



WE CARE SOLAR

We Care Solar Suitcase Programs

Overview

In hundreds of thousands of primary health centers around the world, health providers struggle to provide care in the dark. Facilities either lack power or power often fails when it is most needed. We Care Solar improves maternal child health outcomes by advancing the use of solar electricity in under-resourced health centers.

In 2010, We Care Solar developed an economical compact solar electric system for medical lighting, mobile communication, and essential medical devices. The We Care Solar Suitcase® is designed to be simple, safe, and durable. Once installed, midwives and doctors can identify pregnancy complications and conduct routine and emergency obstetric care without delay. Health workers using the Solar Suitcase report greater confidence and accuracy, and midwives tell us that they no longer fear night duty. We Care Solar has enabled thousands of midwives and doctors to provide lifesaving care.

Over the past 11 years, award-winning Solar Suitcases have brought lighting and essential power to over 7,100 health centers in 49 low and middle-income countries. We Care Solar conducts training, installation, and maintenance programs in collaboration with international partners to ensure effective Solar Suitcase deployments. Solar Suitcases have provided over 215 million hours of nighttime medical lighting, replacing candles, kerosene lanterns, and diesel generators, reducing the risk of fire, and averting more than 76,000 tons of CO₂ emissions.

We Care Solar programs demonstrate the feasibility of providing reliable lighting and electricity to even the most remote health facilities in the world.

The Need for Electricity in Health Facilities

Our initial field research in Nigerian hospitals in 2008 revealed that reliable electricity was crucial for lifesaving obstetric care. Without reliable electricity and lighting, health workers are unable to quickly respond to obstetric emergencies and cannot effectively perform lifesaving procedures. Pregnancy complications claim the lives of 300,000 women and over a million newborns each year, mostly in Africa and Asia. Mothers in low- and middle-income countries die every day giving birth in dark and unsafe conditions. A 2018 study on environmental conditions in health care facilities stated that 59% of health facilities in 78 low- and middle-income countries reported that they had unreliable electricity access.¹

Consequences can be tragic. Childbearing mothers and their newborns often fail to receive timely care for emergencies due to an inadequate supply of electricity. Midwives struggle to work by kerosene lantern, candlelight, or the dim light of their mobile phones. Unable to adequately diagnose and treat medical conditions, and often postponing or canceling critical procedures. Cesarean sections are delayed, and critically ill patients are often turned away from hospitals that lack power. We Care Solar's fieldwork in Africa has shown that even health facilities connected to grid power can be crippled by darkness during evening hours due to frequent and lengthy power interruptions. Facilities with generators often lack funds to pay for daily fuel and maintenance. Health facilities without any source of power rely upon substandard and hazardous sources of light that offer inadequate illumination for medical procedures, emit smoke with deleterious health effects, and increase the risk of fire and injury. Midwives in some countries are forced to request funds from patients to pay for kerosene, candles or batteries, and many women stay home during labor to avoid these charges.

¹ Cronk, Ryan and Jamie Bartram. Environmental conditions in health care facilities in low- and middle-income countries: Coverage and inequalities. *International Journal of Hygiene and Environmental Health* 221 (2018) 409-422.



We Care Solar Background

We Care Solar is a nonprofit organization co-founded by a husband-wife team: obstetrician Laura Stachel and solar innovator Hal Aronson. We Care Solar began designing solar electric solutions for maternal health in 2008, when Dr. Stachel's public health research in a Nigerian hospital revealed that energy poverty was linked to maternal mortality. Dr. Aronson designed four stand-alone solar electric systems for that hospital, targeting the operating theatre, labor room, maternity ward, and a blood bank refrigerator in the laboratory. In the next year, the hospital had a marked drop in maternal deaths and an increase in obstetric admissions. Word spread about the transformation at the state hospital, and health workers in nearby health centers began asking for solar power, lamenting that they were conducting deliveries in the dark. We Care Solar designed a solution that could be brought to scale. Today our Solar Suitcases are manufactured in the United States and shipped all over the world.

