

# Poor Man's Oil

The price of oil and gas is rising so fast that it is upsetting the very foundation of the world's economic order. Jordan, which has no provable supplies of conventional oil, finds itself highly vulnerable to the current wild price gyrations. The good news is that Jordan does have a commercially-viable resource of another type of oil. The bad news is that this oil is environmentally less attractive and isn't as efficient as conventional fuel. What is this resource, how will Jordan exploit it and how will it impact the economy? **By Bilal Hijjawi**

JORDAN HAS ALWAYS HAD substantial deposits of oil; unfortunately these deposits aren't of the high grade liquid kind that comes gushing from the earth. Jordan's oil lies dormant, trapped inside rock and scattered across much of the country's surface area.

This fine-grained sedimentary rock is called oil shale, and although the term uses the phrase oil, the combustible organic substance within the rock is in fact kerogen (a solid mixture of organic chemical compounds). Its extraction process can be quite complex and costly. The more economic method for exploiting this resource is the direct burning of the rock to create energy, a simple application that operates on a similar principle to that of the coal-fired engine.

Jordan has about 23 known mineable surfaces and near-surface oil shale deposits in its southern and central regions and the oil is reportedly of a high grade.

## Untapped

Since the late 1970s, Jordan's consecutive governments have given serious thought to tapping the oil shale resource.

Early attempts saw negotiations with Canadian companies to extract oil from shale (a process called "retorting"), but these were soon scrapped due to the high cost of producing it and the low price of crude oil – especially since Jordan's oil at the time was coming from Iraq at below market cost.

Plans for burning oil shale directly in electricity power stations were also stopped, and gas became Jordan's favorite fuel in power stations. The environmental cost of burning oil shale directly as fuel was perceived as high when weighted against the economic gain for Jordan.

Everything changed for Jordan in 2003. The US and its allies invaded Iraq, effectively ending the Kingdom's honeymoon of cheap Iraqi oil supplies. Last month, NEPCO's (National Electric Power Company) Ahmad Hiasat, the Minister of Energy and Mineral Resources, Khalid Qteishat and "Eesti Energy," the Estonian energy generation company inked an agreement that will build Jordan's first oil shale power plant, with electricity production slated for 2015.

## The switch to power plants powered by oil shale would reduce Jordan's energy bill by at least 40–50 percent

Currently, natural gas flows from Egypt to power 80 percent of electricity generation in Jordan. Total Jordanian electricity generation capacity is around 2100 megawatts. The new oil shale-powered station, which will be built at a cost of about \$1.5 billion to \$2 billion, will generate a capacity of 600 to 900 megawatts of electricity. This, according to Muhannad Khalifeh, Energy Consultant [and Chairman of JO Publishing, the publisher of *Venture*] will significantly reduce Jordan's dependence on fuel oil and natural gas.

"Oil shale has become a strategic choice for Jordan," Khalifeh says. Abdulhai Zalloum, International Petroleum and Energy Consultant, agrees: "It would

be stupid not to go for it. It's feasible, viable and doable."

### Pity the Environment

Oil shale plants, however, will create serious environmental issues. Burning oil shale produces massive amounts of ash and Jordan's oil shale has sulfur that needs to be captured. So plants will require the developer to install systems for neutralizing the impact of pollution.

The ash produced from burning oil shale is fly ash (light) and bottom ash (heavy). To date, little environmental research has been done to analyze the impact of this atmospheric fly ash. One good thing going for Jordan is that its shale has relatively lower ash and moisture content and higher oil yield, at a par with that of western Colorado (USA) shale; some of the best oil shale deposits worldwide.

"Jordanian oil shale does have higher sulfur content (up to 9 percent by weight of the organic content), but there are solutions for capturing this byproduct and converting it to elemental sulfur which we can then use or export," explains Zalloum. Sulfur is a key ingredient in producing fertilizers from Phosphates. "Oil shale and its usage is a long and complex topic; everything in energy production carries its share

of environmental costs and problems, but as usual there are also solutions."

