

WaterWorks: *Powering the community with Hydroelectricity and Water Filtration*

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I. ENGINEERING PROBLEM:

Two major global crises, lack of clean water and electricity, affect many of the same vulnerable people. Clean water is necessary for human survival and should be available publicly to all people. According to the World Health Organization, “785 million people lack even a basic drinking-water service” [3].

Additionally, Energy is a vital necessity. While many may not think twice about charging their cell-phone, as much as “56% of [the houseless population] reported not having service due to not having a place to charge their phones”[4]. Cell-phones are essential for communicating with loved ones and resources such as social services and medical care [1,4].

A global pandemic has only exacerbated these problems, especially for those with insecure housing in our community. Many have relied on restaurants, coffee shops, libraries, and other “common spaces” which faced heavy restrictions during covid for charging their cell-phones [4]. Someone who may have once been able to walk inside a cafe and grab a glass of water now faces many fewer options due to the restrictions on businesses.

This lack of infrastructure and reliance on charity from private businesses is unsustainable! Not only is it unsustainable in the face of a global pandemic, but also in the face of climate change. Thousands of unsheltered folks each summer end up in the hospital due to entirely heat exhaustion/dehydration. Those medical costs get covered by taxpayer. Millions in Texas this month were affected by climate-induced power outages. Decentralization of essential resources is necessary. A community solution is necessary.

II. APPROACH:

WaterWorks (TM) not only seeks to provide community access to green electricity for charging devices, but will also increase access to clean water. The plan is to build a hydroelectric plant that will harness the power of the Merrimack river. A turbine generator will be used to convert rotational kinetic energy caused by the moving water into electrical energy. That electrical energy will be packaged into a charging station where small devices can be used at 120V plugs. At the station, a simple, easy to use water filtration system will be available for community use. It will filter water up to the ESA standard of less than 50 ppm tds for drinking water. The water filtration system will be reusable and cost effective. The maximum weight of the powerplant will be less than 100 pounds, making it easy to be relocated. Inside the hydration station, below the outlet to pour clean water, there will be a storage unit. The small storage unit will be for toiletries, first aid, or possibly sewing tools. The idea is for it to be a community storage bank with essential tools so that the unsheltered of our community can have better and more discreet access to the resources they need. If the project were to reach this stage, a club would be started at The University of Massachusetts Lowell in order to maintain the station. Tasks would include restocking the supplies that are available and performing any maintenance on the plant.

III. CITATIONS:

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3. Raven, Maria C et al. "Mobile Phone, Computer, and Internet Use Among Older Homeless Adults: Results from the HOPE HOME Cohort Study." *JMIR mHealth and uHealth* vol. 6,12 e10049. 10 Dec. 2018, doi:10.2196/10049
4. WHO. "Drinking-Water." *World Health Organization*, World Health Organization, 14 June 2019, www.who.int/news-room/fact-sheets/detail/drinking-water.