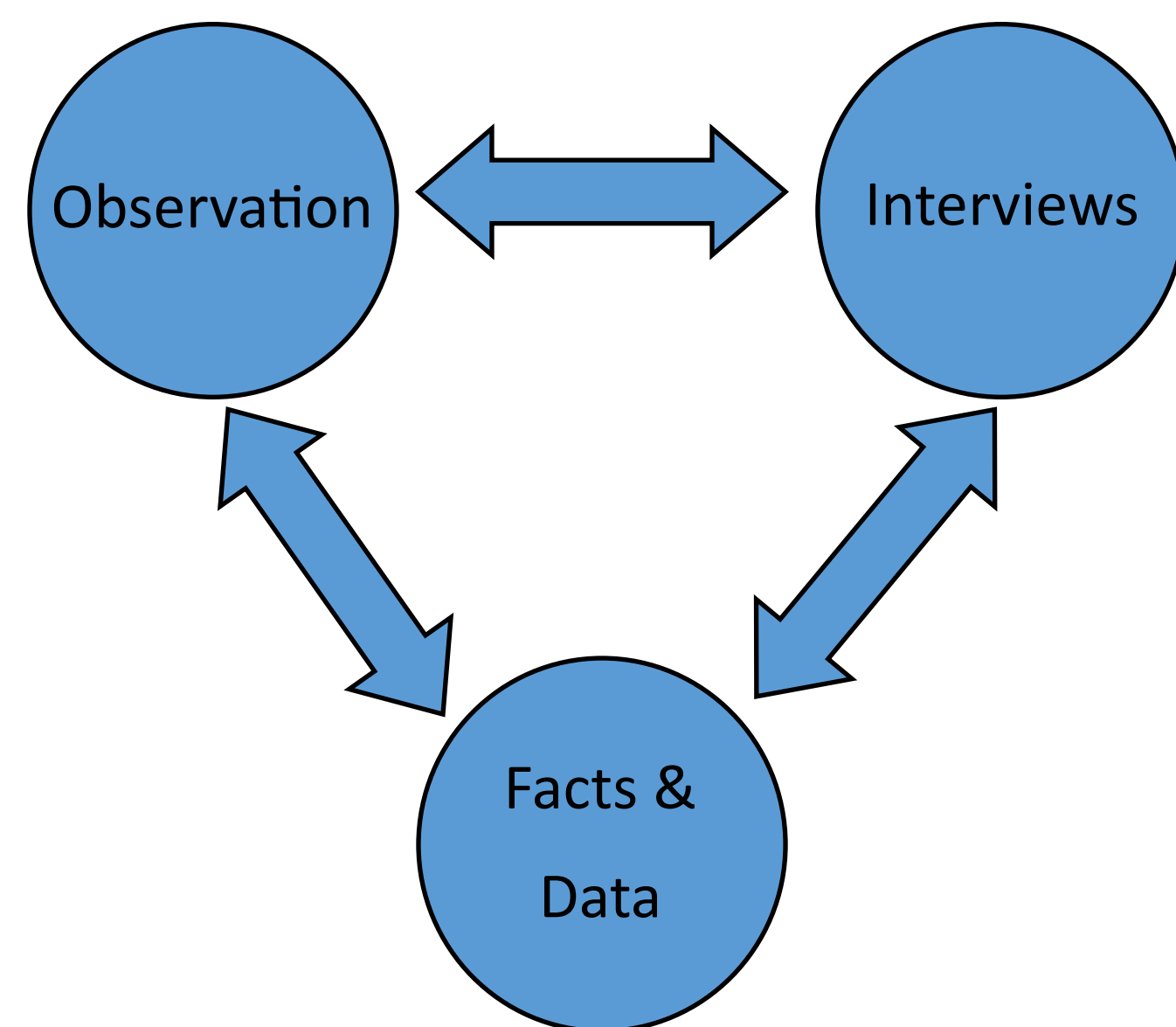


Powering the Pearl: A Study of Cuba's Energy Autonomy

METHODOLOGY

"Triangulation is the process of corroborating evidence from different individuals (e.g. interviewing both a principal and a student), types of data (e.g. observational field notes and interviews), or methods of data collection (e.g. documents and interviews)" (Creswell, 2012, p. 259). The three methods of data collection used in this study are interviews, artifacts, and literary review.