Khalifeh further explains that fly ash can be captured with electrostatic filters; and heavy ash can then be recycled into compacted concrete and used in large infrastructural construction applications or transported back and refilled into the mine from which it was excavated.

### (In)Availability

Jordan is, reportedly, one of many countries with ample oil shale deposits (estimated at 40 billion tons); but a little more than 35 countries have reserves that can be economically exploited. The US (with the highest known reserves), Australia, Brazil, Canada, China, Estonia, France, Russia, Scotland, South Africa, Spain, Sweden and a few others have identified substantial exploitable-grade reserves.

A 2005 study reported that oil shale resources globally were roughly estimated at 411 gigatons, which is enough to produce up to 3.3 trillion barrels of oil - more than the proven global conventional oil reserves. But these estimates could also be dramatically off the mark because the recoverable oil ratio within the rock is hard to estimate.

Most countries with proven reserves have been toying with the idea of extracting oil, developing methods that are mostly inefficient. Producing commercial quantities of oil from shale at costs that are competitive is still an illusive dream.

According to Khalifeh, Brazil and Estonia who have continued to develop their oil shale refining systems, and who are considered the world's most experienced, have at best negligible production capacity (both claim around 2,000 barrels per day of shale oil). Khalifeh adds that Canada however is blessed with sand oil, which is a different property. He says that it is easier to extract oil from sand.

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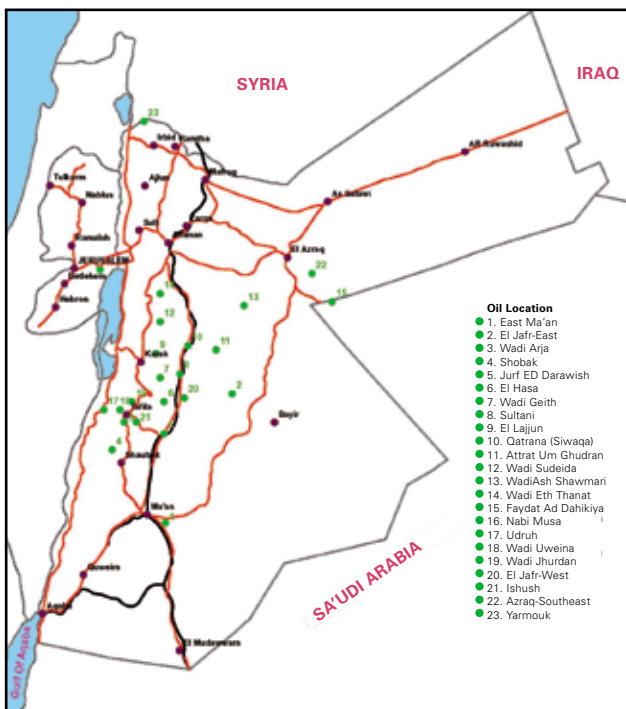
According to Estonian sources, the country generates over 90 percent of its electricity needs from power plants that burn oil shale directly, which is what Jordan intends to do. "Estonia's installed capacity for producing electricity is similar to Jordan's (a little above 2,000 megawatts)," explains Khalifeh.

### A Viable Alternative

There's an almost unanimous agreement among most oil pundits and researchers that oil prices will continue to rise in the future because production capacity has peaked while demand is expected to continue to grow. With demand for electricity in Jordan rising faster than projections, and with gas production from Egypt also reaching peak quota levels, the Kingdom has few options left to secure its future energy supplies.

"Tapping the oil shale resources and developing alternative clean renewable energy sources, such as sun and wind power, is imperative to secure Jordan's future energy needs," said Khalifeh. He estimates the cost of building a 1 megawatt oil shale power producing plant at about 50 percent the cost of building a similar capacity plant that utilizes solar power. So, for the immediate future, oil shale seems to be the logical way to go.

"We've always had an abundance of electricity capacity in the past, but not today. So from this strategic point of view, we need a source of electric energy that we can depend on should hard times come," Khalifeh adds. ♣



Oil Shale occurrences in Jordan