# Introduction

During the meeting of the engineering team on Saturday February 11th, 2017, a

# Design Criteria

Design Criteria from highest importance to lowest:

* Electricity free mechanism(s).
* Water efficient (L/day).
* Must be cheap ($).
* Can survive the harsh effects of sand (durability).
* Maintainability.
* Can be used in any temperature.
* Could be built or assembled locally.
* Capable of providing enough food to help sustain a tent of 6 people. (m^3).
* Easily assembled.
* Can grow a variety of plants.
* Easy/intuitive operating procedures.
* Does not require too much attention.
* Can sit on top of sand/mud without having any effect on the system.
* Has to keep vermin away.
* Made from local material.

|  |  |  |
| --- | --- | --- |
| Need | Design Criteria | Importance |
| Can survive harsh conditions | Can survive the harsh effects of sand (durability) | 4 |
| Not much water | Water efficient (L/day) | 5 |
| Needs to survive the temperatures | Can be used in any temperature | 3 |
| Environmental Conditions | Can sit on top of sand/mud without having any effect on the system | 2 |
| Possible plants to grow | Can grow a variety of plants | 3 |
| Need to keep plants protected | Has to keep vermin away | 2 |
| Possible building materials | Could be built or assembled locally | 4 |
| Refugees do not have much money | Must be cheap ($) | 5 |
| May not have tools | Easily assembled | 3 |
| People of differing backgrounds/professions are present in the camp. | Easy/intuitive operating procedures. | 2 |
| Needs to supply for a lot of people | Capable of providing enough food to help sustain a tent of 6 people. (m^3) | 3 |
| Efficiency | Does not require too much attention | 2 |
| Building material | Made from local material | 1 |
| No tools/ few materials | maintainability | 4 |
| Does not require electricity. | Electricity free mechanism(s). | 5 |

**Benchmarking**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 |
| Size  (per unit) | 15.6 x 11.0 cm | 4.8 cm x not specified x not specified. | 62.23cm x 62.23cm x 62.23cm | 88.9 cm x 33.02 cm x 22.86cm |
| Quantity | 12 | 10 | 8 | 1 |
| Cost | Not specified | $5.25 CDN | $558.71 CND/8 | $129.00 |
| Volume of water(L) | 100 | Not specified  (very small) | 8 x 49.2L + 1 x 30.3L | 15-20L |
| Material | PVC | Polyethylene w/ foam inserts | Plastic | PVC |
| Weight(kg) | 80 | Not specified | 19.64 | 11.84 |
| Electricity(W) | 170 | None  (no pump) | yes | yes |
| Water consumption (L/day) | 8-10 | Not specified | Not specified | Not specified |
| Medium | Water | Water | Water + clay pebbles | Water |

1. <http://www.n55.dk/MANUALS/HOME_HYDRO/HOME_HYDRO.html>
2. <https://www.amazon.ca/Idealhere-Basket-Insert-Cloning-Hydroponic/dp/B01FRWBRFW/ref=sr_1_4?s=lawn-garden&ie=UTF8&qid=1486227074&sr=1-4&keywords=hydroponics>
3. <https://www.amazon.com/gp/product/B007XRCUJ2/ref=as_li_tl?ie=UTF8&tag=hydsupusa-20&camp=1789&creative=9325&linkCode=as2&creativeASIN=B007XRCUJ2&linkId=b5ad5e9d0310a8b3fa18f2a227fcce74>
4. <https://www.amazon.com/Hydroponic-Culture-Garden-System-Basket/dp/B015W3ZCAC/ref=sr_1_17?ie=UTF8&qid=1486227420&sr=8-17&keywords=hydroponics>

Target specifications

* No less than 60cm x 30cm x 20cm in size.
* No more than $60 per unit in cost.
* Between 20 and 30 litres of water in capacity.
* Can survive between temperatures of -8 and 50 degrees Celsius (not necessarily function)
* Not use electricity.
* Can use \*recycled water.
* Must grow at least 5 different types of plants

Reflection

The client meeting gave us more ideas about the design criteria. Such criteria includes electricity, durability in desert environments and water efficiency. The criteria that were most important to us is the water efficiency and cost. The meeting also informed us about what the users would want to grow with a hydroponics system, making us realize that the design should also be as versatile as possible.