

Heliomination



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Priority topic area: Clean Energy and Climate Action

1 - Aim

Worldwide, 675 million people live without access to lighting, with 80% being in sub-Saharan Africa (UN, 2023). The abundant sunlight in Sub-Saharan Africa means that portable and affordable solar panels are the most feasible method of providing clean energy. Hence, to aid the development of communities, we propose a collapsible, portable, and cheap solar panel made of recycled materials in order to generate and store electricity. Incorporating clean energy into these communities will not only allow them to develop faster, but also to serve as an example to the rest of the world regarding sustainable development as the UN desires.

	Light Intensity Measured (Lux)				
Material	1	2	3	Mean	
Frosted Glass	805	801	799	802	
Clear Glass (Tempered)	850	790	810	817	
Tinted Glass (Blue)	470	480	470	473	
Control (Torch)	1500	1657	1600	1586	
Control (No torch)	1	1	1	1	
	Light Intensity Measured (Lux)				
Material	1	2	3	Mean	

	Light Intensity Measured (Lux)					
Material (Acetate)	1	2	3	Mean		
Red	370	359	404	378		
Green	334	374	414	374		
Blue	298	350	347	332		
Clear	1065	1140	1321	1175		

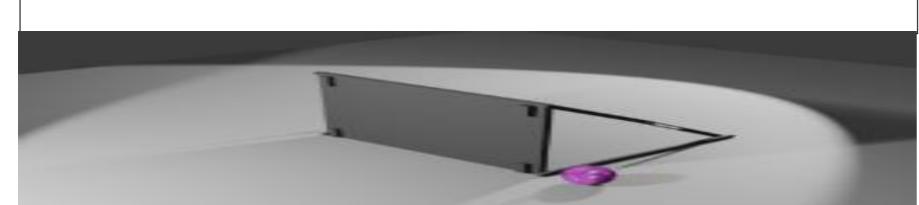
3 - Results

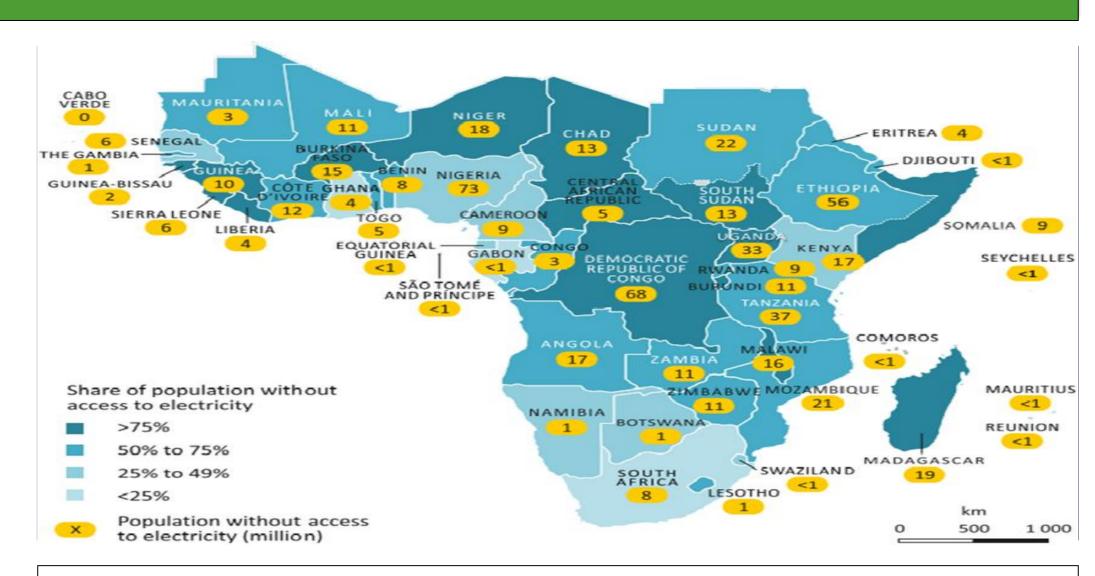
Our panels are carbon-based with an adjustable aluminium frame, transparent glass protective cover, and a lithium battery attached to the rear of the frame. This allows the solar panels to be adjusted to maintain optimum performance throughout the day and to be collapsed to be flat-pack, thereby reducing their carbon footprint during transport. The panel would charge a 12V, 10Ah lithium-ion battery, equivalent to 120 Wh of energy storage, hence its dimensions (on diagram to right).

Carbon-based solar cells are a new technology which is significantly cheaper and lighter than conventional silicon, thus it is more apt for purpose. Aluminium is strong, durable and reasonably cheap, and the glass is most hardwearing.

The product would be distributed via NGOs which would provide us with a network of communities. There are currently 9005 UK NGOs working in Sub Saharan Africa, 2347 of them aiming for "economic and community development", which our product would support greatly.

