

# ENERGIZING A BRIGHTER FUTURE IN THE WORLD'S YOUNGEST COUNTRY

SOUTH SUDAN IS ONE OF THE LEAST ELECTRIFIED COUNTRIES IN THE WORLD...

**JUST 7%**  
OF PEOPLE WITH SOME  
ELECTRICITY ACCESS\*\*



**>10.4 MILLION**  
PEOPLE WITHOUT RELIABLE  
ELECTRICITY ACCESS

SOURCE: SDG 7 TRACKING REPORT

Even in electrified areas like Juba, the capital, electricity supply is unreliable with constant outages and disruptions. In the absence of reliable electricity households and businesses suffer without power or rely on diesel gensets which are very expensive to operate given the high cost of diesel fuel and complicated logistics in South Sudan.

**THIS ENERGY POVERTY CRITICALLY LIMITS SOUTH SUDAN'S POTENTIAL ECONOMIC DEVELOPMENT AND EXACERBATES CHALLENGES FOR ITS PEOPLE**



HIGH ENERGY COSTS



SUPRESSED SOCIOECONOMIC DEVELOPMENT



EXACERBATED GENDER INEQUALITY



DEGRADATION OF LOCAL ENVIRONMENTS



HEALTH IMPACTS AND LIMITED HEALTHCARE



LIMITED BASIC SERVICES

## SOUTH SUDAN'S FIRST SOLAR MINI-GRID IS A FOUNDATIONAL STEP TOWARDS SUSTAINABLE ENERGY ACCESS

In September 2022, SunGate Solar and its partners the Humanitarian Grand Challenges, Village Help for South Sudan, Dunn Family Charitable Foundation, EarthSpark International, and PowerGen launched South Sudan's first solar microgrid in the rural market town of Wanyjok combining a solar array (55 kWp), battery storage (84 kWh/36kVA), and a diesel genset (66 kVA) to deliver clean, reliable, and affordable electricity access to the downtown area.



IN PARTNERSHIP WITH:



