Energy Problems in a Nutshell

There are three basic energy problems: the energy crunch, pollution, and climate change.

1. Energy crunch. The majority of our energy comes from hydrocarbons, which are beginning to come into short supply. Coal is most plentiful, then gas, then oil.[i] After a portion of an oil or gas field is harvested, the rate at which the field produces declines. U.S. oil field production began declining in the 1970s; North Sea, Indonesian, and Columbian oil production are now declining, and many experts believe Middle Eastern oil fields will begin declining in the next few years.[ii] Because hydrocarbons can be substituted for each other to some extent, gas and coal can be partially substituted for declining oil production, but there are many problems and costs of doing so, and it accelerates the depletion of those resources.[ii] Oil prices have doubled since 2003, and natural gas prices have tripled, because of constrained supply.[i] We also have not been building refineries, and we experience constraints because of limited refinery capacity. The specter of declining energy production paired with increasing world energy demand creates the risk of price escalation far beyond anything we have seen so far, and it puts us at the geopolitical mercy of the countries on which we are dependent for oil.

2. Pollution. Most of our energy comes from hydrocarbons, and hydrocarbons are dirty. Coal is very dirty and requires significant processing to reduce pollution. Even then, it is still very polluting. Oil is less dirty than coal, but still emits significant pollutants. Natural gas is cleanest, emitting only carbon dioxide, and less of that than either coal or oil.[ii] Pollution from coal burning was once a terrible problem—St. Louis famously had the day the sun didn't shine in 1939, and still struggles to meet federal pollution standards.[iii] In the U.S., the Clean Air Act has been imperfect, but overall a tremendous success. However, the plume of pollution created in India covers Southeast Asia, and the one created in China pollutes islands across the South Pacific.[iv] Even in the U.S., acid rain created by pollution from mid-western coal-fired electricity generators (that includes Missouri) is a significant problem in the Northeast,[v] and air pollution is estimated to cause 70,000 deaths each year in the U.S. (3 million worldwide).[vi]

The pollution created by mining and oil drilling is also a serious problem. The Exxon Valdez oil spill is but one dramatic example: think also of strip mining.

3. Climate change. Climate change is the result of a certain kind of air pollution. Greenhouse gasses are thought to be contributing to a rise in global temperatures of a kind that have not been experienced on earth for hundreds of thousands of years. The effects of global warming are not known with certainty, only estimated. They are almost certain to vary from place-to-place. Many models predict that Missouri will experience an increase in severe storms with longer, warmer dry periods between. Recent low reservoirs on the Missouri River and consequent competition between states over their water may already be one sign of this trend.[vii]

The extent of human contribution to global warming has been controversial. However, in the last few years the evidence seems to have solidified and the consensus is that we contribute significantly through activities that release carbon dioxide and methane. Burning hydrocarbons is our largest contribution to global warming.[viii] Climate change will be discussed in a separate series of white papers.

[i] *BP annual review of world energy, 2007*. British Petroleum. Available online at http:// www.bp.com/statisticalreview.
[ii] Nersesian, Roy. (2007). *Energy for the 21st Century.* Armonk, NY: M.E. Sharpe.
[iii] "The day the sun didn't shine" occurred in the Fall of 1939. A temperature inversion trapped emissions from coal burning near the ground. The resulting smog was so severe that residents had to use lanterns at midday. See *Episode in St. Louis Region,* City of St. Louis Division of Air Pollution Control. http://stlouis.missouri.org/citygov/airpollution/episod39.htm. For a list of similar episodes in other locations see *A history of air pollution events,* Delaware Department of Natural Resources, www.dnrec.state.de.us/DNREC2000/Divisions/AWM/aqm/education/airqualityappx.pdf.
[iv] To see photos from space, search for "Asia brown cloud" on Google Images, http://images.google.com.
[v] From the website of the U.S. Environmental Protection Agency, http://www.epa.gov/acidrain.
[vi] From the website of the Earth Policy Institute, htttp://www.earth-policy.org/Updates/Update17htm., viewed 9/2007.
[vii] The data supporting this paragraph come from many, many sources. However, the best single resource on global climate change for the lay reader is Gore, Al. (2006). *An inconvenient truth.* Emmaus, PA: Rodale. This book has been controversial because of the author's political history. Some have objected that the book is imperfect, and that not every one of the many, many facts it presents are without error. That objection could be raised about any book that reviews a broad topic. It is an unfair criticism. Whatever one may think of the messenger, *An inconvenient truth* is a valuable synthesis of a complex area that is viewed to be generally correct by most experts.
[viii] Intergovernmental Panel on Climate Change Working Group I (The Physical Science Basis of Climate Change). (2007). *Fourth assessment report: Summary for policymakers.* Available at http://ipcc-wg1.ucar.edu/wg1/wg1-report.html.