SUSTAINABLE ENERGY FOR ALL

ENERGY ACCESS PRACTITIONER NETWORK

UNITED NATIONS FOUNDATION

Innovation for energy access and development

TOWARDS SUSTAINABLE ENERGY FOR ALL

Global Challenges for Science and Technology

Cavendish Laboratory, University of Cambridge

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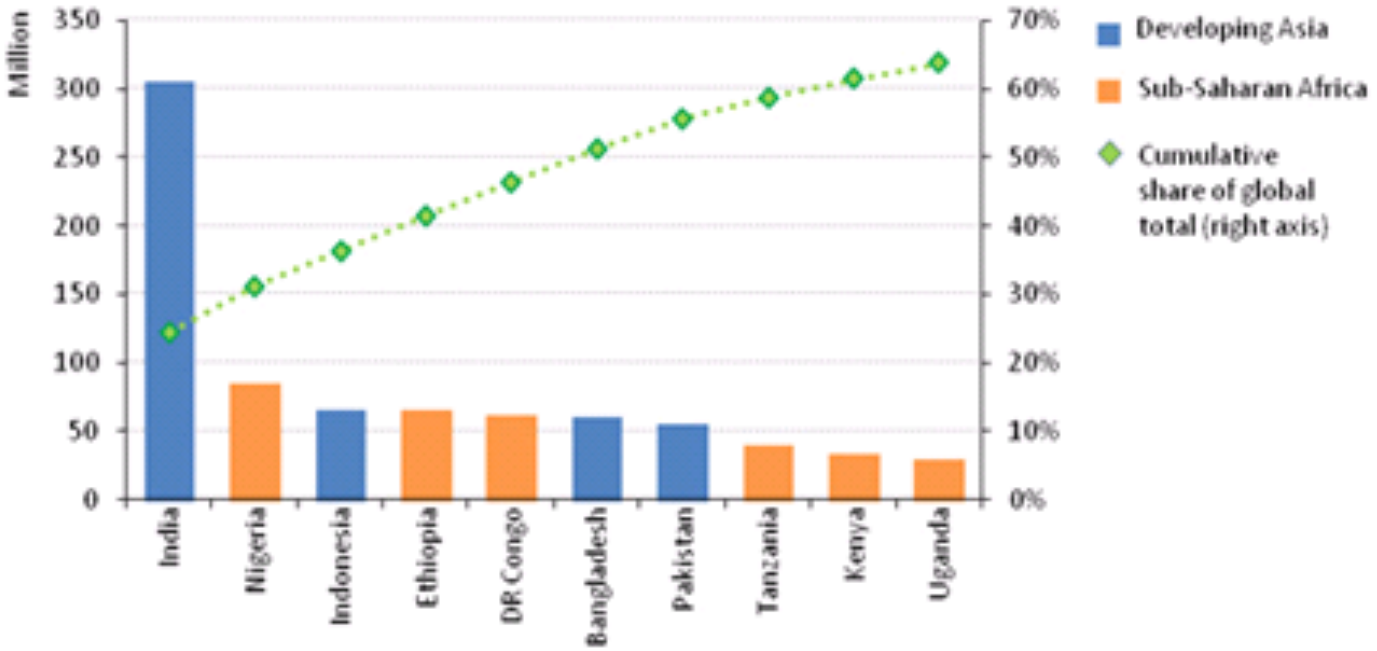
Energy Access - Challenge

- Development is not possible without energy
- But **more than 1.2 billion worldwide lack access to electricity**
- 3 billion people use solid fuels for cooking over open fires and rudimentary cook stoves
- Harmful smoke from cooking and kerosene lighting kills more than 4 million people annually, more than Malaria and TB combined

Global Access to Electricity



IEA – World Energy outlook, 2013

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"As a child growing up during the Korean War, I studied by candlelight. Electric conveniences such as refrigerators and fans were largely unknown. Yet within my lifetime, that reality changed utterly. Easy access to energy opened abundant new possibilities for my family and my nation."

UN Secretary-General Ban Ki-moon,
Powering Sustainable Energy for All.

Photo Credit: Nokero

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"A pregnant woman can go into labor at any time. Her survival should not depend on daylight."

UN Secretary-General Ban Ki-moon,

Rio+20 UN Conference on Sustainable Development.


Photo Credit: Peter DiCampo

Access to reliable electricity is essential for:

- ***powering emergency medical equipment,***
- ***storing blood and vaccines,***
- ***performing basic procedures after dark.***

Maternal deaths in sub-Saharan Africa account for roughly half of deaths globally caused by complications in pregnancy and childbirth.

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In 2011, UN Secretary-General Ban Ki-moon launched the **Sustainable Energy for All** initiative, focused on achieving **three global objectives** by 2030:

- ENSURING *universal access* TO MODERN ENERGY SERVICES.
- DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN *energy efficiency.*
- DOUBLING THE SHARE OF *renewable energy* IN THE GLOBAL ENERGY MIX.

