

Estonia eager to teach world about oil shale

May 30 2013, by Gary Peach



In this March 2013 photo, oil shale rock is processed in northeastern Estonia by removing limestone that is mined along with it. After this "enrichment" process the shale can be used to produce electricity in power plants or undergo further refining to make a variety of liquid fuels. Estonia, which burns shale to meet over 90 percent of its annual electricity needs, is attempting to export its unique technological expertise to shale-rich countries such as Jordan and the United States. Home to the creators of Skype and the first country to use online voting, Estonia relishes its image as a technological pioneer. But the tiny East European country's most far-reaching economic achievement could come from how it has learned to squeeze oil from a rock. (AP Photo/Gary Peach)

Home to the creators of Skype and the first country to use online voting, Estonia relishes its image as a technological pioneer. But the tiny East European country's most far-reaching economic achievement could come from how it has learned to squeeze oil from a rock.

About 200 feet (60 meters) below ground in northeastern Estonia, very close to the Russian border, miners drill holes in a gray-brown limestone wall as they prepare a series of blasts that will free up a soft brown sedimentary rock that contains oil. This oil shale is then scooped up and sent by conveyer to crushing mills above. From there, the shale will either be burned to create electric power or processed further to produce shale oil, a liquid fuel.

Estonia, a country of 1.3 million people, gets more than 90 percent of its electricity needs from oil shale—by far the world's most shale-dependent country.

With interest in non-conventional energy resources surging globally, Estonia wants to carve its own niche by perfecting the technology needed to produce cleaner electricity and high-grade fuel products from oil shale—know-how it wants to export to distant places such as Jordan and the U.S.

But environmentalists in Estonia are concerned that large-scale shale mining could cause pollution and contaminate underground water supplies.

Estonia's oil shale resources are very different from the shale deposits that are now yielding enormous amounts of oil and gas throughout the U.S.

Oil shale is rock that contains organic matter known as kerogen that, when heated, can produce a liquid oil very similar to crude oil. The shale

formations now being tapped in the U.S. are something else altogether. They contain natural gas, crude oil other liquid hydrocarbons that drillers can just bring to the surface and sell without much processing.

Estonia's shale industry directly employs about 6,500 people, or 1.1 percent of the country's workforce, and accounts for up to 3 percent of the nation's economy, according to the Ministry of Economic Affairs.

"We have almost a 100 years' experience working with oil shale in Estonia. If you know something, and if there's a market, you try to sell it," said Tarmu Aas, a board member at Eesti Energia, a state-owned utility that accounts for nearly all the country's shale and electricity production.

By 2016, the country also hopes to begin mass-producing high-quality automotive diesel, a technology that would significantly boost the commodity's value.

"Estonia has put itself on the map of the world with oil shale. In this particular technology we're good, we're the masters," said Konstantin Dotsenko, an Estonian energy trader.

The question, he explained, is whether world oil prices will remain high enough to keep oil shale viable.

Aas said that for decades there's been virtually no market for shale oil—the price for which is not quoted separately but as a rule is slightly cheaper than heavy fuel used to heat homes and power industrial boilers—since crude oil has been so cheap.

In fact, in the late 1990s, when oil prices plummeted, there was talk of mothballing the entire industry. But now that crude is relatively expensive, and could remain so, Aas said the windows of opportunity for

Estonia are beginning to open.



A March 2013 photo of the new, state-of-the-art Enefit280 oil shale refinery about to be launched in northeastern Estonia. A country of 1.3 million, Estonia aims to soon begin producing high-grade diesel fuel from oil shale that can be used in cars and trucks throughout Europe. Estonia annually produces 1-1.2 million barrels of shale oil, the liquid fuel refining oil shale, a rock. The new plant will have an annual capacity of approximately 2 million barrels. Estonia is attempting to export its unique technological expertise to shale-rich countries such as Jordan and the United States. Home to the creators of Skype and the first country to use online voting, Estonia relishes its image as a technological pioneer. But the tiny East European country's most far-reaching economic achievement could come from how it has learned to squeeze oil from a rock. (AP Photo/Gary Peach)

Although they don't exclude a sharp decline in demands and prices in the case of a severe global crisis, analysts generally believe oil prices will

remain at between \$80 and \$100 a barrel as the threat of a global oil shortage all but disappears.

Additionally, as the U.S. shale gas revolution picks up pace, all energy prices could fall—a contingency that would drain the profitability from oil shale projects.

