

A Democracy Center Special Report

# Bolivia and its Lithium

Can the “Gold of the 21st Century” Help Lift a  
Nation out of Poverty?



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## Executive Summary

The resource curse refers to the paradox that countries and regions with an abundance of natural resources, especially minerals and fuels, tend to have less economic growth and worse development outcomes than countries with fewer natural resources.

Bolivia has a long history with that curse, dating back to the theft of its silver at the hands of the Spanish during the colonial era. Today Bolivia seeks to break that curse with what some call “the gold of the 21st century”: lithium. This report examines Bolivia’s prospects for doing so.

### I. Lithium – The Super Hero of Metals

Every time we pick up a cell phone or iPod, look at our watch, or plug-in a laptop we are relying on batteries that contain lithium. It is also used in ceramics and glass production, bi-polar medication, air conditioners, lubricants, nuclear weaponry, and other products. The lightest metal on Earth, lithium is mined from many sources, but most cheaply from underground brines like those found in abundance under Bolivia’s vast Salar de Uyuni.

Today the global focus on lithium is about its potential as a key ingredient in a new generation of electric cars batteries. Powerful global players are investing billions of dollars in lithium’s future. Some predictions speculate that lithium car battery sales could jump from \$100 million per year to \$103 billion per year in the next 2 decades. If so, the countries that possess lithium are poised to become much bigger players in the global economy.

Despite the growing enthusiasm about lithium’s future, there are also real doubts as well. The process for transforming lithium into its commercially valuable form, lithium carbonate, is complex and expensive. The electric vehicle batteries currently being developed with lithium are still too large and heavy, and too slow to charge. The batteries are so expensive that they put the cost of electric cars beyond the reach of most consumers. Lithium batteries also have a record of catching fire. So while lithium car batteries might become a massive global market, they could also turn out to be the energy equivalent of the 8-track tape.

## II. The Race for Bolivia's Lithium

Based even on conservative estimates, Bolivia's lithium reserves are the largest in the world. The Salar de Uyuni, a 10,000 square kilometer (3,860 square miles) expanse of salt-embedded minerals, located in Bolivia's department of Southwest Potosí, is ground zero for Bolivia's lithium dreams.

Foreign corporations and governments alike are lining up to court a Bolivian government intent on getting the best deal possible for its people. Among the major players are two Japanese giants, Mitsubishi and Sumitomo, the latter of which already has a stake in the controversial San Cristobal Mine known for contaminating the same region. The French electric vehicle manufacturer, Bolloré, is also courting the Morales government, as are the governments of South Korea, Brazil, and Iran.

The Bolivian government has sketched out a general plan for the various phases of its lithium ambitions, but many of the details of how all this will be done have yet to be defined. To get its feet wet in the technical and economic waters of lithium, the government of Bolivia has invested \$5.7 million in the development of a "pilot plant" at the edge of the Salar de Uyuni. The plant is intended to test drive the steps in getting the lithium-rich brine out from under the Salar's crust and separating it into its distinct (and marketable) parts. Based on the experience of this pilot plant, the government aims to then construct a much larger industrial-scale plant, capable of producing up to 30,000 to 40,000 metric tons of lithium carbonate per year. This will be followed by a third phase to produce marketable lithium compounds, which the government plans to undertake in partnership with foreign investors.

To get help in meeting the formidable challenges it faces, the government has assembled a Scientific Advisory Committee (Scientific Research Committee for the Industrialization of the Evaporitic Resources of Bolivia) comprised of experts from universities, private companies, and governments, to give free, and mutually beneficial, advice.

## III. The Challenges Ahead on Bolivia's Lithium Highway

At heart, Bolivia's lithium ambitions are simple: to lift a people out of poverty by squeezing the maximum benefit possible from a natural resource on the cutting edge of global markets. But between where Bolivia sits today and where it aims to go on its lithium highway there are major challenges that it will need to face:

## Getting the Economics Right

Bolivia's dreams of lithium wealth involve hitting a complicated moving target. The electric car battery market looks like the most lucrative for lithium development, and is the one the Morales government says it's aiming for (Morales also claims that Bolivia will produce electric vehicles), but how big that market will be, and when it will peak, is still just a guessing game. Bolivia could aim for more traditional lithium markets, such as glass and ceramics, but they aren't nearly so potentially profitable. A middle option would be established types of lithium batteries for products such as watches, cell phones, iPods, laptops and other electronic gadgets.

How much will it cost to build a lithium battery industry in Bolivia? That number is one of the most elusive pieces of information in the picture. If Bolivia kicks into full industrial mode the budget would be \$200 million or higher just for the main plant. But that still doesn't include massive additional investments in supporting chemical industries and huge infrastructure development in a region where today even keeping the lights on is a technological challenge. One Bolivian official has placed the potential cost at as high as \$1 billion. Because of this, Bolivia is looking for serious partnerships with investors, an approach that some local community groups do not support.

The fact that the government might suddenly have substantial new revenues from lithium is also no guarantee that the Bolivian people will end up any better off. Those revenues could easily become a magnet for corruption, waste and favoritism and there will be a constant tension between the demand to use the funds for public goods and reinvesting them into state-controlled lithium production.

## Environmental Impacts

Lost in the great Bolivian lithium race is a set of very deep and real environmental concerns. In the name of providing cleaner cars to the wealthy countries of the north, Bolivia's beautiful and rare Salar could end up an environmental wasteland. The adequacy of Bolivia's environmental strategy for lithium development in Southwest Potosí is doubted by several well-regarded Bolivian environmental organizations.

One major problem that lithium development could cause is a major water crisis. The region already suffers from a serious water shortage, impacting quinoa farmers, llama herders, the region's vital tourism industry, and drinking

water sources. While Bolivian officials contend that the lithium project's water requirements will be minimal, their estimates are based on very limited and incomplete information.

Contamination of the air, water and soil is also a major concern. Large quantities of toxic chemicals will be needed to process the predicted 30,000 to 40,000 tons of lithium per year that the project expects to mine. The escape of such chemicals via leaching, spills, or air emissions is a danger that threatens the communities and the ecosystem as a whole. Reports from Chile's Salar de Atacama describe a landscape scarred by mountains of discarded salt and huge canals filled with blue chemically contaminated water.

Bolivian officials have dismissed those risks, and the government system in place to protect the environment is inadequate at best. Public institutions, such as Bolivia's Ministry of the Environment and Water, which are responsible for ensuring compliance with environmental requirements, clearly lack the capacity or authority to intervene in an effective way.

### **The Threat to Communities**

How do the people and communities who live in Southwest Potosi feel about their homeland becoming the site of what could soon become one of the biggest industrial projects their nation has ever built? To be sure, many groups in the region have long supported lithium development, seeing it as a vital opportunity for increased income and development. But there are deep concerns as well.

Quinoa producers and tourism operators have expressed concern about supposed benefits that the Bolivian government has promised from lithium, saying that the benefits are irrelevant to local needs and could easily damage the two industries that are thriving in the region – agriculture and tourism. But Bolivia's laws that guarantee community involvement in planning are as weak as its environmental protections. While some local organizations – especially ones that actively support Evo Morales' political party (MAS) – have been engaged, others say they have not.

### **The Capacity of the Bolivian Government to Manage the Program**

Finally, there are concerns about the chronic problems faced by the Bolivian government to manage such an ambitious program – problems that pre-date President Morales. To pull off its lithium ambitions, Bolivia will need highly trained and qualified experts, in the technical and scientific aspects of lithium, in business management and economics, and in social and environmental impacts. And these experts need to be solely accountable to the Bolivian people, not to foreign governments or corporations.

### **IV. Conclusion - Can Bolivia Beat the Resource Curse?**

Whether these challenges are surmountable for the people of Bolivia and their leaders is an open debate. To be certain, there is real potential here. The demand for lithium is clearly on the rise, and with the possibility in the future of a very big rise. Bolivia is indeed sitting on the world's largest supply of lithium and it is being courted by some serious players. And importantly, all this is happening just as Bolivia has a government that has committed itself to a different way of doing resource business.

In practical terms, the government is also doing some important things right, such as beginning with a pilot effort to test the technological and economic waters. But there are many things that can go badly wrong on the lithium road ahead. In the uphill battle to make Bolivia's lithium dreams a reality, clearly the first step is to acknowledge and understand the economic, environmental, social, and capacity challenges.

What Bolivia is trying to do is hard – very hard. It is trying to break a curse – the paradox of plenty – that few impoverished nations escape. Its effort to escape that curse is extremely important, which is why so much of the world is watching. It is an experiment that is economic, social, political, technological and practical all at the same time. The fate of its success lies in the hands of the Bolivian people and in their ability to hold their leaders accountable, both for their own benefit and the planet's.

## Introduction

### Bolivia and the Paradox of Plenty

*“There is a curious phenomenon that social scientists call the ‘resource curse.’ Countries with large endowments of natural resources, such as oil and gas, often perform worse in terms of economic development and good governance than do countries with fewer resources. Paradoxically, despite the discovery and extraction of oil and other natural resources, such endowments all too often impede rather than further balanced and sustainable development.”* - Macartan Humphreys, Jeffrey Sachs, and Joseph E. Stiglitz, *Escaping the Resource Curse*<sup>1</sup>

*“[Latin America] continues to exist at the service of others’ needs, as a source and reserve of oil and iron, of copper and meat, of fruit and coffee, the raw materials and foods destined for rich countries which profit more from consuming them than Latin America does from producing them.”* – Eduardo Galeano, *Open Veins of Latin America*<sup>2</sup>

If a visitor to Bolivia wants to see the continent’s greatest legacy of how the resource curse has robbed this nation, the place to go is the rocky slopes of Cerro Rico (Rich Hill) in Potosí. For nearly three centuries this now hollowed mountain virtually bankrolled the Spanish Empire with its immense veins of silver, mined by slaves and workers and carried by the conquistadors back across the Atlantic. Bolivia is a country that sat atop one of the most valuable sources of mineral wealth in the history of the planet only to become the most impoverished nation in South America. In a court this would be reasonable evidence that a theft had taken place.

Time and again, Bolivia has seen one source of resource wealth after another exploited by foreigners and by a tiny Bolivian elite, leaving little to show for it, except the occasional mansion converted into a museum. After silver it was tin. After tin it was oil and gas. In place of the Spanish came the International Monetary Fund and World Bank and their privatization schemes. But the results were largely similar; the real benefits of the wealth taken from the ground went not to the Bolivian people as a whole, but to others.

The resource curse is a theory that goes like this:

First, the real profit that comes from mineral wealth involves turning raw material into something else that commands a higher price. Tin becomes cans, solder, or a new alloy. Crude oil becomes gasoline. But countries like Bolivia rarely get a part of that deal, and hence are denied the real value of their resources.

Second, potential wealth sits side by side with weak and corrupt political systems. Those systems then get weaker still as the powerful go after what they want. Bribes are paid. Favorable contracts are signed. Books are cooked. The people again are denied the true value of what lies underground.

Third, conflicts arise. People with very little are drawn into fights with one another in pursuit of a fair share of the only pot of gold they’ll ever see. In its mild form, these conflicts translate into regional disputes over royalties. In its extreme, battles turn into the war over Chad’s oil and dozens of other conflicts like it.

This economic and political damage is soon joined by environmental destruction, whether in the form of a hollowed-out mountain, or a contaminated river, or a whole ecosystem that has been damaged beyond repair. Such is the desperate legacy of the resource curse.

Will Bolivia’s experience with lithium – what some refer to as the gold of the 21st century – be any different?