Interviews

Five interviews were performed during the trip to Havana:

- Employee of a Cuban and Canadian petroleum collaboration
- Electrician of the Cuban National Power Grid
- Hostel Owner in Viñales
- Cuban Tour Guide
- Professor of Economy at the University of Havana

Artifacts

· Observations were collected on planned excursions and independent explorations of Havana.

Literary Review

- Data that could not be collected through qualitative methods was collected from online sources.
- Personal blogs, online Havana news sources, and other primary sources were

ARTIFACTS COLLECTED



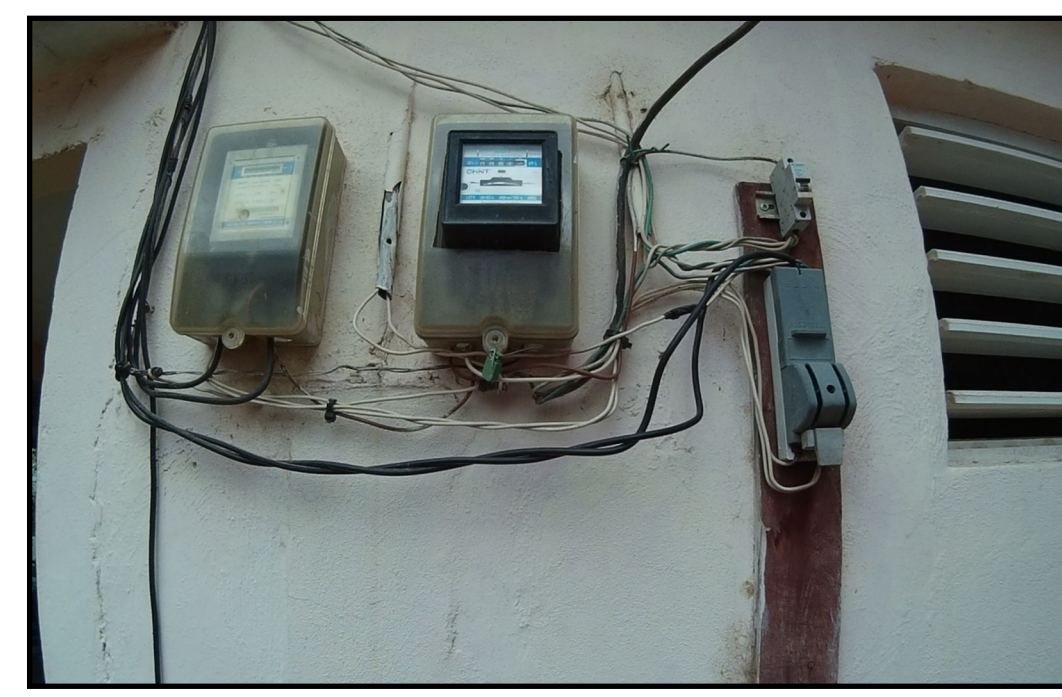
Cuba's electricity grid extends far out into the country. Most, if not all of the energy grid is above ground.



Phone lines cross each other in front of a dilapidated building, providing connectivity to the people.



People fill up their vintage/out-modeled vehicles at a gas station. There are 6 different types of gas. Nearly all cars are manual transmission.



Electricity is paid for on a tiered scale. A meter measures each household's energy use, and they pay a tax accordingly.



Domestic petroleum extraction is done through fracking. Oil rigs and refineries line Cuba's northern coast near Veradero.



Most households do not own a washing machine or dryer. In both the city and country, clothes were hung up outside to dry.

