



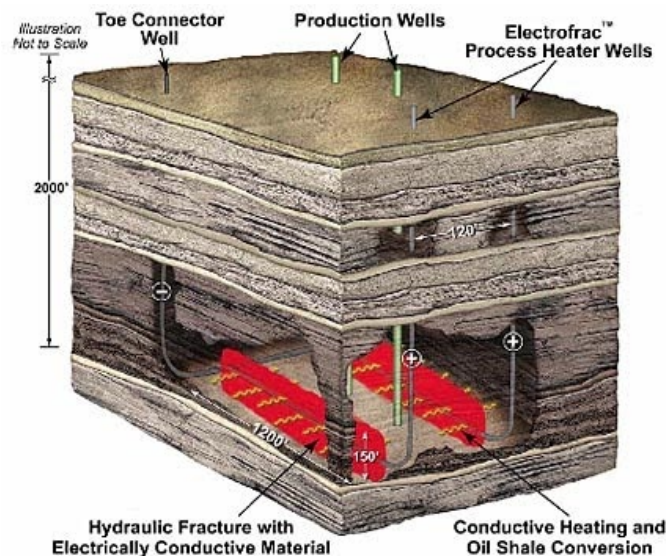
Tech Talk: The Future of Oil Shale

Posted by [Heading Out](#) on April 11, 2010 - 11:00am

Topic: [Supply/Production](#)

Tags: [heading out](#), [oil shale production methods](#), [tech talk](#) [[list all tags](#)]

I have spent some time over the past few weeks writing about various different ways of producing oil from oil shale. While it is now about time that I move on to other topics, [David Hagen](#) was kind enough to post the website that gives access to the presentations from the Oil Shale Symposia that I mentioned at the beginning of this mini-series.



Exxon Mobil plan for oil [production from oil shale](#)

The papers from the 28th Symposium in 2008 illustrate that while the current price of oil may not currently justify the development of large oil shale operations, it can justify the investment of research dollars to seek better ways of producing oil from these fields. This is particularly true if one accepts one of the criteria that Exxon used to justify their ongoing interest, namely that they project that world energy demand will be [40% higher in 2030](#) than today, with more than 80% of that energy still being supplied by fossil fuels. Exxon believes that the oil from oil shale will play a significant role in that supply.

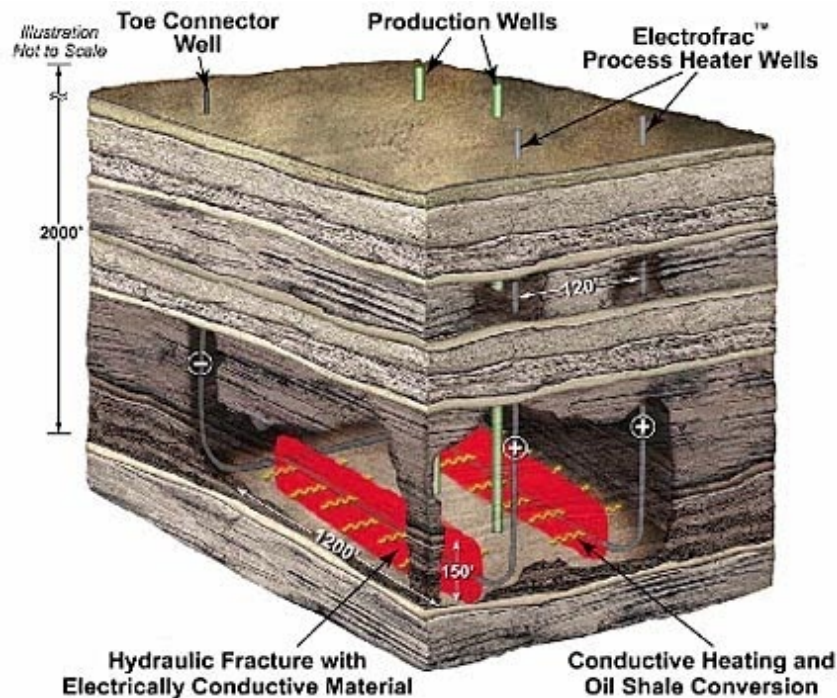
And so I am going to skip lightly through the papers, and highlight anything that catches my eye.

Exxon Mobil, for example, are looking into Electrofracking the shale. The idea of using electrical power directly to break rock has been around for some time. Erich Sarapu wrote his doctoral dissertation on this in the 60s [as I recall](#), unfortunately before the internet made it easy to find much information, though he went on to form [Electrofrac Corp](#). And there have been [more recent papers](#). However it appears that by putting electrically conductive materials into the fractures

and passing current through them, Exxon Mobil both limits the surface footprint, and the amount of material that has to be heated to achieve the transformation of the kerogen. Higher rock stress can apparently also [lighten the oil produced](#), based on lab tests. Since the time of the Symposium, Exxon Mobil has [run a successful field test](#) at their Colony Mine site, but has been quoted as commenting:

ExxonMobil sees tantalizing prospects for shale: up to 162,000 barrels of oil per surface acre at a 50 percent recovery rate. The results suggest a 3-to-1 ratio of energy recovered over energy expended to obtain it, McGinn said...It appears ExxonMobil can make its process work using about 1.5 barrels of water for each barrel of oil produced, he said.

