

Do more here.
Do more with your career. Do more with your life.

View jobs.

StatoilHydro

E&P

SEARCH

Current Issue »
Subscribe | Renew



HART

HOME | EXPLORATION | DRILLING | PRODUCTION | ACTIVITY HIGHLIGHTS | CUSTOM COMMS | OPINION | VIDEO | MAGAZINE

HOME > MAGAZINE > 2008

Microwave potential

A company is examining the possibility of using microwave technology for extracting usable hydrocarbons from oil shale.

Article By Jeff Kimberly, Global Resource Corp.
Published Nov 2, 2008



Print



E-mail

The renewed focus on oil shale is understandable given the size and security of the enormous US resource base, centered in the Piceance Basin of western Colorado. Globally, the oil shale resource base in 27 countries is believed to amount to 2.6 trillion bbl. The Piceance Basin shale is located in the Green River Formation, with four basins containing shale rock traversing Colorado, eastern Utah, and southern Wyoming. Reserves are estimated to be equivalent to 1.2 trillion bbl of oil, almost half of the



Global Resource Corp. completes prototype demonstration of its microwave energy recovery technology at Ingersoll Production Systems in Rockford, Ill.

The United States consumes roughly 21 million bbl of oil per day, or 7.6 billion bbl a year. Thus,

if the nation's scientists could find an economically and environmentally sound way of producing the oil in the shale of the Piceance Basin, it would keep this country in oil at current levels for more than 144 years.

Exploitation of the western Colorado oil shale reserves has, however, been extremely elusive since the mother lode of the deposits, encased in 500-ft (164-m) thick rocks beneath 500 ft of sedimentary rock, are exceedingly tough to reach. In addition to the extraction cost, the current technologies unfortunately are rife with the potential for major environmental carnage. Surface mining leaves spent shale, which is environmentally damaging, while in situ mining leaves problematic residual subsurface formations.

Many technologies have huge water demands; others lack barriers to prevent leaching and protect ground water. Extracting hydrocarbons from oil shale produces carbon dioxide, which must be captured, used, or stored. Moreover, many technologies require using so much energy to extract the oil that the amount of energy expended is greater than the energy produced.

Not surprisingly, therefore, the fortunes of oil shale rise and fall roughly in step with the price of crude oil per barrel because of the cost of extracting it. When crude oil prices were US \$100 a barrel, the shale rush was on. A recent Rand Corp. survey reports that technologies used for surface exploitation — a process that often involves strip mining — range in cost from \$70 to \$95 per barrel, not a huge savings over that price.

The truly rich shale deposits, which lie deep in the earth, necessitate an in situ process of extraction. Thus, the most serious quest is for new ways to get at the oil shale in situ. The majors — ExxonMobil, Chevron, and Shell — are reportedly spending \$100 million a year to test new methods for separating the oil from the shale in situ. Shell, for instance, is working on a way to put coolers into the ground to build a so-called "freeze wall" around the shale lode. In this process, the company would then pump out the groundwater inside the wall and bake the rocks at 650 to 750°F (343 to 400°C), finally pumping out the liquids and gases.

Do more here.
Do more with your career.
Do more with your life.

View jobs.

StatoilHydro

point your career in the right direction



Most Popular Most Emailed Top Search

Offshore Virginia may finally be re...
What's the future hold for Canadian...
Oil and gas scientific software mar...
Gas-lift reverses diminishing retur...
Circle Oil discovers gas on Sebou p...
On the verge of collapse?

WebinarSeries HART

Issues in the Bakken Shale
Designed for oil and gas operators working in the Bakken Shale

Date: December 11, 2008
10:00 a.m. CST [Register Now](#)

The lengthy, elaborate process appears aimed in part at avoiding damage from shale residue leaking onto the water table.

A different approach

Global Resource Corp. (GRC), a developer of a patent-pending microwave technology and machinery for extracting oil and gas, has been adapting its process for extracting usable hydrocarbons from a wide range of materials.

For the past three years the company has been testing oil shale samples in its laboratory to determine its applicability and benefits. The laboratory tests completed to date indicate that microwave technology could resolve many of the challenges that oil shale presents: that is, the current uneconomic cost of converting oil shale to usable energy and the potential for environmental injury during and after the process of extracting the oil shale deposits.

The technology works as follows: It heats the shale in its natural depositional setting, turning the shale to liquids. Then the liquids, which account for up to 70% of the initial weight of the oil shale (depending on where the sample was mined), are gasified. While all current patented microwave solutions use a single common microwave frequency (2.45 GHZ), the company has patents pending for a wide range of microwave frequencies (10,000 exist). The company has identified a specific microwave frequency for each energy resource it targets — one for shale, another for tar sands, another for tarlike heavy oil, another for coal, one for old tires, etc.

In the GRC process, the frequencies are software-controlled.

The process targets the hydrocarbons. With the specific microwave frequency in a dry, self-contained vacuum, the microwave energy converts the energy source — shale rock, heavy oil, etc. — into a unified gaseous consistency. No carbon emissions result. No water or any other type of liquid injection is required.

The fact that no water is required puts the technology at a significant environmental advantage over other technologies being tested. Many require water intake from an available water source and likely contamination. The fact that the process produces no carbon emissions meets another significant environmental challenge for industry.

Other advantages

GRC's technology offers substantial advantages in two specific ways:

- environmental considerations; and
- energy cost. The energy balance for its gasification process is running at approximately \$30 per barrel.

For the second year in a row, the US Department of Energy's Office of Naval Petroleum and Oil Shale Reserves has singled out the company's microwave technology in recognition of its potential to convert oil shale into usable energy. In the government report, the company describes its process for exploiting the notoriously difficult oil shale deposits and getting greater yields at lower costs than any currently available technologies. The environmental advantages of GRC's process are also included in the government report.

While the company has been cited for its innovative technology, it is still undergoing laboratory testing on each of its applications, including heavy oil, oil shale, coal, tires, and plastic. Nonetheless, this innovative technology may hold the key to enormous energy production from a secure and ample resource in the United States.



Copyright© 2008 Hart Energy Publishing, LP
1616 S. Voss, Suite 1000, Houston, Texas 77057-2627
Tel: (713) 993-9320; Fax: (713) 840-0923

[About Us](#) | [Advertise](#) | [Subscribe](#) | [Legal Notice](#) | [Contact](#) | [Customer Service](#) | [Site Map](#)

Visit Our Other Sites: [Hart Energy](#) | [Oil and Gas Investor](#) | [A&D Center](#) | [Pipeline and Gas Technology](#) | [IFQC](#) | [World Fuels](#) | [ISEE](#) | [Hart Conferences](#) | [BioFuels](#) | [FUEL](#) | [WRFS](#)

All rights reserved. Reproduction in whole or in part, in any form or medium without express written permission is prohibited.