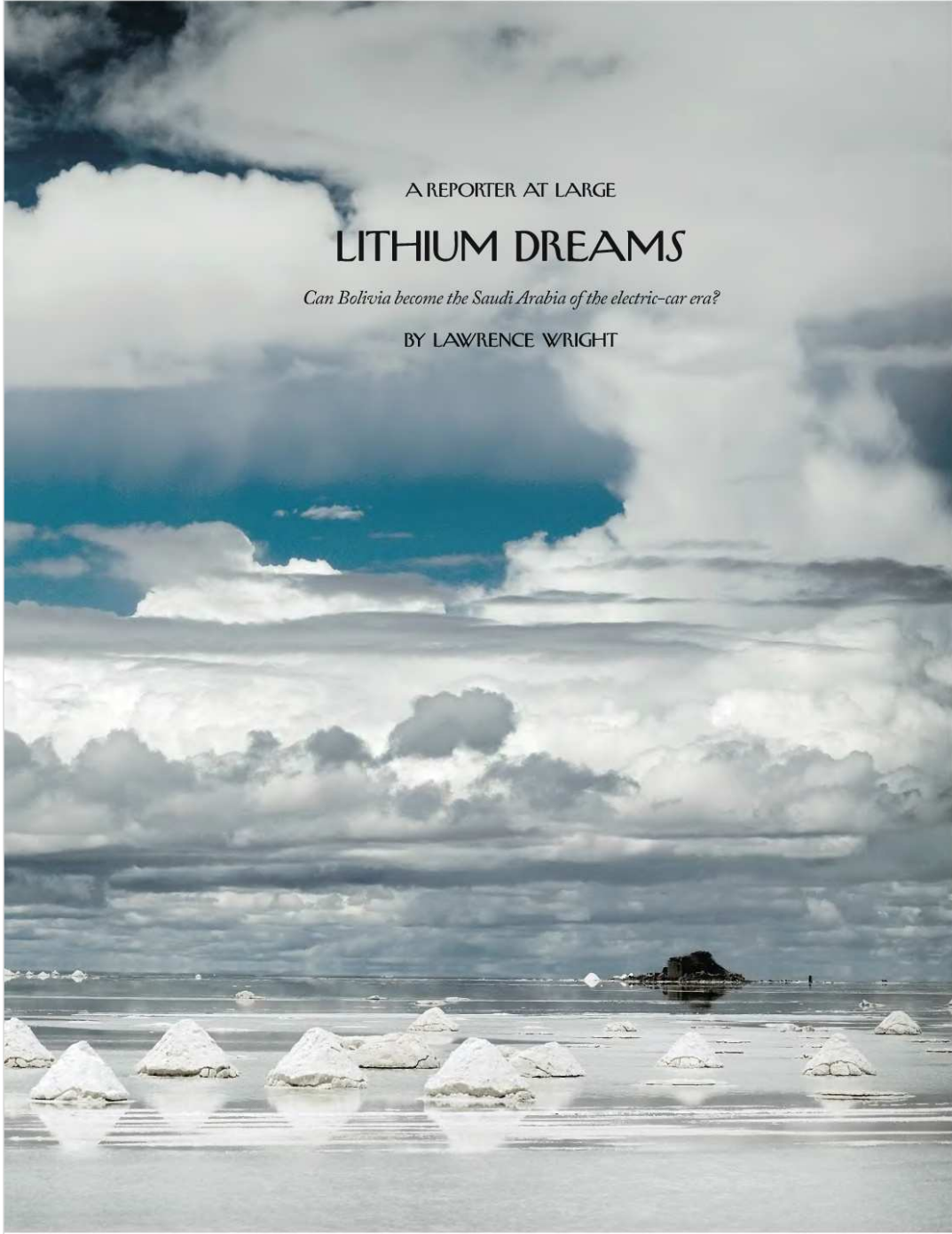


In southern Bolivia, there is a mountain called Cerro Rico—"the hill of wealth." It is a pale, bald rock, crisscrossed with dirt roads that climb the slope like shoelaces. More than four thousand mining tunnels have so thoroughly riddled its interior that the mountain is in danger of collapse. Its base is ringed with slums that spill into the old city of Potosí, a World Heritage site. Evo Morales, the President of Bolivia, recently told me that he and his countrymen see Potosí as "a symbol of plunder, of exploitation, of humiliation." The city represents a might-have-been Bolivia: a country that had capitalized on its astounding mineral wealth to become a major industrial power. Such a Bolivia could easily have been imagined in 1611, when Potosí was one of the biggest cities in the world, with a hundred and eighty thousand inhabitants—roughly the size of London at the time. Although Potosí began as a mining town, with the saloons and gaming houses that accompany men on the frontier, it soon had magnificent churches and theatres, and more than a dozen dance academies. From the middle of the sixteenth century until the middle of the seventeenth, half the silver produced in the New World came from Cerro Rico. Carlos Mesa, a historian who served as Bolivia's President from 2003 to 2005, told me, "It was said throughout the Spanish empire, 'This is worth a Potosí,' when speaking of luck or riches." Potosí is now one of the poorest places in what has long been one of the poorest countries in South America.

Across the divide of the industrial revolution, there is another city whose promise of greatness now lies in ruins: Detroit. Even before the Curved Dash Oldsmobile rolled off the assembly line, in 1901, becoming the first mass-produced American car, Detroit was a showplace of labor, its huge factories producing iron, copper, freight cars, ships, pharmaceuticals, and beer. Following Oldsmobile's lead, carmakers such as Ford, Packard, and Cadillac transformed the American economy. But Detroit's triumph was remarkably short-lived. The city is half the size it was fifty years ago. Two of the Big Three carmakers, General Motors and Chrysler, went bankrupt in 2009, and all of them have cut their workforces drastically. Unem-



*The Salar de Uyuni, a vast salt flat in southwestern Bolivia, contains the world's largest reservoir*



A REPORTER AT LARGE

# LITHIUM DREAMS

*Can Bolivia become the Saudi Arabia of the electric-car era?*

BY LAWRENCE WRIGHT

REDUX/CONTRASTO

*of lithium, and has significant quantities of boron and potassium. Photograph by Fabio Cuttica.*



*"Go back to bed or we'll make you watch Jay Leno."*

ployment in Detroit is at fifteen per cent; the murder rate is the fourth highest in the country; and about a third of its citizens live in poverty. An estimated seventy thousand structures—houses, churches, factories, even skyscrapers—stand empty, many of them vandalized or burned. Parts of town are being farmed. Like Bolivia, Detroit is hoping for a second chance. And both of them are looking to a treasure that could revive their fortunes, and, incidentally, lead the world to a cleaner environment. That treasure is lithium.