Even under the most optimistic of scenarios, ExxonMobil sees no production coming from oil shale for 10 to 24 years, McGinn said.



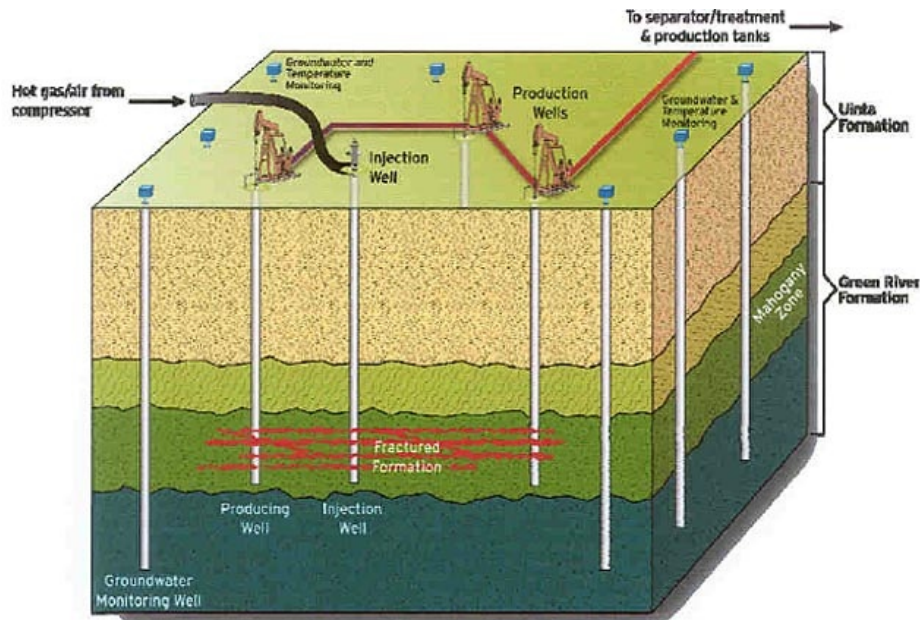
Exxon Mobil plan for oil [production from oil shale](#)

Shell have also reported that the ground conditions can change the quality of the oil produced, and that slower heating increases oil quality, while higher pressures [increase the hydrogen content of the oil](#). Field tests confirmed the lab information. (And for those who wondered about the ability to make jet fuel from oil shale, they also added [this table](#)):

Specification Test	Shell ICP Shale Oil JP8 2007	Shale Oil JP5 1974	Paraho Shale Oil JP5 1978	GTL JP8	Petroleum JP-8
Total Acid Number, mg KOH/g	0.002		0.001	0.004	0.005
Aromatics, vol %	3.2	25.95	24.0	0.0	20.3
Olefins %	0.7	2.29	1.6	0.0	0.6
Mercaptan Sulfur, % mass	0.000		0.01	0.000	0.000
Total Sulfur, % mass	0.00	0.05	0.04	0.00	0.07
Distillation:					
IBP, °C	146	171	186	144	160
10% recovered, °C	166	191	193	167	177
20% recovered, °C	171	199	196	177	183
50% recovered, °C	186	219	207	206	200
90% recovered, °C	219	254	232	256	237
EP, °C	245	282	253	275	255
Residue, % vol	1.3	1.0	1.2	1.5	1.2
Loss, % vol	0.5	1.2	0.2	0.9	0.7
Flash point, °C	44	65.5	66	45	52
Cetane Index (calculated)	52.4	49.5	44.6	66.0	45.1
Freeze Point, °C	-53	-22.5	-46	-51	-49

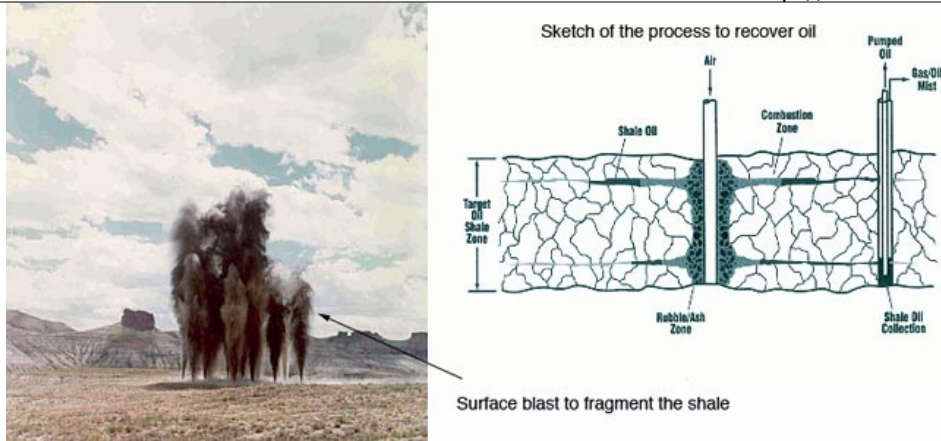
Jet fuel from oil shale (Courtesy of Shell and DoD) (the table has additional pages)

In contrast Chevron has looked at sending hot gases that are surface generated down and through [induced fractures](#):



Chevron concept for oil shale development ([NETL](#))

The [U.S. Bureau of Mines](#) did look at fragmenting the oil shale beds in place and then igniting them for an in-situ variation on the [Ecoshale process](#) I described last time (in the sense that the shale is heated within a geological retort).