In this report, we at the Democracy Center, which has reported for more than a decade on Bolivia’s resource battles, set out to answer that question. To do so, we looked at the science of lithium and the economic predictions surrounding its development. We looked at the Bolivian government’s plan for lithium industrialization. We visited the region where lithium comes from. We spoke with scientists, public officials, indigenous organizations, environmental groups, electric vehicle experts and many, many others. We also gave a full draft of the study to representatives from the various groups we interviewed, including government officials, environmental organizations and leaders from the Salar community, and the feedback from each was carefully incorporated into this final report.

This report is divided into three sections. Part One examines the mineral itself and its emerging importance in the global economy. Part Two looks

at Bolivia's plans for its lithium and its dance with a coterie of foreign interests who have come courting. Part Three examines the major hurdles that lie between Bolivia and its lithium dreams, including the economics, the environmental and social concerns, and the capacities of the government to run the program. We then wrap up with a conclusion and final thoughts.

Our intention with this report is to offer those interested a clear and independent look at the issues involved. The path ahead has serious ramifications for Bolivia – for its people, its economics, and its environment – which will endure for decades to come. We believe that these issues must be resolved democratically, by the people and communities affected, and that smart choices require solid information and analysis.

It is in that spirit that we offer this report.

Rebecca Hollender and Jim Shultz  
 The Democracy Center  
 Cochabamba, Bolivia  
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Photo: Rebecca Hollender

## Part One

# Lithium – The Super Hero of Metals

## I. Lithium and its Many Uses

Lithium -- It can run your iPod! It can treat depression! It can get your car to run at 230 miles to the gallon! Around the world the popular press has just begun to tune in to lithium, a soft silvery white metal that has such a variety of current and potential uses that it boggles the mind. In the sights of everyone from pharmaceutical corporations to car companies, it is becoming the world's most talked about metal.

Every time we pick up a cell phone or iPod, look at our watch, or plug-in a laptop we are relying on batteries that contain lithium. As of 2007, 60 percent of the world's cell phones contained lithium batteries, as well as 90 percent of laptops - percentages that grow each year.<sup>3</sup> Lithium is also used in ceramics and glass production, medications to treat bi-polar disorder, air conditioners, temperature tolerant lubricants and nuclear weaponry, to name just a few of the metal's uses (see chart below).

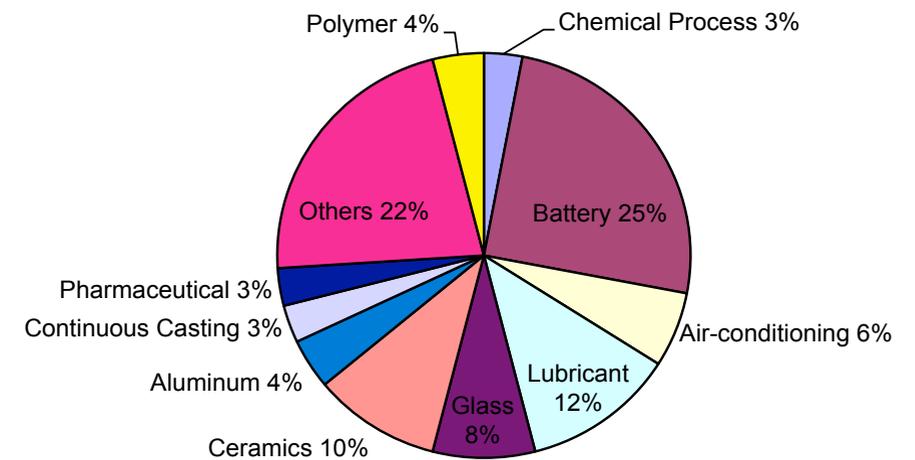


Figure 1: Lithium Use by Volume, 2007<sup>4</sup>

¿What is lithium? The third element on the Periodic Table of Elements (Li), lithium is the lightest metal on Earth. While trace amounts of lithium are found in fruits, vegetables, and drinking water, getting hold of lithium for commercial uses requires that it be mined. Lithium can be mined from a variety of sources, including a special type of igneous rock called spodumene, from clays and seawater, but most especially from underground brines (waters saturated by salt). Lithium is almost always accompanied by other commercially desirable minerals such as potassium, magnesium, and boron. Due to the high costs and technical difficulties of getting lithium out of rock, clay, and seawater, the commercial source of choice for lithium is subsurface brines, such as those found beneath Bolivia's vast Salar de Uyuni. This may change as global demand and the price of lithium rises (giving more incentive to go after it in harder places) but for now the quest for lithium is focused on the places where it is cheapest to get.<sup>5</sup>

### **Lithium Dreams: iPods Today and Electric Cars Tomorrow**

*“The demand for lithium won't double but increase by five times. We will need more lithium sources - and 50 percent of the world's reserves of lithium exist in Bolivia, in the Salar de Uyuni. Without new production, the price of lithium will rise prohibitively.”* - Eichi Maeyama, Mitsubishi's general manager in La Paz.<sup>6</sup>

The clearest measure of the growing demand for lithium is its steadily rising price on the global market. In 2001 the asking price for the soft metal (in terms of lithium carbonate equivalent) was \$1.49 per kg. In 2009 the price rose to \$6.00 per kg and is currently worth \$5.00 per kg.<sup>7</sup> This increase is a direct result of rising demand. Some of this demand comes from industries that have used lithium for decades, to make fine glass, lubricants and other lithium staples. But the more recent spike in demand is directly attributable to something newer on the scene: batteries, and especially rechargeable batteries. In this industry the demand for lithium is increasing by 20 to 25 percent per year.<sup>8</sup>

Today the demand for lithium for batteries comes from consumer electronic makers – for use in cell-phones, MP3 players, laptops, and rechargeable power tools.<sup>9</sup> But the real buzz over lithium is the mineral's potential as the crucial ingredient in a new generation of batteries essential to electric cars. In other words, the lithium sitting in places like Bolivia's highlands might be the key to the Plug-in Prius a few years in the future.

The solution to making electric vehicles practical is being able to store energy efficiently, without weighing down the car so much that it can't get out of first gear. Batteries that use lithium for storage are able to hold a much higher charge for a lot longer than most other batteries the same size. While technical hurdles exist, lithium-ion and lithium-polymer batteries are at the forefront for use in electric vehicles, known in the electric car world as EVs.

There are many predictions about the future of EVs and of the role of lithium in it, not all of which will turn out to be true. However, the seriousness of the thinking and planning over lithium powered electric cars is reflected by the plans being set in motion by two very powerful global players: the international global automotive industry and the U.S. government.

The global auto industry has declared its intent to lead the world in what it calls a transportation revolution. By 2012, the world's automakers are planning on releasing 42 different types of EVs.<sup>10</sup> These new cars vary technologically, but they all aim at the same target: moving us around using electricity instead of gasoline. These new cars include hybrid EVs that use a combination of gasoline and electricity (such as the popular Toyota Prius), and pure EVs that rely solely on electric power.

The major benefit of EVs is that they use significantly fewer hydrocarbons as fuel – a powerful advance in a world where global climate change is no longer a theory. The new General Motors Volt, for example, a hybrid EV that should come out in 2010, is expected to get an average of 230 miles to the gallon.<sup>11</sup> The litany of car companies lining up to produce lithium EV batteries reads like a Who's Who of the global car industry: Toyota, Nissan-Renault, Mercedes, Mitsubishi, and France's Bolloré. Others, including Volkswagen and Honda, are struggling to develop the technology necessary to keep up.

Countries including South Korea and Japan have been developing expertise in EV and lithium battery technology for years. So now the U.S. has started to move into catch-up mode. In 2009, the US government committed \$11 billion to projects related to research and development of EVs and lithium batteries, with the goal of putting 1 million hybrid EVs on American roads by 2015.<sup>12</sup>

With the U.S. poised to add a huge new source of demand in the lithium market, overall demand is expected to leap. One research firm has estimated that by 2013 the U.S. market alone for batteries to be used in hybrid and full

electricity EVs could total \$1.3 billion per year, and lithium batteries account for nearly all of that market.<sup>13</sup> Nissan predicts that lithium batteries will power 1 in 10 cars by 2020, which adds up to more than 6 million vehicles. If these speculations prove accurate, global car battery sales could jump from \$100 million per year to \$103 billion per year in the next 2 decades.<sup>14</sup>

These predictions, even if they prove to be only partly true, underscore an important point: countries that possess lithium are poised to become much bigger players in the global economy.

## **II. Questions About the Long-Term Prospects of the Lithium Market**

While there is little debate that the global demand for lithium will increase (certainly in the reliable consumer electronics market), there are real questions about whether it will meet expectations about its revolutionary role in the electric vehicle market.

### **Technology Challenges**

The first kink in lithium battery technology involves the challenge of separating lithium from other minerals that accompany it in its natural form. That process begins by transforming lithium into a substance known as lithium carbonate (Li<sub>2</sub>CO<sub>3</sub>), the base form of the mineral needed to produce any commercial product. But it must then be treated yet again. To make lithium batteries it has to be transformed into battery grade lithium carbonate, a chemical compound of over 99.5 percent purity.<sup>15</sup> The technology and precision involved are complex. And it is particularly complex when lithium deposits are mixed - as they are in Bolivia - with a thorny soup of other minerals. Each step involved in the production process raises the price and requires a level of technical sophistication that isn't widespread in a low-income nation such as Bolivia.

The other kink and subject of much debate is the viability of lithium EV batteries themselves. While betting on the technology runs high, it is still a technology under development. The batteries being fashioned today are still too large and heavy, too quick to lose their power and too slow to charge.<sup>16</sup>

Lithium batteries also have another problem – they catch on fire. A recent New York Times report cited 22 lithium battery fires on airplanes since 1999, and

the recall in 2009 of more than 400,000 lithium batteries in portable consumer devices over similar flammability problems.<sup>17</sup> If consumers become fearful that their shiny new electric cars might spontaneously combust on a freeway, interest in lithium batteries could take a quick nosedive.

Lithium enthusiasts downplay these concerns and assure that fast advances are being made through research and development. Nevertheless, those who follow the industry say that rival technologies, such as zinc-air batteries and others, could emerge and threaten lithium's supposed future as king of the EV hill.<sup>18</sup> Put another way, while lithium enthusiasts see lithium as the energy equivalent of the cell phone (a technology that came quick and found a massive and lasting market), lithium could also prove to be the energy equivalent of the 8-track tape.

### **Questions About the Future of Electric Vehicles**

The big projections for what will happen in the future to lithium demand also rest on another assumption: the rise of a huge new market in electric vehicles. But here as well there are some important questions.

One main doubt centers on the high cost of lithium batteries. The batteries are currently the single most expensive part of EVs, costing about \$8,000, for example, in the Chevy Volt.<sup>19</sup> That is three to five times more expensive than the cost of non-lithium hybrid car batteries.<sup>20</sup> This raises the overall cost of EVs, pricing them well beyond the reach of most consumers. The Volt is priced at \$40,000, guaranteeing that it will appeal to only a small section of the consumer market.

There is also no certain way to predict consumer demand for these non-traditional cars. Cost, technical problems, and a lack of infrastructure (such as public battery charging stations) are three factors that could keep EVs from catching on in a massive way. The future of EVs will also be impacted by what happens to the price of gasoline. Currently the cost of charging an EV with electricity is about one third the price of filling a tank with gas or diesel.<sup>21</sup> If gas prices rise again to over \$3 a gallon, consumers may be ready to make the leap to a new alternative, willing to lay down the added cost up front for the deeper savings down the road.<sup>22</sup> However, if gas prices remain stable or fall, consumers will likely be satisfied to stay with traditional gasoline powered cars. This is especially true if automakers continue to improve the mileage performance of their gasoline cars.

## Lithium Supply Issues

Lithium, like oil, is a non-renewable resource - available only until humans exhaust it.<sup>23</sup> Even if lithium does take off as the basis for an EV future, how long the gettable supplies of lithium can fuel that future is unknown.

