Coal: Bargain With A Dirty Devil

Coal is the most abundant hydrocarbon, especially in the United States. U.S. and world consumption of coal in 2006 were 851 and 4,635 MM tons respectively.[i] Reserves were 246,643 and 909,064 MM tons respectively.[i] Thus, U.S. reserves were about 27% of the world total, and were sufficient for 290 years at current U.S. levels of usage. Actually determining how long reserves will last is a much more complicated undertaking than this simple calculation, still, compared to oil and gas, coal is plentiful in the U.S.

There are several grades of coal. Anthracite and bituminous pack more energy and burn cleaner. Lignite and peat are dirtier and provide less energy. Coal contains impurities that are serious pollutants when burned. Much coal east of the Great Plains is high in sulfur content.[ii] The sulfur reacts with oxygen to form sulfur dioxide (SO_2), a smelly, poisonous gas. SO_2 reacts with water vapor in the air (we call water vapor *humidity*) to form sulfuric acid. All coal contains nitrogen (it's part of the coal molecule). When coal is burned, nitrogen reacts with oxygen to form nitrogen oxides (NO_x), also poisonous gasses. NO_x reacts with water vapor in the air to form nitric acid. SO_2 and NO_x cause lung and heart disease and they are important constituents of smog. The acids they form are the cause of acid rain. Burning coal also releases particulates, which cause haze; if inhaled, they become trapped in the lungs contributing to (eventually) chronic lung disease. Coal also contains trace amounts of mercury, which is released into the atmosphere when burned. Mercury, of course, is a powerful neurotoxin that is dangerous even in very small amounts. The mercury in your tuna comes from coal. Finally, coal contains large numbers of carbon atoms, thus it releases more carbon dioxide (CO_2) than does oil or natural gas. CO_2 is the principle greenhouse gas causing global warming.[ii]

In large installations like electricity generating stations, scrubbers and filters can be used to mitigate coal's poisonous emissions. They are expensive and bulky, however, and are not easily adapted to smaller installations. They are also less than 100% effective. Consequently, coal is primarily used to generate electricity, to fuel large industrial boilers, and as coke in steelmaking.[ii]

The mining of coal is also a very dirty business. Coal is strip mined when possible. This process is devastating to the area being mined. Whole mountaintops are consumed. The ecosystems there are completely destroyed, and the valleys into which the tailings are dumped are also destroyed. Iron pyrite (fool's gold) is often found where coal is found. When the coal is removed, iron pyrite comes into contact with water, releasing sulfuric acid. Thus, the mines and the tailings leach acid; unless remediated, this occurs whether the mine continues to be operated or not. In Pennsylvania, more than 2,000 streams were blighted by coal mine acid runoff.[iii] Closed coal strip mines can be reclaimed, sometimes quite beautifully, but it is expensive, is not typically done voluntarily, and it requires government monitoring. Even successful mitigation, however, cannot replace a mountain that has been mined away.

We need coal, and we're not going to be able to give it up any time soon. But it comes with a terrible environmental cost. We should be working hard to find alternatives, and to find cleaner ways to use the coal we do use.

[i] *BP Statistical Review of World Energy, 2007.* http://www.bp.com/productlanding.co?categoryId=6848&contentId=7033471. MM tons are million metric tons. A metric ton is about 2,204 lbs.

[ii] Nersesian, Roy. (2007) *Energy for the 21st Century.* Armonk, NY: M.E. Sharpe.

[iii] From the article on coal in Wikipedia. Rettrieved 10/9/07, `http://en.wikipedia.org/wiki/Coal.`