

## Value of Solar at GHESKIO

In Haiti, buildings such as GHESKIO's clinics have traditionally had two options for electricity: connecting to the country's electric grid, and purchasing private diesel generators. The electric grid in Haiti is plagued by chronic unreliability, due to challenges including poor financial management of the national power utility (EDH), insufficient infrastructure and high energy losses due to theft and system inefficiency. Due to a lack of access to and the poor reliability of grid-provided electricity, GHESKIO has relied on self-generation using diesel generators. This is a widespread means of energy generation in Haiti; it is estimated that more than 70 percent of all electricity consumed in Haiti is produced by small-scale diesel-powered generators owned by households and businesses. However, according to IMF, self-generation is expensive, inefficient, and raises oil import costs, and leads to environmental degradation.

In the face of energy challenges, solar energy solutions are a natural choice for Haiti, as the country is one of the world's leading geographies for solar power potential. The global horizontal irradiance (GHI), a measure of the sun's power that can be captured by a flat, horizontal surface, ranges from five to seven kilowatt-hours per square meter per day (kWh/m<sup>2</sup> /day) throughout most of the country. This measure rivals the highest solar potential observed in the United States in Phoenix, Arizona, which has an average GHI of 5.7 kWh/m<sup>2</sup> /day. Germany, one of the global leaders in solar power installations, has few locations with a GHI over 3.0 kWh/m<sup>2</sup> /day. Further, due to Haiti's placement close to the equator, monthly average GHI remains high year-round.

The case for solar becomes even stronger when considered for use at healthcare facilities. Hospitals and clinics rely on electricity for essential functions, such as cold-chain equipment for storing medicines (e.g., refrigeration), pumps for clean water, and life-saving medical equipment. Power outages can cause major complications, such as medicines going to waste or patients going untreated. Solar power, particularly with energy storage capacities, allows healthcare institutions to provide more predictable, reliable care. In fact, a study in India found that solar powered health clinics were able to provide services to more patients than those without a regular power supply.

Beyond the logistical challenges presented by an intermittent power supply, healthcare institutions face compounding negative health impacts that come from powering their facilities with diesel generators. Diesel emissions have been shown to have both immediate and long-term health effects. As diesel emissions contain very small particulate matter, emissions remain airborne for long periods of time and penetrate deep into the lungs upon inhalation. Once in the lungs, diesel emissions can both cause and exacerbate respiratory conditions. Longer term, exposure to diesel emissions is associated with an increased risk of lung cancer, as well as other systemic complications such as cardiovascular diseases. Particularly concerning for GHESKIO, whose patient population includes many tuberculosis patients, is that research indicates that diesel emissions inhibit the immune system's response to tuberculosis and may alter infection outcomes. Even a small change in pollution levels could make a meaningful difference on the population living around the GHESKIO clinic. For instance, just a 1% reduction in particulate matter levels in the 100km<sup>2</sup> surrounding the GHESKIO clinic would save 4 lives per year, with an associated economic benefit of \$561,317.

In light of the benefits of solar power for healthcare institutions, solar power has already been implemented as a solution for hospitals and clinics in resource constrained areas. For example, the United Nations Development Program's Solar for Health initiative has supported the installation of solar panels at over 600 health clinics in Zimbabwe, Nepal, Sudan, Zambia, South Sudan, Namibia, Libya and Angola. In Haiti, Partners in Health helped finance the construction of Hôpital Universitaire de Mirebalais (HUM) in 2013. HUM is powered by 1,800 rooftop solar panels that were designed to meet all of the hospital's daytime power needs and provide surplus

electricity back into the local grid. It was estimated in 2014 that HUM's solar power was saving about \$379,000 in annual operating costs, which would allow the solar power system to pay for itself in just under six years.

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