In 2007, the world's largest lithium mining company, SQM, predicted that in the near future 10 percent of all new cars, - close to 5 million vehicles per year - would be powered by lithium-ion batteries. The company also predicted that this rate would rise to 20 percent by 2020. Based on predictions like these the demand for battery-grade lithium carbonate would rise from 85,000 tons per year in 2007 to 160,000 tons per year in 2015.<sup>24</sup> Based on existing supplies, this means that the world would run out of lithium in 2020. However, there are still enormous supplies of lithium that have yet to be tapped.

More than 80 percent of the world's accessible lithium is found in an area known as "The Lithium Triangle," bordered by three great South American salt flats, Salar de Atacama in Chile, Salar de Uyuni in Bolivia, and Salar del Hombre Muerto in Argentina.<sup>25</sup> In 2008, 55 percent of global lithium production came from the Triangle, despite the fact that Bolivia has yet to become a producer.

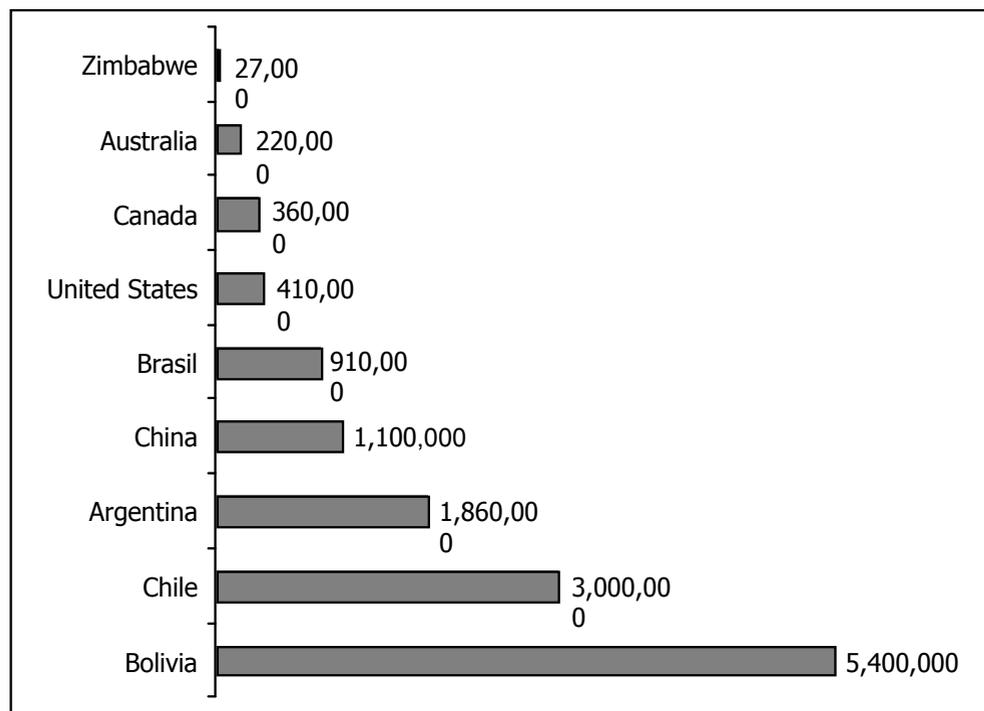


Figure 2: Global Lithium Reserve Estimates in Metric Tons<sup>26</sup>

Chile has been the world's number one producer of lithium carbonate since 1997.<sup>27</sup> Chilean reserves are controlled by two of the biggest lithium-mining corporations who dominate the market: Chemetall, a subsidiary of the New Jersey-based Rockwood Holdings Inc., and Soquimich (SQM), a Chilean state-owned company. The two companies produce 70 percent of all lithium carbonate from Chile's lucrative Salar de Atacama.<sup>28</sup>

With an output of 40,000 metric tons of lithium carbonate per year, Chile currently supplies a third of the global market.<sup>29</sup> Estimates of Chile's remaining lithium reserves, the second largest in the world, range from 3 million to 6.2 million tons.<sup>30</sup> Chile's lithium reserves are also among the purest in the world and Chile's easy access to sea transport helps keep its total production costs low.

After Chile, the world's largest lithium producing countries are Argentina, China, and the U.S. China's brine reserves are considered important in terms of meeting world demand, but they still require infrastructure and technology development before full production can begin. Large rock deposits also exist in Australia, Canada, Portugal and Zimbabwe, but production is low due to the high cost of extraction. This means that the future of the world's lithium supplies remains murky.

## Attention turns to the Great Untapped Mother Lode

In the end, while there is real debate over the future of electric vehicles and over whether lithium will be the long-term mineral ingredient of choice, the actions of big investors speak volumes. Key corporations and governments have made their bet on lithium, backing that bet with billions of dollars.

Measured in terms of raw size, the mother lode of global lithium reserves (nearly double that of Chile) is sitting under the surface of a landlocked and impoverished nation in the heart of South America. It sits in a country that has had one mineral treasure after another stolen out from under it for centuries, and just at a time when the government of that country has declared an end to resource business as usual. The largest reserve in the world of a metal that many believe to be the key to a green transportation future belongs to a people intent on not repeating the injustices of their past.

## Part Two

### The Race for Bolivia's Lithium

*“Recovery of the resources that have always been usurped is recovery of our destiny.” –Eduardo Galeano, *Open Veins of Latin America*<sup>31</sup>*

#### I. The Valley of Minerals

Just seven bumpy hours by bus from Potosí's Cerro Rico, where the legacy of Bolivia's resource curse began, sits the giant Salar de Uyuni, a vast salt flat packed with an alphabet soup of valuable minerals, from Antimony to Zinc. The Salar is a 10,000 square kilometer (3,860 square miles) shining expanse of salt-embedded minerals, punctuated here and there by rocky islands. This expanse of white is ground zero for Bolivia's lithium dreams.

##### The Legend of How the Salar de Uyuni Was Born

*While the versions of this creation story are as numerous as the communities surrounding the Salar, the elements are common in many communities. Differing versions depict Tunupa as a powerful warrior.*

“In my community, it is said that Tunupa (a volcano on the edge of the Salar) was a beautiful woman. She was appreciated by all of the mountains and had many suitors, but she fell in love with one, married, and had a child. Tunupa's husband, however, was constantly jealous of her other suitors. One day they fought and her husband stole the infant child. Tunupa's sorrow was so great that her breasts overflowed with milk and created the Salar. She rests at the edge of the Salar, and her tears each year bring the annual floods, renewing the Salar and bringing rain to our crops.”

*Story adapted from versions told by Teodoro Blanco and other community members from the province of North Lipez, Southwest Potosí.*

While estimates of the amount of lithium underneath Bolivia's white sea of salt vary wildly (the Bolivian government's mining agency has claimed that the reserves could be as much as 100 million metric tons),<sup>32</sup> even conservative calculations place it as the largest lithium source in the world. The U.S.

Geological Survey estimates Bolivia's lithium reserves to be 5.4 million tons, nearly twice that of Chile.<sup>33</sup> It is no surprise then that Bolivia's lithium has become such a focus of global attention by governments and corporations on the hunt for the light metal, and among analysts and journalists gazing into lithium's future.

A mass quantity of lithium under the ground, however, does not automatically translate into marketable lithium above ground. There are disagreements about how much of Bolivia's lithium is actually recoverable for commercial use, about how hard it will be to get, and over how easy it will be for foreign investors to work with the Bolivian government. There are also doubts about the practicality of Bolivia's declared plans to industrialize the Salar de Uyuni's lithium within Bolivia.

But lithium is just one mineral deposit among many in Southwest Potosí. Also found in these lakes and salt flats are chlorine, sulfates, boron, sodium, potassium, calcium, magnesium and ulexcita.<sup>34</sup> Each of these has promising markets, some of them potentially large and lucrative; and in some cases an easier reach for Bolivia. Brazil, for example, has cast an eager eye on the region's potassium because of its high value as a fertilizer for soy and other crops.

Southwest Potosí is no historic stranger to the role of economic player in Bolivia, dating back to before Bolivia was even a nation. Don Teodoro, whose family's livelihood has depended on the Salar for generations, traces his roots here to before the Spanish colonizers arrived. He explained that during pre-



Photo: John Pilkington, from: [qjimed.oxfordjournals.org](http://qjimed.oxfordjournals.org)

colonial times the region was of economic importance to communities who came from far beyond Bolivia's modern borders to harvest salt. The salt was transported on the backs of llamas to agriculturally-rich valleys, where it was traded for products like corn and vegetables, which cannot be produced in nutrient-poor *altiplano* soils.<sup>35</sup>

Today llama caravans have been replaced by trucks, but local communities still rely on the Salar de Uyuni and surrounding ecosystems for their economic survival. Nearly all the economic activity in the region revolves around salt harvesting, quinoa production, llama herding, mining, and, more recently, a boom in foreign tourists seeking out the unique desolate landscape of the Salar.<sup>36, i</sup> Tourism and quinoa production are especially important because they provide a sustainable, long-term economic lifeline to the area.<sup>37, ii</sup>

All this attention on the region's mineral wealth raises an old and fundamental question: Who owns the Salar de Uyuni and its resources?

In 1974, the Bolivian government declared the Salar de Uyuni and its mineral resources a "Fiscal Reserve." This status, which continues today, gives the Bolivian state basic ownership of the Salar and the legal right to exploit and administer all of the natural resources within the reserve's boundaries.<sup>38</sup> In the 36 years since, the boundaries of that reserve have been moved and expanded five times.<sup>39</sup>

Over the years a host of actors have tried to get their hands on the Salar de Uyuni's mineral riches.<sup>40</sup> Yet time and time again, local communities have mobilized to fight what they see as giveaways by corrupt political interests. One of the foreign players chased out of the Salar (by the communities and by a proposed new national tax on the company) was Bolivia's first serious foreign lithium suitor, the U.S. company Food Machinery Chemical (FMC), ex-Lithco. After the FMC Corporation gave up on Bolivia in the beginning of 1993, it focused its efforts instead in Argentina, where the company became the world's third largest producer of lithium.<sup>41</sup>

i The Salar region receives an average of 50,000 tourists annually (equivalent to nearly 1/4 of all visitors to Bolivia and 2% of GDP 1991-2004).

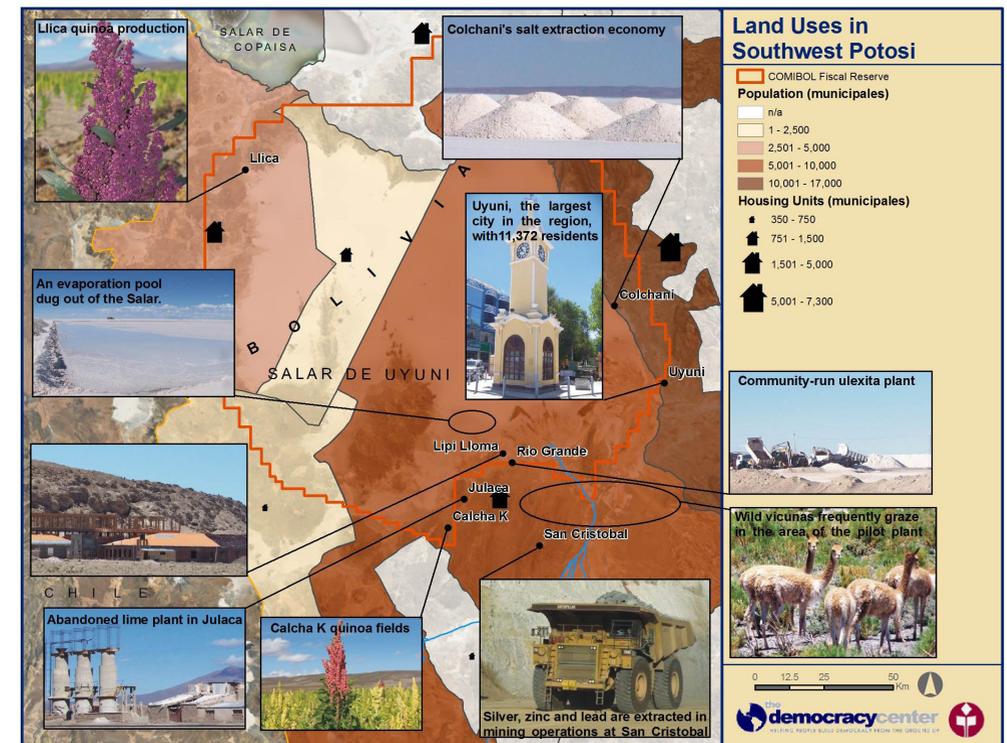
ii Bolivia is the second-largest quinoa producer in the world (.14% GDP) and the only organic producer. It is a crop that holds great potential, given the increasing worldwide demand for organic health foods. Due to infrastructure and water limitations, however, quinoa producers from Southwest Potosí can't even meet 10% of the demand for their product.

