

Brooklynn Coburn
Marshalltown High School
Marshalltown, IA
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Bringing Renewable Energy Sources to Sierra Leone

Waves roll in from the west, trying to reach the looming mountains that ripple on the horizon to the east of the sandy beaches. These mountains shadow the rolling hills and forests like a curtain, keeping out the harshest of the bright African sunshine. This sunny place is Sierra Leone. Sierra Leone, like most countries in North Africa, is not a fully developed country. Although the country possesses all the resources to thrive and provide for the Sierra Leonean people, these resources still need to be harvested and developed. Through the implementation of renewable energy sources such as solar powered household devices and solar power plants, Sierra Leoneans can produce more food and provide more for not only themselves, but future generations as well.

Sierra Leone is a small country, only about 27,700 miles² on the west coast of Northern Africa. The population is also humble, approximately 7 million people. Over half of the population lives in the rural areas of the country, with only 40 percent living in urban communities and cities. Sierra Leone is a democracy with an elected President, Julius Maada Bio, and an elected parliament. Sierra Leone had a recent civil war, which came to an end in 2002 and now the country is considered at peace (Nations Online Project). The tropical climate and lots of summer rain make Sierra Leone an ideal place to grow large amounts of coffee, rice, cocoa, and peanuts. The landscape varies between famous white sandy beaches, mangrove swamps, mountains, wooded hills, and plateaus where cattle is raised; in fact, nearly 35 percent of this land is used for farming. These farms are scattered, independently owned, and only about 1-3 acres in size (Nations Encyclopedia).

A typical family in Sierra Leone is quite large, usually consisting of eight or more members per household, including grandparents, aunts, uncles, and lots of children. "In most Sierra Leonean homes, almost everything is shared by siblings without any permission, except for underwear and toothbrushes," says the AFS intercultural program. It is not uncommon for families to live in homes made out of sun dried mud blocks, or in urban areas, cement buildings (AFS-USA). The average birth rate in Sierra Leone is approximately 4.46 children per woman, higher than in any developed country. The death rate is also high, at 11.06 deaths per 1,000 residents every year (World Bank). Lack of infrastructure, such as roads, limits access to food markets and healthcare. Minimal access to healthcare, as well as health information, means that many rural citizens of this country cannot know if they are providing sufficient care and nutrition for themselves and their families. Families in rural communities are very unlikely to have electricity, indoor plumbing, treated water, or a doctor at all (State.gov).

To procure an income, most men work in mining, food processing, or the oil/petroleum industry. Women are more likely to be found working on farms. Nearly 70 percent of the population lives on less than \$1 a day (Internations). With such little money and such large families, not everyone is sure to get the nutrition they need to thrive. There is not traditionally a dining place in the home, families do not follow regular meal times and instead eat only once or twice a day, whenever they can. Food is prepared and cooked by the women on three large stones over a fire set to hold a large pot (AFS-USA). Typically Sierra Leoneans dine on stews, soups, and sauces; seafood and rice are also a major staple in their diet. Fruit or plantains are sometimes eaten as a snack when in season, but Sierra Leoneans do not get many vegetables in their daily diet, as these can be expensive, hard to grow, or out of season. Despite having plenty of farmland,

rural citizens do not always have access to the most effective farming methods; therefore, they cannot produce enough to feed their own people and also make a profit (Nations Encyclopedia).

One of the biggest problems that the nation of Sierra Leone faces is being under-industrialized and unable to keep up with its growing population. Most do not have access to the resource that powers and connects the rest of the developed world: electricity. Electricity powers production and agriculture in all developed nations. Sierra Leone has electricity almost exclusively in urban areas, which encompass much less than half of the national population. The majority of the centralized electricity Sierra Leone does have is powered by burning fossil fuels. The rural population uses wood or oil burning to cook and to power their farms and homes (Nations Encyclopedia). Rural communities are more affected by lack of electricity as they are too remote to access information, or technology that would benefit their livelihoods and keep these remote families in touch with the rest of the world. If farmers were given access to modern farming technological advancements they could produce more food for their country and perhaps reduce the heartbreaking rates of malnutrition in Sierra Leone. Currently, the nation's malnutrition rates are among the highest in the world, attributing to approximately 46 percent of childhood deaths every year (World Food Programme). As Sierra Leone is working to feed a starving population, they also face an immediate threat of deforestation and the growing pressure to stop burning fossil fuels; creating what could become a power crisis, they will imminently have to search for alternative fuel sources to keep feeding and providing for their people (Power Inverters).

