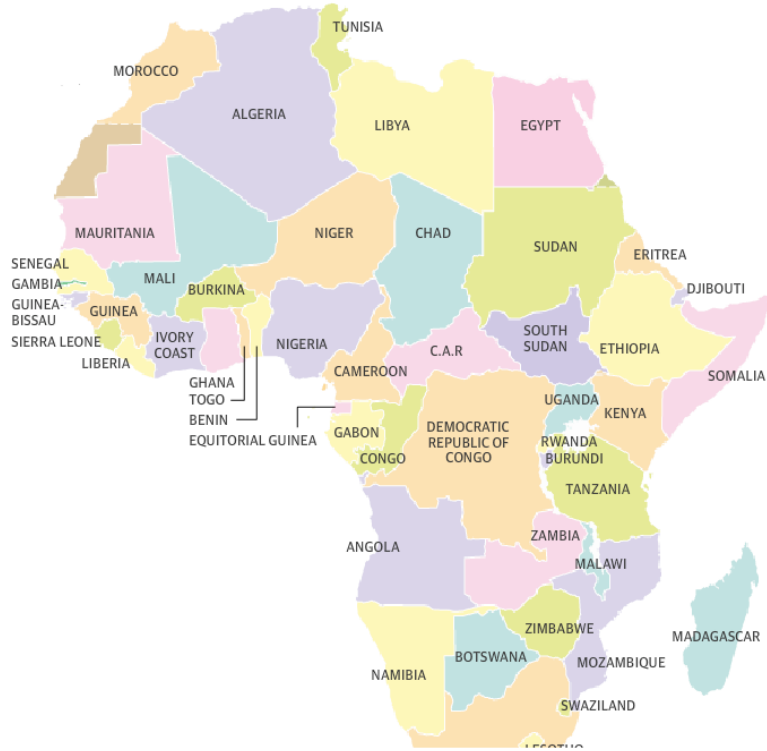



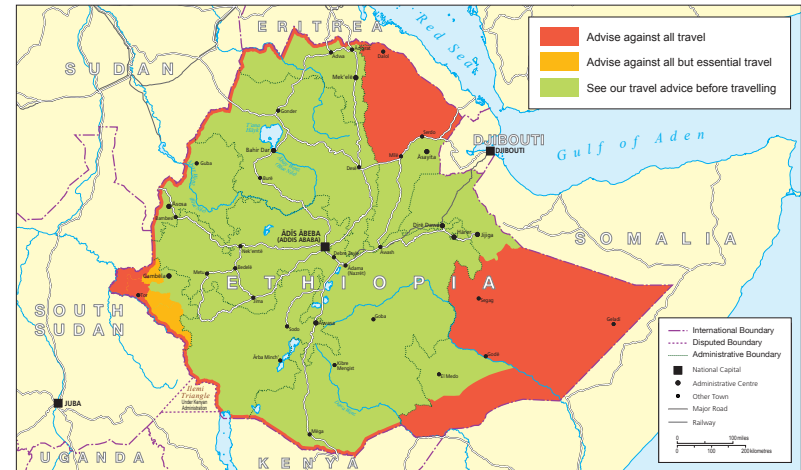
Solar-Power for Africa Ethiopia



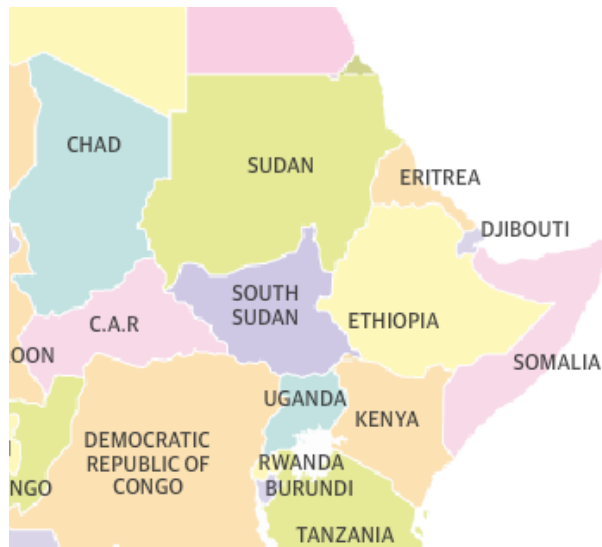


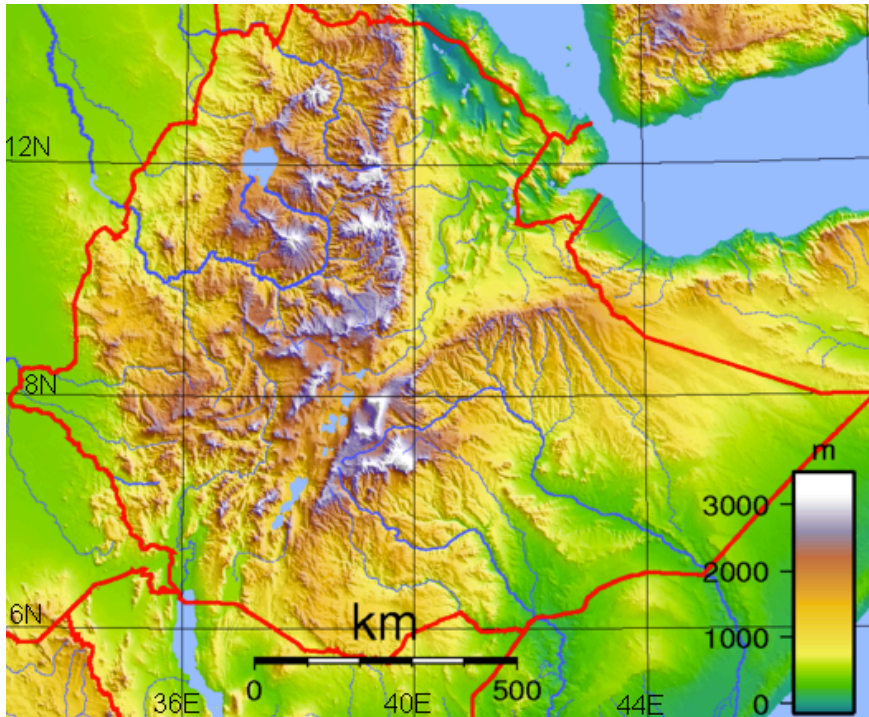


FOREIGN AND COMMONWEALTH OFFICE  BRIEFING NOTES