Resistance to foreign ownership is not the only flash point over control of the Salar. There is also a debate over which Bolivians command its rich mineral rights.

*"We were never consulted when the boundaries of the fiscal reserve were determined and re-determined despite the fact that our communities and crop fields fall within its boundaries. Now that we are struggling to gain collective titles to our lands, a right that we are afforded by Bolivia's constitution, we are running into problems."* – Teodoro Blanco, legal territorial advisor to communities in Nor Lipez, Southwest Potosí<sup>42</sup>

Territorial disputes, such as those explained by Don Teodoro, have created tension in Southwest Potosí that is heightened by the expectation of lavish royalties from lithium development. Local representatives are seeking to define provincial boundaries that have been disputed since the 1950's. These boundaries will be crucial in determining who receives royalties from the minerals in the Salar.

**Map 1: Land Uses in Southwest Potosí**



Statistics adapted from: Prefectura del Departamento de Potosí, Dirección de Recursos Naturales y Medioambiente, "Plan de Acción Ambiental del Salar de Uyuni," Síntesis del Diagnóstico Ambiental, Prefectura del Departamento de Potosí, 2006.

Photos: Leny Olivera Rojas y Aldo Orellana López, except for San Cristobal truck, from [www.apexsilver.com](http://www.apexsilver.com), accessed 2010

Political battles over who benefits from mineral wealth are a typical part of the resource curse, and Bolivia is no exception. Since President Evo Morales took office in 2006 and began reasserting state control over the country's oil and gas reserves, the nation has been torn by a series of high profile battles between the national government and the eastern regions where the gas and oil sits. To what extent does mineral wealth belong to the nation as a whole? To what extent do the communities sitting on it have a greater claim? These are debates and possibly battles that will break out anew if lithium begins looking like the buried treasure many hope it will be.

## II. The Key Actors in Bolivia's Lithium Chase

*"There could be a rush to grab up supplies of lithium. You'll see different folks positioning themselves to secure rights to lithium in the future."* - Alex Molinaroli, president of Johnson Controls Power Solutions, part of the world's biggest car battery maker.<sup>43</sup>

With visions of an extensive new global market for lithium springing from the demand for electric vehicles, an international race has begun to get hold of the untapped sea of lithium underneath the Salar de Uyuni. Foreign corporations and governments alike have lined up to court a Bolivian government intent on getting the best deal possible for its people.

Some of the biggest names in the global corporate world, from South Korea, Russia, China, Brazil and elsewhere are knocking on Bolivia's door, but two players have taken the most aggressive approach:<sup>44</sup>

### ***Japan: Benefiting from a Head Start***

Two Japanese giants, Mitsubishi and Sumitomo, are reputedly ahead of the negotiation game with the Bolivian government. Both companies are global leaders in lithium battery technology and are banking heavily on staying leaders in lithium battery mass production.<sup>45</sup> One high-level Mitsubishi executive told reporters, "The prize is clearly in Bolivia. If we want to be a force in the next wave of automobiles and the batteries that power them, we must be here."<sup>46</sup> Japanese executives on a Bolivia delegation in February 2010 repeated their strong interest in Bolivia's lithium supply, but also made it clear that Bolivia is not the only game in town. They also noted their strong interest in Argentina's lithium supply, in the Salar de Juyjuy.<sup>47</sup>

Sumitomo already has a major economic stake in Southwest Potosí. In 2009, the company purchased ownership of the San Cristóbal Mine (MSC), just an hour drive from the site of Bolivia's lithium operations. The mine's electric grid and roads could provide invaluable infrastructure to lithium development.

On one side, these prior relationships and business experience in Bolivia give the Japanese insight into how to deal with the Bolivian government. JICA, the Japanese government development agency, has also already conducted important social studies in the region, which could give Japanese interests an advantage. However, this Japanese involvement in the region is also a potential threat. Sumitomo's San Cristóbal Mine is a major source of contamination and environmental damage in the region, and a source of growing community anger. As Bolivians begin to focus on the potential environmental threats posed by lithium development, Sumitomo's role in the mine could become a major handicap.

### ***France: Working Hard to Get in the Game***

In February 2009, just outside Paris, President Morales got the chance to try out an electric car himself, as the French EV manufacturer Bolloré escorted him to behind the wheel of its spiffy new BlueCar. During the courting ritual with Morales, the company's owner, Vincent Bolloré, told the visiting President, "It's you who controls the resources for the 21st and 22nd centuries. You're like Saudi Arabia, it's you."<sup>48</sup> Bolloré plans to gradually increase production of the BlueCar starting this year with 10,000 cars. But the company needs lithium for the batteries to make this possible.<sup>49</sup>

Bolloré's EV technology and owner are both under harsh critique. Vincent Bolloré is accused of having corrupt ties to France's president, Sarkozy, as well as shady dealings with questionable regimes in Africa, notably that of accused Liberian war-criminal, Charles Taylor.<sup>50</sup> The BlueCar's battery is faulted for running only six hours per charge. Even so, Bolloré continues to be forefront in the public eye in lithium negotiations and is considered a potential player in Bolivia's lithium development. The company has already obtained lithium concessions in the Salar de Hombre Muerto, Argentina where it plans to set up a lithium carbonate plant over the next two years.<sup>51</sup>

## *The Governments*

Governments are also key players in the Bolivian lithium race. So far Bolivia's strategy with potential government suitors for its lithium has been to avoid formal commitments and to keep courtiers engaged with what one Bolivian official calls "friendly agreements and letters of intent."<sup>52</sup> Among those who have signed such Memorandums of Understanding are the governments of South Korea, Brazil, and Iran.<sup>53</sup>

The Brazilian government is also interested in securing access to materials produced in Bolivia's industrialization project, but instead of lithium, Brazil wants to secure preferential market access to potassium fertilizers, which it needs for its large-scale agriculture industry.<sup>54</sup> Iran's interest in Bolivia's lithium project is unknown.

### **III. The Bolivian Government's Lithium Plans: A Rough Draft in Progress**

The Morales government's plans for lithium development have not lacked for bold pronouncements. Late in 2009 Morales boasted to a reporter for the *New Yorker* that Bolivia would be producing lithium batteries by the end of 2010 and electric cars within "five or six years."<sup>55</sup> These are daring words for a country that exports primarily agricultural products and raw materials, and imports even the most basic manufactured items such as nails.

The concrete plans that Bolivia's government has to match these goals are still fuzzy, with the details either being kept secret for proprietary reasons or because they still don't exist. But the basic elements of that plan include the following:

#### **Who's in Charge?**

Responsibility within the government for planning and carrying out the complexities of lithium development resides in several places at once. Officially, overall project operations are the responsibility of Bolivia's public mining company, COMIBOL. But all the key decisions to be made must be approved by Bolivia's Ministry of Mining and Metallurgy. Other government agencies are also supposed to serve as collaborators in the lithium project, including the Vice ministry of Science and Technology.

Each of these entities within the government holds a reputation for problems with incompetence, corruption, conflicts of interest,<sup>56</sup> and a lack of transparency – challenges to Bolivian governance that long pre-date the Morales administration. [Note: The authors made numerous requests to COMIBOL for responses to specific questions about the project and the agency did not to reply.] COMIBOL is a notoriously slow and cumbersome bureaucracy, but the government hopes to avoid these historical problems with a proposal to create a new government agency with specific authority over lithium development.<sup>57</sup>

In the meantime, the other key player in Bolivia's lithium planning is the Scientific Advisory Committee (Scientific Research Committee for the Industrialization of the Evaporitic Resources of Bolivia), established by the Ministry of Mining and Metallurgy and designed to draw on the free expertise of the government and corporate suitors circling over the country's lithium. The government's strategy is to get access to their thinking and knowledge without having to commit to any long-term partnerships. The Committee brings together experts from universities, private companies, and governments. Participation is voluntary, but it is clear that both Bolivia and the suitors see the process as working to their advantage.<sup>58</sup>

The stated goal of the Committee is to help Bolivia identify the best industrial and technological processes for the unique conditions of Bolivia's salt flats. For example, Brazil will contribute to technological advances in the production of potassium fertilizers in hopes of securing its supply for the future.<sup>59</sup> Japanese Committee members were permitted to take Salar de Uyuni brine samples to Japanese labs in order to advance technological studies.<sup>60</sup> The Committee functions on a virtual basis, meeting rarely and relying on teleconferences and email.<sup>61</sup> It presented its work and major findings from the pilot plant at the October 2009 International Forum on Lithium in La Paz, Bolivia,<sup>62</sup> but the committee has yet to release any additional progress reports in the months since then, raising concerns by some about how quickly the project is advancing. Members of the committee told the authors that they are in the midst of an effort to reorganize the panel and its work.<sup>63</sup>

Not all of the conversations that matter, however, take place within formal structures. Many occur informally when Bolivia's government officials visit other countries, such as Morales' test drive in France. They take place in the midst of negotiations on other issues. When Brazil and Bolivia agreed to construct a new highway in Bolivia, the two governments also took advantage of the moment to sign a Memorandum of Understanding for the

lithium project.<sup>64</sup> These informal conversations are also important to keep an eye on when following Bolivia's plans.

## Taking Lithium for a Test Drive: the Pilot Plant

To get its feet wet in the technical and economic waters of lithium, the government of Bolivia has invested \$5.7 million in the development of a "pilot plant" near the Rio Grande River at the edge of the Salar de Uyuni. The plant, under construction since May 2008, is designed to test drive the four key steps in getting lithium-rich brine out from under the Salar's five meter crust and separating it into its distinct (and marketable) parts. Those steps include the following:<sup>65</sup>

- Giant pumps suck liquid brines out from under the Salar's crust.
- The brines pass through a series of evaporation pools to let liquid evaporate naturally.
- The remaining solids are transported to a processing plant.
- A collection of chemicals is used to separate remaining mineral components.

This process is more complex than it might sound. The transformation of the brine into marketable products is complicated by two unique geographical and climate factors.

First, the lithium comes mixed with other minerals like sodium, potassium, boron, and magnesium (each with its own commercial potential), but separating these minerals is an expensive and advanced process. Second, the high elevation and rainy season make for a lower evaporation rate that complicates the separation process.<sup>iii</sup>

The pilot plant, which the government says should be up and running by the end of 2010 (it is currently four months behind schedule), is designed to produce 480 metric tons of lithium carbonate (the most basic marketable form of lithium) per year. It will also produce non-industrial quantities of three other commercially valuable compounds (potassium chloride, potassium sulfate, and boric acid).<sup>67</sup> The 40,000 tons per year of lithium carbonate is just a tiny fraction of what the government projects for the industrial stage of the project. In the larger vision of the Bolivian government, the real

iii The Chilean experience shows that this process could take up to 18 months without factoring in the rainy season, but Bolivian scientists aim to resolve the rainy-season complication. (McKenna, 2010).

purpose of the pilot plant is not to produce the small quantities that are likely to come out of it, but to help Bolivia prepare for the future. It will allow Bolivia to experiment with what it will take to expand production and achieve industrialization – with the government clearly in the driver's seat.

