



Deep Ocean Energy Resources -- A Critical Analysis

Posted by [Dave Cohen](#) on July 13, 2006 - 7:20am

Topic: [Geology/Exploration](#)

Tags: [deep ocean energy resources](#), [doer](#), [mms](#), [outer continental shelf](#), [proved reserves](#), [undiscovered resources](#) [[list all tags](#)]

On June 29th, the House of Representatives passed the [Deep Ocean Energy Resources](#) (DOER) act. This bill may be taken up by the Senate soon. The legislation is now in the news and the mudslinging has begun. Conservative organizations and media like the [Washington Times](#) are pushing the main agenda, which is to open up areas of the US Outer Continental Shelf (OCS) to oil & natural gas E&P (exploration and production).

Over the latest four quarters for which financial data are available, **ExxonMobil has spent a greater proportion of its record profits (\$36.7 billion) and cash flow repurchasing its common stock (\$20.5 billion) than investing capital in oil and gas exploration (\$19.1 billion)**. If Congress is disturbed by this juxtaposition, it ought to do something about it. In fact, Congress has the power to establish an investment climate in which ExxonMobil would be far more likely to use a much larger share of its cash flow drilling for oil and gas than spending the money boosting its stock price...

The potentially liberated OCS area, where federal rules have banned drilling, is believed to contain **19 billion barrels of oil and 86 trillion cubic feet of natural gas**. Given that current U.S. proved reserves total 22 billion barrels of oil and about 190 trillion cubic feet of natural gas, the OCS oil and gas reserves unleashed by the House last month represent a huge step in the right direction. With the support of 40 Democrats, the Deep Ocean Energy Resources (DOER) Act passed the House by a 232-187 vote....

Under DOER, drilling would still be banned for the first 50 miles off the coast. However, with the approval of a state's governor and legislature, a state could repeal that ban by petitioning the federal Department of Interior to authorize drilling within that 50-mile limit. Unless a state petitioned Interior to maintain the moratorium beyond 50 miles, DOER would permit drilling in waters 50 to 100 miles offshore. To induce states to permit expanded drilling, DOER offers them a larger share of the royalties. In a concession to Florida, DOER bans drilling within 100 miles of the state's west coast....

Here, we'll take a realistic view of what's going on and investigate the question of whether opening up the OCS to drilling will save us.

DOER is [controversial](#) because of environmental concerns and tourism dollars. Even California's Governor opposes it while advocating conservation as the necessary first step to meeting our energy requirements. Others on the right claim that DOER will help us meet our energy needs

and create jobs. But all this begs the question. This is TOD, so we want to know what's at stake regarding energy. You may have noticed the magic numbers bolded in the Washington Times editorial text -- 19 billion barrels of oil and 86 trillion cubic feet of natural gas. Where do these estimates come from? Most [sources](#) you see will quote these numbers.

As far as I know, the sole information source for DOER is [Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources](#), a report to Congress from the Minerals Management Service (MMS) Offshore Minerals Management Program. [**Warning:** this is a 134 page PDF file. Don't try this at home.] MMS is part of the Department of the Interior. Let's get the big picture in two figures from the document.



Figure 1: Map Showing the United States Outer Continental Shelf

Figure 1 -- Click to Enlarge

Table 1(a): Total Endowment of Technically Recoverable Oil and Gas on the OCS, 2006

Regions	Known Resources			Undiscovered Resources (mean estimate)	Total Endowment (mean estimate)
	Cumulative Production	Reserves	Reserves Appreciation		
OIL (Billion Barrels)					
Alaska OCS	0.01	0.03	0.00	26.61	26.65
Atlantic OCS	0.00	0.00	0.00	3.82	3.82
Gulf of Mexico OCS	13.05	7.06	6.88	44.92	71.91
Pacific OCS	1.06	1.46	0.00	10.53	13.05
Total OCS	14.12	8.55	6.88	85.88	115.43
Natural Gas (Trillion Cubic Feet)					
Alaska OCS	0.00	0.00	0.00	132.06	132.06
Atlantic OCS	0.00	0.00	0.00	36.99	36.99
Gulf of Mexico OCS	152.25	27.70	30.91	232.54	443.40
Pacific OCS	1.32	1.56	0.00	18.29	21.17
Total OCS	153.57	29.26	30.91	419.88	633.62