### INITIAL PILOT RESULTS - JANUARY 2023

500+



PEOPLE WITH NEW AND IMPROVED ENERGY ACCESS

20,000



INDIRECT BENEFICIARIES

131



SMALL BUSINESSES AND INSTITUTIONS

25



ELECTRIC COOKING

17

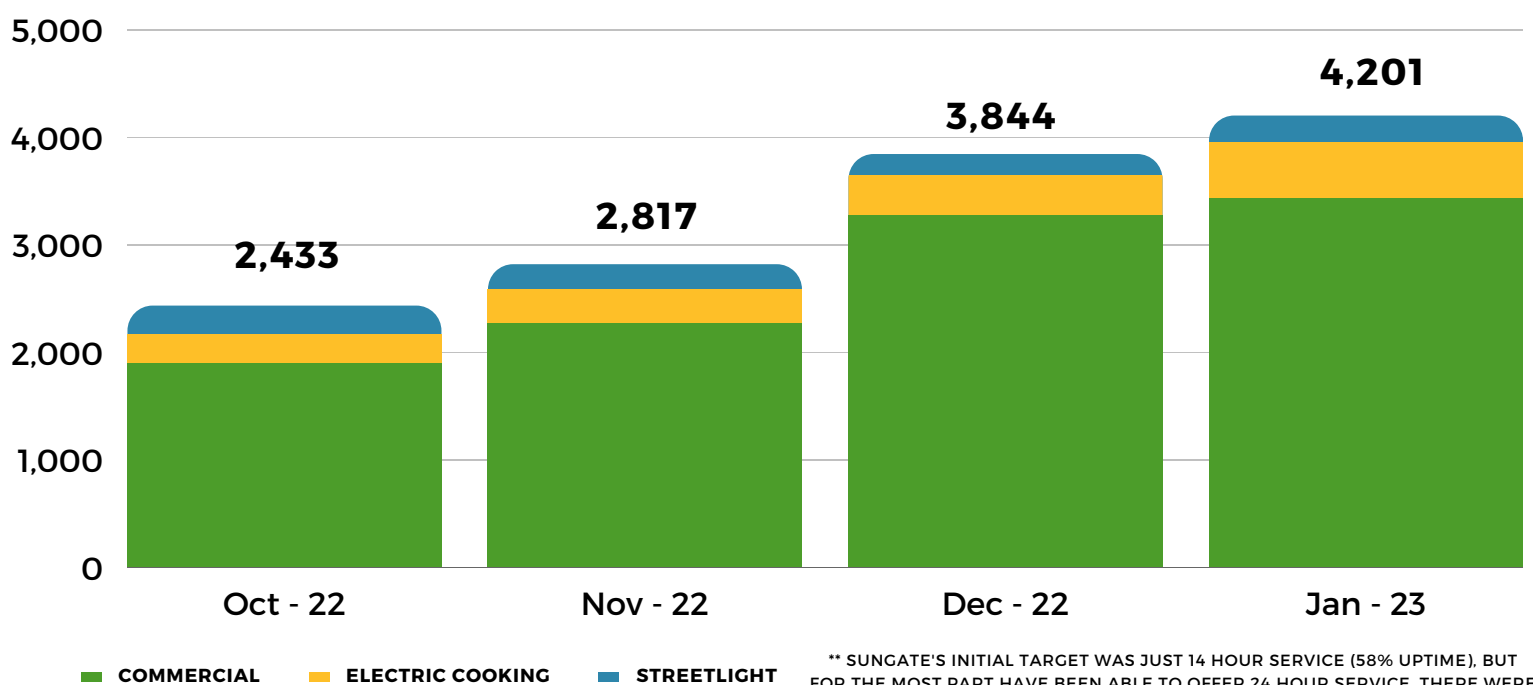


DOWNTOWN STREETLIGHTS

This life-changing electricity grid has reduced energy costs previously paid for unreliable diesel generators and increased opportunities for local enterprises. The lives of the entire community of Wanyjok (~20,000 people) have also been improved from the microgrid power, particularly through the streetlighting for the downtown market area. Healthcare has improved due to access to reliable electricity, local entertainment businesses are opening later into the night and earlier in the day, and people are feeling more secure with a well-lit marketplace.

# MINI-GRID PERFORMANCE SNAPSHOT

## MINI-GRID CONSUMPTION (KWH) OCT 22 - JAN 23



\*\* SUNGATE'S INITIAL TARGET WAS JUST 14 HOUR SERVICE (58% UPTIME), BUT FOR THE MOST PART HAVE BEEN ABLE TO OFFER 24 HOUR SERVICE. THERE WERE SOME CHALLENGES WITH THE INVERTER IN NOV 22 THAT WERE QUICKLY RESOLVED LOWERED THE TOTAL POTENTIAL UPTIME OF THE SYSTEM

**13,100+ KWH CONSUMED**

**83% FROM SOLAR**

**91% UPTIME\*\***

**24 HOUR SERVICE\*\***

## WHAT ARE OUR CUSTOMERS SAYING?



**98%**

OVERALL CUSTOMER SATISFACTION RATE

**72**

NET PROMOTOR SCORE (AVG FOR UTILITIES IS AROUND 30-40)

**98%**

NO CHANGE OR A DECREASE IN ENERGY EXPENSES

**53%**

AVG COST SAVINGS FOR CUSTOMERS SEEING A DECREASE (36-80% SAVINGS RANGE)

**61%**

OF CUSTOMERS HIGHLIGHTED IMPROVEMENTS IN BUSINESS OPERATIONS

**63%**

OF CUSTOMERS HIGHLIGHTED IMPROVED QUALITY OF LIFE (BUSINESS PRODUCTIVITY, MORE LIESURE TIME)

**79%**

OF CUSTOMERS HIGHLIGHTED THAT WANYJOK IS NOW A SAFER PLACE

**69%**

OF CUSTOMERS HIGHLIGHTED THAT THE BEST THING SUNGATE COULD DO TO IMPROVE SERVICE WAS TO EXPAND TO MORE CUSTOMERS AND COMMUNITIES



**“BEFORE THE MINI-GRID, DIESEL POWER WAS VERY EXPENSIVE AND IT WASN'T RELIABLE AT ALL. WHAT WAS WORSE IS THAT THE POWER SURGES WOULD CONSTANTLY DAMAGE OUR COMPUTERS AND EQUIPMENT - WE WOULD SOMETIMES LOSE 1-2 MACHINES A MONTH. NOW, THE MINI-GRID PROVIDES CHEAPER, MORE RELIABLE POWER AND I DON'T HAVE TO WORRY ABOUT DAMAGE TO MY COMPUTERS - I CAN JUST FOCUS ON TEACHING MY STUDENTS!”**