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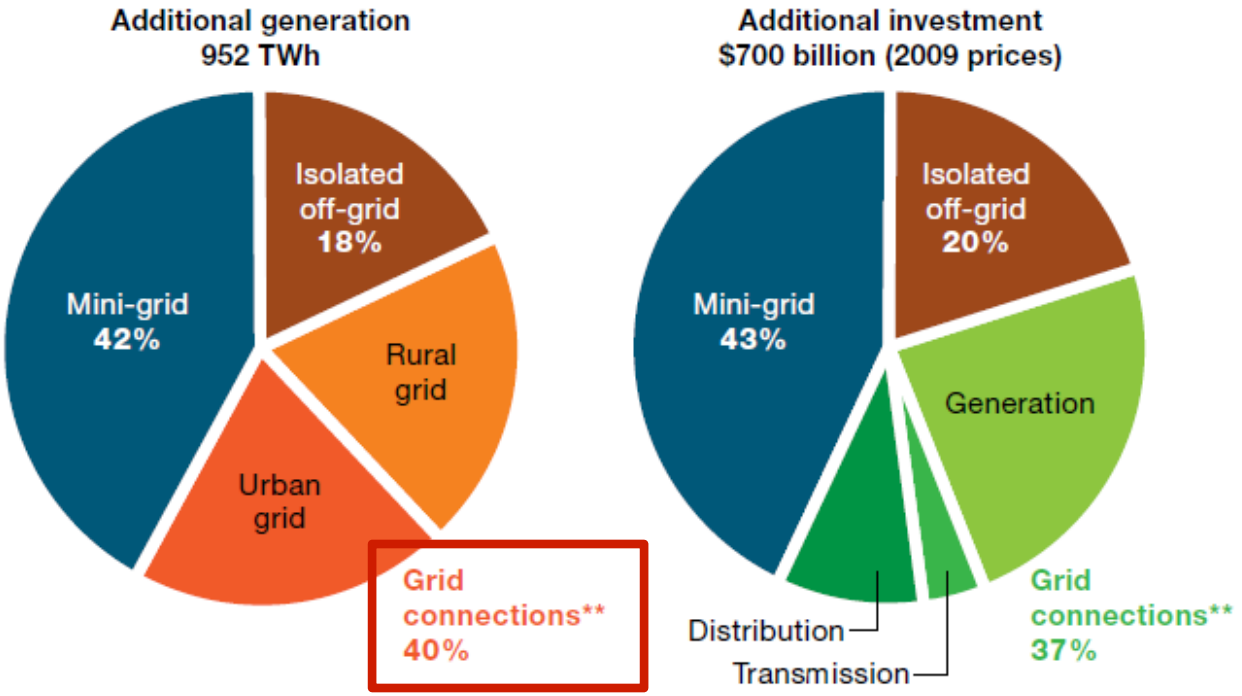
Energy Access: grid/off-grid or… both?

The Importance of Decentralized Solutions

Figure 1. Incremental Electricity Generation and Investment in the Universal Modern Access Case, 2010-2030*



*Compared with the New Policies Scenario

**includes generation, transmission and distribution for both urban and rural grids

IEA (2010). "World Energy Outlook".

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"Ladder" of sustainable energy solutions & services

Photo credits: d.light design, Greenlight Planet

Small stand-alone solutions (solar lanterns)

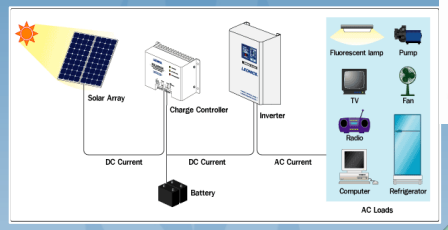

Photo credit: Leonics

Medium stand-alone solutions (solar home systems)

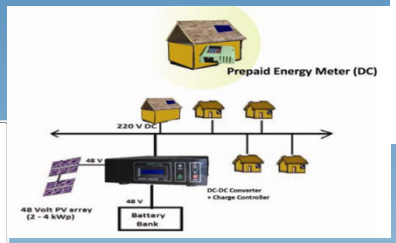

Photo credit: Solaric

Nano-grids

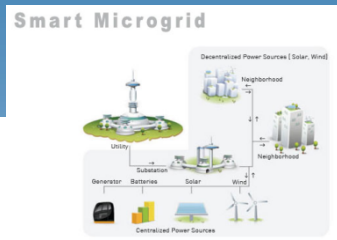

Photo credit: Zreyas Technology

Micro/Mini-grids

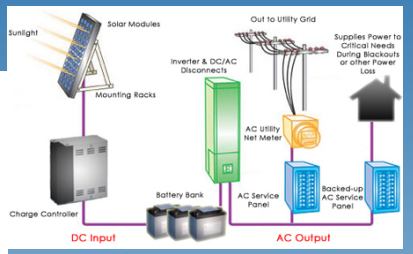

Photo credit: Sunbird Energy

Grid-connected

Tier 1 - Task lighting & phone charging/ radio

Tier 2 – General lighting, television & fan

Tier 3 – Tier 2 & low-power appliances

Tier 4 – Tier 3 & medium-power appliances

Tier 5 – Tier 4 & high-power appliances

* Tiers of access are drawn from the Sustainable Energy for All initiative's Global Tracking Framework.