Ethiopia: Travel Advice



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Solar irradiance is the highest on Earth

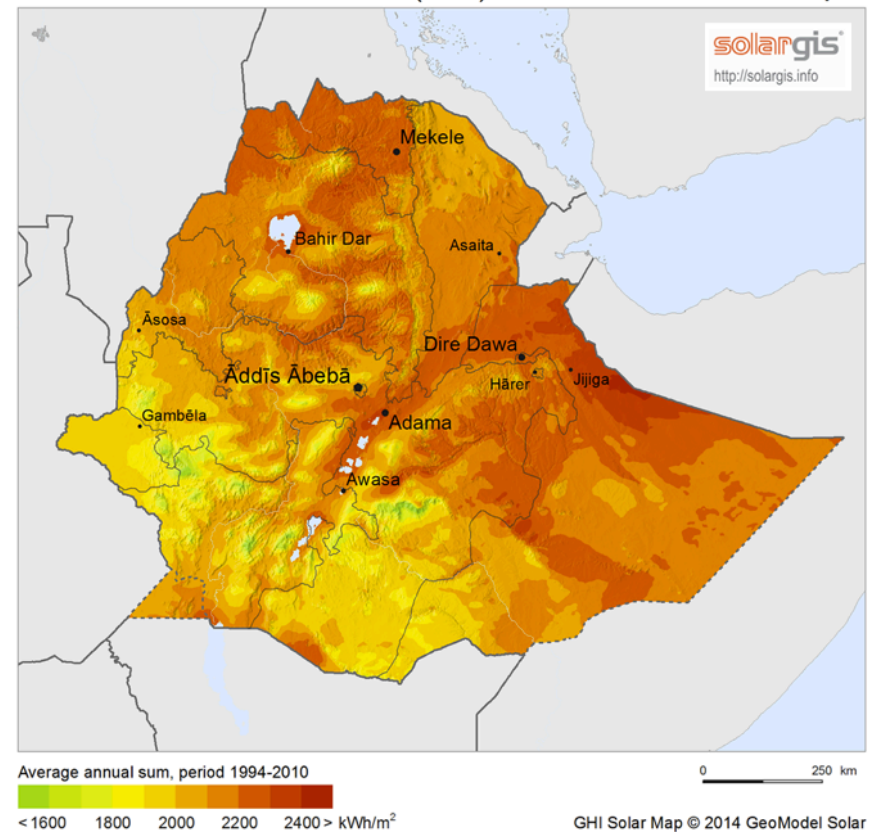
Typical value in Ohio is $\sim 1200 \text{ kWh/m}^2$