Based on the experience of this pilot plant, the government aims to construct a much larger industrial-scale plant, capable of producing 30-40,000 metric tons of lithium carbonate per year, along with other marketable lithium compounds (lithium hydroxide, lithium chloride, lithium metal, etc.)<sup>68</sup> The Bolivian government has also laid out plans for a series of regionally based chemical industries to supply necessary inputs for processing. The plan, the government says, is to construct at least seven basic chemical plants, in addition to the lithium carbonate plant, plus a separate plant for potassium products such as fertilizers.<sup>69</sup>

All of this, of course, is still considered just a precursor to the government's long-term objectives, which include the production of lithium batteries, and supposedly, as Morales suggests, electric cars.

**Map 2: Support Plants Proposed by Bolivia's Department of Evaporitic Resources**



Adapted from COMIBOL, Direccion Nacional de Recursos Evaporiticos, "Proyecto de Industrialización de la Salmuera del Salar de Uyuni". (Powerpoint presentation, 2010.) <http://www.evaporiticobolivia.org/>

## The Technology and Economic Plan

“100% Estatal!” (“100% State-owned and run!”) is the ubiquitous slogan for the lithium project, which aims at keeping the Salar’s mineral reserves and profits under state control. True to the slogan, the pilot plant phase of the project is being completed with 100% state investment and management, a total of \$5.7 million. The Bolivian government has also committed to keeping the industrial-scale lithium carbonate plant state owned and run, to be financed through a combination of state resources and low-interest loans. Beyond the production of lithium carbonate, the government says it will look for outsider investment in the form of capital and technology to produce value-added Li compounds and applications (such as batteries).<sup>70</sup>

*“Bolivia shouldn’t feel like the king of lithium. Companies can live without Bolivian lithium for now, by buying from other countries.” – Hernan Vera Ruiz, Member of Scientific Advisory Committee<sup>71</sup>*

As the Bolivian government looks ahead at the complex tasks of building a full-blown lithium and lithium battery industry, it will find three fundamental economic and technological challenges, each one significant. It will need access to complex technology that it doesn’t have. It will need a set of economic relationships that can help get those products to market. And to finance an enterprise of the size that Bolivia is planning, it will need capital – a lot of it.

### *Getting the Technology*

In its pilot plant, Bolivia is experimenting on its own with the first steps of lithium industrialization. But going from there to converting its lithium into watch batteries or cutting edge electric vehicle batteries is far beyond the country’s current technological capacity. “The myth is that if the resource is there, industrialization can take place,” said Victor Hugo Sainz, a former official with the Bolivia’s Superintendent of Hydrocarbons. “This is wrong. Bolivia first needs a series of basic industries in place before getting into anything more complicated.”

Bolivian officials acknowledged that for the more technologically advanced parts of their plan – production of batteries in particular – foreign partnerships will be important and say they plan to pursue such arrangements.<sup>72</sup>

### *Getting Bolivian Products into the Global Market*

Even if Bolivia is able to get its lithium out of the ground and convert it into industrialized products, taking aim at the potential global markets will be like trying to hit a moving target. Will there be the huge new market for lithium batteries for electric cars that some analysts predict? If so, how big will it be? When will it begin in earnest? How long will it last before some other technology replaces it?

Bolivia’s timing in entering the market, and the products it chooses to export, will be crucial factors in determining the profitability of its lithium development. Project officials assured us of their confidence that Bolivian products will find markets, and that the strategy will be put together during the pilot phase. Because the government has kept its financial plans confidential, it is difficult to judge how realistic those plans are. But government officials have said that they intend to tap into the national treasury, mining revenues, and credit drawn against future profits, among other sources.<sup>73</sup>

### *Getting the Money*

The Bolivian government, which currently boasts both a budget surplus and healthy cash reserves (owing mostly to the country’s assertive new taxes and contracts with foreign gas and oil companies), is in a position to self-finance the pilot phase of its lithium plans. However, in order to finance full-scale industrialization, including massive investments in infrastructure, the government recognizes the need to secure substantial foreign investment. Beyond the production of lithium carbonate, Bolivia will look for outsider investment to help it produce more advanced lithium compounds and end products such as batteries. Bolivia hopes to select these investors from its many suitors and sign agreements around 2013 or 2014.<sup>74</sup>

Morales has said repeatedly that his plan with foreign investors is to have them “as partners, not masters.” For Bolivia’s lithium plans, this translates into maintaining control of 60-80 percent of investments and profits, effectively capping any corporate partner at 20-40 percent.<sup>75</sup> Backers of the plan see it as essential to breaking another aspect of the resource curse: the loss of control and ceding of the real profits of the wealth under the ground. A more conservative critique of the policy warns that it will cause Bolivia to lose potential partners to other lithium operations, as it has in the past.<sup>76</sup>

### **Bolivia's New Brand of Resource Politics**

The decision by Bolivia's government to retain majority ownership and managing control of the lithium industrialization project is a part of the country's new brand of natural resource politics, an approach now enshrined in a new national Constitution.

The new Constitution declares that all natural resources belong to the state and will only be exploited in a way that is strategic and beneficial to the Bolivian people. It sets more stringent standards for environmental stewardship than previous constitutions, and guarantees the permanent role of the state in industrialization activities and in determining resulting benefit-sharing processes. It requires that civil society be consulted on all decisions regarding the exploitation of natural resources, and in the case of indigenous communities, this consultation must take place according to local norms and customs. The Constitution also grants the government the right to coordinate with foreign companies and establish a mixed economy, given that it is strategically advantageous for the Bolivian people.

Bolivia's lithium project will be a test of those words on two fronts. First, will the government fully comply with all of the environmental and community protection requirements? Second, will foreign investors agree to do business with Bolivia on a mass scale or will they decide that the new rules provide insufficient protection of the capital they pour into the country?

These are the basic elements of the Bolivian government's roadmap toward its lithium dreams. Each is complicated and each still lacks, at least publicly, much of the detail needed to evaluate how well the government has done at developing a realistic plan.

But even if the plan passes basic muster on paper, it will face a set of daunting challenges as it seeks to put that plan into effect.<sup>77</sup>

## **Part Three**

### **The Challenges Ahead on Bolivia's Lithium Highway**

*"The current political situation in Bolivia outlines the need [for the country] to develop its own state and social project, whose purpose is to empower the state and the country via a domestic industry that produces and markets lithium derivatives and other minerals found in the brines of the Salar de Uyuni."- Marcelo Castro, Chief of Operations, Pilot Plant<sup>78</sup>*

The heart of Bolivia's lithium ambitions is simple. It is to lift a people out of poverty by squeezing the maximum benefit possible from a natural resource that connects the nation to the cutting edge of global markets. But between where Bolivia sits today and where it aims to go on its lithium highway there are major challenges that it will need to face.

Some of these challenges concern the economics of lithium and lithium development, including the identification of markets, the development of substantial new infrastructure, and how profits will be employed for progressive development. Other challenges concern potential negative impacts that such a huge development scheme can have on a threatened environment and a collection of communities already living on the margin of survival. Finally, Bolivia must also deal with serious deficits in its overall capacity to design, develop and manage such a project.

Whether these challenges are surmountable for the people of Bolivia and their leaders is an open debate. But, clearly, the first step in addressing those challenges is to acknowledge them and understand them.

#### **I. The Economics**

The economics of Bolivia's lithium ambitions are complex and full of still-unanswered questions.

#### **Getting the Market Right**

Bolivia's dreams of lithium wealth rely on a complicated guessing game, not just about what possible lithium markets look like today, but what those

markets might look like in five to ten years (when operations would be up and running). If Bolivia aims at a market (such as lithium car batteries) too soon it might not find enough buyers to recover its costs. If it hits a market too late, it might miss the technological wave and be beat by other producers.<sup>79</sup>

The spectrum of products that Bolivia might choose to produce with its lithium consists of three general options: traditional products, cutting edge technology, and something in between.

### *Traditional Lithium Markets*

Producing things with lithium is nothing new to the world. Lithium has been used for many years to produce products such as glass and ceramics. These products are established and relatively easy to produce. Developing Bolivia-based industries to produce these tried and true products is certain to be within Bolivia's homegrown capacity, both financially and technologically. However the downside of such a strategy is also obvious. Since traditional lithium-based products have been around for so long, it may be harder for Bolivia to insert itself into a market where others have already secured their position. Bolivia would also have to achieve hugely low production costs in order to overcome its geographic and infrastructure challenges and still beat out other producers.<sup>80</sup>

More importantly, the big money in lithium isn't going to be in high-end consumer glassware – it's going to be in technology-related products where the value added is much, much higher. Nothing made of glass has the potential to make Bolivia a real profit on its lithium in the way that an \$8,000 EV battery would.<sup>81</sup> For all these reasons Bolivia appears to have sidestepped the low end of the lithium market altogether.

### *Cutting Edge Markets*

The Holy Grail in terms of Bolivia's lithium aspirations exists at the other end of the spectrum – the cutting edge of lithium technology: electric vehicle batteries. On the one hand, declarations by President Morales that Bolivia will be producing technologically advanced electric cars in five years seems unsupported by any serious analysis. However, what might be a real possibility is that those who do make electric cars will agree to help make batteries in Bolivia as a condition of getting access to the nation's lithium. That would be a more realistic high-end of Bolivia's lithium dream.

While EV batteries may hold out the promise of the highest profits for Bolivia, that goal also involves the highest obstacles to achievement. Production of any lithium batteries (including those less advanced than EV's, such as for watches and iPods) will require the creation of a complex set of input industries. This includes advanced chemical plants to supply the plastics, metallic alloys and so forth required for production. The government has proposed creating input industries that make use of Bolivia's hydrocarbon and steel products. Other inputs, however, would have to be imported from elsewhere. All this adds another level of complexity and cost to the process, as well as separate rounds of negotiations with foreign producers of necessary inputs.<sup>82</sup>

All of these variables and negotiations are even more complex when dealing with an experimental technology, which EV batteries will remain for years to come.

If Bolivia chooses to target cutting edge markets, three economic questions are key. First, will there be mass markets for lithium EV batteries sufficient to recover the enormous investments that Bolivia will be required to make, and how long will those markets last? Second, if those markets do emerge, will Bolivia be able to be a competitive player in them given that other lithium producers are so far ahead? Finally, can Bolivia create the industry required, in terms of technology, capacity, quality and partnerships? This is a tall order for a country that struggles to keep its main highways paved.

### *The Middle Ground*

A third option for Bolivia is to focus on products that strike a balance between high-end technology (and profitability) and more certain markets and less daunting production challenges. The core of such a market might be other, already established types of lithium batteries for products such as watches, cell phones, iPods, laptops and other electronic gadgets.

There are important advantages for Bolivia in such a strategy. The markets for these products are already there and have a steady rate of growth each year. Production of less complicated lithium batteries is also much more feasible than EV batteries, given Bolivia's weak infrastructure and few base industries. While not as profitable as EV batteries, portable electronics batteries are still more profitable than glass and ceramics, and more directly useful than EV batteries domestically in Bolivia, where consumer electronics is a booming business.

Against this backdrop, the Bolivian government has still made it clear that (with the help of foreign partners and under strict terms of negotiation), it is aiming for the EV battery market and nothing less.<sup>83</sup> However, until the state owned and run industrial production of lithium carbonate is in operation, Bolivia's EV battery plans aren't going anywhere. Bolivia is already behind schedule in getting its pilot plant up and running.

