in one day at the Alberta resource. There is a small amount of tar sands produced commercially in Venezuela. In the U.S. tar sand resources are found concentrated in eastern Utah. Tar sands are found in many places worldwide, but it is not all recoverable.

Tar sands, also called “oil sands,” are a combination of clay, sand, water, and bitumen. Bitumen is the sought after part and is a thick, sticky, heavy, black oil that smells like a roofing tar (#1). Bitumen cannot be pumped from the ground in its natural state. It is usually extracted by “open pit mining,” or “strip mining” techniques. In Alberta, Canada, huge machines dig up the earth and remove the oil sands and gigantic trucks are loaded with the mixture. When these trucks are fully loaded they weigh more than two 747 airplanes.

The tar sands are transported to a refinery where a hot water process and an agitation is required to separate the bitumen from the other substances. The hot water and agitation releases the bitumen from the sand. Tiny air bubbles attach to the bitumen causing it to float to the top of the surface where it is then skimmed off (#7). More processing is then involved after the skimming to rid it of residue and water. The bitumen is then transported and upgraded into synthetic fuel. About 75% of the bitumen is successfully removed from the sand, and the rest of the sand and the other materials are returned to the mine to be reclaimed another day (#7).

Companies are mining hundreds of feet deep, and move enough dirt and oil sands in two days to fill Yankee Stadium. The “in- situ” technique is used to get the bitumen
that is buried too deep for mining to be economical. This technique includes steam injection, solvent injection, and firefloods, in which oxygen is injected, and part of the resources are burned to provide heat. Steam injection is favored but requires huge amounts of water and energy for heating and pumping.

It takes two tons of oil sands to produce 42 gallons, or one barrel of crude (#1 & #7). Canada’s oil reserve went from 4.9 billion barrels in 2003, to 180 billion currently, becoming the 2nd largest reserve in the world. David Frowd, of Shell Oil Company, has invested heavily in extracting oil from the Alberta sands. He estimates the reserves even higher, at 300 billion barrels, and the world’s reserves of oil extracted from the tar sands and oil shale at 800 billion barrels (#8).

Shell Oil Co. is currently developing an in situ retorting process using electric heaters placed into deep holes that are drilled through the oil shale. The volume will be heated for two to three years with temperatures reaching 650-700 degrees at which point the oil is released from the shale, but is contained within an underground barrier (#2).

Oil shale is a rock that contains a bituminous material called Kerogen. The bitumen is released as petroleum when the rock is heated. Oil shale was formed millions of years ago by silt and debris from lake beds and sea bottoms, and it will burn without any additional processing.

Oil shale is known as “the rock that burns,” and is mined using one of two methods (#2). Because the oil shale is solid and cannot be pumped right out of the ground, it must be mined. It is then transported to a facility to be heated to a high temperature. This process is called retorting, and the liquid result must then be separated and collected.
The second method is called, “in situ retorting,” which is the process of heating the oil shale while it is yet underground. The liquid is then pumped to the surface (#2). Extracting oil from oil shale is more complex, and more expensive than the extraction of conventional oil, but not necessarily, in comparison to today’s rising prices.

Oil Shale is found in many places worldwide, but the largest deposits in the world are found in the U.S. “Green River Formation Range,” which includes Colorado, Utah, and Wyoming. Estimates are from 1.2 to 1.8 trillion barrels, but not all are recoverable. A moderate estimate of 800 billion barrels is recoverable from the Green River Formation, and that is three times greater than the proven oil reserves of Saudi Arabia (#2).

Oil shale has been used for fuel and as a source of oil in small quantities for many years, but few countries are currently producing it on a commercial level. Many countries do not have enough oil shale reserves; unlike the U.S. (#2). It seems that with oil shale, we have the opportunity and the responsibility to tap this reserve. The oil shale industry has not been fully developed yet. Due to the rising cost of conventional oil, and modern technologies, it may prove to be feasible.

A study by Exxon Mobil concluded that only ancient fossil fuels provide energy on a large enough scale to meet the world’s growing demand for energy (#1). The most reliable replacements would be other hydrocarbon resources such as tar sands and oil shale. These fossil fuels, like conventional oil, have the energy to move our autos, trucks, trains, tractors and aircraft (#4).

Environmental impacts are a factor, and both horrifying and seemingly unavoidable in this modern-technological world, if we are to continue to live the way we
are accustomed to living. Both the mining and the processing involve several kinds of impacts to the environment, such as, global warming and the greenhouse gases, waste ponds of sand and petroleum by-products, disturbances of mined land, and impacts on wildlife, air, and water.

Community and personal opinions will vary from area to area in the midst of the change. Some will be pleased due to high-paying jobs and population increase, while others will be annoyed and disappointed to be in the midst of tar sands or oil shale discovery and production what-so-ever (#3). Still others like me are comforted to know that we do have an abundance of available resources to use as an alternative oil source, and that there are those who are working in our behalf to develop these resources.

In conclusion, I understand that turning tar sands and oil shale into synthetic oil may not be the answer to our energy crisis, but it could buy us some time to come up with a better solution. In the meantime, if giant corporations such as Shell and Exxon are pouring millions of dollars into the extraction of tar sands and oil shale, then one must realize that these are two serious alternatives to oil. The goal is to produce a barrel of oil without it costing a barrel of energy. By using a combination of energy sources, and by practicing conservation and non-hazardous progression we will be lending a hand toward the solution. Most of all, by being thankful to God for all that He has given us, we, the human society will be able to ease into the transitions with faith, knowing that we discovered and preserved plentiful amounts of energy sources for the generations to come.
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