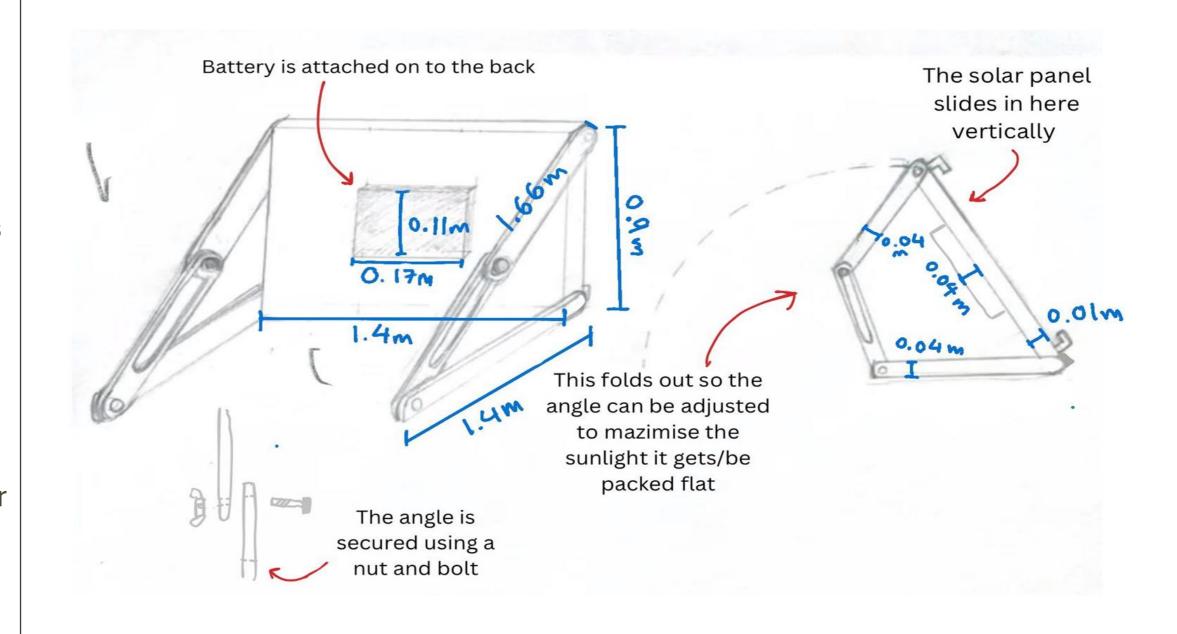
We would transport via cargo boat to reduce environmental impact and ideally be manufactured in location near to the target destination. Our calculation of transport cost was £10.96 per panel, having planned how it would be packed to maximise number of panels per container.

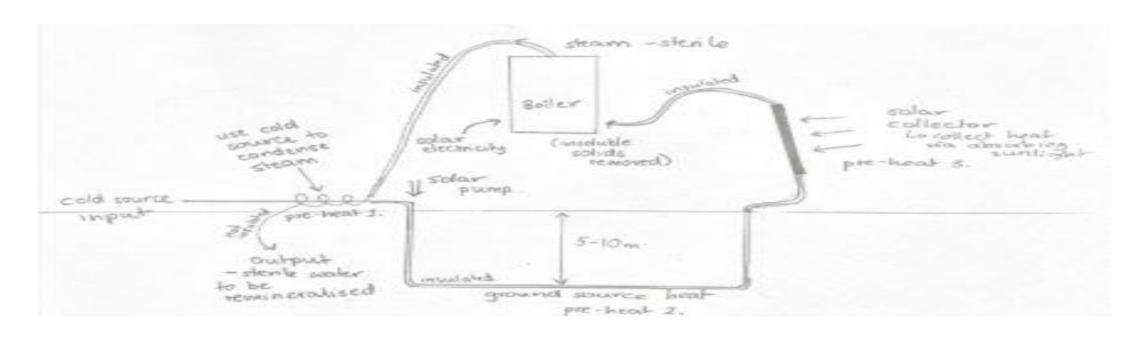




2 – Methodology

Here, we needed to test and scrutinise various different materials like acetates and plywoods for the various parts of the frame. This required us to measure the opacity of various transparent materials by using a light and a lux meter at a set distance from the material. We repeated this process 3 times per material in order to achieve concordant results, and ended up using tempered glass for the panel protector due to its combination of durability and transparency. Recycled Aluminium was used for the frame as it was durable and nonflammable - traits that favour the conditions of sub-Saharan Africa.





4 – Benefit to society

Access to electricity would allow for improved productivity as well as increased academic achievement due to electric lighting allowing for increased time to study as well as smart classrooms. These would both lead to improved education quality, and therefore minimise global inequalities. Also, this electricity could be used to sterilise water and provide sanitation and hygiene that is paramount for sub-Saharan Africa. Potable water would then allow for communities to flourish and develop further by improving the general health of the community. Additionally, abundant electricity would allow for more hygienic cooking, further improving hygiene.

5 - Next steps

It could be used with the water sterilisation system pictured above. Water is preheated by steam, then pumped underground and after passes through a solar collector. This increases the temperature to reduce the (solar) energy required to boil it. Once it is boiled the steam preheats and is remineralised.



References/Acknowledgements
SSA energy map-Research gate
Access to electricity diagram-APAEA 2022
UN Website-Sub Saharan Africa information about electrification