Tim McKenna, vice president of Chemetall, the world's largest lithium producer, told us, "In Chile it took Chemetall 15 years to reach solid production levels."<sup>84</sup> Considering that when Chemetall arrived to Chile, the country was already a significant producer and that it didn't face Bolivia's geographical and infrastructure obstacles, the learning and development process in Bolivia is likely to be even longer. This makes Bolivia's projected date for industrial scale lithium carbonate production (2014-2015) look all the more unrealistic.

## Getting the Needed Investment and Technology

Even if Bolivia does develop a solid plan for products and markets, it still needs two other ingredients – the money to finance such a huge enterprise and the technological know-how to produce. Bolivia is seeking partners to meet these two ambitions.

How much will it cost to build a lithium battery industry in Bolivia? That number is one of the most elusive pieces of information in the picture. The funds allocated for the pilot plant give only a rough basis for calculating the costs of a much, much bigger industrialization plan.

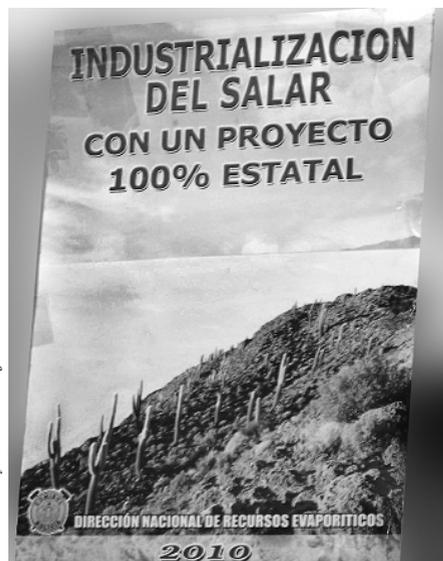


Photo: Leny Olivera Rojas

The pilot plant, designed to produce 1,200 tons of raw lithium per year, is budgeted to cost \$8 million.<sup>85</sup> But if Bolivia kicks into full industrial mode, its aim is an output of 40,000 tons per year. If the costs for an industrial plan increased accordingly, the budget would be approximately \$450 million.<sup>86</sup> But this is just one part of what would be required. A full budget must also factor in other costs. This includes factories with cutting edge technology to process the lithium into batteries, a set of supporting chemical

industries and what could end up being truly massive infrastructure projects (discussed below). When all these possible costs are combined, Ministry of Mining executive Freddy Beltrán isn't joking when he estimates that the final budget will be over \$1 billion.<sup>87</sup> By any measure, the budget that Bolivia will require to chase its lithium visions is going to be high enough to guarantee that it will have to do some serious shopping for foreign investors.

And money is just one side of the coin of what Bolivia will need to go shopping for.

*"They probably don't have a lot of experience of doing this sort of thing themselves so they'll have to bring in expertise and technology. That whole process may take a lot longer than people are anticipating."* - Charles Kernot, mining analyst, Evolution Securities<sup>88</sup>

Today, Bolivia is a country that doesn't have a single factory that is capable of assembling, from scratch, a TV, telephone or radio. From here to the technology of EV battery production – not today's technology, but the technology of a decade from now – is a very, very long leap. The Bolivian government says it will require help in achieving the feat and is actively seeking it from its coterie of foreign suitors.

As Bolivia goes looking for partners it is going to have some serious bargaining to do. How much of a cut will these partners want to take? How much of the industrialization process between raw lithium and hi-tech batteries are they willing to have to take place in Bolivia? Who will control essential decisions, on everything from the choice of market to labor standards at the plants? What standards are they willing to subscribe to in terms of environmental and community protection?

*"Let me make this very clear for everyone to hear. The previous imperialist model of exploitation of our natural resources will never be repeated in Bolivia. Maybe further down the line there could be the possibility of foreigners accepted as minority partners, or better yet, as our clients. This is our ideal."* – Saúl Villegas, director of Evaporitic Resources, COMIBOL.<sup>89</sup>

While Bolivia's lithium potential has gotten some important suitors interested, the anti-capitalist rhetoric of the Morales government also makes them nervous. Yet, if one looks beyond the rhetoric to the actual approach the government has taken toward foreign investors and buyers, the picture looks

much more moderate. What Morales is pushing is a renegotiation of Bolivia's relationship with foreign interests. For example, after Morales took office the government successfully renegotiated the terms of all of its key foreign oil and gas contracts. All of the companies stayed in Bolivia and they all willingly paid higher taxes. The result turned Bolivia into a rarity – a nation running a budget surplus in the midst of a global recession.

For now it looks like Bolivia is talking to the right potential partners to get the economic, technological, and management help that it needs if it plans on producing and marketing EV batteries. Government officials are confident that Bolivia's lithium supply is important enough to keep companies knocking at the door,<sup>90</sup> but critics say that if investment conditions are too tough the companies will take their business elsewhere.<sup>91</sup> But as the Bolivian government sets out along this “partnership” search, it is eventually going to bump into serious opposition from some local community groups, who are fighting to keep multinational companies out of Southwest Potosí. These communities reject any partnership with foreign interests due to decades of negative experiences and recent social and environmental tragedies brought on by San Cristóbal (see box.)

### **Building a Cutting Edge Infrastructure from Scratch**

The region that Bolivia hopes to turn into the hi-tech industrial equivalent of a mini-Detroit or Tokyo is a place where, today, visitors to the main hotel can only take a hot shower for six minutes, and that only during one designated hour per day. The leap in infrastructure from status quo to technological power is going to be a complicated one.

Arriving to the bustling tourist hub of Uyuni, Southwest Potosí at midnight, we were greeted by total darkness – the only light coming from the brilliant Milky Way. Twenty-four hours later the town let out a collective cheer when the sudden blare of radios signaled that the electricity had come back on. The outage was caused by one of the town's frequent windstorms.

These typical infrastructure failures in the region's largest city (just 30 minutes from the Salar de Uyuni) symbolize the truly daunting challenge that Bolivia faces in its industrial plans for lithium. Roads will be needed – the kind that actually stay open regardless of weather or the state of social unrest – to bring in materials to construct and feed the new factories and to transport out the delicate hi-tech cargo Bolivia aims to produce. It will need electricity – reliable electricity and a lot of it – to power all of these operations. Although the government states otherwise, environmental groups believe that it will

need water, in large quantities and in a region that is bone dry more days than not, to service those factories (and to not be contaminated in the process).<sup>92</sup>

This direct industrial infrastructure is just the start. Infrastructure also needs to build to house and provide services to a 1,500 strong labor force that is anticipated for the project, along with their families and the others who will follow.<sup>93</sup> Where will all these extra houses, roads, water, electricity, and waste-disposal systems come from in a region where, today, keeping the lights on is a challenge?

According to Freddy Beltrán, at Bolivia's Ministry of Mining, “All infrastructure components for large-scale production of lithium carbonate and other lithium components will be up and running in 2014.”<sup>94</sup> Maybe, but the government's steady predictions about quick progress seem questionable in the context of a long history of things taking far longer than expected. It is unlikely that such an ambitious infrastructure effort will be any exception. Meeting the historic challenges of Bolivia's inefficiency is a key ingredient in beating the resource curse as well, and an important part of escaping economic control by foreign corporations.

### **Using the Revenues to Benefit the Bolivian People**

One of the most basic truisms of the resource curse is this: the fact that a government suddenly has a lot of new money is no guarantee that the people will end up any better off. New revenues become a magnet for corruption, waste and favoritism to those allied with the nation's leaders. They get spent in ways that do little long-term good. So it is reasonable to ask at the start: what is Bolivia's plan?

The first fork in the road, in terms of choices that the government must make, is how much of the revenue from lithium, when it comes, should be directly reinvested back into its nascent industry to build it up and how much should be spent socially on people's needs. In Bolivia there will be enormous pressure to invest less and spend more. The country's needs are many and the demands from the country's unions, social movements and voters for immediate spending will be hard for any government to resist. It is no coincidence that the heart of every political campaign is the championing of public works – from schools to newly paved roads.

Critics of this approach argue that the government first needs to feed and grow the Golden Egg. This argument is especially powerful in the case of Bolivia and lithium development since the country begins from nearly zero in

terms of investments required to make the elaborate plan work. In the end the Bolivian government will have to strike a balance, dealing with competing pressures from its people on one side and anxious investors and buyers on the other.

The second fork in the lithium investment road is how the government should spend revenues that it does dedicate to social investment. The choice here is a similar one: get people direct help in the short-term or make investments in public programs that aim for bigger but longer-term payoffs.

President Morales has already visited this choice in his decisions about how to invest Bolivia's gas and oil revenue. His administration has basically split the public funds three ways. Some of the new revenue has been used to finance a series of new direct payment "bonus" programs to the public – one that goes to the families of public school children, another for the nation's elderly, and a third to pregnant mothers. The government has also invested heavily in infrastructure programs aimed mostly at rural poor, including electricity, roads, tractors and schools. And the government has also tucked away a large chunk of those funds in public reserves and deficit reduction, a move that earned Morales unusual praise from the International Monetary Fund.<sup>95</sup>

Finally, in Bolivia it is guaranteed that there will be a major battle among the nation's regions over how the funds from lithium get divided. Regional fights over the distribution of the nation's booming oil and gas revenues dominated President Morales' first term. Southwest Potosí is a region that has long been neglected in terms of public investments and there is strong criticism of the ability of the local municipalities to wisely spend revenues that they do get.<sup>96</sup>

Communities in this area complain that they have expressed their needs to the government for decades, to no avail. The president and secretary of a large, Uyuni-based Quinoa cooperative (SOPROQUI) told us, "We have been asking the government for macro irrigation projects for years, which could have prevented our current water scarcity problems, but the government doesn't listen to us."<sup>97</sup>

How the government uses lithium revenue to address the pent up demands and needs of the region where lithium sits will be one of the surest tests of the nation's ability to escape the resource curse.

## II. The Environmental Impacts

Almost all of the attention being paid to Bolivia and its lithium by journalists, analysts, potential investors and the government focuses on economic aspects of the plans for Southwest Potosí. How much money can it make? How much will it cost? How many jobs will it generate? Who will it benefit?

But there is more than economics at stake in the region's proposed lithium future – a lot more at stake. One of the most important concerns is about the potentially devastating impacts that lithium exploitation could have on the region's environment, concerns that the Bolivian government is not treating nearly as seriously as it must.

*"Like any mining process, it is invasive, it scars the landscape, it destroys the water table and it pollutes the earth and the local wells. This isn't a green solution - it's not a solution at all."* – Guillermo Gonzales, Leader of the Chilean delegation to Salar De Uyuni to warn locals of the problems of lithium mining.<sup>98</sup>

The great potential and tragic irony of Bolivia's lithium is that, in the name of servicing the wealthy world with greener transportation, the ecosystem that makes it possible could be irreparably damaged. While the Bolivian government has an environmental strategy for the pilot plant, its effectiveness cannot be tested until the pilot plant is up and running. Environmentalists doubt the science behind some components of the pilot plant strategy and worry about Bolivia's capacity to mitigate the inevitable impacts of a future, large-scale, industrial project. The nightmare scenario for the region looks like this:

### A Water Crisis

While the terrain underneath Southwest Potosí may be wealthy in minerals, the land above is increasingly destitute in a resource vital to life: water. When we visited Don Antonio in the quinoa producing community, Calcha K, near Bolivia's lithium pilot plant, we found that he was the only farmer who planted his fields this year. "We are suffering from a three year drought that has forced most producers to turn to tourism or mining activities. Many people from my community have migrated to Chile to look for jobs until the rains return."<sup>99</sup>



It's not only the quinoa producers who are being slammed by a worsening water crisis in Southwest Potosí. Llama herders complain about disappearing surface water that they rely on to pasture their animals.<sup>100</sup> Tourism operators wonder what natural attractions they will show to tourists if the lagoons disappear.<sup>101</sup> Community drinking water sources have also dried up.<sup>102</sup>

Bolivian officials contend that the lithium project's water requirements will be minimal. But the numbers they use are based on very preliminary calculations. Among other things, they don't factor in the nine or more additional plants planned for the final industrial complex.<sup>103</sup> The implications of industrial water use in a region facing such dangerous declines are substantial.