Bureau of Mines test at Rock Springs ([NETL](#))

And I have previously written about the paper on the [ground freezing test](#) that Shell has carried out:

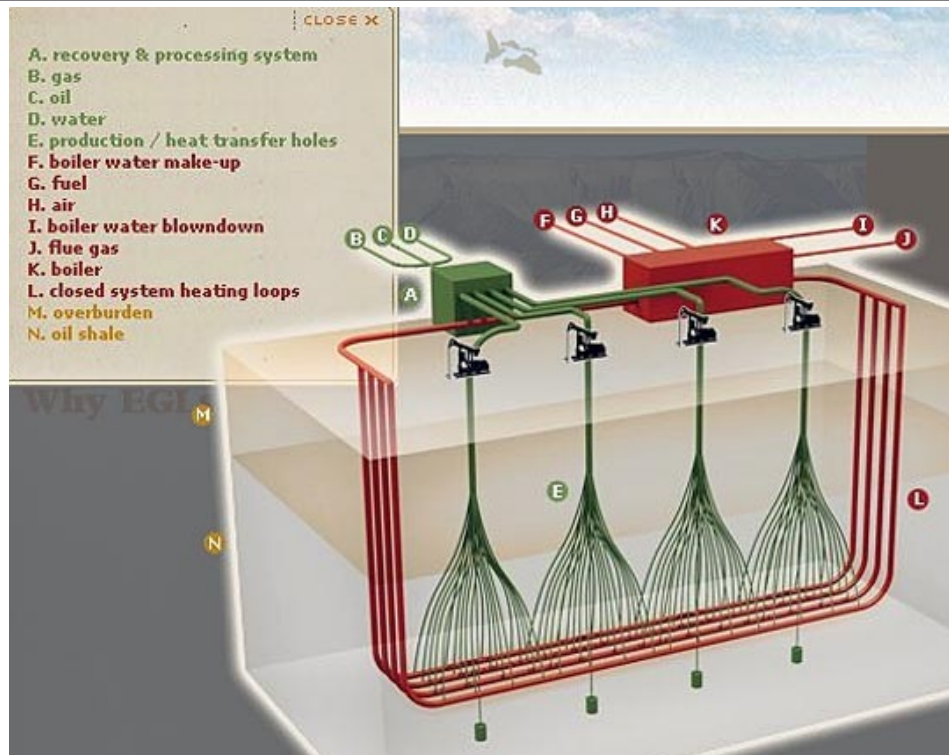


[Shell freezing test](#)

There is work being done by Total (who slipped in a comment that oil supply may [peak before 2015](#)). They see the world potential supply from oil shale as being measured in trillions of barrels of oil. They are collaborating with Petrobras in surface retorting programs and along with other companies encouraged by the [Jordanian government evaluating deposits in Jordan](#), which is also [examining microwave heating](#) and [Morocco](#). They are collaborating with Independent Energy Partner on geothermal fuel cells for in-situ heating and looking at downhole radio-frequency heating. There has been a subsequent paper on the [Moroccan oil shale development](#).

The use of [radio frequency heating](#) was described, with the Bechtel/Parsons conclusion that the process could yield an EROI of greater than 3. And the potential for using wind energy to power the microwaves was advanced.

The program being developed by [EGL](#) where the heating is supplied around the outside of a series of wells was also included.



Representation of the [EGL plan](#)

There is a [report available](#) on unconventional fuels that looks at oil shale, transmitted in December 2008. There was also, from August of that year, a complimentary [list of companies](#) carrying out research into oil shale and tar sands.

The Power Engineering Institute in Moscow discussed some of the work being [done in Russia](#) on both their deposits and those in other parts of the world. The Narva thermal refinery in Estonia has, for example, increased production to [over a million barrels](#) exporting about 40% of the product. The plant uses ash as a pre-heating step, and used [automobile tires](#) as part of the feed stock. A better list of some of the oil shale projects can be found at the [Oil Shale Association](#).

One thing is clear from perusing both the Proceedings and the additional papers that I have chased up to try and update some of the information. The Oil Shale resource around the world will become an increasingly viable one as the price and availability of conventional oil become more of a strain on the world and individual nations. This is being recognized by countries such as Jordan, China and, [Thailand](#). Plans range from continued examinations of more exotic methods for oil recovery, to the more conventional mining and surface retorting. The level of activity appears to be rising again, and thus while the continuous posting on the topic will now halt, I will come back to the subject intermittently in the future. It is a comment on the perceived future scarcity of conventional oil, that this subject is receiving so much attention.



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