Figure 2 -- Click to Enlarge

Figure 1 gives us the geography of the OCS regions under consideration for E&P. Figure 2 shows the *known* and *undiscovered* resources (mean estimate) of the OCS regions. But what does "mean estimate" actually mean? Look at all those zeros in the known resources part of the table. Also, note those enormous numbers in the "undiscovered" category. And where are the magic numbers cited above? It is easy to see how this table could be used to fuel all sorts of wild speculation.

In order to answer these questions, we must understand something about MMS's reserve accounting practices. The publicly quoted numbers appear on page xii of the introduction.

The MMS estimates that conventional oil and gas resources (i.e., **UTRR**) in OCS areas currently off limits to leasing and development total 19.1 Bbo and 83.9 Tcfg (mean estimates). There remains today, **considerable uncertainty concerning the resource potential of many of these OCS areas**. The availability of additional modern G&G [geological & geophysical] data could reduce this uncertainty. It is instructive to note that perceptions concerning the resource potential of the Central, Western and portions of the Eastern GOM, areas experiencing robust levels of exploration and production effort, have continued to evolve for the better over the years. Critical to the changing perception is the fact that the MMS has acquired approximately 1.75 million line-miles of two-dimensional (2-D) common depth point (CDP) seismic data and nearly 300,000 square miles of 3-D seismic data. However, the additional G&G data and information that become available to assessors between assessments is frequently mixed in terms of having a positive or negative effect on the perception of the overall hydrocarbon potential of the OCS.

OK, MMS has some CDP and 3-D seismic data. But what does UTRR mean? We shall get to the "mean estimate" shortly. Unfortunately, I can't quote a 134 page document at too much length. But here's the UTRR.

Undiscovered technically recoverable resources (UTRR):

Hydrocarbons that may be produced as a consequence of natural pressure, artificial lift, pressure maintenance (gas or water injection), or other secondary recovery methods, but without any consideration of economic viability. The UTRR do not include quantities of hydrocarbon resources that could be recovered by enhanced recovery techniques, gas in geopressured brines, natural gas hydrates, or oil and gas that may be present in insufficient quantities or quality (low permeability "tight" reservoirs) to be produced via conventional recovery techniques. Also, the UTRR are primarily located outside of known fields.

Just like how many angels one can fit on the head of a pin, the imponderable question here is how hydrocarbons can be both undiscovered and assessed as technically recoverable at the same time -- discounting, of course, *considerations of economic viability*. As any "hands on" insider in the oil & natural gas business will tell you, the only way to convert a resource from undiscovered to a proved reserve in this case is to get in a boat, load it with some equipment, go at least 100 miles off some OCS region, drill a test well and see what happens. As if to emphasize my point, this comes on the heels of the discovery that Mexico's huge 10 Gb (billion barrel) discovery in the Gulf turned out to be a [dud](#) once they actually drilled some test wells. Just as politics probably played

I will finish up by talking about the "mean estimate", the current R/P ratio of the US and the typical time it might take to bring any of these undiscovered resources on-stream. The "mean estimate", along with the "risked estimates" are calculated as follows.

Risked estimates reflect the long term expected outcome from repeated exploration in areas identical to the one being assessed. An MPhc of 0.5 means that 50 percent of the time the basin will be dry and the other 50 percent of the time technically recoverable hydrocarbons will be present. In the 50 percent of the cases when exploration is successful, the volume discovered is represented by the solid curve labeled "conditional." The assessment shows that there is a 95 percent chance that at least 1.5 Bbo will be found and a 5 percent chance that the amount found will be at least 6.5 Bbo. The average amount is assessed at 3.75 Bbo. The basin, however, is a frontier basin without a discovery, therefore if the basin is dry, the volume of resource expected to be discovered is zero. The resource assessment results reported would reflect this risk of failure. This is shown in the dashed curve labeled "Risked." **Note on this curve there is a 50 percent chance that the volume of resources discovered will be greater than zero. The corresponding F95 and F5 estimates are zero and 5.5 Bbo, respectively. The reported mean estimate is 1.88 Bbo.**

And here's MMS's sample illustrative graph.

