Thermoelectric Atmospheric Water Harvester

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Problem Statement

Access to clean drinking water is a basic human right that many people are not privileged to have. It is a crucial requirement for life, yet a majority of South Asian and Sub-Saharan countries lack access to adequate quantites to sustain human and agricultural use. This solution aims to address the problem of insuffucient amounts of drinking water by providing a year-round source for developing nations and cities like Douala. Cameroon.

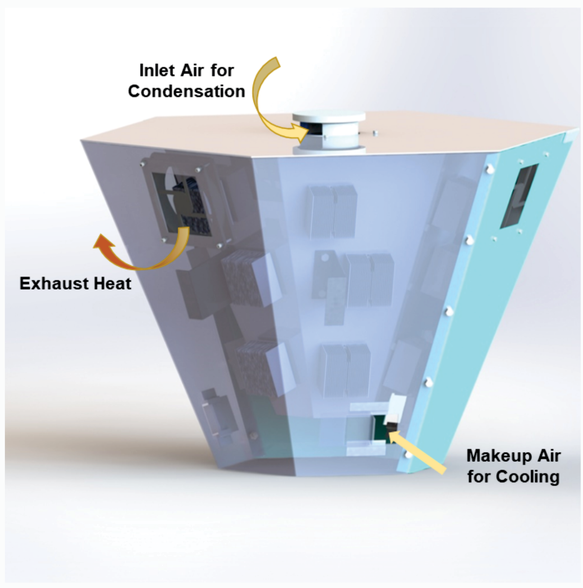
Objective

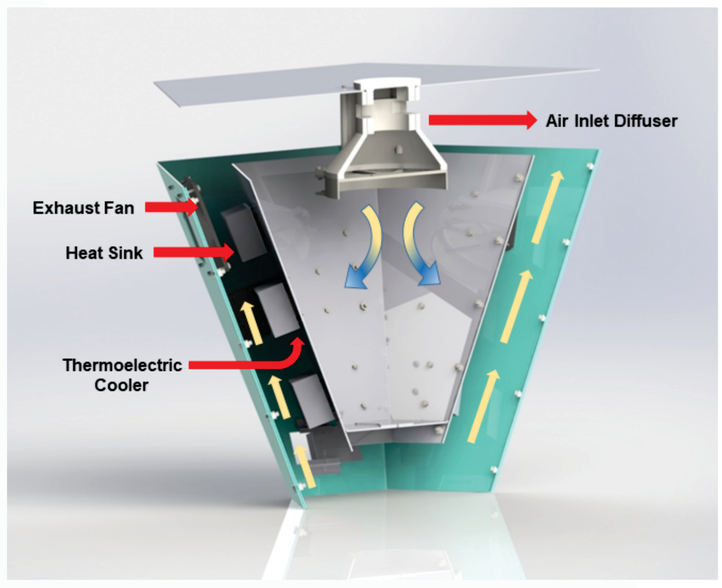
- Harvest moisture from the atmosphere and provide enough potable drinking water for an individual to meet their daily requirement (2.5L) within a 24-hour period
- Provide an overall affordable solution for developing countries with an operation cost less than $0.56 per litre of water and a yearly maintenance cost of less than $400
- The system will function year-round, provided there is a minimum of 65% relative humidity, which is below the average relative humidity in Douala (i.e. 80%)

Make Dew Prototype

Design Solution

Thermoelectric cooling tiles, which utilize the Peltier effect, are used to cool the inner chamber and condense hot, humid air and collect atmospheric water. Heat generated from the operation of the tiles is dissipated through heat sinks, which are cooled by a mixture of ambient and waste cold air from the chamber.



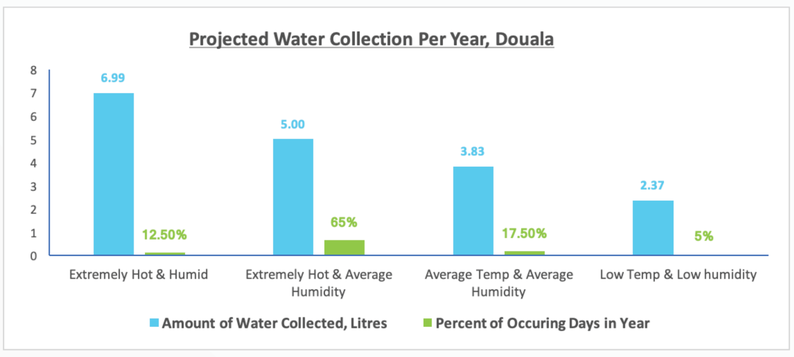


Technical Specifications

Water Production / Day	4.35 L - 8.0L
Power Consumption	296.8 W (8.0 V, 37.1 A)
Operating Cost / Day	$4.48 (CAD)
Cost/ Liter	$0.56 - $1.02
Operating Temperatures	5°C - 50°C
Dimensions	664 x 664 x 513mm, 43.0kg
Prototype Cost	$1300 (CAD)

Testing Methodology

Make Dew technologies have conducted a series of tests to ensure the design solution is safe and capable of meeting an individual's daily minimum water requirement. The graph below illustrates the maximum theoretical amount of water that can be collected over an 8 hour period.



Future Improvements

- Enhance cooling and efficiency of condensation within the chamber
- Harness the exhaust heat for other applications e.g. drying food products
- Develop to meet water requirements for under-served communities
- Integrate sustainable energy sources to provide off-grid power

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