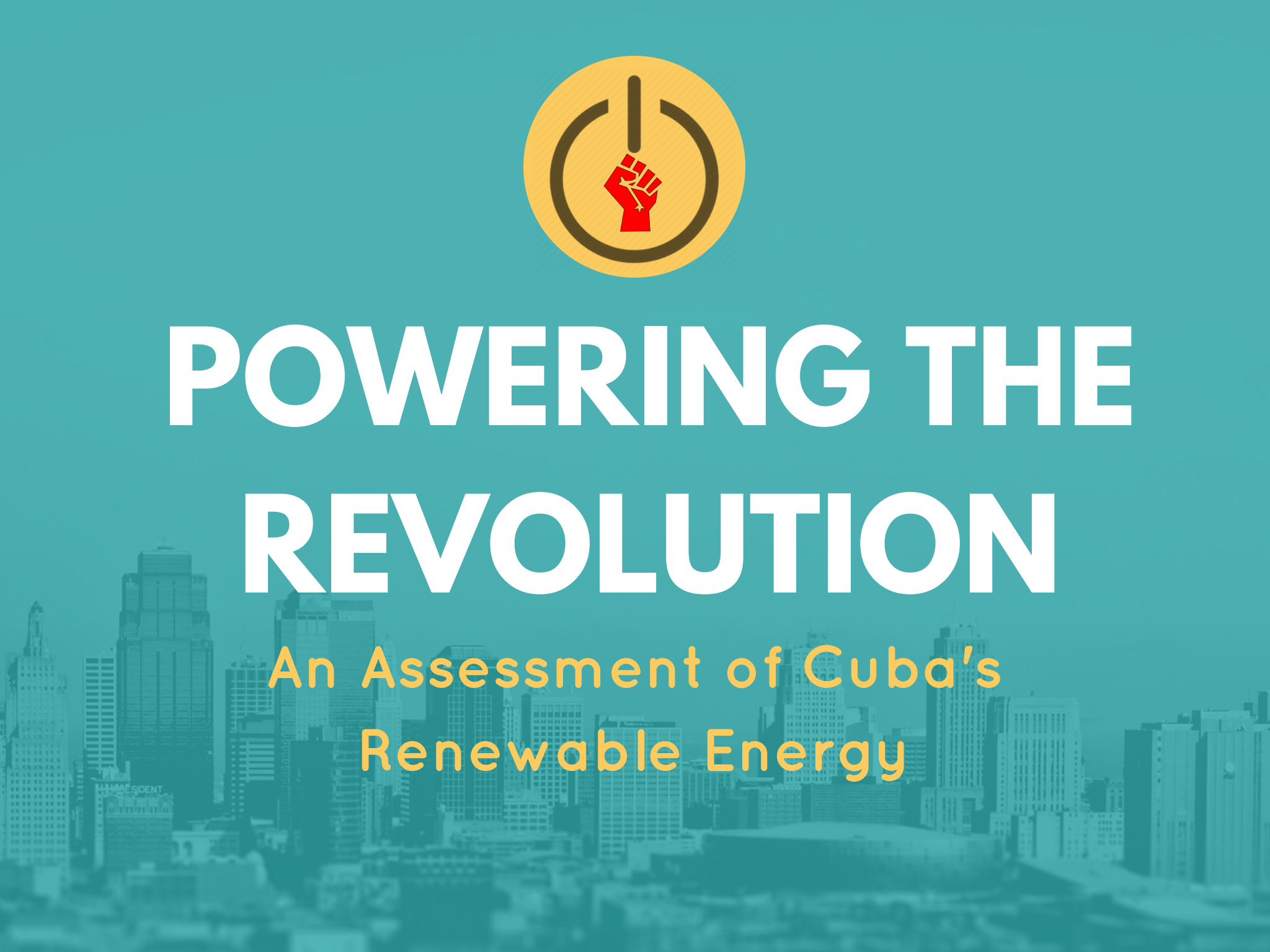


POWERING THE REVOLUTION

An Assessment of Cuba's Renewable Energy

INTRODUCTION

This report examines the Energy Revolution (La Revolución Energética) that began in the mid 2000s. The purpose of the report is to assess whether Cuba is achieving its energy goal while ensuring as even benefits for all of its citizens.