We Care Solar Activities

We Care Solar provides the power to save lives by equipping health facilities with highly efficient and easy-to-use solar electric systems for lighting, mobile communication, and essential medical devices and advocating for the importance of reliable electricity for healthcare. The scope of our activities include:

- (1) *Design, Engineering, and Field Testing.* Our team has designed the Solar Suitcase with the end user in mind. The latest Solar Suitcase (Version 3) was launched in 2019 and features enhanced technology, an improved user interface, and appliance storage. The Solar Suitcase can withstand harsh environments, is easy-to-use and requires minimal maintenance.
- (2) *Partnerships.* We partner with health ministries, local and international NGOs, aid agencies and sustainable energy providers to deploy Solar Suitcases to remote health centers;
- (3) *Health facility assessments and Solar Suitcase installation.* We install Solar Suitcases in areas and situations where it is needed the most, working with governments and NGO partners to assess and select appropriate health facilities to receive Solar Suitcases. Our trained teams conduct installations to the highest standards and we build quality control mechanisms into all of our programs
- (4) *Capacity building.* We build local capacity in Solar Suitcase installation, use, and maintenance with in-depth training for installers and government technicians to create effective, sustainable programs. On-site training of health workers is a necessary component of our program model.
- (5) *Research.* We collect and evaluate health data and interview end-users to understand the impact of our programs. Our goal is to demonstrate that basic lighting and electricity is feasible and affordable for rural health clinics.
- (6) *Advocacy.* We actively engage with partners and global leaders to advocate for clean energy for safe childbirth. We identify champions and invite them to join our advocacy efforts at a national and international scale through our Light Every Birth initiative.
- (7) *Sustainability.* We collaborate with governments and implementation partners to develop service plans and long-term maintenance strategies.

By delivering solar power to last-mile health centers in countries where health care infrastructure is poor and electricity is lacking, we have enabled thousands of midwives and doctors to provide lifesaving care. To date, we have deployed more than 7,100 Solar Suitcases, partnering with leading international NGOs, UN agencies, and development organizations. Our medical LED lights replace candles, kerosene lanterns, and diesel generators, reducing CO₂ emissions and the risk of fire. We have trained more than 30,000 health workers and local technicians on the proper installation and maintenance of the system to ensure the sustainability of our programs.

We Care Solar Suitcases have been recognized as robust technology that perform for years. In 2019, our version 3.0 Solar Suitcase won the Edison Innovation Award and was selected as one of Time Magazine's Best Inventions.



Innovation

We Care Solar is unique in that no other organization has taken a comprehensive approach to the issue of solar electrification for maternal health facilities.

We Care Solar is both designing/manufacturing a technology product (the Solar Suitcase) and developing distribution/service delivery models in partnership with other institutions. We work in a challenging space— rural health care in countries lacking funding and infrastructure—and provide a sustainable form of energy to improve maternal health care.

The We Care Solar Suitcase is an immediately deployable, complete solution to lighting and essential energy needs for health centers. Our plug-and-play Solar Suitcase is designed for ease-of-use, easy maintenance, safety, and scalability. It is built using high-quality, durable components optimal for remote installations.

We have upgraded the Solar Suitcase to better meet challenges in rural health center electrification. We now use lithium ferrous phosphate batteries to increase three-fold the lifespan of the battery; our batteries typically last five years. They are also lighter and have more available energy than sealed lead acid batteries, making them ideal for mobile Solar Suitcase application. Our lights feature Nichia LEDs which are water-resistant, cool to the touch, rugged, and estimated to last 10-20 years. These lights are well-suited for remote locations where repair and maintenance are costly and time-consuming.

We are testing a remote monitoring system that will enable us to respond quickly to repair and maintenance needs. It can connect to local cellular networks to transmit data at regular intervals and will store and transmit Solar Suitcase usage and performance data remotely to We Care Solar, reducing the frequency of site visits and resulting in lower maintenance costs over the life of the suitcase.



Implementation Costs

The Solar Suitcase has an anticipated lifespan of at least ten years with one lithium battery replacement at five years. The estimated cost of equipping a health facility with a Solar Suitcase is approximately \$3,500, including equipment, installation tools, spare parts, shipping, clearance, in-country training, installation, health worker training, and We Care Solar management and support. The Solar Suitcase eliminates the need for kerosene lanterns (estimated cost of fuel for two lanterns is \$480 per year), health center phone charging (\$240 per year), and generators (estimated cost of \$5,000 per five years).



