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Energy Responsibility

Lee Kottmeyer

University of Nebraska-Lincoln, lkottmeyer@huskers.unl.edu

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Course: ENSC230

Energy Responsibility

Lee Kottmeyer

lkottmeyer@huskers.unl.edu

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Shale oil, also known as kerogen oil or oil-shale is an unconventional oil produced from oil shale. Shale oil can be extracted from kerogen contained within a rock source through three ways: pyrolysis, hydrogenation, or thermal dissolution.

The oil shale industry has recently received a large amount of media attention due to the abundant nature of this resource in North America. The United States alone holds 70% of the world's known oil shale deposits. This new oil resource has leading experts predicting that the United States will become a net petroleum exporter in the future. However, these resources have been known to us for over a hundred years, so why are they only beginning to receive attention now?

The extraction of shale oil is very energy intensive, and according to, *Energy Return on Investment (EROI) of Oil Shale*, an article published in the November 22, 2011 issue of the Sustainability journal; the energy return ratio for shale oil is roughly 1.5:1 for the final fuel product. In contrast the EROI for final fuel products produced through conventional methods is approximately 4.5:1.

Due to the low energy return ratio of shale oil there is considerably more pollution associated with this extraction method. To extract the same amount of energy as from conventional sources as compared to shale oil you have to run more machines for a longer period of time. This means you are

burning more fuel and emitting more pollutants from this extraction method than others. It is not an economically responsible decision to develop this industry with this low of an EROI; the benefits of fuel production do not outweigh the environmental degradation caused.

Another means of assessing the impact of production can be done with an entire life cycle assessment. This is a study done that internalizes all factors of production from the beginning of the process to the end in terms of CO₂ equivalent emissions, it includes all transportation, electrical energy emissions, and all other emissions produced during the production process.

A study published in the July 2008 issue of *Environmental Science and Technology* entitled *Converting Oil Shale to Liquid Fuels* did just this study. In this study it was found that the full-fuel-cycle (FFC) emissions are 21%-47% larger than those from conventionally produced petroleum-based fuels.

The EROI and FFC for shale oil make it apparent that this is a very unclean fuel source. However, proponents of shale oil argue that the FFC could be greatly reduced with existing technologies today. Instead of using conventional fossil fuel based sources of electricity for production purposes renewable sources could be used. If this practice were implemented much of the fuel costs and carbon emissions associated with this type of fuel production could be mitigated. If this is the case why are these technologies not currently implemented?

Simply put this is a marketing scheme by proponents of this production method. It is currently a pipe dream to have shale mines powered solely with renewable sources. The current renewable technologies are too expensive, not efficient enough, and base loads are too unreliable to be implemented. There is no clean way to produce shale oil today.

Furthermore, proponents argue there are social and political benefits from the formation of such an industry within our own country. According to the department of Homeland Security

development of more domestic fuel sources will increase our national security; the department of labor also argues thousands of jobs could be created.

“The benefits of developing the shale oil industry do not come close to making up for the environmental degradations it causes. Unclean fuel sources are unsustainable and will not help the U.S. achieve energy security. Investing in renewable energy sources is a smarter more responsible option. Despite our countries massive oil shale deposits, extracting oil from these deposits is neither economical or in our best interest,” Amanda Johnson.

Contact me: lkottmeyer@huskers.unl.edu

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United States Department of Labor

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