CLEAN ENERGY FOR HEALTH CARE
Despite recent progress, quality of health care in sub-Saharan Africa remains a challenge

59% births attended by skilled health staff

72% child immunization coverage (DPT-3)

50% health facilities lack basic water services

200,000 women die during pregnancy or childbirth each year

93% sub-Saharan Africans without access to timely, affordable, safe surgeries

42% sub-Saharan Africans say they have access to high-quality health care

Source: WHO
Source: WHO & UNICEF
Source: WASH in health care facilities: Global baseline report 2019, WHO & UNICEF, 2019
Source: WHO
Source: The Lancet Commission on Global Surgery
Source: Gallup World Poll
Infrastructure (including power) is key cost driver for SDG 3

Additional investment required to meet SDG 3

Billions of $ (2014)

$274 billion / year

Source: Financing transformative health systems towards achievement of the health Sustainable Development Goals: a model for projected resource needs in 67 low-income and middle-income countries, Lancet Global Health, 2017
Quality of care relies on power...
...yet, too often health care looks like this
Nearly 600 million Africans live without power

Access deficit
Million people

Health facilities are not immune to energy poverty

Source of electricity for rural health facilities

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethiopia (rural)</strong></td>
<td></td>
</tr>
<tr>
<td>n=125</td>
<td></td>
</tr>
<tr>
<td>No electricity</td>
<td>68%</td>
</tr>
<tr>
<td>Solar lighting system</td>
<td>7%</td>
</tr>
<tr>
<td>Solar PV system</td>
<td>8%</td>
</tr>
<tr>
<td>Generator</td>
<td>2%</td>
</tr>
<tr>
<td>National grid</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Kenya (rural)</strong></td>
<td></td>
</tr>
<tr>
<td>n=63</td>
<td></td>
</tr>
<tr>
<td>No electricity</td>
<td>17%</td>
</tr>
<tr>
<td>Solar lighting system</td>
<td>1%</td>
</tr>
<tr>
<td>Solar PV system</td>
<td>14%</td>
</tr>
<tr>
<td>Generator</td>
<td>9%</td>
</tr>
<tr>
<td>National grid</td>
<td>59%</td>
</tr>
</tbody>
</table>

Source: Energy Sector Management Assistance Program

Ethiopia
- Almost 7 out of 10 health facilities have no electricity. Access to electricity is a major challenge.
- 15% of health facilities in rural areas have electricity from off-grid solar products.

Kenya
- Almost 2 out of 10 health facilities in rural areas have no access to grid electricity.
- About 15% use off-grid solar solutions as a main source of electricity.
Grid power isn’t a ‘silver bullet’

MTF Tier distribution among grid-connected rural health facilities

<table>
<thead>
<tr>
<th></th>
<th>Tier 0</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Tier 3</th>
<th>Tier 4</th>
<th>Tier 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia (rural)</td>
<td>26%</td>
<td></td>
<td>48%</td>
<td></td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td>n=39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya (rural)</td>
<td>16%</td>
<td></td>
<td>59%</td>
<td></td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>n=20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Main issues with the grid electricity

**Ethiopia**
- Availability: 25% have <8 hours of electricity
- Reliability: 40% having >14 interruptions per week
- Quality: 28% experience severe voltage fluctuations

**Kenya**
- Reliability: 88% experiencing 4-14 times or more than 2 hours of interruptions per week.

Source: Energy Sector Management Assistance Program
With power, comes the opportunity to improve health services

**Availability of medical equipment in rural health facilities**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Kenya</th>
<th>Ethiopia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>83%</td>
<td>32%</td>
</tr>
<tr>
<td>Refrigerator for vaccination</td>
<td>77%</td>
<td>20%</td>
</tr>
<tr>
<td>Sterilizer</td>
<td>64%</td>
<td>12%</td>
</tr>
<tr>
<td>Microscope</td>
<td>63%</td>
<td>12%</td>
</tr>
<tr>
<td>Blood glucose monitor</td>
<td>57%</td>
<td>9%</td>
</tr>
<tr>
<td>Centrifuge</td>
<td>38%</td>
<td>7%</td>
</tr>
<tr>
<td>Suction apparatus</td>
<td>31%</td>
<td>6%</td>
</tr>
<tr>
<td>Nebulizer</td>
<td>22%</td>
<td>4%</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>11%</td>
<td>1%</td>
</tr>
<tr>
<td>ECG machine</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>X-ray machine</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Energy Sector Management Assistance Program
Business-as-usual (grid extension) leaves a big access gap

Electrification rate:

%  

People without access:

Million people

Facility-based care is more important than ever

Facility-based delivery trends in Africa

% of all births taking place within a facility

Source: Demographic and Health Surveys Program
Cost of clean energy is lower than ever before...

**Solar prices**

$/W

PV module prices have declined 93% in the last decade

*Source: Bloomberg New Energy Finance*
...enabling a range of decentralized clean energy solutions

Higher

Tier 5

Tier 4

Facility-wide ‘Micro-grids’

Mini-grids

Level of Access

Tier 3

Stand-alone Solutions

Solar Kiosks

Tier 2

Portable Solutions

Tier 1

Lower
Off-grid solutions are least-cost option for remote facilities

Decentralized energy will be the least-cost electricity solution for 450 million rural Africans

New connections
- On-grid
- Mini-grid
- Off-grid

Energy efficient medical equipment can drive costs down significantly.

Simulation of rural Kenyan facility @ 8.6kWh/day
- Lighting
- Refrigeration
- Radio
- Computer
- Lab centrifuge
- Microscope
- Blood chemical analyzer
- Hematology analyzer
- CD4 machine

Comparative Costs of Stand-alone Power Equipped with...

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Conventional Medical Equipment</th>
<th>Energy Efficient Medical Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator Only</td>
<td>60,862 USD</td>
<td>51,585 USD</td>
</tr>
<tr>
<td>Generator + Battery</td>
<td>32,903 USD</td>
<td>24,639 USD</td>
</tr>
</tbody>
</table>

15-25% savings

Source: Access to Modern Energy Services for Health Facilities in Resource-Constrained Settings
World Health Organization & World Bank, 2015
Distributed energy contributes to more resilient health systems
Powering universal health care

Providing Access
Ensuring Quality
Reducing Costs
Building Resilience