**DANIEL KOCH, OWNER SAHARA COMPUTER CENTER**

# ENERGY POVERTY IN COOKING HAS DRAMATIC IMPACTS IN SOUTH SUDAN, PARTICULARLY ON WOMEN...

Cooking and food are core to culture in South Sudan. It's what brings families and communities together. However **over 99% of the country utilizes charcoal and firewood** for cooking, often in dark, cramped, unventilated spaces. These fuels are burdensome and expensive and can lead to significant negative impacts.

**10,300+**  
**DEATHS**



**ANNUALLY IN SOUTH SUDAN FROM INDOOR AIR POLLUTION, PARTICULARLY FROM COOKING FUELS**

**4-5 HOURS**  
**PER DAY**



**SPENT GATHERING FUEL AND PREPARING MEALS**

**UPWARDS**  
**OF 20%**



**OF INCOME SPENT ON COOKING FUELS**

**1.5-2%**  
**LOSS**



**IN NATURAL FORESTS IN SOUTH SUDAN ANNUALLY**

SOURCE: SDG 7 TRACKING REPORT, WHO, BLACK GOLD REPORT

## SUNGATE LEADS THE WAY WITH INNOVATIVE ELECTRIC COOKING RESEARCH

In parallel with the microgrid, SunGate also enabled an innovative electric cooking pilot project powered by the SunGate Solar microgrid in Wanyjok which conducted controlled cooking experiments adapting South Sudanese cooking to **electric pressure cookers (EPCs)** and deployed electric pressure cookers for 25 participants in Wanyjok. SunGate also deployed EPCs for its own operations and now SunGate offers eCooking to its customers throughout the country!

### High Compatibility of South Sudan Cuisine

Most cuisine can be cooked in the EPC except kiswa (flatbread) and fried foods like Mondasi (doughnuts)



### Time and Cost Savings

15-50% cost savings (at \$0.60/kWh) and 25-85% time savings for EPCs compared to charcoal for sampled meals