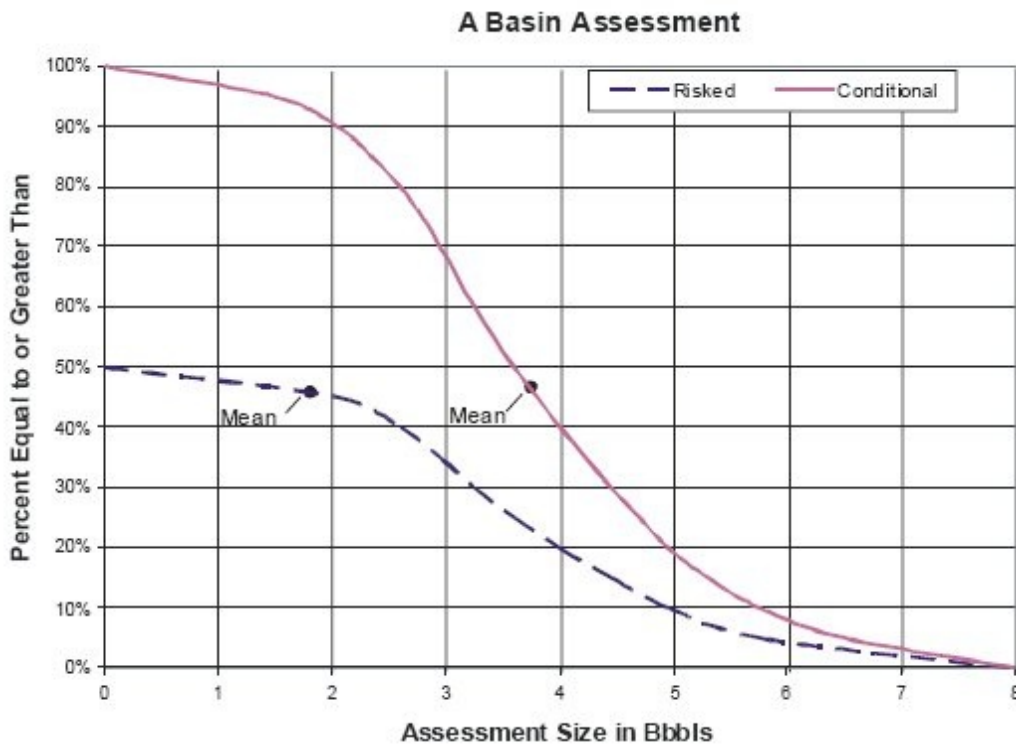


Figure 3 -- Click to Enlarge

F5? F95? Usually reserves are expressed in terms of [probabilities](#) like P5 or P95 and refer to *discovered* resources.

Reserves are generally classified as proved, probable, or possible; where these, usually,

are seen as additive, so the largest amount of reserves judged reasonably likely are the (proved + probable + possible) reserves. Alternatively, one can quote reserves as 95% likely (P95); 50% likely (P50) or 5% likely (P5)....

What does "F" mean? Is this non-standard terminology used because we are talking about some undiscovered "final frontier" hydrocarbon basins like in Star Trek?

In this [open thread](#), I estimated the US R/P ratio at about 7.2 years if production levels remained flat based on proved reserves of 21.4 Gb. For the new readers, always remember to check out our handy [Acronyms](#) guide. As an aside that I need to investigate, the British Petroleum [2006 Statistical Review](#) shows the R/P ratio as 11.8 years based on an increased reserves number of 29.3 Gb. Despite this discrepancy, as a follow-up, [Khebab](#) added this helpful graph.

