

# Lithium in Bolivia

## **Can Resource Nationalism Deliver for Bolivians and the World?**

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# Issues

- Bolivia believes has significant market power
- Insists on state control over
  - lithium extraction
  - technology
  - lithium carbonate processing
  - battery production
  - Production EV vehicles in Bolivia?
- Some people fear Bolivia has ability to control/significantly influence the market

# Evaluation

- Resource Nationalism: Market v. State
- Whose Resource is it Anyway: Central Government v. Local Communities

# Conclusion

- Local politics pushes government to insist on state control and significant appropriation of rents
- a strong but not exponential increase in demand keeps Bolivia out of the market if it insists on its preferred policy
- even a significant increase in demand is likely to provide Bolivia with only a small window in which it would be a major player

# Resource Nationalism

- Resource belongs to the ‘nation’
- Value is inherent in the resource
- Government sets the terms for exploration, production, industrialization, transportation and distribution
  - SOE preferred
  - Private investors provide ‘service’ if necessary
  - Public policy designed to capture maximum rents

# Market for Lithium

- Uncertain Demand
- Latent Supply
  - Geology
  - Extraction Technology Improvements
  - Recyclability

# Demand

- Chevy Volt's battery 400 lbs; only 4 lbs lithium.
- Current reserve estimates 9.9 mt = >5.4 billion Chevy Volts
  - dwarfs the ~800-850 million vehicles worldwide currently on the road & the prospects for two billion vehicles ~2030
  - Other uses unlikely to strain supplies
- Lithium prices in 2008 ~\$13/pound
  - tiny fraction (~\$50) of the cost of EV battery, which can be \$10,000 or more

# Demand Characteristics

- Consumption characteristics
  - ‘One time’ purchase
- Technology
  - ultracapacitors, etc. can increase efficiency of batteries
- Recycling



# Supply: Sources

- continental brines (the chief source today and the type in Bolivia salt lakes, *salars*)
- geothermal brines, minerals and clays
- even seawater can yield lithium at five times the current price of brines
  - South Korea is investing in technology to make extraction of lithium from sea water commercially viable by 2015

# Supply

- Currently, global reserves of lithium that are commercially viable are 9.9 million tons (mt),
  - Chile 76% (7.5 mt)
- Production 2008
  - Chile 10,600 tons
  - Australia 6,280 tons
  - China 3,290 tons
  - Argentina 3,170 tons

# Potential Resource Estimates

- USGS (2010 update) 25.5 mt world total
  - Bolivia 36% (9 mt)
  - Chile 30% (>7.5 mt)
  - Argentina, China, and US each has 10% (2.5 mt each). (China revised its figures up to 3.35 mt)
- Evans 29.8 mt in 2008.
- Roskill 30 mt.
- International Lithium Alliance, ILA 38.5 mt .



# Bolivia: Uyuni salar

- low concentrations of lithium, thereby requiring more drilling and channeling to accumulate the lithium
- significantly high ratios of magnesium to lithium (21.5:1; Chile's Salar de Atacama at 6.6:1; Argentine Salar del Hombre Muerto at 1.5:1), requiring more expensive extraction and processing to generate lithium carbonate.
- Seasonal flooding of the salt flats slows the evaporative process in the pools (40% of the rate at Atacama)

# Infrastructure Issues at 12,000 feet

- Roads
- Rail
- Gas pipeline
- Electrical grid
- Water
- Skilled labor

# Environmental Issues

- Mining in the salt flat
  - Extensive drilling
  - Large pools
- Extensive use of water in a place that has limited water and inadequate distribution
- highly toxic processing plants and battery factories

# So Why This Policy?

- Inclusive Political System
  - Previously marginalized now empowered
- Low competitiveness of opposition
  - Policy monopoly for government
- Morales & Garcia Linera leadership
  - Innovative – new vision for Bolivia
    - Plurinational
    - Natural resource wealth fuel broad-based development
  - Willing to take high risks



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