So far, the government has taken some initiative to begin changing power trends in the country. One of these initiatives is called the Power for All movement, aimed at decentralizing power and bringing more electricity to various underdeveloped countries (Power for All). Sierra Leone could definitely benefit from a movement like this so long as they focus on renewable energy sources as opposed to burning fossil fuels and using up the rapidly depleting wood supply. Some sustainable sources of energy could be wind energy, solar power, or hydropower (Recipe for Success: Sierra Leone). Renewable energy is the most practical option for future generations as it doesn't deplete the natural resource supply and is more environmentally conscious than fossil fuels that release greenhouse gases. Sierra Leone certainly has the right landscape to support many types of renewable energy power plants.

Perhaps the most practical way for Sierra Leone to harvest energy for all of its people, both now and in the future, is through implementing solar power. Solar power is a renewable energy source that is harvested using large sunlight capturing panels and converters, similar to how a plant gets energy from the sun. Solar panels can be installed in large groups to create a power plant that can power entire cities, or on a microscale to power single households or even small devices (About solar energy). Solar energy is the best solution to Sierra Leone's energy crisis because it is sustainable and can be centralized or decentralized to accommodate urban and rural populations respectively. The use of solar power will prevent further deforestation and will protect the environment from the harmful gasses released from fossil fuels. Sierra Leone also gets copious amounts of sunlight almost year round, making the country suitable for power by solar technology (Sunshine & Daylight).

One place in particular seems to be the ideal place to start enacting the spread of nationwide solar power: the city of Kabala, Sierra Leone. Kabala is a large town located in the high northeastern plateaus of the country. With a population of around 30,000 people, Kabala is a decent sized community--but more importantly--Kabala is an agricultural center (Nations Encyclopedia). Farmers from miles around come to Kabala for supplies and information. Getting the citizens of Kabala on board with solar power would be a crucial step in bringing light to the whole country. Changing the world always begins with the individual, so by marketing solar power in Kabala to individuals and families, the movement will grow and build with

their consent. We could start by enlisting AIMS Power, a power company in Sierra Leone and advocate for solar power, to educate the people of Kabala with flyers, in classrooms, and at town meetings(Aimscorp). To garner even more acceptance for solar power in the community, a program like DevelopAfrica could assist the movement by providing solar powered lights and lanterns to families and for demonstration. DevelopAfrica is a non-profit organization that raises money and collects donations of solar lights to give to children in Africa (DevelopAfrica). When families see how much easier their lives can be made by electricity, and they see firsthand that solar power works, they will be more inclined to support the movement and lobby for it to their own local and national government. Expanding on that idea, if the solar powered lights take off in Sierra Leone, so could other household solar devices such as solar powered ovens, These small steps will have an immediate impact on the people of Kabala and the surrounding villages and farms; it won't be long before other communities take notice and want to support this movement as well.

If given electricity, farms would be able to produce and preserve more food; however, solar power plants on the large scale can be expensive and are not easy to install. Professional engineers and/or engineering students would have to be involved in the installation of these plants. There are multiple successful solar power companies in Africa that could assist in this project, such as The Sun Exchange. The Sun Exchange works by carefully selecting places to install solar panels on a project by project basis, people from around the world buy the solar panels for the project and earn a portion of the profits that solar power brings to the company (The Sun Exchange). Some philanthropist groups and educational programs that could do this are Engineers Without Borders or various Engineering schools that send students abroad for educational purposes. Engineers without Borders is a community of professional engineers who often join with engineering students and travel around the world, as part of a non- profit organization, helping out developing countries in crisis (Engineers Without Borders). One of these engineering schools is the Barefoot College in India, engineering women from this school are working to bring light to rural villages throughout rural India and Africa by engineering solar plants and educating citizens (Barefoot College). Of course, even with these low expense laborers and professionals to carry out the goal of bringing solar energy to Sierra Leone, the project would still need to receive funding for the materials. This project could be funded by individual donors and investors, local businesses, and government spending. It is guaranteed that this project will eventually be profitable as the increase in industrialization raises Sierra Leone's wealth and status. The upkeep of these solar power plants could also provide an opportunity to train and give jobs to many citizens, lowering poverty rates. Some agencies within the country who could manage the laborers and funding for this project would be the Rural Electrification Agency to oversee the installation of solar panels on farms and in remote villages, or the Renewable Energy Association--a government agency responsible for teaching the people about protecting their environment (Recipe for Success: Sierra Leone).

