



Reflections from ASPO: Contradiction, EROI, and Future Energy Supplies

Posted by [David Murphy](#) on October 28, 2009 - 10:26am

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Chevron Sets Record with Jack Prospect Well Test
Chevron | Tuesday, September 05, 2006

**NEW WAY TO TAP
GAS MAY EXPAND
GLOBAL SUPPLIES**

Nov. 8 (Bloomberg) -- **Petroleo Brasileiro SA**, Brazil's state-controlled oil company, said its Tupi field may contain as much as 8 billion barrels of oil and natural gas, an

NYT - 10/10/09

One feature of this year's ASPO conference that I most enjoyed was the contradiction amongst presentations. [Marcio Mello](#) gave an animated talk on Sunday night about the pre-salt formations off the coast of Brazil quoting that there are upwards of 500 billion barrels of oil available, an extravagant estimate that peak oilers are unused to hearing. Monday morning two talks on natural gas were juxtaposed in tone and content, one claiming that natural gas is the "American Treasure" and the other claiming that shale gas is marginally profitable, let alone a "treasure."

Contradiction in this kind of academic setting magnifies the awareness of all involved by broadening the scope of the discussion.

I have been to every ASPO-USA conference (save the first ever in Denver) and this is the first time that contradiction was so evident—though not for a lack of invitations from ASPO to potential contrarians like [Cambridge Energy Resource Associates](#) (CERA) and Mr. Yergin himself. All in the peak oil world are guilty of preaching to the choir to some degree. Places like [The Oil Drum](#), [The Post Carbon Institute](#), and [ASPO](#) have done an impressive job of educating people and getting the word out, but we never should feel fully satisfied with our outreach, as there will always be more populations—academic, professional, and otherwise—to educate. Paraphrasing from Al Bartlett at this year's ASPO conference: for every PhD gained, there is one of equal and opposite magnitude.

Serendipitously, the *New York Times* published an article on unconventional natural gas production in the U.S only one day ahead of this year's ASPO conference. They state:

"CERA caculated that the recoverable shale gas outside of North America could turn out to be equivalent to 211 years worth of natural gas consumption in the United States at the present level of demand, and maybe as much as 690 years" (NY Times, Oct. 10 2009)

When I read quotes like the above I think only one thing: we—the peak oil community at large—have much work to do. To that end, it’s important to simplify and condense our message to make it as clear and accessible to the general public as possible—without sacrificing the nuances of the argument for peak oil. I am inclined to borrow a methodology from a book I am currently reading. [The Canon](#) by Natalie Angier is a summation of what scientists within the “hard” sciences (biology, astronomy, physics, chemistry, mathematics, etc) identify as the most significant ideas within their fields. I will share what I believe to be the most important concept to emerge from Energy Return on Investment (EROI) literature. So, here goes:

The quantity of oil, gas, coal, or any other energy bearing resource that is left in the Earth is not the question, all that matters is that portion that can be exploited at a *significant* energy profit.

EROI is a method by which we determine how much energy can be gained at a significant energy profit. And note the deliberate use of the word “significant,” because what may be an insignificant net energy gain to an advancing industrial economy may be a significant net energy gain for a subsistence agricultural economy. Below is a table of what we believe to be the EROI of most major sources of energy. This data was accepted and will be published by the *New York Annals of Science* in January, as part of a special report on Ecological Economics. There are limitations to the estimates provided in this table, however. The numbers quoted in the table are averages, and as technology advances and companies look for oil and gas in remote places using techniques that are far from conventional, the averages grow increasingly inaccurate. Thus whenever there is an announcement of a new discovery, such as those at the top of this post, one needs to ask: “How much will be recovered at a significant energy profit?”

Resource	Year	Magnitude (EJ/yr)	EROI (X:1)	Reference
Fossil Fuels				
Oil and Gas	1930	5	>100	[2]
Oil and Gas	1970	28	30	[1,4]
Oil and Gas	2005	9	11 to 18	[2]
Discoveries	1970		8	[1,4]
Production	1970	10	20	[1,4]
World Oil Production	1999	200	35	[21]
Imported Oil	1990	20	35	[32]
Imported Oil	2005	27	18	[32]
Imported Oil	2007	28	12	[32]
Natural Gas	2005	30	10	[32]
Coal (mine mouth)	1950	n/a	80	[2]
Coal (mine mouth)	2000	5	80	[2]
Bitumen from Tar Sands	n/a	1	2 to 4	[32]
Shale Oil	n/a	0	5	[32]
Other Non-Renewable				
Nuclear	n/a	9	5 to 15	[32,33]
Renewables				
Hydropower	n/a	9	>100	[32]
Wind Turbines	n/a	5	18	[34]
Geothermal	n/a	<1	n/a	[32]
Wave Energy	n/a	<<1	n/a	[32]
Solar Collectors				
Flate Plate	n/a	<1	1.9	[4]
Concentrating Collector	n/a	0	1.6	[4]
Photovoltaic	n/a	<1	6.8	[53]
Passive Solar	n/a	n/a	n/a	[32]
Biomass				
Ethanol (sugarcane)	n/a	0	0.8 to 10	[4,54]
Corn-Based Ethanol	n/a	<1	0.8 to 1.6	[26]
Biodiesel	n/a	<1	1.3	[32]

In summation, this year’s ASPO conference offered a broad scope of argumentation from individuals who do not necessarily subscribe to Peak Oil pedagogy. But this is a positive thing; for me, it confirmed that I still have much work to do, as most people still do not understand the importance of Energy Return on Investment. Take for example the claims made by Marcio Mello, who reported that there are 500 billion barrels of oil located in ultra-deep, pre-salt geologic formations off the coast of Brazil. To him I ask: how many 2.7 billion dollar Tahiti platforms are needed to extract that oil? How much will this cost in both energy and dollar terms? Ultimately, what is the energy return on investment for extracting these resources? Without answers to these questions, reporting the discovery of oil or gas is somewhat misleading because it may take more energy to access those barrels than chemical energy contained within them.

Without Mello’s provocative talk, though, we would not be forced to question our own methodologies. It is essential to keep the scope of argumentation at conferences, as well as individual departments or business, broad and open to contradiction. Otherwise, we peak oilers will find ourselves isolated from the possibility of enlightening others, and will self-reinforce to a point of immobility.



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