The lightest of any solid element, lithium has, until now, played a modest role in industry. Silvery in color, and softer than lead, it has been used mainly as an alloy of aluminum, a base for automobile grease, and in the production of glass and ceramics. It is so unstable that it is never found in its pure form in nature. Lithium floats on water—or, rather, it skitters wildly about, trailing a vapor cloud of hydrogen, until it dissolves. Oddly, given its frantically reactive nature, lithium has powerful tranquilizing effects; it has long been used as a drug to treat mood disorders, especially mania. In the nineteen-fifties, the U.S. govern-

ment created a market for lithium when an isotope of the metal turned out to be useful in building thermonuclear weapons. But demand for lithium, which has corrosive qualities, along with a tendency to spontaneously ignite, otherwise languished. That suddenly changed with the proliferation of cell phones and laptop computers; lithium is ideal for making lightweight batteries. Now, with the emergence of electric cars, lithium could challenge petroleum as the dominant fuel of the future. And nearly half the world's known resources are buried beneath vast salt flats in southwestern Bolivia, the largest of which is called the Salar de Uyuni. Bolivians have begun to speak of their country becoming "the Saudi Arabia of lithium."

Yet it's not clear that Bolivia is capable of making money off its trove. Morales, who is closely aligned with the populist socialism of Hugo Chávez, the President of Venezuela, is prone to revolutionary declarations: "Either capitalism dies or else Planet Earth dies." Such rhetoric tends to scare away the kind of foreign investment that would facilitate the development of the Salar. Then there is Bolivia's lack of infrastructure:

electricity, water, and gas are sparsely distributed, and few of the country's roads are paved. Before Bolivia can hope to exploit a twenty-first-century fuel, it must first develop the rudiments of a twentieth-century economy.

The Salar is approached from a single-lane dirt road that winds down from the Andes, twisting through bright canyons and dry plains where llamas and vicuñas graze. Flamingos high-step through shallow ponds. Until recently, glaciers covered Bolivia's mountaintops, but global warming has caused much of the ice to recede, diminishing the country's water supply. Just outside Uyuni, a mud-brick town perched on the perimeter of the salt flat, the scrubby landscape fills with litter, and colorful plastic shopping bags flutter in the branches of queñua trees.

Entering the town, you encounter a welcoming committee of baying dogs. The local airport has been closed for years. Uyuni, which has a population of ten thousand, is only two hundred miles from the Pacific Ocean, but for more than a century Bolivia's access to the sea has been blocked by its historic enemy, Chile. The country is landlocked and isolated—"an island surrounded by land," as Fernando Molina, a journalist and one of Bolivia's best-known intellectuals, described it to me. "A third of the country is above three thousand metres, and the rest lies below, at a really strong pitch. Our capacity to transport things is terrible. The geography makes it hard to produce anything, because we can't move it."

The Salar looks like a frozen sea. Blindingly white and covering four thousand square miles—twice the size of Delaware—the Salar is visible from the moon. (Neil Armstrong mistook it for a giant glacier.) One legend among local Indians is that the Salar was created when the goddess of a nearby volcano angrily pulled her baby from her breast, and her milk, mixed with her tears, spilled forth. The Indians, who are mostly Quechua or Aymara, use the salt to make bricks and to feed their animals. Occasionally, a llama caravan carries salt to cattle herds in the Bolivian lowlands. In the brief rainy season, a motionless sheet of water covers the salt flat, forming an endless mirror of the sky. Each winter, interlocking

polygonal crystals, resembling oversized bathroom tiles, form on the salt flat's surface. Underneath the thick crust is a layer of brine, where dissolved lithium is found.

For years, the Salar has been a destination for adventure travellers, but there has been little else to support the region's economy. "We've known since 1985 about the lithium," Francisco Quisbert, the head of the campesino federation in Uyuni, told me. The campesinos in the area repeatedly petitioned the government to mine the Salar, and in 1990 President Jaime Paz Zamora agreed, in principle, to a multiyear contract with the Lithium Corporation of America (now F.M.C. Corporation), which would have allowed the company to take all the lithium it could, giving Bolivia only eight per cent of the profits. Many Bolivians were outraged over the deal. When campesinos launched a campaign against it, the Lithium Corporation announced that it was setting up its operations in Argentina, a country that also has lithium reserves. "Everyone blamed us, saying we lost an opportunity and it was the only one," Quisbert recalled, then cited a Spanish proverb: "They said we were 'the gardener's dog'—we can't eat, so we won't let others eat, either."

Eric Norris, an executive at the mining company, told me that Bolivia was initially considered because of the vastness of its lithium deposits, but that the initiative soon "became undoable." He explained that, in addition to concerns about the lack of infrastructure and the difficulty of extracting products from the Salar, "the political environment was not favorable."