CHAPTER 1

Chapter Highlights:

- **Traditional and Alternative Development**

Cuba is amid a revolution, an energy revolution that is. In pursuing renewable energy will Cuba ensure that its residents will have access and receive more even benefits? Or will it result in uneven benefits and access?

Before examining the Cuban context, this chapter introduces important characteristics and components that were used in assessing Cuba's renewable energy projects. The same checklist can be applied to other countries as well.

Traditional

Traditional development is largely directed at developing countries and more often than not perpetuates the power dynamics between developed and developing countries.

The basic components of development involve progress towards an end goal. The means by which this progress is achieved is typically through modern technology and economic progress, which is measured by indices (i.e. GNP).

Alternative

Alternative forms of development contrast ideals of traditional development. This is not to say that alternative development is opposed to progress and change, but rather focuses more on effective change that allows for more equitable change.

Alternative development focuses on the well-being of individuals while emphasizing communication between groups of people and organizations and/or institutions.

CHECKLIST

	Traditional	Alternative
Funding Source		
Scale		
Agency		
Social Outcomes		

These are the categories that each project was assessed under in order to determine whether it aligned with traditional or alternative development. There are more specific characteristics under each category that was used for assessment. For simplicity, the characteristics and categories that were used to assess Cuba's renewable energy projects were condensed into the table shown above.

Funding Source

Surveys the types of investors that take part in these projects.

Traditional: Tends to be major corporations, institutions or organizations
Alternative: Gives out smaller loans/investments with appropriate interest

Scale

Assesses the scale to which projects are being built.

Traditional: Spans large areas without regard to communities
Alternative: Projects account and are tailored for the area

Agency

Considers the extent to which communities and individuals are involved in projects.

Traditional: Dictated by experts; ignores concerns of communities and individuals
Alternative: Greater collaboration between investors/donors and communities/donors

Social Outcomes

Examines benefits afforded to individuals/communities.

Traditional: Exacerbates power dynamics; money flows between foreign investors and entities
Alternative: More even benefits; subsidies; graduated tax breaks/incentives

CHAPTER 2

"Cuba wants to generate 24% of its energy from renewables by the year 2030..."

