



# WE CARE SOLAR

## *We Care Solar Suitcase Programs*

### **Overview**

In hundreds of thousands of primary health centers around the world, health providers work in facilities that lack power, or power that often fails when it is most needed. We Care Solar saves lives in childbirth by advancing the use of solar electricity in under-resourced health facilities to improve maternal and child health outcomes.

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 ten years, the award-winning Solar Suitcases have brought lighting and essential power to over 6,600 health centers in more than 20 developing 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 165 million hours of nighttime medical lighting, replacing candles, kerosene lanterns, and diesel generators, reducing the risk of fire, and averting more than 70,000 tons of CO<sub>2</sub> 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 life-saving 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 303,000 women and over a million newborns each year, mostly in Africa and Asia. Mothers in the developing world die every day giving birth in dark and unsafe conditions. The World Health Organization reported in 2013 that among eight sub-Saharan Africa nations, only 28% of health facilities had reliable electricity.<sup>1</sup>

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 only 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.

<sup>1</sup> Adair-Rohani et al. Limited electricity access in health facilities of sub-Saharan Africa: a systematic review of data on electricity access sources, and reliability. *Global Health: Science and Practice* 2013, Vol 1, No. 2 *Glob Health Sci Pract* August 12, 2013 vol. 1 no. 2 p. 249-261



### *Prevailing Challenges in Energy Solutions for Health Centers*

- Reliance on fossil fuel solutions such as diesel fuel generators that are prone to breakdown and costly to maintain;
- Electrification of health facilities has fallen between ministry "silos" and has had low prioritization by governments and development agencies;
- Early solar equipment was often of poor quality, required excessive maintenance, and was prone to failure;
- Solar electric systems were costly and complicated, and could not be scaled to reach remote health workers;
- Lack of local knowledge and training about solar electricity; and
- Lack of global awareness that health facilities are without reliable electricity and that feasible and affordable solutions are available.

## **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. Mr. 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 America and shipped all over the world.

We Care Solar has systematically addressed the challenges to health-clinic electrification by:

- Designing a rugged, reliable solar electric system for health workers in harsh environments that is easy-to-use and requires minimal maintenance;
- Conducting training programs to build local capacity in solar installation and usage;
- Partnering with health ministries, local and international NGOs, aid agencies and sustainable energy providers to deploy Solar Suitcases to remote health centers;
- Working to ensure that reliable electricity for health care is on the global health and sustainable energy agendas by engaging key policy makers and influencers; and
- Demonstrating that basic lighting and electricity is feasible and affordable for rural health clinics.

## **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. The scope of our Solar Suitcase programs include:

- (1) *Health facility assessments and selection of health facilities.* We install Solar Suitcases in areas and situations where it is needed the most, especially remote rural health clinics and health care facilities in post-disaster countries like Haiti, Nepal, the Philippines.



- (2) *Capacity building workshops.* We provide classroom and on-site training for district technicians, program officers, and health workers on the proper installation, maintenance and optimal usage of the Solar Suitcase and its components.
- (3) *Monitoring and evaluation of program impact.* Together with our partners, we collect and evaluate health data and interview health workers and program staff to understand the impact of our programs.
- (3) *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 6,600 Solar Suitcases, partnering with leading international NGOs, UN agencies, and development organizations. Our medical LED lights replace candles, kerosene lanterns, and diesel generators, reducing CO<sub>2</sub> emissions and the risk of fire. We have trained more than 26,000 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 of maternal health facilities.

We Care Solar is both designing/manufacturing a technology product (the Solar Suitcase) and also developing distribution and 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 as a way 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, mobile use or permanent installation, 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 is capable of connecting to local cellular networks to transmit data on regular intervals and will store and transmit Solar Suitcase usage and performance data remotely to We Care Solar. This will reduce the frequency of site visits and result 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 \$3,600, including equipment, installation tools, spare parts, shipping, clearance, in-country training, installation, health worker training, periodic replacement of parts, 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

In the last five years, We Care Solar has delivered more than 6,600 Solar Suitcases to last-mile health centers in 20 developing 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 8.9 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 use of fossil fuels. Health care 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. Thus far, the Solar Suitcases have averted more than 70,000 tons of CO<sub>2</sub> 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 empowered 16,000 health workers and technicians on the proper installation, use, and maintenance of 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, saving 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, thus improving health outcomes for mothers and newborns by utilizing a renewable energy source that fosters clean air quality.

## **Additional Benefits**

Aside from reducing maternal and perinatal mortality, 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, thus allowing 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. Thus, the Solar Suitcase can impact health systems as a whole, improving the economic productivity of staff and infrastructure.

### **(3) Fight Climate Change**

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 CO<sub>2</sub> per year when replacing a generator.

## **Potential to Scale**

By creating robust, self-contained solar electric systems and incorporating partners into our delivery model, we advocate for program replication wherever health facilities are in need of essential lighting and power. Our Solar Suitcases are easy to produce and can be customized to meet the needs of specific programs.

Our partnerships with more than 75 organizations are a key factor in the effectiveness of our programs and in our scaling impact. We Care Solar selects partners such as UNICEF, WHO, UNFPA, Save the Children, Jhpiego, and Pathfinder International, who have demonstrated an ability to deliver improved maternal and child health care. Partner organizations incorporate Solar Suitcases into their existing health care programs.

We Care Solar has developed programs to build local capacity. Our "Train the Trainer" Solar Suitcase programs develop local knowledge and capacity. We conduct classroom training using a comprehensive hands-on curriculum and follow this with supervised Solar Suitcase installations. This ensures that skilled workers are available in the countries to support our programs. In 2012, we established a Women's Solar Ambassador Program to develop a cadre of trainers who can work with our staff to bring educational programs to our local partners around the world. This volunteer brigade has enabled us to expand our training programs to reach partners in many countries. Solar Suitcase training programs have been conducted in Ethiopia, Eritrea, Liberia, Sierra Leone, Uganda, Malawi, Tanzania, Ghana, Mozambique, Nepal, and the Philippines. Training program participants include NGO staff members, district health technicians, health workers, and local solar installers.



## 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.

Liberia was our first Light Every Birth country. In 2019, we reached every maternal health center in need of clean energy for safe childbirth. Sierra Leone, Uganda and Zimbabwe are our next Light Every Birth countries.

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 functioning 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.