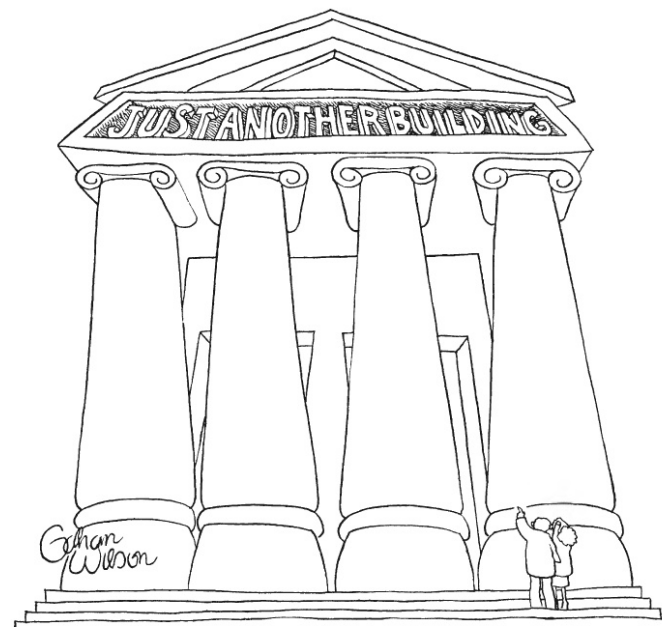
In 2005, Morales became the President of Bolivia. Once again, the campesinos came forward with a proposal for mining the Salar. Morales agreed to set up a pilot project for extracting and processing the metal. This time, he promised, Bolivians would remain in charge. As he has put it, "The state will never lose sovereignty when it comes to lithium."

Marcelo Castro, the head engineer of the pilot project, drove me to see one of the test sites in the Salar. He wore wraparound sunglasses to block the glare; the whiteness of the landscape was interrupted only by jagged Andean peaks, on the horizon. "The lithium can be processed economically, because we

use the evaporative process," Castro told me as we walked across the Salar in hiking boots, the salt crunching underfoot. There was a pickup truck and a steamroller; they looked like children's toys left on a sprawling beach. Nearby was a kind of Toonerville Trolley, where the workers at this remote research station were living. A shallow square pool had been cut into the salt crust and flooded with milky blue brine. Left exposed to the wind and the sun, the brine would turn into a pile of manganese, potassium, borax, and lithium salts, which would then be filtered and placed into another pool, then another. After about a year and a half, it would be possible for lithium carbonate to be chemically separated from the remaining elements. The process was overseen by a ministry of "evaporative resources." Castro, an expansive and passionate man with wild flowing hair, who repeatedly stopped to marvel at the progress that had been made, said that the project would eventually involve about thirty acres of such pools. "Before, the pilot plant was a dream," he said. "Now it is being lived."

The pilot project is a crucial test for

the government, but it is only a portion of what Morales has promised. Early one morning last November, I joined the President on the campaign trail; he was running for reelection. (On December 6th, he won, by an overwhelming margin.) Morales was headed to the northeastern province of Beni, in the Amazon basin. He normally flies in a twenty-year-old Fokker passenger plane, but today he was taking the Vice-Presidential craft, a six-seater that could land on the short dirt strips where we would be alighting. The little plane rose over La Paz, the capital, which nestles high on an Andean slope. The mountains quickly fell away as we flew over the largely trackless interior. Morales, looking out the window, vowed that the Salar "cannot be another Cerro Rico." Bolivia, he said, would no longer export its raw materials without benefitting from the additional value that the industrialized world gained from them. Not only would the country mine and process lithium on its own; it would also make batteries—and, eventually, cars. "From this brine, there will be lithium cars coming out of Bolivia," Morales told



"Nice little touch of humility!"

me. "This is the dream. Without dreams, what's anything worth? Dreams become reality."

The battery, which was invented in 1800 by Alessandro Volta, is a seemingly simple device. It is typically composed of two differently charged electrodes—an anode and a cathode—immersed in an electrolyte, a material that allows a current to flow between them. When you switch on a battery, you complete a circuit that allows negatively charged electrons to flow from the anode toward the cathode, generating energy.

For decades, cars have contained lead-acid batteries, which power the ignition and the electrical systems. Such batteries can also propel an electric car, but they are bulky and, compared with gasoline, pack less punch. A decade ago, G.M. produced an electric car, the EV1, which used twenty-six linked lead-acid batteries; the car had to recharge every seventy miles. A second version, using a nickel-based battery, extended the range to a hundred and ten miles, but the battery was extremely heavy.

Another option was lithium, which is eight times lighter than nickel. In the nineteen-seventies, scientists at Exxon had developed a battery that had an anode of lithium aluminum oxide and a cathode of titanium disulfide. The battery was relatively weak, and there were some mishaps in the lab. "They had a few explosions, and decided to get out of the alternative-energy business," John Goodenough, a material scientist at the University of Texas, recalls. Goodenough decided to give the lithium-ion battery a try. He built a prototype, using lithium cobalt oxide as the cathode, and it provided double the energy of any other similar-sized battery.

In 1991, Sony used Goodenough's insights to produce the first commercial lithium-ion battery, provoking a revolution in the consumer-electronics industry. An early cell phone, the Motorola DynaTAC, weighed twenty-eight ounces when it appeared, in 1983, and allowed only thirty minutes of talk time per charge. In 1996, using lithium-ion technology, Motorola introduced the StarTAC, weighing three ounces and lasting an hour. Lith-

ium-ion batteries soon became standard in laptops and P.D.A.s.

In the past decade, lithium technology has migrated to the auto industry. In 2006, a group of California entrepreneurs unveiled the Tesla Roadster, a sports car fuelled by a battery consisting, essentially, of sixty-eight hundred lithium-ion laptop batteries. The Roadster can travel two hundred and fifty miles on a single charge, and accelerate from zero to sixty in under four seconds. More recently, G.M. has staked its future on the Chevrolet Volt, a hybrid with a lithium-ion battery, which goes on sale later this year.

Although lithium-ion batteries are certainly lighter than their lead-acid and nickel-based competitors, they are still large and heavy. The Volt battery pack, for example, is six feet nine inches long, and weighs nearly four hundred pounds. "It's the size of an interior lineman!" Larry Burns, a former vice-president of research and development at G.M., said.

The reactivity of lithium poses another challenge for carmakers. Since 2003, the Consumer Product Safety Commission has recorded hundreds of cases of lithium-ion batteries in portable electronics catching fire, although nobody seems to have been seriously injured in such an incident. (In 2004, a plane carrying John Edwards, who was running for President, made an emergency stop after a television camera blew up onboard.) Joe LoGrasso, who oversees the development of batteries for G.M.'s hybrid and electric vehicles, acknowledges that "safety is an issue." He recently led me through G.M.'s battery-testing lab. Precise manufacturing is critical, he said, because impurities can cause the battery to short-circuit: "Any moisture inside the cell poses a danger—also particles of dust." He says he is confident that the Volt battery is safe, having subjected it to more than a hundred and fifty different stresses. "We've taken cells and crushed them, shot them, set them on fire," LoGrasso said.