Ethiopia is at high altitude and close to the equator (bottom edge of map).

Population about 100 million people.

Mostly rural farmers.

Global Horizontal Irradiation (GHI) Ethiopia



GHI Solar Map © 2014 GeoModel Solar

Ethiopia: Travel Advice



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Ethiopia: Travel Advice

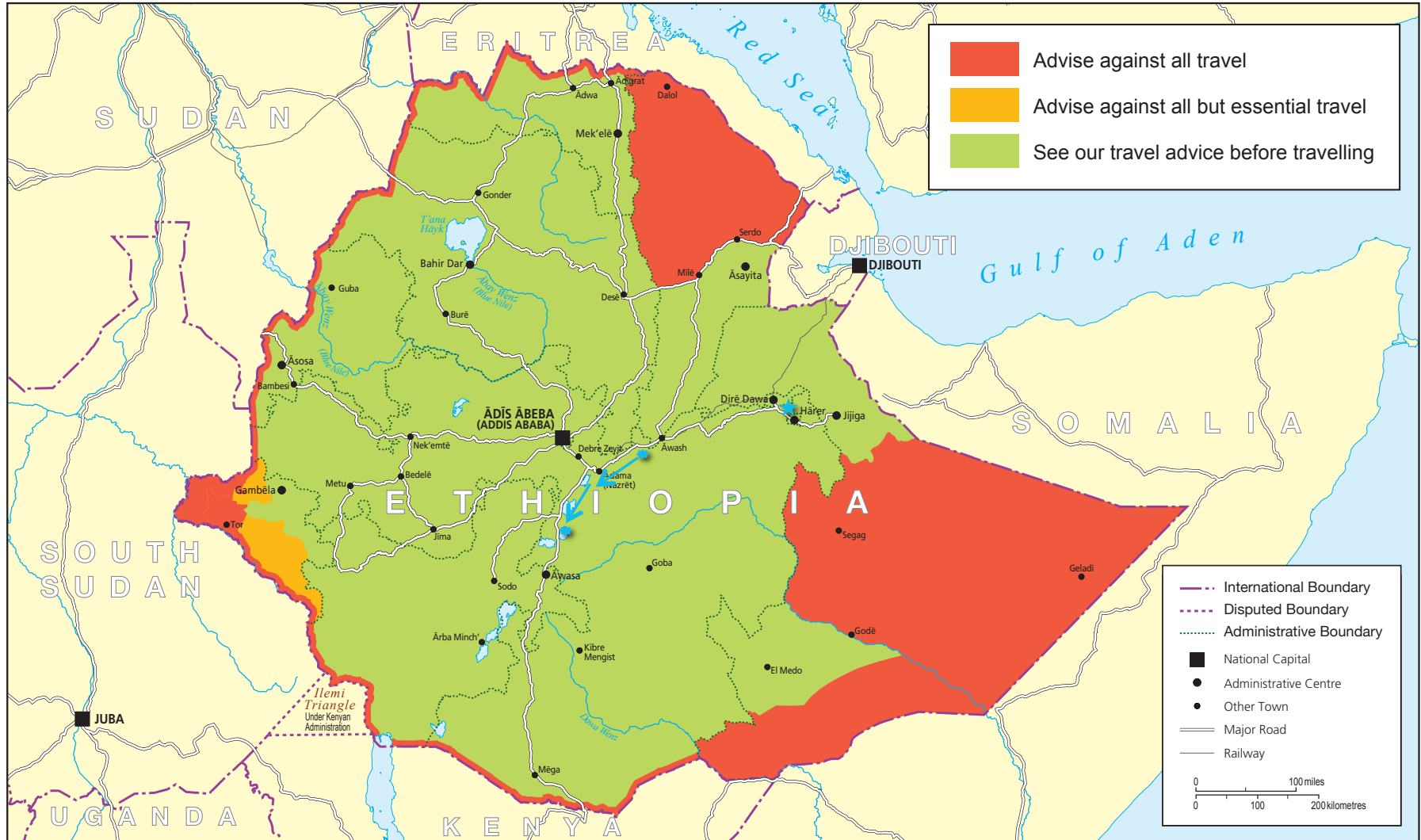


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Ethiopia: Travel Advice



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Accomplishments & Impacts

Forge relationships between the University of Cincinnati and Ethiopian undergraduate students



Entrepreneurial approach to development assistance as a partnership

Application of engineering, design, and business training towards a collaborative project that can improve the living standard for rural sub-Saharan communities



What I Gained

Experienced first-hand the lack of accessible water outside of developed communities

