

# Deliverable B



uOttawa

**GNG 1103**

**Group D-1.4**

***Names :***

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## Context of the problem :

Our client, **Chinedu J. Enendu** holds a patent (Canadian patent 2626472) for the **Heat Exchange Chamber (THEC)**. It is a low-tech **zero emission** HVAC (heating, ventilation and air conditioning) innovation that **extracts energy from the ground** into buildings to achieve required thermal comfort using no fossil fuel, refrigerant or heat pump. He is looking for help to **design** and **prototype** the system.

## Development :

**Problem statement :** Design and prototype a ground coupled heat exchange system for people to keep a comfortable temperature in buildings. The system should be green, sustainable and low-cost for the client.

Group	Order of Importance	Needs
Energy and Environment	1	The system has to extract its energy from the ground
	2	It should be sustainable and environment friendly
	3	It should not use any fossil fuel
	4	An external power source can be used An optimization of the heating can be considered by a better insulation of the building
Functionalities	1	-The system must allow heating, ventilation and air conditioning
	2	-The heating chamber is buried underground -The targeted temperature range is around 22-23°C
	3	-The system functions by a regular thermostat -The exchange of air in the chamber should result in increased humidity in the pipes
	4	-An air filter can be installed at the blower -There should not be any unpleasant smell
Design	1	-The heating chamber should be maintained at a constant temperature -It must be inexpensive to install and to maintain compared to other HVAC systems
	2	-Pipes can be sloped to collect condensation that could lead to health problems -The chamber shouldn't take a lot of space -Can be installed in both existing buildings and new constructions -The system should be long-lasting (35-40 years)
	3	-No need for maintenance: the only moving part is the blower fan which can be serviced or replaced when it malfunctions

	4	-Low tech: a technology utilizing equipment and production techniques that are relatively unsophisticated (opposite of high-tech).
	5	-The facility should be located in the most accessible location of the building and is case specific

- Legend :**
- 1 – Necessary
  - 2 – Very Important
  - 3 – Important
  - 4 – Good but not necessary
  - 5 – Optional

## Benchmarking :

Looking at reviews for other HVAC systems, the needs that result in a successful product is ; being reliable and efficient, having a reasonable price range, high energy efficiency, high part quality and being technically easy to use and maintain. Understanding the qualities of highly rated similar projects, allows us to focus on them to make our product better.

## Conclusion :

Thanks to the client meeting, we can now interpret the needs as well as prioritize them to design a product suitable for all requirements. Being said, many problems will have to be resolved using the design process with the goal of overcoming them to create an optimized and functional system. After doing an independent evaluation of the system, we will have to find ways of improving the energy efficiency. The choice of materials will also be a crucial point since it needs to meet the insulation and solidity criteria while staying unexpensive.