Although electric cars are cheap to operate—about two cents a mile, compared with about twelve cents for gasoline-powered vehicles—the batteries are expensive. G.M. won't reveal how much it costs to make its battery, but various sources calculate the cost at roughly a thousand dollars per kilowatt

hour; that adds up to sixteen thousand dollars for the Volt pack. "We're trying to get down to three hundred dollars per kilowatt hour," Britta Gross, another G.M. executive, told me. The Volt will likely go on sale for forty thousand dollars, but government tax incentives for alternative-energy vehicles could cut the price by seventy-five hundred dollars.

Toyota recently announced that a "plug-in" Prius, employing a lithium-ion battery, will be available this fall. Nissan and Mitsubishi have announced plans for plug-in vehicles, as have Mercedes-Benz, BMW, and Hyundai. In 2011, Ford plans to sell an all-electric version of the Focus. China, meanwhile, has said that by the end of next year it will have the capacity to build half a million hybrid and plug-in vehicles annually. "All these vehicles use lithium ion," Ted Miller, a Ford senior manager, told me. "We don't think about electric vehicles using anything else."

In January, G.M. opened a new plant in Detroit devoted to assembling lithium-ion batteries. Although the facility will employ only about a hundred workers, it was greeted as a harbinger of salvation. John Dingell, the Michigan congressman, declared, "The United States, Michigan, General Motors, and the American auto industry are back."

Despite the auto industry's excitement about electric cars, the prospects of such vehicles remain uncertain. Last year, the Energy Department reported that lithium-ion batteries remained too expensive, and too heavy for the amount of energy they produced. The massive Volt battery pack, for instance, is designed to propel the car forty miles before an internal-combustion engine kicks in—that's about as far as a Honda Civic can travel on a single gallon of gas. Until electric cars can match the range and the power of gasoline-powered vehicles, they will probably remain a niche market for affluent urbanites.

Still, scientists are already pushing lithium technology in new directions. Researchers at I.B.M. are working on a "lithium-air" battery. Instead of being sealed in a container, the lithium remains open to the air, enlisting oxygen as a cathode, much as zinc hearing-aid batteries do. Such a scheme

makes the battery significantly lighter.

I recently visited an I.B.M. lab, outside San Jose, California, where a team of scientists were conducting tests on experimental versions of the battery that they hope will change the world. Sally Swanson, a chemist, showed me a lithium-air battery that had been constructed inside what looked like plastic garden-hose

problem is to create a membrane that can separate oxygen from other constituents in the air.

The battery team is using supercomputers to model countless combinations of electrolytes, catalysts, and electrodes, in order to optimize chemical reactions. The scientists are also using nanotechnology to make the sur-

and politically oppressed. The members of the Organization of the Petroleum Exporting Countries (OPEC), for instance, include some of the most troubled states in the world, such as Iran, Iraq, Libya, Nigeria, Angola, Saudi Arabia, and Venezuela. Bolivia has its own chaotic political history, and a long tradition of failing to use its wealth to



*Evo Morales, Bolivia's President, wants to nationalize the exploitation of natural resources. Photograph by Noah Friedman-Rudovsky.*

couplings. She held up a dime-size black disk. "This is the cathode—I paint the carbon on, it's real high-tech," she said, with a laugh. "Then I cook it on a hot plate." Because the carbon is porous, air passes into it. "Then we put a little piece of glass filter paper on top of the cathode, and on top of that we put the lithium"—a silvery disk. All of this was assembled while argon, an inert gas, streamed through the assembly. "Then we close it up and switch the gas to oxygen," she said, turning a switch on top.

Swanson had six prototypes running on pure oxygen, and one on air. The air version had less capacity. "Today is foggy, with high humidity, so we don't expect it to last as long," Swanson said. "The moisture reacts with the lithium and kills it." One possible solution to this

face area of the cathode denser, which will increase the number of reactions, theoretically making the battery much more powerful.

Winfried Wilcke, the battery team's chief, estimates that it will take at least a decade to make a lithium battery that could conceivably supplant the gas station. "We will spend three years looking for showstoppers," he said. "By the middle of the decade, we should have a pretty spectacular demo." If such efforts succeed, the world will eventually be running on lithium.

One of the famous paradoxes of economics is the curse of natural resources. Countries that are abundantly supplied with great mineral wealth tend to be poorly developed, impoverished,

develop its infrastructure or to provide decent training and education for its citizens. "This dependence on natural resources has always brought us poverty," Fernando Molina, the Bolivian journalist, lamented. "When we sell our raw materials, we have a wave of money and a conflict over who controls it. We create cycles of élites." Bolivia has extreme income disparity and virtually no industrial base. As Pablo Salón, the Bolivian Ambassador to the United Nations, put it, "We even have to import *nails*." Evo Morales promised to change all that.

On the plane flight, I asked him how lithium would be different from the other natural resources that Bolivia had failed to profit from. "Those resources were taken over, they were owned," he said, meaning that they

were in private hands. "Now the state is the owner, and we are starting to industrialize in order to gain the benefits." Morales said that since he nationalized the Bolivian hydrocarbon industry, in 2006, the state had gained more than two billion dollars in annual revenue. The approach, though popular with Morales's base, is seen by many economists as shortsighted: the foreign gas companies that developed the Bolivian natural-gas fields, after their discovery, in 2000, have experienced dramatic declines in their profit margins, leaving in doubt their future investment in the country. Bolivia's neighbors, meanwhile, have turned to more reliable sources of natural gas. In the past year, the price of Bolivia's gas has dropped substantially. Carlos Mesa, the former Bolivian President, says that gas production has fallen to the point that the country is now importing it. "We produce less and less," he said, calling the situation "a disaster."

