



Pay Dirt

Countries with high concentrations of lithium are poised to pick up where their oil-rich cousins leave off.

As the global energy landscape tilts away from fossil fuels and toward renewables, demand for the lithium-ion (Li-ion) battery is growing. Power tools, computers, cell phones, and electric and hybrid cars all use Li-ion power. (Non-automotive Li-ion battery use currently accounts for 26 percent of total usage and is predicted to spike to 55 percent by 2015.) The small steps from petroleum-based energy toward other sources brings to mind the geopolitical hegemony that petrol states have wielded for the past hundred years. If lithium is poised to replace oil as a primary energy source, a few countries stand to win the geologic lottery.

Used in the fields of aerodynamics, medicine, glass, lubrication, air-conditioning, ceramics, nuclear energy, and nuclear weapons, lithium is not a new resource. It is the lightest metal and the 33rd-most abundant element on the planet. It's not found in elemental form

due to high reactivity, but large concentrations are extracted from granites (lithium-containing minerals spodumene and petalite) and brine deposits. Although the purity of extraction from rocks is greater, extraction from brine is cheaper, and this has led a run on the salt flats of the world.

The vast majority of the world's easily accessible lithium deposits are in South America. By some accounts, Bolivia has 50 percent of the world's minable supply. But wary of past exploitation, resource nationalists are moving that continent's leaders to keep a firm grip on their reserves. Governments throughout the region want to keep lithium under state control. Bolivian president Evo Morales recently nationalized the oil and gas industries and hasn't shown any interest in the Western companies that are actively courting a chance to harvest his country's lithium. Further complicating outside involvement, the new Bolivian constitution could

give much of the control over natural resources to the indigenous people. Brazil and Chile have likewise made their lithium deposits state property of strategic importance, in part for lithium's potential use in nuclear weapons but largely due to its economic value. Outside of South America, the largest deposit is under a salt flat in Tibet. Salt deserts are replacing sand deserts in the post-petroleum era.

Mining lithium is only half the power equation when it comes to control of the energy markets. A country with the technology to manufacture the Li-ion battery could be just as powerful. Right now, that country is undoubtedly Japan. Due to early R&D in the 1980s, the Japanese company Asahi got the first patents on Li-ion battery technology. Japanese companies Sony, Matsushita, and Sanyo soon poured hundreds of millions of dollars into the technology and quickly became the leaders in manufacturing.

Asia produces almost all of the world's Li-ion batteries, with Sony and Sanyo leading the way. (Korea and China are distant seconds.)

Paradoxically, the drive for lithium and its green energy end-use in hybrid car batteries is leaving a mark on pristine parts of the world. The best lithium-bearing brines are found near volcanic belts, in geologically enclosed depressions found in desert regions. Large evaporation ponds are used at the sites to concentrate the lithium before trucking it to a processing plant, and processing 1 ton of lithium requires 3 tons of brine and 1.8 tons of soda ash. The demand for lithium is pushing countries to open up designated parklands and ancient lakes for development. That said, industry experts believe we could recycle 95 percent of Li-ion batteries in an attempt to offset cost and environmental damage. The EU has set a mandatory target of recycling 45 percent of portable equipment batteries by 2016. For now, the lithium race is on. — Eric Burns

TOTAL PERCENTAGE OF LITHIUM WORLD RESERVE BASE, BY REGION

