Oil and Natural Gas Estimates for America's Red Rock Wilderness Act, Utah

Results

America's Red Rock Wilderness Act (ARRWA) is 9.6 million acres in size and distributed across 4 of the United States Geological Survey's (USGS) oil and natural gas provinces: Uinta-Piceance, Eastern Great Basin, Southwestern Wyoming, and Paradox. With the exception of the Paradox, these provinces were updated in 2002 or 2005. The Paradox Province was last assessed in 1995. Based on these resource estimates, The Wilderness Society estimates that 128 million barrels of "technically recoverable" oil [MMBO] and 1.47 trillion cubic feet of "technically recoverable" natural gas [TCFG] are associated with the ARRWA (Table 1).

These estimates are based on current technology and do not consider economic factors. As such, they represent an upper bound on the potential resources that may exist in these lands. When such factors as the price of natural gas and oil, drilling costs, and the cost of transporting gas and oil to markets are included, the estimate will be lower than the technically recoverable estimates presented here.

Table 1. Estimates of Technically Recoverable Natural Gas and Oil Resources in America's Red Rock Wilderness Act

	Technically Recoverable Undiscovered Resources	Resources Compared to Annual U.S. Consumption	Resources Compared to U.S. Proved Reserves
Natural Gas	1.47 Trillion cubic feet	6.33% of total annual consumption; would meet U.S. needs for about 23 days [a]	0.62% of proved reserves [b]
Oil	128 Million barrels	1.80% of total annual consumption; would meet U.S. needs for 6.56 days [b]	0.60% of proved reserves [d]

Source: U.S. DOE, Energy Information Administration (www.eia.doe.gov)
[a] U.S. natural gas consumption in 2008 was 63.59 billion cubic feet per day
b U.S. dry natural gas proved reserves in 2007 were 237,726 billion cubic feet
[c] U.S. petroleum consumption in 2008 was 19.498 million barrels per day
[d] U.S. proved crude oil reserves in 2007 were 21,317 million barrels
These estimates are the most recent available from the U.S. Dept. of Energy

Costs of Oil and Gas Drilling

Extraction of the very small amount of oil and gas in these lands would not come without costs. Utah has been prized as a destination for outdoor recreation and pursuing industrial development on wilderness quality lands will have impacts on this tourism. The Utah Tourism Industry Coalition estimates that in 2007 visitors spent over 6 billion while vacationing in the state. The industry generates $617 million in state and local taxes and creates over 113,000 jobs.[1]

[1] Utah Tourism Industry Coalition, 2008 "The State of the Utah Tourism Industry" ftp://ftp.xmission.com/pub/users/u/uttour/outgoing/TourismReport2k8v1r2_print.pdf

Developing wilderness quality lands will also result in the loss of substantial non-market values. These values have been estimated by economists for over 4 decades and are an important aspect of the total value associated with public lands. To ignore these costs results in an incomplete and one-sided picture of the opportunity costs of developing wilderness quality lands.

The Bureau of Land Management has estimated these values for certain lands within the Price Field Office by applying the results of prior research in what is arguably a very conservative manner. They arrive at an estimate of an annual non-market value of $38.50 per acre for wilderness quality lands.[2] The 9.6 million acres of proposed wilderness are worth $346 million annually in non-market values.

Data Sources and Methods

The Wilderness Society's analysis is based on the best available data from the U.S. Geological Survey's (USGS) National Oil and Gas Assessment (NOGA) data (http://energy.cr.usgs.gov/oilgas/noga/). The initial NOGA, completed in 1995, projected the volume of technically recoverable, undiscovered petroleum resources without regard for the time span that might be required to realize the assessed volumes. Subsequent to this effort, the USGS developed new analytical methodologies based on a 30-year time frame for development. The new methodology has been employed for priority basins starting in 2000 to estimate the volume of undiscovered oil and gas resources that have the potential to be added to reserves over the next thirty years. Analysis of these priority basins is an ongoing process and representative of about 97% of the discovered and undiscovered oil and gas resources of the United States. All data is provided by the USGS in geographic information system (GIS) format.