"All signs point to those parts of the world that are growing—China, India and others—as being extremely large consumers of oil because the truth is that oil is the ticket to economic development, and always has been," said Daniel Kish, a senior vice-president at the Washington, D.C.-based research and policy group Institute for Energy Research.

"When countries begin consuming large amounts of oil, they amplify human strength and become wealthier ... oil prices are likely to remain at a pretty high rate."

Kish said no one is sure what the global oil shale market is worth since the resource is so poorly studied, but that could change as countries look to nonconventional fuel sources.

"Personally I think the prospects are good, and largely because there will be continuing demand for the fuel ... which is a high-quality fuel," he said.

One litmus test for shale oil will be Jordan. With Estonia's help, the Mideast country plans to build an oil-shale fired power plant by 2017 and later a refinery for shale-based oil products.

Oil shale could become a boon for Jordan, which imports about 97 percent of its oil and gas needs, crippling its economy with enormous trade deficits. The country sits on an estimated 34 billion barrels of shale oil. Eesti Energia, which markets itself internationally as Enefit,

estimates that the Jordanian venture, in which it owns a 65 percent stake, will be profitable as long as world oil prices stay above \$60 per barrel.

Worldwide, approximate shale oil reserves amount to 4.8 trillion barrels, according to the London-based World Energy Council. This is four times more than all known crude oil reserves, and experts say this estimate is conservative since historically so little exploratory work has been carried out with shale.

China, Brazil, and Russia have sizeable oil shale reserves, and small industries too, but the bonanza is in the U.S., which boasts a whopping 70 percent of the world's reserves. So vast, in fact, is oil shale's potential in the U.S. that Jack Gerard, CEO of the American Petroleum Institute, said in a speech in Washington, D.C. in January that in the western U.S. alone the volume of oil shale is estimated at 800 billion barrels—three times the proven crude reserves of Saudi Arabia. At current prices this much shale oil would be worth a staggering \$65 trillion.

Estonia, however, hopes to bring oil shale out of its dormancy in North America, and in 2011 Enefit bought the mineral rights across a large tract of land in eastern Utah, believed to contain 2.6 billion barrels of recoverable shale oil. Spokeswoman Eliis Vennik said the company must help extract these resources "if we wish to see ourselves as experts in the field of oil shale."

Enefit is still analyzing the quality of Utah shale, but preliminary tests indicate that the net yield per square yard of oil shale in Utah will be higher than at the Narva quarry in Estonia.

Though subsidiary Enefit American Oil has yet to obtain the numerous federal, state and local permits to begin shale mining, the company is optimistic it will begin mine construction in Utah in 2017, with the first oil being extracted in 2020. Enefit's ultimate target is to produce 50,000

barrels of shale oil per day.

But talk of oil shale's future makes environmentalists cringe. Shale mining in Estonia is water-intensive and pollutes underground water tables, while burning the rock for power produces loads of carbon dioxide, sulfur, and ash—even more than coal.

"If you compare different oil products and different technologies used in the European Union, then oil shale is the dirtiest," said Valdur Lahtvee, an expert at the Stockholm Environment Institute in Tallinn, Estonia's capital. Burning oil shale for power is also inefficient, he said, since it uses only 36-38 percent of the combustible organic matter within the rock.

Lahtvee, who argues that Estonia has enough biomass and wind to meet demand for power, said that if the EU were to raise fees on carbon emissions, Estonian shale could go out of business—a reality that Aas acknowledges. But executives at Eesti Energia, whose revenues last year amounted to 868 million euros (\$1.1 billion), emphasize there has been progress made in reducing emissions such as ash and sulfur.

Producing shale oil is far less harmful to the environment as some 3.5 times less CO₂ is emitted, according to Eesti Energia. In other words, the emissions occur "on the road" when cars and trucks burn the diesel, which is why environmentalists have less strenuous objections to Estonia's shale oil plans.

By producing oil "we make the use of energy contained in oil shale more efficient," said Lahtvee. "And there's more value added—that's good for the economy."

In the long run, whether tiny Estonia, which has approximately 50 years-worth of shale left at current production rates, will be successful

exporting shale technology will boil down to energy prices, officials say.

"Everything depends on the oil price. The oil price moves this train," said Aas.

But if shale does take off, Estonia could win big.

"The nut has already been cracked, but what really make the difference (are) the efficiencies of the process and the quality of the resource," said Kish. "There's no reason why a technology that (the Estonians) have worked hard on and stuck with over time when others have abandoned it shouldn't yield the benefits."

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