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Electricity lights health clinics, and powers vaccine refrigerators

Photo Credit: WE CARE Solar

Energy for Healthcare

Renewable energy options for energy access can be a critical step to:

- *supporting needed medical services and devices,*
- *enhancing medical staff morale and retention,*
- *reducing costly diesel generation.*

A WHO survey found that solar PV was more reliable for lighting rural African health clinics than diesel generators.

Clean biogas cooking energy also improves women's health &
frees children from time spent collecting firewood so they can focus on their education...

Photo Credit: Project Gaia

…and small scale LED solar lighting solutions help children do better in school.

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Innovations for healthcare

We Care Solar designs portable Solar Suitcases powering critical lighting, mobile communications and medical devices in areas without reliable electricity.

"Before the Solar Suitcase, we were using all kinds of unreliable lighting to conduct night deliveries"

- Ms. Mutikat Martha, midwife, Amudat Hospital

This Solar Suitcase includes a 65 watt glass-aluminum panel, as well as two LED medical lights, two headlamps, a phone charger, AA and AAA battery charger, and a fetal Doppler. It includes the hardware for mounting the solar panel and attaching the yellow case to the wall.

This expanded system has two 80 watt panels, a 79 Ah sealed AGM battery, and an extra set of LED medical lights. In addition to charging phones, headlamps and a fetal doppler, it can charge a laptop computer and other devices.

Photo Credit: WE CARE Solar

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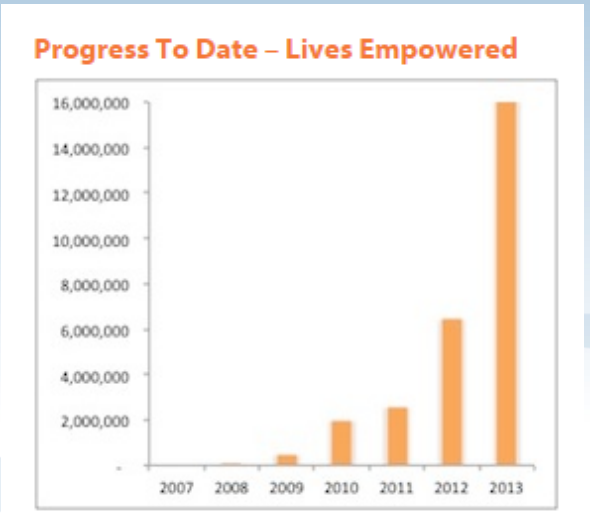
From Masters class to company: d.light design

d.light, a for-profit social enterprise, is the brainchild of Sam Goldman & Ned Tozun, who participated in the "Entrepreneurial Design for Extreme Affordability" course at the Stanford Design School.

While studying at Stanford, they developed an initial prototype solar lantern and an ambitious plan to bring safe, bright, and renewable lighting to people around the globe.

Today, d.light is one of the most successful solar lantern companies in the off-grid sector, and aims to empower the lives of at least 100 million people by 2020.

Photo Credit: d.light design



Remote monitoring breakthroughs: SparkMeter

- A micro-grid metering system enables utilities to implement pre-payment, real-time monitoring & control on micro- & central grids.
- Low-cost system consisting of four hardware components – gateway, smart sensors, signal forwarders, & smart meters – a cloud-based operator interface, and a mobile money or cash-based pre-payment system.
- Energy-based tariffs allow customers to pay for what they use.
- Customizable load- and energy-limiting set-points disable over-use.
- Remote monitoring and control allows theft detection and reaction.

Photo Credit: SparkMeter

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Market-based innovations for energy for development

Consumer Financing: Azuri Technologies' innovative "pay as you go" scratch-card rental system across Africa

Cold Chain:
SunDanzer translated NASA technology into the world's first battery-free solar powered refrigerator designed for off-grid use

Customer Focus:
SELCO India's tailored packages of customized product, service and consumer financing

Supply Chain:
Econet Solar links existing cell phone supply chains with the sale of cell phone chargers and lights in Southern Africa

Energy Storage:
Trojan's Smart Carbon™ technology enhances overall battery life in off-grid and unstable grid applications where the batteries are under-charged on a regular basis

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Photo Credit: SELF

Photo Credit: d.light design

www.energyaccess.org