The ARRWA analysis is based on previous work by The Wilderness Society that synthesized all of the NOGA data for the Rocky Mountain states of Colorado, Montana, New Mexico, Utah and Wyoming. Petroleum resources for basins falling wholly or partly within this region were included in our analysis. We used the updated NOGA datasets, where available, and filled in with the 1995 results to develop as complete a picture as possible of technically recoverable petroleum resources across the entire region. To compile large quantities of GIS data across more than a dozen basins, we developed a series of scripts written in Python, the native scripting language of ArcGIS (geographic information system technology by ESRI). The scripts formatted the data for automation, converted resource volumes to densities (volume per unit area) and then summed density values across overlapping hydrocarbon deposits. The final output of the process was a single data layer that represents resource density estimates for a combination of conventional and continuous (unconventional) accumulations of oil, natural gas, or natural gas liquids as a continuum across the entire region. One additional Python script was written to query this region-wide data and return the volume of oil, natural gas, and natural gas liquid associated with any boundary that falls within the Rocky Mountain Region. The ARRWA boundary data used in this analysis was obtained from the Utah Wilderness Coalition.

Oil and gas volumes are reported as probability of occurrence in the USGS data. A volume in cubic feet of gas or barrels of oil is given for 5%, 50%, 95% and the mean likelihood of

[2] U.S. Department of the Interior, Bureau of Land Management, Price Utah Field Office 2008. West Tavaputs Plateau Natural Gas Full Field Development Plan Draft Environmental Impact Statement UT-070-05-055 (Chapter 3, pages 3-181 to 3-183)

occurrence of each petroleum resource. For example, a volume of natural gas provided at the 95% level indicates a 95% probability that the stated volume of gas is present. Smaller resource volumes are associated with the higher probabilities of occurrence. The results of the Wilderness Society analysis provided in this document use the mean probability and we believe it provides an unbiased measure of the fossil fuel energy potential of public land – as opposed to the 5 percent estimate that has too much risk and uncertainty for use in land management decisions.

It is important to emphasize that the analysis accounted for *technically recoverable resources*, not *economically recoverable resources*. The volumes for economically recoverable resources would be notably smaller and are variable because they depend upon factors such as market prices and the cost to extract the resources, including technology constraints. *Consequently, our results substantially over estimate the volume of oil and natural gas that would actually be economical to produce*.

Assumptions

First, we assumed that the USGS estimates of undiscovered gas and oil resources provide the best, unbiased estimate available to public land managers.

Second, we assumed that gas and oil quantities are distributed evenly across each USGS Assessment Unit – where assessment units consist of areas with common geologic characteristics. The U.S. Department of Energy (2001)[3] and the National Petroleum Council (1999)[4] used the same assumption in their reports.

Data Limitations

Our analysis has employed the best available data for estimating the volume of undiscovered oil and natural gas reserves for a regional assessment based on the USGS data and methodologies described above. It is the same data used by federal land management agencies. While the best available, this data has the following inherent limitations:

- As mentioned above, our results over-estimate the volume of resources that would actually be developed. Our data is for *technically recoverable* volumes of oil and gas rather than the more practical *economically recoverable* estimates that take into a host of practical issues such as engineering constraints on extraction, distance to market and market prices for resources. *Technically recoverable* data significantly overestimate the volume of resources that are *economically recoverable* as is documented in the report by the Rand Corporation.[5]
- Our results may miss oil and gas resources in limited areas not yet assessed by the USGS. There are gaps in the Rocky Mountain States that the USGS has not assessed for oil and gas potential in either the original assessment or their more recent updates. Most of these

[3] U.S. Department of Energy, Energy Information Administration. 2001. U.S. Natural Gas Markets: Mid-Term Prospects for Natural Gas Supply. SR/OIAF/2001-06

[4] National Petroleum Council. 1999. Natural Gas: Meeting the Challenges of the Nation's Growing Natural Gas Demand. A Report of the National Petroleum Council.

[5] Tom LaTourrette, Mark Bernstein, Mark Hanson, Christopher Pernin, Debra Knopman, and Adrian Overton, 2003. Assessing Natural Gas and Oil Resources: An Exampoe of a Ner Approach in the Greater Green River Basin. Prepared by Rand Science and Technology for the William and Flora Hewlett Foundation.

areas have low potential for adding to undiscovered resources based on their lack of proximity to existing development and the fact that the USGS has not made these areas a priority for their assessments.

- Inaccuracies in the GIS boundaries of the USGS basins may lead to small errors (under and over estimates) in the volumes of oil and gas at the edges of the basins. This error is on the order of 1 to 2% per basin. It is minor in computing regional oil and gas volumes but could be more significant when examining areas at a basin boundary.