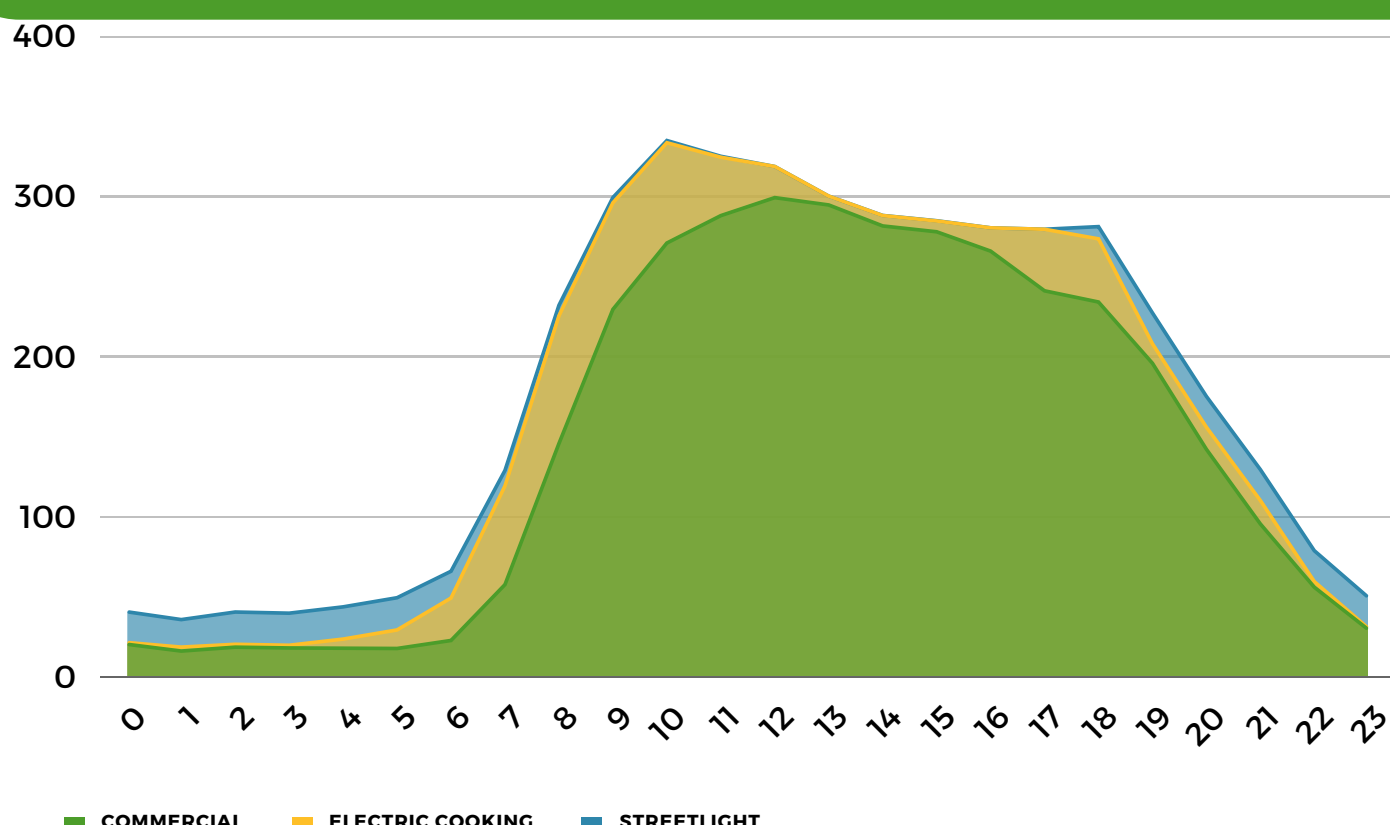
### Benefits of Cooking with EPCs

100% of participants highlighted that they liked how fast the EPC cooked especially compared to charcoal and woodfuels. 32% of the participants also highlighted that the EPC had "no stress" when cooking and an additional 16% of participants highlighted the benefit of no smoke when cooking



## Successful Integration with the Microgrid

Despite challenges with EPC sizing and only a few “High Users”, EPC load still represented about 10% of the total microgrid consumption (through Jan 2023). Consumption was particularly significant early in the morning accounting for 37% of load in the 6:00 AM hour, 52% of load in the 7 AM hour, and 32% of load in the 8 AM hour



## Opportunity to Couple Electric Cooking with SunGate's Stand-alone Solar Customers

SunGate also trialed EPCs for its own offices as well as with some stand-alone solar customers. These trials highlighted a number of advantages for electric cooking including:

- High capacity, high visibility and rapidly expanding customer base
- Built in follow-ups and check-in as part of solar system performance
- Straightforward sales / marketing strategy as a value add to their solar system to cover full spectrum of energy costs, alignment with program goals (e.g. for NGOs), immediate time and fuel cost savings

## NEXT STEPS AND OPPORTUNITIES FOR PARTNERSHIPS

1

### Expansion of microgrids to additional communities

Building upon SunGate's decade long experience in stand-alone solar as well as the foundational microgrid and cooking projects, SunGate is now working to scale up its work to serve more people. This will include expanding microgrids to other communities (2 targeted in 2023-2024) and scaling the microgrid solution to “metrogrid” scale to serve regional capitals (SunGate has MOUs with two state governments). To do this effectively, SunGate needs strategic financing and technical assistance partners to support feasibility studies, new modeling and analysis, and technical capacity building, as well as grant and investment financing to support deployment of solar systems.

2

### Need for Innovative Financing for Energy Access Solutions

There is a critical need for new partnerships and innovative financing solutions in South Sudan to scale the energy access solutions (microgrids / metrogrids and stand-alone solar) as well as the electric cooking and other solutions that they power. There are a number of solutions that warrant piloting and expansion in South Sudan including innovation financing to refine the business models, results-based financing (e.g. for outcomes related to energy access, health, and gender), and carbon financing.

3

### Technology Development, Research, and Capacity Building

SunGate needs to develop additional technology and research partnerships to improve the technologies offered to customers, particularly for electric cooking (e.g. more affordable, simplified, and bigger EPCs) and productive use applications (e.g. agricultural processing). To quickly achieve scale, SunGate also needs technical capacity building and training both for SunGate staff but also the end customers to ensure optimal integration with power systems, revenue for SunGate, and benefits for end-users.