Overcame language barriers in order to complete a project

Full immersion into a new culture

Exposed to engineering practices that differ greatly than those used in the US

















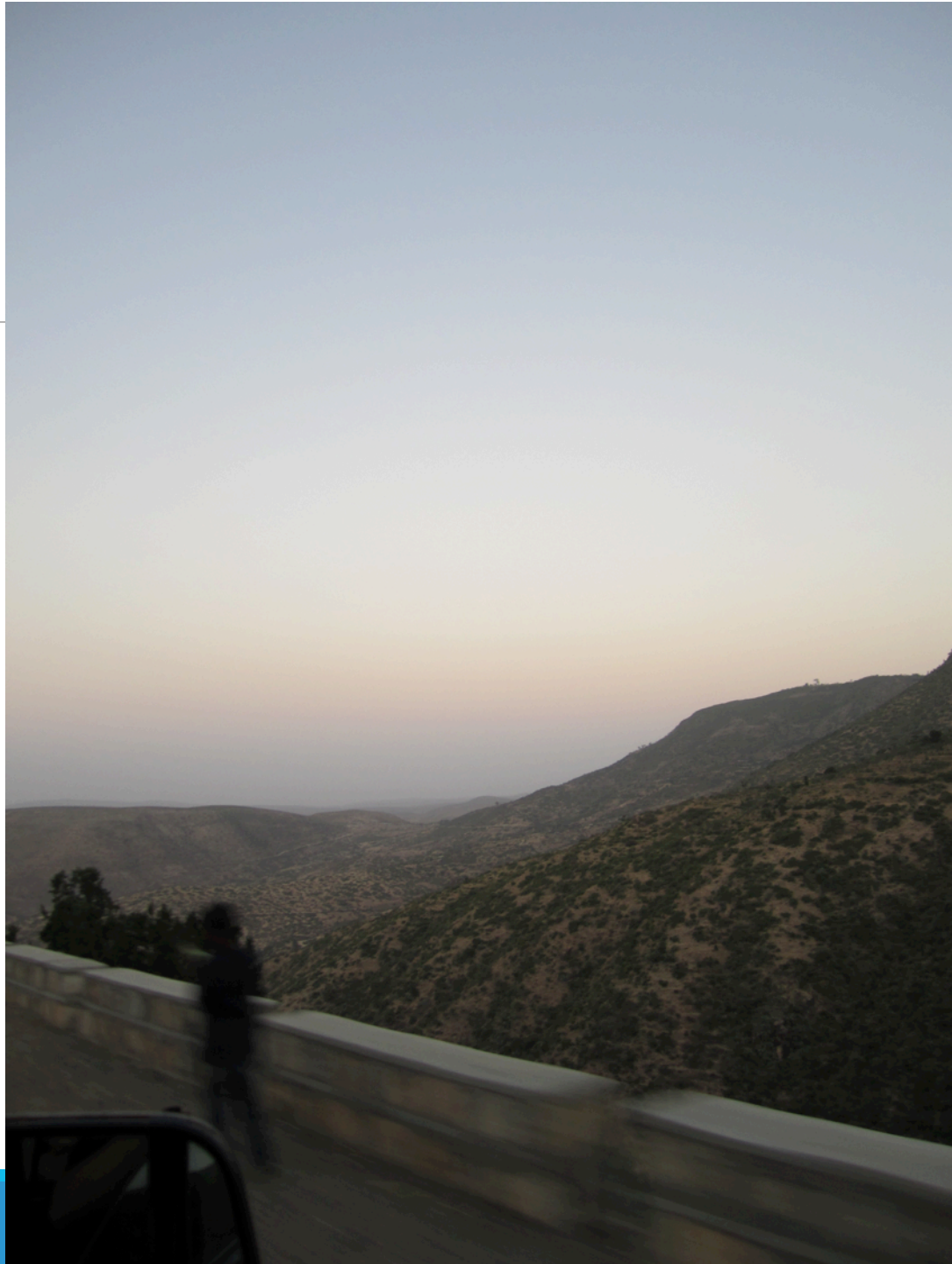
































Well # 1
10 m, dry



Well # 2

30 m, almost dry





































College Student Interaction and Community Outreach: Outdoor lighting for safety improvement in a rural Ethiopian village.

- Engineering, Architecture, Design, and Marketing undergraduate students from the University of Cincinnati (UC) will collaborate with their counterparts at Dire Dawa University (DDU) to assemble outdoor solar lighting from components as a learning experience for in country manufacture of solar lighting.
 - The project will be conducted in December, during a visit by 14 UC students to Dire Dawa.
 - A target village, in the Oromo Mountains, will be fitted with 35 outdoor lights that will improve safety and living standards in an area with no grid power
 - Students will assess the impact and viability of a business model for the student designs.
 - The interaction is expected to lead to long-term relationships between the US and Ethiopian students as well as between the two groups of students and the village.
- 

College Student Interaction and Community Outreach: Outdoor lighting for safety improvement in a rural Ethiopian village.

- 80 % of Marriages in the Oromia region of Ethiopia are by abduction.
 - Partly this is an accepted cultural custom but partially it is against the girls will.
 - Often abductions occur at night so improved lighting can help prevent unwanted abduction.
- 

***College Student Interaction and Community Outreach:
Outdoor lighting for safety improvement in a rural
Ethiopian village.***



***College Student Interaction and Community Outreach:
Outdoor lighting for safety improvement in a rural
Ethiopian village.***



Figure 3. Alfredo Moser and his solar light invention in Brazil.
(www.bbc.com/news/magazine-23536914)

College Student Interaction and Community Outreach: Outdoor lighting for safety improvement in a rural Ethiopian village.