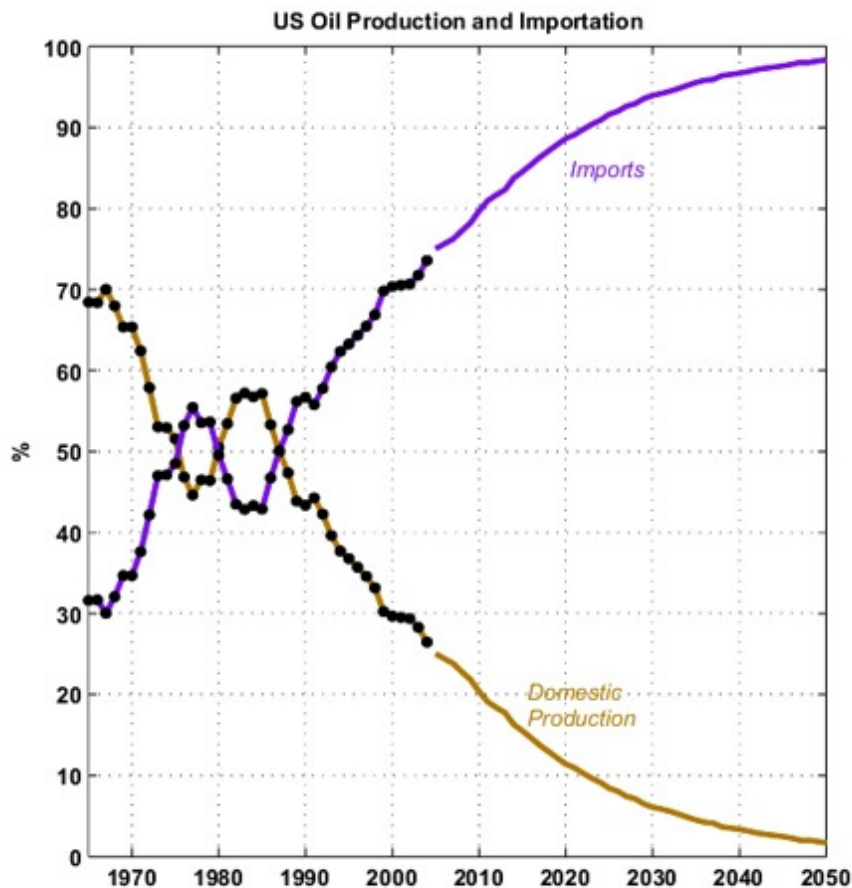


Figure 4 -- Click To Enlarge

As you can see in *Figure 4*, the "energy independence" situation is dire now and future consumption at current levels will make it much, much worse. How long would it take, again *discounting financial considerations*, to put the MMS undiscovered resources (assuming they are actually there) on-stream? I will also remind you that these projects will require deepwater or even [ultra deepwater](#) drilling. Even for "easy" E&P, which is rapidly disappearing all over the world, the ramp-up time is measured in some number of years in the likely range 4 to 8. As ExxonMobil is fond of telling us, the oil & gas business has "long lead times". Recall from the lead-in quote that they are spending more money on buying back their own stock than on E&P. Will the DOER bill change that? The DOER act passed by the House isn't even law yet. Assuming this

happens, lease blocks would have to be mapped out, auctioned off to oil & natural gas companies, initial testing would have to be done, etc. If a real "play" was discovered, it would then take some number of years to put it in production.

Concerning the mean estimates for the publicly quoted numbers, those 19 billion barrels of oil and 86 trillion cubic feet of natural gas, we note that non-existent reserves -- proved, probable or possible -- are being discussed as inferred from seismic data and extrapolations from the Gulf of Mexico where similar studies have been carried out. Considering the current US R/P ratio, I can only recommend this wisdom: "deal with reality or it will deal with you".

In conclusion, here in the United States we continue to fiddle as Rome burns.

[editor's note, by Prof. Goose] [Perhaps if we would change the political discourse with regard to energy...?](#)

[editor's note, by Prof. Goose] Also, please, this OCS thing might actually pass, fark, boing boing, reddit, furl, digg, do whatever you can to get this piece out there, from a green angle, from whatever angle you need. This is imporant.



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