Morales defended his actions by pointing out that the World Bank and the International Monetary Fund, alarmed by Bolivia's budget deficit, had hectoring the previous Administration to raise taxes. "And there were public uprisings, just to reduce the deficit!" he said. "Now there aren't high taxes or special gasoline taxes. Salaries have increased like never before for health-care workers and teachers." (The average teacher's salary has risen by forty per cent.) "Now we have a fiscal surplus—and that's since the first year of our government. All we did was nationalize petroleum and gas to produce results." He failed to mention that Bolivia's deficit reduction derives in part from international lenders forgiving debts. Some of the money from gas revenues has gone to subsidize school lunches, to create a form of social security for the elderly, and to provide incentives for mothers to keep their children in school; but much of it has stayed in government coffers, which pleases international lenders. The government reports that poverty rates have fallen substantially and that worker productivity has increased.

Morales said that nationalization

will also work with the lithium industry. "After petroleum and natural gas, lithium is very important to the economy," he said. "But the moment we begin to develop the industrialization of lithium it will become the most important."

When Morales's pilot project in the Salar began, many companies involved in the development of lithium technology expressed interest in mining the salt flat. Bolivian officials held preliminary talks with representatives of L.G., the Korean conglomerate, which is building the Volt battery for G.M. And in 2006 Morales visited France, where the billionaire industrialist Vincent Bolloré took him for a ride in a BlueCar—a small, bubble-shaped electric vehicle that Bolloré plans to produce in partnership with France's electrical utility. Morales wanted to see how such cars are made. According to Morales, Bolloré told him, "It's you who controls the raw materials for the twenty-first and twenty-second centuries. You're like Saudi Arabia"—a familiar refrain. But Morales doesn't want his country to become Saudi Arabia; he wants it to become France, an industrial power.

I asked Morales how, given the miserable state of Bolivia's infrastructure, such a transformation could be accomplished. "We have organized a scientific committee in the Ministry of Mining to carry out research," he said. The committee will bring together "foreigners and Bolivians" to determine how best to recover the natural resources and begin the process of industrialization. He told me that he expected Bolivia to be making lithium-ion batteries later this year. Automobile production, he added confidently, would come in another "five or six years."

Morales, who is fifty, is a creature of his biography. His nationalist approach to developing the Salar, and his politics in general, are representative of many poor, indigenous Bolivians, who for centuries have lived on the margins of their society, and are determined to end the pattern of exploitation. Morales was born in an Aymara village, in the Altiplano. He grew up in an adobe

hut with a thatched roof, where he lived with his parents and the two siblings out of seven who survived beyond the age of two. He began selling pop-sicles on the street before he was five, and at nine he joined his father in the cane fields of Argentina. As a young teen-ager, he herded llamas on the plains outside the city of Cochabamba, and taught himself to play soccer with a ball made from rags. Along the roadside, he used to collect orange and banana peels that people had thrown from passing buses. "I gathered them to eat," he says, in a campaign leaflet. "Since then, it was one of my major aspirations to ride in some of these buses."

Like many poorly educated Bolivians of his generation, Morales had few opportunities for employment. Being an Indian was also a barrier. "My mother, for instance, she couldn't walk in the plaza," Morales said. "She didn't have the right to walk on the sidewalks." To have become President, he says, is "historic, incredible."

Before entering politics, Morales made his reputation as a fearless and canny leader of the coca growers' union, an office that he still holds. Like many of his countrymen, he has a mystical attachment to coca, which Bolivians have traditionally chewed as a mild stimulant. In his Presidential office, there are two portraits—one of himself, the other of Che Guevara—that are fashioned out of coca leaves. On the plane trip, Juan Ramón Quintana, Morales's chief of staff at the time, explained to me, "Coca is a link between human beings and nature. It helps the community relate to itself."

As a coca grower, Morales was an aggressive opponent of the U.S. drug-eradication policy in the Andes and, particularly, of the Drug Enforcement Agency. Before the agency began a forceful intervention in Bolivia, in the eighties, the country was verging on becoming a narco state. Corrupt military leaders ran the country and openly reaped profits from the drug trade. The D.E.A. gained a reputation for supporting brutal reprisals, however. In 1988, police trained by the D.E.A. and the U.S. military raided a village and were accused of wounding more than a hundred coca growers and kill-



ing twelve of them. The following year, Morales delivered an address commemorating the killings. Afterward, the cops beat him up and threw him down a mountain, leaving him for dead.

“One of his greatest fears was the presence of the D.E.A.,” Fernando Molina told me. “Sometimes he dreams that the D.E.A. is out to get him.” Morales doesn’t carry luggage when he travels outside the country, fearing that the drug agency will plant incriminating narcotics in his suitcase. (An aide takes his clothes on a separate flight.) “The D.E.A. doesn’t understand the Bolivian people,” Morales told me.

In 2008, after President George W. Bush placed Bolivia and Venezuela on a blacklist, saying that neither country was doing enough to combat drug trafficking, Morales and Chávez expelled their respective American Ambassadors. Morales then expelled the D.E.A. Talks are now being held to restore diplomatic relations between Bolivia and the U.S. “There will be rules that will set a new standard for bilateral relations with the United States,” Morales told me. “You’re not going to see a relationship of subjugation.”

I asked Morales how he planned to insure that the drug trade didn’t once again corrupt Bolivian society. “Social control,” he said, vaguely. He said that new government regulations, such as restricting the size of the plot that coca growers can claim, and the modernization of law enforcement would keep narcotraffickers at bay. Morales told me that when he retires—a prospect he clearly saw as quite remote—he hopes to return to his own coca plot, which is in the tropical Chapare region of Bolivia, and resume tending his crop.

In the meantime, Morales has allied himself with the most conspicuously anti-American leaders in the world. In addition to his alliance with Hugo Chávez, he is friendly with Fidel Castro, of Cuba, and Mahmoud Ahmadinejad, the Iranian President. Ahmadinejad visited La Paz in November to announce a joint project to study lithium technology. “I’m a big admirer of you and your people,” Morales told him. “Our people have the mandate to liberate ourselves from the empires.”



Molina said of Morales, “Evo is Aymara, and the Aymara see the world as a fight between the forces of good and the forces of evil, like in ‘Star Wars.’ For him, the forces of good are coca growers and the coca leaf. The evil is the D.E.A. and the U.S.”