Once the community of Kabala and surrounding farmers integrate solar power into their lives, people would need to come together to spread the movement outwards throughout the nation. It is most likely that large scale implementation of solar power in Sierra Leone would take many years, and cost the people, as well as investors and nonprofit organizations, upwards of billions of dollars. This project would also require changes in the Sierra Leonean government. The government of Sierra Leone would eventually have to create new policies and collect new taxes to keep up with the rapid development that historically follows an industrial boom. A smaller scale idea might be a simpler, but more effective at remedying the immediate energy and food shortages that Sierra Leoneans face. This small scale change may just be the use of solar ovens and solar lights for cooking, working, and education. Solar cooking ovens have been gaining popularity all over Africa in the last few years. A solar cooker works outdoors, where special panels take in light particles, called photons, to generate heat (The SOE Team). This simple

technology solution would have an immediate impact on the average Sierra Leonean family; each household would decrease their consumption of firewood or gas if they had a financially and environmentally friendly fuel alternative. Ultimately, incorporating these smaller solar devices still furthers the overarching goal of electrifying the whole nation by helping people adapt, giving them the ability to achieve more with their lives, and garnering support for more renewable energy options.

It is important to note some potential downfalls to this plan, including the worry that in the wet season, Sierra Leone may not get all of the sunlight needed to power the larger plants (Sierra Leone Power Inverters). There are also some cultural concerns, electricity would be a huge shock to some of the most rural people of Sierra Leone who are not familiar with life in the developed world and might reject a large movement against their way of life. Financially, without many generous investors and funding from the government, this project could become infeasible to carry out nationwide, especially when it comes to installing solar panels in every poor rural village. This project would have to be as environmentally conscious as possible, avoiding damage to the landscape or excessive waste in the production and installation of the major plants.

When you compare all of these potential and highly manageable downfalls with the potential benefits to the entire nation and its people, the pros most certainly outweigh the cons. With better infrastructure, production of goods and foods in Sierra Leone could increase dramatically. Additionally, with updated farming techniques, such as water pumping for irrigation, more food could be produced at a faster rate to support the growing population. With the use of technology such as freezers and dryers, the food could be preserved for less waste and in turn, less malnutrition. Not only would electricity increase agricultural productivity, it could also mean big positive changes for Sierra Leoneans society as a whole. Access to important health and safety information would decrease the shockingly high rates of HIV/AIDS, decrease infant mortality and prevent disease (World Bank). If Sierra Leone could produce more for their own country and increase their GDP, economic growth might bring about more health services and better infrastructure. Former president of the Worldwatch Institute, Christopher Flavin, once said, "The real potential of electricity lies not in providing social amenities, but in stimulating long-term economic development." Educational opportunities would be increased considerably, when agricultural work can be done by machines, less children are needed to work the farm and can attend school. More schools could provide student lunches, and access to the internet gives students all the information they could ask for. Overall, the nation wide implementation of electricity would be an enlightening experience for all ages of people. There are other potential ideas for bringing renewable energy to Sierra Leone, such as wind power plants near the mountains, and hydro power plants on rivers, but these are both expensive options and, in the case of Sierra Leone, are not as viable due to geography and climate (About Solar Energy). For this reason, solar power is the most feasible approach to ending the energy crisis in the nation.

Thankfully, the government is already putting out an effort towards bringing Sierra Leone up to date in industrialization and infrastructure, and working hard to improve the lives of their citizens. The amount of electricity enabled homes has increased dramatically in the last decade, if only for the wealthiest class so far (state.gov). Sierra Leone has all the resources needed to thrive and provide for their growing population and be self sufficient. If this nation had the power to sustainably make the most of their natural resources they could dramatically reduce hunger and poverty that is currently commonplace. Renewable energy would open up opportunities to increase the GDP of Sierra Leone and protect future generations from the consequences of exploiting resources like timber and oil. Sierra Leone is a beautiful country with beautiful culture and it is important that we shed light on their people and their potential. Through this use of solar energy, Sierra Leone could realistically produce and provide more food, and hope, for the people of their nation.

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