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ABSTRACT

Cuba's national pride comes from their projected autonomy as a communist country, although they have been dependent on other countries to supply them with resources since the revolution. However, Cuba has a high capacity for various forms of renewable energy. This study analyzes the impacts of Cuba's decline in petroleum use and the rise of renewable energy. There is a lack of primary research on Cuba's energy infrastructure because of government censorship, so this study utilizes accounts from Cuban citizens as well as first-hand observations of the country. Research was conducted through interviews, observations, and written accounts of life in Cuba. The decline of Cuba's use of petroleum has led to an emphasis on sustainability, affecting people's lifestyles and the economy. The inability to produce enough electricity has created an inequality between those who are involved in tourist industries and those who are not. However, the dawn of renewable energy is helping to close that gap while

KEY FINDINGS

Tourism/Economy

- The Tourism grid has more electricity than what the native Cubans receive
- Those associated with the tourism industry are afforded a higher quality of life, as the growing sector allows for a higher income.
- The majority of those who graduate with any degree end up either involved with the military, healthcare, or the tourism sectors as they are most in-demand.



Most kitchens only contain small, electric appliances.

Lifestyle

- In attempts to save energy, scheduled and unscheduled blackouts are experienced.
- Electricity is only used for basic necessities, e.g. cooking, small appliances use like television, radio, fan, phone.
- Electric washers and dryers are not common appliances in the city or country.
- In the country, people used either gas-powered harvesting tools or oxen for farming. Horses are often used for transportation.

Sustainability

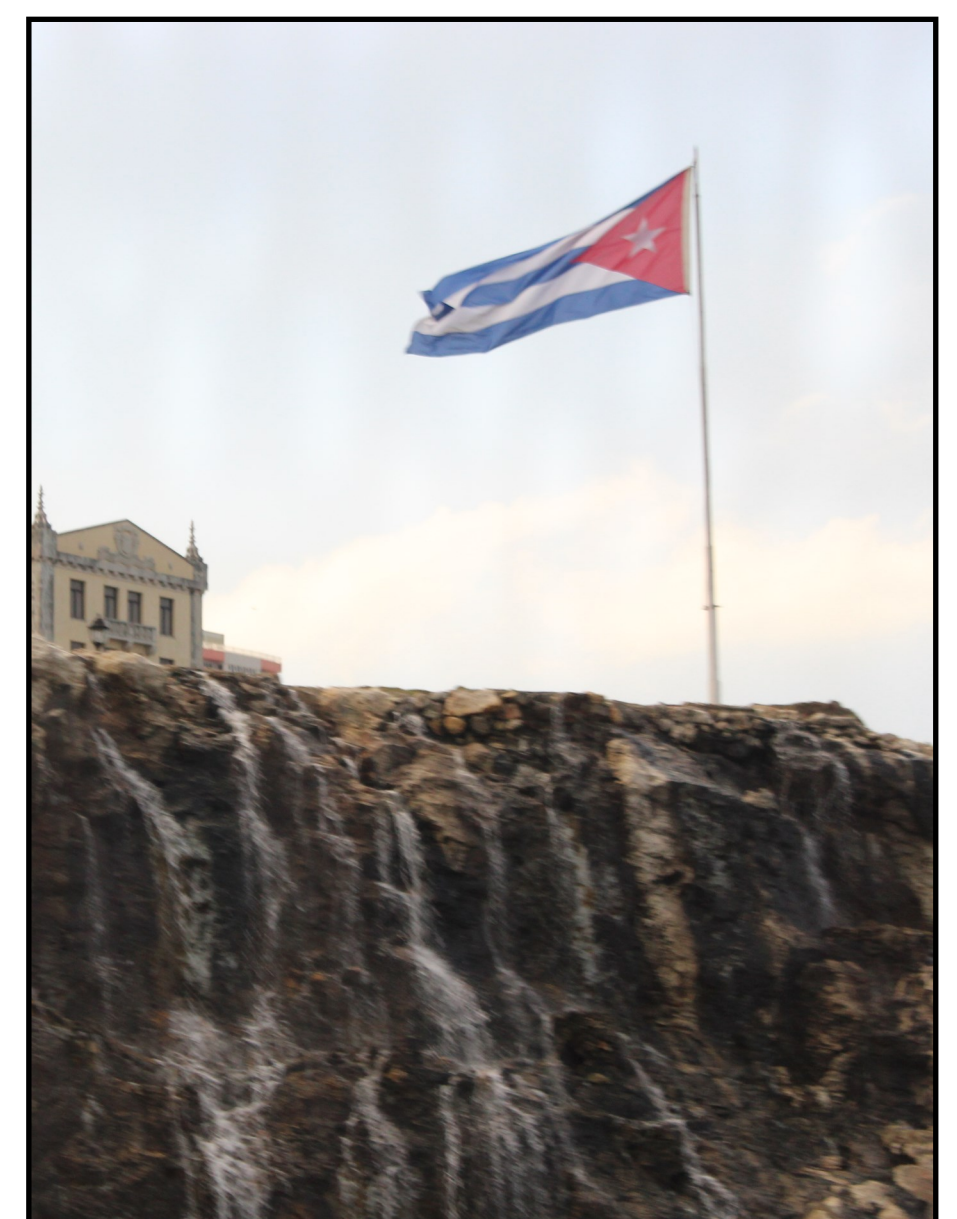
- As Venezuelan oil production is decreasing, the amount of subsidized oil imported to Cuba is also decreasing. Cuba has resorted to fracking to extract oil along the coastal region.
- Foreign companies and other governments are collaborating with the Cuban government to produce electricity.
- The use of old oil burning equipment are contributing to the oil shortage by causing less-efficient fuel burning.
- Different types of energy are used depending on what region people live in, and electricity is available to everyone. Farmers too far from the national power grid