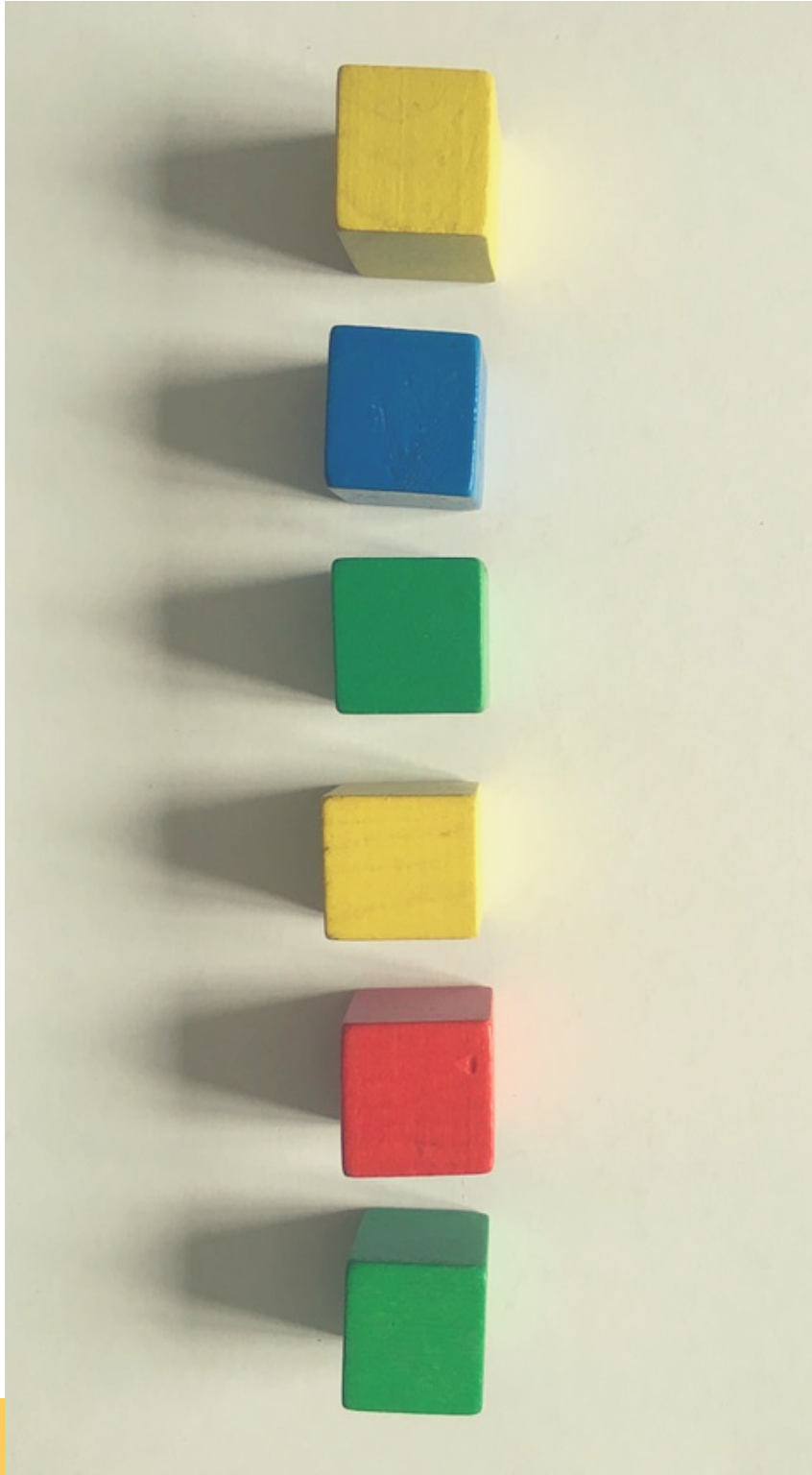
Cuba is rich with renewable sources: biomass, solar and wind. Since the beginning of the energy revolution back in 2006, the Cuban government has aimed to further integrate renewables into their energy grid. The ultimate goal to dedicate 24% of its energy from renewable sources by the year 2030. During the last decade, Cuba has taken on smaller projects to progress towards their goal while prioritizing a better standard of living for their residents.

CUBA - A CLOSER LOOK

These are the 6 building blocks of the revolution:

- Improve energy efficiency through replacement of inefficient appliances and lightbulbs
- Complement large central power plants while improving transmission and distribution networks
- Development of renewable energy projects
- Increase exploration and production of country's fossil deposits
- Increase international cooperation
- Raise public awareness

With these building blocks in mind Cuba is looking for investment capital from foreign entities to help finance renewable energy projects that rely on solar, wind and biomass. The next chapter looks at the different projects Cuba is taking on.



CHAPTER 3

Chapter Highlights:

- **Traditional and Alternative Development Assessment of Renewable Energy Projects in Cuba**

This chapter is focused on the assessment of Cuba's renewable energy projects in comparison to traditional and alternative means of development.

This assessment aims at surveying the work that Cuba has done so far to integrate renewable energy as part of their electrification grid. The projects shown here look at the projects that deal with biomass, wind and solar.

