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## The Lithium Chase

By **CLIFFORD KRAUSS**

For many years, few metals drew bigger yawns from mining executives than [lithium](#), a lightweight element long associated mostly with mood-stabilizing drugs.

Suddenly, the yawns are being replaced by eureka's. As awareness spreads that lithium is a crucial ingredient for hybrid and [electric cars](#), a global hunt is under way for new supplies of the metal.

[Toyota Tsusho](#), the material supplier for the big Japanese automaker, announced a joint venture in January with the Australian miner [Orocobre](#) to develop a \$100 million lithium project in Argentina. That deal came only days after [Magna International](#), the Canadian car parts company that is helping develop a battery-powered version of the [Ford Focus](#), announced that it was investing \$10 million in a small Canadian lithium firm that also has projects in Argentina.

They were the latest in a series of deals and projects announced over the last year, reflecting a new urgency among companies to assure themselves future supplies of the metal.

"There is a sea change under way," James D. Calaway, the chairman of [Orocobre](#), said. "We are at the front end potentially of a very significant increase in the demand for lithium for the emerging electric transportation sector."

Mr. Calaway added, however, that the timing of any increase in lithium supply and demand was difficult to predict in large part because electric cars had yet to take off in any big way.

About 60 mining companies have begun feasibility studies in Argentina, Serbia and Nevada that could lead to more than \$1 billion in new lithium projects in the next several years, while dozens of smaller projects are being proposed in China, Finland, Mexico and Canada.

The companies are competing for construction financing, and the future of most of the projects will depend on how popular electric cars eventually become. That is an open question since batteries remain expensive, recharging stations need to be developed, and consumer taste for cars that depend on regular stops at electric outlets remains untested.

"It's moving so fast," said Edward R. Anderson, president of TRU Group, a consultancy firm that specializes in the lithium industry. "There are a lot of people throwing money into this, and a lot of people are going to lose their money."

In the meantime the four biggest current producers, which mine and otherwise gather lithium in Chile, Argentina and Australia, say they are planning to expand long-running projects as future demand warrants.

In Bolivia, which has almost half of the world's reserves, the leftist government is building a pilot production plant and is drilling exploratory holes. That Bolivia is a remote, unstable country often hostile to foreign investment has helped spur interest in producing lithium in neighboring Argentina and Chile, in Australia, and in the United States. Several Canadian and American companies are making claims about future production prospects in Nevada, though few analysts foresee large-scale production from that state.

While most experts are skeptical that meaningful amounts of lithium can be produced domestically, they maintain that adequate supplies will be available from sources outside of Bolivia for many years to come and note that the biggest producer, Chile, is a dependable American ally.

Most of the lithium market serves a variety of industrial applications. About a quarter of all lithium produced is used for energy storage, in everything from cellphones to laptop computers to digital cameras.

That proportion stands to increase sharply if battery-powered cars take off. Lithium-ion batteries are the favored battery type for electric and hybrid vehicles because they carry more energy with less weight than other materials and because they lose their charge more slowly. They store about three times as much as energy per pound as a nickel-metal hydride battery.

Lithium is found in trace amounts in many places, but it is being produced commercially mainly by two methods. One is through mining and processing, a relatively expensive method that produces the metal mostly for glass, ceramics and the manufacturing of television tubes.

The more economical and significant method is through evaporation of lithium-containing brines, mostly in salt flats in the highland areas in South America and western China. Lithium reservoirs have been formed over millions of years in highland bowls, after rivers and hot springs washed over lithium-laden rocks and leached the mineral from them. Producers drill wells into the salt flats and pump the brine into evaporation ponds. With the removal of water, the lithium content in the brine increases to a level where it can be collected and shipped to a chemical plant for processing.

The industry leader in this method of production is Sociedad Química y Minera, a Chilean fertilizer company in which the Potash Corporation, a Canadian fertilizer giant, holds a major stake. The other important producers in Latin America include [FMC Corporation](#) and Chemetall, a subsidiary of [Rockwood Holdings](#), which also operates a small brine reserve in Nevada.

Recycling of lithium from used batteries could become an important source, in which case "the demand for virgin material would be reduced," said R. Keith Evans, a geologist who serves as a consultant to lithium producers. Up to 50 percent of the lithium in used batteries may be recycled in the future.

But Mr. Evans added, "The big question is the timing of demand. Are you going to build a plant before a market has developed?"

By the standards of traditional gold and copper booms, the increase in interest in lithium is still muted among big mining companies. Supplies of lithium are plentiful for now, and the price of lithium chemicals actually declined at the end of last year because of the economic slowdown. The price for lithium carbonate,

the basic lithium compound used in batteries, had been around \$5,000 a ton for the last five years or so, and has leveled at about \$4,000 since October.

But with several major auto companies promising to market electric cars around the world over the next few years, demand may be poised to increase. Nissan will introduce the Leaf, a five-passenger electric car, and [General Motors](#) will be introduce the Chevrolet Volt, a plug-in hybrid, within the next year.

“We believe that demand is slated to rise dramatically,” according to a recent report by the investment adviser Byron Capital Markets, predicting a 40 percent increase in demand for lithium from 2009 to 2014. [Credit Suisse](#), in a recent report, predicted a 10.3 percent annual growth in demand for lithium between 2009 and 2020.

“You could probably go further out than that and see similar growth rates,” John P. McNulty, a co-author of the Credit Suisse report, said. “It’s going to be a big industry.”

*This article has been revised to reflect the following correction:*

***Correction: March 12, 2010***

*An article on Wednesday about increasing demand for [lithium](#), an element that is crucial for the lithium-ion batteries favored for hybrid and [electric cars](#), referred incorrectly to another battery used in such vehicles. That battery is known as nickel-metal hydride, not hybrid.*