REFERENCES

- Interview with an employee of a Cuban and Canadian petroleum collaboration. March 17, 2017.
- Interview with an electrician of the Cuban national power grid. March 18, 2017.
- Interview with a hostel owner in Viñales. March 15, 2017.
- Interview with a Cuban tour guide. March 12, 2017.
- Interview with a professor at the University of Havana. March 17, 2017
- P. V., Alejandro. (2016, October 29). El shock venezolano y Cuba: crónica de una crisis anunciada. Retrieved March 04, 2017, from <https://cubapossible.com/shock-venezolano-cuba-cronica-una-crisis-anunciada/>.
- Ramos, A. L. (2009, September 1). Renewable Energy Sources in Cuba. Retrieved March 01, 2017, from <http://www.havanatimes.org/?p=13250>
- R. E., Feinberg. (2012, December 01). The New Cuban Economy: What Roles for Foreign Investment? Retrieved March 08, 2017, from <https://www.brookings.edu/wp-content/uploads/2016/06/cuba-economy-feinberg-9.pdf>
- Torres, N. G., & Pentón, M. J. (2016, November 2). Cuban refinery cuts production in half because of drop in Venezuelan oil. Retrieved March 08, 2017, from <http://www.miamiherald.com/news/nation-world/world/americas/cuba/>

CONCLUSION

Until now, electrical autonomy has not been possible for Cuba. Relying solely on other countries to import petroleum has led to two instances where an unexpected decrease of imports caused Cuba to nearly collapse. In order to protect against another infrastructure collapse and to increase domestic energy production, Cuba is trying to diversify its energy portfolio in both types of electricity production and foreign partnerships. Meanwhile, the exploitation of the tourist industry as a main source of income is greatly affecting lifestyle by creating inequality of electric resources. The decrease in oil imports, and therefore the shortage of electric power has made this inequality more pronounced. The exploitation of solar, wind, and other renewable resources in the areas in which they are best suited can create a more even distribution of resources, boost the economy outside of tourism, and pre-



The Cuban Flag sits atop of a cliff at the Hotel Nacional.