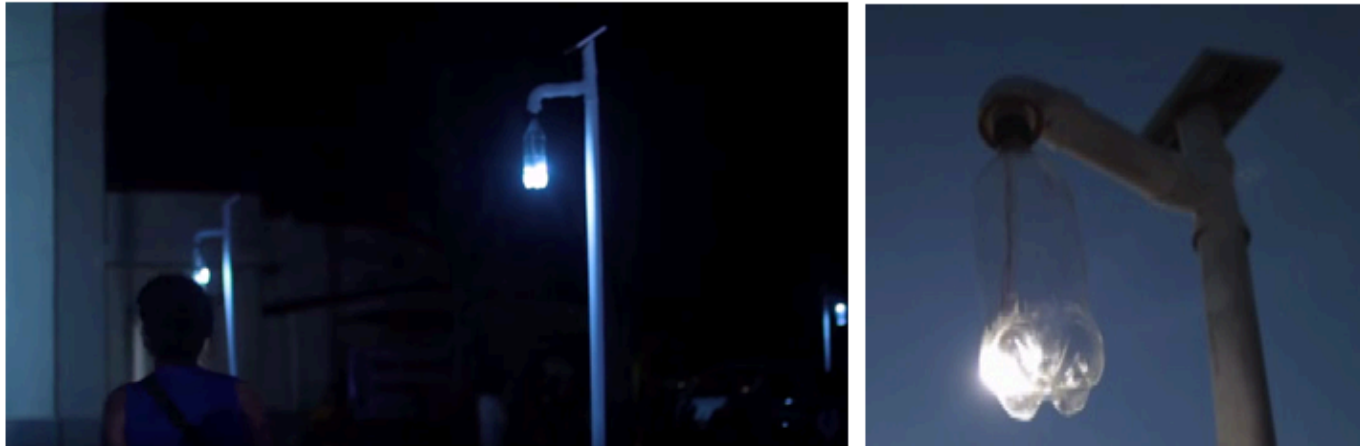


Figure 1. [Solar lanterns in use in the Philippines \(www.youtube.com/watch?v=0PSsyufpZ2Q\)](http://www.youtube.com/watch?v=0PSsyufpZ2Q).

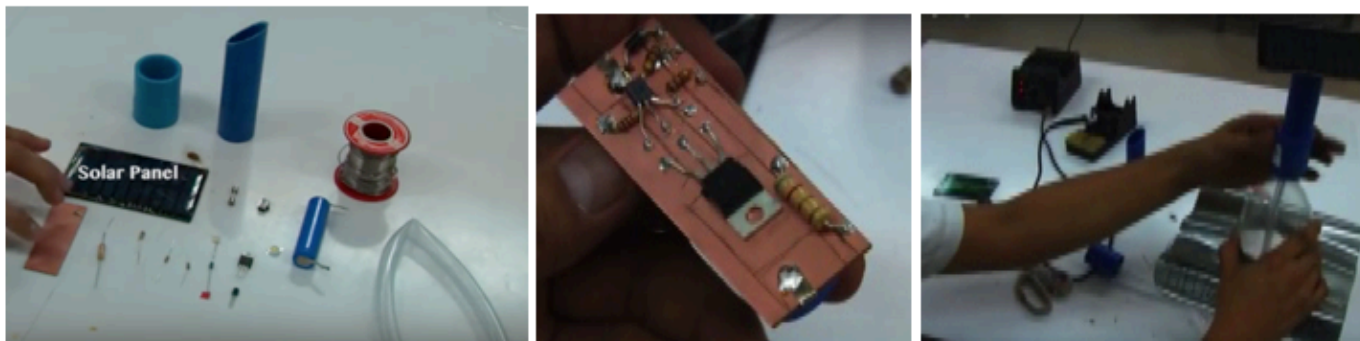


Figure 2. [Assembly of a solar lantern using simple components available in country. \(www.youtube.com/watch?v=bAPNtEFzrcA\)](http://www.youtube.com/watch?v=bAPNtEFzrcA)

College Student Interaction and Community Outreach: Outdoor lighting for safety improvement in a rural Ethiopian village.

Number of People Impacted by Project:

Ethiopians:

Primary School Students: 600-650

Primary School Instructors: 4

Villagers: 100

Regional impact of demonstration

of simple solar technology ~many 10,000s

College students at Dire Dawa University participating 30 actively involved total impact 300

Faculty at Dire Dawa University, 50

Haramaya University, 4

Addis Ababa University 10

US:

Undergraduate students: 16-18 traveling, 4-6 not traveling

Faculty: 2 traveling, 1 not traveling

College Student Interaction and Community Outreach: Outdoor lighting for safety improvement in a rural Ethiopian village.

Estimated Budget for Materials:

In country purchases:

80 Bags of Concrete	\$3 per bag	\$240	
~2 Bags per pole			
40 PVC Pipes 4' x 10"	\$20	\$800	
30 PVC T & U joints	\$10	\$400	
Solder		\$50	
Subtotal for Installation:		\$1490	Per unit cost ~\$37

Purchases in US:

40 Blank PCBs	\$25 (Amazon.com)	
40 LED Bulbs	\$15 (Ebay.com)	
40 Solar Panels	\$130 (Alibaba.com)	
40 Batteries	\$250 (BatterySpace.com)	
Wire etc.	\$100 (TBD)	
Subtotal for Lanterns:		\$520 Per unit cost ~\$13

Grand Total:	\$2,010	Per unit cost ~\$50
---------------------	---------	---------------------



End