Morales told me, “It’s not that I don’t like North Americans. I like everybody. But the North American government would involve itself in internal affairs, conspire, and offend. The American Ambassador would treat me like a bin Laden, a terrorist, an assassin, a narco-trafficker. Who’s going to like that?” As for President Barack Obama, Morales said, “He’s trapped by the capitalist system, and by the structure of imperialism.” The only difference between Obama and his predecessor, he said, is that “one is gringo, the other is black.”

Morales embodies two powerful social forces in Bolivia: the unions and the indigenous movement. His election brought a degree of stability to a country that has seen frequent coups, assassinations, and sudden changes in government since gaining independence, in 1825. “Previously, politics in Bolivia was done on three pillars: the business community, the Church, and the U.S. Embassy,” Walter Chávez, a former Peruvian insurgent who ran one of Morales’s

Presidential campaigns, told me. (Chávez, who faces terrorism charges in Peru, has been granted political asylum by Bolivia.) “These were the de-facto powers. No politician could hope to secure the Presidency without the support of these three groups.”

Morales’s success was directly connected to the arrogance of his opponents. During his first run for the Presidency, in 2002, the American Ambassador at the time, Manuel Rocha, threatened to cut off aid to Bolivia if Morales was elected. Until then, Morales had been a marginal factor in Bolivian politics; afterward, running as “America’s worst nightmare,” he received 20.9 per cent of the vote. The winner, Gonzales Sánchez de Lozada, known as Goni, took the office with a mere 22.5 per cent.

Goni, a mine owner who, by some accounts, was the richest man in the country, had occupied the position previously, from 1993 to 1997. He returned to the Presidential palace facing a crippling shortfall in revenue, which he proposed to solve by selling Bolivian gas to California. But that required moving the gas through a port in Chile that had once been Bolivian territory. The pain of that old trauma is still so acute in Bolivia that it set off a revolution.

Bolivia’s coastal territories were lost





*"Mind if I tweak it?"*

in 1879, when Chile, spurred on by British investors, invaded the country to claim the Atacama Desert's rich deposits of guano (for fertilizer) and saltpeter (for explosives). The resulting War of the Pacific was just one of the five unfortunate wars that Bolivia has fought with its neighbors, which, cumulatively, have reduced its territory by half. The loss to Chile lingers most bitterly in the minds of Bolivia's citizens. There is still a Bolivian Navy, which patrols inland waterways. Near the naval headquarters, on Lake Titicaca, is a statue of a fallen hero from the War of the Pacific, inscribed with the hollow boast known to every Bolivian schoolchild: "Surrender? Your grandmother surrenders, Damn it!"

The idea that Chileans might benefit from the sale of Bolivian gas inflamed nationalist sentiments, and provided a political opening for Morales, who declared that the gas should be kept in the ground. The controversy soon led to a series of strikes and blockades, which paralyzed the country. Luis Ramos de Espejo, one of the organizers of the protests, repeated to me a widespread rumor at the time: "Our government wanted to sell all our gas to Chile, through Argentina. We know, because of our history, who Chileans are. They've always wanted to take our

natural resources." On October 13, 2003, Ramos joined hundreds of other insurgents in the sprawling ghetto of El Alto, overlooking La Paz. Together, the protesters shoved four railroad carriages over a bridge and onto the main highway connecting La Paz to the airport. All other avenues to the city were also blocked.

Goni called out the Army to break the siege. More than sixty people were killed, in the bloodiest episode in Bolivia's turbulent democratic experience. Goni fled to the U.S., and Carlos Mesa, the Vice-President, assumed the Presidency. He had no easier time of it, however. "I could put the Army in the streets, or I could go home," he said. "I went home."

Morales came to power in a special election in 2005, gaining the first majority in Bolivian history. From the moment he took office, he made a fetish of working constantly. "He never takes off a single day," Walter Chávez told me. "Not Christmas, not New Year's, not on his birthday." Morales sometimes schedules meetings for four in the morning. Early in his Presidency, Cabinet members began dispatching their drivers to watch for his convoy leaving for the office, usually around 5 A.M.; the ministers then quickly dressed and followed him to work. I asked Morales

when he slept. "I usually sleep on the plane," he grumbled. "You're getting in the way of that."

The plane touched down on a dirt strip in Baures, near the border with Brazil. Morales was the first elected President to visit the town. Although his reelection was never in doubt—he won with sixty-three per cent of the vote, securing the Presidency until 2015—he was also campaigning for a two-thirds majority in parliament for his party, Movement Toward Socialism, or MAS, which would allow it to continue his program of nationalization without obstruction. MAS won more seats than it needed.

Morales surveyed the crowd gathered beside the landing strip—several hundred people wearing blue MAS hats, carrying party flags, crying "*Viva Evo!*" and waiting in the withering heat to escort him into town.

"Mr. President, you need to go in by foot," Quintana told him. "It's really informal here. They like personal contact."

As soon as Morales disembarked, wearing a striped short-sleeved shirt, black jeans, and jogging shoes, he was greeted with garlands of clamshells and bright-red bird-of-paradise blossoms. Then the exuberant crowd, along with one of Bolivia's ubiquitous brass bands, marched him toward their village. Morales himself used to play the trumpet in such a band.

Most residents of Baures cultivate cacao, and when the delegation arrived at the steps of the city hall the mayor welcomed Morales to "the capital of chocolate." The band played the national anthem. Morales genially remarked that the last time he visited the region, in 1995, as a union leader, he had been thrown in jail. "I never would have thought that I'd be President of a place I visited in confinement," he said.

Morales can be disarming in acknowledging his shortcomings. "Brothers and sisters, I'm like you," he told the crowd, which pressed together in the shade under the porch of the city hall. "I never studied to be President. It was hard for me to understand how the state operated, how Bolivia functioned. It has cost a lot for me to understand how the economy works." He thanked

his Vice-President, Alvaro García Linares, “an intellectual who is very committed to the poorest people, the most abandoned.” García, who comes from an elite mestizo family, is a Marxist and a former guerrilla; Carlos Mesa calls him “a militant in a terrorist organization.” Ricardo Calla, an anthropologist who is a former Minister of Indigenous Affairs, claims that García is the “other President” of Bolivia, and runs the country with “a neo-Austrian-Marxist outlook.” García spent five years in prison during the nineties, and it is said that since this experience he can never get warm; indeed, when we met, in the Presidential palace, he was bundled up in a long wool coat. As for his influence in the Administration, García coyly told me, “We made the effort to Indianize Marxism and Marxize the Indian movement.”