Already there is clear evidence of the competition for water in Southwest Potosí between mining operations and crop irrigation.<sup>104</sup> Water needs of the tourism industry haven't been directly analyzed, but they are another competing force. More alarming are 90 active mining concessions around the Salar that already rely on the region's water resources.<sup>105</sup> The most exploitative of these concessions is the San Cristóbal Mine (see box), which will be a certain competitor for fresh water and salt water from the Rio Grande. Serious concerns exist that Rio Grande's waters will lower too much to be able to meet the needs of the lithium project.<sup>106</sup>

It is certain that increased water scarcity in the region will have an impact on the people who live there - on their ability to continue working, farming and living in the region. But the ecosystem as a whole will also be impacted.

The Salar de Uyuni and surrounding region is rich in animal, bird, and vegetative life. Nearly all of the local plants are still used by communities for medicinal purposes.<sup>107</sup> The Salar is home to three of the six flamingo species in the world and serves as their breeding ground during flood season. Due to the importance of the Salar watershed for human and animal life, it is protected by the RAMSAR Convention, an international treaty for the conservation of wetlands.<sup>108</sup> The delta of the Rio Grande, the drainage from which is crucial for the Salar's regeneration, has already been classified as one of 34 global biodiversity Hot Spots<sup>iv</sup> by Conservation International.<sup>109</sup> This delta forms a year-round lagoon, used by birds as well as wild and domestic animals. All of this could be thrown into environmental disarray by a large scale, water-using, industrial project in the region.

Given that industrialization plans for the region will stress an already over-tapped supply of water, the obvious question is: what are the government's plans to bring in the water required? To date there is no answer to that question.

## Contamination of the Air, Water and Soil

Large quantities of toxic chemicals will be needed to process the predicted 30,000 to 40,000 tons of lithium per year that the project expects to mine.<sup>110</sup> The escape of such chemicals via leaching, spills, or air emissions is a danger that threatens the communities and the ecosystem as a whole. Organic quinoa producers worry that the region's incessant winds will carry chemical residues to their fields, rendering them non-organic.<sup>111</sup>

These contamination concerns for the region are underscored by the experience of lithium producing regions in other countries. Communities living around Argentina's Salar del Hombre Muerto complain that lithium operations are contaminating streams used for humans, livestock and crop irrigation.<sup>112</sup> In Chile, a journalist described the Salar de Atacama as a landscape scarred by mountains of discarded salt and huge canals filled with blue chemically contaminated water. The scarce remaining water in the region has been contaminated by mines, and once-agricultural communities are deserted due

iv The Hot Spot classification is awarded by Conservation International to ecosystems that combine an exceptionally high level of unique, native species with serious levels of habitat loss.

to migration.<sup>113</sup>

A separate report from Chile shows how contaminating mineral levels in soils correspond to byproducts of lithium operations.<sup>114</sup> Finally, a report about a small brine operation in Nevada confirms the mortal effects that lithium contamination has on aquatic species 150 miles north of the mine.<sup>115</sup>

The technical proposal (ficha ambiental) for Bolivia's lithium project includes only one plan for disposing the massive quantities of salt that will be the byproduct of lithium and other mineral production in the Salar, dumping it into the Rio Grande River with the hope that the salt will be reabsorbed back into the salt flats during the rainy season. However, this method has not been tested, and if it fails the negative environmental impacts could be significant, especially due to the continuously diminishing flow of the river.<sup>116</sup>

### **The Painful Inadequacy of Bolivian Environmental Regulation**

The clear environmental risk posed by the project begs a crucial question – How equipped are Bolivian environmental regulators to guard against this damage? The answer is: not well.

*“Not one environmental impact assessment has ever stopped a potentially risky project in Bolivia.”* - Marco Octavio Ribera, Bolivia's Environmental Defense League (LIDEMA).<sup>117</sup>

Bolivian law requires that all industrial project proposals complete a public consultation, environmental impact assessment (EIA) and technical proposal (ficha ambiental) that highlight potential environmental impacts and how they will be mitigated.<sup>118</sup> These studies must be submitted and approved before breaking ground. The technical proposal, approved by the government for the pilot plant, does not seriously address pre-existing environmental problems of the region in its baseline study.<sup>119</sup>

According to Bolivian environmentalists, environmental assessments are notoriously unreliable in their scientific foundations and rigorousness.<sup>120</sup> Companies and the government view them as a bothersome formality and wriggle around them to get the green light for a project. Public institutions, such as Bolivia's Ministry of the Environment and Water, which are responsible for ensuring compliance with environmental requirements, clearly lack the capacity or authority to intervene in an effective way.<sup>121</sup>

COMIBOL and the Ministry of Mining and Metallurgy have historically presided over state and private industrial operations that have resulted in environmental catastrophes, due to bending the rules or turning a blind eye. Mineral exploitation projects have the worst environmental track record of all. In Southwest Potosí, the legally protected Reserva Eduardo Alvaroa, (equivalent to a U.S. National Park) has already been contaminated by evaporitic resource operations.<sup>122</sup> Its mineral resources are also included as a stated interest for the lithium project.<sup>123</sup>

“Bolivia's environmental law lacks just about everything to monitor and enforce environmental protection for this type of industrial project,” notes Víctor Sainz, the former Bolivian energy official who has studied the project closely and previously worked for 25 years for the Colorado Environmental Protection Agency in the U.S.<sup>124</sup>

All this raises serious concerns about the environmental consequences of large-scale lithium development in the Salar de Uyuni. Bolivia will likely face significant tradeoffs between drawing its lithium riches out from under Southwest Potosí and causing serious environmental desecration of that region in the process. If history is any indication – including under the current administration – of how those tradeoffs will be decided, the Salar and the surrounding environment are under serious threat.

*“There's no information, no water use nor hydrological studies, so how can they begin to project what the long-term effects might be? This is supposedly a project to improve the region, but what if it makes living impossible? How could it be called sustainable development?”* - Elizabeth Lopez Canelas—Bolivian Forum on Environment and Development (FOBOMADE).<sup>125</sup>

Thus far the Bolivian government has downplayed the possible environmental consequences of its plan. As one official said, “Every activity has an impact, but compared to other mining activities, the impact from the lithium project will be minimal.”<sup>126</sup> But not everyone in the region is buying the calm talk from La Paz. “The government only talks about the positive parts of the project, said Urbano Quispe, President of an Organic Quinoa Cooperative in Uyuni (CECAOT), “but we think it will be the same as the San Cristóbal Mine.”<sup>127</sup>

### **The San Cristóbal Mine: Portrait of a Social and Environmental Calamity**

Just an hour's drive from the Salar de Uyuni is the San Cristóbal Mine, a living reminder of the environmental nightmare that Bolivia's lithium project could produce. San Cristóbal is a large open-pit mine that began operations for silver, zinc, and lead in 2007, and plans to operate for 20 years. The mine has resulted in environmental and social disaster that affects all of Southwest Potosí.

#### **The Environmental Impact**

The mine's immense water use (50,000 liters per day) threatens the natural and human future of the region. Its industrial-scale and permanent, contaminated tailings threaten local soil and water quality. The mine's "publicly accessible" Environmental Impact Assessment is over ten years old and difficult to obtain and decipher. Informational inconsistencies, unwilling staff, and lack of baseline studies all contribute to even the most basic non-compliance with environmental regulations.

#### **The Social Impact**

In order to start operations, the mining project uprooted and relocated an entire community and began mining on a sacred spiritual site. The economic benefits that the mine does produce for the community, particularly in terms of employment, are short-term and will disappear once company operations conclude. The mine has also exasperated regional conflicts because only one municipality in Southwest Potosí (Colcha K) receives royalty payments from MSC, despite region-wide impacts.

While backers of MSC tout its creation of necessary jobs, those jobs come with a cost. This is a fundamental trade-off that all resource-cursed countries face. Bolivia says it will change this pattern, but lacks the capacity to prevent it from happening. The government has turned a blind eye to San Cristóbal's destructive and illegal actions, a position that raises many questions about how well the government will address the same issues on a much larger scale with regard to lithium development.<sup>128</sup>

In April 2010, local community members protested against San Cristóbal's disastrous activities by setting fire to some regional offices, blocking train tracks used to export minerals to Chile, and tipping over train canisters containing raw mineral materials. Protesters demanded that the mine pay for its exorbitant water use.<sup>129</sup>

### **III. The Threat to Communities**

How do the people and communities who live in Southwest Potosí feel about their homeland becoming the site of what could soon become one of the biggest industrial projects their nation has ever built?

An industrial and development project of the scale that Bolivia is planning for lithium necessarily translates into huge impacts on the people and communities that already make their homes and their livelihoods in the region. Aside from the potential environmental impacts described earlier, the project will crowd the region's roads, add stress to local school and health systems, encroach on agriculture and land use, alter the culture and population of the area, as well as many other impacts, both predictable and not.

To be sure, many groups in the region have long supported lithium development. In fact, a large peasant organization in Southwest Potosí is credited for proposing the lithium project to Morales and assisting in its initial planning.<sup>130</sup> The people of Bolivia, like impoverished people in most parts of the world, are hungry for almost any economic activity that might bring the promise of increased income and development. Many people we spoke with in our visits to the Salar de Uyuni spoke supportively of the government's plans.

But many local representatives we spoke with say that support comes with a condition, as noted earlier – that the project be 100% state owned and operated from start to finish. This reflects a deep distrust of foreign multinational corporations, a distrust born of decades of abuse. But that local demand also raises the prospect of confrontations with the government down the road, as official plans include foreign investors in the industrialization phase.