TRADITIONAL OR ALTERNATIVE

Red=Traditional **Blue**=Alternative **Purple**=Combination **Grey**=N/A

Project	Type	Location	Funding Source	Scale	Agency	Social Outcome
Havana Energy and ZERUS Investments SA	Biomass	Ciro Redondo				
Cubaenergía in cooperation with Ankur (India)	Biomass	Isla de Juventud				
China Goldwind Science and Technology Co. Ltd	Wind	Gibara				
Integrated Department of Wind Energy Project Management of Renewable	Wind	La Herradura				
EDIFRE	Solar	Cuba				
Hive Energy	Solar	Special Economic Development Zone at Port of Mariel				
Spanish Solar Association (UNEF) and Cuban Society for Promotion of Renewable Energy (Cubasolar, NGO)	Solar	Throughout Cuba				
International Renewable Energy Agency (IRENA)	Solar	Cuba				
Abu Dhabi Fund for Development	Solar	4 Provinces in Cuba				
Commercial Funded Solar	Solar	Cuba				
Cuban Government	Solar	Granma Province				
Cuban Government	All	Cuba				
United States	All	Cuba				
Stonegate Bank (FL, USA)	N/A	N/A				
Energizing Cuba	N/A	N/A				

The table shown in the previous page shows the different renewable energy projects that have been implemented in Cuba thus far.

These categories are not black and white, but create more of a spectrum. Agency and social outcome lend themselves more towards alternative development approach, while scale falls in the middle and funding source lends itself most towards traditional development approaches. The more important categories that ensure more even benefits are **Agency** and **Social Outcome**.

Agency centers around communication between investors and communities. When there is greater communication and collaboration between these two, community needs are better met.

Social outcome results from agency. Not only are community needs met, but individuals can enjoy the benefits easy access to energy grids with adjusted tax rates to ease economic strain

Funding Source and **Scale** are also important in assessment because they can point to potential outcomes that could result in traditional or alternative development trends.

Funding source most often falls under traditional development because they are entities that give out large amounts of capital. It is very rare to see small scale loans (i.e. microfinance) used for renewable energy projects because it is often aimed more towards individual entrepreneurship initiatives.

Scale can be misleading, the graphic shows wind as alternative, but wind farms often take form in larger development projects (i.e. wind farms). It can also be classified as alternative because in Cuba it is working with the given resource potential and works with surrounding land use without imposing upon communities.

CHAPTER 4

Chapter Highlights

- **How do other development projects compare to Cuba?**

This next section examines similar projects that have been taken on by other countries. The aim of this chapter is see what a good example of development project looks like in comparison to one that would be classified as bad.

One project, in particular, that is proving to be an example of a good development project is the "Solarization of Granma Province." The Cuban government wants to make Granma 100% powered by renewables and will serve as a model for the rest of the island. It looks like the province is on its way, as of 2013, 37% of there energy was produced from renewables. A majority of their energy generation comes from small-scale photovoltaic systems that are scattered throughout the province. Currently there are 3,664 renewable energy systems that are powering the provinces households, schools and hospitals.

GRANMA, CUBA
V.
INDIA

An example of a bad development project comes from India during the 1970s when the government wanted to build biogas digesters for its rural population. The motivation was create cheap source of energy. The pitfall of this project was that it was it was a project largely led by experts whose only interests were build an efficient biodigester without regard to cost, construction materials or capability of individuals to build and maintain the biodigesters. As a result, the project was technologically sound, but uneconomical for the rural population of India.

CONCLUSION

Chapter Highlights

- **Lessons from Cuba**
- **A Model for Other Developing Countries**

What are lessons that can be drawn from Cuba? What implications does this have for other developing countries and their pursuit of renewable energy?

LESSONS FROM CUBA

There are lessons that can be taken from Cuba. A prominent one is to prioritize social programs, such as schools and hospitals. By prioritizing these social programs it could ensure a more even benefit to all Cuban residents.
For developing countries it could prompt them to pursue their own avenues of renewables. One country that could follow in Cuba's footsteps is Venezuela.
However, it is still important to recognize the potential inequalities that could arise from traditional forms of development.
There are concepts that Venezuela could imitate such as the replacement of inefficient appliances and supply government subsidies to lower income households.