Morales, who has two children from former relationships, lives alone in the Presidential palace, in La Paz. At first, he thought that the arrangement was unseemly, so he encouraged García and members of his Cabinet to move in with him. His security detail pointed out the danger of concentrating the government in one place, and soon “the pajama party was over,” a former government adviser recalled. Morales loves sports, and continues to play racquetball and soccer, although he carries himself in a slack, shoulders-forward posture that gives no hint of physicality. He has never owned a suit, but when he was elected President he worked with a tailor, Manuel Sillerico, who fashioned for him sweaters and jackets interwoven with Indian braids. (Morales claims to have designed them himself.) When Morales travels abroad, he maintains the same proletarian informality that he displays at home, meeting the King of Spain in a pullover sweater and dining at an Olive Garden when visiting New York.

Last fall, when Morales was in Manhattan for the annual U.N. meeting, Harry Belafonte had planned a benefit for him, in Harlem. But Morales was sidelined by an earache. According to another former member of Morales’s staff, the President doesn’t trust American medicine, so he called a doctor in Bolivia, who prescribed flushing the ear with warm water.

“The hotel said they would charge forty dollars for a pot of steaming water,” the former staffer recalled. “When I left, his aides were rolling up newspapers, setting them on fire, then sticking them in his ear.”

When Morales came into office, he made a point of selecting nontraditional appointees; Casimira Rodríguez, an indigenous woman who headed the housemaids’ union, was named Minister of Justice. A year later, Morales had to fire her. “She didn’t seem to be learning anything,” Walter Chávez told me. Chávez recounted another incident, which took place shortly before the 2005 election: “Evo went to Chapare for a meeting of the union of coca growers. The m.c. didn’t know how to read, except really slowly, and everyone began to whistle. ‘Put somebody up there who knows what he’s doing!’ they cried. Me, too, I was also whistling. Then Evo stepped up and grabbed the mike and said, ‘I’m about to be President because I’m like this guy. When I didn’t know how to read, they gave me a chance. If we take out

this guy who doesn’t know how to read and put in someone who does, then the revolution I thought I was part of has suddenly become something different. Those who don’t have the patience to stick it out can leave.” No one left. “It was clear he was going to give opportunities to people who had never had them,” Chávez said. “The dream he has, walking around or asleep, is to show that an Indian can govern, and govern well.”

The overwhelming mandate that voters have given Morales has left his opponents worrying about the future of the party system in Bolivia. “Morales mixes the Latin-American caudillo tradition with leftist authoritarianism,” Ricardo Calla observed. The supermajority that Morales’s party gained in the December election meant that there would be few remaining political obstacles to his revolutionary goals. “The President has four fixed ideas that form the heart of his discourse,” Mesa told me. “The state is sacred; the state represents all Bolivians; the state should be the boss of



*“How’s everything?”*

everything; and these things together guarantee happiness and progress.”

It is a paradigm that seems very much out of date, even in Latin America. One of Morales’s opponents in the recent Presidential race, René Joaquino, told me, “Evo has a fanaticism for the state model in terms of the economy, and he doesn’t have an accurate read on the big changes in the world.” Joaquino is a popular former mayor of Potosí, and, like Morales, he is an Indian; but he was crushed by Morales’s formidable political machine, receiving less than three per cent of the vote. “In Bolivia, state business is always inefficient, corrupt, and uncompetitive,” Joaquino said. “We’ve already lived the state model. It hasn’t resolved the big problems in Bolivia.”

But even some of Morales’s critics concede that there’s little alternative to the path he has chosen, given the dialectic of exploitation and instability that has always defined the Bolivian state. “For most Bolivians, the best model is the welfare state,” Fernando Molina said. He pointed out that Chile also has abundant natural resources, but it is a strong, homogeneous nation with a varied economy. “Bolivia, on the other hand, is a very diverse nation, and has never been able to integrate itself,” Molina said. “For us, natural resources have been a curse.” He added, “I’d prefer to see money go directly to people than to the corrupt builder of a smelter or of a highway that ends up costing ten times what it actually should.” But, until those smelters and highways are in place, Bolivia will remain in its pre-industrial cocoon. “In the end, Bolivians are going to have to change their mind-set, and stop thinking about what the state is going to give them,” Molina said. “We have to discover new ways to produce things and pray we don’t keep on finding more natural resources.”

After Morales finished speaking in Baures, the mayor thanked him for the new roads and other projects that Morales had promised. “They will fill the empty feeling we’ve had in these communities,” the mayor said. Morales then led the crowd back to the dirt-

strip airport. Before boarding the plane, he reached into his shirt pocket, where he had a wad of hundred-dollar bills, and paid the band.

Nearly thirty years ago, Guillermo Roelants du Vivier, a young Belgian nuclear engineer with a yearning to promote social change, cobbled together some grant money and made his way to southwestern Bolivia. He had fallen in love with Andean culture, he told me not long ago, in a café in La Paz. He helped to develop a market for quinoa, a local grain that is now found on many menus around the world, and he also set up a boric-acid factory, using geothermal steam as a power source. “You didn’t have any services,” he recalled. “Uyuni was very, very small. Now we have some doctors and drinkable water. Things have changed a lot.”

Roelants is the head of the scientific committee that Morales has charged with developing the resources of the Salar. “The U.S. Geological Survey has published that there are five and a half million tons of metallic lithium” in the Salar, Roelants told me. “They are completely wrong!” After conducting extensive surveys, he estimates that the figure is about a hundred million tons—an amount that would quadruple the size of the world’s known lithium supply. “We also have very important reserves of potassium, magnesium, and boron in the same Salar,” he said. “Not the biggest in the world, but very important.”

