

Geothermic fuel cells

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“Geothermics” – adding heat to the ground.

Geothermics has a long history in hydrocarbon recovery in general and oil shale in particular. During World War II, the Swedes investigated geothermic production of shale oil using electrical resistance heaters installed in vertical boreholes. Later this approach was commercialized as the “Ljungstrom Method”. Shell Oil has researched a similar *in situ* approach to oil shale, essentially proving the technical viability of geothermics. However, the work to date has been done using electrical heaters similar to those used in Sweden 60 years ago. Burning fuel in a power plant to produce electricity and then using the electricity to produce heat underground is too inefficient and environmentally disadvantageous to be the ultimate answer. Clearly, a new idea is needed. Geothermic Fuel Cells is our new idea. Instead of an electrical resistor, the heating element is formed by a solid oxide fuel cell stack. The stack is sealed inside a cylindrical casing and is fed processed fuel and air from compressors on the surface. Approximately half the energy in the fuel is converted to electricity, with the balance expressed as heat. The hot geothermic fuel cell stacks, grouted into vertical boreholes, heat the oil shale to retorting temperature. The ground is thereby heated by energy that would otherwise be lost as waste heat. Geothermic Fuel Cells are now under a prototype development agreement between IEP and Battelle at their Pacific Northwest National Laboratories. Field demonstrations are scheduled to commence in the summer of 2008.