There are deep concerns as well. Local residents we spoke with are attentive to the environmental and social risks of the project, and look on with a mix of faith and unease as the project gets underway. Quinoa producers and tourism operators have expressed concern about supposed benefits that the Bolivian government has promised from the lithium project, saying that the benefits are irrelevant to local needs and could easily result in damaging impacts on the two industries that are thriving in the region, agriculture and tourism.<sup>131</sup>

In theory these concerns should find a place in the government's planning process through new social laws that require local participation before an industrial project can begin.<sup>132</sup> But Bolivia's laws to guarantee community

involvement in planning are as weak as its environmental protections.<sup>133</sup>

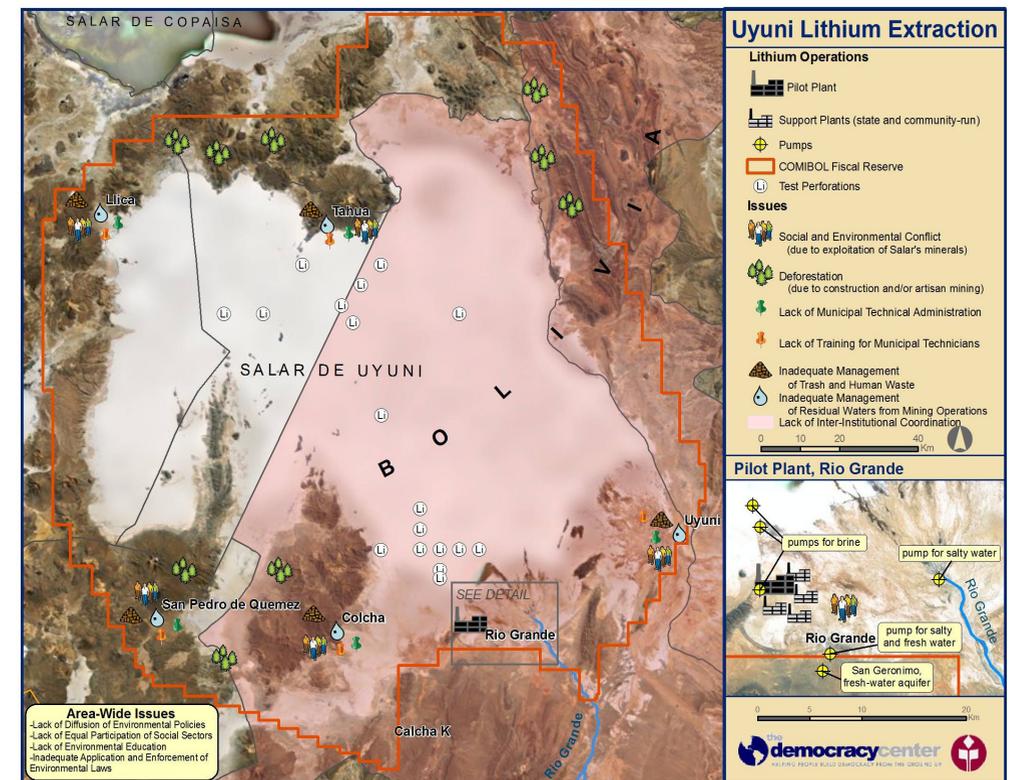
So far, major community involvement has been solicited by the government on a number of occasions, including at the inauguration of the pilot plant in May 2008, an informative forum that was held in Uyuni in 2009, and various meetings in Rio Grande and around the region during the planning phases of the pilot plant.<sup>134</sup> Local residents also receive information via hearsay and occasional radio ads announcing job openings at the pilot plant.<sup>135</sup> COMIBOL officials were unable to provide a clear methodology for their plan to ensure local participation and mitigate social impacts of the project, even though they cited the importance of doing so.<sup>136</sup>

Despite the series of activities to involve residents of the region, groups and individuals who did not participate in this process complain that they were never consulted about the existence or location of the pilot plant.<sup>137</sup> Others in the community voiced a concern that most of the groups being consulted are those with political ties to the Morales government and MAS party. The prevalence of these complaints casts doubt about the existence of genuine community involvement. The quinoa producer groups that we interviewed, for example, claimed that none of them had been approached about the project, despite the fact that, through its water use and other factors, it could have a huge impact on those growers.<sup>138</sup>

Another result of this lack of participation is significant misinformation about the project. One misconception is that the project will bring a large quantity of new jobs to the region. However, official estimates only predict 700-1500 jobs (and who these jobs will go to is still undisclosed).<sup>139</sup> Another common misconception in Southwest Potosí is that the state will never sign a deal with a foreign company in any stage of the project, a belief at clear odds with the government's active courtship of such partners.

Communities in Southwest Potosí have seen close-up how the nearby San Cristóbal mine has affected its neighbors in negative ways (see box). Whether they will be able to avoid a repeat of these same threats in the ongoing planning for lithium production is a serious and unanswered question.

**Map 3: Uyuni Lithium Extraction and Preexisting Environmental and Social Issues**



Adapted from: Prefectura del Departamento de Potosí, Dirección de Recursos Naturales y Medioambiente, "Plan de Acción Ambiental del Salar de Uyuni," Síntesis del Diagnóstico Ambiental, Prefectura del Departamento de Potosí, 2006, and COMIBOL, Dirección Nacional de Recursos Evaporíticos, "Proyecto de Industrialización de la Salmuera del Salar de Uyuni", (Powerpoint presentation, 2010.) .

#### **IV. The Capacity of the Bolivian Government to Manage Such an Ambitious Program**

Any plan that the Bolivian government cooks up to exploit its lithium for national development is only as good as its overall capacity to administer that plan. And this is an area where Bolivia suffers from deep and chronic weaknesses that put its lithium future in doubt. When Evo Morales took power in 2006, he inherited a weak civil service infrastructure with a long history of corruption. While the current administration has publicly pledged itself to run a more efficient and honest public service, chronic problems of mismanagement and dishonesty have continued to raise their head under Morales as well.

Building an effective public capacity that put the interests of the Bolivian people first will require serious attention to two basics:

### **In-House Expertise Accountable only to the Bolivian People**

To pull off its lithium ambitions Bolivia will need highly trained and experienced experts – in technical and scientific aspects of lithium, in business management and economics, and in social and environmental impacts. While it is not essential that these experts all be Bolivians, most of them do need to be, and all of them need to be solely accountable to the Bolivian people.

Bolivia is a country that knows well the costs of turning over its most important economic decisions to people accountable to others beyond its borders. In the mid 1980s, more than 250 important state functionaries were simultaneously on the consultant payroll of institutions including the World Bank, USAID, and the Inter-American Development Bank (in the name of being able to attract functionaries who required higher salaries.)<sup>140</sup> These officials and institutions drove Bolivia's wave of botched privatizations – the opposite of the approach that the Morales government seeks today. This underscores the importance of Bolivia calling the shots independently as it designs its lithium plans.<sup>v</sup>

Bolivia can develop this in-house expertise in two ways. One is to build up the expertise of current workers through trainings and programs, a strategy that is slowly being implemented. Another is to take better advantage of the significant expertise that already exists among Bolivian professionals who are out of the political loop.

Bolivia's use of homegrown expertise has been both praised and critiqued. On one hand the newspaper *El Deber* (one normally critical of the Morales government) awarded a prize to 15 Bolivian engineers who participated in the laboratory phase of the lithium project, citing their contribution to the advancement of the country.<sup>141</sup> One of the achievements of these Bolivian experts was the development of a technological process to obtain lithium carbonate from the Salar's brines, a process that will be tested at the Pilot Plant.<sup>142</sup>

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v For a complete analysis of the role of international financial institutions and foreign corporations in Bolivia's recent history, see the Democracy Center's book, *Dignity and Defiance, Stories from Bolivia's Challenge to Globalization* (University of California Press, 2009).

On the other hand, some Bolivian experts with decades of experience in evaporitic resources complain that they have been intentionally excluded from the project and Scientific Committee due to political differences with MAS. Many of those excluded are highly critical of technological aspects of the project and of government capacity. COMIBOL refutes these accusations and points out that any interested individual or institution can be granted membership on the Committee, if they meet the requirements of its internal regulations.<sup>143</sup>

### **Battling Bolivia's Corruption Demon**

Government corruption is nearly a constant factor in natural resource extraction projects in almost every country in the world. This is especially true in developing countries where a weak and low-paid civil service, sitting side by side with huge mineral wealth, is a recipe for corruption. Bolivia is no exception. Transparency International ranks Bolivia as number 120 (out of 180 countries) in terms of public-sector corruption.<sup>144</sup> This corruption includes bribes and money siphoning, as well as the hiring of public officials based on personal relationships or party fidelity instead of qualifications. The Morales government's effort to re-establish its national gas and oil company, YPFB, is the closest parallel to lithium ambitions, and YPFB has been struck by one corruption and mismanagement scandal after another.

Bolivia's President knows this. In a meeting with all of his ministers and vice-ministers the day after his December 2009 reelection, Morales declared that ineffectiveness and corruption remain the most serious challenges of his second term.<sup>145</sup> The path to defeating Bolivia's corruption demon is 100 percent transparency and zero tolerance. The government, media, and public must engage in constant, deep vigilance. Thus far the measures needed to combat corruption in the lithium project are not in place. Transparency is low and public oversight is nearly impossible.

## Conclusion

### Can Bolivia Beat the Resource Curse?

At the end we return to the question we asked at the beginning. For Bolivia and its long history with the resource curse – will lithium be any different? The answer is: maybe.

To be certain, there is real potential. The demand for lithium is clearly on the rise, with the possibility in the future of a very big rise. Bolivia is indeed sitting on the world's largest supply of lithium and it is being courted by some serious players. Importantly, all this is happening just as Bolivia has a government that has committed itself to a different way of doing business.

In practical terms the government is also doing some important things right. It is aiming for the technological side of the market where real money might be made. It is talking with the right potential partners. It is integrating some of those potential partners into the Scientific Advisory Committee in order to take advantage of their expertise and to get to know them better. It plans to keep the Pilot Plant and industrialization of lithium carbonate state-owned and -run and maintain profits and control in Bolivian hands once foreign partnerships are made. It is being coy about long-term agreements. It is integrating Bolivian experts into the project as well. All of this is sound strategy.

The government's decision to start with a pilot plant owned by and for Bolivians is also a good signal about how seriously it takes maximizing Bolivian control of the expansion to follow.

But there are many things that can go badly wrong on the lithium road ahead.

The government could aim at the wrong markets. President Morales' declarations that his country will soon be producing global class electric cars may raise the dreams of the Bolivian people, but when the government gets down to the practicalities of deciding which markets to bet on, those decisions must be guided by hard analysis rather than rhetoric. Where in the lithium battery mix that target might be is still soon to say.

The government could lock itself into bad partnerships. International business contracts are complex things. Serious observers of how the Bolivian government negotiated its new contracts for gas and oil have raised hard questions about the skill that the government brought to the task. It moved too quickly, one participant in the process told us. The government was also outgunned in terms of the expertise brought to the table by corporations.

The government could pay far too little heed to the warnings being raised about serious environmental damage to the Salar de Uyuni and its surroundings. Whether it turns out to be for a fortune or for something much less, Bolivia may end up destroying an entire ecosystem in chase of lithium wealth.

And the government might fail in its efforts to root corruption out of the process and establish a competent and honest regime to run the project. All of these are risks, real ones, and both the Bolivian government and the Bolivian people need to be aware and vigilant about each one.

What is the solution? It is both simple and complex at the same time. Bolivia's process toward lithium development must be transparent and the whole of Bolivian society must commit itself to being both informed and engaged.

Transparency in this case means not one thing, but many. It means that everything from development plans, to the state of negotiations with foreign partners, to movement of money in and out of the project must be made public, accessible and understandable. It goes beyond just putting information out there. Transparency will also require a genuine public education effort by the government and by organizations completely independent of the government. The Bolivian people, at least a good number of them, need to have a genuine understanding of the issues involved and the implications of the choices to be made.

Public engagement in this case also means not one thing but many. Oversight is key, and it needs to come in at least three varieties. Some oversight should be formal, carried out by political institutions charged with the task, including the legislative branch, the ministries, and independent bodies. The Bolivian media have an important role as well to play in securing information and explaining what it means. And equally as important, if not more so, the Bolivian citizenry must oversee the project through its unions, social movements, communities, and non-governmental organizations.

Finally, we cannot overstate the importance of paying close attention to the possible environmental impacts of lithium development. They are by no means to be taken lightly, and thus far it is clear that the government is not paying sufficient attention to these risks. The historical record of environmental destruction in Bolivia is too clear and the stakes are too high to ignore, especially for future generations of Bolivians.

As President Morales seeks to position himself more and more as a global spokesman in defense of Mother Earth (la Pachamama), it is on lithium that his government will be judged as to whether his actions at home match his words in the global arena.

What Bolivia is trying to do is hard – very hard. It is trying to break a curse – the paradox of plenty – that few impoverished nations escape. Its effort to escape that curse is extremely important, which is why so much of the world is watching. It is an experiment that is economic, social, political, technological and practical all at the same time. The fate of its success lies, more so than it has at any time in the past, in the hands of the Bolivian people and in their ability to hold their leaders accountable, both for their benefit and for the planet's.

## Notes

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