The high amount of magnesium mixed into the brine drives up the cost of extracting the lithium. Then there are the formidable expenses in getting the lithium to market—Roelants estimates that completing the industrial plant and the infrastructure required to ship it abroad will cost more than six hundred million dollars. At present, the entire world market for lithium is only about six or seven hundred million dollars a year. Many industry analysts expect that the demand for lithium will shoot up as soon as electric cars come off the production line. Byron Capital Markets, an investment adviser, predicts a forty-per-cent increase in demand over the next four years.



Roelants said that the financing for developing the Salar would come from the Bolivian government, or from loans. “Everybody wants to give us credit,” he said, “with a very good interest rate.” An alternative is to seek financing from “international companies working with cars,” based on projected sales. “It’ll be no problem to get the money,” he assured me. What is certain, Roelants says, is that the government will retain control. “The Bolivian people don’t want another war like the War of the Pacific . . . or something like Potosí,” he said. “The Salar is not for sale.”

Despite the fact that Bolivia is sitting on an ocean of lithium, there is a substantial amount of it already available elsewhere. In addition to large brine deposits in the Andes and in the Chinese interior, lithium is also available in a hard rock called pegmatite, which is already mined in Australia. New lithium-mining companies are springing up around the world. The Bolivian government has suggested that the sheer quantity of lithium in the country will eventually tip the scales in its favor, but that isn’t necessarily so. The amount of lithium required to make a car battery is surprisingly small: less than four pounds of it is used in the making of the immense Volt battery, for instance. And some of that lithium can be recycled.

“Two countries—Argentina and Chile—could supply the whole world with cheap lithium past 2060,” Lucie Bednarova Duesterhoeft, a researcher for G.M.’s Global Energy Systems group, told me. Because of Bolivia’s shoddy infrastructure and remote location, and the impurities in the Salar, the cost of extracting the lithium there will be significantly greater than in some other countries—about five thousand dollars per metric ton, Duesterhoeft estimates, versus less than two thousand in Chile. Currently, the world’s two largest lithium-mining operations are in the Atacama Desert of Chile—on land that was taken from Bolivia during the War of the Pacific.

Although Morales’s grudging stance toward multinational corporations remains popular at home, his obsession with preventing the Salar from becoming another Cerro Rico may also keep it from ever becoming a source of Boliv-

ian wealth. Unless his regime can come to an agreement with a multinational corporation—or figure out, on its own, how to mine the treasure in the Salar de Uyuni at a competitive global price—its lithium will remain forever stuck in the brine, as will Morales's dreams of Bolivian batteries and electric cars.

In January, Toyota Tsusho, a supplier for the Toyota Motor Corporation, announced a hundred-million-dollar deal with Orocobre, an Australian mining company, to supply Argentine lithium for future hybrid and electric cars. Orocobre is conducting a feasibility study for mining the Salar de Olaroz—a salt flat, just across the border from Bolivia, that is much smaller than the Salar de Uyuni but has fewer impurities, according to James Calaway, Orocobre's chairman. Calaway told me that Bolivia's salt flat is "like a seductress. But, when you really look at it, it doesn't work." Moreover, he said, "You can't ignore the Morales factor." Orocobre intends to start production in Argentina by 2012, and it has already secured the rights to more than a dozen other salt flats there. Only about eight per cent of the profits will end up in Argentine hands, but over the years the payoff should be significant. (Orocobre will have to pay income tax.) A press release stated that Toyota Tsusho's interest in the Salar de Olaroz "stems from the desire to increase its exposure to reliable and diversified lithium supplies... in a time frame closely aligned with worldwide lithium requirements for hybrid and electric vehicles."

Many Bolivians were dismayed at the news: once again, one of the country's neighbors was profiting at its expense. (An op-ed for the Bolivian daily *El Deber* fumed that Argentina, with its "small salt flats," had "secured the best contracts for its lithium while Bolivians dillydallied.") But a spokesman for the Bolivian government said that Toyota's news had been expected, and was received "with calm and caution, but without despair." Toyota seems never to have considered working in Bolivia; Bill Reinert, who helped develop the Prius, recently told me, "You have to look at the geopolitics and the logistics."

A month after the Toyota deal was



*"Can you believe it, Marlow—our little girl is finally getting divorced."*

announced, word began trickling out that the scientific committee headed by Roelants was entertaining proposals from a few foreign companies still interested in the Salar de Uyuni, including Mitsubishi, the car and electronics manufacturer; Kores, the mining concern owned by the South Korean government; and Bouygues, a French conglomerate. A Japanese delegation arrived in La Paz, and participated in a government-sponsored conference dedicated to "the future of Bolivian industry." The meetings were cordial, but a deal did not seem imminent. At the conference, Saúl Villegas, the director of evaporative resources in the Bolivian Ministry of Mining, reiterated that any lithium-mining project must be "a hundred per cent state-controlled." Afterward, he told me that Bolivia "would not repeat the history of Potosí." Bolivia, he went on, had an obligation to guarantee to the world a steady and reliable supply of lithium "for the next hundred or two hundred years." He said nothing about making batteries or cars in Bolivia, however.

A more sober perspective on Bolivia's economy appears to have settled in among some members of the govern-

ment. A few weeks after the Toyota Tsusho deal with Argentina was announced, Roelants said that the big "future industry" of Bolivia would not be lithium after all. Instead, the country would focus on the other valuable substances buried in the Salar: in particular, on potassium chloride, a common ingredient in fertilizers. It could be extracted far more easily than lithium, Roelants said, and in far greater quantities. Roelants said that the Salar was expected to yield eight hundred thousand metric tons of potassium salts a year. "Potassium is more important," he said, adding that lithium was just a by-product.

Bolivia's President, however, does not quite seem to have accepted the idea that the Salar's lithium treasure may amount to little. On March 10th, José Pimentel, the Minister of Mining, announced the founding of a new state-owned corporation, the Bolivian Evaporative Resources Enterprise, which will devote particular attention to lithium, exploring "every alternative" for exploiting "gray gold." The government's initial investment will be five million dollars. The company's chief will be handpicked by Evo Morales. ♦