

## MOTIVATION

- Camps lack of efficient ovens, so they use coal and wood to cook which cause them harm (Team Volunteering, 2019).
- Electric ovens are not efficient for places with interrupted electricity.
- Gas ovens cause pollution.
- **We must create a healthy product for refugees, one that is environmentally friendly.**

## APPLICATION

- Syrian refugees struggle in seeking a normal life, Many lost their homes and possessions in airstrikes .
- Providing Syrian refugees in camps with Photovoltaic ovens will replace the use unhealthy methods to cook meals.
- There has been a remarkable development in using Photovoltaic cells technologies and applications in the past few years (Pouris, 2007).

## TECHNICAL CONCEPTS

### ▪ Solar Energy (Photovoltaic Cells):

Electrical energy is generated when photons coming from the sunlight knock down the surface of the solar panel, thus creating an electric current (Dhar, 2017).

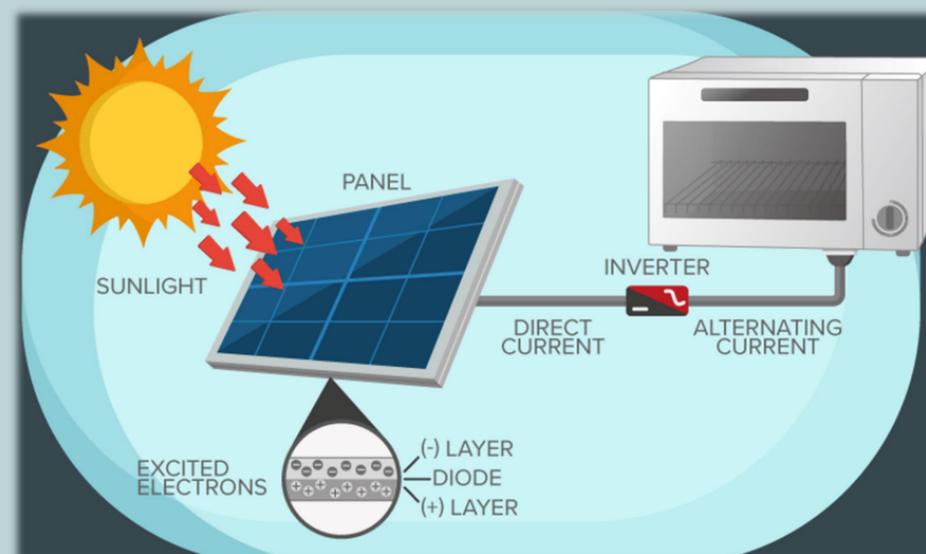
### ▪ Radiative Sky Cooling System:

The difference in heat between two surfaces (ambient, and radiatively cooled surfaces) will be generated into electricity through a thermoelectric generator (Raman, 2019).

### ▪ Graphene Films:

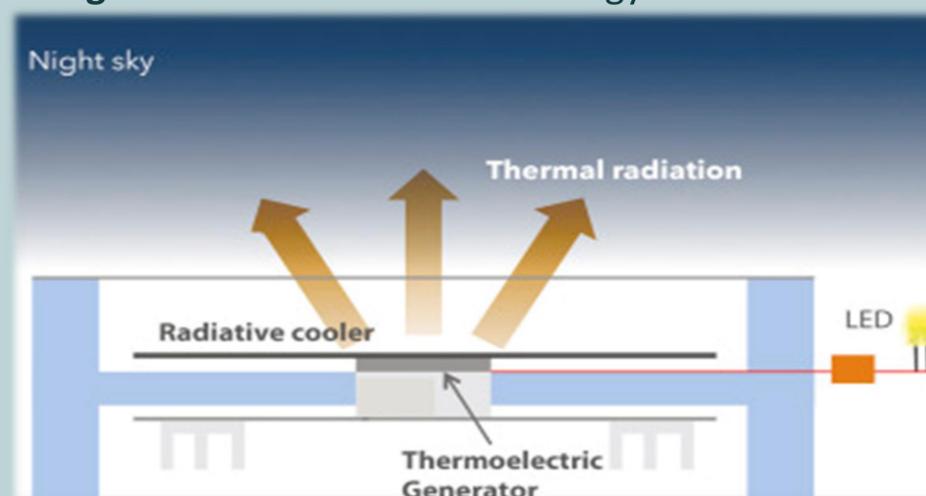
These films will allow the production of electricity during rain. This occurs when positively charged ions coming from rain bind to the delocalized electrons of graphene, a feature known as "Pseudocapacitor". Through this, a voltage and current are created (Peleg, 2016).

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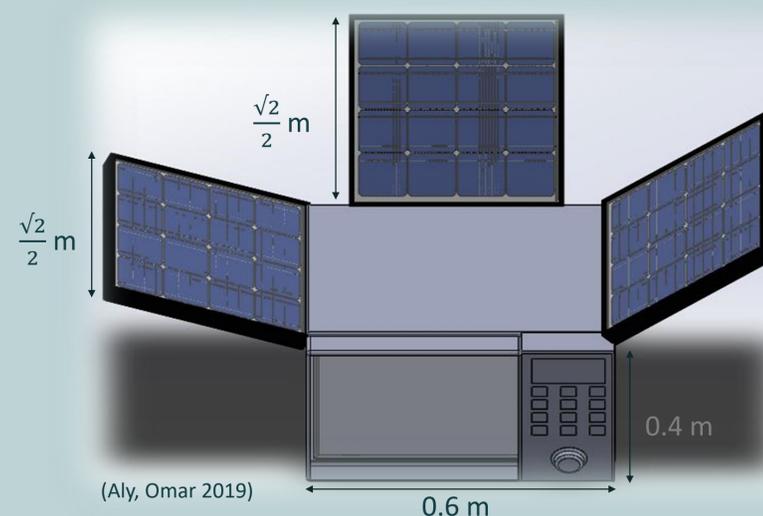
<https://www.santansolar.com/ca-faq/>

▪ **Figure 1** Collection of Solar Energy



<https://www.sciencedirect.com/science/article/abs/pii/S254243511930412X>

▪ **Figure 2** Radiative Sky Cooling Unit



(Aly, Omar 2019)

▪ **Figure 3** Design of the oven

## SITE TESTING IN TURKEY

- The Ceylanpinar camp in Turkey is our case study. Refugees there experience health problems.
- The camp's area is 2000 kilometers squared, which means there is enough space for implementing our idea.
- The population reaches up to 21,000 refugees which is approximately 5000 families. This is an opportunity for us to improve the life of many refugees (Kurtulus, 2018).
- Implementing the new oven technology would help in providing the refugees at least a good quality of life.

## CHALLENGES

- The oven is expensive due to the addition of the radiative cooling system which works at night.
- The distribution of the product would be hard. Political problems could get in the way and the product may not be able to reach the camps in need.
- There was limited amount of research on our project. According to Dr. Ellen D. Williams, a physics professor at the University of Maryland about PV cells and Radiative Sky Cooling System, "Both technologies are proven and practical, but I haven't seen them combined like this" (Cell Press, 2019).
- The oven's size will be double the size of a conventional oven due to the use of solar panels.

## NEXT STEPS?

- As engineers, our aim is to find the safest options for refugees.
- This oven would cause a major change for people who are fleeing their homes.
- In the future, this product could be used for further business investments since climate change has become a big issue, and eco-friendly products would be much needed.