Our Results

We Care Solar has delivered Solar Suitcases to more than 7,100 last-mile health centers in 49 low- and middle-income countries. We have enabled midwives and doctors to provide lifesaving care, such as conducting deliveries, detecting fetal distress, arranging timely referrals, suturing lacerations, resuscitating babies, and conducting c/sections. Our programs have served more than 10 million mothers and newborns. Health care workers at health centers equipped with Solar Suitcases report they no longer fear nighttime duty and feel more confident in the provision of care.

Our Solar Suitcases also have a positive environmental impact by replacing the use of fossil fuels. Healthcare facilities in regions without reliable electricity utilize kerosene lamps for nighttime lighting and diesel-fuel generators for production of electricity. Kerosene lanterns pose health hazards and safety concerns; their emissions degrade the quality of indoor air. Kerosene itself is flammable and increases the risk of fire. Diesel fuel generators are polluting, noisy, costly to operate, and prone to failure. Additionally, the use of fossil fuels contributes to global warming. To date, the Solar Suitcases have averted more than 76,000 tons of CO₂ emissions.

Our programs focus on sustainability. We ensure that local technicians have the skills required to maintain our solar electric systems for years to come. Our hands-on training programs have equipped more than 30,000 health workers and technicians with the knowledge to properly install, use, and maintain the solar electric systems.

When lighting is assured, more mothers seek skilled care in a health facility where emergency complications can be detected and treated to save lives. Saving the life of a mother increases life chances for her family: her newborn will be more likely to survive, her children will be more likely to attend school and have adequate nourishment, and her family will be more likely to prosper economically.

By increasing health facilities' access to solar electricity, We Care Solar strengthens health service delivery and improves health outcomes for mothers and newborns by utilizing a renewable energy source that fosters clean air quality.

Additional Benefits

Other benefits of the Solar Suitcases include:

(1) Enhanced Family Productivity

Mothers play a vital role in the economic health of their families and communities. Each year an estimated \$15.5 billion USD in potential global productivity is lost when mothers and infants die. Maternal mortality has lifelong implications on childhood health and education: enrollment in school is delayed and children are less likely to be immunized and more likely to suffer malnutrition. We Care Solar works to reduce maternal mortality, helping families to achieve their full economic potential.

(2) Strengthened Health Systems

The effects of the Solar Suitcase extend beyond reducing maternal death. Pilot studies have observed an increase in patient volume, higher utilization of medical services and equipment, and elevated staff productivity and morale. The Solar Suitcase impacts health systems as a whole, improving the economic productivity of staff and infrastructure.

(3) Reduced Carbon Emissions

The Solar Suitcase provides a clean renewable alternative to fossil fuel driven power and lighting systems that utilize diesel fuel and kerosene. Each solar suitcase obviates eight tons of CO₂ per year when replacing a generator.



Light Every Birth

To support our vision of a world where all mothers have access to prompt, appropriate obstetric care provided in well-equipped health centers, We Care Solar launched the *Light Every Birth* initiative. This initiative links Sustainable Development Goals for improved healthcare, energy access, gender equity and climate action and is galvanizing international support for the electrification of health facilities. *Light Every Birth* calls upon governments, international NGOs and multilateral partners to commit to ensuring availability of lighting for every institutional birth, beginning with several strategic countries in Africa.

Our *Light Every Birth* initiative is ensuring that health centers throughout a nation have clean energy for safe childbirth, beginning with Liberia, Uganda, Zimbabwe, and Sierra Leone. We reached every health center in need in Liberia in 2019 and expect to reach all health centers in need in Sierra Leone, Uganda, and Zimbabwe by the end of 2022.

Light Every Birth partners are united by three fundamental beliefs:

- All women have the right to safe childbirth;
- Every health center is entitled to life-saving electricity; and
- Renewable energy offers an immediate solution to this global challenge.

Through Light Every Birth, we are (1) improving the function of off-grid maternal health centers, (2) documenting the impact of energy access on maternal and newborn health, and (3) advocating for the fundamental right of all mothers to delivery safely in a well-lit health center. Furthermore, we are demonstrating that safe, reliable, and sustainable electricity for childbirth is achievable at the country level throughout the developing world.

